Manila to Malaysia, Quezon to Qatar: International Migration and the Effects on Origin-Country Human Capital

Caroline Theoharides*
University of Michigan

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Abstract

International migration is a key labor market option for many individuals from developing countries. One way that migration can affect the country of origin is by changing investment in human capital. U sing an original dataset of all new migrant departures from the Philippines between 1992 and 2009 matched to the migrants' province of origin, I examine the effect of migration demand on province-level secondary school enrollment rates. To isolate exogenous changes in demand, I create a Bartik-style instrument that exploits destination-specific migrant networks across local labor markets. Analysis at the local labor market level accounts for effects of migration on both migrant and non-migrant households. I find that secondary enrollment increases by 2.1% in response to an average year-to-year percent increase in province-level migration demand. For each additional new migrant, 2.8 more children are enrolled. Private school enrollment increases by 10.1%, while the effect on public school enrollment is near zero. These effects can occur through two channels: the income channel or the wage premium channel. Exploiting variation in gender-specific migration demand, I test their relative importance and conclude that the income channel is dominant.

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1 Introduction

International migration is a key labor market option for many individuals from developing countries. These labor market opportunities are typically characterized by large gains in wages for both skilled and unskilled workers (Clemens, 2011; Clemens, Montenegro and Pritchett, 2008; Gibson and McKenzie, 2012). Such wage gains often result in increased income in the migrant-sending country through the receipt of remittances, which lead to substantial increases in both investment and consumption (Clemens and Tiongson, 2013; Yang, 2008). One type of investment that may respond to increased income is human capital. Unlike other investments, however, increases in migration opportunities may also affect human capital investment by changing the expected wage premium for education. Depending on the education level necessary to acquire jobs abroad, the education wage premium may either increase or decrease, and individuals will change their optimal level of educational investment accordingly. Thus, migration can affect investment in human capital in the origin country through two main channels: the income channel and the wage premium channel.[1]

Due to data and research design limitations, most previous studies are unable to examine the net effect of migration on human capital, but rather estimate the partial effect operating either through the income channel (Ambler, Aycinena and Yang, 2013; Cox-Edwards and Ureta, 2003; Yang, 2008) or the wage premium channel (Beine, Docquier and Rapoport, 2007; Chand and Clemens, 2008; Shrestha, 2012). The handful of studies that do estimate the net effect typically focus exclusively on migrant households (Clemens and Tiongson, 2013; Hanson and Woodruff, 2003; Kandel and Kao, 2001; McKenzie and Rapoport, 2011). As a result, they are not able to capture the potential spillovers that occur within a local economy due to migration. For example, non-migrant households may also benefit from the receipt of remittances or their multiplier effects in the local economy as well as from changes in the expected wage premium. Therefore, estimates focusing exclusively on migrant households underestimate the effects on human capital in the economy as a whole. An exception is Dinkelman and Mariotti (2014), who estimate the net effect of migration on educational attainment of primary school-aged children across high and low cost migration areas in rural Malawi.

[1] Ambler (2013) finds that information asymmetries in migrant households matter for resource allocation. Thus, migration may also affect human capital investments by geographically splitting households and changing bargaining power. However, Clemens and Tiongson (2013) find that remittances overwhelmingly dominate effects from splitting households.

In this paper, I estimate the net causal effect of international migration on province-level secondary school enrollment rates in the Philippines. Estimation at the province level not only captures the effects of both the income and expected wage premium channels, but also spillovers and multiplier effects to non-migrant households in the local economy. The net effect of migration on human capital at the local labor market level is a key parameter of interest for policymakers in migrant-sending countries in order to predict the level of human capital in the future labor force. My results provide some of the first estimates of this effect. Further, following predictions set out in a basic theoretical framework, I examine the relative importance of the income channel and the wage premium channel on secondary school enrollment decisions. This is the first paper to attempt to disentangle the effects of these two mechanisms. Identifying the dominant mechanism has the potential to guide the design of policies with the goal of increasing the human capital stock.

I estimate the effect of the province-level migration rate on secondary school enrollment decisions in the province. However, the observed province-specific migration rate will confound changes in the demand and supply of migrants. To isolate exogenous changes in demand for migrants, I collected a unique, individual-level, administrative dataset on all new migrant departures from the Philippines matched to the migrant's province of origin to create a plausibly exogenous instrument for local migration demand following Bartik (1991). This Bartik-style instrument exploits variation generated by shocks to destination country-specific migration networks across local labor markets in the Philippines. Migrant networks are an important determinant of where migrants move and the occupations in which they are employed (Munshi, 2003). As a result of these networks, provinces will vary in the degree to which they are affected by changes in demand from a given destination country. The instrument predicts the number of migrants in each province-year, and is defined as the interaction of the destination-country composition of migrants in each province at baseline and destination-specific total national migration. Due to the unique nature of my micro data, this is the first instance where a Bartik-style instrument is used to predict outmigration rates from a migrant-sending country. In previous studies, the historic migration rate is often used to instrument for the contemporaneous migration rate (see McKenzie and Rapoport (2010); Woodruff and Zenteno (2007), among others), and the use the Bartik-style instrument with panel data is a substantial improvement in terms of causal identification.

To identify the relative importance of the income channel versus the expected wage premium channel, I exploit differences in gender-specific migration demand. For instance, a change in demand for female migrants should only affect the wage premium for females. Thus, female enrollment may respond to this change in demand through the expected wage channel while male enrollment should not. The income channel, on the other hand, may or may not affect male and female students equivalently in response to a change in female migration demand. If I find that a change in female migration demand impacts male and female enrollment equally, then this suggests that the income channel is the dominant channel. If, on the other hand, I find the effects are different, then both channels may matter. A positive effect of female demand on male enrollment suggests the presence of the income channel. To test the effects of demand by gender, I create separate Bartik-style instruments for male and female migration.[2]

I find a strong and statistically significant positive relationship between secondary school enrollment and total migration demand. Total secondary school enrollment increases by 2.1% in response to an average year-to-year percent increase in province-level migration demand. This means that for each additional migrant, there are 2.8 more students enrolled in secondary school. Private school enrollment increases by 10.1% for an average change in migration demand. While there is a near-zero effect on public school enrollment, when combined with the large effect on private school, one interpretation is that students switch from public to private school while others are induced from no school into public school. Demand for female migrants leads to similar increases in both male and female school enrollment, which leads me to conclude that the income channel is the dominant channel through which migration affects education, though there is suggestive evidence that the expected wage premium may matter as well. I also examine heterogeneity of enrollment responses by grade level to identify the location of marginal students in the education distribution. While enrollment increases for all grade levels, the largest effect is on first year enrollment, suggesting that increased migration demand induces students to enter secondary school who otherwise would not have enrolled.

The Philippines provides an excellent setting to address the effect of migration on education. As the first country to adopt temporary overseas contract migration on a large scale, approximately 2% of the Philippine working-age population migrates for employment each

[2]Migrant occupations from the Philippines are highly gender-specific, as shown in Section 2.1. However, as I discuss in Section 5.3, exogeneity of the gender instruments does not require that gender composition is stable over time or that occupations must be exclusively male or female.

year in a wide variety of occupations and destinations. Further, substantial heterogeneity in the gender and skill composition of overseas migrants allows me to test the relative importance of changes in income versus the wage premium. From a policy perspective, the Philippines has served and continues to serve as a model for many other Asian countries such as Indonesia, Bangladesh, and Sri Lanka in the establishment of temporary contract labor programs (Asis and Agunias, 2012; Rajan and Misha, 2007; Ray, Sinha and Chaudhuri, 2007; World Bank, 2011). Understanding the implications of such a program on school enrollment decisions in the migrant-sending country is thus increasingly important for policymakers in these countries as they seek to understand the future level of human capital in their domestic workforce.

The remainder of the paper is organized as follows. Section 2 discusses background on migration and education in the Philippines. Section 3 presents a basic theoretical framework relating migration to education. The data are presented in Section 4, followed by a discussion of the empirical strategy in Section 5. Section 6 discusses the main results, mechanisms, and magnitudes of the estimates, and Section 7 concludes.

2 Background

2.1 Migration from the Philippines

As the first country to adopt temporary overseas contract migration on a large scale, the Philippine government created an overseas employment program in 1974 in response to poor economic conditions in the Philippines. The program has grown dramatically; in 2011, 1.3 million Filipinos departed overseas on labor contracts (representing 2% of the working age population).[3] Approximately 517,000 of these migrants were new hires with first time labor contracts. Based on the perceived success of the migration program in the Philippines, several other countries, such as Indonesia, India, Bangladesh, Sri Lanka, and Tajikistan, have adopted or are in the process of adopting similar migration programs (Asis and Agunias, 2012; Rajan and Misha, 2007; Ray, Sinha and Chaudhuri, 2007; World Bank, 2011).

Filipinos migrate to a wide range of destination countries, as shown in Table 1. Saudi Arabia is the largest destination country, and the majority of migration is to the Middle East or within Asia. Almost 50% of male migrants work in Saudi Arabia, whereas female

[3]This figure is for land-based workers only and excludes seafarers.

migrants are split more evenly across Japan, Saudi Arabia, Taiwan, Hong Kong, and the United Arab Emirates. Filipinos also migrate in a variety of occupations. Table 2 shows the top 20 occupations for migrants from the Philippines. Occupations tend to be highly gendered, and occupations that are over 50% female are shaded in grey. Of the top 10 occupations, domestic helpers, performing artists, caregivers, and medical workers are all over 80% female. Plumbers, engineers, and laborers are almost exclusively male occupations while production workers, cooks and waiters, and building caretakers are much more evenly split across genders.

Contract migration is largely temporary and legal by way of licensed recruitment agencies. There are numerous fees associated with the migration process. Legally, recruitment agencies may only charge a placement fee equivalent to one month's wages (Orbeta, Abrigo and Cabalfin, 2009). The worker satisfies this debt upon receipt of the first month's wages. However, in addition to the placement fee, a number of additional costs are incurred by potential migrants such as travel to Manila and room and board prior to overseas deployment. Migrants commonly resort to predatory lenders to cover these expenses (Barayuga, 2013). The Philippine Overseas Employment Administration (POEA) regulates recruitment and verifies work contracts prior to employment. One of the main regulatory functions of POEA is to set occupation-destination specific minimum wages for overseas contracts. McKenzie, Theoharides and Yang (2014) find that these minimum wages are binding. In the absence of a minimum wage policy, an increase in demand for migrants should lead to both an increase in the quantity and wages of these workers. However, given that these minimum wages are binding, McKenzie, Theoharides and Yang (2014) find that destination countries respond to economic shocks by changing the quantity of overseas workers rather than altering the wage.

The rate of new hire migration varies substantially across the Philippines.[4] In 2009, the average new hire migration rate across provinces for new labor contracts was 0.54% of the province population. However, this varied from a maximum of 1.3% of the population in Bataan province to just 0.07% of the population in Tawi-Tawi province. This suggests that migration is a more important labor market option in certain parts of the country than others.

[4]I examine how much of the movement in province-level migration rates is common across provinces versus how much is province specific. Following Blanchard and Katz (1992), I regress the log migration rate in province p on the log total migration rate separately for each province. The adjusted R^2 for each regression provides an empirical estimate for how much province-level migration rates move together from one year to the next. The average adjusted R^2 across all 83 province-level regressions is 0.22. Therefore, the majority of the movement in province-level migration rates is not explained by movement in the overall aggregate migration rate.

Figure 1 shows the new hire migration rate in 1993 in each province. While higher rates of migration are largely concentrated on the northern island of Luzon, there is substantial variation throughout the country as a whole. Even among high migration provinces, provinces specialize in certain occupations and destinations, resulting in substantial heterogeneity in the composition of migrants across the Philippines. Figure 2 shows province-level migration rates in 1993 for migrants to Hong Kong compared to migrants to Saudi Arabia. Migration to Hong Kong is concentrated in the northern part of Luzon, whereas migration to Saudi Arabia is more heavily concentrated around Manila and in Mindanao, the southern part of the Philippines.

I exploit this variation in the destination composition of migrants across provinces in order to identify the causal effect of migration demand on secondary school enrollment. While no legal barriers prevent workers from other provinces from acquiring these jobs, the reliance on social networks in choosing recruitment agencies and obtaining jobs abroad creates rigidities across local labor markets. In personal interviews with POEA staff, Barayuga (2013) states that migrants rely on family members and friends who have previously migrated to choose recruiting agencies and find jobs abroad.

2.2 Migration and Education

The effect of migration on human capital through the expected wage premium channel depends on whether jobs abroad require more or less education than jobs at home. To determine the sign of the wage premium effect in the Philippines, it is important to note the location of Filipino contract workers in the education distribution among all Filipino workers. Borjas (1987) argues that workers migrating from countries with high income inequality to countries with lower income inequality are negatively selected, and so one might expect an increase in migration demand to reduce human capital investment due to low skill, high wage opportunities abroad. While earnings inequality in the Philippines is high, Docquier, Lohest and Marfouk (2007) suggest that emigration from the Philippines is positively selected. However, their study is limited to OECD destinations. As shown in the previous section, the majority of contract migrants work in non-OECD countries in the Middle East and Asia. To establish if this finding holds for non-OECD countries, in Figure 3 I follow Chiquiar and Hanson (2005) and plot the

education distribution of all migrants and non-migrants in the 2000 Philippine Census.[5] Panel A shows the distributions for all migrants and non-migrants between the ages of 18 and 65. The share of migrants with less than a high school education is smaller than the share of non-migrants with less than a high school education. The opposite is true for high education levels, especially for training programs. Training programs are vocational degrees that require a high school diploma for enrollment, and in many occupations, a training program is required to be eligible for overseas contract migration. Based on Panel A, it appears that migrants from the Philippines are positively selected.

Panel B shows the same figure for individuals located in the ten provinces with the highest rates of migration.[6] Provinces that send a large number of migrants may be more educated overall, and thus the apparent positive selection in Panel A might be driven by the fact that migrants are from more educated provinces. While the degree of positive selection in Panel B is somewhat less pronounced, migrants are still more educated than non-migrants in high migration provinces. Panels C and D examine the distribution separately by gender and indicate that both male and female migrants are positively selected, though the degree of selection appears to be slightly higher for male migrants than for female migrants. One additional concern is that differences in cohort may confound the distributions. Since migrants are younger than the overall population, if younger cohorts get more education than older cohorts, the apparent positive selection may simply be a result of comparing different cohorts. Panels E and F show the education distribution for workers less than 35 years of age and workers greater than 35 years of age. Both younger and older workers appear positively selected, though the degree of positive selection is somewhat less for younger workers.

While there is no overall required level of education for contract laborers mandated by either the Philippine government or employers, Figure 3 suggests that employers screen on education. McKenzie, Theoharides and Yang (2014) argue that there is an excess supply of Filipino workers who seek overseas employment. Given this, it is not surprising that employers can be quite selective in terms of the workers that they hire for overseas contracts. Beam (2013) collects data on job vacancies from a popular job-posting website in the Philippines and finds that potential migrants without at least a high school education are qualified for very few jobs.

[5] Unlike Chiquiar and Hanson (2005), because the Philippine Census includes temporary contract migrants, I can create the education distributions based on a single data source.

[6] There are 80 provinces in the Philippines and 4 districts of Manila, which I count as provinces.

While certain occupations may not require the skills of a college-educated worker, when hiring workers internationally, employers may rely on education to signal that the worker is a high ability type.

2.3 Education in the Philippines

To understand the margin along which individuals may alter their investment in schooling, it is important to note some key features of the Philippine education system. Primary education in the Philippines consists of six years of schooling, and secondary education is four years, thus totaling ten years.[7,8] Public primary education is free and compulsory, whereas secondary education is free but not compulsory (Philippine Republic Act 6655, 1988). Despite the fact that secondary education is officially free, in addition to the opportunity cost of schooling, households must also cover the cost of miscellaneous fees, uniforms, school supplies, transportation, food allowances, and textbooks (World Bank, 2001).[9,10] Approximately fifteen percent of students drop out of secondary school,[11] and evidence from household survey data indicates that they do so mostly to work or because the cost of schooling is too high (Maligalig et al., 2010). Because on-time graduation occurs at age fifteen or sixteen and the minimum age to work abroad is eighteen, only domestic wages are relevant for an opportunity cost calculation.[12]

Private school education is a common alternative to public school, and eighteen percent of students enrolled in secondary school attend private school.[13] The fees for private school are substantially higher than the costs of attending public school. While Filipinos perceive the quality of private school to be higher than public school and cite sending children to private

[7] According to the Department of Education, children must enter school by age six. However, using household survey data, Maligalig et al. (2010) find that fewer than half of six year olds are in school.

[8] In 2011, the Philippines passed a bill to switch to a K-12 education system. The addition of grades eleven and twelve will not occur until the 2016-2017 and 2017-2018 school year and thus is not relevant for this analysis (Philippine Republic Act 10533, 2013).

[9] Officially, miscellaneous fees may not bar a student from public school (Philippine Republic Act 6655, 1988). However, households cite these as major barriers to public school enrollment, suggesting that this policy is not enforced (World Bank, 2001).

[10] In 2008, the Department of Education implemented a no uniform policy (Philippine Department of Education Order 45, 2008) as an attempt to reduce the barriers to poor children attending public school.

[11] This number is an underestimate of the true dropout rate as it only counts students who ever enrolled in secondary school. 8.5% of students drop out of primary school (Maligalig et al., 2010), and there are certainly some children who never enter school at all.

[12] Using household survey data from the 2006 Family Income and Expenditure Survey (FIES) and the 2007 Labor Force Survey (LFS), I calculate that direct education costs are approximately 15,000 Philippine pesos per year (USD350), and indirect costs are 35,000 pesos per year (USD810). I calculate indirect costs as the average annual wages earned by children between ages twelve and seventeen, conditional on working.

[13] These are predominantly Catholic schools.

school as a major motivation for international migration (Bangko Sentral Ng Pilipinas, 2012), there is little evidence to support the perception that the quality is higher in private schools (Yamauchi, 2005).

3 Theoretical Underpinnings

In this section, I develop a theoretical framework that describes the secondary school enrollment decision when international contract migration is a labor market alternative. The model provides predictions to help distinguish between the income channel and the expected wage premium channel. The basic framework is similar to McKenzie and Rapoport (2011), but I extend their model so that schooling decisions are sequential due to uncertainty surrounding potential labor market outcomes and the household budget.[14,15]

3.1 Optimal Education Choice Without Migration

First, consider the education decision when migration is not a labor market option. At the completion of primary school, a risk neutral benevolent household dictator (the parent) chooses whether to enroll a child in high school by maximizing the discounted present value of expected lifetime earnings net of education costs. Education costs include both direct costs of schooling such as school fees or uniforms, and indirect costs such as foregone income or alternative investments. I assume there are imperfect credit markets,[16] and the parent cannot borrow against a child's future earnings. Therefore, all direct costs for a year of schooling must be paid from the household's current budget at the time of enrollment. As a result, there are two types of households: unconstrained and constrained. Unconstrained households will invest in the optimal level of schooling for children, whereas constrained households invest in education until the liquidity constraint binds.

A child's expected wage is conditional on educational attainment. I assume that the parent expects the child to receive this wage for his or her entire working life. For simplicity, I consider

[14] See e.g. Keane and Wolpin (1997) or Heckman, Lochner and Todd (2006) for surveys on uncertainty and the returns to education.

[15] While ideally I would use individual-level panel data to test a dynamic model of the annual enrollment decision, such education data are not available in the Philippines. However, individual-level decisions have implications for the stock of students enrolled in secondary school, so instead I use a panel of aggregate province-level data to test the response of the stock to these aggregate changes.

[16] I later relax this assumption.

two levels of schooling, high school graduate, hs, and less than a high school education, lhs.[17] I assume the expected wage is increasing with schooling, such that $E[w_{hs}] > E[w_{lhs}]$, where $E[w_{hs}]$ is the expected wage earned by a high school graduate, and $E[w_{lhs}]$ is the expected wage earned with less than a high school education. The wage premium for a high school education is defined as:

$$Wage\ Premium = \frac{E[w_{hs}]}{E[w_{lhs}]} \tag{1}$$

The parent's optimal choice of schooling is based on a forecast of household income and expected returns to education when the child enters the labor market. At the start of each school year, the parent receives updated information on household liquidity and the expected returns to schooling. In response, they may revise their enrollment decision for the child. In the event that expected household income was higher than realized income, the household may not be able to enroll the child in school. Alternatively, if realized income is greater than expected household income, the parent may enroll a child who would otherwise not be enrolled. For constrained households, the constraint will either no longer bind or bind less strongly, and the child is enrolled in school. Unconstrained households may also increase enrollment in response to higher income by purchasing normal goods that complement education (e.g., electricity, books, better healthcare), such that now the investment in education is worthwhile. Changes in the wage premium may cause parents to revise their optimal level of schooling choice. If the expected returns to education have fallen, children may receive less education, whereas if the returns have increased, children may now receive more education.

3.2 Optimal Education Choice With Migration

Now suppose individuals have two potential labor market options: work at home or work overseas.[18] Introducing migration as a labor market alternative changes the expectation of wages for a given level of schooling and thus the wage premium for a high school education.

[17] I discuss heterogeneity by grade-level enrollment in Appendix A.

[18] Recall that one must be at least eighteen years of age to migrate. Since on-time graduation from high school in the Philippines is at age 15 or 16, international migration will not induce individuals to drop out in order to immediately migrate. Approximately twelve percent of eighteen year olds are currently enrolled in secondary school (2007 LFS and author's calculations).

Specifically, conditional on searching for an overseas job, an individual's expected wage is:

$$E[w_s] = E[w_{a,s}] * p_{a,s} + E[w_{d,s}] * (1 - p_{a,s}) \; for \; s = \{hs, lhs\} \tag{2}$$

where $p_{a,s}$ is the probability that an individual with schooling level s will acquire a job abroad, a. $E[w_{a,s}]$ is the expected wage overseas (net of migration fees) for schooling level s, and $E[w_{d,s}]$ is the expected wage for schooling level s domestically, d. I assume individuals are employed with probability 1.[19] I also assume that individuals can renew their overseas work contracts for as many periods as they choose, and thus may be a contract migrant for their entire working life.[20] Thus, the present discounted value of earnings is calculated assuming that a parent expects a child to earn $E[w_s]$ for his or her entire working life. I assume that 1) Migration is positively skill-biased so $p_{a,hs} > p_{a,lhs}$; 2) Expected wages, both at home and abroad, are increasing in education; and 3) For a given level of education, domestic wages are assumed to be lower than wages earned abroad, $E[w_{a,s}] > E[w_{d,s}]$.

Now consider an economic shock in a destination country that results in a change in demand for migrants. This change affects the parent's optimal choice of schooling for children in the household through two channels—a change in income or a change in the expected high school wage premium—and may cause households to revise the optimal level of schooling as outlined above.[21] I will discuss each of these channels below and predict what each implies for the empirical results. Because households are unlikely to alter expectations in response to a transitory shock, I assume that the change in migration demand is perceived to be persistent.

[19] Loosening this assumption and allowing for unemployment as a third alternative with probability $p_{u,s}$ changes the value of the wage premium quantitatively but not qualitatively. I assume that $p_{u,hs} < p_{u,lhs}$ and $E[w_{u,s}] = 0$. Thus, $E[w_{hs}] > E[w_{lhs}]$ still holds, and all predictions will remain valid.

[20] Yang (2006) states that most contracts are open to renewal. Contracts are typically two years, and on average each contract is renewed for 6 years (POEA and author's calculations).

[21] Migration may also affect households by changing household structure. Cortes (2013) provides evidence that children with migrant mothers are more likely to lag behind in school than children with migrant fathers. However, Clemens and Tiongson (2013) find that the effects of migration are largely through remittances rather than changes in household structure amongst migrant households. In addition, changes in household structure are a less important channel when examining the effect of migration at the local labor market level since only a small fraction of households have an international migrant. As a result, I abstract away from household structure, but the predictions of the model for a change in household structure are qualitatively the same as a change in income.

3.3 Two Channels: Income and the Wage Premium

Three types of households may respond to the change in demand for migrants: 1) Households that have at least one child of secondary schooling age, but experience no change in income in response to migration demand; 2) Households that do not have children of secondary schooling age, but receive remittances or benefit from multiplier effects due to the increase in migration demand; and 3) Households that receive remittances or benefit from multiplier effects and have secondary school-aged children.[22] Parents in the first and third types of households may change their enrollment decision based on the change in the expected wage premium. The second and third types of households will experience a change in income due to the receipt of remittances or their multiplier effect. For the second type of households, this increase in income has no effect on school enrollment decisions. For the third type of household, a change in income can lead to a revision of the school enrollment decision. Thus, Type 1 households may change enrollment decisions due to the wage premium, and Type 3 households may change enrollment decisions due to both the income and wage premium channels.

Changes in income may affect the enrollment decisions of both unconstrained and constrained Type 3 households. For unconstrained households, enrollment may rise in response to the higher household income level through the direct purchase of more education or the purchase of normal goods that complement education.[23] Previously constrained non-migrant households can get closer to or attain the optimal level of schooling, resulting in increased school enrollment. For constrained migrant households, the effects on enrollment decisions depend on their ability to borrow to pay for migration and education. Consider the case where credit markets are imperfect for both migration and education.[24] While households may want to send a migrant overseas, they are liquidity constrained and do not have the ability to borrow. In response, parents may reallocate household resources to invest in sending a household member abroad. While the household budget could be reallocated in a number of ways, one potential option is that parents might invest in a lower level of education for children in the

[22]Type 3 households include both migrant households and non-migrant households that benefit from remittances.

[23]For every migrant, there are four households in the Philippines that receive remittances, suggesting that many non-migrant households benefit from changes in income as well (2006 FIES, 2007 LFS survey, and author's calculations).

[24]Alternatively, if credit markets exist, otherwise constrained households are able to borrow to finance migration and education costs. Thus, children will receive the optimal level of education.

household. Once the migrant is earning income abroad and the household begins to receive remittances, the liquidity constraint loosens. Children may be reenrolled in school, and the negative effect on enrollment is only temporary. Thus, unconstrained and remittance-receiving non-migrant households should experience an increase in enrollment in response to higher income levels, whereas the effect on constrained migrant households is ambiguous and depends on the reallocation of household investments.

In a standard labor market setting, an increase in migration demand may affect the expected wage (and thus the expected wage premium) in two ways: 1) By changing the expected probability of migrating, $p_{a,s}$, or 2) By changing the expectation of the overseas wage, $E[w_{a,s}]$.[25] However, due to binding minimum wages (see Section 2.1), $p_{a,s}$ will respond to a change in migration demand, while $w_{a,s}$ (and thus $E[w_{a,s}]$) cannot.[26] $p_{a,s}$ affects enrollment in Type 1 and 3 households in the following way: given that a household perceives the change in demand as persistent, they will update the expected probability, $p_{a,s}$, that a child will work overseas in the future for a given level of education, s. Depending on the household's initial expectation of $p_{a,s}$ and whether the change in demand for overseas labor is for high or low skilled workers, the expected wage premium could either increase or decrease.

Interpretation 1: A persistent increase in migration demand affects enrollment through both the income and wage premium channels. A positive effect could be due to increased remittances or an increase in the wage premium. A negative effect could be due to the reallocation of household resources to pay for migration costs or a decrease in the expected wage premium.

3.4 Gender-Specific Migration Demand

As discussed above, a change in migration demand may affect enrollment decisions through the income channel, the wage premium channel, or some combination of the two. To determine the relative importance of these two channels, I exploit the fact that occupation and desti-

[25] Because migration is positively skill biased, an increase in migration demand may result in a decrease in the supply of educated labor in the local labor market. As a result, there are fewer educated workers, and the labor supply curve for educated workers shifts back. Wages should rise domestically for educated workers, and the wage premium for a high school education increases.

[26] An increase in migration demand may also change the wage premium through $E[w_{a,s}]$ due to changes in information about wages. Several studies show that individuals underestimate wages overseas (McKenzie, Gibson and Stillman, 2013), though the expectation in the Philippines is on average fairly accurate (Beam, 2013).

nation patterns differ strongly between male and female migrants, as shown in Section 2.1. As a result, there may be separate shocks to migration demand for male and female migrants which has important implications for the theoretical framework outlined thus far. If there is no sex preference in terms of the educational investment, male and female school enrollment should respond equivalently to any change in income.[27] However, it is also possible that male and female enrollment might not respond equivalently to a change in income. For instance, if households are constrained after the change in income and have children of different genders, enrollment effects may differ by gender as parents are forced to choose which child to enroll. In terms of the wage premium channel, an increase in demand for migrants in predominantly female occupations should only change the wage premium for females.[28] Thus, female enrollment should respond to increased demand, but male enrollment should not. A positive effect on male enrollment in response to female demand indicates that the income channel is present.

Interpretation 2: If male and female enrollments respond equally to gender-specific migration demand, then the income channel is dominant. If enrollment responds differentially, this could be due to the income channel, the wage premium channel, or some combination.

3.5 Expectations Formation

Empirical evidence suggests that individuals in the developing world form expectations using social networks, community outcomes, and neighbors' outcomes (Delavande, Gine and McKenzie, 2011). Jensen (2010) examines the labor market returns perceived by 8th grade Dominican youths and finds more than seventy percent of students report the labor market outcomes of people in their community as their primary source of information on earnings. Thus, I assume individuals form expectations about migration demand based on the outcomes of those they

[27] Cruz and Vicerra (2013) find that Filipino women do not exhibit sex preference for their children.

[28] One concern might be that domestic wages will rise for both male and female skilled workers, which would increase the wage premium for both genders. Using the 2007 Philippine Labor Force Survey (LFS), I calculate that of the top 37 domestic occupations (which represent 75% of all employment), 22 occupations are more than 75% male or female, 26 occupations are more than 70% male or female, and only 4 occupations are between 40% and 60% male or female. Appendix Table 1 shows these occupations and the percent female. Further, using phil-jobs.net, the job posting website maintained by the Philippine government, of the 1,160 domestic job vacancies posted during the week of September 9th, 2013, over 50% explicitly specified the gender of the applicant. This evidence suggests that, like overseas employment, domestic occupations are highly gender specific, and a change in the supply of skilled female workers should increase wages for females more than for males. Even if higher domestic wages increase the wage premium for both males and females, the increased probability of finding work abroad for females means the female expected wage premium will increase by more.

observe in their local labor market, where I define the local labor market as the province.[29]

A number of papers in the U.S. examine how labor market expectations affect the decision to enroll in post-secondary education. Much of the existing literature focuses on either the effect of contemporaneous labor market conditions on college enrollment (Card and Lemieux, 2001; Dillon, 2012; Freeman, 1976)[30] or the effect of ex post earnings on enrollment (Cunha and Heckman, 2007; Willis and Rosen, 1979). A new literature examines the effects of ex ante expected returns to schooling on the school enrollment decision. Attanasio and Kaufmann (2010) find that ex ante subjective expectations matter for secondary schooling decisions for youth in Mexico. Since I do not have data on the perceived ex ante migration rate, I assume that parents form expectations of migration demand based on the observed migration rate, which I define empirically as the migration rate in the previous calendar year.[31] As mentioned above, households will only alter investment in education in response to changes in the expected wage premium if the change in migration demand is perceived as reasonably permanent. In Section 6.1, I use a Fourier frequency decomposition to show that changes in migration demand are overwhelmingly low frequency, implying they are both predictable and persistent. As a result, it is reasonable for parents to alter their expectations of the wage premium based on the observed migration rate in the previous year since these labor market conditions likely persist.

4 Data

4.1 Migration Data

I construct an original dataset of all new migrant departures from the Philippines between 1992 and 2009. The data are from the Philippine Overseas Employment Administration (POEA) and the Overseas Worker Welfare Administration (OWWA). Both under the Department of Labor and Employment (DOLE) of the Philippine government, these agencies are responsible for overseeing various aspects of the migration process. Specifically, POEA monitors recruit-

[29] One key reason to use the province as the local labor market is because recruitment agencies are granted the authority to recruit at the province level (Philippine Overseas Employment Administration, 2013).

[30] Survey evidence indicates that students form subjective expectations of future earnings based on contemporaneous earnings in the labor market (Dominitz and Manski, 1997; Freeman, 1976; Manski and Wise, 1983).

[31] Because the school year commences in June, the observed annual migration rate used to make enrollment decisions at time t is the migration rate at time $t-1$.

ment and regulates the employment program. Prior to deployment, all contract migrants must visit POEA in order to have their contracts approved and receive exit clearance. As a result, POEA maintains a rich database on all new contract hires from the Philippines, encompassing 4.8 million individual-level observations of migrant departures. The database includes the individual's name, date of birth, sex, marital status, occupation, destination country, employer, recruitment agency, salary, contract duration, and date deployed.

OWWA is the agency responsible for the protection and welfare of overseas workers and their families. Upon processing overseas labor contracts at POEA, migrants are required to become members of OWWA.[32] OWWA maintains a membership database of new hires and rehires including information similar to that housed at POEA with approximately 1 million observations per year. However, while the POEA database includes information on the salary, recruitment agency, and occupation to uphold their responsibility to monitor contracts and recruitment, because OWWA is concerned with the welfare of both the migrant and his or her family, home address of the migrant is one of the key variables in the OWWA database.

OWWA membership requirements have changed substantially over the sample period. Since 2001, all contract hires are required to have active OWWA membership, but prior to 2001 membership was only required for new contract hires, domestic helpers, and seafarers. In order to obtain a sample of only new hires, I match the OWWA data to the data from POEA.[33] This adds home address to the POEA data, creating a unique dataset including both the origin and destination of all new contract migrants from one of the world's largest labor exporters. This paper is the first to make use of this unique data from OWWA.

To calculate province-level migration rates, I total the number of migrant workers in each province-year and divide by the working aged population in the province.[34,35] Because OWWA

[32]Membership entitles workers to a number of services such as repatriation or evacuation. OWWA also conducts mandatory Pre-Departure Orientation Seminars as well as Reintegration Seminars.

[33]I match the data using first name, middle name, last name, date of birth, destination country, gender, and year of departure using fuzzy matching techniques as discussed in Winkler (2004). For the years of data used in this analysis, the match rates are approximately 90% for 1992 and 1993 and between 95% and 98% for 2004 to 2009.

[34]I define the working aged population as 18 to 60 since 18 is the minimum age at which one can migrate. The age range 18 to 60 covers 99% of all migration episodes in my sample period. All population data are from the 1990, 1995, 2000, and 2007 Philippine Censuses from the National Statistics Office, and I linearly interpolate values for years between censuses. Overseas contract workers are included in census population counts in the Philippines.

[35]The home address variable from OWWA includes only the municipality of origin, not the province or region. Out of 1630 municipalities, 332 have ambiguous names that are used in more than one province or region. Thus, to calculate the number of migrants in the province, I assign municipalities with repeated names

did not collect home address in all years of the sample, province-level migration rates can only be constructed in 1992, 1993, and 2004-2009. As a result, the sample period of analysis is from 2004-2009. Table 3 shows summary statistics. The average provincial-level migration rate is 0.51% and ranges from near zero to 1.59% of the population.[36] I also calculate gender-specific migration rates. Women migrate at a higher rate than men, with an average 0.28% of the female population working as overseas migrants versus 0.22% of the male population.

4.2 Education Data

Data on public and private high school enrollment are from the Philippine Department of Education (DepEd). To my knowledge, this paper is the first academic research study beyond government reports to make use of these data. Public school data are from the Basic Education Information System (BEIS). Started in 2002, it includes school-level data on enrollment, number of dropouts, retention, number of teachers, number of classrooms, and a variety of other variables. I aggregate school-level data to the province level to calculate province-level public school enrollment.

Private school data are available at the division level. Divisions are a geographic unit smaller than provinces, but larger than municipalities used for the oversight of the education system. I aggregate divisions to calculate province-level private school enrollment.[37] To create province-level enrollment rates, I calculate total provincial secondary enrollment from public and private numbers and divide each enrollment count by the population in the province aged twelve to seventeen. The average province has a total secondary school enrollment rate of approximately 57%. The range is large, with the lowest rate of enrollment at 13% and the highest near 100%. Females are enrolled in secondary school at a higher rate than males, and

their population share of the total number of migrants across municipalities with the same name.

[36]The 2% rate of migration stated earlier for the Philippines as a whole is based on both new hires and rehires.

[37]The private school data from 2002 to 2004 are the official figures from DepEd. Unlike public school, private schools are not required to submit enrollment counts to DepEd. Thus, for 2005 to 2010, I adjust division-level enrollment to account for non-submission. I calculate the submission rate by dividing the number of schools that submitted by the total number of private schools in the division. The median submission rate is 1, and the 5th percentile is 0.5, suggesting that compliance is generally high. However, 47% of divisions do not have 100% compliance, suggesting that adjustment is important. To adjust for compliance, I assume that complying and non-complying schools are the same size. I then inflate enrollment by one divided by the submission rate. Further, there are 120 observations (10%) between 2005 and 2010 that are missing or have unavailable compliance rates. For these observations, I replace enrollment with the average enrollment for the years before and after. The results are robust to excluding missing values or non-compliers. Neither official figures nor compliance rates are available for 2011 so I drop it from my analysis.

this is true both for public and private schools. About 46% of the school-aged population is enrolled in public schools, while approximately 11% are enrolled in private schools.

5 Empirical Strategy

The basic specification for identifying the impact of migration demand on school enrollment is as follows:

$$EnrollRate_{pt} = \beta_0 + \beta_1 MigRate_{pt-1} + \alpha_p + \gamma_t + \epsilon_{pt} \tag{3}$$

where $EnrollRate_{pt}$ is the secondary school enrollment rate, defined as the percent of students enrolled in high school out of the total number of children aged twelve to seventeen in province p, year t.[38] $MigRate_{pt-1}$ is the province-specific migration rate in year $t-1$, defined as the outflow of new migrants. I define it as the percent of migrants in province p, year $t-1$ out of the total working age population in province p, year $t-1$. Province fixed effects, α_p, remove province-specific effects, and year fixed effects, γ_t, remove time-specific unobservables.[39] ϵ_{pt} is the error term and is clustered by province. There are 80 provinces in the Philippines and 4 districts of Manila, resulting in p equal to 84.

The inclusion of province and year fixed effects resolves some concerns of omitted variables bias. However, a number of threats to the validity of the identification strategy remain. First, province-year specific omitted variables can lead to bias. For instance, if a province had a large factory close in a given year, this could lead to both an increase in the province-specific rate of migration abroad due to limited job opportunities at home and to an increase in the high school enrollment rate as individuals stay in school longer due to a lower opportunity cost. As a result, β_1, the coefficient on $MigRate_{pt-1}$, would be biased upward. In addition to possible omitted variables, reverse causation could also lead to upwardly biased point estimates. Specifically, high enrollment rates in a given province may cause migration rates to increase.[40]

[38] The results are robust to other definitions of the school-aged population. I follow the Department of Education's definitions and Maligalig et al. (2010) in my choice. I also examine the enrollment rates by gender and in public and private schools.

[39] I prefer the fixed effects estimator to the first difference estimator since a fixed effects estimator is more likely to identify long-run effects whereas a first difference estimator tends to only estimate short-run effects. See Baker, Benjamin and Stanger (1999) for a thorough and technical discussion.

[40] This seems less likely to be a concern given that the migration rate is lagged.

5.1 Migration Demand Index

To address these threats to causal identification and isolate changes in migration demand from changes in migration supply, I instrument for the migration rate using a migration demand index. Specifically, I create a Bartik-style instrument (Bartik, 1991; Blanchard and Katz, 1992; Bound and Holzer, 2000; Katz and Murphy, 1992) by exploiting destination country-specific historic migrant networks across provinces. However, rather than predicting employment growth as is standard in this literature, I create an index of the predicted number of migrants in each province-year. To predict the number of migrants, I weight the total number of migrants nationally to 32 distinct destinations by the province share of the national total to that destination in a base period. I then sum over all 32 destinations to predict the total number of migrants in each province-year.[41] Specifically, I define the migration demand index as follows:

$$D_{pt} = \sum_{i} M_{it} \frac{M_{pi0}}{M_{i0}} \tag{4}$$

where D_{pt} is the predicted number of migrants in province p, year t, M_{it} is the number of migrants to destination i, year t in the Philippines as a whole, and $\frac{M_{pi0}}{M_{i0}}$ is the share of migrants at baseline in province p, destination i, out of the total number of migrants nationally at baseline in destination i. I define baseline as 1993, but the results are robust to the choice of other base years.[42] By using these baseline shares, I am implicitly assuming that the distribution of migrants to a given destination is stable across the Philippines over time, or at least a reasonable predictor of future distributions of migrants (Munshi, 2003; Woodruff and Zenteno, 2007). If this is not the case, the instrument will be a poor predictor of the province-specific migration rate. I then divide the index by the working population in the base year in order to obtain a predicted migration rate.

Panel B of Table 3 shows summary statistics for the Bartik-style instrument. The con-

[41] As a robustness check, I also create two analogous indices that exploit occupation-specific historic migration networks and occupation x destination country-specific historic migration networks rather than destination-specific shares. For the occupation-based index, I use 38 occupations categories, and for the destination x occupation-based index, I use 32 destination cells times 38 occupation cells. The results are robust to the choice of index, and the main results are shown in Appendix Table 2.

[42] The results are robust to using 1992 or an average of 1992, 1993, and 1994 as the base year instead. I use 1993 as the base year for the majority of my analyses for two reasons: 1) 1993 has the fewest missing values for municipality and thus provides the most accurate counts of migrants at the province level and 2) One large occupation, caregivers, only commenced as a migration opportunity in 1993. Thus, to accurately assign networks, I use the base year once it was established as a common occupation.

structed total migration demand index exhibits similar patterns as the actual migration rate. The main difference between the actual rate and the demand index is the maximum values. The Bartik-style instrument has a much larger maximum value. This is because at baseline (1993) the four districts of metro Manila composed a much larger share of total migration than in later periods, since migration has spread more evenly across the Philippines over time.

I then estimate Equation (3) using the migration demand index to instrument for the actual province-level migration rate.[43] This is an improvement on the OLS fixed effects estimation strategy for a number of reasons. First, it isolates the effects of changes in migration demand, rather than confounding changes in demand with changes in supply. Returning to the example of the factory closure, now if a factory closes in province p, year t, it will not affect the predicted migration rate as long as the factory closure does not affect the total demand for overseas migrants. I argue in Section 5.2 that demand is determined by destination countries. Thus, while this factory closure may result in a shift in the allocation of migrants across provinces, it will not affect total overseas migration.[44] Further, it seems highly unlikely that a factory closure today affects shares at baseline. The index alleviates concerns from any province-year specific omitted variables since they no longer affect the constructed migration rate. It should be noted that this approach differs substantially from the use of the historic migration rate as an instrument for current migration (see McKenzie and Rapoport (2010); Woodruff and Zenteno (2007), among others). These studies use cross sectional data, which leads to concern about the endogeneity of the historic migration rate. Due to the panel nature of my data and the inclusion of province fixed effects, province-specific omitted variables at baseline are not a relevant concern in this paper for reasons I discuss below. Finally, reverse causation is also no longer a concern unless the high school enrollment rate in a province drives destination country demand at the national level. Given that migrants are spread across the Philippines and that demand is from outside the country, this seems doubtful.

[43] In a previous version of this paper, I also instrumented for the actual migration rate with a weighted measure of destination country GDP and destination country sectoral GDP, where the weights are based on the province-specific destination shares at baseline. However, my preferred specification includes province-specific linear time trends, and when these are included, the weighted GDP instrument is weak. Results are robust without the province-specific linear time trends and are available upon request.

[44] This potential shift in the allocation of migrants across provinces is one reason why simple OLS may be biased despite the fact that migration demand is determined outside the Philippines.

5.2 Identifying Assumptions

For this analysis to provide a causal estimate of the effect of migration demand on secondary school enrollment, a number of identifying assumptions must hold.[45] First, to satisfy the relevance condition, there must be variation in the province-specific destination shares at baseline. If, for instance, each province sends an equal share of migrants to Saudi Arabia in the base period, then the instrument would explain little of the variation in province-level migration rates. In Appendix Table 3, I show the quartiles, standard deviation, minimum and maximum of the base shares for each of the 32 destination countries. There is substantial variation in the size of the shares that each province comprises of total migration to a given destination country, thus satisfying this condition.

The second assumption, which is necessary for the exogeneity of the instrument, states that the number of migrants departing from the Philippines annually is determined by host country demand. I argue that there is a large potential supply of Filipinos who want to migrate, and the number hired is determined by demand from overseas employers. McKenzie, Theoharides and Yang (2014) suggest, based on evidence from 2010 Gallup World Poll, that there may be as many as 26 million Filipinos who would like to migrate if given the opportunity, compared to only 2 million who currently work abroad each year. Further, they report from qualitative interviews with recruiting agencies that there is an excess supply of Filipinos who want to work abroad and that the overseas contract labor market is a buyer's market.

If demand is determined outside the Philippines, then the actual number of migrants in each year should not be influenced by economic conditions in the Philippines, but rather by the economic conditions in the destination countries. McKenzie, Theoharides and Yang (2014) show that there is a causal link between migrant numbers and GDP shocks in the destination country. To further show that economic conditions in the Philippines do not influence the number of migrants, I regress the log number of migrants in each of the 32 destination countries on log Philippine GDP, controlling for log GDP in the top ten destinations for Filipinos. If economic conditions in the Philippines do not affect the number of overseas workers, then Philippine GDP should not have an effect on migrant outflows. Appendix Table

[45] Blanchard and Katz (1992) discuss two identifying assumptions for the standard Bartik-style instrument. Goldsmith-Pinkham, Sorkin and Swift (2013) formalize their assumptions and assert that two additional assumptions must hold in the standard case for the instrument to be valid. Since the construction of my instrument is slightly different, the identifying assumptions are modified accordingly.

4 shows the results of this analysis. Out of the 32 destinations, Philippine GDP only has a statistically significant effect in 2 cases, roughly what would be expected due to chance. While the coefficients are not precisely estimated zeros, they are smaller and less precisely estimated than the point estimates on log GDP in the top ten destinations.

The final identifying assumption is that baseline shares are not correlated with trends in variables related to the outcome variable.[46] One way to test the validity of this exogeneity assumption is to compare provinces with low destination-specific baseline migration rates to those with high rates and compare their trends in variables related to education. If, for example, provinces with high baseline rates have higher growth in enrollment than provinces with low baseline rates, I would incorrectly estimate that an increase in demand has a positive effect on enrollment, when in actuality the increase in enrollment was at least partly due to differing trends due, presumably, to other factors.[47]

Ideally I would compare trends in education outcomes prior to the start of the overseas migration program in areas that have high or low destination-specific migration rates at baseline. However, the overseas migration program for the Philippines commenced in 1974, long before data on education outcomes in the Philippines were available. In Figure 4, I plot the migration outflows for the 9 destinations with the highest variation over the sample period. It seems demand for at least some of the occupations remained relatively flat between 1993 and 2000. This suggests that the importance of shocks to migration demand was much larger during the later years of the sample. Thus, in provinces with high and low destination-specific migration rates, I examine trends in the high school enrollment rate in the period from 1993 to 2000.[48]

In Figure 5, I plot the average province-level high school enrollment rates for high and low migration provinces for each of the 9 destinations with the highest variation in migrant counts.[49] This allows for a visual evaluation of the parallel trends assumption: in the absence of the change in migration demand, enrollment should have remained parallel. In the pre-period,

[46]Because I am using panel data, province fixed effects absorb differences in the levels of any such omitted variables.

[47]This is conceptually similar to testing for pre-trends in a difference-in-differences methodology.

[48]I use destination-specific rates of migration at baseline to measure the level of treatment. The baseline shares used in the construction of the index do not take into account the population of the province, thus they are not measuring the density of migration experienced by the province.

[49]Since DepEd did not release enrollment data prior to 2002, I use the NSO's quarterly Labor Force Survey to calculate province-level high school enrollment rates.

the trends in enrollment appear quite parallel. This suggests, for example, that recruiters did not choose to locate in areas where education was increasing at a higher rate. In the post period, enrollment in the low migration provinces appears to be catching up, perhaps due to poverty reduction policies or policies geared at increasing educational attainment specifically.[50] While this is concerning for the parallel trends assumption, it will lead to downward bias of the estimates of the effect of migration demand on enrollment. Since I hypothesize that migration demand increases enrollment, increases in education for low migration areas compared to high migration areas will bias the estimates against finding an effect from increased migration demand.

To more rigorously examine if there are differential trends in enrollment, I estimate the following equation separately for each destination country in the pre period, post period, and full sample:

$$\Delta EnrollRate_{pt} = \beta_0 + \beta_1 MigRate_{p0} + \gamma_t + \epsilon_{pt} \tag{5}$$

where $\Delta EnrollRate_{pt}$ is the percent change in the province-level high school enrollment rate from time $t-1$ to time t, $MigRate_{p0}$ is the province migration rate at baseline, γ_t are year fixed effects, and ϵ_{pt} is the error term. t is equal to 1993 to 2000 for the pre period and 2006 to 2011 for the post period. A non-zero value for β_1 would lead to concern that the enrollment rate is trending differentially for different levels of the migration rate. Appendix Table 5 shows the results. While the point estimates are not precise, there is substantial variation in the magnitudes of the coefficients. However, many of the destinations with large point estimates are small and account for little of the variation in migrant demand over the sample period. I highlight the 9 highest variation destination countries in grey. Other than Lebanon and Singapore, the coefficients in the pre-period for these highest variance destinations are close to zero. Given that most of the identifying variation will come from changes in demand in these destinations, this reduces concerns about differential trending driving the results. The inclusion of province-specific linear time trends in all preferred specifications further alleviates this concern.

[50] Total high school enrollment data are not available from the LFS in 2001 to 2005.

5.3 Gender-Specific Demand Indices

In order to identify the mechanism through which migration affects human capital, I examine the enrollment response to gender-specific demand for migrants as discussed in Section 3.4. Estimating equation (3) with the province-level gender-specific migration rate as the key explanatory variable will suffer from the same threats to identification as outlined for the overall migration rate. Thus, I create gender-specific Bartik-style instruments:

$$D_{gpt} = \sum_i M_{git} \frac{M_{gpi0}}{M_{gi0}} \tag{6}$$

where D_{gpt} is the predicted number of migrants of gender g in province p, year t, M_{git} is the number of migrants of gender g to destination i, year t in the Philippines as a whole, and $\frac{M_{gpi0}}{M_{gi0}}$ is the share of migrants at baseline of gender g in province p, destination i, out of the total number of migrants nationally at baseline of gender g to destination i. While occupations are highly gendered in the Philippines as shown in Section 2.1, the creation of this index does not assume that the gender composition is stable over time. Rather, it simply assumes that, given a certain number of female migrants hired for a certain destination, the share coming from each province is relatively stable over time. The identifying assumptions are the same as discussed in Section 5.2.

6 Results

6.1 Identifying Variation

One critique of Bartik-style instruments is that the source of underlying variation is often unclear (Goldsmith-Pinkham, Sorkin and Swift, 2013). To address this, in Figure 4 I start by plotting total migration over time in each of the 9 destinations with the highest variances over the sample period in order to explicitly explore the identifying variation.[51] Migrant outflows change substantially over the sample period. Despite fluctuations in certain destination-years, in general these plots of destination-specific migration demand suggest that migration demand increased over time and that the variation in most destinations is fairly low frequency.

[51] Incidentally, these are also 7 of the top 10 largest destinations. Figures for all 32 destinations are available upon request.

To formally test whether the variation in migrant demand is high or low frequency, I filter the migration demand index into high and low frequency components following Baker, Benjamin and Stanger (1999) and Bound and Turner (2006). Low frequency variation suggests that changes in migration demand are persistent over time, whereas high frequency variation would imply that changes in migration demand are quite transitory. If demand is high frequency, it seems unlikely that individuals will change their expectations of the wage premium in response to changes in migration demand. If demand is instead low frequency, such labor market conditions are likely to persist and thus may cause individuals to revise expectations of the wage premium. First, I employ a basic decomposition following Baker, Benjamin and Stanger (1999), which filters the migration demand index into a high frequency component and a low frequency component:

$$D_{pt} = \frac{1}{2}(D_{pt} - D_{pt-1}) + \frac{1}{2}(D_{pt} + D_{pt-1}) \tag{7}$$

The first component, $\frac{1}{2}(D_{pt} - D_{pt-1})$, is the first difference and encompasses high frequency changes in the migration demand index. The second component, $\frac{1}{2}(D_{pt} + D_{pt-1})$ or the moving average, represents low frequency changes in the index. Because I have data on the national number of migrants by destination in all years of the sample period, the migration demand index can be constructed from 1993 to 2009. Thus, I conduct the decomposition over the entire sample period.[52] Eighty-two percent of the variance in the migration demand index is explained by the low frequency component, and when province-specific linear time trends are included, 88% of the variance is explained by the low frequency component. This suggests that long-run, persistent changes in migration demand will drive the results.

I next use a Fourier decomposition following Baker, Benjamin and Stanger (1999) and Bound and Turner (2006) to divide the migration rate into orthogonal components at varying frequencies, which more precisely determines the nature of the variation. Using seventeen years of data from 1993 to 2009, I split the migration demand index into nine orthogonal components of different frequencies using:

[52] While the IV results cannot be estimated over this sample period, the reduced form and IV results are qualitatively similar. Further, it seems reasonable that households will make educational investment decisions based on long-run variation from before my main sample period.

$$D_{pt} = \sum_{k=0}^{8} \left(\xi_k cos \left(2\pi \frac{k(t-1)}{17} \right) \right) + \left(\gamma_k sin \left(2\pi \frac{k(t-1)}{17} \right) \right) \quad (8)$$

To estimate ξ_k and γ_k, I follow Bound and Turner (2006) and run separate regressions for each province (84 regressions in total). I then use these parameter estimates of ξ_k and γ_k to calculate the nine Fourier components for each province-year. Each component is simply the term under the summation for k equals 0 to 8. Over 87% of the variance in the migration demand index is explained by the two lowest frequency components regardless of the inclusion of province-specific linear time trends. The results of both the basic and Fourier decompositions indicate that changes in province-specific migration demand are overwhelmingly low frequency and thus are stable and predictable. As a result, when individuals in the Philippines observe an increase in demand for migrants, it is reasonable for them to infer that such a change is permanent and to change their expectations about future labor market opportunities in response.

To further explore the determinants of demand, I uncover a number of institutional factors that drive the identifying variation for the 9 highest variance destinations shown in Figure 4. Panel A shows total migration to Saudi Arabia from 1992 to 2009. During the early part of the sample period, migration fell due to the Gulf War (United Nations, 2006). From 2003 onward, migration to Saudi Arabia grew substantially as oil prices increased, and the hire of engineers, building caretakers, domestic helpers, laborers, and medical workers increased substantially. The dip at the end of the sample is due to a change in the minimum wage for domestic helpers imposed by the Philippines in 2007 (McKenzie, Theoharides and Yang, 2014). With a minimum wage that was double the previous rate ($400 per month from $200 per month), the number of domestic helpers fell from 12,550 in 2006 to 3,870 in 2007, though the hire of domestic helpers recovered by 2009.

Migrants to Japan are almost exclusively employed as Overseas Performing Artists (OPAs). In Panel B, the large drop in the number of migrants to Japan in 2005 is due to barriers imposed on migration of OPAs in response to pressure from the United States (Theoharides, 2014). The dip in deployment of migrants to Japan between 1994 and 1995 was due to more stringent requirements for OPAs imposed by the Philippine Labor Secretary in response to exploitation of Filipinas (Philippine General Rule 120095, 1996).

Panels C, D, and F show steady increases in the number of Filipino migrants to the Middle East from 2003 onward. This coincides with the rise in oil prices, and the number of migrants employed as building caretakers, cooks, domestic helpers, engineers, plumbers, salesmen, and other service workers increases substantially in these destinations during this period. Similar to Saudi Arabia, the dip in the number of migrants in 2007 is due to the increase in minimum wage for domestic helpers.

In Taiwan (Panel E), about 50% of migrants work in the production sector, which is largely composed of factory workers. Growth in the hire of these workers over the sample period was substantial due to growth in cell phones, computers, and other electronics during the 1990s, and this growth remained steady through the 2000s. The other major occupations migrating to Taiwan are caregivers and domestic helpers, though this declined substantially in 2006 for caregivers and in 1997 for domestic helpers, likely due to the increased hire of these migrants from Indonesia. The large drop in the number of workers to Taiwan in 2000 was due to a hiring ban on Filipino workers imposed by Taiwan in June, 2000 due to deteriorating relations between Taiwan and the Philippines (Migration News, 2000).

Almost all migrants to Hong Kong (Panel G) are employed as domestic helpers. While there are fluctuations in demand for these workers over the sample period, the general trajectory is upward. Indeed, the number of domestic helpers increased from about 13,500 in 1992 to 25,000 in 2009. Migrants to Lebanon (Panel I) are also almost exclusively domestic helpers. The hire of domestic helpers grew substantially starting in 1998 and by 2005, over 11,000 domestic helpers were employed. However, in 2007, the Philippines imposed a two year ban on the deployment of Filipinos due to fighting between Israel and Hezbollah (GMA News, 2011). Finally, migration to Singapore (Panel H) is mainly for domestic helpers, engineers, and medical workers. The growth at the end of the sample period was due to a doubling of the hire of medical workers between 2007 and 2008.

To summarize, the majority of the variation in the migration demand index is relatively low frequency, indicating that changes in migration demand are persistent. Policy changes by destination countries and the Philippines, the price of oil, and growth in the electronics field seem to be the drivers behind changes in the number of Filipinos migrating abroad each year overall as well as to specific destinations.

6.2 The Effect of Migration Demand on Enrollment

In Table 4, Panel A, Column 1, I report the first stage results of the effect of the total migration demand index on the total migration rate. The index has a positive and statistically significant relationship with the endogenous variable, but the F-statistic is less than 10, indicating that weak instruments are an issue (Stock and Yogo, 2002).[53] In column 2, I add province-specific linear time trends to alleviate concerns about differential trending in omitted variables across provinces at baseline as outlined in Section 5.2. The F-statistic increases to greater than 10, and the relationship between the endogenous variable and the instrument is larger in magnitude. In Column 3, my preferred specification, I weight by the population in order to obtain nationally representative results. The first stage results are much stronger with an F-statistic of 46. Finally, in Column 4, I test if the highest migration province, the second district of Manila, is driving the results. The first stage results appear robust. Therefore, I proceed with Column 3 as my preferred specification, though I show the robustness of the results to other specifications throughout.

Table 5, Panel A shows that total migration demand is positively related to secondary school enrollment decisions. To interpret the point estimate in Panel A, Column 3, my preferred specification, for a 1-percentage point increase in total migration demand, school enrollment increases by 10.3 percentage points. However, it is important to note that, given average migration rates of 0.51% of the total province working population, a 1-percentage point increase in the province-level migration rate is unrealistic. Instead, I calculate the average year-to-year percentage point change in migration demand over my sample period to be 0.12 percentage points. For an average change in migration demand of 0.12 percentage points, enrollment increases by 10.3*0.12=1.2 percentage points. This results in a 2.1% increase in enrollment, off a sample mean of 56.8% enrolled. The results without the population weights (Column 2) are qualitatively similar, but larger in magnitude. This indicates that the enrollment response to education is different across small and large provinces in the Philippines. Namely provinces with smaller populations have a larger education response to migration. In Column 4, I drop the second district of Manila. The results are robust to this change in sample. The effects on female and male enrollment Panels B and C are qualitatively similar to

[53] When using robust standard errors, the Cragg-Donald Wald statistic is not valid. Instead, I report the Kleibergen-Paap statistic (Kleibergen and Paap, 2006).

the overall results. Male and female enrollment increase by 2.0% and 2.2% respectively, and I cannot reject that the coefficients are the same.

In addition to the effect of migration demand on total secondary school enrollment, another key consideration is whether households choose to send their children to public or private school. One of the major motivations for international migration from the Philippines is the desire to enroll children in private school (Asis, 2013). As income increases, parents may now choose to switch to a type of schooling that they perceive as higher quality. The effect of the expected wage premium on public and private enrollments remains an empirical question, and I will test the channels affecting school choice below using gender-specific migration demand. In Table 6, I examine the response of public and private secondary school enrollment to changes in total migration demand. The effects on public school enrollment are small and imprecisely estimated. However, they suggest that increases in migration demand lead to slightly greater public school enrollment. Private school enrollment, on the other hand, increases statistically significantly in response to migration demand. Looking at Panel B, Column 3, an average year-to-year increase of 0.12 percentage points yields a 10.1% increase in private secondary school enrollment off a sample mean of 11.4%. If I assume that most individuals who enroll in private school in response to an increase in migration demand were previously enrolled in public school, these results suggest that for every student switching to private school, there is another previously unenrolled child who enrolls in public school.

6.3 Mechanisms

The results thus far provide evidence that total and private secondary school enrollment increase in response to increases in total migration demand, while there is suggestive evidence of slight increases in public school enrollment. In order to determine the mechanisms through which these effects may occur, I examine the effect of gender-specific migration demand on school enrollment. As discussed in Section 3.4, if the effects on male and female enrollment are equal in response to an increase in, for instance, female migration demand, the income channel is dominant. If the effects are not equal, either income, the wage premium, or some combination of the two could be the dominant channel. A positive effect of female migration demand on male enrollment suggests that the income channel is present since the wage premium should never have a positive effect. Panels B and C in Table 4 show the first stage results for the male-

and female-specific migration demand indices. Both indices have a positive and statistically significant relationship with the gender-specific migration rates. However, the male migration demand index has an F-statistic below the critical value of 10, and thus weak instruments are a problem. The higher standard errors in the male regressions compared to the female regressions suggest that there is less variation in the male migration rate over the sample period. As a result of the weak first stage for male migration, I focus the gender-specific analysis on the effect of female migration demand.

While the same identifying assumptions must hold for the gender-specific demand indices as for the total migration demand index, by splitting demand by gender, I introduce the potential for an additional omitted variable. Consider the effect of female migration demand. If the provinces that are more affected by changes in the national number of female migrants (ie., higher base share provinces) also experience an increase in the male migration rate, and male migration also has an effect on school enrollment, then the results will be biased. To test for this, I first examine the relationship between the male migration rate and the female demand index as well as the relationship between the female migration rate and the male demand index by regressing the gender-specific migration demand index on the migration rate for the opposite gender. A positive relationship would suggest that the effect of gender-specific migration demand on enrollment may be biased upward. The results are shown in Columns 1 and 2 of Appendix Table 6. For the female demand index, the male migration rate appears to have little effect. As such, omitted variables bias due to the male migration rate is likely not a concern.[54] I also control for the male migration rate in the regressions that follow.

Table 7 reports the effect of female migration demand on total, female, and male enrollment. Looking at my preferred specification in Panel A, Column 3, a change in female migration demand has a positive but statistically imprecise effect on total secondary school enrollment. In Column 5, I add a control for the male migration rate, and the results are robust to the addition of this control. Turning to Panel B, Column 3, female migration demand has a positive and significant effect on female secondary school enrollment. Specifically, an average year-to-year percentage point increase in female migration demand of 0.05 percentage points

[54]On the other hand, the female migration rate and the male demand index have an inverse and statistically significant relationship. Thus, if female migration has a positive effect on school enrollment, estimates of the effect of the male migration demand index on enrollment will be biased downward. Thus, in addition to concerns about the weak first stage for men, I proceed in my analysis using the female migration demand index due to concerns about omitted variables bias with the male index.

leads to a 7.3*0.05=0.36 percentage point increase in female secondary school enrollment. This is a 0.6% increase in enrollment off a sample mean of 60.0%. In Panel C, Column 3, the effects of female migration demand on male enrollment are smaller than the effects on female enrollment. However, I cannot reject that they are the same, suggesting that the income channel is likely dominant. If I examine the estimates without population weights shown in Column 2, the coefficients on male and female enrollment are quite similar. This leads me to conclude that changes in income, rather than changes in the expected wage premium, are the dominant channel through which migration affects school enrollment. The slight differences in point estimates suggest that the expected wage premium may matter as well. The differential effects could be due to either changes in the female-specific wage premium or households preferring to invest in girls' education when income increases. Because the coefficient on male enrollment is positive, this indicates that the entire effect could not be from the wage premium, and enrollment changes at least partially in response to the income channel.

In Table 8, I examine the response of public and private enrollment to a change in female migration demand. Comparing Column 1 to Column 2 in Panel A, the public school enrollment results are not particularly robust to the population weights. This suggests that while lower population provinces in the Philippines respond positively to increases in female migration demand in terms of public school enrollment, this is not true in Manila or other high population areas. This may be indicative of lower income levels of migrant households outside Manila, such that the marginal student is induced into public school, whereas in Manila a higher initial portion of children in migrant households are enrolled. In Panel B, Column 2, private school enrollment increases by 2.5% in response to an average year-to-year change. The results are of a similar magnitude when both unweighted and weighted. The estimates without weights on both public and private school enrollment are nearly identical for men and women and slightly larger for women than for men when weights are included, though I cannot reject that they are the same. This again suggests that the dominant channel through which migration affects secondary school enrollment is through an income channel, rather than through changes in the expected wage premium.

6.4 Effect of Migration Demand on Enrollment by Grade

Secondary school enrollment increases in response to increased migration demand, primarily due to changes in income rather than changes in the wage premium. However, given that the enrollment choice is sequential, aggregate enrollment results may miss potentially interesting dynamics regarding the marginal student affected by changes in migration demand. To examine these dynamics, I look at the effect of both total and female migration demand on grade-level enrollment rates for each grade of high school. The results are shown in Table 9.

Panel A shows the effects of total migration demand by grade level. An increase in migration demand causes an increase in enrollment across all grades, indicating marginal students are induced into enrollment at all grade levels. However, first year enrollment increases by more than fourth year enrollment (3.2% compared to 2.4%), likely due to the bunching of dropouts prior to the first year of high school. This could be a result of limited benefits to partial completion of high school or because this is when compulsory schooling concludes, among other reasons. Thus, while there are marginal students in all grades, this suggests a large number of students never enroll in high school either because of liquidity constraints or the returns on the education investment are too low.

Panel B shows the enrollment response to female migration demand. The effects are positive and quite similar across grade levels, though imprecisely estimated. Turning to Panels C and D, while there are equivalent effects on male and female aggregate enrollment in response to a change in female migration demand, I find substantial heterogeneity when comparing the male and female enrollment responses. Specifically, for year one, I can reject that female migration demand has equal effects on male and female enrollment, while in later years I cannot reject that the effects are the same, though the male point estimates are consistently smaller than the female estimates. This differential response to gender-specific demand in the first year suggests that while the aggregate results imply that income is the dominant channel, first year enrollment may respond to some combination of both channels.

6.5 Interpreting Effect Sizes

The results suggest that an average year-to-year increase in total migration demand leads to a 2.1% increase in total secondary school enrollment. Given that the average province sends

2,550 migrants and has 79,081 students enrolled in secondary school, my main point estimate (Table 5, Panel A, Column 3) suggests that a 1 percentage point increase in migration demand off a mean migration rate of 0.51% would lead to a 196% increase in migration. Thus, given that the average province sends 2,550 migrants, this results in 4,998 new migrants. A 10.3 percentage point increase in total secondary school enrollment off a sample mean of 57.21% enrolled is an 18% increase in enrollment. This results in 14,234 new students enrolled for every 4,498 new migrants. Every additional migrant causes 2.8 more children to enroll in secondary school.

How does this effect size compare to previous estimates? Yang (2008) estimates the effect of differences in exchange rate shocks faced by Filipino migrant households in light of the Asian financial crisis on school enrollment. A 10% improvement in the exchange rate experienced by migrant households leads to a 6% increase in remittances and a 1% increase in total school enrollment. A 6% increase in remittances is 2,160 pesos in Yang's sample. Thus, for every 216,000 additional pesos remitted, one additional child will be enrolled in school. Using data from the 2006 Family Income and Expenditure Survey, I determine that the average remittance receiving household receives 76,273 pesos of remittances each year. Further, for every one migrant in a province, four households receive remittances. Thus, a rough back-of-the-envelope calculation suggests that each additional migrant results in 305,092 pesos of remittances.[55] So, by Yang's estimate, each additional migrant in my sample should cause 1.4 additional children to be enrolled in school.[56]

It is important to note that Yang's paper examines the effects of an increase in remittances on households that already have a migrant abroad (and thus are likely already receiving remittances). For households sending a new migrant abroad, the increase in income and the relaxation of the liquidity constraint from the initial receipt of remittances is likely more pro-

[55] Recall that the sum of direct and indirect education costs is approximately 50,000 pesos.

[56] One important consideration is that I only estimate the effect of new hire migration on secondary school enrollment. If rehires are positively correlated with both new hire migration and secondary school enrollment, I will overstate the results. McKenzie, Theoharides and Yang (2014) find that a 1% increase in GDP leads to a 2.6% increase in new hires and a 1.9% increase in rehires. Based on their respective sample means, a 1% increase in GDP results in 121 new hires and 148 rehires. Thus, for every 1 additional new hire as a result of a change in GDP, there are approximately 1.2 additional rehires. I hesitate to simply split my effect size linearly as there are likely heterogeneous effects on education depending on if a migrant is a new hire or rehire. For instance, liquidity constrained households may find the liquidity constraint loosened enough to increase education in response to new migration, and thus when the migrant is rehired, there is no enrollment response. Unfortunately, I cannot test this empirically, but it is an important consideration when interpreting the magnitude of the results.

nounced than for households that have received remittances for some time. Further, Yang only estimates the effect of remittances on migrant households, thus missing spillovers to non-migrant households. While it is not possible to determine if the difference in estimates is due to a larger effect from first time migrants or from spillovers, my results suggest that spillovers matter.

Turning to a similar calculation for private school enrollment, there are 17,465 students enrolled in private school in the average province. Following the same calculations as above, this suggests that for each additional migrant, 2.9 additional students enroll in private school. I turn to Clemens and Tiongson (2013) to contextualize these results. Using a regression discontinuity design, they compare the households of individuals just above and below the cutoff on a Korea proficiency exam required for migration to Korea. They find that for each additional migrant, there are 0.41 more children enrolled in private school. To compare this to my results, it is important to remember that this estimate assumes that there are no effects of migration on non-migrant households. Given the fact that each migrant on average sends remittances to four households, if the effects of a given peso of remittances are equal across migrant and non-migrant households, then each migrant would induce 4*0.41=1.64 additional students to enroll in school. The difference of 1.3 students between my estimate and Clemens and Tiongson's estimate is likely due to two factors. First, these estimates again miss potential spillovers to non-remittance receiving households. Second, Clemens and Tiongson acknowledge that their sample is not representative of the Philippines as a whole. Their sample is both richer and better educated than the overall population. Thus, both migrant and non-migrant households in my sample are likely more responsive to the loosening of liquidity constraints than households in their sample.

Finally, Dinkelman and Mariotti (2014) estimate the effect of migration on long run human capital outcomes at the district level in rural Malawi. While the context differs substantially, since this paper provides the only other estimates of the net effect of migration on human capital, I compare my estimates. Dinkelman and Mariotti (2014) find that for a 1% increase in migration, affected cohorts increase their schooling by 0.88 to 1.3 years. Given that the average province in the Philippines has 2,550 migrants, a 1% increase in migration leads to 25.5 more migrants. As stated above, I find that for each additional migrant, 2.8 more children are enrolled in secondary school, thus 71.4 more children will enroll in school in response

to a 1% increase in migration. With a province-level average of 79,081 students enrolled in secondary school, this results in a 0.1 percentage point increase in secondary enrollment (0.17%). With 139,675 students of secondary schooling age, those 71.4 enrolled students will create a very minimal increase in the cohort's years of schooling, certainly much less than a 0.88 increase.[57] While my effects are substantially smaller, Dinkelman and Mariotti (2014) examine the marginal student in primary school in a context where education levels are substantially lower than in the Philippines.

While my results are large, they are comparable with results found in these previous studies in the Philippines, especially given the differences in sample and research design, and smaller than studies that estimate the net effect of migration on human capital. These comparisons emphasize the importance of spillovers to non-migrant households from migration.

7 Conclusion

As international migration continues to gain prominence as a labor market outcome, understanding the impacts of migration on migrant-sending economies can have important implications for development. One way in which migration can affect the home economy is by altering the human capital stock. In this paper, I estimate the effect of migration on secondary school enrollment in the Philippines. I conduct my analysis at the province level in order to account for spillover effects from migration on non-migrant households. To do this, I use two large administrative datasets to create an original dataset of all new migrant departures from the Philippines linked to the migrant's province of origin and calculate province-level migration rates. Simply estimating the effect of the province-level migration rate on secondary school enrollment is likely to suffer from a number of biases and confound changes in migrant demand with changes in migrant supply. To isolate exogenous changes in demand for migrants, I create an instrument following Bartik (1991) that exploits variation generated by shocks to destination-specific migrant networks across local labor markets in the Philippines. As a result of these networks, provinces will vary in the degree to which they are affected by changes in demand for migrants from certain destination countries.

[57] For instance, if we assume an extreme case where all unenrolled students have 0 years of education and all enrolled students attain 10 years, the average education level would rise from 5.662 years to 5.667 years when the additional 71.4 students are enrolled.

I conclude that an average sized increase in migration demand leads to an overall increase in high school enrollment of 2.1%. Effects are larger for private school: in response to an average-sized increase in female migration demand, private school enrollment increases by 10.1%. Effects on public school enrollment are small and imprecise. Assuming most children who enroll in private school in response to increased migration demand were previously enrolled in public school, this suggests an equal number of children switch from no schooling to public school. While my results are larger than previous estimates of the effect of migration on human capital in the Philippines, they underscore the importance of spillovers from migration to non-migrant households. As policy makers in migrant-sending countries seek to understand the human capital stock in the domestic economy, omitting non-migrant households will lead to an underestimate of the true level.

The previous literature suggests that migration may affect investment in human capital through two key channels: the income channel and the expected wage premium channel. I empirically test predictions laid out in a basic theoretical framework in order to examine the relative importance of these two channels. Specifically, I test the response of male and female enrollment to changes in female migration demand. If the effects on male and female enrollment are equal, this suggests the income channel is dominant, whereas if the effects are different, the channel is ambiguous. I find that while the effects on female enrollment are slightly larger, they are not statistically distinguishable from the effects on male enrollment. Thus, I conclude that changes in income due to the receipt of remittances is the dominant channel through which migration affects education. For policymakers, this suggests that there are a large number of students who would enter school if liquidity constraints were loosened.

I also examine heterogeneity in enrollment responses by grade level. While enrollment increases for all grade levels, the largest response is on year one of secondary school enrollment. This indicates that there are a substantial number of marginal students who never even enter high school due to the income and liquidity constraints in their households. The effects on female first year enrollment in response to female migration demand are larger than the effects on male enrollment. Thus, while the aggregate specifications lead to the conclusion that the income channel dominates, the effects on first year enrollment suggest that a combination of the two channels may matter.

While it appears that the stock of human capital increases as a result of migration, one

concern is that these students may eventually migrate away from the Philippines, leading to brain drain. Recall that for each new migrant, there are 2.8 additional children enrolled in school. For all of these additional students to acquire work abroad, demand for Filipino migrants would need to increase by unprecedented proportions. This implies that migration causes a substantial increase in the stock of high school educated labor in the Philippines. Such increases, however, have important policy implications and highlight the vulnerability of education levels in the Philippines to changes in migration demand. As a result, policymakers in the Philippines and other migrant-sending countries may want to devote some portion of their limited resources to provide a social safety net that helps smooth educational investment in times of reduced migration demand.

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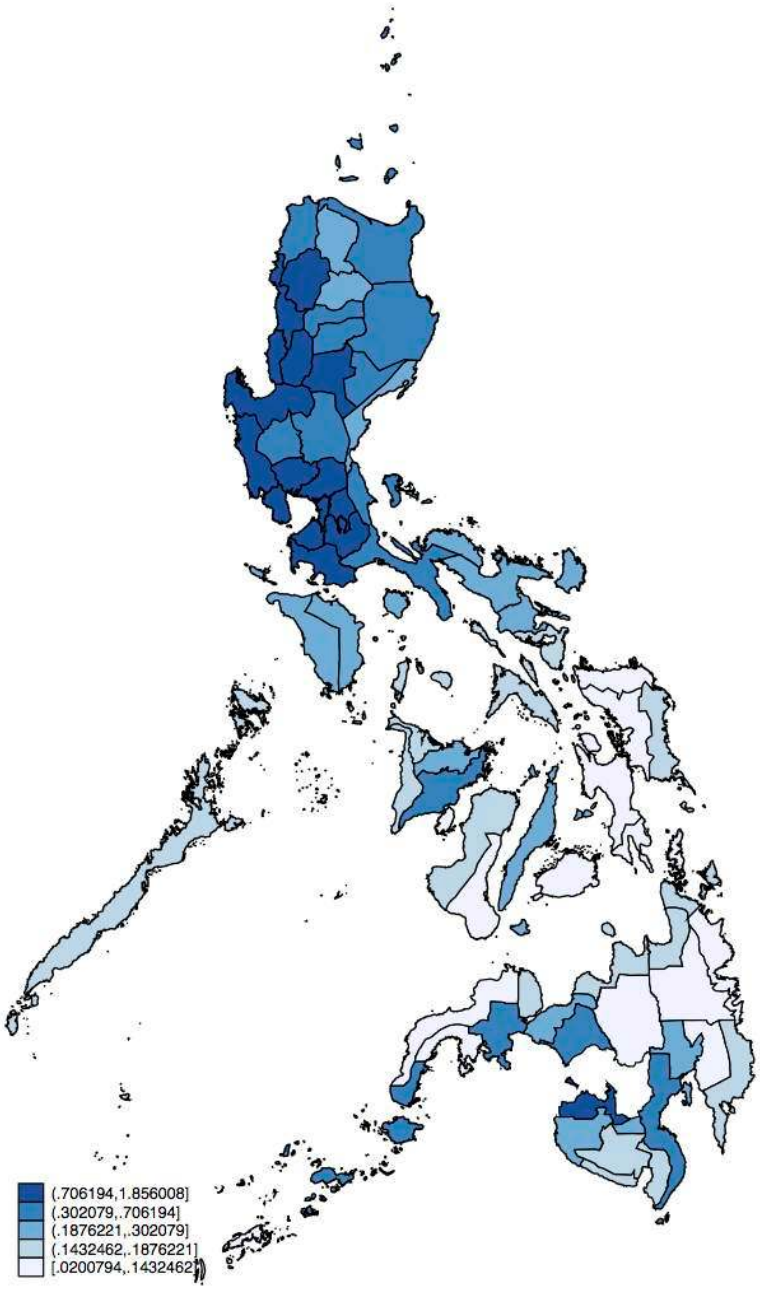


Figure 1: 1993 Migration Rates by Province

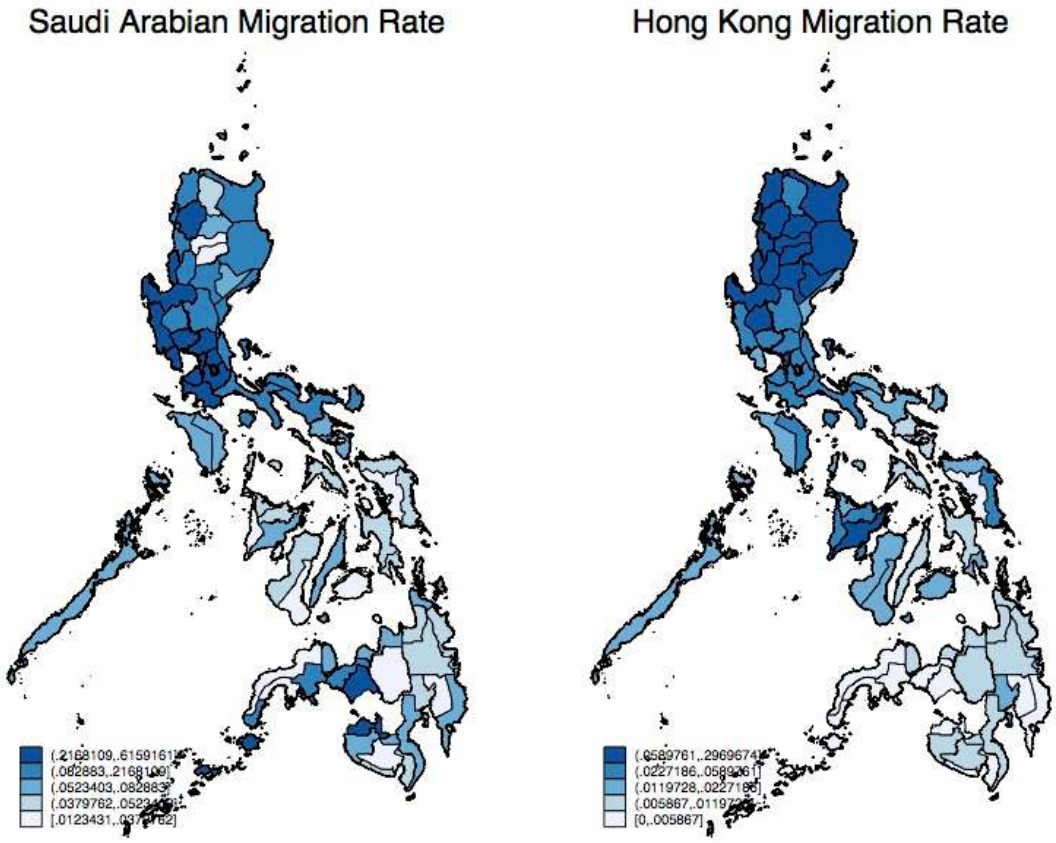
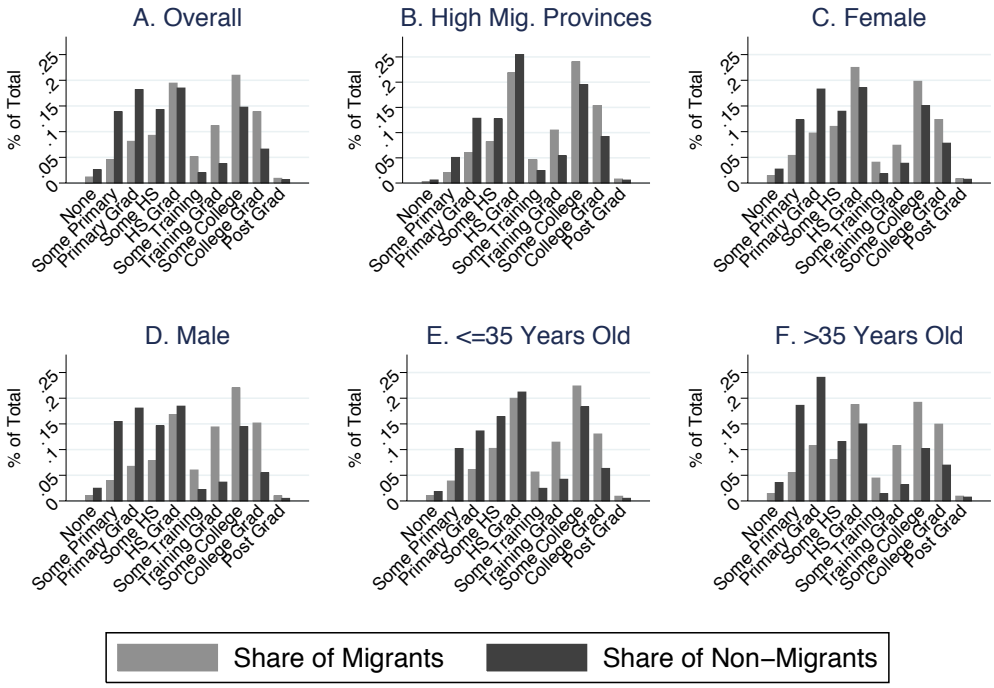


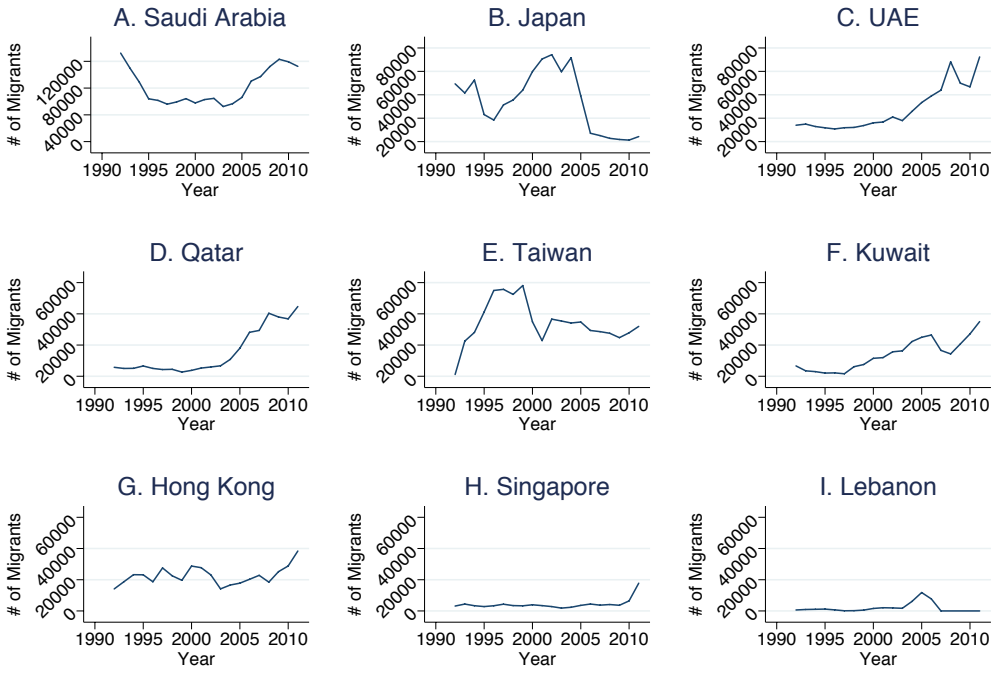
Figure 2: 1993 Destination-Specific Migration Rates by Province

Figure 3: Distribution of Education



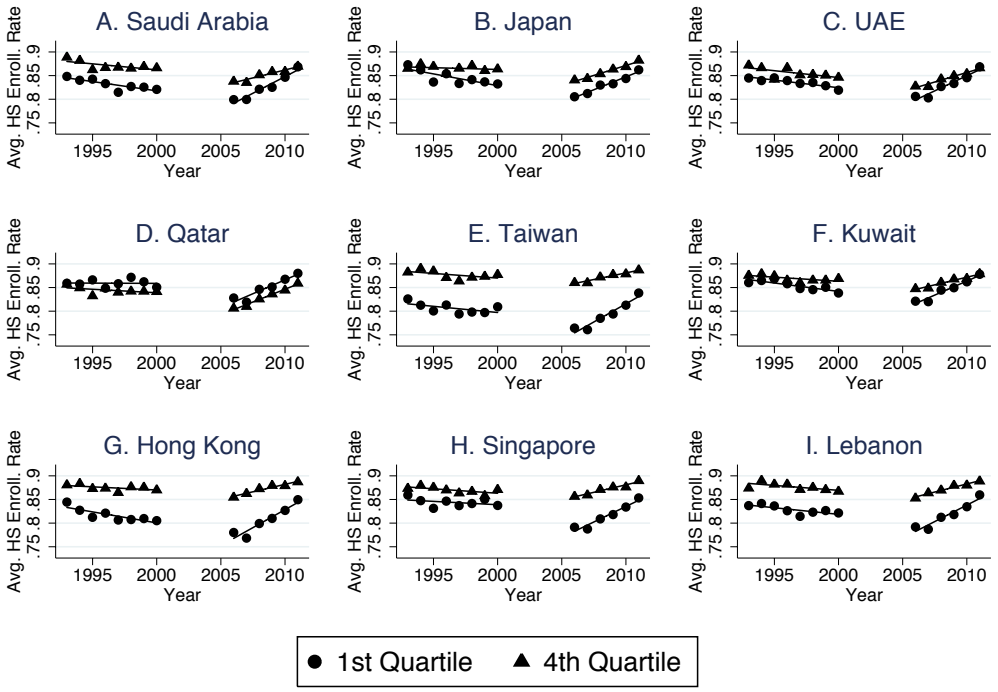
Source: 2000 Philippine Census

Figure 4: Total Migrants in Highest Variance Destinations



Source: POEA.

Figure 5: Parallel Trends Test Across High and Low Baseline Migration Provinces



Source: POEA, OWWA, LFS.

Table 1. Top 10 Destination Countries

	Overall			Female		Male	
	Destination	Percent	Avg. New Contracts per Year	Destination	Percent	Destination	Percent
1.	Saudi Arabia	33.10	78,860	Japan	22.64	Saudi Arabia	49.19
2.	Japan	16.04	38,205	Saudi Arabia	16.81	Taiwan	11.40
3.	Taiwan	14.53	34,621	Taiwan	14.06	UAE	7.60
4.	UAE	10.12	24,121	Hong Kong	12.82	Qatar	7.49
5.	Hong Kong	8.92	21,247	UAE	10.01	South Korea	2.43
6.	Kuwait	4.97	11,848	Kuwait	5.78	Kuwait	2.42
7.	Singapore	1.44	3,438	Qatar	2.88	Japan	1.69
8.	South Korea	1.44	3,435	Malaysia	1.57	Libya	1.47
9.	Malaysia	1.38	3,298	Singapore	1.47	Brunei	1.17
10.	Bahrain	1.34	3,190	Lebanon	1.38	Singapore	1.02

Notes: The sample period is from 1992 to 2009.
Source: POEA and author's calculations.

Table 2. Top 20 Occupations for Overseas Contract Workers

Occupation		Total	% of Total	% Female
1.	Domestic Helpers	1,139,053	23.97	97.46
2.	Performing Artists	696,504	14.66	95.14
3.	Production	328,486	6.91	43.99
4.	Caregivers	238,408	5.02	96.07
5.	Laborers	237,064	4.99	11.88
6.	Medical Workers	214,832	4.52	81.25
7.	Plumbers	197,508	4.16	0.35
8.	Engineers	191,816	4.04	3.48
9.	Cooks and Waiters	163,382	3.44	53.24
10.	Building Caretakers	140,199	2.95	72.15
11.	Electrical Workers	137,306	2.89	19.97
12.	Carpenters	131,314	2.76	0.41
13.	Machine Fitters	92,946	1.96	2.69
14.	Tailors and Sewers	87,185	1.83	83.16
15.	Other Service Workers	80,832	1.70	54.61
16.	Freight Handlers	74,995	1.58	3.62
17.	Clerical Workers	63,516	1.34	51.32
18.	Transport Equipment Operators	52,664	1.11	5.39
19.	Production Supervisors	43,434	0.91	5.14
20.	Machine-Tool Operators	39,609	0.83	5.87
Total		**4,751,936**		**60.66**

Notes: The sample period is from 1992 to 2009. Occupations that are shaded light grey are over 50% female.
Source: POEA and author's calcuations.

Table 3. Summary Statistics

	Mean	SD	Min	Max
Panel A. Actual Migration Rate (%)				
Total Migration Rate	0.51	0.23	0.04	1.59
Female Migration Rate	0.28	0.17	0.03	1.29
Male Migration Rate	0.22	0.18	0.01	1.39
Panel B. Migration Demand Index (%)				
Total Migration Rate	0.64	0.64	0.01	3.62
Female Migration Rate	0.41	0.39	0.02	2.68
Male Migration Rate	0.22	0.33	0.00	1.99
Panel C. School Enrollment Rates (%)				
Total	57.21	10.39	13.47	96.66
Total Female	60.30	10.28	14.39	100.00
Total Male	54.28	10.76	12.50	93.32
Total Public	45.96	8.47	12.30	79.61
Female Public	48.58	8.70	12.30	78.29
Male Public	43.51	8.59	11.34	80.81
Total Private	11.25	6.57	0.00	47.95
Female Private	11.74	6.80	0.00	52.05
Male Private	10.77	6.38	0.00	47.99

Notes: The unit of observation is the province-year, and the sample period is from 2004 to 2009. All values are expressed as percentages. The enrollment rates are calculated using the population aged 12 and 17 as the denominator.
Sources: Department of Education, POEA, OWWA, and author's calculations.

Table 4. First Stage Analysis: Effect of Instruments on Migration Demand

	Lag 1 Migration Demand Index	Plus Province-Specific Time Trends	Plus Weights	Plus Weights & Without 2nd District
	(1)	(2)	(3)	(4)
Panel A. Lag 1 Total Migration Rate	0.276**	0.444***	0.654***	0.674***
	(0.123)	(0.125)	(0.096)	(0.110)
N	502	502	502	496
R^2	0.876	0.954	0.956	0.958
F-Statistic	5.04	12.57	46.12	37.39
Panel B. Lag 1 Female Migration Rate	0.435***	0.504***	0.487***	0.512***
	(0.072)	(0.080)	(0.057)	(0.064)
N	502	502	502	496
R^2	0.905	0.947	0.951	0.952
F-Statistic	36.54	39.71	73.64	64.38
Panel C. Lag 1 Male Migration Rate	0.327**	0.337	0.136	0.218
	(0.133)	(0.205)	(0.137)	(0.174)
N	502	502	502	496
R^2	0.888	0.963	0.965	0.968
F-Statistic	6.07	2.69	0.99	1.58

Notes: The sample period is from 2005 to 2010 (N=502) with 1993 used as the base year in the construction of the instrument. All regressions include province and year fixed effects. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. Since the standard errors are clustered, the reported F-statistic is the Kleibergen-Papp statistic. The female and male migration rates are instrumented for with the gender-specific versions of the indices. In Column 4, I drop the Second District of Manila, which is the province with the highest migration rate. The migration rate and the migration demand index are lagged by 1 year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.
Sources: POEA, OWWA, and author's calculations.

Table 5. Effect of Total Migration Demand on Total School Enrollment (public plus private)

	Total Demand Index			
	(1)	(2)	(3)	(4)
Panel A. Effect on Total Enrollment	6.091	16.976***	10.324***	12.789***
	(5.988)	(5.826)	(3.578)	(3.354)
R^2	0.912	0.947	0.927	0.920
Mean Dependent Variable	56.8	56.8	56.8	56.7
Panel B. Effect on Female Enrollment	10.579	16.492***	10.995***	13.192***
	(7.546)	(5.359)	(3.528)	(3.393)
R^2	0.892	0.945	0.912	0.907
Mean Dependent Variable	60.0	60.0	60.0	59.9
Panel C. Effect on Male Enrollment	-0.381	15.488***	9.178**	11.739***
	(4.713)	(5.724)	(3.585)	(3.275)
R^2	0.932	0.954	0.943	0.936
Mean Dependent Variable	53.8	53.8	53.8	53.6
N	502	502	502	496
F-Statistic	5.04	12.57	46.12	37.39
Province-Specific Linear Time Trends	No	Yes	Yes	Yes
Population Weights	No	No	Yes	Yes
Drop Largest Province	No	No	No	Yes
Mean Change in Demand	0.12	0.12	0.12	0.12

Notes: The sample period is from 2005 to 2010 with 1993 used as the base year in the construction of the instrument. All regressions include province and year fixed effects. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. The mean change in migration demand is measured in percentage points and is the average annual province-level change in migration demand. The migration rate and the migration demand index are lagged by 1 year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.
Sources: POEA, OWWA, DepEd, and author's calculations.

Table 6. Effect of Total Migration Demand on Public and Private Secondary School Enrollment

	Total Demand Index			
	(1)	(2)	(3)	(4)
Panel A. Effect on Total Public Enrollment	1.078	5.629*	0.723	1.637
	(2.938)	(3.167)	(1.226)	(1.110)
R^2	0.970	0.991	0.984	0.981
Mean Dependent Variable	45.7	45.7	45.7	45.7
Panel B. Effect on Total Private Enrollment	5.013	11.347***	9.600***	11.152***
	(4.962)	(3.815)	(3.160)	(3.293)
R^2	0.853	0.921	0.905	0.895
Mean Dependent Variable	11.4	11.4	11.4	11.4
N	502	502	502	496
F-Statistic	5.04	12.57	46.12	37.39
Province-Specific Linear Time Trends	No	Yes	Yes	Yes
Population Weights	No	No	Yes	Yes
Drop Largest Province	No	No	No	Yes
Mean Change in Demand	0.12	0.12	0.12	0.12

Notes: The sample period is from 2005 to 2010 with 1993 used as the base year in the construction of the instrument. All regressions include province and year fixed effects. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. The mean change in migration demand is measured in percentage points and is the average annual province-level change in migration demand. The migration rate and the migration demand index are lagged by 1 year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Sources: POEA, OWWA, DepEd, and author's calculations.

Table 7. Effect of Female Migration Demand on Total School Enrollment by Gender (public plus private)

	Female Migration Demand Index				
	(1)	(2)	(3)	(4)	(5)
Panel A. Effect on Total Enrollment	0.842	10.043**	5.452	7.726*	6.408
	(4.768)	(4.416)	(3.644)	(4.466)	(3.945)
R^2	0.919	0.954	0.931	0.926	0.931
Mean Dependent Variable	56.8	56.8	56.8	56.7	56.8
Panel B. Effect on Female Enrollment	2.277	10.699**	7.291**	9.180**	8.431**
	(5.330)	(4.236)	(3.502)	(4.371)	(3.811)
R^2	0.909	0.952	0.917	0.914	0.917
Mean Dependent Variable	60.0	60.0	60.0	59.9	60.0
Panel C. Effect on Male Enrollment	-1.347	8.516*	3.458	6.029	4.235
	(4.140)	(4.378)	(3.804)	(4.536)	(4.102)
R^2	0.931	0.960	0.945	0.940	0.945
Mean Dependent Variable	53.8	53.8	53.8	53.6	53.8
N	502	502	502	496	502
F-Statistic	36.54	39.71	73.64	64.38	70.02
Province-Specific Linear Time Trends	No	Yes	Yes	Yes	Yes
Population Weights	No	No	Yes	Yes	Yes
Drop Largest Province	No	No	No	Yes	No
Control for Male Mig. Rate	No	No	No	No	Yes
Mean Change in Demand	0.05	0.05	0.05	0.05	0.05

Notes: The sample period is from 2005 to 2010 with 1993 used as the base year in the construction of the instrument. All regressions include province and year fixed effects. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. The mean change in migration demand is measured in percentage points and is the average annual province-level change in migration demand. The migration rate and the migration demand index are lagged by 1 year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.
Sources: POEA, OWWA, DepEd, and author's calculations.

Table 8. Effect of Female Migration Demand on Public and Private School Enrollment

	Female Migration Demand Index	
	(1)	(2)
Panel A. Total Public Enrollment	2.937*	-0.378
	(1.549)	(1.240)
R^2	0.989	0.981
Mean Dependent Variable	45.7	45.7
Panel B. Total Private Enrollment	7.106**	5.830*
	(3.590)	(3.194)
R^2	0.928	0.911
Mean Dependent Variable	11.4	11.4
Panel C. Female Public Enrollment	2.907*	0.012
	(1.501)	(1.197)
R^2	0.989	0.982
Mean Dependent Variable	48.5	48.5
Panel D. Male Public Enrollment	2.959*	-0.762
	(1.653)	(1.370)
R^2	0.989	0.982
Mean Dependent Variable	43.2	43.2
Panel E. Female Private Enrollment	7.792**	7.279**
	(3.518)	(3.147)
R^2	0.929	0.906
Mean Dependent Variable	11.6	11.6
Panel F. Male Private Enrollment	5.557	4.219
	(3.479)	(3.244)
R^2	0.929	0.916
Mean Dependent Variable	10.7	10.7
N	502	502
F-Statistic	44.56	71.28
Population Weights	No	Yes
Mean Change in Demand	0.05	0.05

Notes: The sample period is from 2005 to 2010 with 1993 used as the base year in the construction of the instrument. All regressions include province and year fixed effects and province-specific linear time trends. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. The mean change in migration demand is measured in percentage points and is the average annual province-level change in migration demand. The migration rate and the migration demand index are lagged by 1 year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.
Sources: POEA, OWWA, DepEd, and author's calculations.

Table 9. Effect of Migration Demand on School Enrollment, by Grade Level

	Year 1	Year 2	Year 3	Year 4
	(1)	(2)	(3)	(4)
Panel A. Total Demand on Total Enrollment	24.569***	10.654	9.990*	14.413**
	(7.922)	(6.852)	(5.722)	(5.858)
R^2	0.911	0.904	0.919	0.927
Mean Dependent Variable	91.4	88.2	80.1	72.4
N	502	502	502	502
F-Statistic	46.12	46.12	46.12	46.12
Mean Change in Demand	0.12	0.12	0.12	0.12
Panel B. Female Demand on Total Enrollment	8.339	10.906*	8.173	4.356
	(5.655)	(6.193)	(6.523)	(6.475)
R^2	0.919	0.905	0.921	0.930
Mean Dependent Variable	91.8	88.2	80.1	72.4
Panel C. Female Demand on Female Enrollment	12.479**	14.311**	10.312	5.606
	(5.035)	(6.215)	(6.848)	(7.104)
R^2	0.899	0.877	0.901	0.916
Mean Dependent Variable	100.0	94.3	81.0	78.6
Panel D. Female Demand on Male Enrollment	3.230	7.075	5.980	3.207
	(6.548)	(6.592)	(6.311)	(5.984)
R^2	0.937	0.926	0.936	0.941
Mean Dependent Variable	97.4	86.2	75.5	64.9
N	502	502	502	502
F-Statistic	73.64	73.64	73.64	73.64
Mean Change in Demand	0.05	0.05	0.05	0.05

Notes: The sample period is from 2005 to 2010 with 1993 used as the base year in the construction of the instrument. All regressions are population weighted and include province and year fixed effects and province-specific linear time trends. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. The mean change in migration demand is measured in percentage points and is the average annual province-level change in migration demand. Grade level enrollment rates are calculated by dividing the total number enrolled in a given grade by 1/7th of the age 12-17 population. Rates are higher than total secondary enrollment rates because while on time enrollment would suggest that 12 year olds are enrolled in year 1, a number of individuals older or younger than 12 are also included. As a result, rates may be greater than 100. See Maligalig et al., (2010) for a more detailed description of enrollment rate calculations in the Philippines. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.
Sources: POEA, OWWA, DepEd, and author's calculations.

Appendix A Heterogeneity By Grade Level

In Section 3, I assume that parents make the decision whether or not to enroll their child in high school and consider two levels of schooling, high school graduate and less than a high school graduate. I test this empirically by examining the effects of migration demand on aggregate secondary school enrollment. However, examining the effects on aggregate enrollment across all grades may miss potentially interesting dynamics. By testing for differential responses of grade level enrollments to migration demand, it is possible to further shed light on the mechanisms through which migration affects overall secondary school enrollment, namely by identifying the marginal students induced into schooling by changes in migration demand. Understanding both the location of the marginal student in the education distribution and the mechanisms through which they are induced in can help policymakers design policies to increase human capital that are targeted at these students. The responses to migration demand depend on the distribution across grades of unenrolled students from both unconstrained and constrained households as well as the benefits to partial completion of high school. Thus far, by comparing the wage premium for high school graduates compared to non-high school graduates, I have essentially assumed there is no benefit to partial completion of high school. I relax this assumption below.

First, however, consider the case where there is no benefit to partial completion of high school. There will be a reduced probability of drop out in each subsequent year of high school, with the bulk of unenrolled students dropping out prior to year one. Unconstrained households may revise their education decision in response to a change in income or the expected wage premium. Constrained households may revise their decision in response to a change in the expected wage premium or a negative income shock, but they will only be able to respond positively through the income channel if they experience a loosening of liquidity constraints. Since most unenrolled students will drop out prior to year one of high school, I anticipate that there will be a bunching on year one enrollment from either the income channel or the expected wage premium channel.[58]

Now assume there are benefits to partial completion of high school, and students may

[58]Such bunching at year one could also occur due to fixed costs of high school that force a number of students to drop out at this point in their education.

drop out in any grade. Dropout rates in the Philippines decline by grade level.[59] Thus, I anticipate that the enrollment response for both constrained and unconstrained households to the income channel will simply follow where marginal students are located in the education distribution and will have the largest effect on year one with smaller effects on each subsequent year.[60] Again, the wage premium can only increase education for constrained households if they also experience a loosening of the liquidity constraint. One might expect changes in the wage premium to have the largest effect on those entering the fourth year of high school, since labor market conditions are more likely to persist until these students graduate and enter the labor force than for first year students. However, since dropout rates decline by grade level, depending on the probability that parents assign to the chance that labor market conditions will persist, any pattern of enrollment responses is possible. Based on these potential scenarios, the location in the education distribution of marginal students induced into schooling by increased migration demand is ambiguous. I test these predictions empirically in Section 6.4.

[59] Author's calculations from Philippine Department of Education data.

[60] This could, however, be more nuanced for parents with more than one child. In the event that the household receives just enough extra income to send one child to school for one more year, sheepskin effects may mean that the parent may enroll the older student rather than the younger student.

Appendix Table 1. Top Domestic Occupations

Occupation	% of Total	% Female
Farmhand and Laborers	18.17	39.9
General Managers in Wholesale and Retail Tra	6.74	73.5
Rice Farmer	5.96	7.85
Salesperson	4.27	62.0
Corn Farmer	3.39	9.59
Domestic Helper	3.18	88.6
Motorcycle Driver	2.76	1.20
Fisherman	2.05	2.40
Coconut Farmer	1.95	10.6
Market and Sidewalk Stall Vendor	1.93	64.1
Car Driver	1.84	0.75
Carpenter	1.62	40.3
Street Vendor	1.56	0.54
Elementary Teacher	1.36	87.0
Hand Packer	1.30	40.3
Hog Farmer	1.24	71.2
Protective Service Worker	1.17	5.61
Vegetable Farmer	1.11	31.0
Fishery Laborer	1.05	17.1
Hand Launderers	1.03	97.2
Hotel Cleaner	0.94	25.9
Building Construction Laborer	0.89	1.30
Waiter	0.89	51.0
Root Crop Farmer	0.86	33.9
Construction and Maintenance (Roads)	0.77	1.96
Deep Sea Fisherman	0.73	0.87
General Manager (Transport)	0.66	7.80
Messenger	0.66	12.5
Cashiers and Ticket Clerks	0.63	81.4
Sewers	0.62	83.1
Hairdresser	0.60	66.9
Heavy Truck Driver	0.55	0.75
Office Clerk (Other)	0.54	58.2
Bricklayer	0.54	0.76
Secondary Teacher	0.53	73.7
General Managers (Restaurant)	0.52	69.1
Electronics Fitter	0.51	12.9

Notes: This table lists the top occupations for domestically employed Filipinos in 2007.

Source: LFS and author's calculations.

Appendix Table 2. Effect of Total and Female Migration Demand on Total Secondary Enrollment, by Index Type

	Index Type		
	Destination	Occupation	Occupation x Destination
	(1)	(2)	(3)
Panel A. Total Migration Demand Index	10.324***	6.038	4.858
	(3.578)	(5.815)	(3.354)
N	502	502	502
R^2	0.927	0.930	0.930
F-Statistic	46.12	24.06	38.06
Panel B. Female Migration Demand Index	5.452	8.430***	7.875***
	(3.644)	(2.770)	(2.611)
N	502	502	502
R^2	0.931	0.931	0.931
F-Statistic	73.64	71.38	145.74

Notes: The sample period is from 2004 to 2009 with 1993 used as the base year in the construction of the instrument. Column 1 uses the destination-based index which is used for the main analysis. Column 2 creates the index in the same manner, but instead of destinations, it uses 38 occupation categories. Column 3 uses 38 x 32 occupation-destination groups to create the instrument. All regressions include province and year fixed effects as well as province-specific linear time trends. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. The mean change in migration demand is measured in percentage points and is the average annual province-level change in migration demand. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Sources: POEA, OWWA, DepEd, and author's calculations.

Appendix Table 3. Summary Statistics for Base Shares used in Construction of the Bartik-Style Instrument

	Percentile					
	25th	**50th**	**75th**	**SD**	**Min**	**Max**
Algeria	0.00	0.00	0.00	3.47	0.00	17.39
Angola	0.00	0.00	0.00	3.03	0.00	14.00
Australia	0.00	0.00	0.00	7.18	0.00	60.00
Bahrain	0.14	0.26	1.30	2.10	0.00	10.22
Brunei	0.14	0.39	1.13	1.96	0.00	10.34
Canada	0.00	0.08	1.32	2.43	0.00	13.25
Cyprus	0.00	0.00	1.43	2.71	0.00	15.71
Guam	0.00	0.05	0.48	4.21	0.00	35.48
Hong Kong	0.11	0.24	1.60	1.95	0.00	9.48
Ireland	0.00	0.00	0.00	10.91	0.00	100.00
Israel	0.00	0.00	0.00	3.74	0.00	10.09
Italy	0.02	0.24	1.27	2.41	0.00	15.55
Japan	0.03	0.08	0.47	3.46	0.00	21.38
Jordan	0.00	0.00	0.66	2.99	0.00	19.10
South Korea	0.00	0.23	1.48	2.21	0.00	12.27
Kuwait	0.06	0.17	0.84	2.64	0.00	14.20
Lebanon	0.13	0.36	1.07	2.14	0.00	10.31
Libya	0.02	0.15	0.65	2.72	0.00	16.40
Malaysia	0.11	0.31	1.75	1.90	0.00	1.19
Nigeria	0.00	0.14	0.69	3.13	0.00	21.73
Northern Mariana Islands	0.06	0.12	0.85	2.86	0.00	16.62
Oman	0.13	0.38	1.29	2.26	0.00	14.27
Other	0.02	0.12	0.59	2.67	0.00	12.64
Papua New Guinea	0.00	0.03	1.09	2.82	0.00	18.92
Qatar	0.10	0.31	1.17	2.35	0.00	13.24
Russia	0.00	0.08	0.94	2.97	0.00	1.19
Saudi Arabia	0.10	0.21	0.83	2.60	0.00	1.19
Singapore	0.12	0.40	1.22	1.95	0.00	9.96
Taiwan	0.07	0.15	0.95	2.57	0.00	15.14
United Arab Emirates	0.15	0.49	1.43	1.94	0.00	10.09
United Kingdom	0.00	0.00	0.00	4.29	0.00	25.00
United States	0.04	0.18	0.94	3.08	0.00	20.96

Notes: The baseline shares are defined as M_{pi0}/M_{i0}. Summary statistics for the baseline shares are presented for each of the 32 destinations (expressed as percentages). The base year is defined as 1993. The unit of observation is the province, and 84 provinces are included in the analysis. The category "Other" includes migrants to all destination countries besides the 31 listed here. 2% of observations fall in the "Other" category.
Source: POEA, OWWA, and author's calculations.

Appendix Table 4. Effect of Philippine GDP on Number of Departing Migrants

	Log GDP		Log GDP
Algeria	-20.245	Lebanon	9.793
	(14.886)		(9.783)
Angola	5.131	Libya	-1.185
	(4.112)		(0.739)
Australia	-0.029	Malaysia	-14.327
	(5.566)		(7.395)
Bahrain	-2.570	Nigeria	0.077
	(4.884)		(3.323)
Brunei	2.457	Northern Mariana Islands	0.096
	(2.562)		(4.808)
Canada	-6.720	Oman	-12.982
	(3.549)		(8.091)
Cyprus	6.306	Other	-1.793
	(10.446)		(1.276)
Guam	-7.734	Papua New Guinea	-0.505
	(7.315)		(0.926)
Hong Kong	-6.380	Qatar	-0.323
	(3.437)		(5.842)
Ireland	-3.445	Russia	-4.955
	(4.084)		(5.512)
Israel	-0.889	Saudi Arabia	0.954
	(1.732)		(6.155)
Italy	0.181	Singapore	-9.278*
	(2.319)		(4.258)
Japan	18.597*	Taiwan	-3.765
	(9.272)		(7.071)
Jordan	7.113	UAE	4.541
	(3.987)		(2.817)
South Korea	-13.429	United Kingdom	-3.559
	(10.367)		(4.397)
Kuwait	0.976	United States	-19.170*
	(1.871)		(7.849)

Notes: Each cell represents a separate regression of the log number of migrants on log GDP in the Philippines and the top 10 destination countries for OFWS in each of the 32 destinations used in construction of the migration demand index. The time series is from 1992 to 2009.

Source: POEA, OWWA, WDI, and author's calculations.

Appendix Table 5. Effect of Baseline Destination-Specific Migration Rate on Change in High School Enrollment Rate

	Pre-Period	Post-Period	Full Sample		Pre-Period	Post-Period	Full Sample
Algeria	-67.670	-1392.519	-638.118	Lebanon	51.557	-86.430	-8.137
	(2427.689)	(3524.548)	(2057.687)		(59.319)	(85.743)	(50.221)
Angola	-207.951	-756.388	-454.732	Libya	-5.791	-4.809	-5.366
	(1319.069)	(1841.143)	(1098.809)		(24.768)	(35.834)	(20.961)
Australia	689.174	10656.617	4965.825	Malaysia	-11.848	13.102	-0.979
	(7147.079)	(10398.928)	(6064.321)		(8.118)	(11.672)	(6.862)
Bahrain	2.203	10.646	5.868	Nigeria	58.404	34.243	47.950
	(34.712)	(50.046)	(29.333)		(152.460)	(220.444)	(128.996)
Brunei	-22.738	49.883**	8.768	Northern Mariana Islands	-8.797	-52.478	-27.758
	(16.699)	(24.018)	(14.133)		(36.411)	(52.444)	(30.758)
Canada	-158.161	-161.486	-159.606	Oman	-10.686	139.046	54.372
	(456.752)	(657.799)	(385.784)		(86.868)	(124.977)	(73.361)
Cyprus	-63.828	1329.034	538.462	Other	-0.072	-32.654	-14.119
	(800.557)	(1156.553)	(677.290)		(26.562)	(38.498)	(22.500)
Guam	2.313	-72.079	-29.694	Papua New Guinea	-24.111	-316.706	-153.707
	(61.575)	(89.410)	(52.200)		(194.792)	(275.471)	(163.248)
Hong Kong	-1.580	-1.907	-1.722	Qatar	2.617	19.678	9.954
	(3.585)	(5.175)	(3.031)		(10.750)	(15.602)	(9.112)
Ireland	3322.300	-1.01e+04	-2426.762	Russia	-47.151	456.172	170.619
	(8928.155)	(13006.084)	(7580.403)		(359.627)	(519.576)	(304.232)
Israel	-2216.072	-6637.257	-4158.360	Saudi Arabia	-0.164	-0.179	-0.170
	(4426.718)	(6308.695)	(3721.969)		(1.076)	(1.550)	(0.909)
Italy	-21.201	10.809	-7.316	Singapore	-19.797	-94.196**	-52.946**
	(103.436)	(149.221)	(87.431)		(30.703)	(43.050)	(25.639)
Japan	-0.674	-2.220	-1.341	Taiwan	-1.532	-5.856	-3.413
	(2.272)	(3.291)	(1.924)		(4.842)	(6.964)	(4.087)
Jordan	83.597	150.931	112.627	UAE	2.131	4.908	3.349
	(792.773)	(1149.835)	(671.648)		(8.392)	(11.981)	(7.061)
South Korea	-214.572	166.267	-49.729	United Kingdom	-2160.414	303.421	-1101.018
	(130.856)	(189.396)	(110.927)		(4769.007)	(6934.382)	(4044.996)
Kuwait	-2.720	4.709	0.505	United States	-2.174	-51.719	-23.658
	(34.455)	(49.668)	(29.114)		(38.213)	(55.094)	(32.296)

Notes: The unit of observation is the province-year. In the pre-period, there are 628 observations, and the sample period is from 1993 to 2000. In the post-period, there are 498 observations, and the sample period is 2006 to 2011. In the full sample, there are 1,126 observations, and the sample period is 1992 to 2000 and 2006 to 2011. All regressions include year fixed effects. The dependent variable, the change in enrollment, is expressed as a percent. The destination-specific province migration rate at baseline is also expressed as a percent. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, LFS, and author's calculations.

Appendix Table 6. Identification Check for Gender-Specific Demand Indices

	Effect of Male Migration Rate on Female Index	Effect of Female Migration Rate on Male Index
	(1)	(2)
	0.066	-0.196*
	(0.109)	(0.104)
N	501	501
R^2	0.982	0.985

Notes: The sample period is from 2005 to 2010 with 1993 used as the base year in the construction of the instrument. All regressions include province and year fixed effects as well as province-specific linear time trends. Robust standard errors clustered at the province level are in parentheses. The unit of observation is the province-year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.
Sources: POEA, OWWA, DepEd, and author's calculations.

Appendix Table 7. Check for Pre-trends in the Enrollment Rate

	Change in Enrollment Rate		
	Total Public	Female Public	Male Public
Share OPA	-0.868	-1.487**	-0.326
	(0.600)	(0.629)	(0.668)
N	154	154	154
R^2	0.238	0.225	0.234

Notes: The sample period is from 2002 to 2004, and the dependent variable is the change in the enrollment rate. All regressions include year fixed effects. Robust standard errors are clustered at the province level. The unit of observation is the province-year. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Sources: DepEd, OWWA, POEA, and author's calculations.