

THE RELATIVE QUALITY OF FOREIGN NURSES IN THE UNITED STATES*

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Abstract

We examine the relative quality of foreign educated nurses using wages as a measure of skill. Philippine-educated nurses enjoy a wage premium that is not explained by observed differences in worker or job characteristics. We reconcile the results with a Roy model featuring endogenous skill acquisition and provide some empirical evidence of “double-selection” into nursing and migration. Our results suggest that the wage premium is likely driven by strong positive selection into nursing among Filipinos resulting from high and heterogeneous returns to the occupation due to active government support for nurse migration in the Philippines.

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1 Introduction

The number of foreign educated nurses working in the United States has increased rapidly over the last few decades. In the mid-1980s, 6 percent of nurses taking the licensure examination (NCLEX) were foreign-educated and this proportion increased to close to 20 percent in the mid-2000s. The US has also recently become the world's largest importer of nurses, surpassing the United Kingdom, which has historically depended on foreign nurses to a larger extent (Aiken 2007). The composition of foreign nurses has also changed markedly over time, and the Philippines has emerged as the single largest source of foreign nurses to the US, accounting for over half of all nurses imported in the last two decades. Future increases in the demand for health care due to aging of the population, the passing of the Affordable Care Act and a potential shortage of primary care physicians makes it almost inevitable that the United States will have to rely more heavily on foreign nurses, even if the supply of native nurses continues its recent upward trend (Auerbach et al. 2011).

Nevertheless, the importation of foreign registered nurses (RNs)¹ to satisfy the demand for nurses raises a number of important concerns. These include whether differences in training, language and culture result in lower quality care, and whether the importation of foreign nurses exert a negative impact on the wages and working conditions of native nurses, thereby resulting in native nurse displacement.² Furthermore, there are also ethical concerns arising from potential brain drain that might negatively impact the health systems of source countries.

This paper examines how foreign educated nurses differ from native nurses in terms of observable characteristics and quality measures —wages in particular— and interpret these quality differentials within the framework of the Roy model of occupational choice.

Using data from the US Census and the National Sample of Registered Nurses (NSSRN), we find that foreign nurses, in particular Filipinos, tend to work in more demanding settings

¹In this study, we focus on Registered Nurses (RNs) as a category distinct from Licensed Practice Nurses (LPNs). RNs have to go through more training (2 years in nursing school to obtain Associate's degree in the US) than LPNs (1 year in vocational training). RNs typically have more medical and supervisory responsibilities as compared to LPNs.

²A representative of the American Nurse Association (ANA) giving testimony in 2008 in Capitol Hill stated that "The ANA opposes the use of immigration as a means to address the growing nursing shortage" and that "In the end, ANA is concerned that the influx of foreign-educated nurses only serves to further delay debate and action on the serious workplace issues that continue to drive American nurses away from the profession." (ANA, 2008)

and maintain less desirable schedules —they are more likely to work in hospitals, work full-time, and do shift-work, relative to their native counterparts. In terms of educational background, the majority of foreign nurses have at least a bachelor’s degree, whereas a larger fraction of natives have an associate degree. A more educated nurse workforce has been associated with better patient outcomes and higher nurse productivity (Aiken et al. 2003 and Bartel et al. 2014). Hospitals have also been shown to attract nurses of higher unobserved ability (Hirsch and Schumacher 2007). Therefore, at least in terms of their education levels and place of work, foreign nurses appear to have higher levels of skill compared to native nurses.³

Next, we focus on quality differences between foreign and native nurses beyond those suggested by their observed characteristics. Absent direct productivity measures, we use wages as a proxy for skill. Using Census data from 1980 to 2010, we find striking evidence of a positive wage premium for Filipino nurses relative to US-born nurses. The premium is less than 2 percent in 1990, reaches a maximum of 8.5 percent in 2000, and decreases to 6 percent in 2007 and 2010. This wage premium cannot be explained by differences in demographics, education, location or detailed job characteristics (such as setting, part-time status, shift work and hospital unit). Interestingly, the observed wage premium for Filipino nurses does not extend to other foreign nurses, who appear more comparable to native nurses.⁴ Moreover, we present several pieces of evidence suggesting that the observed wage premium for Filipino nurses reflect actual quality differences and not just unobserved characteristics of the job that carry a higher wage but are unrelated to skills, such as working nonstandard schedules.

To explain why Filipino nurses enjoy a wage premium relative to their native counterparts, we turn to the Roy (1951) model of occupational choice. Active support of the Philippine government for the migration of nurses makes nursing one of the most profitable occupations. Filipino nurses who migrate to work in other countries earn between 2.5 (if they migrate to Taiwan) and 13 times more (if they migrate to the US) than nurses who remain in the Philippines. Nurses who migrate to Europe or to the US earn about 5 times more than what the average lawyer or CEO makes in the Philippines. In contrast, nursing

³Note that nursing education in the Philippines has been modeled after that of the United States (Institute of Medicine 2011) so a bachelor’s degree in both countries is likely to entail similar skills.

⁴A few recent papers have reported foreign nurses earning more (or at least not less) than native nurses. See Arends-Kuenning (2006), Huang (2011), Schumacher (2011) and Xu, Zaikina-Montgomery and Shen (2010). Ours is the first, however, to focus on Filipinos, to argue that the wage premium is likely to reflect quality differences and to explore selection into the occupation by country. In addition, none of the previous studies controls for shift work, an important dimension in this particular setting.

in the US exhibits one of the lowest wage dispersion levels among major skilled occupations, and although it pays relatively well, other professions such as medicine, law and business are associated with higher salaries and prestige. With the possibility of international migration, the Roy model predicts that the higher and more heterogeneous returns to nursing compared to any other occupation in the Philippines (a result of the Philippines' policy of nurse exportation), are likely to generate strong positive selection into nursing. Moreover, given that the US offers the highest wages, it is likely that Filipino nurses working in the US are drawn from the upper tail of the skill distribution of nurses in the Philippines.

We find that Filipino nurses are positively selected along a number of observable characteristics. Nurses in the Philippines are more likely to come from higher-educated families compared to other women with a bachelor's degree. The opposite is observed for native nurses in the US. Furthermore, among Filipino nurses, those who migrated to the US are more likely to come from higher-educated families relative to those who migrated to other destinations. They are also more likely to come from the upper end of the nurse wage distribution in the Philippines. Overall, these findings support the Roy model, which predicts positive selection into the nursing sector in the Philippines and positive sorting of nurse migrants to destinations that offer the highest wages. These effects are likely to result in the observed wage premium for Filipino nurses in the US.

Understanding the nature of the large scale inflow of foreign-educated nurses is particularly important given the widespread reliance on foreign-educated nurses in the US and other developed countries health-care systems and the importance of nurses for health care productivity (Propper and Van Reenen 2010 and Bartel et al. 2014). Our findings have important implications for the use of foreign RNs to address current and future nurse shortages. First, we find no evidence that foreign educated nurses, in particular Filipinos, are of lower quality than native nurses. It is difficult to imagine a situation in which Filipino nurses provide a lower quality of care and yet are paid significantly more than native nurses. Second, our results mitigate concerns raised by native nurse organizations that hospitals prefer to hire foreign nurses because they can pay them lower wages, plausibly driving down wages for natives.⁵ Finally, our analysis suggests that international demand for nurses is

⁵In a testimony to Congress in 2008, a representative from ANA stated that "In addition, ANA is concerned that immigrant nurses are too often exploited because employers know that fears of retaliation will keep them from speaking up" and that "their complaints are very similar to those that I have heard made by literally hundreds of other immigrants. They were promised that they would be employed as RNs, but were made to work as lesser-paid staff; they were made to work unreasonable hours; they were not paid overtime." (ANA, 2008)

likely to affect, at least in the medium to long run, both the quantity and quality of individuals choosing nursing as a career in sending countries. Therefore, hiring foreign nurses does not necessarily imply that nurse migration depletes them of their healthcare workforce, especially for countries with the capacity to expand the supply of healthcare professionals such as the Philippines, India and Korea.⁶

Beyond the immediate policy relevance of this phenomenon, our paper also contributes to the growing theoretical and empirical literature on high-skill migration, self-selection and endogenous skill acquisition by providing an in-depth empirical case study on a single profession and sending country. Our paper is close in spirit to a growing literature based on the Roy (1951) model that examines patterns of self-selection among migrants (Chiquiar and Hanson, 2005, McKenzie and Rapoport, 2010, Grogger and Hanson, 2011 and Abramitzky, Boustan and Ericksson 2012). Our analysis also lends support to the idea that the possibility of emigration could increase the expected returns to skill acquisition, possibly resulting in a higher quantity and quality of skilled individuals in the source country (Clemens 2007, Gibson and McKenzie 2011, Docquier and Rapoport 2012). Our paper is one of the first to explore, both theoretically and empirically, how variation in the probability of emigration by profession (in this case driven by sending government policies) affects the occupational choice and distribution in the country of origin. Our empirical evidence showing that the most skilled migrants settle in the US—the destination country that offers the highest wages for nurses—and that it is the most popular destination is consistent not only with positive selection but also positive sorting (Grogger and Hanson 2011) of foreign nurses.

The rest of the paper proceeds as follows. The next section describes the background of foreign educated nurses in the US. Section 3 outlines the data used and the descriptive statistics. The empirical specifications and results are presented in Section 4. Section 5 provides an interpretation of the empirical findings within the context of the Roy model. Section 6 concludes.

2 Background

Foreign educated nurses have been a part of the US workforce since the 1940s (CGFNS 2009). However their recruitment has varied significantly through time, shaped by changes in the

⁶See Section 5.4 for a discussion of the welfare effects of a policy of nurse exportation.

domestic supply and demand for nurses and by immigration laws. The share of foreign RNs in the nursing labor force increased from 4 percent in 1970 to 8 percent in 2010; their share grew every decade, except in the 1980s where it stayed relatively constant. The observed growth in the share of foreign RNs is similar to that of foreign educated workers with a bachelor's degree or a graduate degree.

Examining the flows allows for a better characterization of the fluctuations in the recruitment of foreign RNs. Figure I presents data on the number of first time takers of the board exam for RNs in the US (NCLEX) by foreigner status. As observed, since 1983, there have been two periods of significant increase in the number and share of foreigners taking the exam. The first coincides with a decline in the number of native nurses entering the labor force in the second half of the 1980s and the subsequent approval of the Nursing Relief Act of 1989, legislation that created the H-1A visa category for registered nurses for a period of 5 years. Under the Act, there were no limits placed on the number of nurses who could enter the US under this visa category. The Nursing Relief Act expired in 1995, which left nurses without a special category of their own.⁷ As most nursing positions do not require a bachelor's degree, they cannot be filled by foreigners on an H1-B visa. Since 1995, most foreign nurses have to obtain a permanent visa or green card which typically involves a lengthy process, as the requests from some countries such as India, the Philippines, and China, always exceed the yearly quota.

The second spike in the share of foreign nurses taking the exam once again followed a period of continuous decline in the number of native nurses taking the exam. Starting in 2000, the share of foreign nurses increased to unprecedented levels, reaching an all time high of 22 percent in 2006, when Congress passed a legislation that allocated 50,000 immigrant visas exclusively for nurses, physical therapists and their families. The increase since 2000 also reflects important changes that have greatly facilitated the hiring of foreign nurses beyond changes in immigration laws. First, the number of US based international nurse recruitment firms experienced a ten-fold increase since the late 1990s (Pittman et al. 2007). Second, the licensure exams (NCLEX) started being offered overseas beginning in 2005 - prior to that, candidates had to apply for a temporary visa to take the exams in the US.

Immigration laws have also shaped the country of origin composition of foreign nurses.

⁷The exception is the H-1C Nonimmigrant Visa, which is limited to a total of 500 nurses per year and then only to 25 nurses for each state that qualifies. Only hospitals that have been determined by the U.S. Department of Health and Human Services to have a critical shortage of health care workers can apply.

As shown in Table I, which presents the country distribution of foreign nurses by Census/ACS year, before the Hart-Celler Act of 1965 – which replaced the country quota system with preference categories based on family and job skills —most foreign nurses came from Canada and Western Europe. The new legislation shifted the country composition of migrants to the US, with many more people coming from Asia and Latin America. In the particular case of nurses, the law led to thousands of nurses from the Philippines migrating to the US. For the last several decades, the Philippines has been the primary source of foreign educated nurses to the US. Today 4 out of 10 foreign nurses are from the Philippines and even larger shares are observed when focusing on flows. In particular, since the early 2000s the share of foreigners taking the licensure exam (NCLEX) who were educated in the Philippines has hovered around 55 to 60 percent (see Figure I). Table I also shows that in the last few years, nurses from India had started to enter the US in larger numbers - nevertheless, they still represent less than 10 percent of foreign nurses.

Why the predominance from the Philippines?

Medicine and nursing constituted integral components of the American Colonial project in the Philippines.⁸ As a result, the Philippines ended up with an Americanized hospital training system that was able to produce nurse professionals with the required training, language, and work culture comparable to that of nurses in the US. With the passage of the Hart-Celler Act of 1965 in the US and the establishment of international migration as a development policy by President Marcos in the Philippines, nurse migration became a large phenomenon in the Philippines. Entrepreneurs in the Philippines set up more nursing schools as the international demand grew, and the number of nursing graduates soared. In the 1940s there were only 17 nursing schools in the Philippines, compared to 170 in 1990 and more than 300 today. Currently, the Philippines export nurses to several dozen countries worldwide.⁹

⁸The islands were an American Colony from 1898-1946.

⁹Confidential data from the Philippines Overseas Employment Administration (POEA) on all contracts of temporary migrant workers leaving the Philippines from 1992 to 2009 suggest that the country exports nurses to more than 50 countries around the world.

3 Data and Descriptive Statistics

We use the 1980 to 2000 Censuses and the American Community Survey three-year aggregates for 2007 (2005-2007) and for 2010 (2008-2010) as our main data sources.¹⁰ The average sample size per year is about a hundred thousand nurses. Table II presents the descriptive statistics of RNs by country of education and by Census/ACS year.¹¹ Important differences stand out between native and foreign nurses, especially Filipinos. Foreign nurses born elsewhere tend to be in between the other two groups on most dimensions.¹² Although Filipino nurses were on average significantly younger than natives in 1980, the slowdown of nurse importation during the 1980s closed the gap. Today, the average age of nurses working in the US is more than 45 years, significantly higher than the average for workers with 2 years of college or a bachelor's degree (45.1 vs. 40.8). The greying of the nursing labor force in the US is a cause for concern given its implications for future projected nurse shortages.

Females continue to strongly dominate the profession in all cases, but foreign nurses are relatively more likely to be male. More than 80 percent of Filipino nurses have at least a bachelor's degree. This is in contrast to most native nurses and other foreign nurses who typically have only an associate degree or diploma. This fact is not surprising given that in the Philippines, a four-year college degree is required to become a nurse. In terms of work setting, Filipino nurses are significantly more likely to work in hospitals and much less likely to work in physicians' offices. Given that higher educational attainment and working in hospitals have been linked to better patient outcomes and higher unobserved ability of nurses (Aiken 2007, Hirsch and Schumacher 2007), at least in terms of observables, the

¹⁰Unlike the Decennial US Census that is conducted once every ten years in the US, the ACS is an ongoing survey that samples a small percentage of the population every year on a range of demographic, housing, social and economic information. Both surveys are conducted by the US Census Bureau.

¹¹The Census does not ask about country of education. We assume that a nurse was educated abroad if she was 21 or older when she first arrived to the US. To calculate the age of arrival we use the variable year of immigration. The variable year of immigration is aggregated in five year periods in the 1980 and 1990 Census (for example, people arriving between 1960 and 1964 are all assigned the same code). We assume all migrants arrived in the middle year of the relevant period (1962 in the example above).

We estimate that about 80 percent of nurses born in the Philippines were educated abroad, 6-7 percent came to the US for their post-secondary education, with the rest arriving when children. We include foreign born nurses educated in the US in the group of native nurses.

The results are robust to changing the allocation rule for country of education.

¹²Naturally, the averages for foreign nurses born elsewhere hide important variation across countries. However, Filipino nurses are an outlier in most dimensions. In particular, their wages are consistently higher than the average wages for each of the other top source countries (Canada, Jamaica, India, Nigeria and Korea).

average Filipino nurse appears more skilled than the average native nurse.

Foreign nurses are heavily concentrated in some areas of the country. Whereas in states like DC, California and Nevada about 1 out of 5 nurses were educated abroad, in other states like Wyoming and North Dakota there are almost none. Filipinos represent a significant share of nurses (larger than 10%) in Nevada, California, New Jersey and Hawaii.

4 Empirical Specification

To investigate differences in labor supply outcomes between native and foreign nurses and to estimate wage premiums for nurses educated abroad, we use the following linear model:

$$Y_{icst} = \alpha + \beta \textit{Filipino}_{icst} + \delta \textit{OtherForeign}_{icst} + \gamma X_{icst} + \lambda_c + \tau_s + \pi_t + \epsilon_{icst} \quad (1)$$

where i is the individual, c is the city, s is the setting (hospitals, nursing home, physician’s office and other health services) and t is the time period.¹³ Y is either a labor supply outcome or the log hourly wage of nurses. *Filipino* and *OtherForeign* are dummy variables that take a value of one if the nurse was educated in the Philippines or in another foreign country, respectively. Vector X_{icst} are individual-level controls, including demographic characteristics (age fixed effects, marital status, race, children), highest level of education dummies (2 or 3 years of college, a bachelor’s degree or a graduate degree), and depending on the outcome, dummies for part-time work and shift work. In all specifications, we include city and setting fixed effects. We estimate equation (1) using OLS.¹⁴

4.1 Labor Supply

Table III presents the estimation of (1) for labor supply outcomes. We first look at usual hours of work per week (including zeros). We find that Filipino nurses work about 4 hours more per week than natives, and that the difference is not explained by observable characteristics, in particular, by being more likely to work in hospitals. Looking at how the coefficient changes by year (Figure II) suggests that in recent years the gap narrowed somewhat, but

¹³We use the 1980, 1990, 2000 Census data and ACS three-year aggregate for 2007 and 2010.

¹⁴Probit estimates for labor force participation, shift work, part-time and over-time models are very similar to OLS. Results available from the authors upon request.

it is still large in magnitude and highly statistically significant.

We explore if the longer hours worked per week on average by Filipino nurses are due to differences in participation rates, the likelihood of working extra time or the probability of working part time. Filipinos are more likely to participate in the labor force than natives, but only by about 1 percentage point. Interestingly, they are slightly less likely to work more than 40 hours per week. Therefore, what drives the average difference in usual hours worked per week between natives and Filipino nurses is that the former are significantly more likely, by between 15-18 percentage points, to work part time. Note that the model controls for type of setting dummies, so the difference cannot be explained by the higher propensity of Filipino nurses to work in hospitals. Finally, Filipino nurses are significantly more likely to do shift work,¹⁵ with the difference increasing by 50 percent in the last decade (Figure II). The magnitude of the Filipino dummy coefficient (14 percentage points) is large, and is about the same magnitude as the average likelihood that a native nurse works odd hours.

Outcomes for nurses from other foreign countries are generally in between: they also work longer than natives, but only between half an hour to an hour more. As Filipinos, this difference comes from being less likely to work part time. Other foreign nurses are 6 percentage points more likely to do shift work relative to native nurses.

To the extent that health care providers value full time availability of RNs and their willingness to work night and evening shifts, the ability to hire Filipino and other foreign nurses has clear benefits for healthcare providers. For example, a recent survey conducted by the Texas Department of State Health Services on 274 hospitals in the state found that vacancies in evening and night shifts were reported by employers to be the most severe and difficult to fill (Texas Center for Nursing Workforce Studies 2008).

¹⁵We define a nurse doing shift work if she reported leaving home for work anytime between 5 pm and 4 am. The Census variable used to construct the shift dummy was not included in the 1980 Census.

4.2 Wage Regressions

In the last row of Table III we present the estimation of (1) when the dependent variable is the log of the hourly wage of a RN.¹⁶ ¹⁷The unconditional wage differential between foreign and native nurses is very large —on average, Filipino nurses (other foreign nurses) make about 25 (10) percent more than natives. Controlling for city fixed effects and job characteristics such as setting, part-time and shift dummies reduces the Filipino premium by half. Filipino and other foreign nurses are more likely to live in larger and richer areas. Including education level fixed effects and demographic characteristics as controls reduces the premium further by 6 percentage points. Nevertheless, even after controlling for all observable characteristics, we continue to find a large and highly statistically significant wage premium for Filipino nurses of 5.5 percent. As shown in Figure II, the premium starts at below 2 percent in 1990, reaches a maximum of close to 8.5 percent in 2000, and declines to about 6 in 2007 and 2010.

An important question is whether the wage premium for Filipino nurses reflects quality differences or just unobserved characteristics of the job that carry a higher wage but are unrelated to skills, such as working nonstandard schedules. As discussed above, a premium is estimated even after controlling for a proxy for shift work and for part-time status.¹⁸

Examining the assimilation profiles of Filipino nurses and other foreign nurses provides additional suggestive evidence that the wage premium for Filipino nurses is likely to reflect skill differences. These results are presented in Table IV. If we believe that the longer a Filipino nurse has been in the US the more likely she is to prefer the type of job settings and work schedule characteristic of native nurses, then if the premium is mostly driven by job characteristics it should go down the more years the foreign nurse has been in the US. We find, however, the exact opposite. For the first five years after their arrival to the US,

¹⁶The hourly wage was calculated dividing salary annual income by the product of usual hours worked per week and number of weeks worked last year. The salary annual income was deflated using the CPI, using 1990 as the base year. We dropped hourly wages smaller than 3.5 dollars or greater than 150 dollars. The income variable used to construct the hourly wage includes cash bonuses, which are common in the occupation.

¹⁷Wage regressions exclude 1980 because the shift work variable cannot be constructed for that Census year.

¹⁸To further explore the role of job characteristics in explaining the premium, we ran models with and without dummies for shift work and working part-time to see how the estimated wage premium changes. Additionally, we estimate a model that includes an interaction term between the Filipino dummy and the shift work dummy to test if the premium is driven primarily by Filipino nurses doing shift work. Our findings suggest a very limited role of shift work and part-time status in explaining the estimated wage premium for Filipino nurses. The coefficient of interest changes little when these variables are added and the coefficient on the interaction term is small and not statistically significant. Results available upon request.

Filipino nurses earn less than natives. This result is fairly typical of all immigrants, not only nurses. It takes time for a worker to find the best match for her skills and to develop host countries specific skills, such as language and knowledge of the culture. The premium becomes positive if the nurse arrived 6 to 10 years before and increases to 8-12 percent after. Note that the increase in the premium is unlikely to be explained by selective return migration —Appendix Table A1 shows that the size of arriving cohorts of Filipinos hardly decreases across census years, at least while the cohorts are of working age. Furthermore, as the US the destination of choice for migrant nurses, foreign nurses who migrate to the US typically settle as permanent migrants (Aiken 2007).

For foreign nurses educated outside the Philippines, the wage premium is negative and statistically significant when they first arrive, and although it becomes less negative with time in the US, in contrast to Filipino nurses, there is little evidence of a significant positive wage premium even for nurses that have been in the country for two decades. We estimate a positive and significant premium after nurses had been in the US for more than 20 years, albeit much smaller than for Filipinos.

Finally, we explore if English skills are likely to explain the observed wage premium as English is one of two official languages in the Philippines. We divide foreign nurses into Filipinos, those from other English speaking countries (Canada, India and Jamaica) and the rest. We find that after including all sets of controls, Filipinos earn 5.5 percent more, nurses from other English speaking countries earn 1.6 percent more and the rest earn 4.7 percent less than comparable natives. All coefficients are statistically significant. This implies that roughly a quarter of the wage premium associated with Filipino nurses might be due to their English skills.

Wage regressions using the National Sample Survey of Registered Nurses and the 2008 California Survey of Registered Nurses

In this section, we discuss wage regressions using two alternative datasets, the National Sample Survey of Registered Nurses (NSSRN)¹⁹ ²⁰and a survey of registered nurses conducted

¹⁹The NSSRN has been conducted approximately every four years since 1977. However, we restrict our analysis to 1988-2004, years for which the variable hospital unit was included in the data. The earlier years and 2008 do not include this variable.

²⁰We follow Aiken and Cheung (2008) suggestion to use the Census as the main source to study foreign nurses. In their own words: "We believe that Census data is the most reliable source for estimating foreign educated nurses in the stock of current nurses. . . The NSSRN provides a richer array of data on foreign-educated nurses. However compared to Census data, the NSSRN appears to significantly underestimate the

by the California Board of Nursing. These datasets allow us to explore the role of additional job and individual characteristics that are not available in the Census in explaining the wage premium. In particular, the NSSRN allows us to control for more detailed job setting categories,²¹ for the hospital unit in which the nurse works and for whether she works for a temporary agency. The main advantage of the California Survey of Registered Nurses is that it has information on years of experience as a registered nurse,²² tenure in most recent position, whether her position offers health insurance or a retirement plan, and indicator variables for nurses working for temporary agencies or as travel nurses. Information on years of experience is particularly valuable as it allows us to test if Filipino nurses have more experience, conditional on age, than natives (either because they graduate younger or because they are less likely to temporarily drop out of the labor force) and the extent to which differences in experience might explain the wage premium.

In Table V we present results of the estimation of (1) using the NSSRN.²³ The estimated wage premium for Filipino nurses is very similar to the one estimated using Census data — 5.3 percent when demographic, education, geographic²⁴ and job characteristics controls are added, suggesting that more detailed job setting categories and working for a temporary agency do not explain the premium. Restricting the sample to nurses working in hospitals increases the coefficient to 8 percent. Adding hospital unit fixed effects to the model only slightly changes the coefficients implying that wage differences are observed within unit and are not driven by Filipinos working in better paid units.²⁵ The estimated wage premium for

number of foreign educated nurses in the U.S." Our own calculations also suggest high underreporting. Additionally, the federal government discontinued the NSSRN (the last year was 2008, no survey was conducted in 2012).

²¹We use 5 categories with Census data and 11 with the NSSRNs.

²²When using the Census, we approximate (potential) experience with age. The California survey asks explicitly for how long has the nurse practiced as an RN, excluding years since graduation during which she did not work as an RN.

²³Descriptive statistics of the NSSRN are presented in Appendix Table A2.

²⁴The survey does not include a city identifier, only a state identifier. Our models include state fixed effects and state fixed effects interacted with a dummy for living in a metropolitan area.

²⁵In a separate analysis we also examine whether foreign nurses tend to be assigned to skill-intensive units within hospitals. We proxy for skill intensity using the average education level of native nurses in the hospital unit as measured by the share of native nurses with at least a bachelors degree working in that unit. Using the 1988 to 2004 NSSRN, we create a ranking of hospital unit skill intensity by regressing a dummy for whether a native nurse has a bachelors degree of more on indicator variables for hospital unit, controlling for year fixed effects and state*MSA fixed effects. We find that the ICU is by far the most skill-intensive unit followed by labor/delivery. Using this ranking, we examine whether Filipino nurses and other foreign nurses are more likely to report working in the ICU (the most skill-intensive unit) and labor and delivery unit The results are reported in Appendix Table A3. We find that Filipinos are about 5 percentage points (or about 30%) more likely to report working in the ICU while other foreign nurses are about 2 percentage

other foreign nurses in the full specification is small, positive and only marginally significant.

Using the California Survey of Registered Nurses our estimate of the premium is similar to the one using the Census, even though we are focusing on just one state. Interestingly, we find that Filipino and other foreign educated nurses have about 1.5 more years of experience than comparable natives, but have a shorter tenure (by close to a year) at their current position.²⁶ As expected, controlling for experience and its square reduces the premium, but only by about 15 percent. Adding tenure and its square has the opposite effect, such that controlling for experience and tenure leaves the premium basically unchanged. Differences between natives and foreign nurses in the probability of working for a temporary agency, as a travel nurse or in a job that offers health insurance or a retirement plan are small, and have no sizable effect on the premium when they are included as controls in the wage regressions.

4.3 Which Hospitals Hire Foreign Nurses?

In this section, we turn to hospital level data to provide additional evidence in support of the idea that the wage premium is likely to reflect real quality differences between native and foreign nurses. Using data from the 1990 American Hospital Association (AHA) Nursing Personnel Survey we show that foreign nurses are hired disproportionately by hospitals with better characteristics.²⁷ The 1990 NPS surveyed all hospitals in the US and collected detailed information about RN employment and wages (including foreign nurse hiring), education, unions, work schedules and basic characteristics about the hospital. Close to 20 percent of hospitals reported sponsoring RN recruitment from foreign countries, with the average hospital hiring close to 10 foreign nurses in 1989, most of them from the Philippines. Table VI compares the characteristics of hospitals that hired foreign nurses to those that did not. As observed, hospitals that hire foreign nurses are more likely to be private, are much larger as measured by the number of beds and RNs, hire more educated nurses and have higher educational requirements for the nurse staff. They also pay higher wages. Given that it is likely that part of the differences is explained by the geographic distribution of hospitals and foreign nurses (for example, regions that attract more migrant nurses could be areas with

points more likely to work in the ICU, even after adding all controls. However, they are less likely to work in the labor and delivery unit.

²⁶See Appendix Table A4.

²⁷Unfortunately, the NPS was only conducted from 1990 to 1992. We use the 1990 sample because it has the highest response rate.

a denser and richer population and have larger and higher quality hospitals), the bottom part of the table presents regressions of hospitals characteristics on a dummy for hiring foreign nurses that control for hospital location (in particular, we include state fixed effects interacted with 6 city size dummies). We find that the coefficients do go down once we control for location, but for most characteristics, the differences remain statistically significant and the magnitudes are sizeable. For example, *ceteris paribus*, hospitals that hire foreign nurses have on average 33 percent more beds, hire 42 percent more RNs, are 34 percent more likely to require a BA for nurse supervisors and 20 percent more likely to require a master’s degree for the chief of nurses. They also pay about 1 to 2 percent more.²⁸

5 Interpretation

What can explain that Filipino nurses earn significantly more than natives, even after controlling for detailed job characteristics? Why is the premium observed only for Filipino nurses and not for nurses from other foreign countries? In this section, we explore plausible explanations to these questions.

5.1 Roy Model of Occupational Choice

In this section we present a very simple model of occupational choice to help explain why we might observe the positive wage premium for Filipinos. It is a simplified version of Borjas (1987).

Assume people can choose between two occupations, nursing denoted by n and non-nursing denoted by 0 , and for simplicity assume both require the same level of investment (for example, a 4-year Bachelor’s degree). People are endowed with skill level ε which is distributed in the population as a standard normal ($\varepsilon \sim N(0, 1)$).²⁹ Average wages as well as the return to skill (r) differ by occupation so that the expected wage for individual i in

²⁸We obtain coefficients of similar magnitude and sign (although these are estimated with less precision) when the explanatory variable of interest is a dummy for hiring Filipino nurses.

²⁹For simplicity, we have assumed a one dimension skill, but the model extends easily to the more general case of occupation specific skills. If skill endowments are positively correlated, one would also observe positive selection in the occupation with relative higher dispersion in wages and negative selection in the other. The case of negative correlation is less interesting, as it is always the case that positive selection is observed for both occupations, independent of their relative dispersion.

each occupation is given by:

$$\begin{aligned} \text{Nursing:} \quad & w_{i,n} = \bar{w}_n + r_n \varepsilon_i \\ \text{Non-Nursing:} \quad & w_{i,0} = \bar{w}_0 + r_0 \varepsilon_i \end{aligned}$$

Assuming individuals choose their occupation to maximize earnings, individual i would choose nursing as long as:

$$\bar{w}_n - \bar{w}_0 > (r_0 - r_n) \varepsilon_i$$

Case 1: Suppose $r_0 > r_n$, the probability that a randomly chosen worker chooses to join nursing is equal to:

$$P = Pr[\bar{w}_n - \bar{w}_0 > (r_0 - r_n) \varepsilon_i] = Pr \left[\varepsilon_i < \frac{\bar{w}_n - \bar{w}_0}{r_0 - r_n} \right] = \Phi(z)$$

The selection of nurses in the nursing sector is given by:

$$E(\varepsilon | nurse = 1) = E \left[\varepsilon | \varepsilon_i < \frac{\bar{w}_n - \bar{w}_0}{r_0 - r_n} \right] = -\frac{\phi(z)}{\Phi(z)} < 0$$

Case 2: Suppose $r_0 < r_n$, the probability that a randomly chosen worker chooses to join nursing is equal to:

$$P = Pr[\bar{w}_n - \bar{w}_0 > (r_0 - r_n) \varepsilon_i] = Pr \left[\varepsilon_i > \frac{\bar{w}_n - \bar{w}_0}{r_0 - r_n} \right] = 1 - \Phi(z)$$

The selection of nurses in the nursing sector is given by:

$$E(\varepsilon | nurse = 1) = E \left[\varepsilon | \varepsilon_i > \frac{\bar{w}_n - \bar{w}_0}{r_0 - r_n} \right] = \frac{\phi(z)}{1 - \Phi(z)} > 0$$

where $z = \frac{\bar{w}_n - \bar{w}_0}{r_0 - r_n}$ and $\Phi(\cdot)$ and $\phi(z)$ is the CDF and PDF of the standard normal, respectively.

These equations show that the popularity of nursing depends mostly on the relative average wage, but selection depends only on the relative returns to skill: positive selection into nursing occurs if and only if the returns to skill in nursing are higher than in alternative occupations ($r_n > r_0$).

Assuming that the average wage in the nursing sector is lower than the average wage in the non-nursing sector ($\bar{w}_n < \bar{w}_0$), Panel A in Figure III depicts the distribution of the population between the two occupations for the cases above assuming $\bar{w}_n - \bar{w}_0$ and $|r_0 - r_n|$ are constant.

Allowing for Migration

Now, suppose that nurses are allowed to migrate but there are no migration possibilities for workers choosing non-nursing occupations (a good approximation of the Philippines' case). We assume that migration increases the average wages for nurses (as would be the case if the source country is a developing country and the host country is a developed country). We further assume that migration also increases the returns to skill. Let $w_{i,n}^m$ be the wages that individual i is expected to earn if she works as a nurse abroad (superscript m is for migrant, h is for home), where

$$w_{i,n}^m = \bar{w}_n^m + r_n^m \varepsilon_i \quad (2)$$

and we assume that $\bar{w}_n^m > \bar{w}_0 > \bar{w}_n^h$ and $r_n^m > r_0 > r_n^h$. Let p be the probability of migration. A risk-neutral worker would choose to become a nurse if:

$$pw_{i,n}^m + (1-p)w_{i,n}^h = p\bar{w}_n^m + (1-p)\bar{w}_n^h + (pr_n^m + (1-p)r_n^h)\varepsilon_i > \bar{w}_0 + r_0\varepsilon_i$$

Define $E(\bar{w}_n) = p\bar{w}_n^m + (1-p)\bar{w}_n^h$, $E(r_n) = pr_n^m + (1-p)r_n^h$ and $z' = \frac{E(\bar{w}_n) - \bar{w}_0}{r_0 - E(r_n)}$. Following the derivation above, it is easy to see that in the case where $E(r_n) < r_0$, the probability that a randomly chosen worker chooses to join nursing is equal to $\Phi(z')$ and the expected ability of individuals who choose nursing is given by $\frac{\phi(z')}{\Phi(z')}$. And in the case where $E(r_n) > r_0$, the corresponding probability is $1 - \Phi(z')$ and the expected ability of individuals is $\frac{\phi(z')}{1 - \Phi(z')}$.

Hence, the assumption of higher average wages and higher returns to skill for migrant nurses imply that the possibility of migration increases the share of the population choosing nursing and increases the average skill level of workers who select into nursing. If r_n^m and p are large enough such that $pr_n^m + (1-p)r_n^h > r_0$ then we should observe a shift from negative to positive selection into nursing. Panel B in Figure III illustrates the three cases (a) autarky with $\bar{w}_0 > \bar{w}_n$ and $r_0 > r_n$ (b) migration with $E(\bar{w}_n) > \bar{w}_0$ and $r_0 > E(r_n)$ and (c) migration with $E(\bar{w}_n) > \bar{w}_0$ and $r_0 < E(r_n)$.

In this analysis we have abstracted from migration costs. Previous work has shown that if migration costs depend on the skill level (negative relationship), including them in the model might change the nature of selection into migration (Chiquiar and Hanson, 2005, McKenzie and Rapoport, 2010). In our case, we can model migration costs as the probability of migration depending on the skill level of the nurse (and continue with the assumption of no migration if in a non-nursing occupation). If so, under the assumption that $r_n^h < r_0$, we would find that people with very low skill levels will choose nursing despite having a close to zero probability of migrating as nurses. What share of the population is in this category depends on how much smaller is \bar{w}_n^h compared with \bar{w}_0 . On the other end, highly skilled people will choose nursing because their high probability of migration guarantees that the returns to skill are higher for nursing than for non-nursing. A share of them, however will not migrate and will drive up the average skill of those who stay. Note that even though there is both positive and negative selection observed for nurses who stay in the Philippines, there is only positive selection for those that end up migrating.

Note also that if the average wage of nurses who end up migrating is much larger than the average wage of non nurses ($\bar{w}_n^m \gg \bar{w}_0$), a probability of migration that depends on skill will guarantee positive selection of Filipino nurses working abroad, even if the returns to skill are not higher abroad. Same applies for the selection of nurses entering the United States; all we need to get positive selection is that the US pays significantly more and that the probability of finding a job here depends on skill. Note that the two other main destinations, UK and Saudi Arabia, do not require passing a board examination to get a nursing license.

5.2 Implications of the Model for the US and the Philippines

In this section, we consider what this simple model implies for selection into nursing in the US and in the Philippines, with and without international migration.

The Nursing Sector in the US and the Philippines

Nursing is a relatively well paid occupation in the US (the ratio of the average hourly wage of nurses to the average hourly wage of workers with a bachelor's degree has hovered at around 1.2 for about 3 decades). Nevertheless, nursing is by no means one of the most profitable occupations, especially as women started entering more prestigious occupations, such as medicine, law and business, in large numbers. Additionally nursing is characterized

by having one of the most compressed wage distributions, suggesting relatively low returns to skill. In fact, out of 41 occupations in the 2000 Census with more than 80 percent workers with two or more years of college, registered nurses have the fourth lowest 90/10 percentile ratio in hourly wages. As a comparison, registered nurses earn on average close to 10 percent more per hour than primary school teachers, yet, the 75/25 percentile ratio for nurses is lower at 1.6 as compared to 1.92 for teachers.³⁰ Therefore, the model implies that nursing will be a reasonably popular occupation in the US, but nurses will be negatively selected.

A somewhat similar situation would be observed in the Philippines in the absence of international migration. Panel A of Table VII shows the average wages for the most common skilled occupations in the Philippines, as well as the 75/25 percentile ratio. As observed, and in contrast to the US, nurses' pay is relatively low.³¹ On the other hand, as in the US, wage dispersion is below average. Therefore, nurses will also be negatively selected but a lower share of the population would choose a nursing career.

Philippines' Migration Policy and Model Implications

To analyze the predictions of the model given the Philippines' migration policy, we start by establishing key important facts.

1. The probability of migrating as a nurse is very high in the Philippines. We have no direct estimate of the share of Filipino nurses that eventually migrates but the comparison of the number of Filipino nurses working in the Philippines and the number working in the US and other countries suggests that it is very large. Using Census data collected in 2000 we count approximately 135 000 Filipino nurses working in their country of origin and close to 80 000 working in the US. Data from the Philippine Overseas Employment Administration (POEA) suggests that close to 40 000 nurses migrated as contract workers to other countries besides the US between 2000 and 2002. These numbers taken together imply at the very least as many Filipino nurses working abroad as working in the Philippines, given that we are missing Filipino nurses who moved to countries other than the US before 2000.

2. The probability of migration for workers in any other skilled occupation is much

³⁰Hirsch and Schumacher (2012) find that registered nurses earn about 15 percent more than other college educated workers, even after controlling for observable characteristics of the workers, demanding working conditions and high levels of skill required in the profession, but that they exhibit one of the lowest wage dispersion levels among major occupations.

³¹Note, however, that the actual wage in the counterfactual scenario of no international migration might be higher if the possibility of migration leads to overproduction of nurses.

lower, especially for women. In Panel A of Table VII, we present the share of overseas Filipino workers (OFWs) by skilled occupation and gender. Because the shares are constructed using Census data, they provide a lower bound as the Census excludes permanent migrants and those who left with their whole family (even if temporarily). As observed, for both women and men, nursing has the largest share of OFWs (23% for men and 19% for women). For women, more than half (53%) of all migrant skilled workers are nurses. The Census estimates are in line with more recent data provided by the POEA—in 2010 6 out of 10 females who left the country to work abroad in a professional occupation were nurses (POEA 2010).

3. The average wage for nurses who migrate is very high. Panel B of Table VII shows the average wage for Filipino nurses by major destination. Even if a nurse ends up migrating to the country with the lowest pay for Filipino nurses, she would still earn about 2.5 times that of the average nurse in the Philippines. Wages in the West are much higher, about ten times the average wage for nurses and four to five times the average wage for lawyers and CEOs in the Philippines. Even the average wage for Filipino nurses in the US is more than double the 99th percentile wage for CEOs in the Philippines.

4. The large cross-country variation in the wages for nurses imply that the returns to migration are very heterogeneous. To the extent that highly skilled nurses are more likely to migrate to countries that offer the highest wages, this would result in higher returns to skill for migrant nurses ($r_n^m > r_n^h$).

Our simple model combined with these four facts strongly suggest that the possibility of migration should have the effect of significantly increasing the popularity of nursing in the Philippines and generating positive selection into the occupation. The latter prediction requires that the probability of migration is sufficiently high and that there is large variation in nursing wages across destinations to ensure that the returns to skill among migrant nurses is high enough such that the expected returns to skill for nurses ($E(r_n) = pr_n^m + (1 - p)r_n^h$) is larger than the returns to skill in the non-nursing sector in the Philippines (r_0).

Note that this model also helps to explain why we observe the premium for Filipinos but not for nurses migrating from other countries. Unlike the Philippines that specializes in the exportation of nurses, in the two other main source countries, India and Canada, the likelihood of migration and thus the return to becoming a nurse relative to other occupations is not as high. Based on Census data, nurses are by far the most common occupation for

college educated Filipinos in the US (18%), whereas the top occupations for Canadians are Managers (8%) and College Instructors (6%) and for Indians are Software Developers (17%) and Computer Scientists (8%). Only 4% of skilled Canadians work as registered nurses (same percentage work as physicians) and even fewer Indians (2% vs. 5% as physicians). Note also, that even if the likelihood of migration was relatively higher than for other occupations, the overall emigration rate of skilled workers is not as high as in the Philippines. Estimates of the emigration rate to OECD countries by skill from Brücker, Capuano and Marfouk (2013) show that relative to the Philippines, workers with at least some college in India and Canada are much less likely to migrate (14% vs 5%).

5.3 Evidence supporting the model

We can test directly if nursing is indeed a more popular occupation in the Philippines than in the US. In 2010, the number of nurses that passed the Philippines Board Examinations was 70,000; in the US, among natives, the same number was 120,000. However, the population of the US is 4.4 times that of the Philippines and its GDP per capita is 12 times higher (there is a very strong cross-country positive correlation between level of development and nurse to population ratios).

Providing direct evidence of a greater degree of positive selection of nurses in the Philippines than in the US to complement the estimation of a positive wage premium for Filipino nurses is a more difficult task. Unfortunately, we lack data on direct measures of worker quality in different occupations in the Philippines (for example, test scores on college admission exams such as the SAT in the US). We attempt to approach this issue by using the educational attainment of her parents (if she is single) and of her husband (if she is married) as proxy for worker quality. The first is based on heritable ability (Behrman and Rosenzweig, 2002, Bacolod, 2007) and the intergenerational transmission of human capital (Currie and Moretti 2003) and the second is based on positive assortative mating.³²

Our data comes from the 1990 and 2000 Filipino Censuses. We focus on women ages 20 to 64 with a bachelor's degree. Unlike in the US or other Western developed countries, most adult single women in the Philippines (about 60 percent) live with their parents,³³

³²It is possible that parent's education could affect children's occupational choices through other channels besides the intergenerational transmission of ability. For example, parent's education could also be proxying for credit constraints. Unfortunately, we cannot separately distinguish between these two channels.

³³In the US only about 25 percent of single women live with either of their parents.

allowing us to observe their parents' education. Table VIII presents regressions where the dependent variables are the educational attainment of the mother, father or husband and the explanatory variable of interest is a nurse dummy. The only additional controls are age dummies. We find that compared to other skilled women, nurses are significantly more likely to have parents (husbands) that have a bachelor's or graduate degree. The differences are large, especially with respect to the parents' education: the probability of having a highly educated parent is between 50 and 100 percent higher (depending on the outcome and year) for nurses than for other women with a bachelor's degree. Panel D in the table presents similar regressions using US Census data and restricting the sample to natives. We concentrate on the education of husbands, given that only a small percentage of single women live with their parents. For all outcomes and years, nurses are about 20 percent less likely to be married to men with higher educational attainment. The results are similar when the sample includes all women with at least some college education.

As an alternative approach to provide indirect evidence of positive selection into nursing in the Philippines, we examine the wage premium among Filipinos in the US who work in non-nursing occupations. While this approach is imperfect, it provides us with some indication as to whether the observed positive wage premium among Filipino nurses is due to being Filipino per se, or from the quality of Filipinos selecting into nursing or nursing related occupations in the US. Appendix Table A5 presents the estimation of (1) for the most common occupations of skilled Filipinos in the US: Accountants, Physicians, Managers, Computer Software Developers, Clinical Lab Technicians, Nursing Aids and Bookkeepers. Positive wage premiums for Filipinos are estimated only for nurses. Filipinos in all other occupations, once we control for observable characteristics, earn between 8 and 27 percent less than natives in the same occupation.

Sorting across destinations

In the previous paragraphs, we have examined positive selection into nursing in the Philippines and the extent to which the evolution of the wage premium could reflect changes in the quality of native nurses. Next, we consider selection into migration among nurses. Specifically, we are interested in the quality of Filipino nurses that choose to migrate to the US.

We present some anecdotal and more systematic evidence that suggests that the US

attracts the best Filipino nurses.³⁴ For example, a widely publicized Washington Post article in 2007 covered the story of Elmer Jacinto, a doctor from the Philippines who obtained the top score in the national medical exam in 2004 and migrated as a nurse to the US soon after.³⁵ This is not an isolated case —since 2000, 3,500 Filipino doctors have retrained as nurses and left for nursing jobs abroad and an estimated 4,000 Filipino doctors are currently enrolled in nursing schools (Labarda 2011). Moreover, surveys have also indicated that the US is the top destination country even for foreign nurses in other countries —a survey of 380 Filipino nurses working in the UK found that at least 63 percent of them were considering moving to another country, most of them to the US (Buchan, 2006).³⁶ The popularity of the US as a destination and the size of the Filipino nurse workforce in the country is consistent with the idea of positive sorting - the relative stock of more-educated migrants in a destination is increasing in the level of skill-related wage differences —as defined by Grogger and Hanson (2011).

For more systematic evidence, in Table IX Panel A we present the wage distribution of nurses living in the Philippines in 2003 and the pre-migration wage distribution of Filipino nurses included in the New Immigrant Survey (NIS) in the same year.³⁷ Note that the number of Filipino nurses included in the NIS is very small so conclusions drawn from the survey should be considered suggestive. As observed, a nurse who ends up migrating to the US was much more likely than the average nurse to belong to the upper tail of the wage distribution of nurses in the Philippines. In Panel B, we utilize data from the 1993-2002 Survey of Overseas Filipinos³⁸ to provide further evidence by using parental education as

³⁴It is worth mentioning that theoretically, our model suggests that nurses select into destinations based on the returns to skill in the different countries and that we have noted that the wage distribution for nurses in the US is relatively compressed. Note, however, that this does not imply that we might observe negative selection in the type of nurses that choose to migrate to the US; what matters for selection is the dispersion relative to other countries, not to other occupations within the US. A compressed wage distribution for nurses is determined at least partially by the nature of the occupation/work and thus likely to be observed in other countries as well, and even more saliently in places like the UK, where most nurses are hired by the government and their wages are based on a strict pay scale.

³⁵His story was covered by The Washington Post, USA Today and the New York Times. Link: <http://www.washingtonpost.com/wp-dyn/content/article/2007/01/07/AR2007010700163.html>

³⁶In Singapore, the attrition rate of foreign nurses in 2005 was 23 percent. In particular, Filipino nurses tend to move to other countries such as the UK, US or Canada upon completion of their employment contracts (Matsumo, 2009).

³⁷The NIS is a nationally representative sample of new legal immigrants and their children to the United States. While the coverage of the NIS is limited only to permanent residents and does not include temporary visa holders, to our knowledge, this is the only survey that has information on pre-migration wages of migrant nurses. This survey would be more applicable to Filipino nurses who are more experienced and have been in the US for a longer period of time. For more information see <http://nis.princeton.edu/>.

³⁸The Survey of Overseas Filipinos is a rider of the Philippines Labor Force Survey. We match the two

a measure of quality. Similar to the evidence presented in Table VIII, we are interested in whether nurses who migrate to the US are more likely to have higher educated parents (the sample is restricted to migrant children of the household head who are nurses). We regress the probability that a migrant nurse has a parent with a college degree on a dummy for the nurse having migrated to the US. We find that nurses living in the US are 50 percent more likely to have a highly educated parent than nurses who had migrated elsewhere.

5.4 Implications of the model for the number of nurses working in the Philippines

Finally, we can use our model to explore how the possibility of international migration affects the size of the nursing workforce in source countries, one of the main issues raised in the debate about nurse importation and brain drain in general (Gibson and McKenzie 2011). Since the model is very restrictive (only one skill type) and is based on strong functional form assumptions, this analysis is only meant to be illustrative.

As discussed in Section 5.1, based on our simple model, the share of the population working as nurses in the Philippines is $\Phi(z)$ under autarky and $(1-p)(1-\Phi(z'))$ with international migration. We can calibrate the simple model to some of the key parameters observed from the data to show that there is a range of p such that $(1-p)(1-\Phi(z')) > \Phi(z)$. That is, the size of the nurse workforce in the source country can actually increase with the prospect of international migration. This occurs if p and \bar{w}_n^m is sufficiently high, but p is not too high such that the majority of nurses migrate. Panel A of Figure IV shows the share of nurses in the Philippines as a function of the migration probability p for key parameters calibrated from the data and measured in dollars per day: $w_0 = 12$, $w_n = 10$, $w_n^m = 60$, $r_0 = 6$, $r_n = 4$ and $r_n^m = 37$.³⁹ Panel B graphs the corresponding selection of nurses as a function of p . From the figures, we can see that when the probability of migration is 0, our model predicts that approximately 16% of the population chooses nursing with the

datasets to obtain data on household characteristics of migrant workers.

³⁹The average wages in nursing and other skilled occupations in the Philippines were computed from the Philippine Labor Force Survey (LFS). The average wage across destinations for nurses working abroad were obtained from the wage information in the 2002 POEA contracts. We proxy for the returns to nursing with the standard deviation of wages for other skilled occupations, nurses and nurses migrating abroad. Note that the average wages for nurses abroad are a lower bound of the actual wages as these are based on nurses who are leaving the Philippines on a contract (for example, if a nurse moves permanently to the UK or US, she will not be covered in the POEA data).

nurses being largely drawn from the lower tail of the ability distribution. As p increases, the share of nurses in the Philippines increases sharply (likely due to the shape of the normal distribution) and reaches a peak of 0.94 when $p = 0.06$, $r_0 \approx E(r_n)$ and all workers choose to become nurses. At this point, selection also switches from negative to positive and remains positive as p increases. The share of nurses in the Philippines remains high, but gradually declines as p increases since a larger fraction of them are migrating. From our highly stylized model, the size of the nurse workforce increases with the possibility of migration compared to autarky so long as p is less than 0.8.

In sum, our simple model highlights that the possibility of international migration can indeed increase the size of the nursing workforce. This suggests that although the most skilled nurses leave, international migration will not necessarily deplete the local nursing workforce. Note, however, that the number and average quality of workers in other occupations always decreases. Which occupations are being displaced by nursing is an interesting question with important implications for the overall welfare effects of Philippines' policy of nurse exportation. The share of foreign nurses' income that is sent back and how remittances are used are also key missing components of the welfare analysis for this type of policy.

6 Conclusion

In recent years, the United States and many developed countries have become increasingly reliant on the importation of foreign registered nurses to satisfy health care demands. The effect of foreign nurse importation on the quality of healthcare and the nursing labor market in both destination and source countries remains a hotly debated issue.

In this paper, we examine quality differentials between foreign and native nurses and show that foreign nurses, in particular Filipinos, earn significantly more than native nurses in the US. This wage premium holds even after taking into account differences in demographic, education, location, or detailed job characteristics between foreign and native nurses. To the extent that wages are a proxy for quality, this suggests that Filipino nurses have higher observable and unobservable skills as compared to native nurses. Moreover, we document that Filipino nurses are more likely to work in hospitals and perform hard-to-fill positions such as evening and night shifts. We also find that foreign nurses are hired disproportionately by hospitals with "better" characteristics such as private hospitals, larger hospitals and

hospitals that pay higher wages, hire more educated nurses and have higher educational requirements for their nursing staff. These findings should alleviate concerns that foreign educated nurses offer a lower quality of care and also provides evidence against the claims by native nurse associations that nurses educated abroad are willing to work for lower wages and that exploitation by employers is a common phenomenon.

We argue that the positive wage premium for Filipino nurses in the US is likely to be driven by strong positive selection into nursing among Filipinos as a result of the the high and heterogeneous returns to the occupation generated by Philippine migration policy. We provide evidence showing that within the Philippines, nurses are likely to be drawn from the upper tail of the skill distribution and that by offering the highest wages, the US tends to attract the best Filipino nurses (and possibly doctors switching into nursing).

Finally, our analysis suggests that understanding the effects of the growing international demand on the size and quality of the healthcare workforce of sending countries is not straightforward. Our simple Roy model suggests that for countries that have the capacity to expand production for exporting nurses such as the Philippines and India, the international migration of nurses does not necessarily imply a depletion of their local nursing workforce. On the contrary, it may expand the domestic supply of nurses, although the prospect of international migration may result in a local nursing workforce that is comprised mostly of young and inexperienced nurses. Furthermore, the higher likelihood of migration for nurses compared to other occupations generates positive selection into the profession. Thus, the best nurses might migrate, but they may not have been nurses if not for the possibility of migration.

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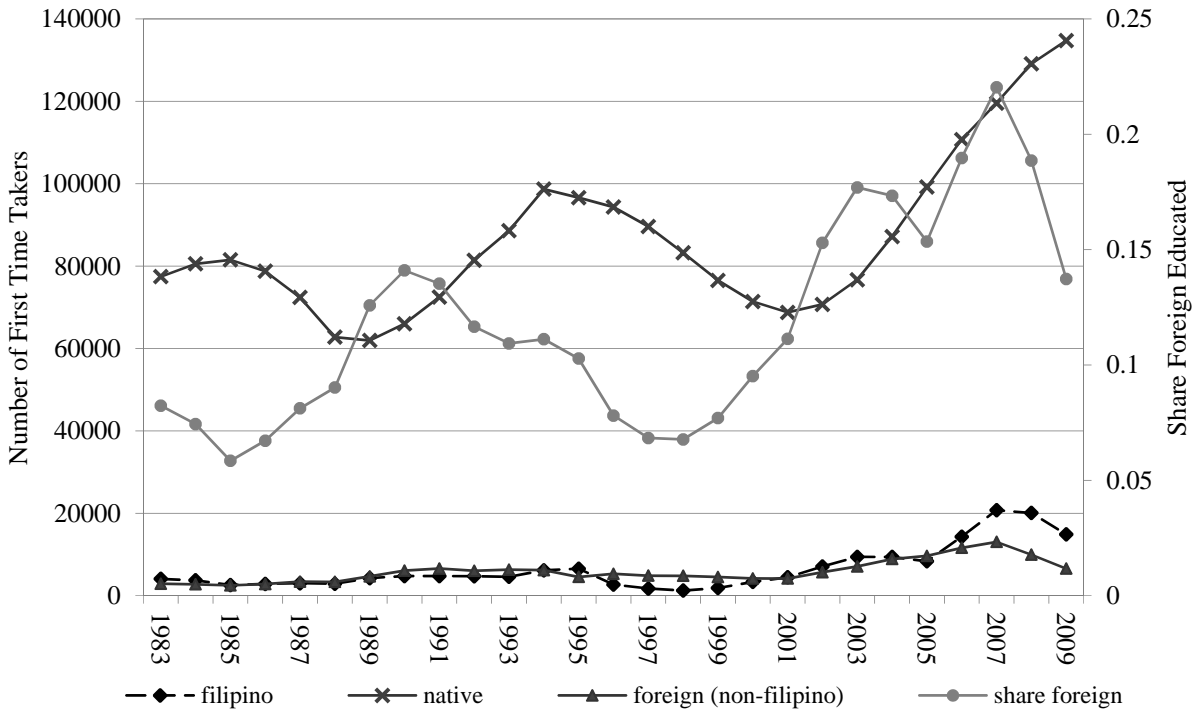
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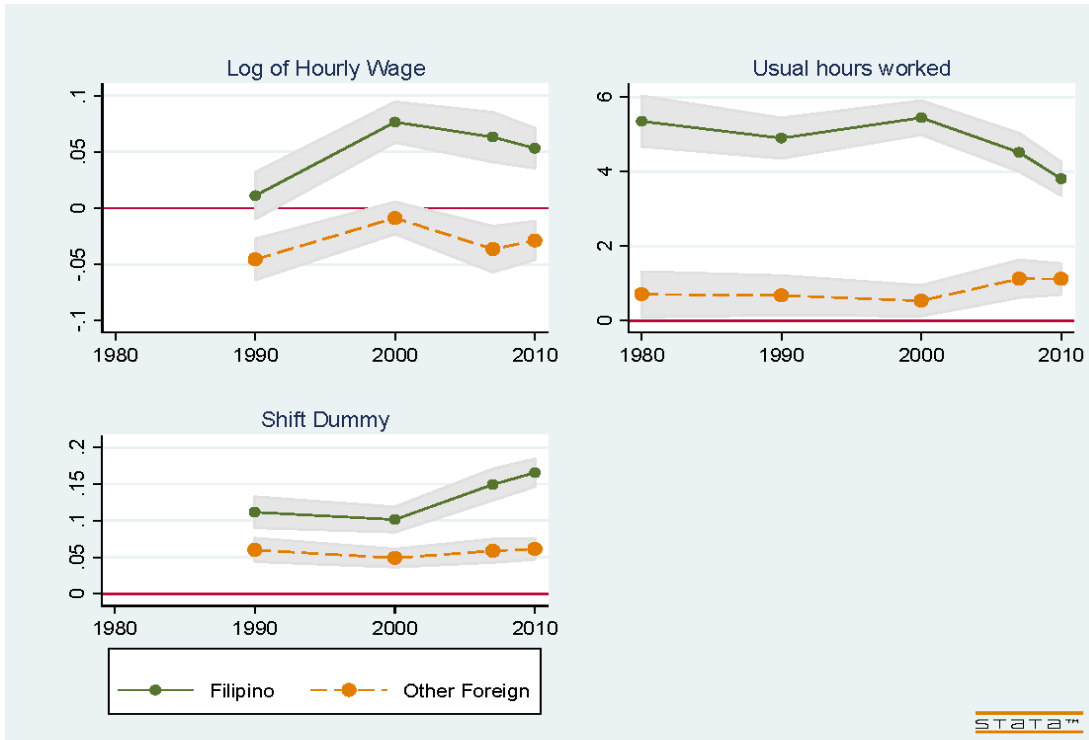
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Figure I
Flow of Nurses by Foreign Status – NCLEX First-Time Takers



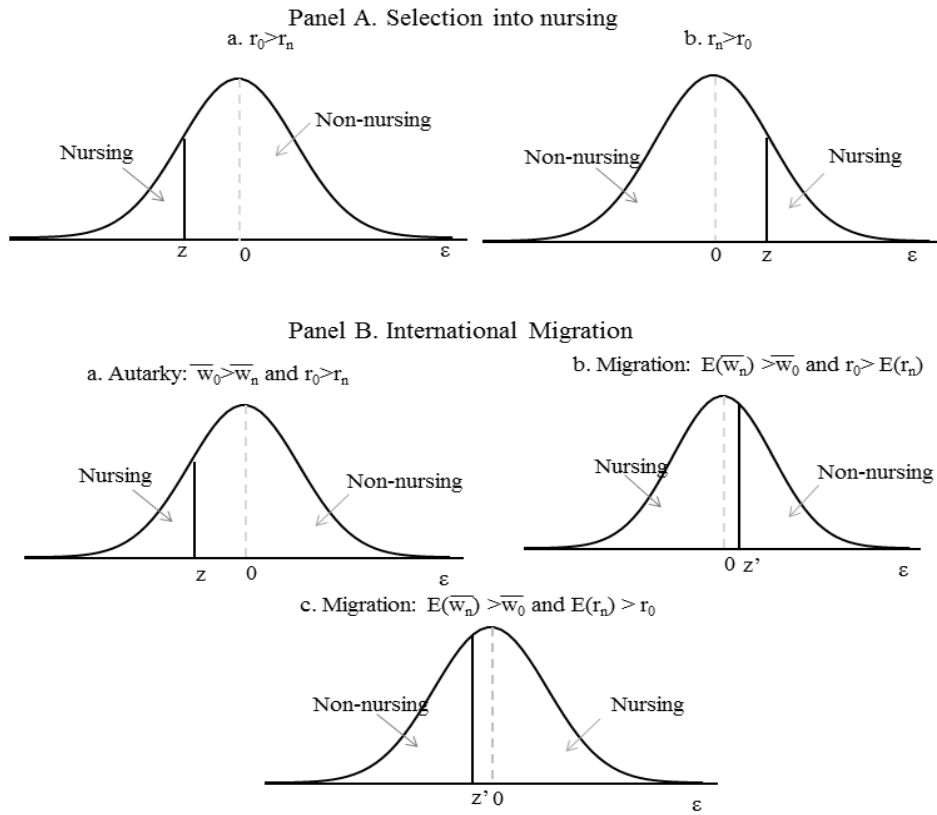
Note. The data is from the National Council of State Boards of Nursing (NCSBN) registered nurse licensure examination statistics (NCLEX). The sample is limited to first-time takers of the examination.

Figure II
Time Variation in Coefficient of Filipino and Other Foreign Dummies



Note: The coefficients are for the Filipino and Other Foreign dummies interacted with Census year fixed effects in specifications with the most comprehensive set of controls (see Table III). Data for wage and shift dummy models do not include 1980 because the shift variable was not included in that Census year.

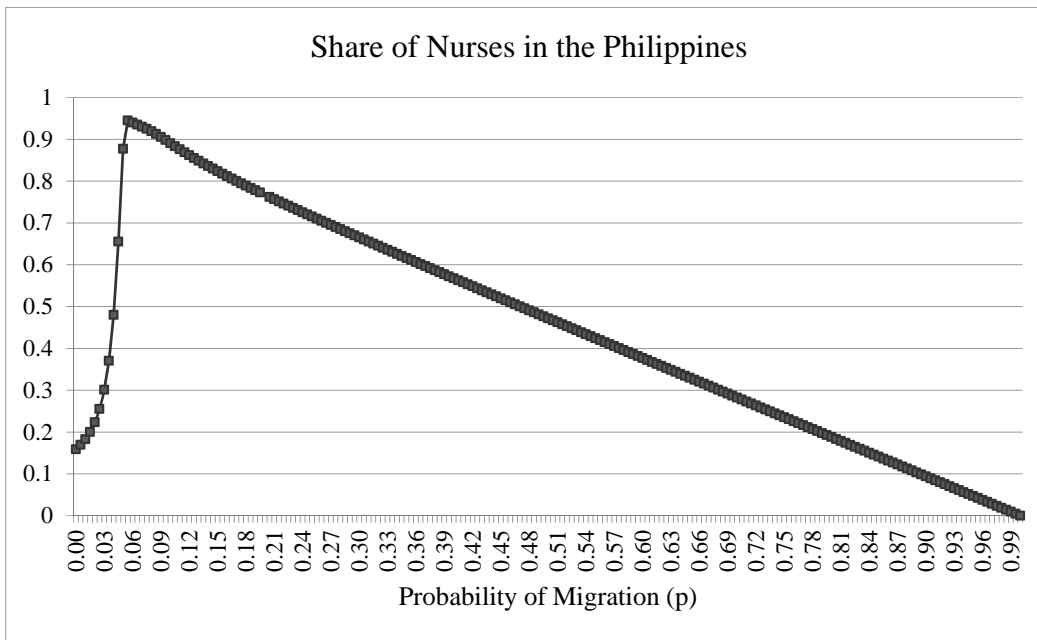
Figure III Model of Occupational Choice



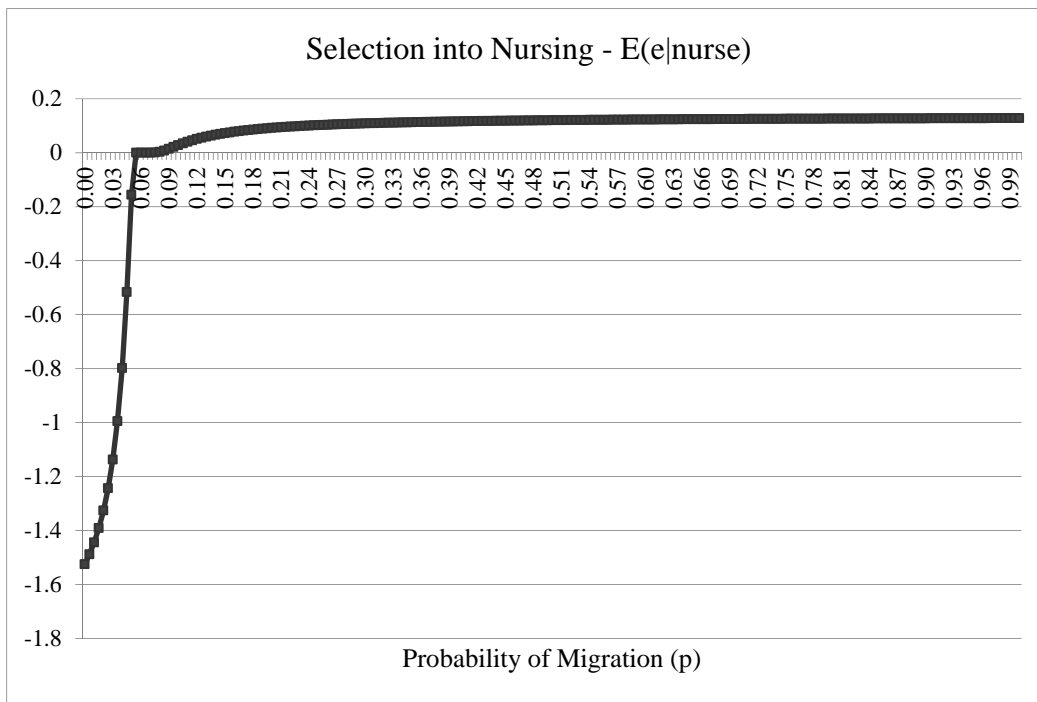
Note. Panel A. keeps constant $w_n - w_o$ and $|r_o - r_n|$

Figure IV

A. Predicted Share of Nurses in the Philippines based on Roy Model



B. Selection of Nurses based on Roy Model



Note. These graphs are based on the Roy model detailed in Section 5.1 calibrated to $w_0=12$, $w_n=10$, $w_{abroad} = 60$ and $r_0=6$, $r_n=4$ and $r_{abroad}=37$. The key parameters were obtained from the Philippine Labor Force Survey and the POEA data. See text for more details.

Table I. Top Countries of Origin of Foreign Nurses Educated Abroad by Census Year
(Share of Total Foreign Nurses)

1950*		1960*		1970		1980	
Canada	0.38	Canada	0.35	Canada	0.25	Philippines	0.27
Ireland	0.12	Ireland	0.08	Philippines	0.10	Canada	0.13
Germany	0.08	Germany	0.08	England	0.08	Jamaica	0.05
England	0.06	England	0.05	Germany	0.07	India	0.05
Scotland	0.04	Philippines	0.04	Ireland	0.07	Korea	0.04
1990		2000		2007		2010	
Philippines	0.35	Philippines	0.35	Philippines	0.40	Philippines	0.40
Canada	0.08	Canada	0.08	India	0.07	India	0.08
Jamaica	0.06	India	0.06	Canada	0.06	Canada	0.05
India	0.05	Jamaica	0.05	Jamaica	0.04	Jamaica	0.04
Korea	0.03	Nigeria	0.03	Nigeria	0.04	Nigeria	0.04

Note. The data is from the US Census and ACS 3-year aggregates. The sample includes Registered Nurses aged 20-70 of all education levels. The years with an asterisk include all nurses born abroad as we cannot distinguish between nurses educated in the US or abroad. See text for the criteria used to determine if a foreign nurse was educated abroad.

Table II. Characteristics of Stock of Nurses by Country of Education and Decade

	In the US			Nurses educated: In the Philippines			Abroad - Except Phil.		
	1980	2000	2010	1980	2000	2010	1980	2000	2010
Female	0.96	0.93	0.92	0.95	0.91	0.86	0.94	0.91	0.89
Age	36.98	43.01	44.80	34.75	43.75	46.56	41.74	45.08	47.10
Single	0.19	0.13	0.15	0.31	0.15	0.12	0.17	0.13	0.11
Child age 0-5	0.19	0.16	0.14	0.30	0.17	0.16	0.22	0.15	0.15
Child age 0-18	0.53	0.56	0.51	0.55	0.65	0.63	0.56	0.60	0.60
Bachelors	0.26	0.39	0.43	0.35	0.80	0.84	0.31	0.41	0.47
Graduate Deg.	0.11	0.14	0.12	0.57	0.10	0.09	0.16	0.18	0.16
Hospital	0.71	0.62	0.62	0.89	0.75	0.77	0.78	0.66	0.62
Nursing Home	0.07	0.08	0.07	0.07	0.13	0.08	0.07	0.11	0.11
Physicians Off.	0.06	0.07	0.05	0.01	0.02	0.01	0.03	0.03	0.02
Other Health	0.04	0.11	0.14	0.01	0.06	0.09	0.03	0.10	0.15
Number of Obs.	61410	111308	86021	1160	3489	3415	2411	5913	4849

Note. The data is from the 1980 to 2000 Census and the ACS 3-year aggregate for 2010 (2008 to 2010). The sample includes Registered Nurses aged 20-70 with at least 1 year of college.

Table III. Differences in Labor Market Outcomes between Foreign Educated Nurses and Native Nurses

<i>Dependent Variable</i>	Mean	No. Obs	(1)		(2)		(3)		(4)	
			Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
Usual Hours Worked per week (inc zeros)	34.14	465,029	4.505*** [0.120]	1.049*** [0.116]	4.239*** [0.125]	0.743*** [0.120]	4.092*** [0.126]	0.682*** [0.120]	4.600*** [0.127]	0.890*** [0.117]
		R ²	0.009		0.017		0.019		0.122	
LFP	0.89	465,560	0.017*** [0.003]	-0.021*** [0.003]	0.018*** [0.003]	-0.023*** [0.003]	0.012*** [0.003]	-0.024*** [0.003]	0.013*** [0.003]	-0.014*** [0.003]
		R ²	0.006		0.006		0.013		0.115	
Part time hrs>0	0.27	433,321	-0.165*** [0.003]	-0.090*** [0.003]	-0.152*** [0.003]	-0.071*** [0.003]	-0.150*** [0.003]	-0.069*** [0.003]	-0.182*** [0.004]	-0.069*** [0.003]
		R ²	0.009		0.032		0.034		0.092	
Over Time hrs>0	0.16	433,321	-0.011*** [0.004]	-0.005 [0.003]	-0.011*** [0.004]	-0.004 [0.003]	-0.009** [0.004]	-0.005 [0.003]	-0.018*** [0.004]	-0.007** [0.003]
		R ²	0.004		0.010		0.011		0.030	
Dummy Shift Work ^a	0.15	340,972	0.139*** [0.005]	0.051*** [0.004]	0.146*** [0.005]	0.058*** [0.004]	0.125*** [0.005]	0.052*** [0.004]	0.139*** [0.005]	0.057*** [0.004]
		R ²	0.006		0.009		0.044		0.058	
Log(hourly wage) ^b	2.71	332,775	0.253*** [0.005]	0.097*** [0.005]	0.132*** [0.005]	-0.001 [0.005]	0.121*** [0.005]	0.000 [0.005]	0.055*** [0.005]	-0.029*** [0.005]
		R ²	0.038		0.108		0.142		0.213	
<i>Controls</i>										
Year FE			X		X		X		X	
City FE					X		X		X	
Sector FE, Job Characteristics ^c							X		X	
Education FE									X	
Demographic Characteristics									X	

Note. Data comes from the 1980, 1990 and 2000 Census and 3-year aggregate ACS for 2007 and 2010. The sample includes all workers aged 20-70 who reported Registered Nurse as their occupation and have at least one year of college education. The coefficient estimates for Filipino nurses and Other Foreign Nurses for each numbered column and Census year corresponds to a separate regression of the dependent variable on a dummy for Filipino nurses and Other foreign nurses (the omitted category is native nurses) controlling for various sets of fixed effects and worker's characteristics. Demographic controls include age dummies, a black dummy, a male dummy, a single dummy, a dummy for children younger than 18, and a dummy for children younger than 6. Education controls include dummies for 2-3 years of college, bachelor's degree and graduate degree. The sector fixed effects include dummies for working in a hospital, a nursing home, in a physician's office and other health establishments. Job Characteristics include a dummy for shift work, a dummy for part-time (less than 35 hours a week), a dummy for over-time (41 + hours a week). Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

^a Shift work models have fewer observations because the sample excludes 1980. The variable needed to construct the shift work dummy was not included in the 1980 Census.

^b Wage regressions exclude 1980 because the shift work variable cannot be constructed for that Census year.

^c Job characteristics are controlled for in the wage regression only. They are excluded from the labor supply models.

Table IV. Assimilation Profile of Foreign Educated Nurses by Country of Education

	Dep Var.: Log(Wage per hour)	
	Filipino	Other Foreign
Arrived to the US:		
0-5 years ago	-0.065*** [0.011]	-0.110*** [0.010]
6-10 years ago	0.033*** [0.010]	-0.052*** [0.009]
11-15 years ago	0.081*** [0.010]	-0.026*** [0.009]
16-20 years ago	0.087*** [0.010]	-0.006 [0.008]
21+ years ago	0.125*** [0.007]	0.024*** [0.006]
R ²		0.247
<i>Controls</i>		
Year FE		X
City FE		X
Sector FE, Job Characteristics		X
Education FE		X
Demographic Characteristics		X
Number of Obs.		332,792

Note. Data comes from the 1990 and 2000 Census and 3-year aggregate ACS for 2007 and 2010. The sample includes all workers aged 20-70 who reported Registered Nurse as their occupation and have at least one year of college education. All coefficients come from one regression: log(hourly wage) on dummies for Filipino nurses and Other foreign nurses interacted with number of years in the US dummies (the omitted category is native nurses) controlling for various sets of fixed effects and worker's characteristics. Demographic controls include age dummies, a black dummy, a male dummy, a single dummy, a dummy for children younger than 18, and a dummy for children younger than 6. Education controls include dummies for 2-3 years of college, bachelor's degree and graduate degree. The Sector fixed effects include dummies for working in a hospital, a nursing home, in a physician's office and other health establishments. Job Characteristics include a dummy for shift work, a dummy for part-time (less than 35 hours a week), a dummy for over-time (41 + hours a week). Almost identical results are obtained when the sample includes data from the 1980 Census but excludes the shift dummy from the analysis. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table V. Wage Differences between Foreign Educated Nurses and Native Nurses: 1988-2004 NSSRN Data

<i>Dependent Variable</i>	(1)		(2)		(3)		(4)		(5)	
	Filipino	Other Forgn	Filipino	Other Forgn	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
Log(hourly wage)	0.081*** [0.011]	0.036*** [0.009]	0.086*** [0.010]	0.034*** [0.009]	0.053*** [0.010]	0.015* [0.009]	0.079*** [0.012]	0.014 [0.010]	0.083*** [0.011]	0.019* [0.010]
Sample	All		All		All		Hospital		Hospital	
Controls										
Year FE	X		X		X		X		X	
State FE, MSA dummy, State*MSA	X		X		X		X		X	
Sector FE	X		X		X		X		X	
Job Characteristics, includes Temp. Agency			X		X		X		X	
Education FE					X		X		X	
Demographic Characteristics					X		X		X	
Hospital Unit FE										X
R ²	0.152		0.172		0.201		0.220		0.232	
No. Observations	121,689		121,689		121,689		68,675		68,675	

Note. Data comes from the 1988, 1992, 1996, 2000 and 2004 NSSRN. We omit the 2008 NSSRN because it doesn't include data on hospital unit. The sample is restricted to registered nurses aged 20 to 70. The coefficient estimates for Filipino nurses and Other foreign Nurses for each numbered column corresponds to a separate regression of the dependent variable on a dummy for Filipino nurses and Other foreign nurses (the omitted category is native nurses) controlling for various sets of demographics, education and job characteristics. Demographic controls include age dummies, female dummy, dummy for children 0-17, dummy for children <6 and a black dummy. Education controls include a dummies for having an associate degree, a diploma or a bachelor's degree. Job characteristics include dummies for working part-time and for working for a temp agency. Sectors include hospital, nursing home, physician's office, schools, nursing education, public health and other. Hospital units include intensive care, general bed unit, emergency room, operating room, outpatient, labor and delivery and, other. Columns (5) and (6) include only nurses who reported working in hospitals. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table VI. Which Hospitals Hire Foreign RNs, Controlling for Hospital Location and Type of Hospital

	Hourly Wages of RNs in:									
	Private	Beds	No. of RNs	Fraction of RNs with Bachelor's	Min BA required for Nurse Supervisor	Min Masters required for Chief	Hourly Wages of RNs in:			
							ICU	Maternal-Child	Medical-surgical unit	Outpatient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign RN	0.143*** [0.022]	117.571*** [9.256]	115.833*** [10.160]	8.211*** [1.069]	0.174*** [0.023]	0.225*** [0.024]	0.113*** [0.008]	0.111*** [0.009]	0.113*** [0.007]	0.118*** [0.009]
Controls	no	no	no	no	no	no	no	no	no	no
Observations	3,246	3,246	2,590	2,688	3,025	3,126	2,311	1,808	2,624	1,984
R-squared	0.013	0.047	0.048	0.021	0.019	0.028	0.086	0.087	0.081	0.081
Foreign RN	0.075*** [0.023]	68.767*** [8.396]	63.557*** [9.963]	4.384*** [0.976]	0.058** [0.023]	0.085*** [0.023]	0.01* [0.006]	0.010 [0.006]	0.011** [0.005]	0.02*** [0.007]
Controls:										
Hospital Type	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
StateXMSA size FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Hospital Service Code	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3,246	3,246	2,590	2,688	3,025	3,126	2,311	1,808	2,624	1,984
R ²	0.240	0.457	0.396	0.447	0.305	0.378	0.679	0.707	0.688	0.664

Note. "StateXMSA size FE" refers to dummies for state interacted with MSA size (6 categories), resulting in a total of 209 groups. Other controls include 17 dummies for hospital type and 13 dummies for the type of service the hospital provides. Robust standard errors in brackets. ***significant at 1%, **5%, *1%.

Table VII. Share of Overseas Filipino Workers (OFWs) and Wages by Skilled Occupation in the Philippines and Top Destinations

Occupation	Panel A. Share of OFWs by Skilled Occupation and Average Wages						Panel B. Wages for Filipino Nurses in Top Destinations	
	2000 Philippines Census				2002 Philippines LFS		POEA Data - circa 2002	
	Males		Females		(Both Sexes)		Destination	Average Daily Wage (US\$)
	Share of OFWs in Occupation	Share of Occ in OFWs	Share of OFWs in Occupation	Share of Occ in OFWs	Average Daily Wage (US\$)	75/25 Percentile Ratio		
Nursing and midwifery professionals	0.23	0.10	0.19	0.53	10.34	1.67	Canada	100.42
Directors and chief executives of corp.	0.02	0.00	0.04	0.00	26.34	2.29	Ireland	115.02
Legal professionals	0.02	0.01	0.01	0.00	23.07	1.81	Kuwait	41.36
Specialized managers	0.04	0.03	0.02	0.02	17.23	2.08	Libya	30.32
Production and operations managers	0.04	0.02	0.01	0.01	16.61	2.08	Saudi Arabia	25.40
Government administrators	0.02	0.01	0.02	0.00	16.51	2.03	Singapore	29.08
School supervisors and principals	0.01	0.00	0.01	0.00	15.40	1.38	Taiwan	21.82
Architects and related professionals	0.12	0.04	0.03	0.00	15.06	1.84	UAE	33.06
Business professionals	0.04	0.05	0.02	0.04	14.46	1.91	UK	90.28
Engineers and related professionals	0.13	0.53	0.04	0.03	13.91	1.80	USA	141.89
Life science professionals	0.04	0.01	0.02	0.00	13.82	1.67		
Health professionals (except nursing)	0.06	0.06	0.04	0.09	13.66	1.98		
Physicists, chemists and related prof.	0.11	0.01	0.02	0.00	13.36	2.14		
Mathematicians, statisticians	0.04	0.00	0.02	0.00	13.09	1.48		
College, university teaching prof.	0.01	0.01	0.02	0.02	12.90	1.58		
Social and related science professionals	0.04	0.01	0.01	0.01	12.55	2.00		
Other supervisors	0.12	0.01	0.03	0.00	11.73	2.05		
Elementary education teaching prof.	0.01	0.02	0.01	0.13	11.60	1.23		
Computer professionals	0.13	0.05	0.07	0.03	11.54	1.69		
Customs, taxation, licensing, welfare prof.	0.02	0.00	0.01	0.00	11.35	1.81		
Librarians, archivists and curators	0.09	0.00	0.00	0.00	11.30	1.78		
Secondary education teaching prof.	0.01	0.01	0.01	0.04	11.24	1.31		
Special education teaching prof.	0.02	0.00	0.02	0.01	10.81	1.53		
Administrative associate professionals	0.02	0.01	0.01	0.02	10.33	2.09		
Technical, vocational instructors	0.03	0.00	0.01	0.00	10.22	1.79		
Life science technicians associated prof.	0.04	0.01	0.01	0.00	10.05	1.65		

Note: The included occupations in Panel A were chosen based on the share of workers with a college degree and a minimum number of workers. All numbers are computed using workers with a college degree. Data comes from the Philippines' 2000 Census and 2002 Labor Force Survey. Numbers reported in Panel B are constructed using Confidential POEA data.

Table VIII. Selection into Nursing in the Philippines and the US

Philippines				
A. Dep Var.: Father's Education (Sample: Single Women)				
	Year = 1990		Year=2000	
	Father College +	Father Grad. Edu	Father College +	Father Grad. Edu
Nurse Dummy	0.111*** [0.014]	0.004 [0.003]	0.143*** [0.013]	0.022*** [0.006]
Mean Dep. Var.	0.233	0.011	0.252	0.027
R ²	0.007	0.001	0.017	0.001
No. Obs.	39,135	39,135	34,026	34,026
B. Dep Var.: Mother's Education (Sample: Single Women)				
	Year = 1990		Year=2000	
	Mother College +	Mother Grad. Edu	Mother College +	Mother Grad. Edu
Nurse Dummy	0.126*** [0.013]	0.007** [0.004]	0.188*** [0.012]	0.031*** [0.006]
Mean Dep. Var.	0.210	0.013	0.280	0.029
R ²	0.010	0.011	0.007	0.002
No. Obs.	45,735	45,735	39,504	39,504
C. Dep Var.: Husbands's Education (Sample: Married Women)				
	Year = 1990		Year=2000	
	Husband College +	Husband Grad. Edu	Husband College +	Husband Grad. Edu
Nurse Dummy	0.126*** [0.010]	-0.003 [0.002]	0.102*** [0.010]	0.002 [0.004]
Mean Dep. Var.	0.538	0.015	0.495	0.045
R ²	0.014	0.003	0.006	0.003
No. Obs.	96,921	96,921	96,609	96,609
USA				
D. Dep Var.: Husbands's Education (Sample: Married Women)				
	Year = 1990		Year=2000	
	Husband College +	Husband Grad. Edu	Husband College +	Husband Grad. Edu
Nurse Dummy	-0.110*** [0.004]	-0.051*** [0.003]	-0.108*** [0.003]	-0.060*** [0.003]
Mean Dep. Var.	0.675	0.313	0.660	0.292
R ²	0.008	0.035	0.008	0.035
No. Obs.	394,599	394,599	532,866	532,866

Note. The data is from the 1990 and 2000 Philippines Census and US Census. The sample is restricted to women aged 20 to 64 with a college degree or more. Each cell corresponds to a separate regression of the dependent variable on a nurse dummy for each Census year. All regressions include age dummies. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table IX. Selection into Migration to the US

Panel A. Hourly Wages of Filipino Nurses in the US in their Last Job in the Philippines Before Migration (in 2003 pesos)			
	New Immigrant Survey (2003)		Philippine Labor Force Survey (2003)
	Healthcare workers	Nurses	Nurses
Mean	67.2	71.8	48.7
25th Percentile	39.2	33.3	35
Median	49.9	52.2	45.4
75th Percentile	85.3	86.6	58.3
No. of obs	62	49	390

Panel B. Education Level of Parents of Temporary Migrant Filipino Nurses Living in the US vs. Other Destinations (Survey of Overseas Filipinos)		
Dep. Var: Dummy for Head of Household having a College Degree		
Nurse living in the US	0.169 [0.060]***	0.182 [0.059]***
Controls	None	Age, Gender, Year FE
R ²	0.018	0.056
No. Observations	477	477
Mean of Dep. Var.	0.348	
Share of Migrant Nurses living in the US	0.171	

Note Panel A: The sample includes nurses aged 25 to 35. Hourly wages of Filipino nurse migrants in their last reported job are deflated using 2003 prices (in pesos) based on the reported year that migrants were employed in their last job before entering the US. For the sample of nurses aged 25 to 35 in the 2003 NIS, the years in which migrants were last employed in the Philippines range from 1987 to 2003.

Note Panel B: Data comes from the 1993-2002 Survey of Overseas Filipinos (SOF) merged with the 1993-2002 October Labor Force Survey. SOF includes workers that have migrated within the last 5 years and are still considered members of a household in the Philippines. Sample is restricted to nurses who are the daughter/son of the household head. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table A1. Cohort Size of Filipino Nurses Educated Abroad by year of Immigration to the US

Census Year	Before 1960	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009
1980	380	1260	5040	9340	7180						
1990	377	1353	5095	8760	8927	10828	10070				
2000	325	1236	4838	8516	9676	13514	13716	18020	8121	154	
2007		571	3715	7041	7946	12376	14348	16970	8940	18906	5914
2010		112	2444	7338	8341	14012	13698	17054	11199	21472	16389

Note. Restricted to nurses aged 20-70. In some cases the size of the cohort goes up. This is likely to be due to undercounting of migrants that have arrived on the relevant Census year. This is either because they arrived after the Census or recently and were not taken into account (for example, if they were living in temporary housing).

Table A2. Descriptive Statistics - National Sample Survey of Registered Nurses 1988-2004

	Native	Filipino	Other Foreign		Native	Filipino	Other Foreign
<i>Demographic characteristics</i>				<i>Setting</i>			
Age	40.10	38.51	43.11	Hospital	0.61	0.79	0.70
Female	0.95	0.91	0.95	Nursing Home	0.07	0.10	0.09
Black	0.05	0.00	0.15	Physicians Offices	0.09	0.04	0.05
Single	0.11	0.16	0.14	Public Health	0.11	0.02	0.08
Child 0-6	0.19	0.27	0.17	School Nurse	0.03	0.00	0.02
Child 0-18	0.56	0.64	0.57	Other	0.08	0.04	0.06
Lives in MSA	0.82	0.95	0.94				
<i>Education characteristics</i>				<i>Unit / Hospital</i>			
Associate D / Diploma	0.72	0.29	0.87	Intensive Care	0.18	0.25	0.18
Bachelors degree	0.28	0.71	0.13	General bed unit	0.36	0.38	0.40
				ER	0.08	0.04	0.06
				Operating Room	0.09	0.07	0.07
<i>Labor Supply Characteristics / working as a nurse</i>				Labor/delivery Room			
Hrs per week	35.90	40.38	37.24	Outpatient	0.07	0.03	0.04
Hrs <35	0.31	0.11	0.23	Other	0.15	0.19	0.16
Hrs >41	0.13	0.14	0.11				
Hired by Temp Agency	0.02	0.01	0.04	No. Observations	117993	1459	2237

Note. Data comes from the 1988, 1992, 1996, 2000 and 2004 NSSRN. We omit prior years and the 2008 NSSRN because they don't include data on hospital unit. The sample is restricted to registered nurses aged 20 to 70 working in a nursing job.

Table A3. Do Filipino Nurses Work in More Skill Intensive Hospital Units? 1988-2004 NSSRN

Panel A. Dep. Var. : Dummy for Bachelors Degree or + Sample: Native Educated Nurses						
	(1)	(2)				
Intensive Care (ICU)	0.086*** [0.007]	0.080*** [0.007]				
General/Specialty	0.026*** [0.006]	0.023*** [0.006]				
Emergency	-0.008 [0.009]	-0.002 [0.009]				
Operating Room	-0.010 [0.008]	-0.010 [0.008]				
Labor/Delivery Room	0.053*** [0.010]	0.053*** [0.010]				
Outpatient	0.036*** [0.010]	0.033*** [0.010]				
Panel B. Dep. Variable:						
	Dummy for Intensive Care Unit			Dummy for High Skilled Unit ^a		
	(1)	(2)	(3)	(4)	(5)	(6)
Filipino	0.072*** [0.015]	0.062*** [0.015]	0.049*** [0.015]	0.037** [0.016]	0.020 [0.016]	0.001 [0.016]
Other Foreign	0.002 [0.012]	-0.010 [0.012]	0.012 [0.012]	0.023 [0.014]	0.008 [0.014]	0.035** [0.014]
Mean of dependent variable		0.180			0.248	
<i>Controls</i>						
Year FE	X	X	X	X	X	X
State FE, MSA dummy, State*MSA		X	X	X	X	X
Job Characteristics, includes Temp. Agency			X			X
Education FE			X			
Demographic Characteristics			X			

Note: Data comes from the 1988, 1992, 1996, 2000 and 2004 NSSRN. The sample includes registered nurses aged 20 to 70. Number of observations is 68,675. See Table V for a description of the controls. ***significant at 1%, **5%, *10%.

^a High Skilled Unit = 1 if nurse works in Intensive care or labor/delivery unit. These units were chosen based on regressions of a dummy for having at least a bachelor's degree on unit FE with the sample restricted to native nurses.

Table A4. Wage Differences between Native and Foreign Educated Nurses: 2008 California Survey of Registered Nurses

Panel A. Dependent Variable:										
Year	Experience		Tenure		Temporary Agency		Travel Nurse		Health Ins.or Retire. Plan	
	(1)	(2)	(3)	(4)	(5)	Filipino	Other Foreign	Filipino	Other Foreign	Filipino
2008	1.561***	1.442***	-0.942**	-1.321***	-0.010	-0.010	-0.017**	-0.012	0.035	-0.005
	[0.404]	[0.477]	[0.398]	[0.501]	[0.008]	[0.010]	[0.007]	[0.009]	[0.019]	[0.026]
<i>Controls</i>										
Demographic	X		X		X		X		X	
Education	X		X		X		X		X	
Region FE	X		X		X		X		X	
Job setting FE	X		X		X		X		X	
N. Obs	4375		4324		4450		4450		4450	
Panel B. Dep Variable: Log(Wage per hour)										
Year	(1)		(2)		(3)		(4)		(5)	
	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
2008	0.062***	0.000	0.054**	-0.012	0.065***	-0.001	0.064***	-0.001	0.071***	0.005
	[0.024]	[0.026]	[0.024]	[0.027]	[0.022]	[0.027]	[0.024]	[0.027]	[0.025]	[0.028]
<i>Controls</i>										
Demographic	X		X		X		X		X	
Education	X		X		X		X		X	
Region FE	X		X		X		X		X	
Job setting FE	X		X		X		X		X	
<i>Variables not available in the Census</i>										
Experience, Exp squared			X		X		X		X	
Tenure, Tenure Squared					X		X		X	
Dummies for travel nurse, temp. agency							X		X	
Health insurance, Retirement funds									X	
No. Obs	3771		3732		3719		3719		3191	

Note. The sample includes all registered nurses aged 20 to 70. The coefficient for Filipino nurses and Other Foreign Nurses for each numbered column and year corresponds to a separate regression of the dependent variable on a dummy for Filipino nurses and Other foreign nurses (the omitted category is native nurses) controlling for various sets of demographics, education and job characteristics. Demographic controls include age, age squared, female dummy, dummy for children 0-17, dummy for children <6, black dummy and single dummy. Education controls include dummies for having a bachelor's degree, an associate degree, a master's degree and a doctorate. Job characteristics include dummies for working more than 41 hours, working part-time and a dummy for overtime. The state of California is divided into 8 regions and there are 30 different job settings. Experience refers to the number of years the worker has practiced as an RN. Excludes years since graduation during which she did not work as an RN. Temporary Agency is a dummy variable for working for a temporary agency, Travel Nurse a dummy variable for working as a travel nurse, and Health Insurance or Retirement Plan a dummy variable for employer providing health insurance or a retirement plan. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

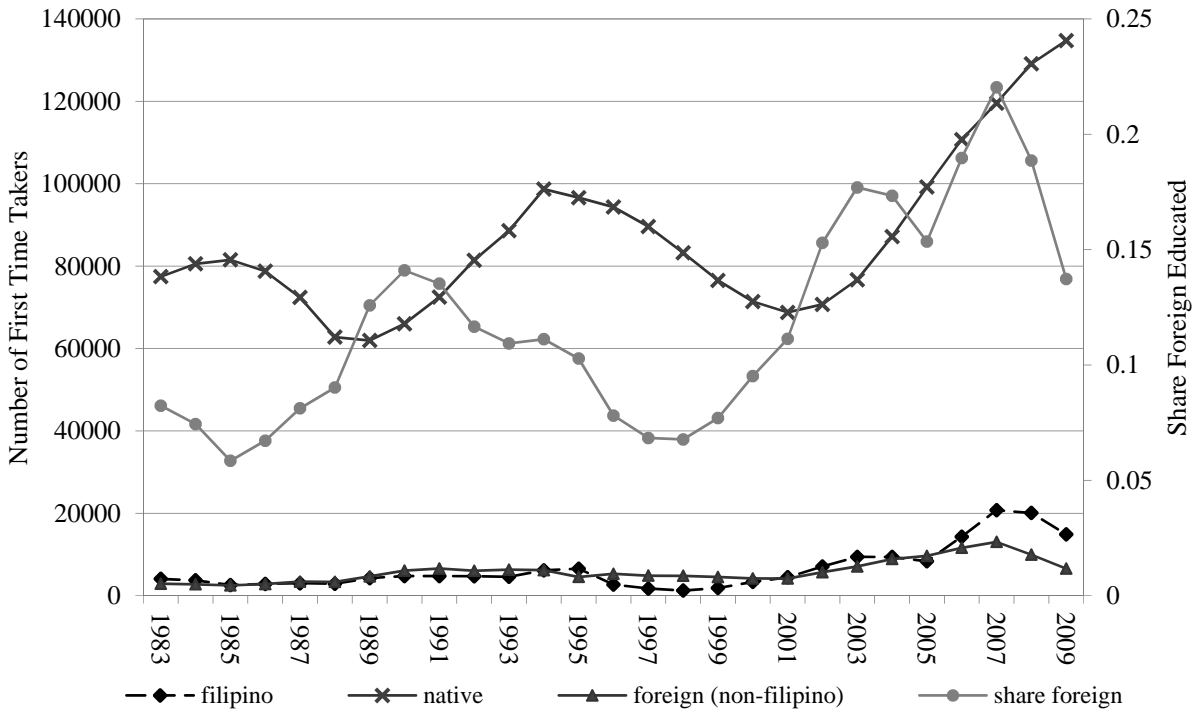
Table A5. Wage Differences Between Native and Foreign Workers: Selected Occupations

<i>Occupation</i>	Share of Skilled Filipinos working in occ.	Dep Variable: Log(Wage per hour)				No. Obs
		(1)		(2)		
		Filipino	Other Forgn	Filipino	Other Forgn	
Nurses	0.178	0.253*** [0.005]	0.097*** [0.005]	0.054*** [0.005]	-0.029*** [0.005]	332,775
Accountants	0.059	-0.037*** [0.010]	-0.022*** [0.006]	-0.237*** [0.010]	-0.205*** [0.005]	223,976
Physicians	0.040	0.112*** [0.022]	-0.039*** [0.009]	-0.108*** [0.020]	-0.119*** [0.008]	89,103
Nursing Aides	0.037	0.115*** [0.013]	0.066*** [0.007]	-0.063*** [0.013]	-0.106*** [0.008]	87,619
Clinical Lab. Technician	0.023	0.186*** [0.015]	0.073*** [0.012]	-0.080*** [0.014]	-0.129*** [0.012]	38,021
Managers	0.023	-0.079*** [0.017]	0.149*** [0.005]	-0.272*** [0.016]	-0.085*** [0.004]	546,023
Bookkeepers and auditing clerks	0.023	0.119*** [0.013]	0.073*** [0.009]	-0.126*** [0.013]	-0.104*** [0.009]	113,145
Computer Software Dev.	0.020	0.057*** [0.018]	0.109*** [0.004]	-0.109*** [0.017]	-0.047*** [0.004]	139,497
<i>Controls</i>						
Year FE			X		X	
Demographic					X	
Education/Job Characteristics					X	
Industry FE					X	
City FE					X	

Note. Data comes from the 1990 and 2000 Census and 3-year aggregate ACS for 2007 and 2010. The sample includes all workers aged 20-70 who reported the given category as their occupation and have at least one year of college education. The coefficient estimates for Filipino and Other Foreign for each numbered column and occupation corresponds to a separate regression of the dependent variable on a dummy for Filipino and Other foreign controlling for various sets of fixed effects and worker's characteristics. Demographic controls include age dummies, a black dummy, a male dummy, a single dummy, a dummy for children younger than 18, and a dummy for children younger than 6. Education controls include dummies for 2-3 years of college, bachelor's degree and graduate degree. Job Characteristics include a dummy for shift work, a dummy for part-time (less than 35 hours a week), a dummy for over-time (41 + hours a week). Robust standard errors in brackets.

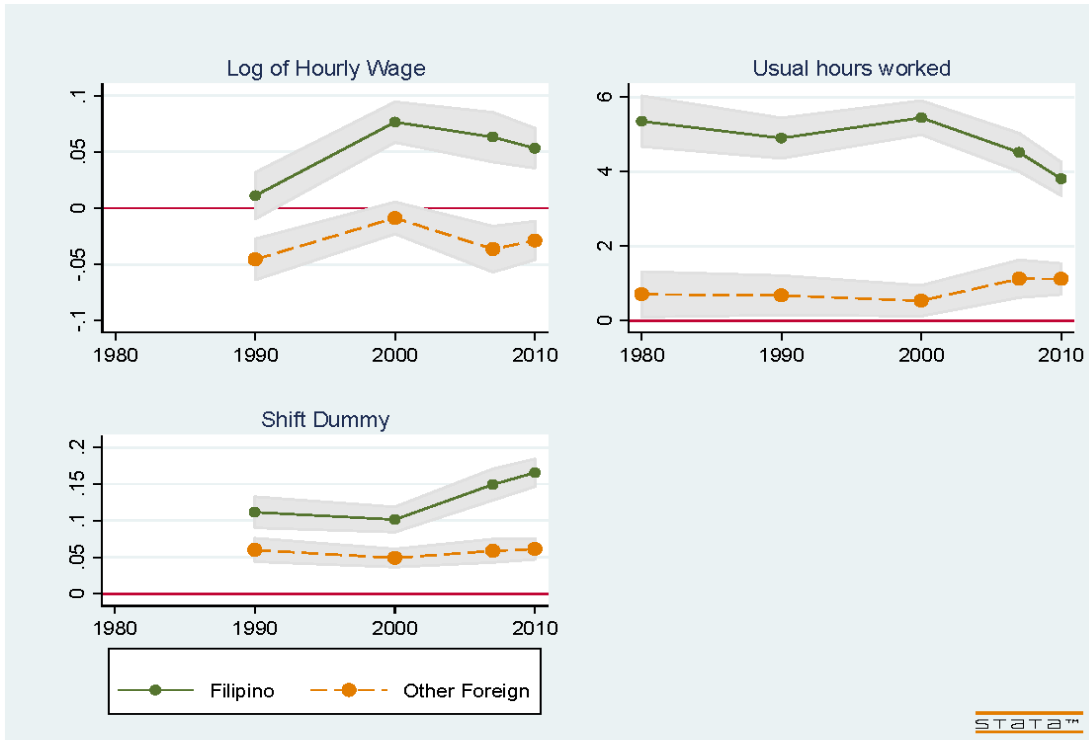
***significant at 1%, **5%, *10%.

Figure I
Flow of Nurses by Foreign Status – NCLEX First-Time Takers



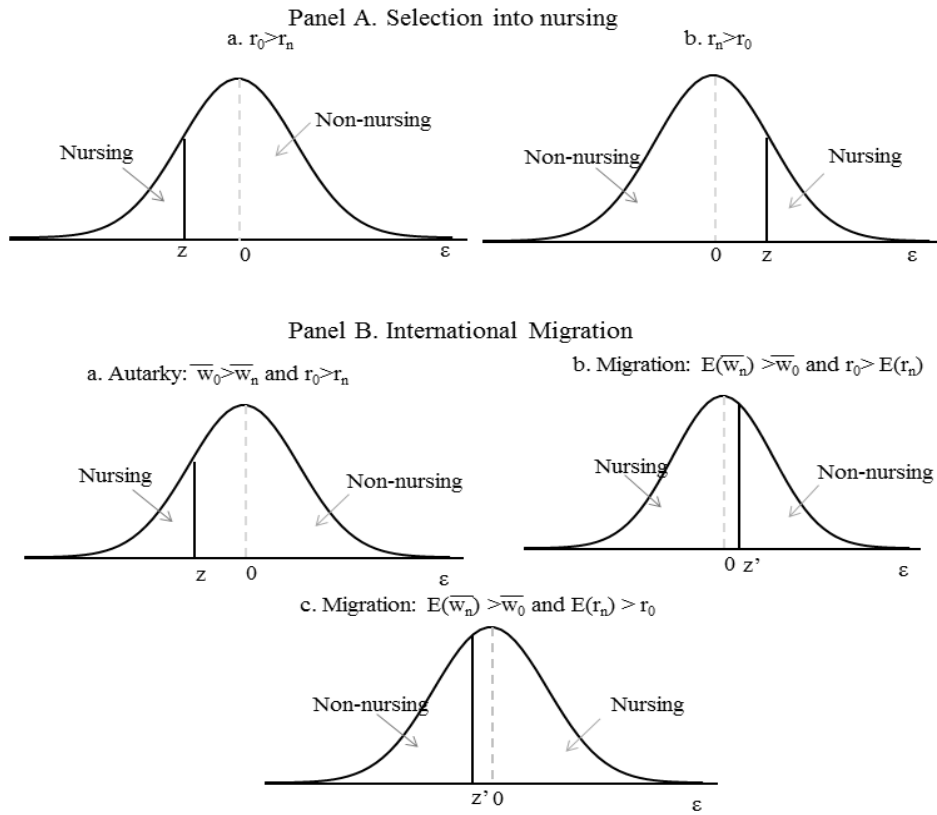
Note. The data is from the National Council of State Boards of Nursing (NCSBN) registered nurse licensure examination statistics (NCLEX). The sample is limited to first-time takers of the examination.

Figure II
Time Variation in Coefficient of Filipino and Other Foreign Dummies



Note: The coefficients are for the Filipino and Other Foreign dummies interacted with Census year fixed effects in specifications with the most comprehensive set of controls (see Table III). Data for wage and shift dummy models do not include 1980 because the shift variable was not included in that Census year.

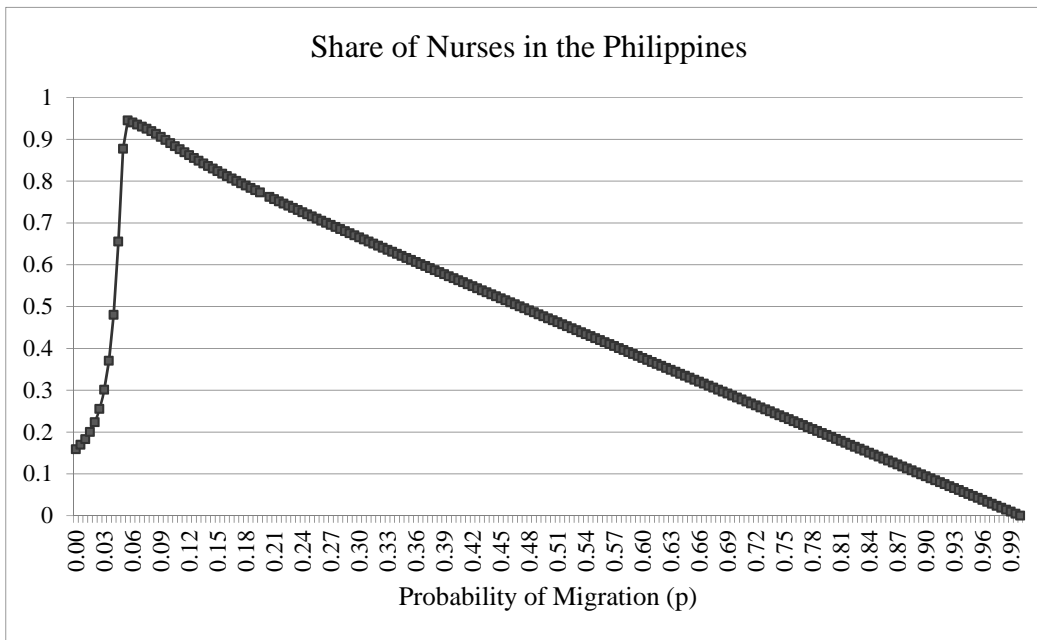
Figure III Model of Occupational Choice



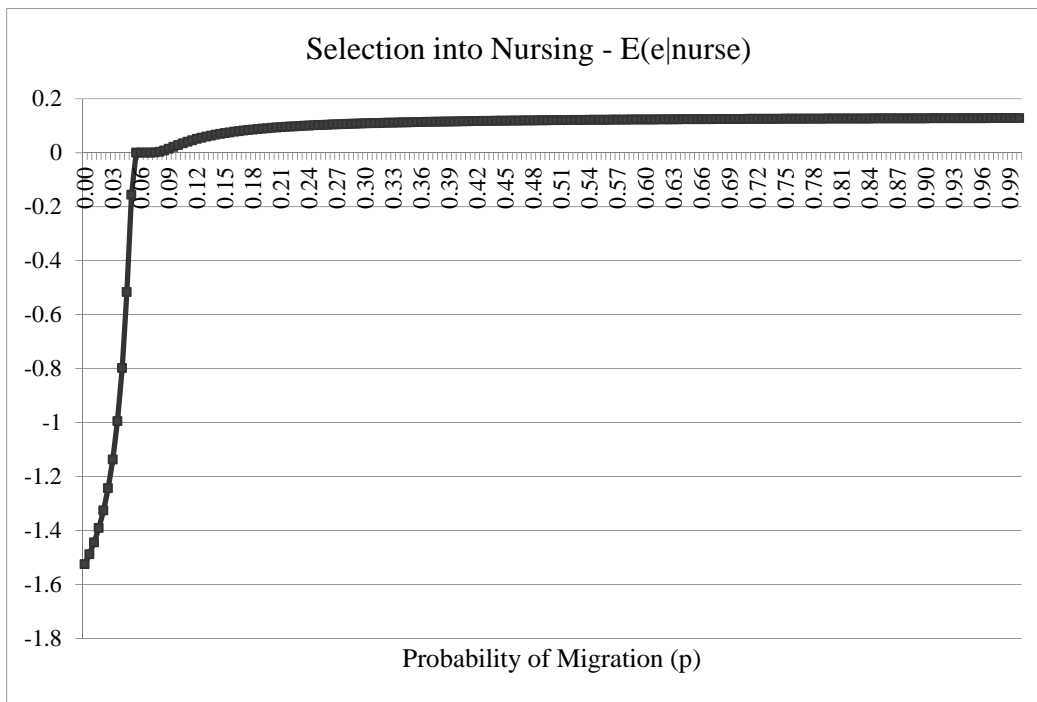
Note. Panel A. keeps constant $w_n - w_o$ and $|r_o - r_n|$

Figure IV

A. Predicted Share of Nurses in the Philippines based on Roy Model



B. Selection of Nurses based on Roy Model



Note. These graphs are based on the Roy model detailed in Section 5.1 calibrated to $w_0=12$, $w_n=10$, $w_{abroad} = 60$ and $r_0=6$, $r_n=4$ and $r_{abroad}=37$. The key parameters were obtained from the Philippine Labor Force Survey and the POEA data. See text for more details.

Table I. Top Countries of Origin of Foreign Nurses Educated Abroad by Census Year
(Share of Total Foreign Nurses)

1950*		1960*		1970		1980	
Canada	0.38	Canada	0.35	Canada	0.25	Philippines	0.27
Ireland	0.12	Ireland	0.08	Philippines	0.10	Canada	0.13
Germany	0.08	Germany	0.08	England	0.08	Jamaica	0.05
England	0.06	England	0.05	Germany	0.07	India	0.05
Scotland	0.04	Philippines	0.04	Ireland	0.07	Korea	0.04
1990		2000		2007		2010	
Philippines	0.35	Philippines	0.35	Philippines	0.40	Philippines	0.40
Canada	0.08	Canada	0.08	India	0.07	India	0.08
Jamaica	0.06	India	0.06	Canada	0.06	Canada	0.05
India	0.05	Jamaica	0.05	Jamaica	0.04	Jamaica	0.04
Korea	0.03	Nigeria	0.03	Nigeria	0.04	Nigeria	0.04

Note. The data is from the US Census and ACS 3-year aggregates. The sample includes Registered Nurses aged 20-70 of all education levels. The years with an asterisk include all nurses born abroad as we cannot distinguish between nurses educated in the US or abroad. See text for the criteria used to determine if a foreign nurse was educated abroad.

Table II. Characteristics of Stock of Nurses by Country of Education and Decade

	In the US			Nurses educated: In the Philippines			Abroad - Except Phil.		
	1980	2000	2010	1980	2000	2010	1980	2000	2010
Female	0.96	0.93	0.92	0.95	0.91	0.86	0.94	0.91	0.89
Age	36.98	43.01	44.80	34.75	43.75	46.56	41.74	45.08	47.10
Single	0.19	0.13	0.15	0.31	0.15	0.12	0.17	0.13	0.11
Child age 0-5	0.19	0.16	0.14	0.30	0.17	0.16	0.22	0.15	0.15
Child age 0-18	0.53	0.56	0.51	0.55	0.65	0.63	0.56	0.60	0.60
Bachelors	0.26	0.39	0.43	0.35	0.80	0.84	0.31	0.41	0.47
Graduate Deg.	0.11	0.14	0.12	0.57	0.10	0.09	0.16	0.18	0.16
Hospital	0.71	0.62	0.62	0.89	0.75	0.77	0.78	0.66	0.62
Nursing Home	0.07	0.08	0.07	0.07	0.13	0.08	0.07	0.11	0.11
Physicians Off.	0.06	0.07	0.05	0.01	0.02	0.01	0.03	0.03	0.02
Other Health	0.04	0.11	0.14	0.01	0.06	0.09	0.03	0.10	0.15
Number of Obs.	61410	111308	86021	1160	3489	3415	2411	5913	4849

Note. The data is from the 1980 to 2000 Census and the ACS 3-year aggregate for 2010 (2008 to 2010). The sample includes Registered Nurses aged 20-70 with at least 1 year of college.

Table III. Differences in Labor Market Outcomes between Foreign Educated Nurses and Native Nurses

<i>Dependent Variable</i>	Mean	No. Obs	(1)		(2)		(3)		(4)	
			Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
Usual Hours Worked per week (inc zeros)	34.14	465,029	4.505*** [0.120]	1.049*** [0.116]	4.239*** [0.125]	0.743*** [0.120]	4.092*** [0.126]	0.682*** [0.120]	4.600*** [0.127]	0.890*** [0.117]
		R ²	0.009		0.017		0.019		0.122	
LFP	0.89	465,560	0.017*** [0.003]	-0.021*** [0.003]	0.018*** [0.003]	-0.023*** [0.003]	0.012*** [0.003]	-0.024*** [0.003]	0.013*** [0.003]	-0.014*** [0.003]
		R ²	0.006		0.006		0.013		0.115	
Part time hrs>0	0.27	433,321	-0.165*** [0.003]	-0.090*** [0.003]	-0.152*** [0.003]	-0.071*** [0.003]	-0.150*** [0.003]	-0.069*** [0.003]	-0.182*** [0.004]	-0.069*** [0.003]
		R ²	0.009		0.032		0.034		0.092	
Over Time hrs>0	0.16	433,321	-0.011*** [0.004]	-0.005 [0.003]	-0.011*** [0.004]	-0.004 [0.003]	-0.009** [0.004]	-0.005 [0.003]	-0.018*** [0.004]	-0.007** [0.003]
		R ²	0.004		0.010		0.011		0.030	
Dummy Shift Work ^a	0.15	340,972	0.139*** [0.005]	0.051*** [0.004]	0.146*** [0.005]	0.058*** [0.004]	0.125*** [0.005]	0.052*** [0.004]	0.139*** [0.005]	0.057*** [0.004]
		R ²	0.006		0.009		0.044		0.058	
Log(hourly wage) ^b	2.71	332,775	0.253*** [0.005]	0.097*** [0.005]	0.132*** [0.005]	-0.001 [0.005]	0.121*** [0.005]	0.000 [0.005]	0.055*** [0.005]	-0.029*** [0.005]
		R ²	0.038		0.108		0.142		0.213	
<i>Controls</i>										
Year FE			X		X		X		X	
City FE					X		X		X	
Sector FE, Job Characteristics ^c							X		X	
Education FE									X	
Demographic Characteristics									X	

Note. Data comes from the 1980, 1990 and 2000 Census and 3-year aggregate ACS for 2007 and 2010. The sample includes all workers aged 20-70 who reported Registered Nurse as their occupation and have at least one year of college education. The coefficient estimates for Filipino nurses and Other Foreign Nurses for each numbered column and Census year corresponds to a separate regression of the dependent variable on a dummy for Filipino nurses and Other foreign nurses (the omitted category is native nurses) controlling for various sets of fixed effects and worker's characteristics. Demographic controls include age dummies, a black dummy, a male dummy, a single dummy, a dummy for children younger than 18, and a dummy for children younger than 6. Education controls include dummies for 2-3 years of college, bachelor's degree and graduate degree. The sector fixed effects include dummies for working in a hospital, a nursing home, in a physician's office and other health establishments. Job Characteristics include a dummy for shift work, a dummy for part-time (less than 35 hours a week), a dummy for over-time (41 + hours a week). Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

^a Shift work models have fewer observations because the sample excludes 1980. The variable needed to construct the shift work dummy was not included in the 1980 Census.

^b Wage regressions exclude 1980 because the shift work variable cannot be constructed for that Census year.

^c Job characteristics are controlled for in the wage regression only. They are excluded from the labor supply models.

Table IV. Assimilation Profile of Foreign Educated Nurses by Country of Education

	Dep Var.: Log(Wage per hour)	
	Filipino	Other Foreign
Arrived to the US:		
0-5 years ago	-0.065*** [0.011]	-0.110*** [0.010]
6-10 years ago	0.033*** [0.010]	-0.052*** [0.009]
11-15 years ago	0.081*** [0.010]	-0.026*** [0.009]
16-20 years ago	0.087*** [0.010]	-0.006 [0.008]
21+ years ago	0.125*** [0.007]	0.024*** [0.006]
R ²		0.247
<i>Controls</i>		
Year FE		X
City FE		X
Sector FE, Job Characteristics		X
Education FE		X
Demographic Characteristics		X
Number of Obs.		332,792

Note. Data comes from the 1990 and 2000 Census and 3-year aggregate ACS for 2007 and 2010. The sample includes all workers aged 20-70 who reported Registered Nurse as their occupation and have at least one year of college education. All coefficients come from one regression: log(hourly wage) on dummies for Filipino nurses and Other foreign nurses interacted with number of years in the US dummies (the omitted category is native nurses) controlling for various sets of fixed effects and worker's characteristics. Demographic controls include age dummies, a black dummy, a male dummy, a single dummy, a dummy for children younger than 18, and a dummy for children younger than 6. Education controls include dummies for 2-3 years of college, bachelor's degree and graduate degree. The Sector fixed effects include dummies for working in a hospital, a nursing home, in a physician's office and other health establishments. Job Characteristics include a dummy for shift work, a dummy for part-time (less than 35 hours a week), a dummy for over-time (41 + hours a week). Almost identical results are obtained when the sample includes data from the 1980 Census but excludes the shift dummy from the analysis. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table V. Wage Differences between Foreign Educated Nurses and Native Nurses: 1988-2004 NSSRN Data

<i>Dependent Variable</i>	(1)		(2)		(3)		(4)		(5)	
	Filipino	Other Forgn	Filipino	Other Forgn	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
Log(hourly wage)	0.081*** [0.011]	0.036*** [0.009]	0.086*** [0.010]	0.034*** [0.009]	0.053*** [0.010]	0.015* [0.009]	0.079*** [0.012]	0.014 [0.010]	0.083*** [0.011]	0.019* [0.010]
Sample	All		All		All		Hospital		Hospital	
Controls										
Year FE	X		X		X		X		X	
State FE, MSA dummy, State*MSA	X		X		X		X		X	
Sector FE	X		X		X		X		X	
Job Characteristics, includes Temp. Agency			X		X		X		X	
Education FE					X		X		X	
Demographic Characteristics					X		X		X	
Hospital Unit FE										X
R ²	0.152		0.172		0.201		0.220		0.232	
No. Observations	121,689		121,689		121,689		68,675		68,675	

Note. Data comes from the 1988, 1992, 1996, 2000 and 2004 NSSRN. We omit the 2008 NSSRN because it doesn't include data on hospital unit. The sample is restricted to registered nurses aged 20 to 70. The coefficient estimates for Filipino nurses and Other foreign Nurses for each numbered column corresponds to a separate regression of the dependent variable on a dummy for Filipino nurses and Other foreign nurses (the omitted category is native nurses) controlling for various sets of demographics, education and job characteristics. Demographic controls include age dummies, female dummy, dummy for children 0-17, dummy for children <6 and a black dummy. Education controls include a dummies for having an associate degree, a diploma or a bachelor's degree. Job characteristics include dummies for working part-time and for working for a temp agency. Sectors include hospital, nursing home, physician's office, schools, nursing education, public health and other. Hospital units include intensive care, general bed unit, emergency room, operating room, outpatient, labor and delivery and, other. Columns (5) and (6) include only nurses who reported working in hospitals. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table VI. Which Hospitals Hire Foreign RNs, Controlling for Hospital Location and Type of Hospital

	Hourly Wages of RNs in:									
	Private	Beds	No. of RNs	Fraction of RNs with Bachelor's	Min BA required for Nurse Supervisor	Min Masters required for Chief	Hourly Wages of RNs in:			
							ICU	Maternal-Child	Medical-surgical unit	Outpatient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign RN	0.143*** [0.022]	117.571*** [9.256]	115.833*** [10.160]	8.211*** [1.069]	0.174*** [0.023]	0.225*** [0.024]	0.113*** [0.008]	0.111*** [0.009]	0.113*** [0.007]	0.118*** [0.009]
Controls	no	no	no	no	no	no	no	no	no	no
Observations	3,246	3,246	2,590	2,688	3,025	3,126	2,311	1,808	2,624	1,984
R-squared	0.013	0.047	0.048	0.021	0.019	0.028	0.086	0.087	0.081	0.081
Foreign RN	0.075*** [0.023]	68.767*** [8.396]	63.557*** [9.963]	4.384*** [0.976]	0.058** [0.023]	0.085*** [0.023]	0.01* [0.006]	0.010 [0.006]	0.011** [0.005]	0.02*** [0.007]
Controls:										
Hospital Type	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
StateXMSA size FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Hospital Service Code	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3,246	3,246	2,590	2,688	3,025	3,126	2,311	1,808	2,624	1,984
R ²	0.240	0.457	0.396	0.447	0.305	0.378	0.679	0.707	0.688	0.664

Note. "StateXMSA size FE" refers to dummies for state interacted with MSA size (6 categories), resulting in a total of 209 groups. Other controls include 17 dummies for hospital type and 13 dummies for the type of service the hospital provides. Robust standard errors in brackets. ***significant at 1%, **5%, *1%.

Table VII. Share of Overseas Filipino Workers (OFWs) and Wages by Skilled Occupation in the Philippines and Top Destinations

Occupation	Panel A. Share of OFWs by Skilled Occupation and Average Wages						Panel B. Wages for Filipino Nurses in Top Destinations	
	2000 Philippines Census				2002 Philippines LFS		POEA Data - circa 2002	
	Males		Females		(Both Sexes)		Destination	Average Daily Wage (US\$)
	Share of OFWs in Occupation	Share of Occ in OFWs	Share of OFWs in Occupation	Share of Occ in OFWs	Average Daily Wage (US\$)	75/25 Percentile Ratio		
Nursing and midwifery professionals	0.23	0.10	0.19	0.53	10.34	1.67	Canada	100.42
Directors and chief executives of corp.	0.02	0.00	0.04	0.00	26.34	2.29	Ireland	115.02
Legal professionals	0.02	0.01	0.01	0.00	23.07	1.81	Kuwait	41.36
Specialized managers	0.04	0.03	0.02	0.02	17.23	2.08	Libya	30.32
Production and operations managers	0.04	0.02	0.01	0.01	16.61	2.08	Saudi Arabia	25.40
Government administrators	0.02	0.01	0.02	0.00	16.51	2.03	Singapore	29.08
School supervisors and principals	0.01	0.00	0.01	0.00	15.40	1.38	Taiwan	21.82
Architects and related professionals	0.12	0.04	0.03	0.00	15.06	1.84	UAE	33.06
Business professionals	0.04	0.05	0.02	0.04	14.46	1.91	UK	90.28
Engineers and related professionals	0.13	0.53	0.04	0.03	13.91	1.80	USA	141.89
Life science professionals	0.04	0.01	0.02	0.00	13.82	1.67		
Health professionals (except nursing)	0.06	0.06	0.04	0.09	13.66	1.98		
Physicists, chemists and related prof.	0.11	0.01	0.02	0.00	13.36	2.14		
Mathematicians, statisticians	0.04	0.00	0.02	0.00	13.09	1.48		
College, university teaching prof.	0.01	0.01	0.02	0.02	12.90	1.58		
Social and related science professionals	0.04	0.01	0.01	0.01	12.55	2.00		
Other supervisors	0.12	0.01	0.03	0.00	11.73	2.05		
Elementary education teaching prof.	0.01	0.02	0.01	0.13	11.60	1.23		
Computer professionals	0.13	0.05	0.07	0.03	11.54	1.69		
Customs, taxation, licensing, welfare prof.	0.02	0.00	0.01	0.00	11.35	1.81		
Librarians, archivists and curators	0.09	0.00	0.00	0.00	11.30	1.78		
Secondary education teaching prof.	0.01	0.01	0.01	0.04	11.24	1.31		
Special education teaching prof.	0.02	0.00	0.02	0.01	10.81	1.53		
Administrative associate professionals	0.02	0.01	0.01	0.02	10.33	2.09		
Technical, vocational instructors	0.03	0.00	0.01	0.00	10.22	1.79		
Life science technicians associated prof.	0.04	0.01	0.01	0.00	10.05	1.65		

Note: The included occupations in Panel A were chosen based on the share of workers with a college degree and a minimum number of workers. All numbers are computed using workers with a college degree. Data comes from the Philippines' 2000 Census and 2002 Labor Force Survey. Numbers reported in Panel B are constructed using Confidential POEA data.

Table VIII. Selection into Nursing in the Philippines and the US

Philippines				
A. Dep Var.: Father's Education (Sample: Single Women)				
	Year = 1990		Year=2000	
	Father College +	Father Grad. Edu	Father College +	Father Grad. Edu
Nurse Dummy	0.111*** [0.014]	0.004 [0.003]	0.143*** [0.013]	0.022*** [0.006]
Mean Dep. Var.	0.233	0.011	0.252	0.027
R ²	0.007	0.001	0.017	0.001
No. Obs.	39,135	39,135	34,026	34,026
B. Dep Var.: Mother's Education (Sample: Single Women)				
	Year = 1990		Year=2000	
	Mother College +	Mother Grad. Edu	Mother College +	Mother Grad. Edu
Nurse Dummy	0.126*** [0.013]	0.007** [0.004]	0.188*** [0.012]	0.031*** [0.006]
Mean Dep. Var.	0.210	0.013	0.280	0.029
R ²	0.010	0.011	0.007	0.002
No. Obs.	45,735	45,735	39,504	39,504
C. Dep Var.: Husbands's Education (Sample: Married Women)				
	Year = 1990		Year=2000	
	Husband College +	Husband Grad. Edu	Husband College +	Husband Grad. Edu
Nurse Dummy	0.126*** [0.010]	-0.003 [0.002]	0.102*** [0.010]	0.002 [0.004]
Mean Dep. Var.	0.538	0.015	0.495	0.045
R ²	0.014	0.003	0.006	0.003
No. Obs.	96,921	96,921	96,609	96,609
USA				
D. Dep Var.: Husbands's Education (Sample: Married Women)				
	Year = 1990		Year=2000	
	Husband College +	Husband Grad. Edu	Husband College +	Husband Grad. Edu
Nurse Dummy	-0.110*** [0.004]	-0.051*** [0.003]	-0.108*** [0.003]	-0.060*** [0.003]
Mean Dep. Var.	0.675	0.313	0.660	0.292
R ²	0.008	0.035	0.008	0.035
No. Obs.	394,599	394,599	532,866	532,866

Note. The data is from the 1990 and 2000 Philippines Census and US Census. The sample is restricted to women aged 20 to 64 with a college degree or more. Each cell corresponds to a separate regression of the dependent variable on a nurse dummy for each Census year. All regressions include age dummies. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table IX. Selection into Migration to the US

Panel A. Hourly Wages of Filipino Nurses in the US in their Last Job in the Philippines Before Migration (in 2003 pesos)			
	New Immigrant Survey (2003)		Philippine Labor Force Survey (2003)
	Healthcare workers	Nurses	Nurses
Mean	67.2	71.8	48.7
25th Percentile	39.2	33.3	35
Median	49.9	52.2	45.4
75th Percentile	85.3	86.6	58.3
No. of obs	62	49	390

Panel B. Education Level of Parents of Temporary Migrant Filipino Nurses Living in the US vs. Other Destinations (Survey of Overseas Filipinos)		
Dep. Var: Dummy for Head of Household having a College Degree		
Nurse living in the US	0.169 [0.060]***	0.182 [0.059]***
Controls	None	Age, Gender, Year FE
R ²	0.018	0.056
No. Observations	477	477
Mean of Dep. Var.	0.348	
Share of Migrant Nurses living in the US	0.171	

Note Panel A: The sample includes nurses aged 25 to 35. Hourly wages of Filipino nurse migrants in their last reported job are deflated using 2003 prices (in pesos) based on the reported year that migrants were employed in their last job before entering the US. For the sample of nurses aged 25 to 35 in the 2003 NIS, the years in which migrants were last employed in the Philippines range from 1987 to 2003.

Note Panel B: Data comes from the 1993-2002 Survey of Overseas Filipinos (SOF) merged with the 1993-2002 October Labor Force Survey. SOF includes workers that have migrated within the last 5 years and are still considered members of a household in the Philippines. Sample is restricted to nurses who are the daughter/son of the household head. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table A1. Cohort Size of Filipino Nurses Educated Abroad by year of Immigration to the US

Census Year	Before 1960	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009
1980	380	1260	5040	9340	7180						
1990	377	1353	5095	8760	8927	10828	10070				
2000	325	1236	4838	8516	9676	13514	13716	18020	8121	154	
2007		571	3715	7041	7946	12376	14348	16970	8940	18906	5914
2010		112	2444	7338	8341	14012	13698	17054	11199	21472	16389

Note. Restricted to nurses aged 20-70. In some cases the size of the cohort goes up. This is likely to be due to undercounting of migrants that have arrived on the relevant Census year. This is either because they arrived after the Census or recently and were not taken into account (for example, if they were living in temporary housing).

Table A2. Descriptive Statistics - National Sample Survey of Registered Nurses 1988-2004

	Native	Filipino	Other Foreign		Native	Filipino	Other Foreign
<i>Demographic characteristics</i>				<i>Setting</i>			
Age	40.10	38.51	43.11	Hospital	0.61	0.79	0.70
Female	0.95	0.91	0.95	Nursing Home	0.07	0.10	0.09
Black	0.05	0.00	0.15	Physicians Offices	0.09	0.04	0.05
Single	0.11	0.16	0.14	Public Health	0.11	0.02	0.08
Child 0-6	0.19	0.27	0.17	School Nurse	0.03	0.00	0.02
Child 0-18	0.56	0.64	0.57	Other	0.08	0.04	0.06
Lives in MSA	0.82	0.95	0.94				
<i>Education characteristics</i>				<i>Unit / Hospital</i>			
Associate D / Diploma	0.72	0.29	0.87	Intensive Care	0.18	0.25	0.18
Bachelors degree	0.28	0.71	0.13	General bed unit	0.36	0.38	0.40
				ER	0.08	0.04	0.06
				Operating Room	0.09	0.07	0.07
<i>Labor Supply Characteristics / working as a nurse</i>				Labor/delivery Room			
Hrs per week	35.90	40.38	37.24	Outpatient	0.07	0.03	0.04
Hrs <35	0.31	0.11	0.23	Other	0.15	0.19	0.16
Hrs >41	0.13	0.14	0.11				
Hired by Temp Agency	0.02	0.01	0.04	No. Observations	117993	1459	2237

Note. Data comes from the 1988, 1992, 1996, 2000 and 2004 NSSRN. We omit prior years and the 2008 NSSRN because they don't include data on hospital unit. The sample is restricted to registered nurses aged 20 to 70 working in a nursing job.

Table A3. Do Filipino Nurses Work in More Skill Intensive Hospital Units? 1988-2004 NSSRN

Panel A. Dep. Var. : Dummy for Bachelors Degree or + Sample: Native Educated Nurses						
	(1)	(2)				
Intensive Care (ICU)	0.086*** [0.007]	0.080*** [0.007]				
General/Specialty	0.026*** [0.006]	0.023*** [0.006]				
Emergency	-0.008 [0.009]	-0.002 [0.009]				
Operating Room	-0.010 [0.008]	-0.010 [0.008]				
Labor/Delivery Room	0.053*** [0.010]	0.053*** [0.010]				
Outpatient	0.036*** [0.010]	0.033*** [0.010]				
Panel B. Dep. Variable:						
	Dummy for Intensive Care Unit			Dummy for High Skilled Unit ^a		
	(1)	(2)	(3)	(4)	(5)	(6)
Filipino	0.072*** [0.015]	0.062*** [0.015]	0.049*** [0.015]	0.037** [0.016]	0.020 [0.016]	0.001 [0.016]
Other Foreign	0.002 [0.012]	-0.010 [0.012]	0.012 [0.012]	0.023 [0.014]	0.008 [0.014]	0.035** [0.014]
Mean of dependent variable		0.180			0.248	
<i>Controls</i>						
Year FE	X	X	X	X	X	X
State FE, MSA dummy, State*MSA		X	X	X	X	X
Job Characteristics, includes Temp. Agency			X			X
Education FE			X			
Demographic Characteristics			X			

Note: Data comes from the 1988, 1992, 1996, 2000 and 2004 NSSRN. The sample includes registered nurses aged 20 to 70. Number of observations is 68,675. See Table V for a description of the controls. ***significant at 1%, **5%, *10%.

^a High Skilled Unit = 1 if nurse works in Intensive care or labor/delivery unit. These units were chosen based on regressions of a dummy for having at least a bachelor's degree on unit FE with the sample restricted to native nurses.

Table A4. Wage Differences between Native and Foreign Educated Nurses: 2008 California Survey of Registered Nurses

Panel A. Dependent Variable:										
Year	Experience		Tenure		Temporary Agency		Travel Nurse		Health Ins.or Retire. Plan	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
2008	1.561***	1.442***	-0.942**	-1.321***	-0.010	-0.010	-0.017**	-0.012	0.035	-0.005
	[0.404]	[0.477]	[0.398]	[0.501]	[0.008]	[0.010]	[0.007]	[0.009]	[0.019]	[0.026]
<i>Controls</i>										
Demographic		X		X		X		X		X
Education		X		X		X		X		X
Region FE		X		X		X		X		X
Job setting FE		X		X		X		X		X
N. Obs	4375		4324		4450		4450		4450	
Panel B. Dep Variable: Log(Wage per hour)										
Year	(1)		(2)		(3)		(4)		(5)	
	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign	Filipino	Other Foreign
2008	0.062***	0.000	0.054**	-0.012	0.065***	-0.001	0.064***	-0.001	0.071***	0.005
	[0.024]	[0.026]	[0.024]	[0.027]	[0.022]	[0.027]	[0.024]	[0.027]	[0.025]	[0.028]
<i>Controls</i>										
Demographic		X		X		X		X		X
Education		X		X		X		X		X
Region FE		X		X		X		X		X
Job setting FE		X		X		X		X		X
<i>Variables not available in the Census</i>										
Experience, Exp squared				X		X		X		X
Tenure, Tenure Squared						X		X		X
Dummies for travel nurse, temp. agency								X		X
Health insurance, Retirement funds										X
No. Obs	3771		3732		3719		3719		3191	

Note. The sample includes all registered nurses aged 20 to 70. The coefficient for Filipino nurses and Other Foreign Nurses for each numbered column and year corresponds to a separate regression of the dependent variable on a dummy for Filipino nurses and Other foreign nurses (the omitted category is native nurses) controlling for various sets of demographics, education and job characteristics. Demographic controls include age, age squared, female dummy, dummy for children 0-17, dummy for children<6, black dummy and single dummy. Education controls include dummies for having a bachelor's degree, an associate degree, a master's degree and a doctorate. Job characteristics include dummies for working more than 41 hours, working part-time and a dummy for overtime. The state of California is divided into 8 regions and there are 30 different job settings. Experience refers to the number of years the worker has practiced as an RN. Excludes years since graduation during which she did not work as an RN. Temporary Agency is a dummy variable for working for a temporary agency, Travel Nurse a dummy variable for working as a travel nurse, and Health Insurance or Retirement Plan a dummy variable for employer providing health insurance or a retirement plan. Robust standard errors in brackets. ***significant at 1%, **5%, *10%.

Table A5. Wage Differences Between Native and Foreign Workers: Selected Occupations

<i>Occupation</i>	Share of Skilled Filipinos working in occ.	Dep Variable: Log(Wage per hour)				No. Obs
		(1)		(2)		
		Filipino	Other Forgn	Filipino	Other Forgn	
Nurses	0.178	0.253*** [0.005]	0.097*** [0.005]	0.054*** [0.005]	-0.029*** [0.005]	332,775
Accountants	0.059	-0.037*** [0.010]	-0.022*** [0.006]	-0.237*** [0.010]	-0.205*** [0.005]	223,976
Physicians	0.040	0.112*** [0.022]	-0.039*** [0.009]	-0.108*** [0.020]	-0.119*** [0.008]	89,103
Nursing Aides	0.037	0.115*** [0.013]	0.066*** [0.007]	-0.063*** [0.013]	-0.106*** [0.008]	87,619
Clinical Lab. Technician	0.023	0.186*** [0.015]	0.073*** [0.012]	-0.080*** [0.014]	-0.129*** [0.012]	38,021
Managers	0.023	-0.079*** [0.017]	0.149*** [0.005]	-0.272*** [0.016]	-0.085*** [0.004]	546,023
Bookkeepers and auditing clerks	0.023	0.119*** [0.013]	0.073*** [0.009]	-0.126*** [0.013]	-0.104*** [0.009]	113,145
Computer Software Dev.	0.020	0.057*** [0.018]	0.109*** [0.004]	-0.109*** [0.017]	-0.047*** [0.004]	139,497
<i>Controls</i>						
Year FE			X		X	
Demographic					X	
Education/Job Characteristics					X	
Industry FE					X	
City FE					X	

Note. Data comes from the 1990 and 2000 Census and 3-year aggregate ACS for 2007 and 2010. The sample includes all workers aged 20-70 who reported the given category as their occupation and have at least one year of college education. The coefficient estimates for Filipino and Other Foreign for each numbered column and occupation corresponds to a separate regression of the dependent variable on a dummy for Filipino and Other foreign controlling for various sets of fixed effects and worker's characteristics. Demographic controls include age dummies, a black dummy, a male dummy, a single dummy, a dummy for children younger than 18, and a dummy for children younger than 6. Education controls include dummies for 2-3 years of college, bachelor's degree and graduate degree. Job Characteristics include a dummy for shift work, a dummy for part-time (less than 35 hours a week), a dummy for over-time (41 + hours a week). Robust standard errors in brackets.

***significant at 1%, **5%, *10%.