

Foreign-Born Nurses in the US Labor Market

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Abstract

This paper examines immigration and the wages of foreign and native nurses in the US labor market. Data from the Current Population Survey identifies a worker's country of birth and the National Survey of Registered Nurses (NSRN) identifies nurses who received their basic training outside the US. About 3.4 percent of the RN workforce is foreign-born non US citizens, and 3.1 percent received their basic education elsewhere. The principal countries of origin are the Philippines, Canada, India, and England. Regression results show a 4.5 percent lower wage for non-citizen nurses born outside of the US (Canadian nurses are an exception), while those who are foreign-born citizens earn wages similar to native nurses. The wage disadvantage is concentrated on foreign-born nurses new to the US; once a nurse has been in the US for as few as 4 years there is no longer a significant penalty. Results from the NSRN show relatively little overall wage differences between RNs who received their basic training outside versus inside the US, with the exception of a significant penalty for nurses trained in India and a small advantage for nurses trained in the Philippines. The presence of foreign-trained nurses appears to decrease earnings for native RNs, but the effects are small.

I. Introduction

Nursing shortages have been an issue in the health care industry, especially for hospitals, over the past twenty to thirty years. Staffing difficulties within the industry create numerous problems, perhaps the most important being that there may be barriers to accessing needed care by patients. Systematic shortages are also of interest to economists. Possible explanations for nursing shortages (not mutually exclusive) include lagged supply response to continuing demand growth, limited space in nursing schools, shortages of qualified teachers in nursing programs, increasing opportunities for women in alternative occupations, and hospital market power that depresses wages below market-clearing levels.¹ One of the more important strategies to alleviate these shortages has been the importation of nurses from other countries. Based on current data (described below) approximately 3.5 percent of the registered nurse (RN) workforce is comprised of individuals who report being foreign-born and not US citizens, smaller than the figure for the economy-wide labor market which is around 6.5 percent of the workforce. Proposed immigration reform legislation has included language to remove the limit on the number of nurses who can immigrate.² This could cause an even larger influx of foreign-born nurses and could have a substantial impact on the nursing labor market.

In order to practice as a registered nurse, all US nurses must pass the National Council Licensure Examination (NCLEX-RN), a standardized, multiple-choice exam developed and controlled by the National Council of State Boards of Nursing. Before a foreign-trained nurse can take the exam they must first demonstrate that their education meets the US standards, which includes requiring the education be at the post-secondary level. Nurses trained in countries where English is not the primary language must first pass the Test of English as a Foreign Language (TOEFL). The H-1C category for registered nurses was established by the Nursing Relief for Disadvantaged Areas Act

¹ See Buerhaus, Staiger, and Auerbach, 2004, 2003; Hirsch and Schumacher 1995, 2005; Schumacher 2007, 2001; or Spetz 1999.

² Dugger, Celia W. "U.S. Plan to Lure Nurses May Hurt Poor Nations," *New York Times*, May 24, 2006.

of 1999, based on the H-1A category which expired in 1997. This classification is restricted to 500 per year and is designed for registered nurses working in health professional shortage areas. Facilities who want to hire H-1C nurses must file with the Employment and Training Administration of the U.S. Department of Labor indicating among other things that the employment of the H-1C nurse will not adversely affect the wages and working conditions of similarly employed nurses and that the H-1C nurse will be paid the same wage as similarly employed nurses.

In 2005 about 34,000 foreign educated nurses took the NCLEX-RN and about 15,000 passed. The number passing tripled between 1994 and 2005 (Aiken, 2007). This increase is due, in part, to the approval by Congress in 2005 of the recapture or carryover of 50,000 unused employment-based visas for nurses and physical therapists that had been authorized in previous years but not filled. The number of nurses trained abroad has increased from about six per hundred in 1998 to fourteen per hundred in 2002 (Aiken et al. 2004). Buerhaus, Staiger, and Auerbach (2003) estimate from Current Population Survey data that nurses born outside of the US accounted for about a third of the increase in nursing employment since the mid-1990s.

Despite their prominence in the market, however, there has been little research examining how foreign born RNs have impacted the U.S. labor market. The goal of this paper is to provide a better understanding of how foreign-born nurses impact the US labor market. The research is unique relative to previous literature on immigration in that it focuses on a single skilled occupation in an area where the demand for workers has been high. As policymakers debate increasing the number of RNs allowed from abroad and as hospital administrators examine bringing in foreign-born RNs to alleviate local shortages, it is important to understand the consequences of such action. The paper first provides descriptive evidence on foreign-born and foreign-trained nurses in the US, including the proportion in the market, what countries they are coming from, and how the distribution of foreign-born nurses differs from that of other foreign born workers. The analysis next examines how the earnings of foreign-born nurses compare to native-born and how quickly they have assimilated into

the US work force. The final section of the paper examines the impact of foreign nurses on the earnings of native-born RNs.

II. Previous Research

While there is little research examining the economic effects of foreign-born nurses, there is a large body of research on the overall performance of immigrants in the US economy. Early work (Chiswick 1978) typically found that immigrants earn lower wages when they first enter the US labor market, but that they quickly catch up as they accumulate on-the-job training to overcome the gap in formal schooling. The entry wage disadvantage tends to be larger for more recent cohorts (Borjas 1985, 1995). Previous work also finds that there are large differences in the economic performance among national origin groups (Borjas, 1987, 1995; LaLonde and Topel, 1992, and Funkhouser and Trejo, 1995). These studies tend to find that immigrants who originate in developed countries earn more than immigrants who originate in poorer countries, and that rates of growth differ by country of origin as well.

Related work on the value of English skills tends to find that occupations requiring English speaking skills tend to pay more and that English proficiency has a large payoff for immigrants.³ Chiswick and Miller (2007a) find that earnings increase with the respondent's own proficiency in English, with the English proficiency required for the occupation, and with the interaction of the two - when those with high levels of proficiency work in jobs requiring English language skills. Among the foreign born, years of schooling and proficiency in English are the key factors determining access to high-paying occupations (Chiswick and Miller 2007b).

Research on the effects of immigration on native earnings has faced the difficulty of dealing with the nonrandom location decisions of immigrants. That is, immigrants are likely to locate in areas where demand (or expected future demand) is highest and thus a simple cross-sectional wage equation may well show that native wages are higher in areas with a higher proportion of

³ See Bleakley and Chin (2004) for a review of this literature.

immigrants.⁴ One Solution to this problem is to utilize data on more than one time period and use differencing techniques. This assumes that immigrants choose their location based on the level of wages but not expected increases (Goldin 1994, LaLonde and Topel, 1991). These studies tend to find relatively small effects of immigration on native earnings. An alternative to differencing is to utilize instrumental variables. The challenge here is to find suitable instruments that are sufficiently correlated with immigrant density, but not with earnings (conditional on other covariates). Altonji and Card (1991) use the stock of immigrants in 1970 as an instrument for the change in the fraction of foreign-born individuals in the population from 1970 to 1980. Their results suggest that a 1 percentage point increase in the percent of foreign born in a city reduces the unemployment rate by .23 percentage points and reduces wages of unskilled natives by 1.2 percent at most. Card (2005) concludes that “instrumenting sometimes moves the coefficients in the ‘right direction’, but does not change the conclusion that immigrant impacts are small”.

Alternatively, several studies use factor proportion models which make assumptions about the elasticity of substitution between immigrants and natives (Borjas, Freeman and Katz, 1992, 1997; Jaeger, 1996; Johnson, 1998). These models tend to find negative effects of immigration for unskilled workers, but the effect is quite small for skilled workers. Results tend to be sensitive to changes in the underlying assumptions, however, and relaxing these assumptions can even result in the prediction of a positive wage effect of immigration on natives (Ottaviano and Peri, 2005).

Thus, most cross-sectional approaches to estimation tend to find relatively small wage effects of immigrants on natives among lower skilled workers. Card (2005) concludes that selective mobility and industry realignment within local markets are relatively unimportant and that the bulk of the absorption of immigrants occurs within industries. Orrenius and Zavodny (2006) examine the effects of immigration on both skilled and unskilled workers. They use immigrants who are admitted to the U.S. in a given year as the spouse of a U.S. citizen by occupation group, area, and year as an

⁴ For a discussion on the theoretical impact of immigrants on native labor market outcomes, see Friedberg and Hunt (1995).

instrument. They also use area fixed effects and area-year interactions, and find that there is a small negative impact that is concentrated among low-skill, blue collar occupations, but find no evidence that immigration adversely affects medium and high-skilled native workers.⁵

This paper builds upon previous research in a number of ways. First, understanding the impact of immigrants in the nursing labor market is important as hospitals and policy makers attempt to understand the role of immigration in easing reported nursing shortages. More generally though, by looking within a specific occupation for which there is a high degree of occupation and industry specific training, substantial homogeneity in skill requirements and tasks across labor markets, and a high degree of required English proficiency, it provides a unique glimpse into the effects of immigration on both the immigrants and to native workers in the same labor market. It also provides an analysis of a well-defined high skilled labor market, in contrast to the bulk of previous research which has focused on low skilled labor markets.

III. Methodology

In order to examine the impact of foreign nurses, this paper first examines the earnings of immigrants and how they compare to native earnings. Here the question of how foreign-trained nurses compare to native nurses once adjustments are made for measurable characteristics. Is there evidence that foreign-trained nurses are “exploited” or are they paid similar wages as native nurses? If there is a wage penalty for foreign nurses, how long does it take for these workers to “catch up” to their native counterparts? I later turn to how the wages of native nurses are influenced by immigrants.

Wage Effects of Immigrant RNs

To estimate earnings differences between foreign-born and native nurses, other measurable factors influencing earnings such as education and experience must be taken into account. A human capital wage equation of the following form is estimated.

$$(1) \quad \ln W_i = \alpha + X_i\beta + \delta FB_i + \varepsilon_i$$

⁵ Borjas (2005) examines the effects of foreign student enrollment in American universities, and finds that a 10 percent immigration-induced increase in the supply of doctorates lowers the wage of competing workers by about 3 percent.

where $\ln W_i$ is the log wage, α is an intercept, X_i is a set of measurable worker and job characteristics such as degree type, years of experience, gender, race, marital status, job setting, region of residence, city size, etc., with β the corresponding vector of coefficients. Foreign-born nurses are represented by the dummy variable FB ($FB=1$ if the worker is foreign-born and 0 otherwise), and ε_i represents random worker-specific heterogeneity. The coefficient δ provides an estimate of the earnings difference between foreign-born and native nurses, after controlling for other characteristics.⁶ Extensions of this model allow additional information to be accounted for, including differences in earnings across country of origin, a distinction between foreign-born nurses who are citizens and not, and the amount of time the worker has been in the US labor market. Using information on time spent in the US allows one to assess the assimilation of foreign-born RNs are able to assimilate into the US market.

Effects of Immigration on Native RN earnings

If foreign and native RNs are substitutes then an influx of foreign nurses increases the supply of RNs and leads to a reduction in the earnings of native RNs. As described above, this effect has been difficult to capture. A naive approach to measure how immigration affects native wages would be to estimate the following equation:

$$(2) \quad \ln W_i = \alpha + X_i\beta + \lambda \%FB_k + \varepsilon_i$$

where the sample is restricted to native nurses, and $\%FB_k$ is the percentage of foreign nurses in market k . If foreign-born workers were randomly assigned to cities, then the coefficient λ will capture the effect of foreign-born workers on the wages of native workers. Assignment of foreign-born workers, however, is not random as immigrants are likely to go to markets where opportunities are greatest, social networks are strongest, markets are larger, etc, and these factors are also likely to be correlated with earnings. Thus, λ is likely to capture things such as increasing demand and higher

⁶ The analysis is described here in terms of foreign-born nurses. Analysis is also done examining the effects of foreign-trained nurses. Since the foreign-born nurses are identified in the CPS and foreign-trained nurses are identified in the NSRN it is not possible to look at the two effects simultaneously.

wage levels in addition to immigration effects. Wage effects on native-born RNs would also be mitigated by their out-migration from low wage and in-migration to high wage markets, although one suspects that nursing markets are largely local for the native population.

The approach taken in this paper is to compare the effect of foreign nurses on native nurses to the effect of foreign nurses on a control group of workers. That is, RNs are pooled with a non-nursing comparison group and the following is estimated:

$$(3) \quad \ln W_i = \alpha + X_i\beta + \gamma RN_i + Year_i\zeta + \eta \%FB_k + \varphi \%FB_k * RN_k + \varepsilon_i$$

Here $\ln W_i$ is the log wage of the worker, RN_i is a dummy variable equal to 1 if the worker is a nurse and zero otherwise, so that the coefficient γ is the difference in wages between RNs and the comparison group after adjusting for differences in measurable characteristics (contained in the vector X_i). $Year$ captures differences in earnings over time. $\%FB_k$ measures the percent of RNs in market k who are foreign born, and $\%FB * RN_k$ interacts the RN dummy variable with the percent foreign born in the market. The coefficient η provides an estimate of what the percent of RNs in the market who are foreign-born is associated with the earnings of non-RN workers, while the coefficient φ estimates how the wage effect of foreign born *differs* between RNs and the comparison group. Here the assumption is that foreign nurses have a direct effect on native RNs but estimation of these effects requires one to purge estimates of correlated factors (growing demand) that influence RNs and the comparison group equally. Thus, the interaction term φ captures the direct effect on RNs.

IV. Data and Descriptive Evidence

Data

There are two major data sources utilized for this study. The first is the monthly Current Population Surveys (CPS) Outgoing Rotation Group (ORG) earnings files for September 1995 through December of 2007. These data contain information on earnings and employment as well as personal and demographic characteristics. Beginning in 1994 the CPS began collecting information

on the birth country of workers, parents' country of birth, citizenship status, and indicators of year of entry. For the main analysis, foreign born workers are defined as those who indicate their country of birth outside of the United States and that they are not US citizens. The CPS education questions do not allow the distinction between foreign and native education.

The samples include employed wage and salary workers ages 18 and over, with positive weekly earnings and hours. The wage on the primary job is measured directly for workers reporting hourly earnings who do not receive tips, commissions, or overtime. For others, the wage is calculated by dividing usual weekly earnings on the primary job (which includes usual tips, commissions, and overtime) by usual hours worked per week.⁷ Usual weekly earnings are top-coded at \$1,923 through 1997 and at \$2,885 beginning in 1998. Those at the cap are assigned mean earnings above the cap based on year and gender-specific estimates that assume a Pareto distribution for earnings beyond the median.⁸ Workers with measured hourly earnings less than \$3 or greater than \$150 (in 2006 dollars) are omitted.

Workers who have had their earnings, occupation, or industry allocated by the Census are also excluded. While few workers have occupation or industry allocated, a large number (20-30%) have earnings imputed by the Census based on a cell hot-deck procedure in which nonrespondents are allocated the earnings of a "donor" with an identical set of match characteristics. Imputed earners are excluded from the sample since their inclusion may result in match bias (Hirsch and Schumacher, 2004). Since non-responding workers are not in general matched to the earnings of workers in similar settings (Country of birth and citizenship are not match criteria), wage differences between foreign-born and native workers are biased toward zero. Allocated earners cannot be reliably identified in the CPS ORG files between January 1994 and August 1995, but there are reliable allocation codes for September 1995 through the 2007 survey. Thus the sample begins with September 1995 and

⁷ Those reporting "variable" hours have their implicit wage calculated, if necessary, using hours worked last week.

⁸ Estimates of gender-specific means above the cap for 1973-2003 are posted by Barry Hirsch and David Macpherson at <http://www.unionstats.com>. Values are about 1.5 times the cap, with somewhat smaller female than male means and modest growth over time.

eliminates workers with allocated earners. This yields a sample of 25,278 native-born and 907 Foreign-born RNs.

The second source of data is the National Survey of Registered Nurses (NSRN), conducted by the Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services. The survey, mailed to individuals with an RN license in the US, is conducted every four years and the 1988, 1992, 1996, 2000, and 2004 surveys are utilized. The data contain personal and demographic information on the registered nurse population; including the country where the nurse received his/her education, time since the nurse's first US license, and current (and previous) employment setting. There are no questions in the survey on birth country or citizenship. The sample was restricted to those who were employees of a facility or a temporary employment agency (self-employed were eliminated), who were employed in nursing as their principal position, and whose real wage was between \$3 and \$150 in 2006 dollars. These restrictions yield a sample of 119,046 RNs whose basic nursing education was in the US and 3,854 whose basic education was not in the US (or Guam, Puerto Rico, the U.S. Virgin Islands).

There are some notable differences between the CPS and NSRN. The wage variable in the CPS sample is constructed by dividing usual earnings per week by usual hours per week (or hours last week), while the NSRN wage is constructed from annual earnings and the product of weekly hours and weeks worked per year.⁹ Another difference is in the definition of immigrant. The NSRN identifies those who received their basic nursing training in another country, but does not capture country of birth. Presumably this serves as a good proxy for immigrant RNs, but some native-born workers could have gone overseas for their training. On the other-hand, the CPS does identify country of birth and citizenship status, but does not have as good information concerning nursing education as the NSRN. Another difference in the CPS versus the NSRN is the response rate of the

⁹ Lemieux (2006) shows that March CPS wage measures and ORG earnings and hours measures have higher residual variance than does reported hourly wage.

NSRN. The NSRN is mailed to all licensed RN in the US, but the response is voluntary and so may be subject to response bias.

Descriptive Evidence

Table 1 displays descriptive statistics by birth and education origin. About 3.5 percent of the CPS sample are foreign-born non-citizens, while 3.1 percent of the NSRN report receiving their basic education outside the US. Foreign-born workers have a slightly lower average wage, tend to be younger (or less experienced), are more likely to have a bachelor's degree, are more likely to be employed in a hospital, and are less likely to be part-time employees than native-born RNs. The NSRN data show a higher wage for those with a foreign education relative to those with a native education. The log wage difference suggests foreign-trained RNs earn about 12 percent more than native-trained RNs. Foreign educated nurses are about twice as likely to be employed by a temporary agency (but are a small fraction of workers). Many of those who receive their basic education outside the US may well have obtained additional education within the United States. The high proportion of graduate RNs in this category suggests this is the case.¹⁰

Table 2 shows that the largest country of origin is the Philippines which makes up 32 percent of the foreign-born RNs. Canada is second at 16 percent, followed by India and England. These numbers are quite different from figures for the workforce as a whole, where Mexico, by far, makes up the largest portion of the immigrant workforce.¹¹ Figure 1 shows the country of origin for foreign-educated RNs from the NSRN by year. The Philippines is the largest group and its share has increased over the period, accounting for about 45% of the foreign educated RNs in the NSRN in 2004. There does not appear to be a trend for the other countries, but as in the CPS data, Canada, the UK and India are the other largest countries of origin.

¹⁰ The CPS education categories do not match perfectly with the RN degree types. Beginning in 1992 the survey began collecting information on degree type. Among the categories are: Associate's degree in college – occupation/vocation program, Associate's degree in college – academic program. Thus the CPS asks for highest degree attained (and may exclude the diploma degree since it is through a hospital and not school) and the NSRN asks type of nursing degree.

¹¹ These numbers are taken from the CPS ORG files from September 1995 through June 2007 for all wage and salary workers.

Table 3 shows that RN immigrants look quite similar to other immigrants when examining which states to which they immigrate: California, New York, Florida, and Texas attract the largest proportion of nurse immigrants and these proportions are similar to the workforce in general. In results not shown, the percentage of foreign born RNs from the CPS has remained relatively stable between 3 and 4 percent over the 1995 through 2007 period.

Table 4 displays descriptive statistics by country of birth and education. When examining country of birth, wages are similar for all immigrants, while those RNs who received their basic education in the Philippines have a higher wage than those from other countries, and Canadian-trained nurses show the lowest average wage. Nurses from India have a high proportion of graduate degrees (these include advance practice professional degrees, such as nurse practitioner, and nurse midwife, etc.). Canadian-trained nurses are more likely to be employed by temporary agencies and are more likely to work part-time than are Filipino or Indian RNs.

V. Results

Wage Effects of Immigrant RNs

Table 5 shows estimated wage differentials for immigrant RNs relative to their native counterparts from the CPS data. Other variables included in the log-wage regression are potential experience and its square, controls for education (4), race (3), part-time employment, union membership, marital status (2), hospital employment, residence in a large metropolitan area, region (8), and year (12). Column 1 shows that overall there is about a 4.5 percent lower wage for RNs born outside the US who are non-citizens. Column 2 shows that this differential does not differ significantly between hospital and non-hospital employment. In column 3 the differential is allowed to differ by country of birth. Overall there is a 7.5 percent lower wage for foreign-born workers, but there is a slight positive effect for Canadian RNs ($-.078 + .107 = 2.9$), while Filipino RNs earn about 3 percent lower wages than native-born nurses. This may reflect similarities in the training programs in Canada and the Philippines as compared to other countries, or may be correlated with English fluency.

The final column of Table 4 allows the differential to vary by time in the US. The CPS contains information on when immigrant's entered the US in two-year intervals. Similar to results for the population as a whole (Borjas, 2000; Chiswick, 1978) the regression results in column 4 shows that all of the penalty for foreign born workers is in the first few years after entry. There is an insignificant differential for the most recent entrants, but those who have been in the country between 2 and 4 years experience wages that are about 10 percent lower than natives. Once the RN has been in the country for about 4 years, the differential falls to -.023 and is no longer significant. For those who have been in the US more than 10 years, there is a small wage advantage over native born RNs.¹²

Table 6 shows similar results using the NSRN where foreign education is the main variable of interest. Other variables included in these regressions are potential experience (years since received first license) and its square, controls for education (3), part-time status, race, (3) marital status(2), hospital employment, temporary agency, region (8), and year (3). The results are slightly different than those from the CPS. Columns 1 and 2 shows that, unlike the raw wage difference, once measureable characteristics are accounted for, foreign trained RNs do not receive a different wage than native-trained nurses in or out of the hospital sector. Results by country show a slight positive wage differential for Filipino RNs and a negative wage differential of about 4 percent for RNs who received their initial training in India.

Finally, similar to results from the CPS, the NSRN results in column 4 of Table 6 show that there is a large initial penalty for recent immigrants, but this quickly goes to zero as the RN accumulates experience. RNs who recently received their training outside of the US experience almost a 10 percent lower wage than their native-trained counterparts. Wage comparability is acquired in just a few years, however, and after 10 years there is a wage advantage for foreign-trained RNs. These results suggest that while foreign-trained nurses start out at a disadvantage, they quickly catch up as they accumulate experience. An alternative explanation is that only the most able foreign

¹² In results not shown a distinction is made between foreign-born citizens and non-citizens. Similar to what is shown in column 4, there is a wage disadvantage for foreign-born non-citizens, but a small wage premium for foreign-born workers who have become US citizens.

nurses remain in the US nursing market and so after a few years the lower-skilled nurses exit the market leaving only the nurses with similar human capital to US trained nurses. While this nonrandom selection over time is likely to occur for native nurses as well, it might be stronger for foreign RNs who are likely to be more mobile.

Table 7 shows wage differentials for each year using the NSRN.¹³ The first specification shows the wage differential for foreign-educated nurses, and the second shows how the differential varies based on years in the country. The overall differential is slightly negative in 1988, but then is essentially zero for all remaining years, revealing no real trend in the foreign-trained wage differential. Interacting foreign-trained with years in the US shows that for each year there is a large penalty for new foreign trained nurses in the market, but this quickly goes to zero. The results for each year are similar to the pooled results in Table 6, making it unlikely that cohort effects can explain the declining differential associated with years in the US. For example, the sample of foreign-trained RNs with 0-2 years in the US in 1988 earn wages .11 log points lower than natives trained nurses. Four years later this cohort of workers (with 4-6 years experience in 1992) earns wages similar to their native-trained counterparts. The story from both data sets, however, suggests that after an initial period of lower wages, immigrant RNs earn wages similar to native RNs.

Wage Effects of Immigration on Native Earnings

The paper next turns to the effect of immigration on the earnings of native RNs. In order to estimate the percent of foreign RNs in each market, the NSRN for the 1996, 2000 and 2004 survey years are utilized. For each survey the percent of foreign educated RNs in each metropolitan area is calculated. In areas comprising more than one metropolitan statistical area, the consolidated metropolitan area is used. The percent foreign educated for the rural non-metropolitan area for each state is constructed and this is matched to workers not in a metropolitan statistical area.¹⁴ The Census Bureau changed their metropolitan area classifications beginning with the September 1995 and then

¹³ Sample size limitations from the CPS do not make year by year analysis reliable.

¹⁴ Omitting these workers and including only workers in a MSA does not change the results presented below.

again with the May 2004 CPS ORG survey. Thus, the 2004 NSRN is matched to the May 2004 – June 2007 CPS ORGs, the 2000 NSRN is matched to the January 2000 to April 2004 CPS ORG, and the 1996 NSRN is matched to the September 1995 through December 1999 CPS ORG. Matching the NRSN to forward looking years of the CPS is consistent with previous literature on immigration which has used the lagged stock of immigrants to instrument for current immigration. Other than the variables specified, the regressions all include controls for schooling, potential experience and its square, dummy variables for race/ethnicity(3), marital status(2), public employment, union membership, part-time status, and year.

Table 8 displays these results. The specifications in panel 1 follow the naive approach described by equation 2 above. Note that in line 1 there is a very large positive coefficient associated with the percentage foreign-educated across all three sample periods. In line 2 dummy variables for city size and state are added and the coefficients go to zero. This implies that the positive effects found in line 1 are due to factors correlated with state and city size.

Panel 2 of Table 8 pools RNs with college educated females not employed in healthcare and includes interactions between the percent foreign trained and an RN dummy variable. Overall, RNs earn a large premium over college educated females. Also, the wages of all workers are higher in cities that have a higher proportion of foreign educated RNs – both RNs and college educated females. Note, however, that the coefficient on the interaction term is negative and significant, suggesting that the boost in wages for workers in cities with a high proportion of foreign-trained RNs is smaller for RNs than the comparison group. This is interpreted as the direct effect of nurse immigration on native earnings. In the 2004-2007 period the coefficient is -1.183. To put this in perspective, a one standard deviation increase in the percent of foreign-educated RNs in a metropolitan area is associated with a 4.1 percent reduction in RN wages ($-1.183 \cdot .035$). The equivalent effect in the 2000-2003 and 1995-1999 periods are .028 and .033 respectively. The addition of city size and state dummies does not affect the results, suggesting that the comparison

group coefficient is capturing much of the area-specific factors correlated with immigration status and earnings.¹⁵

In results not shown restricting the RN sample to those with less than a BS degree results in slightly smaller (in absolute value) estimates of the interaction term (just over 3 percent for the 2004-2007 period). Previous research on immigration across occupation (Orrenius and Zavodny 2007) finds that lower skilled workers are more adversely affected by immigration than higher skilled nurses. Likewise, we might expect that looking within a specific occupation such as nursing that lower skilled nurses would be the ones most affected by foreign-educated RNs. This does not appear to be the case as the negative interaction term is similar for RNs with a BS as for those with less than a BS degree.

Setting the control group of workers as college educated females outside of healthcare is informative and controls for endogeneity with respect to city-specific wage differences. But it does not control for endogeneity of RN immigration with respect to wages specific to the health sector. The third panel of Table 8 pools RNs with other workers in the healthcare industry.¹⁶ While the sample sizes for this group tend to be small and it may be asking too much of the data, the results suggest that, contrary to the results in Panel 2, immigrants do not have a significant effect on the earnings of native RNs. The large coefficient on the RN dummy variable indicates that RNs earn a wage premium over other healthcare workers. The percent foreign trained RNs in a market tends to increase wages for all workers, but the interaction term between the percent foreign-trained and RNs is small and insignificant in all three year groups. Assuming that common factors affect RN and other health industry wages, the lack of a relationship may indicate that RN immigrants' choice of location

¹⁵ Allowing for alternative non-healthcare comparison groups does not affect the results. For example, including all workers with a college degree, or all females not in healthcare results in a significantly negative interaction effect that is on the same order as those presented in Panel 2 of Table 8 where females with a college degree are the comparison group

¹⁶ Physicians, dentists, and optometrists are omitted since their earnings are well above the cap and they are often self employed.

in the US is not driven by city wage differences (no doubt it is influenced by employment opportunities).

Thus, if one thinks a non-health industry group is the appropriate comparison group, the results suggest a small negative effect on RN wages. Alternatively if one relies on the health industry comparison group (where the small sample size may be an issue), the results suggest no effect on RN wages. Either way, however, the conclusion is that there at most a small effect of RN immigration on the earnings of native nurses.

VI. Conclusions.

This paper examines the role of foreign-born/trained RNs in the US labor market. Using data from the CPS which contains information on country of birth and citizenship status, and the NSRN which contains information on which country the RN received his or her basic nursing education, it is found that about 3 to 4 percent of the RN workforce emigrated from another country. The Philippines, Canada, and India are the largest countries of origin. Unlike the workforce in general, the main exporters of nurses tend to come from English speaking nations. The proportion of RN immigrants in general and proportions by country have remained relatively stable over the past 10 years.

Overall, there is little wage difference between immigrant and native nurses once accounting for measurable characteristics. Breaking out immigration status by country of origin, the CPS results show no differential for Canadian nurses, a penalty of about 4 percent for Filipino RNs, and a penalty of about 8 percent for Indian and other foreign born nurses. The NSRN results show a 4.5 percent penalty for Indian-trained RNs, a small premium for Filipino RNs and no difference between Canadian and US-trained RNs. Both data sets show wage differentials that are largest early in immigrants' time in the US. Nurses who have been in the US for less than 4 years receive a wage that is about 10 percent lower than their native counterparts. After this time, the differential is approximately zero suggesting that immigrant nurses quickly accumulate human capital and establish job matches sufficient to catch up to their native-born counterparts.

Regardless of the data set, the results of the analysis show that immigrant RNs perform quite similarly to native born RNs in the US market. While there is an initial penalty once the nurse enters the market, this quickly dissipates after a few years on the job. As foreign nurses accumulate experience they are able to perform similarly to native nurses. Given that these are not longitudinal results, we cannot completely rule out cohort effects in which more recent entrants are doing worse than earlier entrants. But the pseudo-cohort analysis discussed in the paper suggests the primary explanation is the assimilation of immigrant RNs and not cohort effects.

Previous literature on immigration effects on native workers has found little to no wage effects. The results in this paper find a similar effect on the earnings of native RNs. By pooling RNs with a comparison group of workers and interacting the percentage of foreign-trained RNs in a metropolitan area with an RN dummy variable allows the direct effect of immigration to be distinguished from other factors correlated with immigration and earnings. When the comparison group is comprised of college educated females not employed in the health industry the results show a small negative effect of RN immigrants on native earnings. When the comparison group is comprised of non-RNs in the healthcare industry, however, the estimates show no effect of immigration on native RN wages. Either way, however, the affect is small at best.

While this research has focused on the wage effects of immigration, the findings suggest that the importation of foreign RNs does not result in any major negative consequences in US markets. Rather than decreasing real wage levels for RNs in the US, immigration has simply slowed the growth of real wages during a period of steadily growing demand and a sluggish response in native supply. Likewise, foreign-trained nurses are attracted to areas where demand and earnings are the highest and there appears to be only small effects on the earnings of native RNs. One future avenue for research would be to examine quality differences in patient outcomes associated with foreign-trained nurses.

Thus, while foreign-trained nurses do not appear to be the sole long-term solution to the nursing shortage (Aiken, 2007), the use of foreign nurses is a viable strategy for easing shortages. A

consequence of the migration of nurses into the US and other developed countries, however, is the supply effect in their native countries (Kingma, 2007). Note that on the one hand, the emigration of nurses to developed countries results in a decrease in supply in their native countries. On the other hand, investment in nursing education and the return of some who emigrate may lead to an increase in supply in the source country. While beyond the scope of this paper, this issue should be addressed by policymakers when establishing immigration policy with respect to professional groups.

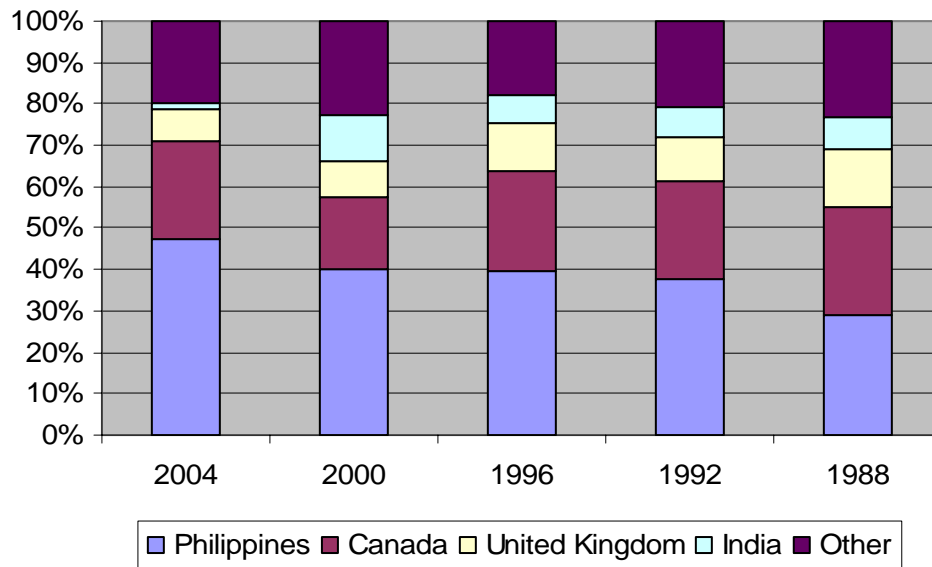
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Figure 1: Distribution of Foreign Education by Country



Source: The Sample Survey of Registered Nurses for the years 2004, 2000, 1996, 1992 and 1988. Shown is the distribution of country of basic nursing education for nurses who indicated they received their primary education outside of the United States.

Table 1: Descriptive Statistics by Birth and Education Origin

	Foreign Born	Native Born	Foreign Education	Native Education
Real Wage \$2006	25.56 (10.65)	26.08 (12.31)	30.05 (11.75)	26.48 (10.26)
Associate	.138 (.345)	.233 (.423)	.085 (.279)	.408 (.491)
Diploma	.103 (.305)	.165 (.371)	.415 (.493)	0.261 (.439)
Bachelors	.611 (.488)	.439 (.496)	.369 (.483)	.285 (.451)
Graduate	.084 (.277)	.094 (.292)	.189 (.392)	.139 (.346)
Experience	16.87 (9.41)	21.60 (10.44)	20.21 (10.31)	16.35 (11.13)
Hospital	.637 (.481)	.627 (.483)	.737 (.440)	.677 (.468)
Temp Agency	--	--	.028 (.165)	.015 (.124)
Part- Time	.132 (.339)	.288 (.453)	.168 (.374)	.278 (.448)
Female	.895 (.306)	.931 (.254)	.933 (.250)	.945 (.227)
Married	.633 (.482)	.697 (.460)	.723 (.448)	.714 (.452)
Sample Size	907	25,278	3,854	119,046

Note: Country of birth data are from the September 1995 – December 2007 CPS ORG files. Foreign born are those who are non-citizens born outside of the US. Education data are from the 1988, 1992, 1996, 2000, and 2004 National Survey of Registered Nurses. Foreign Education is defined as those who indicated their basic training in nursing was outside of the US.

Table 2: Largest Country of Origin for Immigrants

Registered Nurses		All Wage and Salary Workers	
Country	Percentage	Country	Percentage
Philippines	31.9	Mexico	31.5
Canada	16.1	El Salvador	4.2
India	6.4	Philippines	4.1
England	4.0	India	3.7
Mexico	3.0	China	3.3
Jamaica	2.8	Canada	2.7

Source: Birth country numbers are from Current Population Survey Monthly Outgoing Rotation Group Files for the September 1995 – December 2007 surveys. Shown is the percentage of workers who are foreign-born non-citizens of the US.

Table 3: Largest States of Residence for Immigrants

RNs		All Wage and Salary Workers	
State	Percentage	State	Percentage
California	17.8	California	22.9
New York	11.8	New York	11.9
Florida	8.8	Florida	7.4
Texas	7.5	Texas	7.3
Illinois	6.1	New Jersey	5.3
Michigan	3.8	Illinois	5.1
New Jersey	3.7	Massachusetts	3.1
Nevada	3.5	Nevada	2.7
Maryland	3.3	Arizona	2.2

Source: Current Population Survey Monthly Outgoing Rotation Group Files for the years September 1995 – December 2007. Shown is the percentage of workers who are foreign-born non-citizens of the US.

Table 4: Descriptive Statistics by Country of Birth/Education

	CPS Country of Birth				NSRN Country of Education			
	Philippines	Canada	India	Other	Philippines	Canada	India	Other
Real Wage	25.77 (9.72)	25.94 (9.98)	25.14 (8.28)	25.33 (11.79)	32.01 (12.75)	27.20 (9.27)	29.04 (10.57)	29.75 (11.78)
Associate	.048 (.215)	.205 (.405)	.052 (.223)	.188 (.392)	.056 (.231)	.068 (.252)	.059 (.236)	.139 (.346)
Diploma	.028 (.164)	.212 (.410)	.034 (.184)	.128 (.335)	.199 (.399)	.702 (.457)	.478 (.500)	.478 (.502)
Bachelors	.879 (.327)	.425 (.496)	.586 (.497)	.493 (.501)	.716 (.451)	.107 (.309)	.210 (.407)	.143 (.350)
Graduate	.031 (.174)	.082 (.276)	.207 (.409)	.104 (.305)	.097 (.297)	.148 (.355)	.327 (.470)	.305 (.461)
Experience	14.57 (8.48)	18.37 (9.88)	17.19 (10.65)	18.26 (9.40)	18.67 (9.09)	20.79 (12.44)	21.14 (8.46)	21.56 (10.29)
Hospital	.612 (.481)	.671 (.471)	.793 (.223)	.621 (.486)	.756 (.430)	.692 (.462)	.813 (.391)	.728 (.445)
Temp Agency	--	--	--	--	.011 (.105)	.045 (.208)	.004 (.061)	.043 (.204)
Part- Time	.087 (.282)	.164 (.372)	.052 (.223)	.154 (.371)	.094 (.292)	.227 (.419)	.074 (.261)	.241 (.428)
Female	.837 (.370)	.945 (.228)	1.00	.903 (.296)	.914 (.280)	.948 (.223)	.967 (.179)	.939 (.239)
Married	.599 (.491)	.596 (.492)	.583 (.489)	.621 (.486)	.764 (.425)	.619 (.486)	.938 (.243)	.695 (.461)
Sample Size	289	146	58	414	1,540	840	272	1,202

Note: Country of birth data are from the September 1995 - December 2007 CPS ORG files. Foreign born are those who are non-citizens born outside of the US. Education data are from the 1988, 1992, 1996, 2000, and 2004 National Survey of Registered Nurses. Foreign Education is defined as those who indicated their basic training in nursing was outside of the US.

Table 5: Wage Effects of Foreign Born Nurses from CPS

	1	2	3	4
Foreign Born	-.046 (.011)	-.063 (.018)	-.078 (.016)	--
Foreign Born * Hospital	--	.026 (.023)	--	--
Foreign Born*Philippines	--	--	.048 (.025)	--
Foreign Born*Canada	--	--	.107 (.032)	--
Foreign Born*India	--	--	-.012 (.046)	--
Foreign Born * 0-2 Years	--	--	--	-.014 (.043)
Foreign Born * 2-4 Years	--	--	--	-.099 (.031)
Foreign Born * 4-6 Years	--	--	--	-.023 (.030)
Foreign Born * 6-8 Years	--	--	--	.016 (.032)
Foreign Born * 8-10 Years	--	--	--	.000 (.030)
Foreign Born * >10	--	--	--	.035 (.009)

Results are from the CPS ORG files for September 1995 through December 2007. Other variables included in the regressions are potential experience and its square, controls for education (3 for 4 categories), race (3), part-time status, union membership, marital status (2), hospital employment, region (8), and year (11).

Table 6: Wage Effects of Foreign Educated Nurses from NSRN

	1	2	3	4
Foreign Ed	.005 (.006)	.019 (.010)	-.001 (.009)	--
Foreign Ed * Hospital	--	-.019 (.012)	--	--
Foreign Ed *Philippines	--	--	.035 (.013)	--
Foreign Ed *Canada	--	--	-.008 (.014)	--
Foreign Ed *India	--	--	-.043 (.022)	--
Foreign Ed * 0-2 Years	--	--	--	-.115 (.017)
Foreign Ed * 2-4 Years	--	--	--	-.028 (.018)
Foreign Ed * 4-6 Years	--	--	--	.009 (.017)
Foreign Ed * 6-8 Years	--	--	--	-.005 (.018)
Foreign Ed * 8- 10 Years	--	--	--	-.013 (.012)
Foreign Ed * > 10 years	--	--	--	.042 (.008)

Data are from the 1988, 1992, 1996, 2000, and 2004 National Survey of Registered Nurses. Other Foreign Ed is a dummy variable equal to one if the nurse's basic education was received outside of the US. Other variables included in the regression are potential experience (years since received first license) and its square, controls for education (3), part-time status, race (3), marital status (2), hospital employment, temporary agency, region (8), and year (3).

Table 7: Wage Effects by Year from the NSRN

	1988		1992		1996		2000		2004	
	1	2	1	2	1	2	1	2		
Foreign Education	-.029 (.012)	--	.018 (.013)	--	-.011 (.013)	--	.007 (.012)	--	.017 (.013)	--
Foreign Ed * 0-2 Years	--	-.111 (.037)	--	-.066 (.026)	--	-.153 (.033)	--	-.090 (.036)		-.078 (.038)
Foreign Ed * 2-4 Years	--	-.044 (.042)	--	.061 (.042)	--	-.060 (.030)	--	-.075 (.038)		.009 (.048)
Foreign Ed * 4-6 Years	--	-.011 (.037)	--	.022 (.047)	--	-.008 (.031)	--	.012 (.031)		.034 (.064)
Foreign Ed * 6-8 Years	--	-.007 (.036)	--	.026 (.040)	--	-.000 (.042)	--	-.024 (.033)		-.012 (.050)
Foreign Ed * 8-10 Years	--	.023 (.014)	--	-.005 (.043)	--	.042 (.049)	--	.079 (.034)		.001 (.038)
Foreign Ed * > 10 Years	--	--	--	.041 (.016)	--	.025 (.016)	--	.028 (.015)		.041 (.017)

Data are from the 1988, 1992, 1996, 2000, and 2004 National Survey of Registered Nurses. Foreign Education is defined as those who indicated their basic training in nursing was outside of the US. Other variables included in the regression are potential experience (years since received first license) and its square, controls for education (3), part-time status, race (3), marital status (2), hospital employment, temporary agency, region (8), and year (3).

Table 8: The Effect of Foreign Nurses on Native Earnings

		2004-2007	2000-2003	1995-1999
	RNs Only			
	City Size, and State dummies?			
1. Proportion Foreign Trained	No	1.649 (.130)	1.363 (.094)	1.436 (.081)
2. Proportion Foreign Train	Yes	0.097 (.241)	0.598 (.176)	0.937 (.131)
	RNs Pooled with College Educated Females			
RN	Yes	0.446 (.008)	.398 (.007)	.410 (.007)
Proportion Foreign Trained	Yes	.945 (.122)	-.514 (.093)	.899 (.071)
Proportion Foreign Trained * RN	Yes	-1.183 (.171)	-.755 (.126)	-.821 (.112)
	RNs Pooled with Other Health Industry Workers			
RN	Yes	0.296 (.008)	.298 (.006)	.320 (.006)
Proportion Foreign Trained	Yes	.216 (.127)	.332 (.091)	.535 (.066)
Proportion Foreign Trained * RN	Yes	.012 (.162)	.263 (.113)	.101 (.099)

Data are from the CPS ORG files from May 1995 – December 2007. Robust standard errors are shown in parenthesis. Proportion foreign trained is from the NSRN. The 2004-2007 estimates use the 2004 NSRN, the 2000-2003 estimates use the 2000 NSRN, and the 1995-1999 estimates use the 1996 NSRN. The top panel includes only RNs, while the second panel pools RNs with females with at least a college degree not employed in healthcare, and the bottom panel pools RNs with non-RNs in the health industry. Other variables included in the regressions are controls for schooling, potential experience and its square, dummy variables for race/ethnicity(3), marital status(2), public employment, union membership, part-time status, and year.