The Effect of Foreign-Trained Nurses on the U.S. Nursing Labor Market

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Extended Abstract

Recruitment of foreign-trained nurses is used as a strategy to ease nursing shortages in the U.S. healthcare industry over the past 30 years as market forces began to shift away from equilibrium. Although the supply of registered nurses experienced its largest expansion between 2005 and 2010 since 1970, there is a cyclical pattern of nursing surpluses and shortages. Therefore, strategies that can satisfy the healthcare demands in the long-run are needed.

Because the empirical evidence on the issue has a wide range of the results of immigrants having no adverse effects to large negative effects (Borjas and Katz, 2007; Schumacher, 2011; Kaestner and Kaushal, 2012; Cortes and Pan, 2014), it is still an unanswered question as to how immigrant nurses affect native nurses. Moreover, studies exploring the effect of foreign-educated nurses in the U.S. nurse labor market have not focused on the change covering recent periods. Updating the influence of foreign-trained nurses on domestic nurses is worthwhile because it is believed that the Great Recession has induced older nurses to postpone their retirement and retired nurses to re-enter the nursing industry as other types of jobs disappear or cut back on hours (Buerhaus, Auerbach, and Staiger, 2009).

I examine whether there is any particular movement in the employment of native registered nurses[1] by the influx of the foreign-educated nurses before and after the Great Recession. This study contributes to the existing literature on the effect of immigrant nurses in the U.S. labor market in two ways. First, while previous research would identify the geographic unit by the area of residence, this paper assigns the metropolitan statistical areas (MSAs) based on place of work to provide a better understanding of the labor market to policymakers. Second, I apply a multiple instrumentation method to avoid conflating the short- and long-term reaction to the entry of new immigrants. Combining national inflow of immigrants with the geographic distribution is a well-known instrument to identify exogenous labor shocks in the literature on immigration. However, the inflow of immigrants across cities tends to be highly serially correlated in the States since 1970. By adding a lagged past settlement instrument to the regression, this paper separates the initial response and the long-period effects of the increase in foreign-educated nurses on native nurses.

Data

The 2000 Census and the American Community Survey three-year aggregates for both 2007 (2005-2007) and 2010 (2008-2010) and five-year aggregates for 2015 (2011-2015) are used for the main data source. They contain information on personal and demographic characteristics, country of birth, as well as earnings and employment. Because they do not ask about country of education, I assume that a foreign registered nurse was trained in the U.S. if the nurse was younger than 25 years old when he or she first arrived to live in the States. According to a person's specific year to enter the U.S. and the middle year of the relevant period surveyed for multi-year aggregates, I identify domestic- and foreign-trained nurses. Individuals are restricted to employed workers in the health sector who are aged 20-70 for U.S.- trained nurses and those aged 25-70 for internationally-trained nurses.

Research Methods

The analysis closely follows a linear model that Cortes and Pan (2014) employed. It is basically using the "cross-area approach" proposed by Card (2001) with the assumption that areas represent separate labor markets and that employment of a registered nurse is determined by supply and demand factors in those markets. A city in the analysis corresponds to the MSA as defined by the Census Bureau. Among 381 MSAs in the United States identified by area of residence, I construct 182 cities based on workplace[2]. There are two widely recognized concerns with this strategy. First, local markets are not closed and natives may respond to the immigrant's supply shock by moving their labor to other cities. Second, immigrants are not randomly distributed across labor markets. Immigrants select locations where previous immigrants have settled because they could lower the cost of job

[1] Throughout the paper, use of the term "nurses" refer to registered nurses.
[2] Throughout the paper, use of term "cities" refers to 182 MSAs. When the person does not report the city or work, the city of residence is used for its replacement. The correlation between the city of work and city of residence is 0.9191.

searching and moving to a new place given information networks (Munshi, 2003). To address this possible endogeneity bias, the tendency of foreign-trained nurses to settle in a city with a large group of immigrants from the same country of origin is commonly used. The instrument is an interaction between the historical distribution of highly skilled migrants across U.S. cities and the national flow of foreign-trained nurses aged 25 to 70 years old in the labor force. Because the single instrument can still result in biases (Jaeger, Ruist, and Stuhler, 2018), I exploit multiple instruments. By limiting the inclusion of past immigration inflows to one lag, the empirical specification is as follows:

$$\frac{USTN}{Population}_{ijt} = \alpha + \beta_1(\frac{FTN}{pop})_{ijt} + \beta_2(\frac{FTN}{pop})_{ijt-1} + \gamma X_{ijt} + \theta_{jt} + \delta_i + \lambda_t + \varepsilon_{ijt}$$

where *i* is the city, *j* is the division, and *t* is the time period (*t* = 2000, 2005, 2007, and 2010). A dependent variable is the number of employed U.S.-trained nurses (USTN) per 10,000 population working in city *i* in each time period. β_1 captures the impact of importation of foreign-educated nurses on domestic trained nurses in the short-run and β_2 describes the longer-term reaction to past supply shocks. Like Cortes and Pan (2014) assumed, the U.S.-trained nurses' labor force is a function of the number of employed foreign-trained nurses per 10,000 population and time-varying city-level characteristics (X_{ijt}). Time-varying city-level controls consist of proxies for demand and supply determinants. The demand-side factors include the share of the city population aged 65 and over, the log of average hourly wages to describe a city's income level, and the number of physicians in the labor force per 10,000 population. The supply-side determinants of the U.S. nursing labor market include the share of the city population aged 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 54, 55 to 59, and 60 to 64 years, the share of females in professional occupations, the labor force participation of skilled people and of skilled married females, the log average hourly wage of skilled women outside of nursing, and the number of skilled women who speak Spanish at home per 10,000 population. All variables to capture the supply-side are restricted to those aged 20-70 years old in the labor force. Division x year (θ_{jt}), city (δ_i) and year (λ_t) fixed effects are also included in a specification.

Preliminary Results

Table 1 displays descriptive statistics of registered nurses by demographic and labor characteristics by census year and by internationally trained status. Both domestic- and foreign-educated nurses are dominantly composed of married women while experiencing aging and an increase in the share of male nurses over time. Differences are observed with respect to education levels and hourly wage. Table 2 presents the estimates of single and multiple instrument variables strategy for the displacement regression. According to Panel A, the single IV estimates are all negative and the magnitudes range from -1.210 to -4.698 implying that one foreign-educated nurse who enters a city to work leads to approximately one to five native nurses' displacement. The estimates show highly statistical significance and strong robustness to the inclusion of controls and fixed effects as well as to the exclusion of selected cities. Panel B illustrates the IV estimates obtained by using multiple instruments. Generally, I fail to find a statistically significant effect of foreign-trained nurses on the employment of native nurses. However, the last specification that needs to be emphasized shows the negative response to labor shocks in the short-run and the positive reaction in the longer-term. The single IV's coefficient is -2.268 and the short-term estimate under multiple instruments is -2.680. Taken together, findings suggest one foreign-educated nurse's inflow displaces two to three native nurses in the short-run, whereas his or her hiring gives a boost to the U.S. nursing labor market in the long-run. Hence, the supply of additional foreign-educated nurses into the market can be an effective strategy to ease the nursing shortage problem.

Conclusion and On-going Research

The preliminary results suggest that relying heavily on foreign-educated nurses to fill the gap in the U.S. healthcare workforce can be a convincing policy in the long-run although domestic nurses may be suffered from the influx of their counterparts in the short-run. The on-going research focuses on three efforts: 1. recognition the most affected native nurses by the importation of foreign-trained nurse with respect to age and educational attainment; 2. assessing the potential role of wages to check where the displacement effects are stemming from; 3. differentiating the correlation by business cycle conditions. The uncertainty generated by the Great Recession could have the different effects on the U.S. Nursing labor market. For robustness check, I plan to use a different base year. There is sufficient variation in the source country composition only in the 1970s (Jaeger, Ruist, and Stuhler, 2018). I expect that the impact of foreign-trained nurse inflows on the supply of native nurses in the 1970s is more negative in the short-run and more positive in the long-run based on the single or multiple instruments created by the base year of the 1990s.

Table 1: Demographic and labor supply characteristics of US- and Foreign-trained Nurses, 2000-2015

	2000		2007		2010		2015	
	USTN	FTN	USTN	FTN	USTN	FTN	USTN	FTN
Age (mean)	42.31	44.13	43.85	46.41	44.11	46.83	43.67	47.91
Gender								
Male	7.52	10.10	8.67	13.10	8.74	13.49	9.73	15.08
Female	92.48	89.90	91.33	86.90	91.26	86.51	90.27	84.92
Race								
White	88.20	23.83	84.78	23.54	83.68	22.12	82.14	19.55
Black	7.75	17.73	8.60	19.01	9.13	18.08	9.57	20.45
Asian	1.57	52.23	3.85	53.31	4.58	55.92	5.07	56.05
Native American	0.47	0.17	0.48	0.16	0.43	0.15	0.45	0.12
Other Races	2.01	6.04	2.30	3.98	2.18	3.73	0.45	3.83
Hispanics	2.96	5.61	3.82	6.66	4.62	6.96	5.73	6.04
Marital Status								
Married	67.98	72.13	65.31	71.97	64.82	73.28	62.75	73.77
Widow/ divorce/ separated	18.91	14.21	19.74	15.91	19.31	15.22	18.23	15.60
Single	13.11	13.66	14.95	12.12	15.87	11.50	19.02	10.63
Educational Attainment								
Less than HS	0.13	0.41	0.07	0.36	0.15	0.40	0.20	0.47
High school	11.29	9.67	6.40	5.77	6.56	5.17	6.11	4.95
Associate's degree	37.76	23.36	38.85	21.00	38.55	20.56	35.11	18.51
Bachelor's degree	37.69	53.62	41.50	58.23	42.57	60.62	45.01	62.32
Graduate degree	13.08	12.75	13.16	14.59	12.11	13.05	13.54	13.68
Hours worked/wk (mean)	37.42	39.84	37.58	40.00	37.58	39.40	37.82	39.14
Hourly wage (mean)	13.07	15.86	17.28	20.44	18.53	21.48	19.63	23.33
Number of observation	96,567	7,838	71,149	4,848	77,845	5,881	119,706	8,858

Note: The data is from the 2000 U.S. Census and the multi-year aggregate American Community Survey (2007, 2010, and 2015). The sample is restricted to employed U.S.- and foreign-educated registered nurses.

Table 2: Displacement Effects of Foreign-trained Nurses on U.S.-trained RNs, 2000-2015

	Dependent Variable: US-trained Nurse/Population					
	(1)	(2)	(3)	(4)	(5)	(6)
	A. 2SLS (Single Instrument)					
FTNs/Pop	1.210*	2.618***	2.576***	2.710***	4.698***	2.268***
	(0.640)	(0.337)	(0.296)	(0.529)	(1.119)	(0.283)
Observations	728	728	728	728	712	656
R-Squared	0.550	0.973	0.977	0.981	0.963	0.978
	B. 2SLS (Multiple Instruments)					
FTNs/Pop	-2.242	-9.880	-6.731	-0.290	0.335	2.680***
	(10.06)	(10.31)	(5.723)	(1.846)	(1.943)	(0.638)
Lagged FTNs/Pop	0.921	-0.584	-0.327	0.210	0.732	0.375*
	(0.980)	(1.206)	(0.871)	(0.386)	(0.858)	(0.224)
Observations	546	546	546	546	534	492
R-Squared	0.441	0.907	0.956	0.988	0.983	0.983
Controls		X	X	X	X	X
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Division*Year FE	No	No	Yes	Yes	Yes	Yes
State*Year FE	No	No	No	Yes	No	No
Excludes						
Top immigrant cities	No	No	No	No	Yes	No
Cities in California	No	No	No	No	No	Yes

Note: The data is from the 2000 U.S. Census and the multi-year aggregate American Community Survey (2007, 2010, and 2015). The dependent variable is the number of employed native-trained nurses aged 20-70 years per 10,000 population in a city, and the main independent variable is the number of employed foreign-trained registered nurses age 25-70 years per 10,000 city population. For the 2SLS regressions, the instrument is constructed by using the historical distribution of skilled immigrants, excluding those who are register nurses, across cities in 1990 to allocate the national flow of nurses to each city. Robust standard errors are reported in parentheses. The symbol * means significant at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

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