Medical Worker Migration and Origin-Country Human Capital: Evidence from U.S. Visa Policy

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Motivation

- Many developed countries face shortages of medical workers
- To fill these gaps, countries often recruit foreign-born nurses (Cortes and Pan, 2014)
- For migrant-sending, developing countries, recruitment may lead to scarcity, or “brain drain,” of health care professionals
  - Could contribute to poor health outcomes for local population
- Alternatively, recruitment for high-wage jobs may induce more investment in education
  - If more individuals invest in education than migrate, results in “brain gain” of health care workers
Causal Question

- What is the effect of demand for foreign-born health care workers on the stock of health care workers and educated labor in the country of origin?
Examine the effect of international migration of nurses from the Philippines on post-secondary enrollment, graduation, supply of programs, and quality of degree.

Exploit two changes in U.S. visa policy that led to the expansion and subsequent contraction of visas for Filipino nurses to the U.S.

Certain areas of the Philippines specialize in sending migrants to certain destinations and occupations (Theoharides, 2018)

- Some areas of Philippines had larger treatment dosage than others

Event study methodology

- Treatment is defined as provinces with high levels of nurse migration at baseline
Expansion and contraction of U.S. nursing visas first increased and then decreased migration of Filipino nurses

Nursing enrollment increased after expansion, and then decreased when visas were reduced

Nursing graduates responded similarly but with 4-year lag

Supply of nursing programs increased to allow for new enrollment
Results

- Marginal nurse induced into nursing degree was less likely to pass nursing licensure exam
  - But, increase in licensed nurses far exceeded number departing
  - For each new migrant, 10 new nurses licensed in Philippines

- Brain drain or gain?
  - Increases due to individuals switching to nursing from other fields
  - Persisted to graduation at a higher rate, thus increasing college grads overall
Contributions

- Provide first causal microeconomic estimates of medical worker migration on sending country human capital
  - Adds to long literature on brain drain and gain (Batista et al., 2012; Beine et al., 2001; Chand and Clemens, 2019; Dinkelman and Mariotti, 2016; Docquier et al., 2008; Khanna and Morales, 2019; Shrestha, 2017; Theoharides, 2018)

- Focus on skill-specific migration where supply of postsecondary education may not readily respond
  - Measure supply-side effects of changes in nursing programs and changes in quality of nursing programs

- Unique data allow for accurate estimates of skill prior to migration
Policy Implications

- Results refute usual refrain about brain drain
- Directly relevant to policy debates surrounding medical worker migration and reliance of wealthy countries on medical personnel from developing countries
  - WHO, developed countries have discouraged or banned recruitment from certain countries
- Highlight importance of well-designed partnerships between migrant-sending and receiving countries
  - Caveat: results may not translate to all contexts (ie. sub-Saharan Africa)
- For low to middle income countries seeking to use migration as development tool, Philippines provides optimistic evidence
Philippines is one of the world’s largest migrant-sending countries

Filipino nurses make up the largest group of foreign-born nurses

- Rooted in colonial relationship with U.S.
- United States is largest destination (74%)
- Filipino nurses in the U.S. earn approximately 10 times higher salaries plus legal status for family members

Migrant networks are key determinant of nurse migration patterns (Choy, 2006)
U.S. Recruitment of Nurses

- Most common channel for foreign nurses is through permanent employment based visas (EB-3)
- 140,000 EB-3 visas granted per year
  - Nurses experience shorter processing time due to shortages of U.S. nurses (Schedule A occupations)
  - Philippines cannot receive more than 7% of EB-3 visas granted
  - Demand for visas far exceeds supply
American Competitiveness in the 21st Century Act of 2000 loosened per country limits in visa allocation
- Approximately 200,000 additional visas to Schedule A occupations

In 2007, processing of Schedule A visas stopped
- In 2006, 6,839 nurse visas processed from the Philippines
- Fell to 2,342 in 2007
Migrant Departures of Nurses and Other Migrants

- Non-nurse Migrants
- U.S. Nurse Migrants
- Non-U.S. Nurse Migrants


Graph showing trends in Nurse Migrants (1,000s) and Other Migrants (1,000s) from 1990 to 2015.
Philippines provides compelling example of where one might anticipate a shortage of domestically employed nurses

Government officials in the Philippines have described the migration of nurses not as a “…brain drain, but more appropriately as a brain hemorrhage of our nurses.” (Galvez-Tan, 2003)

Despite this fear, postsecondary enrollment and graduation data suggest opposite result
Enrollment in Post-Secondary Education by Discipline

- Nursing
- Business
- Other Disciplines
- Education
- STEM
- Humanities

Number of students enrolled (1,000s) vs. Year

Commission for Filipinos Overseas (CFO): Administrative data on all permanent migrant departures from 1990 to 2014
  - Demographics, place of birth, country of destination, education, profession, etc.
  - Calculate province-level migration rates for nurses

Commission on Higher Education (CHED): Postsecondary enrollment and graduation from 1990 to 2013 disaggregated by program of study
  - Calculate enrollment, graduation rates and number of nursing programs in each province over time
### Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>St. Dev.</td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Migration Rate (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.075</td>
<td>0.094</td>
<td></td>
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<tr>
<td>U.S. Nurse</td>
<td>0.004</td>
<td>0.005</td>
<td></td>
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<tr>
<td>Non-Nurse</td>
<td>0.070</td>
<td>0.089</td>
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<tr>
<td><strong>Postsecondary Enrollment Rates (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21.41</td>
<td>12.53</td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>1.54</td>
<td>2.69</td>
<td></td>
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<tr>
<td>Other</td>
<td>19.87</td>
<td>11.07</td>
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<tr>
<td><strong>Postsecondary Graduation Rates (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.79</td>
<td>2.05</td>
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<tr>
<td>Nurse</td>
<td>0.36</td>
<td>0.57</td>
<td></td>
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<tr>
<td>Other</td>
<td>3.43</td>
<td>1.77</td>
<td></td>
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<tr>
<td><strong>Number of Nursing Programs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.39</td>
<td>8.94</td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>0.64</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>3.75</td>
<td>8.16</td>
<td></td>
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<tr>
<td><strong>Nursing Licensure Exam (%)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Examinees/Population</td>
<td>0.072</td>
<td>0.155</td>
<td></td>
</tr>
<tr>
<td>Passers/Population</td>
<td>0.031</td>
<td>0.065</td>
<td></td>
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Exploit plausibly exogenous policy changes that occurred in 2000 and 2007 that expanded and restricted nurse migration to US

Aggregate results provide suggestive evidence of impacts of the policy changes

To isolate causal effect, exploit importance of migrant networks

Compare high baseline nurse migration areas (treatment group) to low baseline nurse migration areas (control group) before and after the policy changes
Event Study

$$Y_{pt} = \sum_{\tau \neq 1999} \beta_{\tau} High_{p,0} D_{t}^\tau + \alpha_p + \gamma_t + X_{p0} \ast \gamma_t + \epsilon_{pt}$$  \hspace{1cm} (1)

- $Y_{pt}$: nursing enrollment or graduation rate in province $p$ year $t$
- $High_{p,0}$: binary variable equal to 1 if province has above median nurse migration at baseline
- $D_{t}^\tau$: binary variable equal to one if year of observation $t$ equals the specific year, $\tau$, and 0 otherwise
- $\alpha_p$ and $\gamma_t$: province and year fixed effects
- $X_{p0} \gamma_t$: baseline controls interacted with year fixed effects
- 1999 is omitted in order to identify the model
Identifying Assumptions

- Identifying assumption: In the absence of the policy changes, high nurse migration provinces would not have experienced differential changes in outcomes compared to low nurse migration provinces.
- If this assumption holds:
  - Should not reject null hypothesis that $\beta_\tau$’s prior to 2000 equal zero.
Identifying Assumptions

Threats:

- Differential trending of outcomes by high and low nurse migration provinces
  - Province fixed effects control for differences in levels
  - Baseline controls interacted with year dummies
- Economic shocks or policy changes correlated with both nurse migration and the outcome variable
  - No major changes to healthcare system or legislation that occurred simultaneously
- Show robustness to baseline non-nurse migration × year fixed effects, dropping Manila, additional baseline controls, island × year fixed effects
First stage: Effect on Nurse Migration to U.S.
Effect on Nursing Enrollment

![Graph showing the effect on nursing enrollment over the years from 1990 to 2015. The graph plots the percentage points against the years, with a peak around 2005.]
Magnitude of Effects

- Average effect on nurse graduation during expansion: 0.39pp per year
- Pre-period sample mean nursing graduation rate: 0.13%
- Visa expansion led to a 290% increase in graduates
- Average province had 270 nursing graduates per year, or 783 new grads
- 30 new nurses departing in average province-year during expansion period
- Implies for each additional nurse migrant, 26 additional nursing graduates
- Huge effect, but recall aggregate response
  - 1,207 nurse migrants in 1999 to 7,323 in 2006
  - 11,313 nurse grads in 2002 and 113,484 in 2009
Supply of Schooling

- Proponents of brain drain argument often purport that even if returns to schooling could induce enrollment, supply constraints bind such that individuals cannot enroll
  - Particularly likely for specialized occupations
- We examine this directly by looking at the effect of policy changes on number of nursing programs in the Philippines
Effect on Supply of Nursing Programs

- Increase of approximately 0.5 new programs per year
- Driven by both public and private programs
Is the marginal nursing graduate of the same quality as graduates before the policy change?

- New graduates may be less-skilled because new schools are less rigorous or students themselves are weaker.

Use data on pass rates from the Philippine Nursing Licensure Exam (NLE) to measure nurse quality:

- Must pass in order to practice nursing in the Philippines or apply for jobs abroad.
- National pass rates declined over sample period.
### Implied Pass Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Passers out of Population (1)</th>
<th>Examinees out of Population (2)</th>
<th>Pass Rate (Column 1/Column 2) (3)</th>
<th>P-value, col 3=0.58 (Pre-period pass rate) (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Effect (2000-2013)</td>
<td>0.033*** (0.011)</td>
<td>0.085*** (0.028)</td>
<td>0.390</td>
<td>0.000</td>
</tr>
</tbody>
</table>

- Would like to know how pass rate (passers/examinees) responds
- Estimate two regressions comparing high versus low nurse provinces in the pre and post period (basic DID)
  1. Number of passers/population
  2. Number of examinees/population
- Divide coefficient for passers by coefficient for examinees to get implied pass rate: 39%
- Test against pre-period past rate of 58%
- Despite lower pass rates, so many individuals took and passed the exam that each new nurse migrant led to 10 new licensed nurses at home
Effect on Non-Nursing Enrollment

Did this policy change increase the overall stock of college educated labor?

(a) Non-Nursing Enrollment Rate

(b) Total Enrollment Rate

Notes: The solid line shows coefficients from the event study model (equation 1). The interaction with the indicator for 1999 is omitted to identify the model. 95% confidence intervals are shown by dotted lines. Dashed lines show the pooled model (equation 2). All specifications include province and year fixed effects, and baseline controls interacted with year indicators as listed in Figure 3. The sample includes 74 provinces. Standard errors are clustered by province. The light grey vertical lines represent the visa expansion in 2000 and subsequent contraction in 2007.

Source: CHED, CFO, Census, and authors' calculations.
Post-expansion effects on total graduation are jointly significant

126 new graduates in the average province
What happens to nursing graduates who do not get a visa?

- Very small share migrate as nurses to other destinations
  - Also do not appear to be absorbed by temporary contracts as domestic helpers or caregivers
- Results from Census suggest a large increase in nurse employment in the Philippines
  - No major healthcare expansions during this time
  - Driven by RN HEALS program and “Professional Volunteer” nurses
- What about those that do not pass?
  - Universal Healthcare Implementers, Public Health Associates
  - Business Process Outsourcing (BPO)
Conclusion

- Enrollment and graduation from nursing programs increased dramatically
- Number of nursing schools rapidly expanded to accommodate increased demand
- Although students passed licensure exam at lower rates, increase in licensed nurses outweighed increase in nurse migration
  - For each additional nurse migrant, 10 more graduates passed the licensure exam
- Overall increase in stock of college educated labor
In terms of benefits, Philippines gained more nurses and many worked in underserved areas.

Those who migrated experienced huge gains in wages and sent remittances.

In terms of costs, many nurses remained unemployed or in volunteer positions.

- Switched to nursing from other fields
- Unclear if remaining in those fields would have greater development impacts

Ultimately, our paper provides evidence of partial equilibrium effects of demand for foreign nurses on education in the origin.

- Overall welfare calculations are beyond paper’s scope
- Should be subject of future research
Policy Implications

- Our results provide useful evidence for many low-to-middle income countries seeking to emulate worker export process of Philippines
  - May not apply to the most underdeveloped countries with limited postsecondary infrastructure
- Highlight importance of well-designed partnerships between receiving and sending countries (Clemens, 2015; CGD, 2020)
- Such partnerships can present a win-win situation
  - Allow receiving countries to subsidize training for workers in sending countries while facilitating migration of skilled workers