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

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BREAD-IGC PhD Course
Spring 2022

Motivation

- Many developed countries face shortages of medical workers
  - Often recruit foreign-born nurses (Cortes and Pan, 2014)
- For migrant-origin, developing countries, recruitment may lead to scarcity, or "brain drain," of health care professionals (Bhagwati and Hamada, 1974; Bhagwati and Rodriguez, 1975; Docquier et al., 2008)
  - Could contribute to poor health outcomes for local population
- Alternatively, emigration and high prospective returns abroad may lead to skill acquisition, or "brain gain" (Stark et al., 1997; Mountford, 1997; Beine et al., 2001)
- Despite theoretical prevalence of debate, little causal evidence exists

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?

This paper

- Exploit pair of plausibly exogenous policy changes
  - In 2000, U.S. dramatically expanded availability of visas for foreign nurses
  - In 2007, visas suddenly reduced to pre-2000 levels
- Altered migration prospects for nurses, especially from the Philippines
- Examine effect of international migration of nurses from the Philippines on both demand for and supply of education
- Event study methodology compares historically high versus low nurse migrant-origin provinces before and after the policy changes
  - Leverages migrant networks (Munshi, 2003; Theoharides, 2018)

How did this work come about?

- Unstructured time in the Philippines conducting dozens of interviews with those working in migration (2009)
    - Government, recruiters, NGOs, migrants
- At the time, everyone reporting huge number of unemployed nurses in the Philippines due to reduction in US visas
    - Sifted through US visa policy to understand what happened

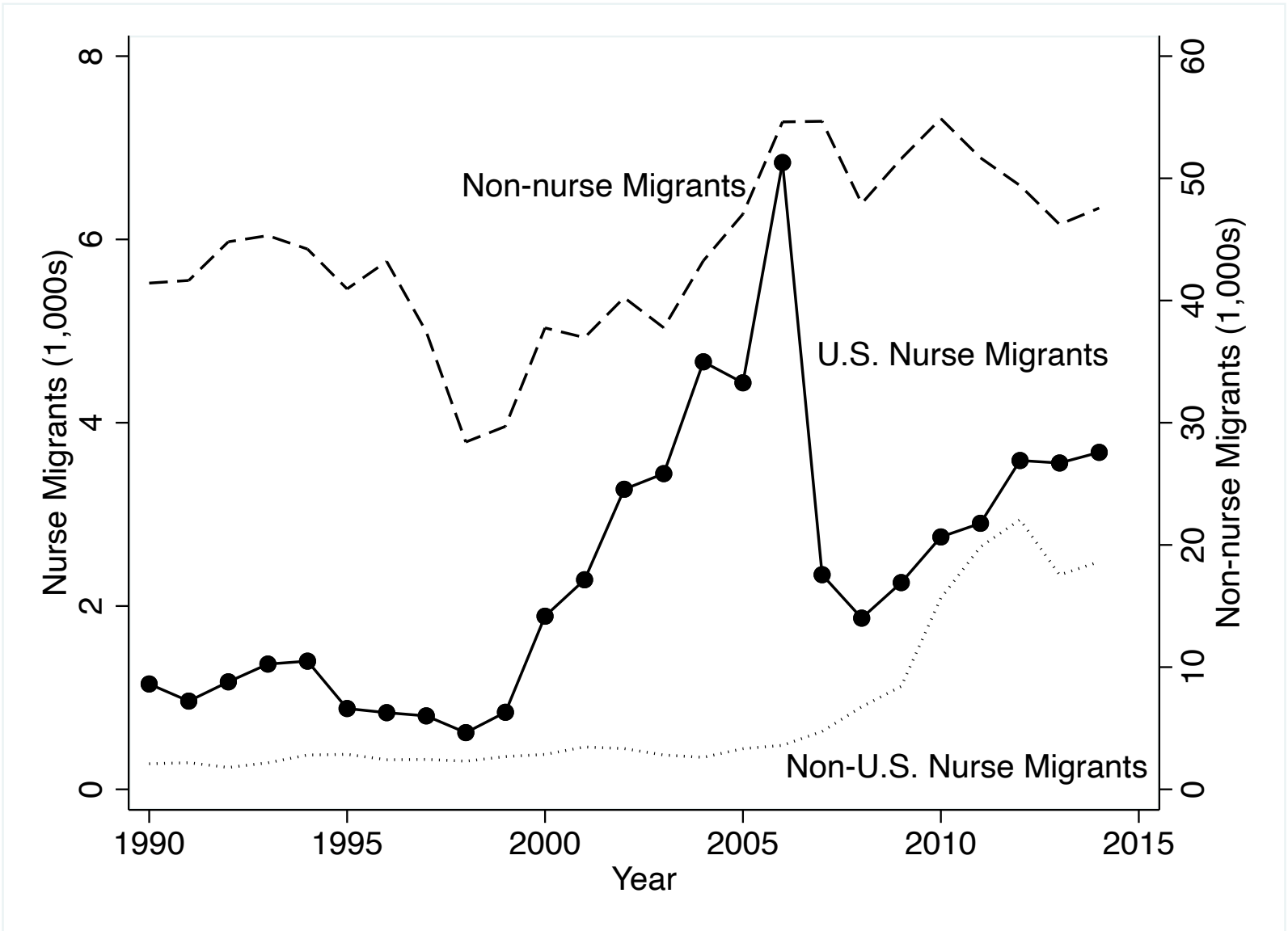
U.S. Recruitment of Nurses

- 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

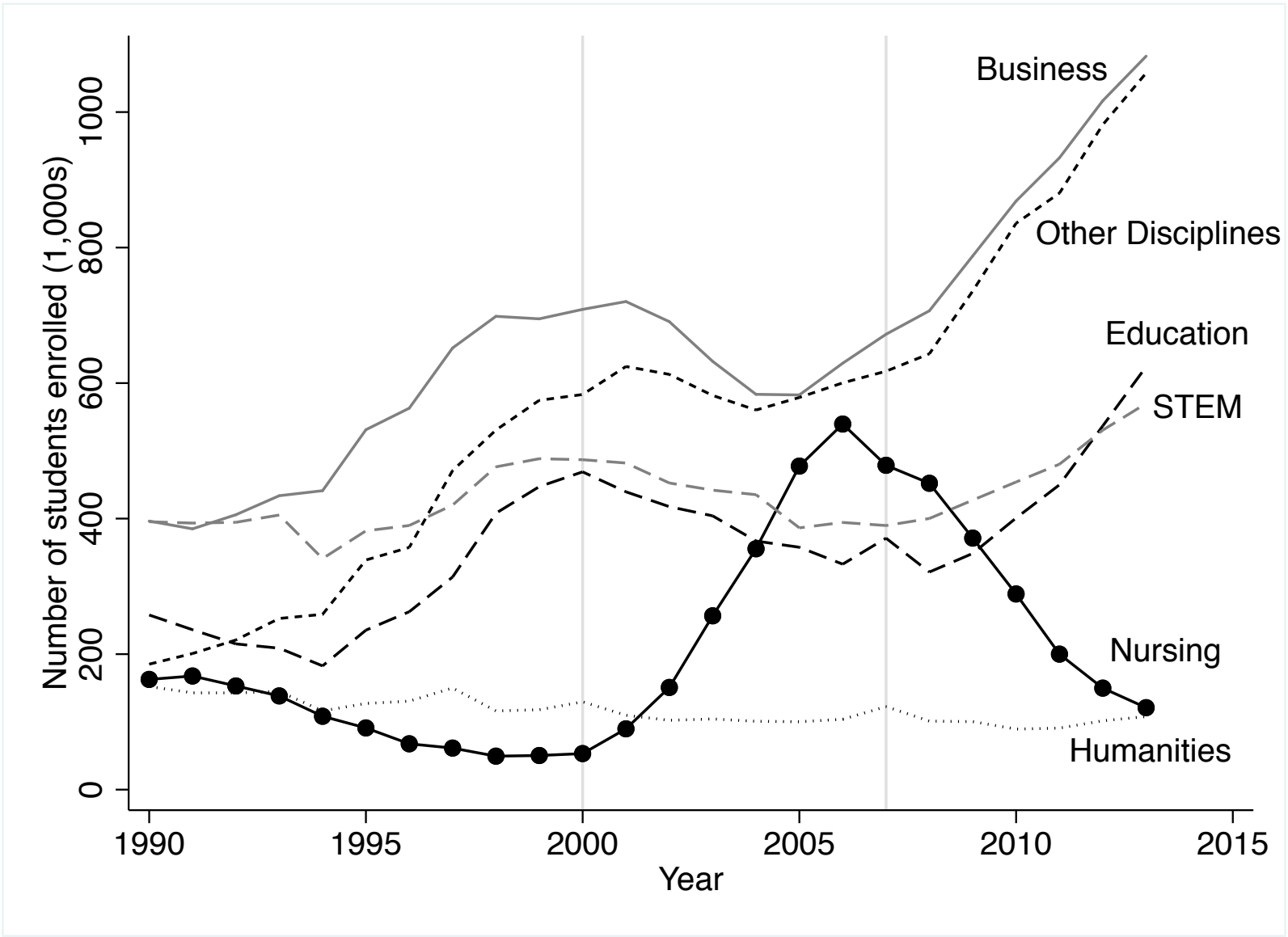
U.S. Recruitment of Nurses

- 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

Departures of Nurse and Non-nurse Migrants



Enrollment in Postsecondary Education by Discipline



Data

- Government partnerships are important!
- Commission for Filipinos Overseas (CFO): Administrative data on all permanent migrant departures from 1990 to 2013
- Commission on Higher Education (CHED): Institution-level postsecondary enrollment and graduation data from 1990 to 2013 disaggregated by program of study
- Philippine Nursing Licensure Exam (NLE): Number of examinees and number of passers by institution from 1990 to 2016

Empirical Strategy

- Exploit plausibly exogenous and opposite-signed policy changes that occurred in 2000 and 2007 that expanded and restricted nurse migration to US
- National time series provide suggestive evidence of impacts of 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

$$Y_{pt} = \sum_{\tau \neq 1999} \beta_\tau High_{p,0} D_t^\tau + \alpha_p + \gamma_t + X_{p0}\gamma_t + \epsilon_{pt} \quad (1)$$

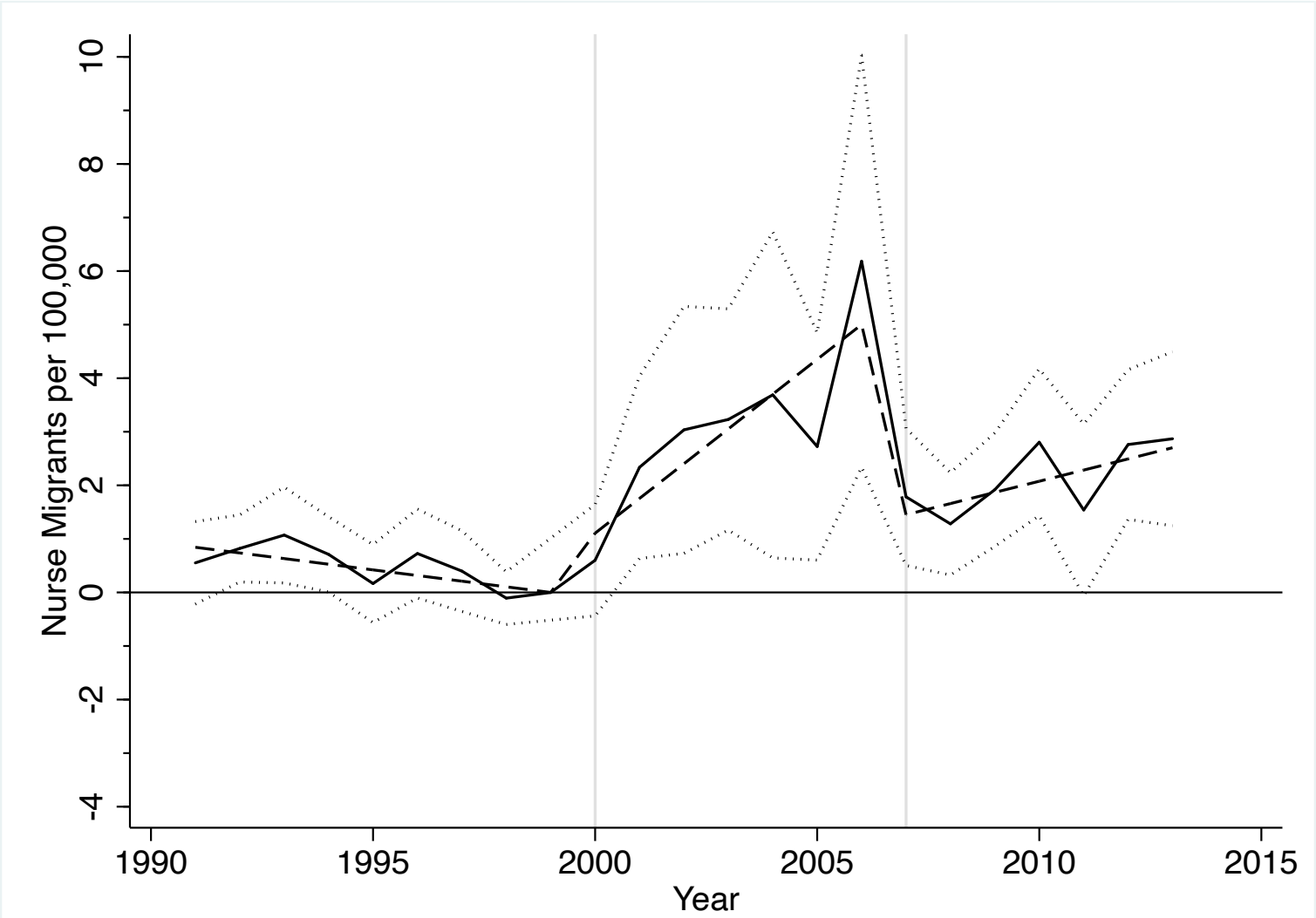
- Y_{pt}: outcome in province p year t
- $High_{p,0}$: binary variable equal to 1 if above median nurse migration at baseline
- D_t^τ: binary variable equal to one if year of observation t equals the specific year, τ, and 0 otherwise
- α_p and γ_t: province and year fixed effects
- $X_{p0}\gamma_t$: baseline controls interacted with year fixed effects
  - Baseline domestic nurses per capita x year fixed effects

▸ Pooled

Identifying Assumptions

- Identifying assumption: In 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 β_τ's prior to 2000 equal zero
- See paper for detailed discussion on threats to validity
  - Dual policy changes yield inverted U-shaped pattern of results
  - Bounding exercises for cross province migration
  - No major changes to healthcare system or legislation occurred simultaneously

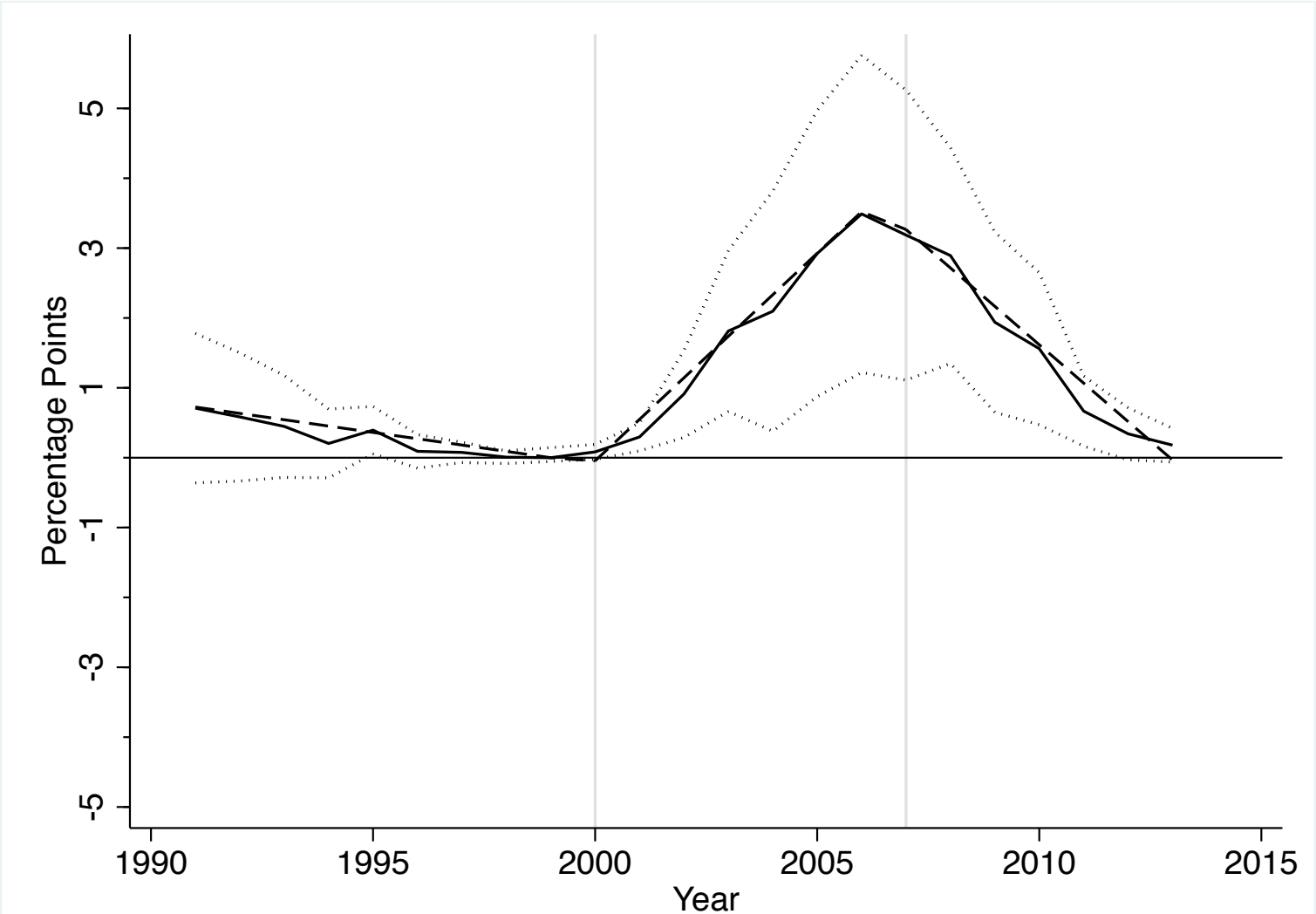
Effect on Nurse Migration to U.S.



- Average effect in expansion period = 3.9 nurses per 100,000, or 126%
  - Pre-period mean = 3.1 nurses per 100,000

▸ Table

Effect on Nursing Enrollment



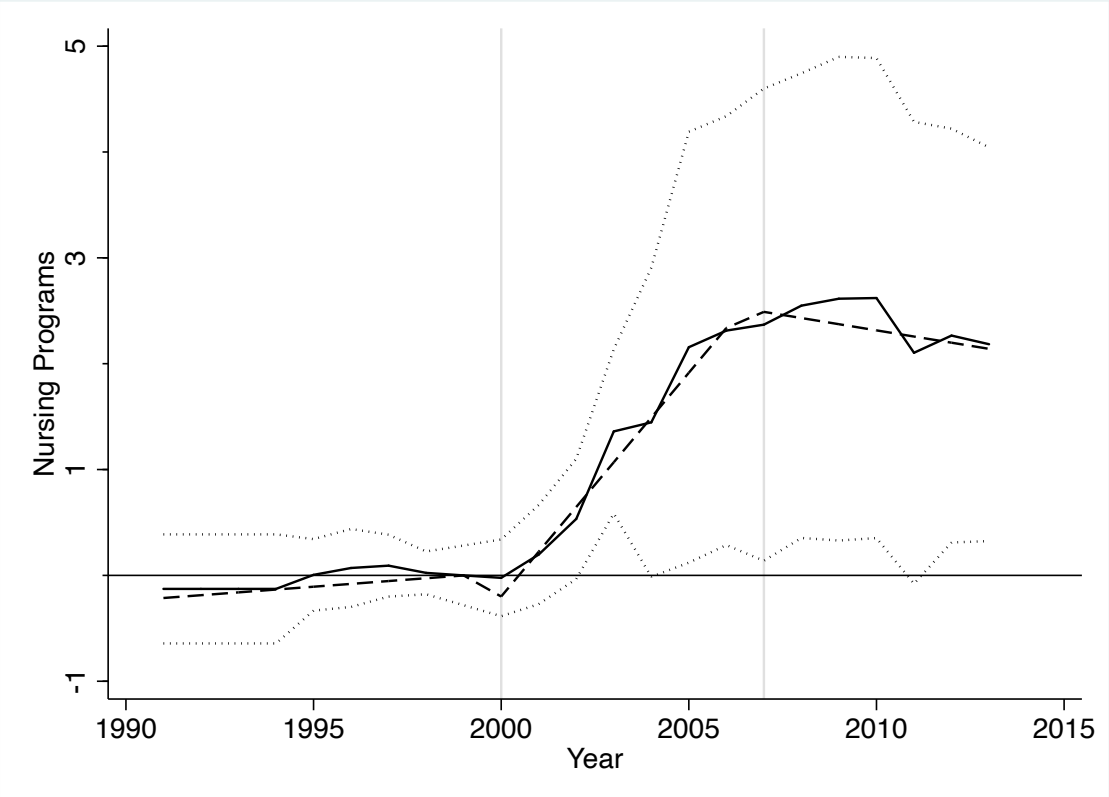
- Average effect in expansion period = 1.74pp, or 129%
  - Pre-period mean = 1.35pp

▸ Table ▸ Gender

Supply of Schooling

- Common argument: even if returns to schooling could induce enrollment, supply constraints bind
    - Particularly likely for specialized occupations
- This is where Philippine government policy on opening of nursing schools is important for the results
- Examine effect of policy changes on number of nursing programs

Effect on Supply of Nursing Programs



- Average increase in expansion = 1.07 programs, relative to pre-period mean of 4.13
- Mostly driven by increases in private institutions
- Almost entirely from existing institutions adding programs, rather than new institutions
- Effects driven by places with more elastic supply of schooling

▸ Table ▸ Private ▸ Existing

Quality of the Marginal Nurse

- While the Philippines gained licensed nurses, not all new graduates passed exam
    - Regulation commission did not relax standards. Why?
- Is marginal nurse less likely to pass?
    - Yes, pass Philippine Nursing Licensure Exam (NLE) at lower rates
    - But, so many more people take exam in high nurse provinces that licensed nurses increased substantially
        - 9 licensed nurses for every new migrant

Future Work

- Low-to-middle income countries seeking to use migration as a development tool may experience increases in human capital stock and domestic supply of healthcare workers
    - Key to our findings is that supply of schooling was able to accommodate demand
- Do these results apply to other contexts? What about contexts where supply may be more inelastic?
- What are the outcomes of those who never migrate as nurses? (the brain gain)
- What can origin country policy do to:
    - Facilitate brain gain over brain drain?
    - Ensure new supply of schooling is high quality?
    - Develop labor market policies that support those workers who never migrate?

Extra Slides

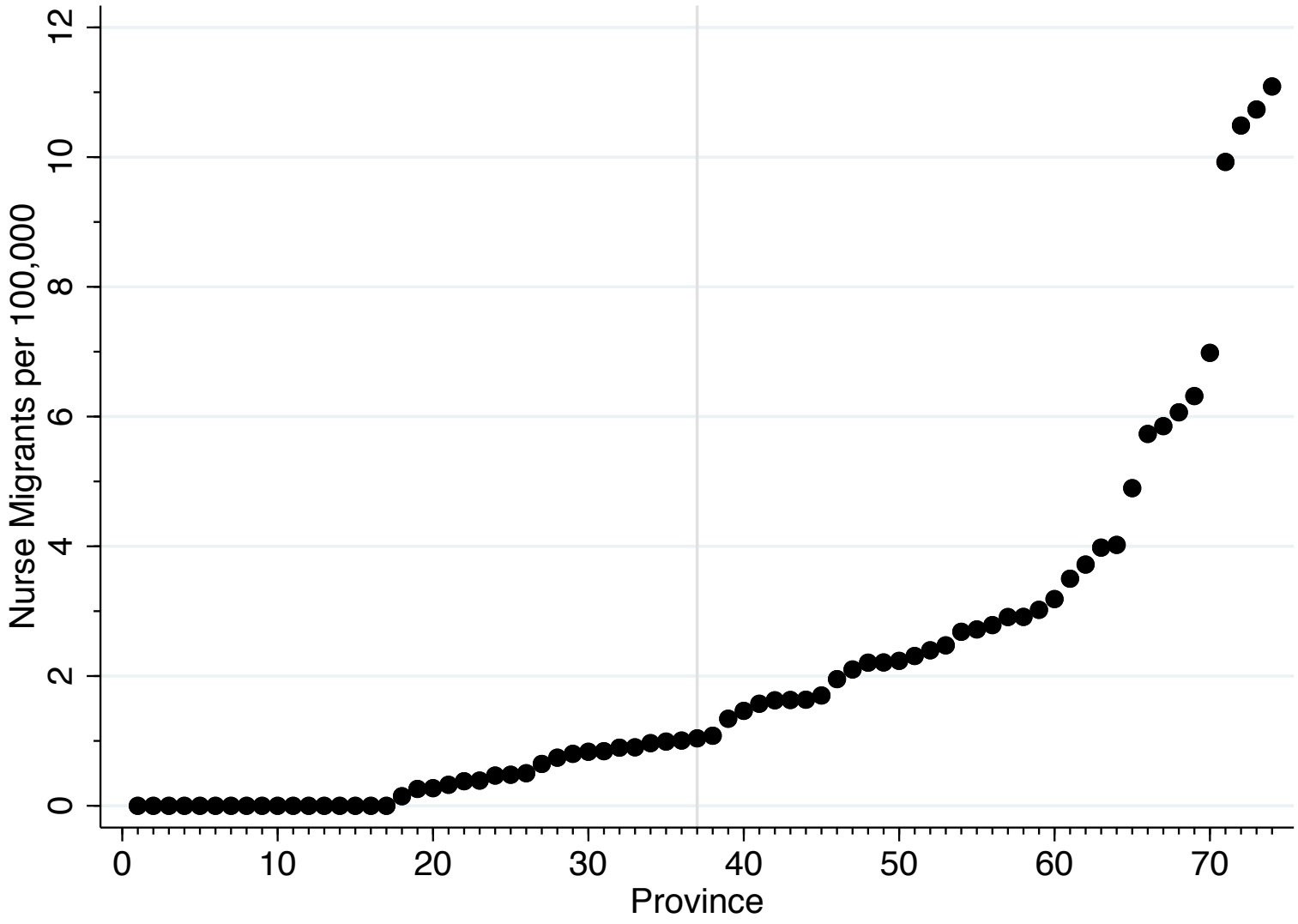
Pooled Event Study

$$
\begin{aligned}
Y_{pt} = \beta_{post1} High_{p,0} 1(t \geq t_1) + \beta_{trend1} High_{p,0} 1(t > t_1)(t - t_1) \\
+ \beta_{post2} High_{p,0} 1(t \geq t_2) + \beta_{trend2} High_{p,0} 1(t > t_2)(t - t_2) \quad (2) \\
+ \beta_{trend} High_{p,0}(t - t_1) + \alpha_p + \gamma_t + X_{p0}\gamma_t + \epsilon_{pt}
\end{aligned}
$$

- Y_{pt}: outcome in province p year t
- t_1 and t_2 represent years of expansion (2000) and contraction (2007), respectively
- β_{post1} and β_{post2} capture the immediate change in outcomes
- β_{trend1} and β_{trend2} capture delayed annual changes in outcomes

▸ Back

Baseline U.S. Nurse Migration Rates



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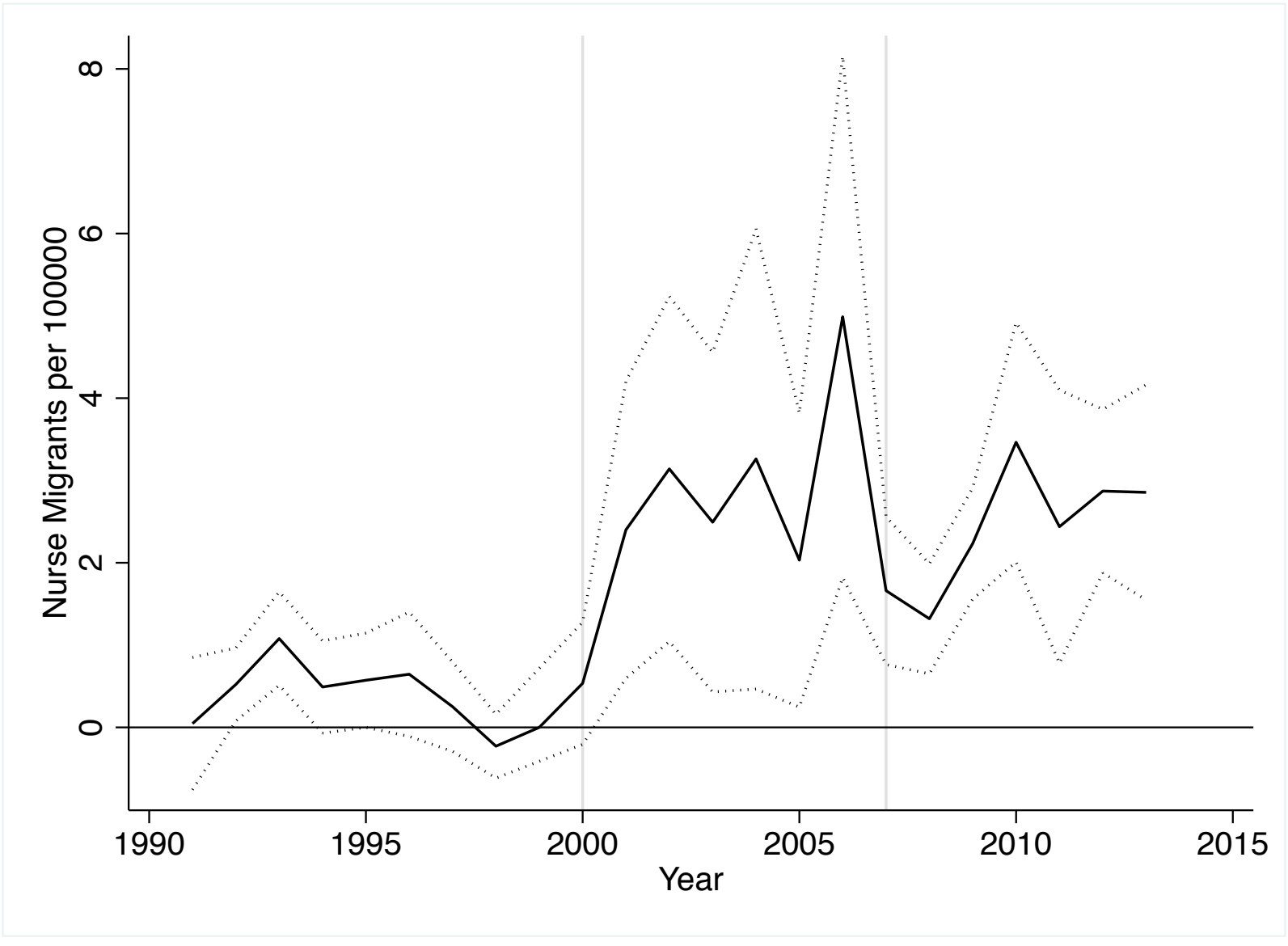
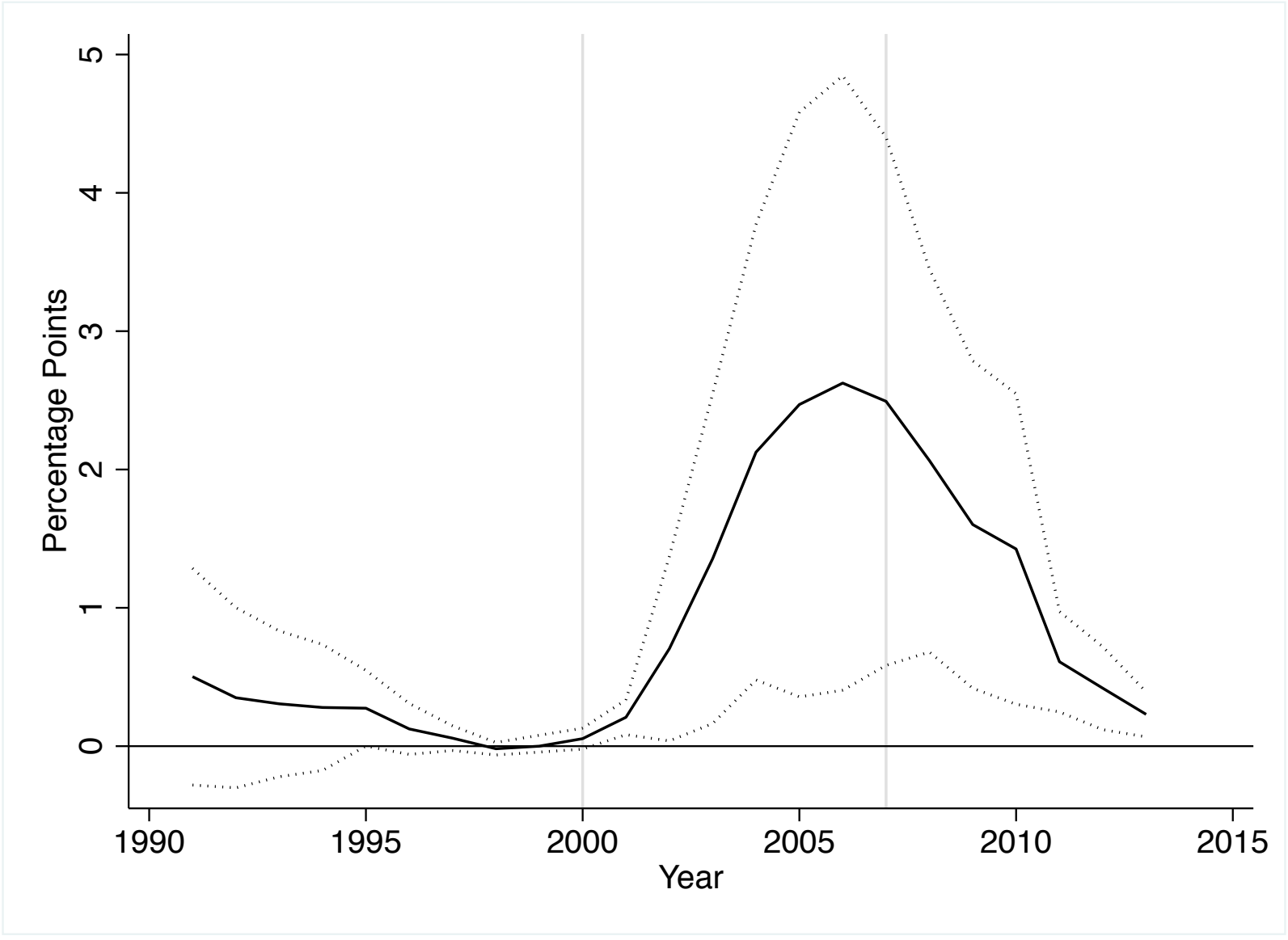
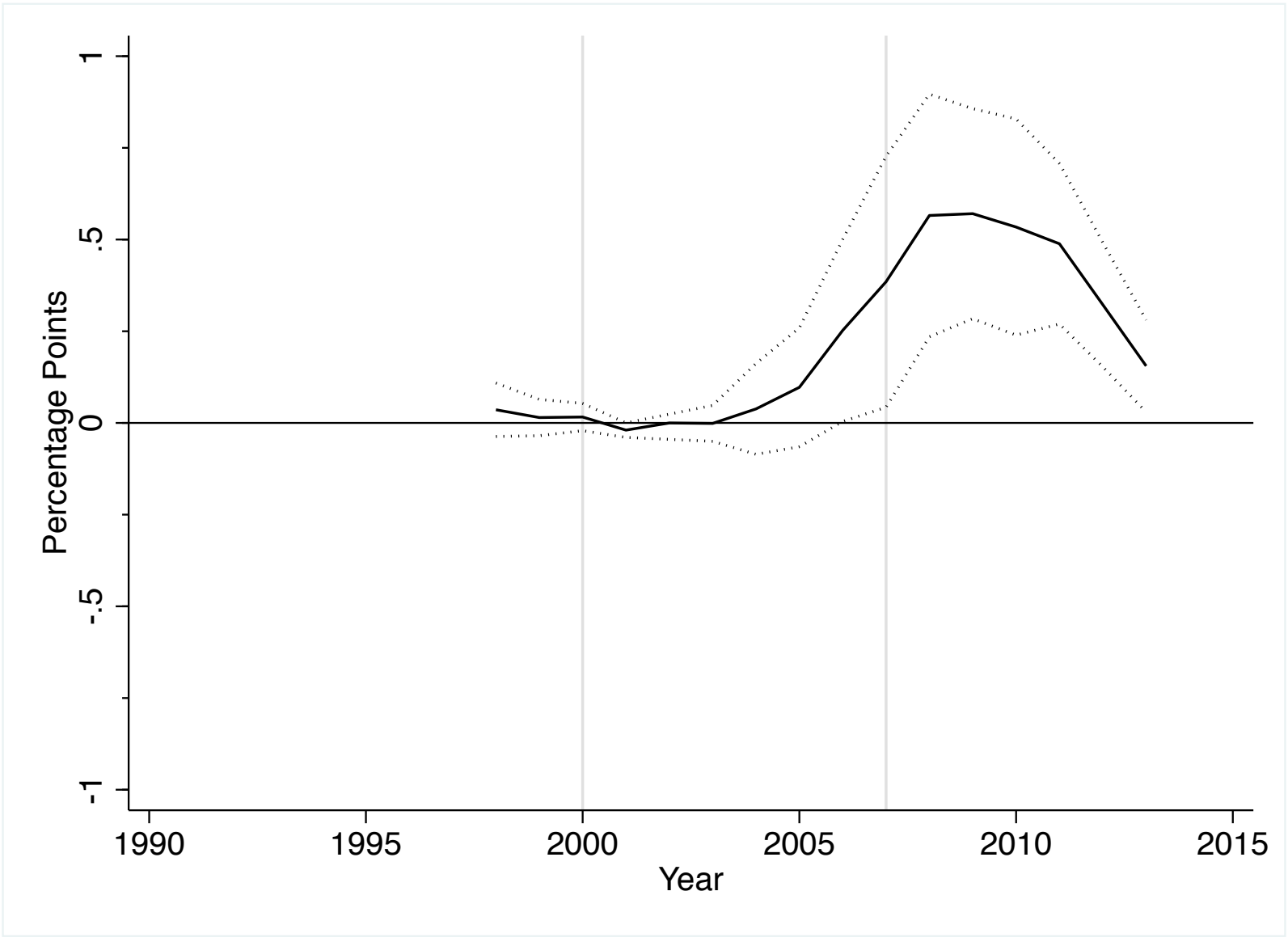
Continuous Treatment: U.S. Nurse Migration Rate



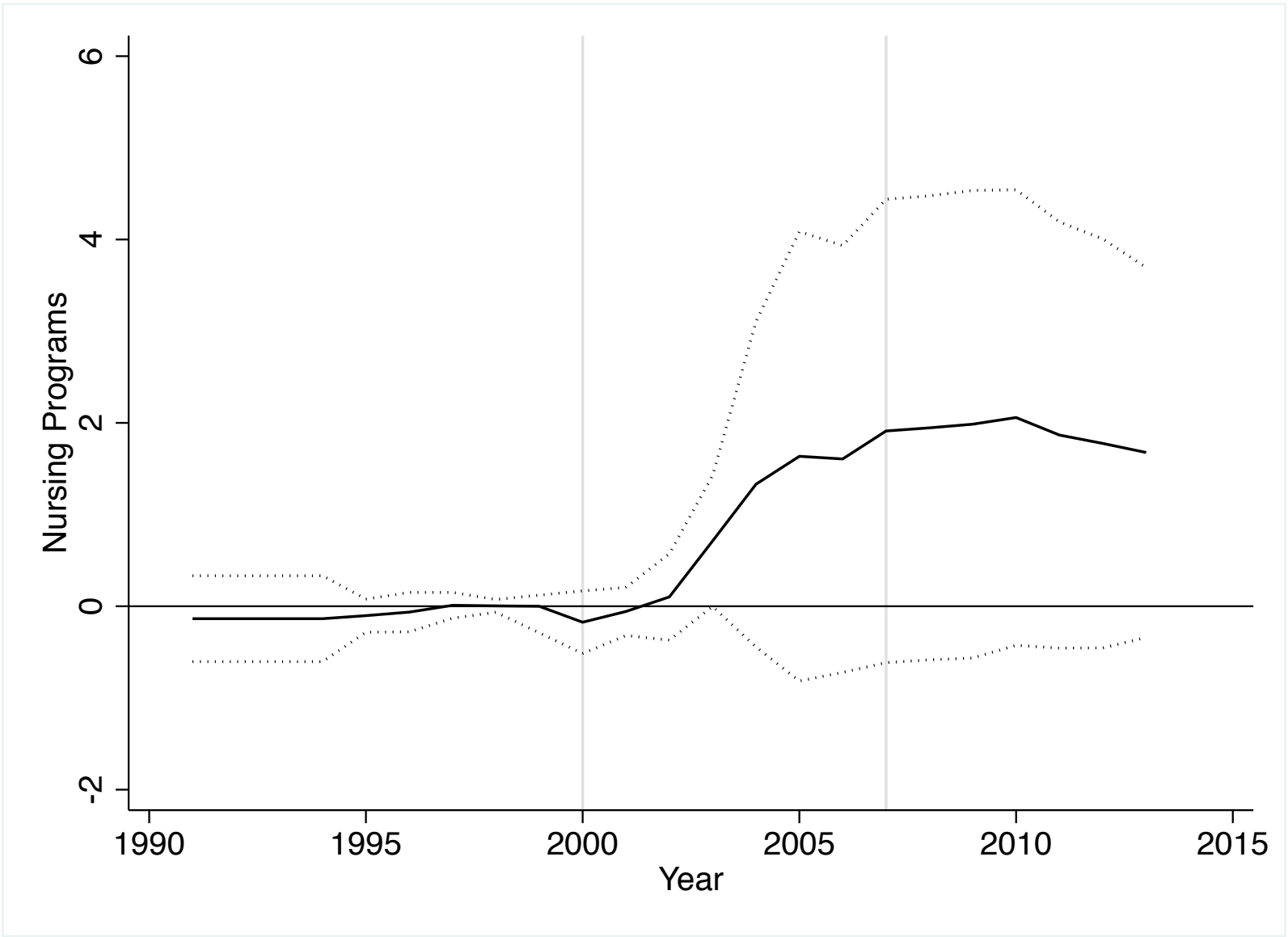
Continuous Treatment: Nursing Enrollment



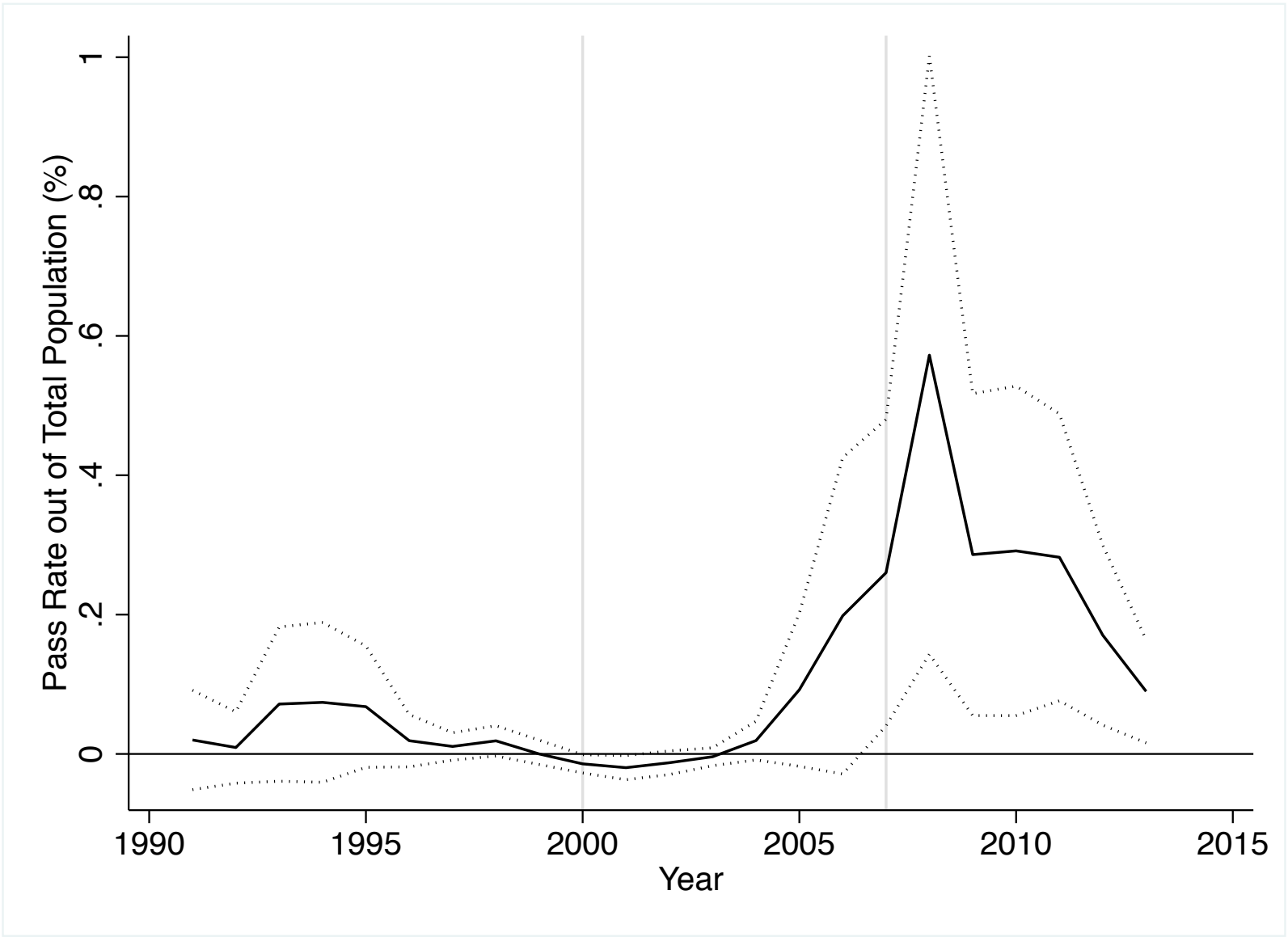
Continuous Treatment: U.S. Nurse Graduation



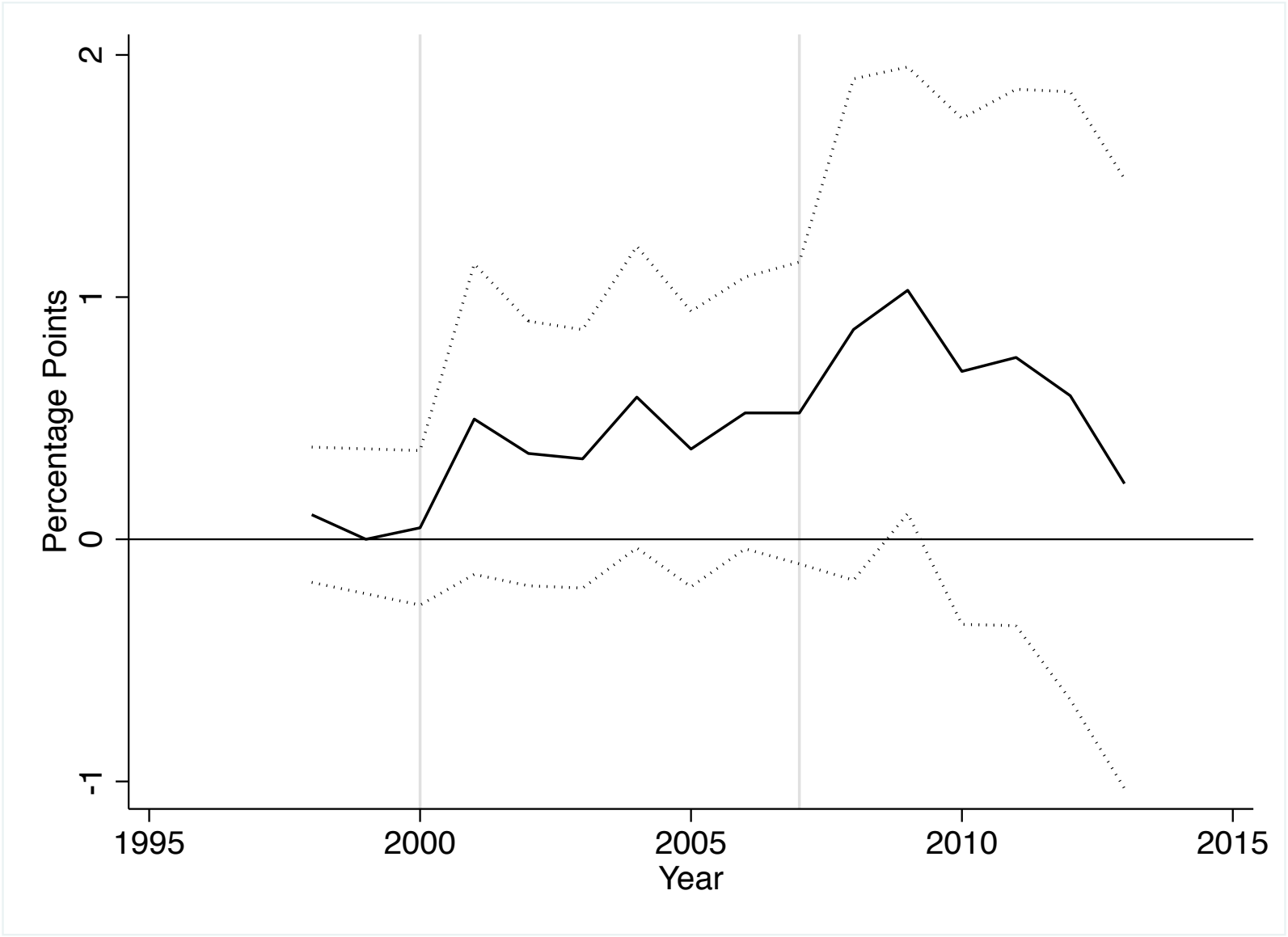
Continuous Treatment: Total Nursing Programs



Continuous Treatment: Nursing Exam Pass Rate



Continuous Treatment: Total Graduation Rate



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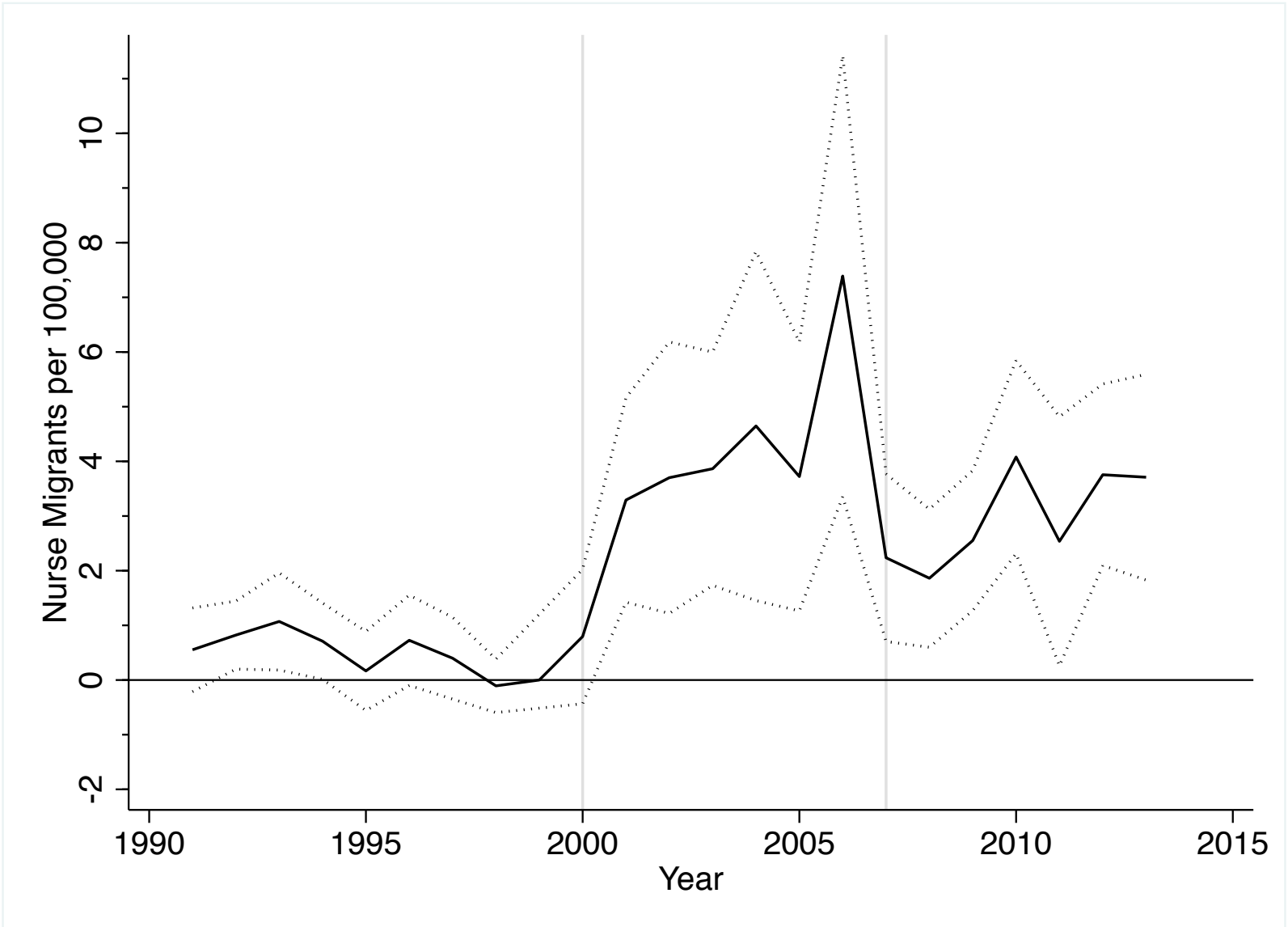
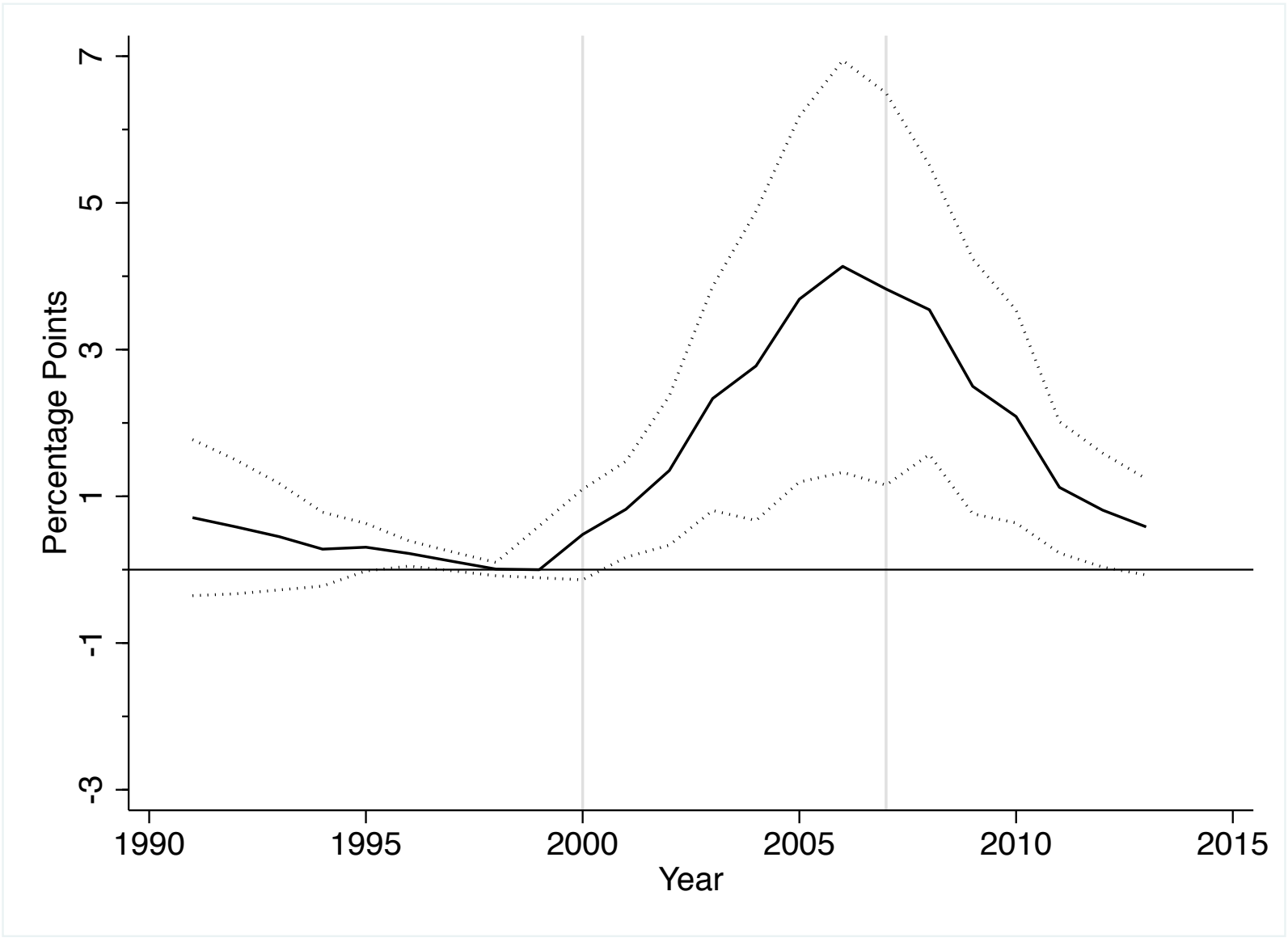
Borusyak et al. Imputation Estimator: U.S. Nurse Migration Rate



Borusyak et al. Imputation Estimator: Nursing Enrollment



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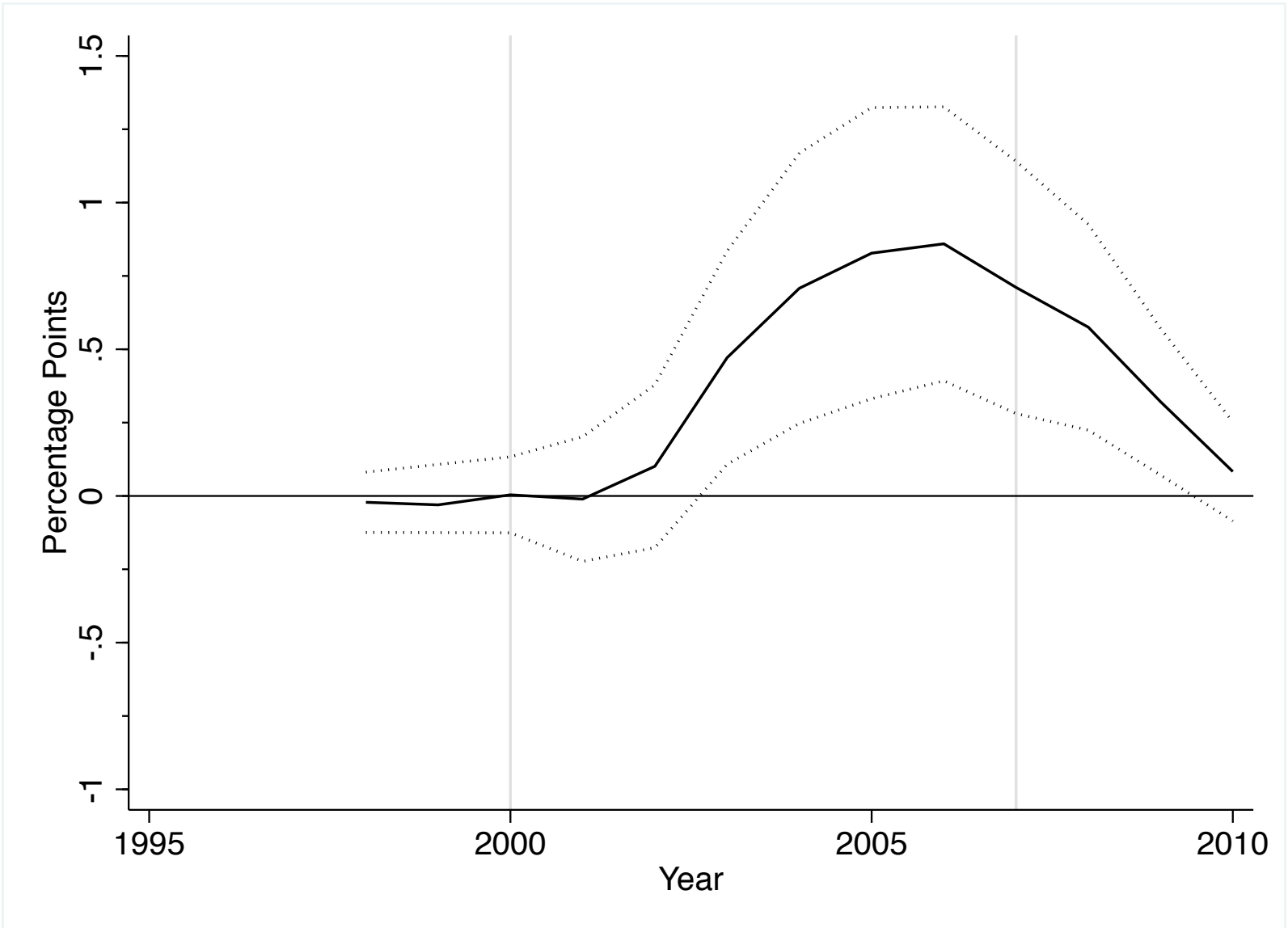
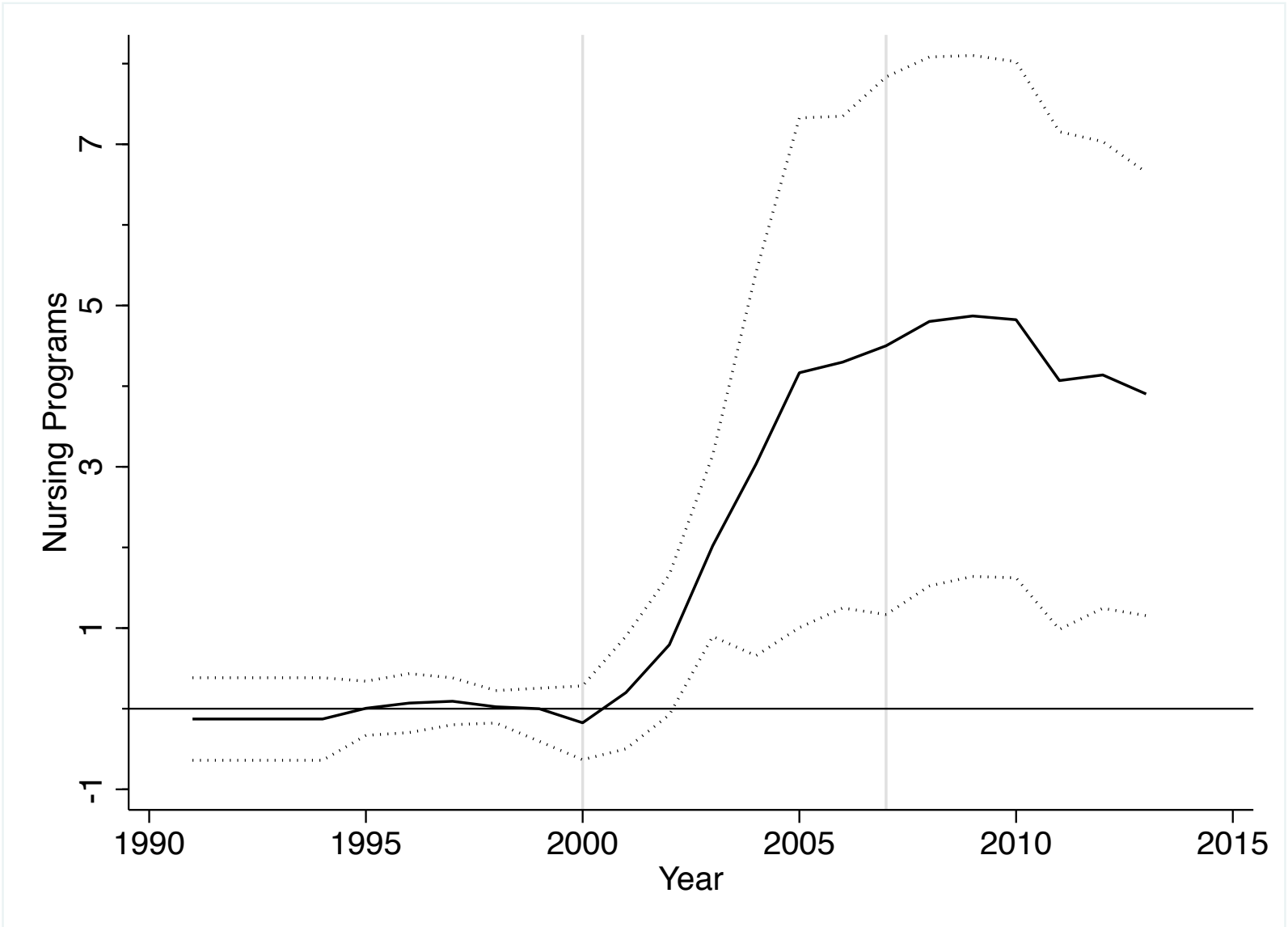
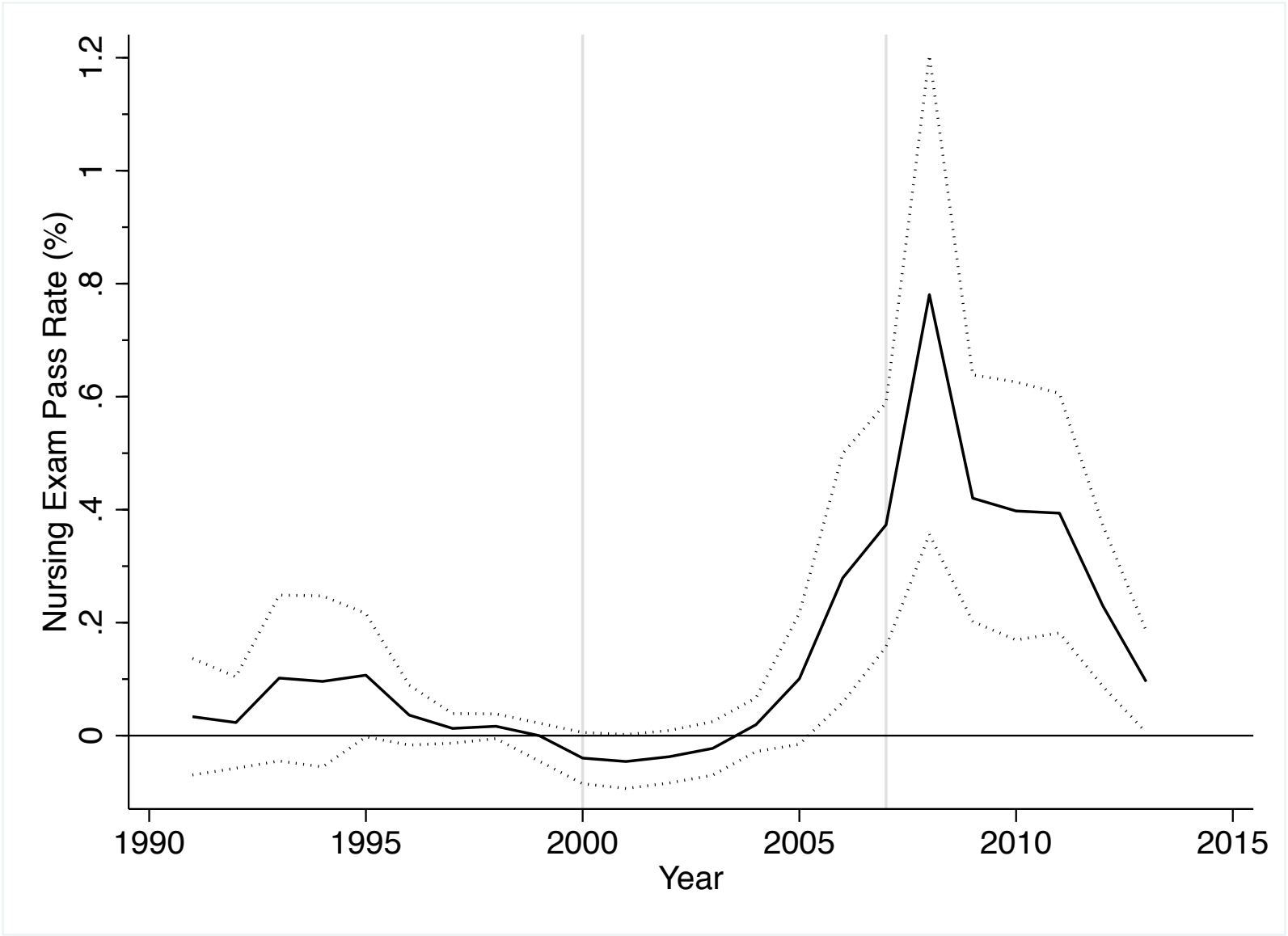


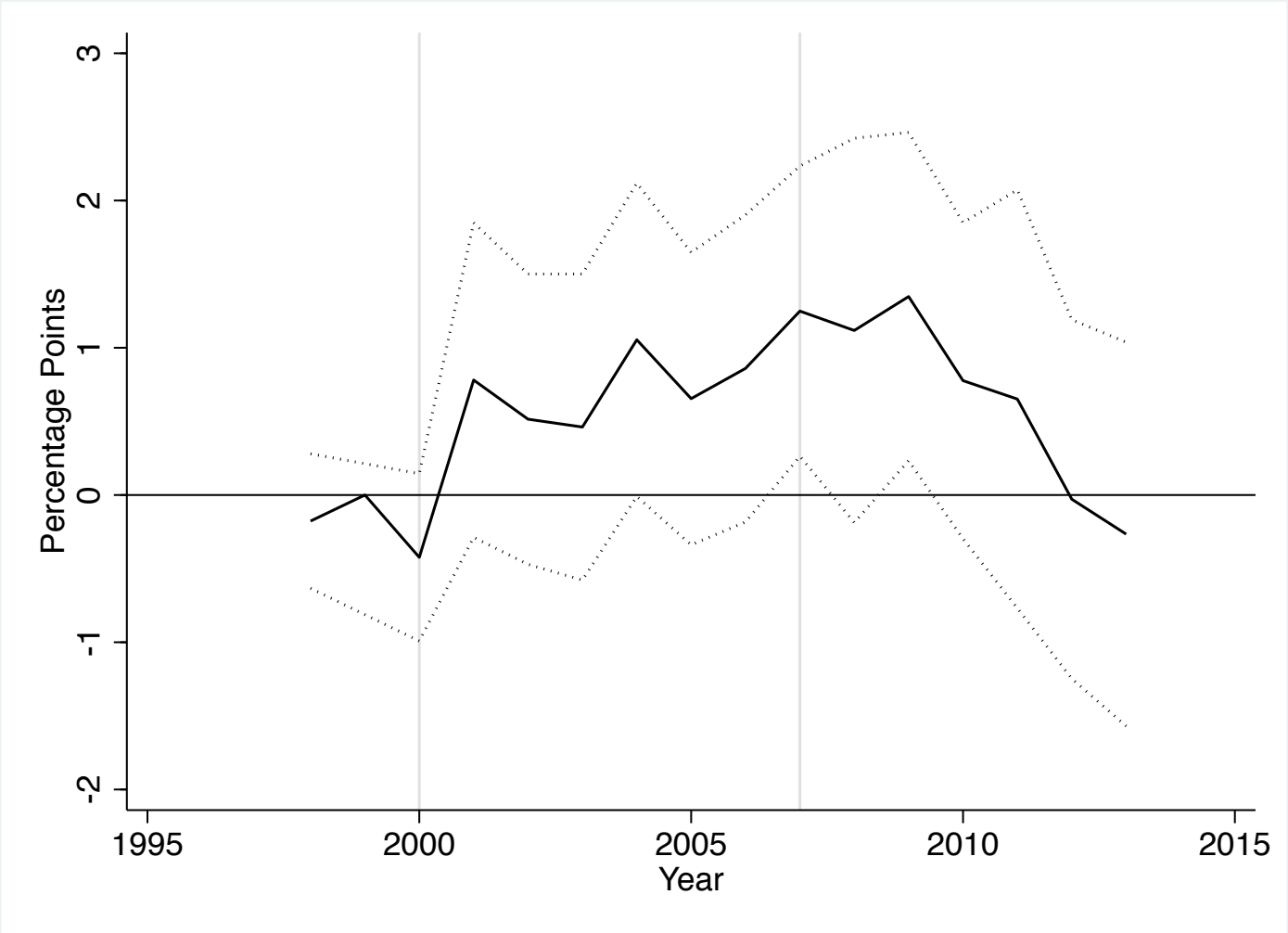
Borusyak et al. Imputation Estimator:Total Nursing Programs



Borusyak et al. Imputation Estimator: Nursing Exam Pass Rate



Borusyak et al. Imputation Estimator: Total Graduation Rate



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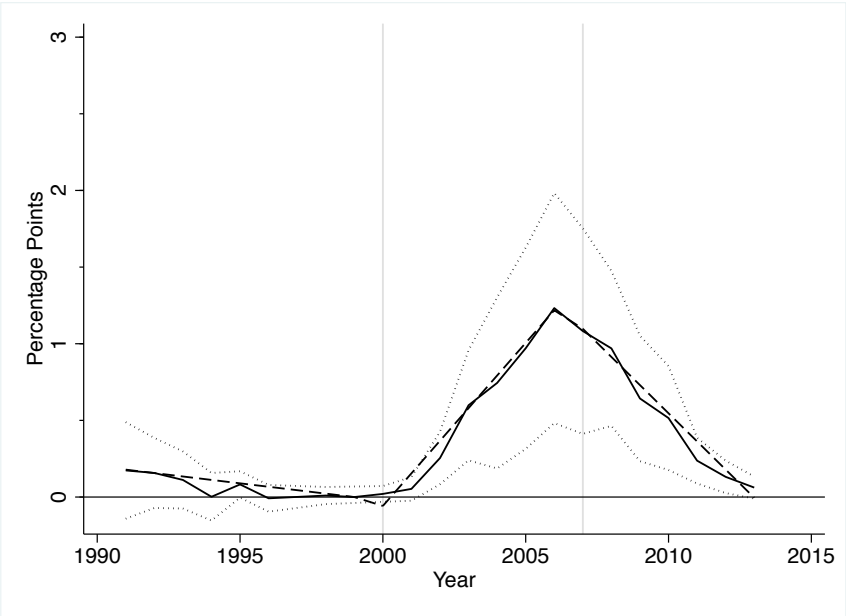
Borusyak et al. Imputation Estimator: Post Expansion Effects

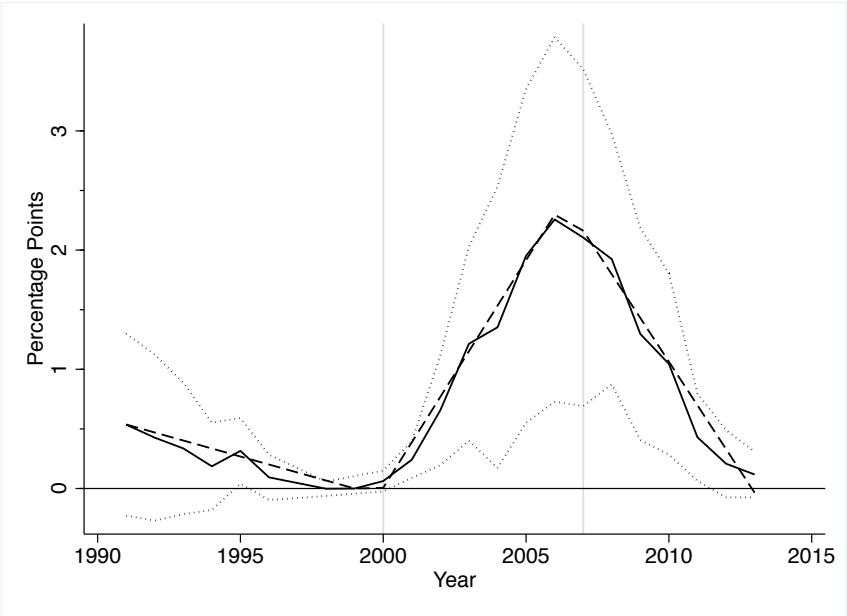
	U.S. Nurse Migrants Per 100,000 (1)	Nursing Enrollment Rate (2)	Nursing Graduation Rate (3)	Number of Nursing Programs (4)	Total Graduation Rate (5)
Panel A. Main specification					
Post Expansion x High	2.632**	1.380***	0.387***	1.176**	0.558**
	(1.030)	(0.487)	(0.114)	(0.552)	(0.278)
Panel B. Borusyak et al. imputation estimator					
Post Expansion x High	3.364***	1.522***	0.439***	2.176***	0.737
	(1.110)	(0.478)	(0.128)	(0.741)	(0.472)

Nursing Enrollment Rates by Gender

Male Nursing Enrollment Rate



Female Nursing Enrollment Rate



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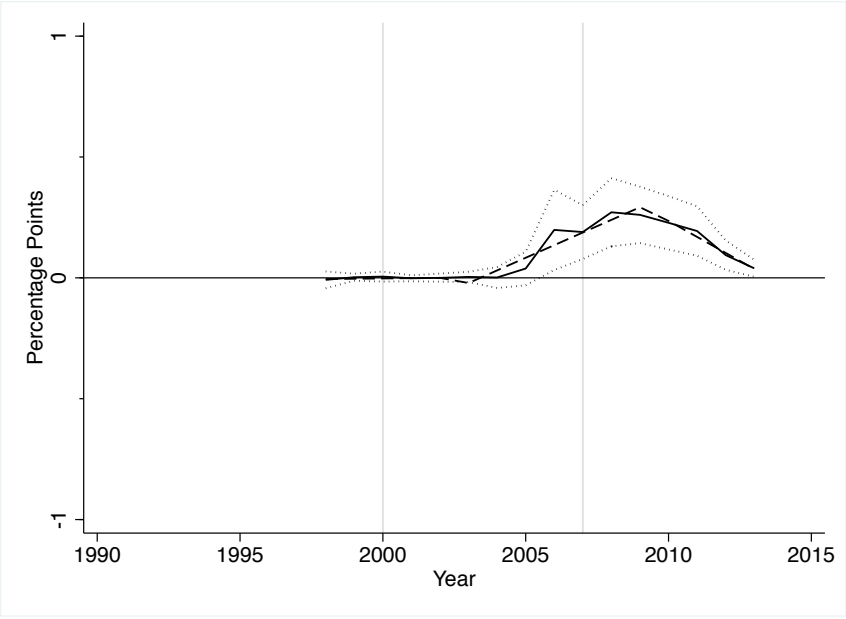
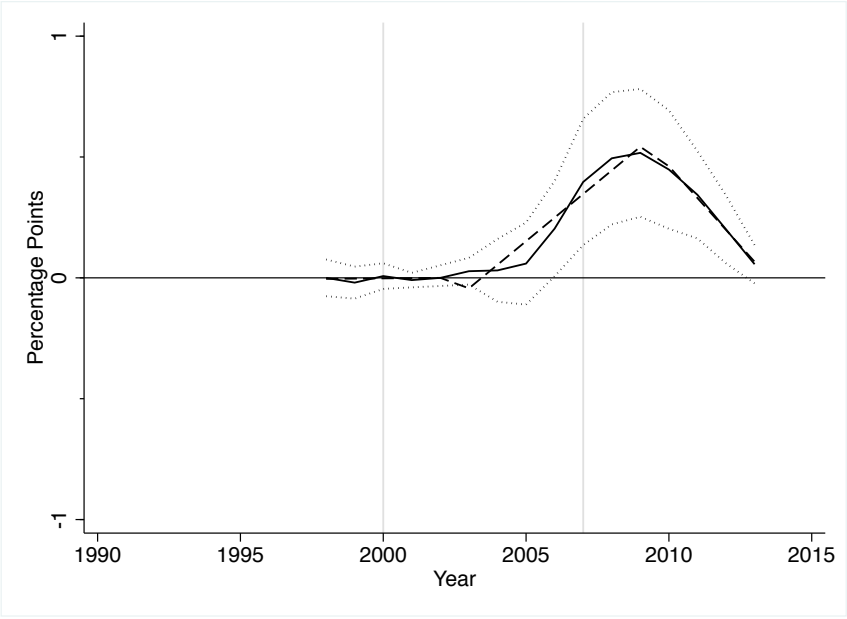
Nursing Graduation Rates by Gender

Male Nursing Graduation Rate



Female Nursing Graduation Rate



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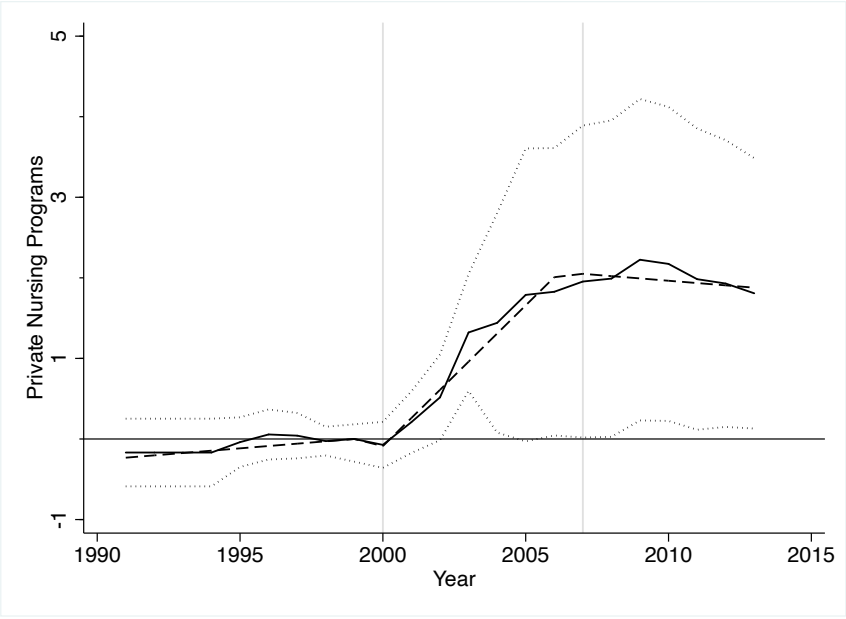
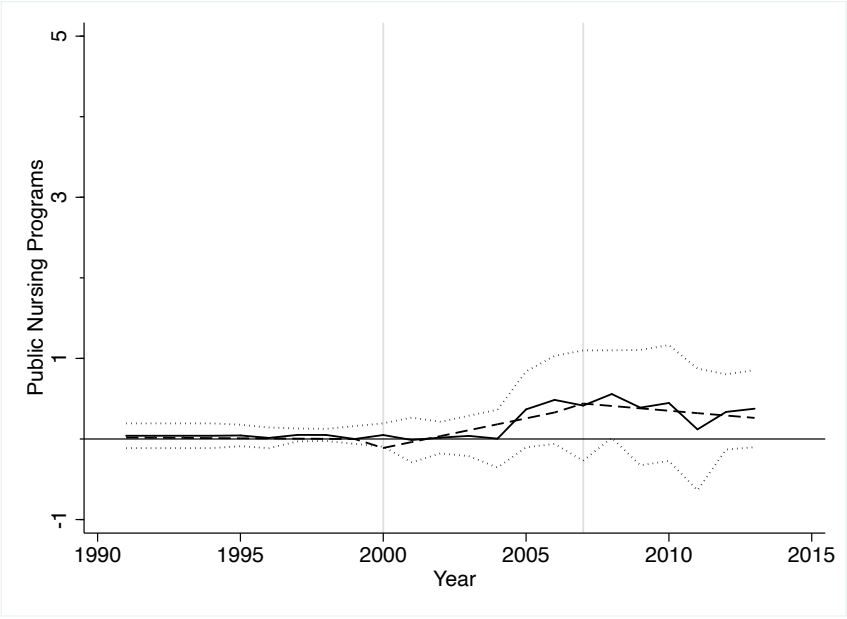
Effect on Supply of Nursing Programs

Private Nursing Programs



Public Nursing Programs



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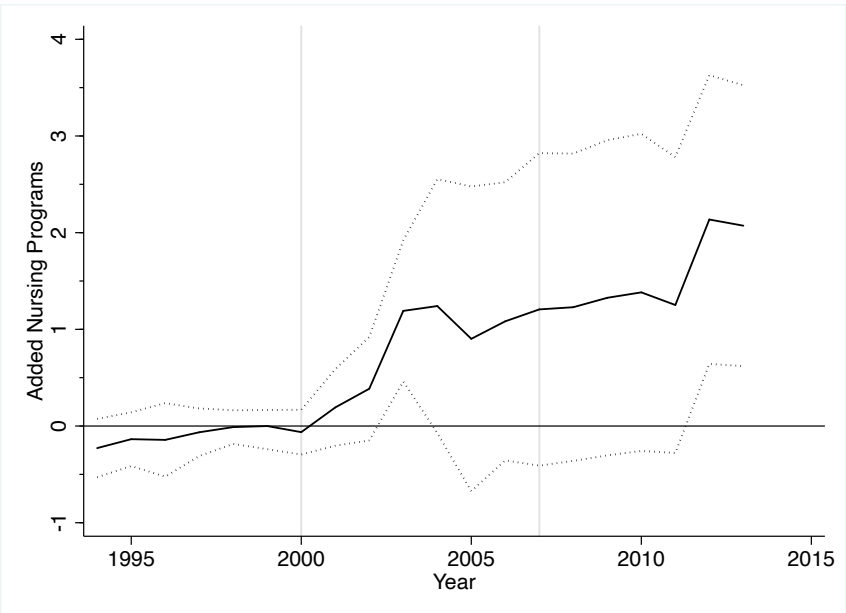
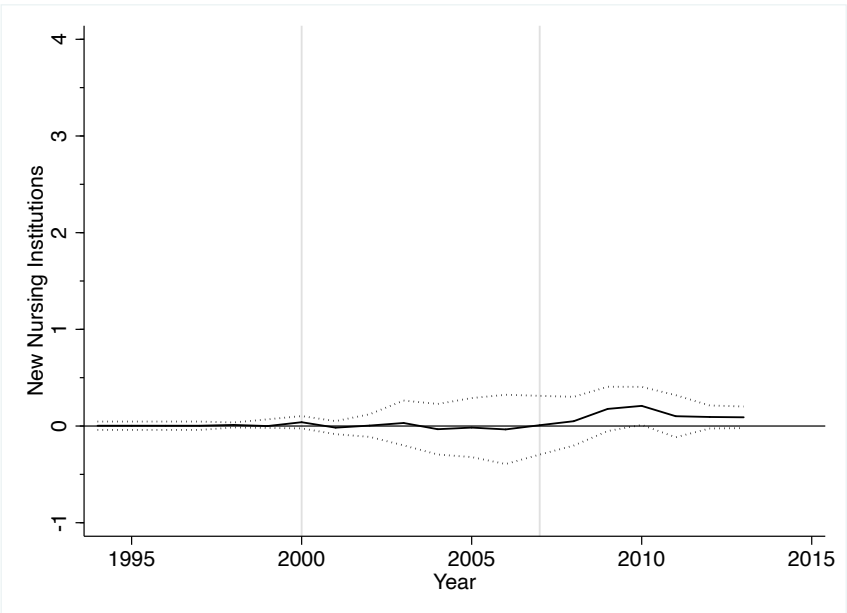
Effect on Type of New Nursing Program

Nursing Programs Added to Existing Private Institutions



New Private Nursing Institutions



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Robustness Checks

	U.S. Nurse Migrants Per 100,000	Nursing Enrollment Rate	Nursing Graduation Rate	Number of Nursing Programs	Total Graduation Rate
	(1)	(2)	(3)	(4)	(5)
Panel A. Main specification					
Post Expansion x High	2.632**	1.380***	0.387***	1.176**	0.558**
	(1.030)	(0.487)	(0.114)	(0.552)	(0.278)
Post Contraction x High	-0.977	-0.127	0.015	1.246*	-0.305
	(0.792)	(0.159)	(0.070)	(0.628)	(0.282)
Panel B. Plus baseline non-nurse migration rate x year fixed effects					
Post Expansion x High	2.722***	1.304***	0.365***	0.870	0.388
	(1.005)	(0.470)	(0.108)	(0.577)	(0.252)
Post Contraction x High	-1.792**	-0.200	-0.089	0.686	-0.598*
	(0.798)	(0.160)	(0.072)	(0.641)	(0.317)
Panel C. Without Manila					
Post Expansion x High	2.591**	1.349***	0.380***	1.362***	0.555*
	(1.051)	(0.491)	(0.116)	(0.372)	(0.283)
Post Contraction x High	-0.968	-0.126	0.015	1.443***	-0.315
	(0.792)	(0.158)	(0.070)	(0.438)	(0.278)
Panel D. Plus additional controls x year fixed effects					
Post Expansion x High	3.137**	1.501**	0.340**	0.509	0.624*
	(1.411)	(0.691)	(0.161)	(0.801)	(0.344)
Post Contraction x High	-1.789*	-0.110	0.030	0.346	-0.447
	(1.061)	(0.183)	(0.084)	(0.815)	(0.293)

Robustness Checks

	U.S. Nurse Migrants Per 100,000	Nursing Enrollment Rate	Nursing Graduation Rate	Number of Nursing Programs	Total Graduation Rate
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Panel A. Main specification					
Post Expansion x High	2.632**	1.380***	0.387***	1.176**	0.558**
	(1.030)	(0.487)	(0.114)	(0.552)	(0.278)
Post Contraction x High	-0.977	-0.127	0.015	1.246*	-0.305
	(0.792)	(0.159)	(0.070)	(0.628)	(0.282)
Panel E. Plus additional controls x year fixed effects, without Manila					
Post Expansion x High	3.010**	1.399**	0.315*	1.168***	0.609*
	(1.405)	(0.675)	(0.160)	(0.387)	(0.363)
Post Contraction x High	-1.798*	-0.103	0.032	1.019**	-0.493
	(1.056)	(0.177)	(0.086)	(0.419)	(0.299)
Panel F. Plus island x year fixed effects					
Post Expansion x High	3.230***	1.488***	0.430***	0.892	0.252
	(0.912)	(0.426)	(0.095)	(0.669)	(0.260)
Post Contraction x High	-1.449**	-0.194	-0.018	0.789	-0.313
	(0.719)	(0.162)	(0.063)	(0.755)	(0.273)
Panel G. Continuous Treatment Measure: Baseline Nurse Migration Rate					
Post Expansion x Baseline Nurse Migration Rate	2.318**	1.157**	0.263***	0.814	0.403**
	(1.030)	(0.485)	(0.088)	(0.651)	(0.197)
Post Contraction x Baseline Nurse Migration Rate	-0.287	-0.103	0.101	1.152*	-0.041
	(0.933)	(0.141)	(0.080)	(0.675)	(0.409)

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Pooled Event Study Estimates

	U.S. Nurse Migrants Per 100,000	Nursing Enrollment Rate	Nursing Graduation Rate
	(1)	(2)	(3)
Post Expansion x High	1.211*	0.045	-0.067
	(0.646)	(0.133)	(0.074)
Post Expansion x High x Trend	0.755***	0.685**	0.148***
	(0.267)	(0.261)	(0.043)
Post Contraction x High	-4.200**	-0.850*	-0.287***
	(1.760)	(0.497)	(0.108)
Post Contraction x High x Trend	-0.441**	-1.144***	-0.348***
	(0.217)	(0.371)	(0.077)
Trend x High	-0.105***	-0.091	0.002
	(0.039)	(0.073)	(0.014)
Observations	1702	1670	1169
Pre-period mean for high nurse provinces	3.068	1.348	0.156

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Pooled Event Study Estimates

	Number of Nursing Programs (4)	Number of Private Nursing Programs (5)	Number of Public Nursing Programs (6)
Post Expansion x High	-0.226	-0.118	-0.109
	(0.296)	(0.255)	(0.102)
Post Expansion x High x Trend	0.396**	0.320*	0.076*
	(0.187)	(0.172)	(0.045)
Post Contraction x High	-0.270	-0.307	0.037
	(0.251)	(0.219)	(0.135)
Post Contraction x High x Trend	-0.481*	-0.378*	-0.103
	(0.250)	(0.219)	(0.064)
Trend x High	0.027	0.029	-0.002
	(0.038)	(0.031)	(0.011)
Observations	1702	1702	1702
Pre-period mean for high nurse provinces	4.126	3.685	0.441

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DID Estimates

	Enrollment Rate Outcomes		Graduation Rate Outcomes	
	Non-Nurse	Total (Non-Nurse + Nurse)	Non-Nurse	Total (Non-Nurse + Nurse)
	(1)	(2)	(3)	(4)
Post Expansion x High	-2.589**	-1.209	0.172	0.558**
	(1.100)	(1.125)	(0.296)	(0.278)
Post Contraction x High	-0.267	-0.395	-0.319	-0.305
	(1.060)	(1.117)	(0.263)	(0.282)
Observations	1670	1670	1169	1169
Mean Dependent Variable	23.50	24.85	4.52	4.67

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