Health Womanpower

The Role of Federal Policy in Women's Entry into Medicine

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Abstract

During the 1970s, women's representation in medical schools grew rapidly from 9.6% of all students in 1970 to 26.5% in 1980. This paper studies the role of federal policy in increasing women's access to medical through two distinct channels: pressure to curb sex discimination in admissions policies brought by the women's movement and a massive expansion in total enrollment through Health Manpower policy starting in 1963. To study this, I construct a novel school-by-year data set with enrollment and application information from 1960 through 1980. Using a continuous difference-in-differences design, I find that medical schools respond to the threat of losing federal contracts by increasing first year enrollment of women by 4 seats at the mean, which explains 27% of women's gains between 1970 and 1973. Further, I provide OLS evidence that year-to-year expansions explain around 40% of women's gains from 1970 to 1980; I verify this result in a set of case studies utilizing synthetic controls to identify the increase in women's enrollment resulting from large jumps in capacity.

JEL codes:
Key words:

1 Introduction

2 Historical Context

It is well known that women made large inroads into professional schools in the 1960s and 1970s, progress which continued through the 20th century. For health professional schools, though, this growth coincided with a rapid expansion in capacity as the result a series of federal health manpower legislation. This section will lay out the details and motivation of these policies, as well as a conceptual framework to understand their impact on women's enrollment.

2.1 Health Manpower Legislation

As President Kennedy took office in the beginning of the 1960s, the U.S. was increasingly concerned with an expected shortage of health professionals by the end of the decade. In his 1961 congressional testimony, Abraham Ribicoff, then sectretary of the Department of Health, Education, and Welfare (DHEW), forecasted that the number of physicians per 100,000 people was projected to drop from its current level of 141 to 138 in 1970 and 135 in 1975 (CITE). The reason for this was straightforward: a dramatic rise in fertility rates during the late 1940s and 1950s was driving up the U.S. population at a much faster rate than it was producing newly minted physicians (FIGURE 2). Moreover, the earlier decline in fertility during the 1920s implied important shifts in the age distribution: Ribicoff notes that the number of people aged under 15 and over 64 were projected to increase by 35% and 40% respectively, both demographics with high demand for healthcare (CITE).

Recognizing that in order to increase the supply of health professionals in the 1970s the nation would have to act far earlier, Congress passed the Health Professions Educational Assistance (HPEA) Act in 1963. This legislation created what would become two pillars of health manpower policy: assistance for medical schools, though the provision of construction grants, and aid for medical students by providing student loans. The federal government had, by this point, become involved in the funding of medical schools, but this represented a fundamental shift away from research grants, which comprised around a quarter of all revenue in 1960 (CITE). Under the construction grant program, DHEW would provide funding for 2/3 of the costs for building a new school or expanding an existing one in exchange for several promises from the institution, including that the building would be used for teaching purposes for at least 10 years and a small increase in first-year enrollment (CITE). In addition, the

HPEA provided student loans, provided jointly with medical schools, to defray the increasing costs of medical education.

The HPEA was amended in 1965 to both extend the existing programs and add three more: the government would provide additional assistance to medical schools through basic and special improvement grants, as well as further aid to students through a new scholarship program. Basic improvement grants, which would later be more aptly called "Capitation Grants," provided institutions with a grant consisting of a baseline payment in addition to further funding for each enrolled student. In exchange, the institution would be required to implement a small increase in first-year enrollment. Any appropriated funds left over after these payments were doled out would be put towards Special Improvement Grants, which were provided to fund specific types of projects that schools would pitch in their application. Finally, institutions were provided with funding to provide scholarships to a fraction of their students.

These programs were extended and modified by the Health Manpower Act of 1968, but remained reasonably constant through the end of the decade. Taking stock in 1970, a report to the President on the effectiveness of these policies noted that first-year places had risen from 9,213 in 1963 to a projected 11,500 in 1970, slightly below Ribicoff's threshold of 12,000 to stabilize the physician-to-population ratio. Despite this progress, however, concerns about a shortage of health professionals persisted. An October 1970 report from *The Carnegie Commission on Higher Education* reiterated the severity of the problem, citing an estimate from then DHEW secretary Roger Egeberg that the U.S. needed approximated 50,000 more physicians (CITE). Even the American Medical Association (AMA) and Association for American Medical Colleges (AAMC) agreed, issuing joint statements in 1968 stressing the need for expanded enrollments.

2.1.1 Comprehensive Health Manpower Training Act of 1971

However, even as progress was made on this crisis, another had propped up - medical schools were experiencing increased funding issues at the beginning of the 1970s. To alleviate this, beginning in 1968, the government had been providing financial distress grants for institutions under the health manpower program; by 1970, 61 of the existing 103 medical schools were receiving funding through this program. The problem had begun to reach crisis levels at particular programs, threatening their ability to stay afloat (CITE).

Recognizing the need to rectify this situation in order to obtain its goal of increased enrollment, congress looked for a "comprehensive" solution that would stabilize the financial situation of medical schools while incentivizing an increase in enrollment (CITE). This policy took the form of the Comprehensive Health Manpower Training Act of 1971, where the focus of federal support shifted to Basic Improvement Grants, now more aptly called "capitation grants," which provide schools with a set amount of funding dependent on their enrollment, type of enrollment, and number of graduates. As before, to receiving this funding, an institution was also required to increase its first-year enrollment by a given amount. In addition, all forms of funding in the CHMTA are tied to a requirement that a school "will not disriminate on the basis of sex in the admission of individuals to its training programs" (CITE).

2.2 Sex Discrimination

This stipulation prohibiting sex discrimination in admissions was not in the original bill on the Senate floor, S. 934, but added later as an amendment which was maintained in the final version of the legislation (CITE). This addition was likely the result of a successful lobbying effort on the part of the Women's Equity Action League (WEAL), which called for such an amendment during the hearings on S. 934. For WEAL, this was not an isolated achievement, but instead part of a larger push to end sex discrimination in higher education.

The effort was led by Bernice Sandler, who realized that by the end of the 1960s, there were already federal rules in place that would, in principle, prohibit discrimination on the basis of sex (NPR). In 1967, President Johnson had issued Executive Order (EO) 11375, which amended EO 11246 to extend prohibitions on discrimination in hiring by federal contractors to include sex as a protected category. Since most universities receive federal contracts, Sandler reasoned that they would be subject to this regulation. Starting in January 1970, Sandler, along with WEAL and the National Organization for Women (NOW), filed complaints of EO 11246 violations at 250 college and universities (Welch).

Enforcement fell to the Department of Health, Education and Welfare (DHEW), which propmtly began investigations of several institutions that had received complaints (Fitzgerald).

2.2.1 Medical Schools

It was not at all difficult to establish that some medical schools were discriminating against women. Beginning in 1958, the Association of American Medical Colleges began publishing *Medical School Admission Requirements*, a yearly periodical intended to help prospective students in the application process. Included in each year starting in XXXX is a table containing preferences for each school over the sex, race, residency and age of applicants. Even in 1971, four schools still openly expressed that they treated applicants differently based on their sex (CITE).

What was more unclear was the extent of the problem. By the end of the 1960s, while all medical schools admitted women, there was one institution, Women's Medical College, which did not admit any men. This school would, in 1970, decide to start admitting men, a decision that met resistance from alumni worried that it would compromise opportunities for women to study medicine provided by a women-only institution. In 1969, the dean of Women's Medical interviewed admissions officers at 25 Northeastern medical schools, finding that 19 "admited they accepted men in preference to women unless the women were demostrably superior" (CITE), suggesting that many schools acted in a discriminatory manner without admitting formally to preferences over sex.

Once enacted, enforcement fell to the Bureau of Health Manpower (BHM) of the Department of Health, Education and Welfare. From their report to congress, it appears that the BHM took this seriously, stating the requirement of non-discrimination as one of the "assurances" that must be provided by institutions before receiving a capitation grant (CITE). The BHM has access to admissions data through the grant application process, and it is given the power to visit medical schools to check on their progress on special projects, which it reports that it does.

2.3 Conceptual Framework

To understand how this policy will affect the admission of men and women, I construct a simple model of the admissions committee's decision in each year t. The school's enrollment decision is set up in a similar manner as Blair & Smetters 2022.

2.3.1 Setup

Medical school has revenue given by

$$R_t(Q) = Q \cdot T(Q) + R_o(\bar{K}_t, \bar{L}_t) \tag{1}$$

Here, Q is the number of enrolled students, and $T(Q)$ is the implied tuition level to enroll Q students, given by demand faced by the institution. $R_o(\bar{K}_t, \bar{L}_t)$ is the revenue from all other operations of the medical school, which is a function of buildings constructed $\bar{K}_t$ and faculty hired $\bar{L}_t$. These vary over time, but I add a bar to show the assumption that they are fixed from the perspective of the admissions committee. This inclusion of this term might seem superfluous, but I add it here to make explicit that the only way in which admitted students benefit the university is through tuition revenue. In addition, the medical school has costs given by

$$C_t(Q) = c(\bar{K}_t, \bar{L}_t)Q + C_o(\bar{K}_t, \bar{L}_t) \tag{2}$$

I assume there is a constant marginal cost $c(\bar{K}_t, \bar{L}_t)$ of enrollment in every period, which can vary over time given capital and labor present. There is also another term $C_o(\bar{K}_t, \bar{L}_t)$ representing all other costs the university faces. Putting this together, we can write profits as

$$\Pi_t(Q) = R_t(Q) - C_t(Q) + G_t(Q) \tag{3}$$

Where $G_t(Q)$ is the (so far unspecified) federal government incentive program.

Medical schools also care about the quality of applicants. I assume that there is a univariate, observable measure of student quality, x, and that each university receives applications from women with distribution $f(x)$ and men with distribution $m(x)$. When making admissions decisions, the school sets a separate admissions threshold for women a_f and men a_m so that all students with $x \geq a_g$ are admitted. Accordingly, we can write total enrollment as

$$Q = \int_{a_m}^{\infty} m(x)\mathrm{d}x + \int_{a_f}^{\infty} f(x)\mathrm{d}x \tag{4}$$

2.3.2 Solving the Model

Consistent with the literature on enrollment decision, I assume that medical schools care about both the revenue from additional students as well as their quality (Fu 2014). Accordingly, the admissions committee solves the following problem:

$$\begin{aligned} \underset{Q, a_f, a_m}{\text{maximize}} \quad & \Pi_t(Q) + \gamma\Big\{\int_{a_m}^{\infty} x m(x)\mathrm{d}x + \int_{a_f}^{\infty} x f(x)\mathrm{d}x\Big\} \\ \text{subject to} \quad & Q = \int_{a_m}^{\infty} m(x)\mathrm{d}x + \int_{a_f}^{\infty} f(x)\mathrm{d}x \end{aligned} \tag{5}$$

Where γ is a parameter garnering the relative importance of student quality to the admissions committee. I assume that schools care about the weighted sum of student quality so that an additional student increases school utility but marginal utility is decreasing in enrollment.

To solve, I assume that demand is linear and marginal cost is constant so that

$$R_t(Q) = (P - bQ)Q \tag{6}$$

$$C_t(Q) = cQ \tag{7}$$

Substiuting for Q, we have the first order conditions for a_f and a_m:

$$P - 2bQ = C - \gamma a_f \tag{8}$$

$$P - 2bQ = C - \gamma a_m \tag{9}$$

This expression has a simple interpretation: the admissions committee equates marginal revenue with marginal cost, which equals the cost of educating the marginal student less the gain in student quality. This system immediately implies that $a_f = a_m$ - in the no discrimination case, schools will set an identical admissions threshold for men and women.

Now, consider a case where the school imposes an upper limit on the admission of women so that the optimization problem becomes:

$$\begin{aligned} \underset{Q, a_f, a_m}{\text{maximize}} \quad & \Pi_t(Q) + \gamma\Big\{\int_{a_m}^{\infty} x m(x)\mathrm{d}x + \int_{a_f}^{\infty} x f(x)\mathrm{d}x\Big\} \\ \text{subject to} \quad & Q(a_f, a_m) = \int_{a_m}^{\infty} m(x)\mathrm{d}x + \int_{a_f}^{\infty} f(x)\mathrm{d}x, \\ & \bar{F} \geq \int_{a_f}^{\infty} f(x)\mathrm{d}x \end{aligned} \tag{10}$$

Now, letting μ denote the multiplier on the inequality constraint, our first order conditions become:

$$P - 2bQ = c - \gamma a_f + \mu \tag{11}$$

$$P - 2bQ = c - \gamma a_m \tag{12}$$

Let (Q^*, a_f^*, a_m^*) denote the non-discriminatory solution. Assume that a_f' solving $\int_{a_f}^{\infty} f(x)\mathrm{d}x = \bar{F}$ is such that $a_f' > a_f^*$ so that the constraint binds and $\mu > 0$. a_m^* can no longer be the solution, as $P - 2bQ(a_f', a_m^*) > P - 2bQ(a_f^*, a_m^*) = C - \gamma a_m^*$. Therefore, the admission committee will lower a_m^* until this is satisfied, and the cost of the additional constraint will be given by $\mu = \gamma(a_f - a_m)$.

This has several implications. First, as we would expect from limiting the admission of women, the number of women admitted falls, and the number of men rises, in the discriminatory equilibrium. However, we have also found that total enrollment falls as the marginal male student is less valuable to the institution than the marginal woman. This implies that the penalty to women's enrollment can be decomposed into two sources. There is a direct discriminatory effect: holding Q' fixed, women's enrollment is lower with a limit on admissions; however, there is also an indirect discriminatory effect whereby enrollment of both women and men is curtailed by the drop in total enrollment.

2.3.3 Policy Counterfactuals

3 Data

To test these predictions, I collect a novel institution-by-year dataset from 1960 through 1980. Medical schools are unique among health professional schools in that there is consistent historic reporting of institution-level enrollment data. My main source of data is the Study of Applicants published yearly in the *Journal of Medical Education*. From 1967 - 1977, the Study of Applicants reports the number of new entrants, as well as applicants, for each medical school, split by sex. Unfortunately, data reporting from this source stops in 1977, and before 1967, enrollment figures are not split by sex.

Accordingly, to fill a complete panel, I bring in several other sources of data. I am able to collect first-year enrollment[1] in years 1966 and 1978-1980. In 1966, this information is reported in the 1967 *Medical School Admission Requirements*; and in 1978-1980, this is reported in the Education Number, published yearly in the *Journal of the American Medical Association*. To extend the number of pre-periods I can study, I also collect information on estimated new entrants, split by sex, from 1960 - 1965 in the Education Number.[2] Data availability and the source of information in each year is summarized in Table 1.

3.1 Unpacking Women's Entry

Using this dataset, I begin by establishing several stylized facts about the nature of women's entry into medicine.

[1]This is not equivalent to new entrants as it includes students repeating the first year, though these students represent a miniscule portion of the first year class in medical schools.

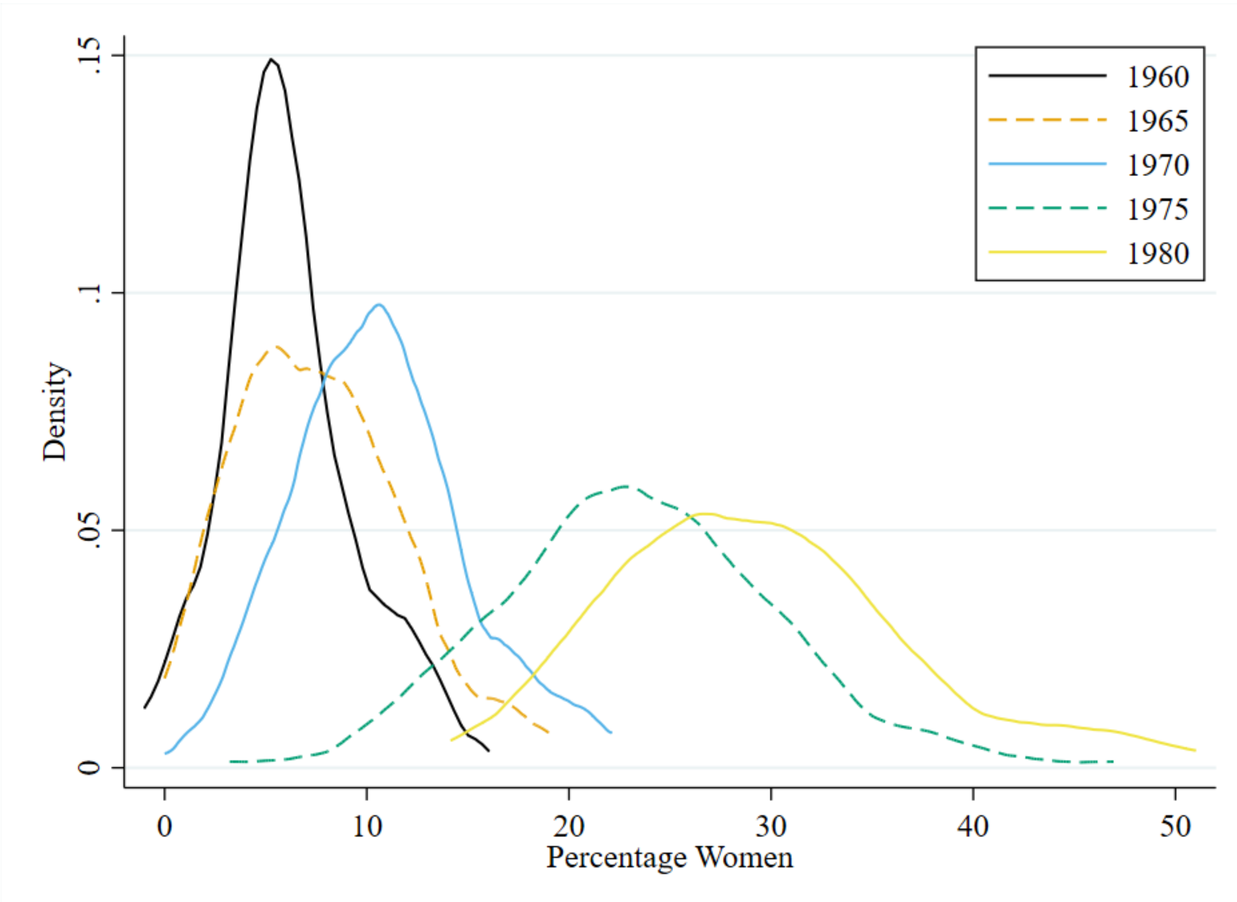
[2]These estimates, while published in the Education Number, were first compiled for the *MSAR* in each year.

Table 1: Data Sources and Availability

Year	First-Year Enrollment	New Entrants	Applications	Estimated Enrollment
1960			*JME*	*JAMA* EN
1961			*JME*	*JAMA* EN
1962			*JME*	*JAMA* EN
1963			*JME*	*JAMA* EN
1964			*JME*	*JAMA* EN
1965			*JME*	*JAMA* EN
1966	*MSAR*		*JME*	
1967		*JME*	*JME*	
1968		*JME*	*JME*	
1969		*JME*	*JME*	
1970		*JME*	*JME*	
1971		*JME*	*JME*	
1972		*JME*	*JME*	
1973		*JME*	*JME*	
1974		*JME*	*JME*	
1975		*JME*	*JME*	
1976		*JME*	*JME*	
1977		*JME*	*JME*	
1978	*JAMA* EN			
1979	*JAMA* EN			
1980	*JAMA* EN			

[ADD INFORMATION ON: Changes in distribution of women across schools, entry of new schools, seats at new schools vs existing schools, changing geographical distribution of students]

Figure 1: Distribution of First-Year Enrollment, Fraction Women



4 Anti-Discrimination Policy

To estimate the impact of this policy on women's enrollment, I assume that there is a differential response across medical schools depending on their financial exposure. Similar to Rim (2021), schools with more at stake to lose from non-compliance should be more likely to admit higher levels of women. I test this hypothesis using a continuous difference-in-differences approach with an event study specification:

$$Y_{it} = \sum_{\tau=1960,\tau\neq 1970}^{\tau=1977} \alpha_\tau d_{i,1970} \mathbb{1}(t=\tau) + \boldsymbol{\beta}'\mathbf{X}_{it} + \gamma_i + \delta_{st} + \varepsilon_{it} \tag{13}$$

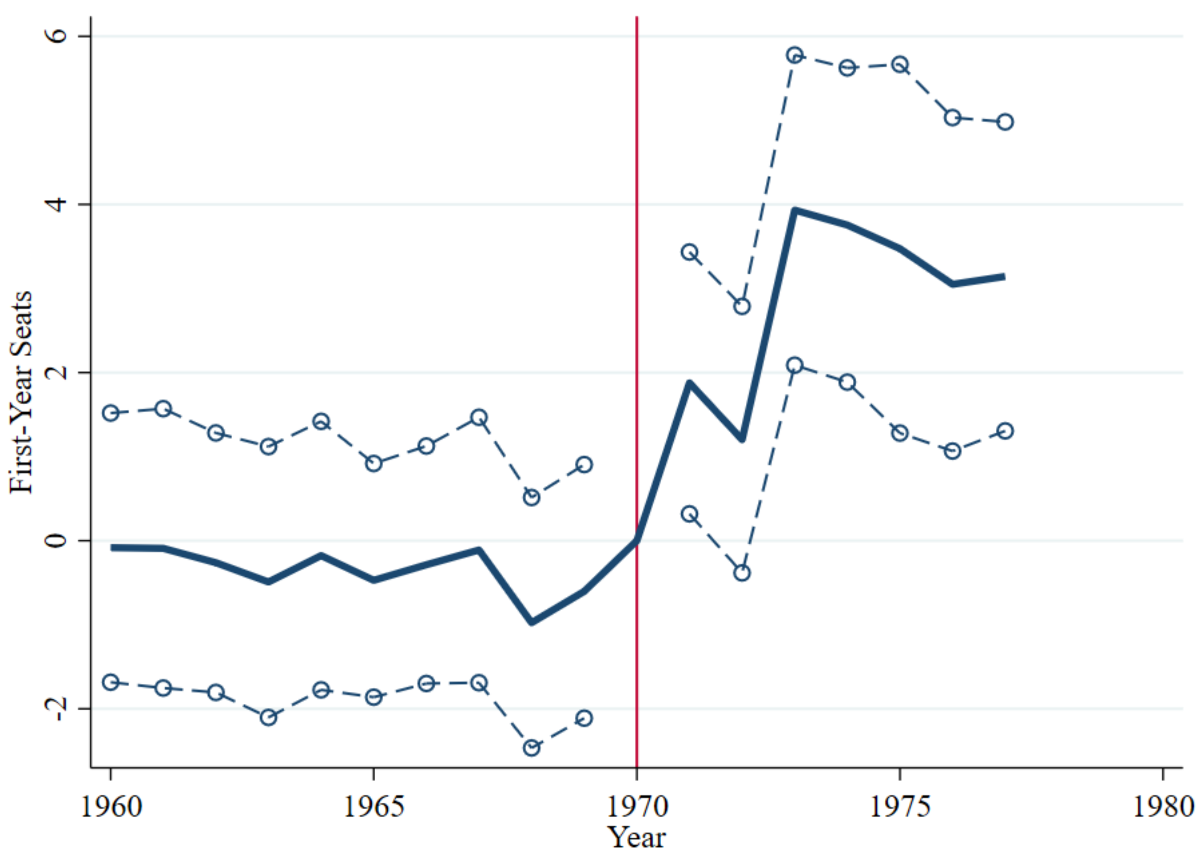
The outcome, Y_{it}, gives the number of women enrolled at institution i in year t. $d_{i,1969}$ is my preferred measure of exposure to the policy. I collect data on all DHEW funding provided to each medical school, which should be an excellent measure of the financial support that would be withheld in the case of non-compliance. For institutions that receive a construction grant in 1969, I subtract the amount of the grant to obtain a more permanent measure of DHEW support. This dose is interacted with a set of year dummies, omitting 1970. My parameter of interest, α_τ, captures changes in the relationship between DHEW funding and women's enrollment. If it was the case that this policy raised women's enrollment, we would expect that this relationship would change abruptly in 1971 and that $\alpha_{1971} > 0$. I include a long pre-period extending back to 1960 in order to check for pre-existing trends in this relationship.

My baseline specification includes institution fixed-effects γ_i to control for time-invariant differences in school preferences over women's enrollment and year fixed effects δ_t to account for year-to-year changes in women's demand for medical education. My baseline control $\mathbf{X}_{it}$ is the school's total enrollment, and in a second specification I include controls for both women's and men's applications to account for the relative demand for medical education at a particular institution. Finally, in my last specification, I add state-by-year fixed effects to account for differential regional trends in attitudes towards women's professional education.

These results are presented in Figure 2. Coefficient estimates are scaled by the mean of the dose distribution so that they can be interpreted as the number of first-year seats added. For the 10 years prior to 1971, we see almost no change in the relationship between DHEW funding and women's enrollment. This changes abruptly in 1971, and gains for women peak in 1974, likely buoyed by the anti-discrimination provisions in the CHMTA and Title IX, which are passed in 1971 and 1972, respectively. At the mean, women gain 4 first-year seats as the result of this policy, which is a small but significant increase in enrollment. Across the 101 medical schools, this would create 404 first-years seats, which constitutes roughly an increase in enrollment of 1600 women.

The primary threat to identification in this design is that other institutional characteristics, which correlate with DHEW funding, might drive differential responses to an unrelated policy. Specifically, with the passage of the CHMTA in 1971, we worry that better funded

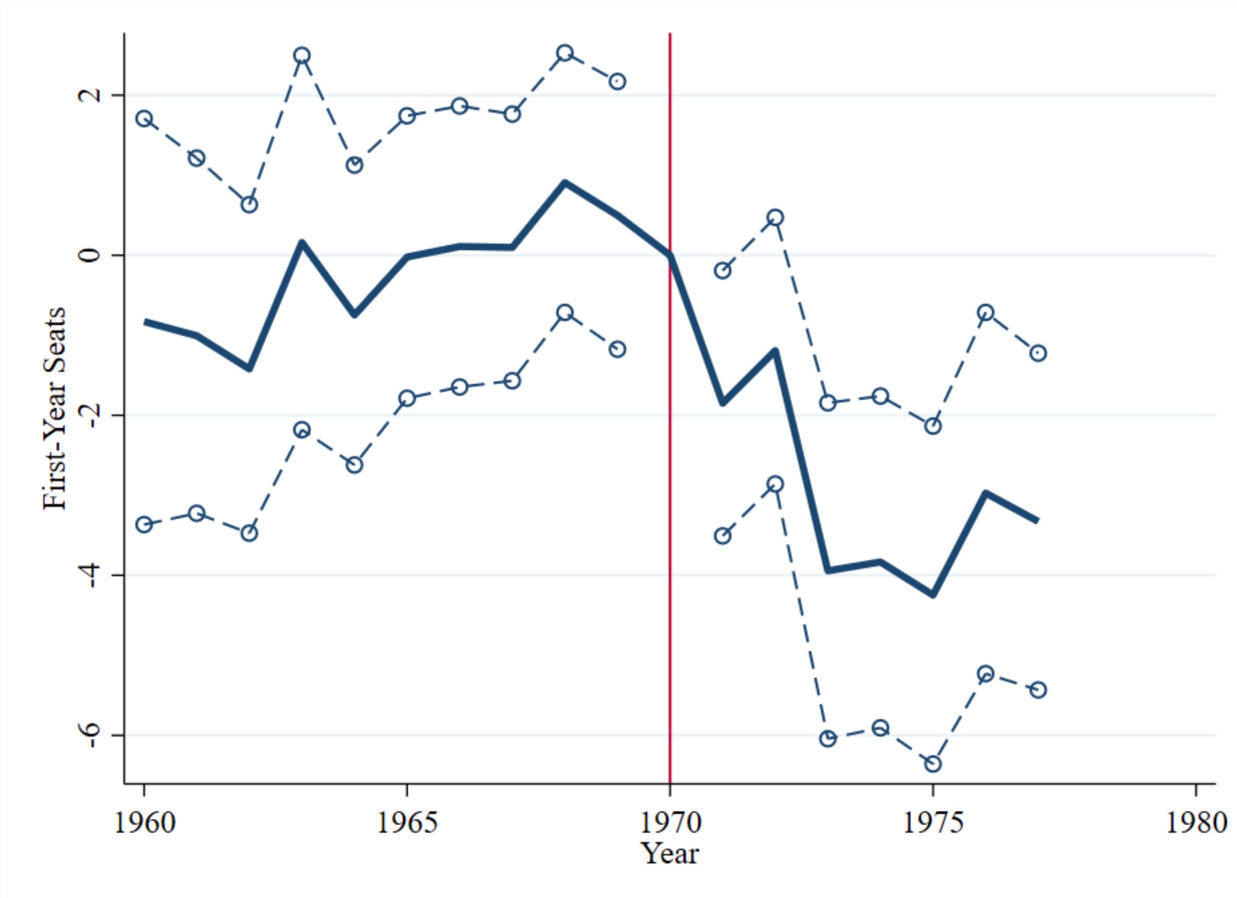
Figure 2: Difference-in-Differences: Results for Women



schools might have expanded enrollment more rapidly, causing an increase in women's enrollment. This hypothesis would also predict increases in men's enrollment in the early 1970s; accordingly, to rule out this explanation, I run an identical design with men's enrollment on the left-hand side.

The results from this design are in Figure 3. Not only does this design rule out enrollment expansion as an alternative explanation, but it also gives insight into the nature of the institutional response. The coefficient for men's enrollment in 1973 is -4, suggesting that the seats allotted to women as a result of this policy would have been given to men if not for government intervention.

Figure 3: Difference-in-Differences: Results for Men



5 Expansionary Policy

We've established that anti-discrimination policy likely played a role in women's initial entry into medicine. However, these gains stall around 1973, while the number of women in their first-year continues to grow. The other clear role for federal policy in this setting is expanding the number of seats offered. Now, we turn to the question of determining whether or not this expansion was to the benefit of women.

5.1 OLS Results

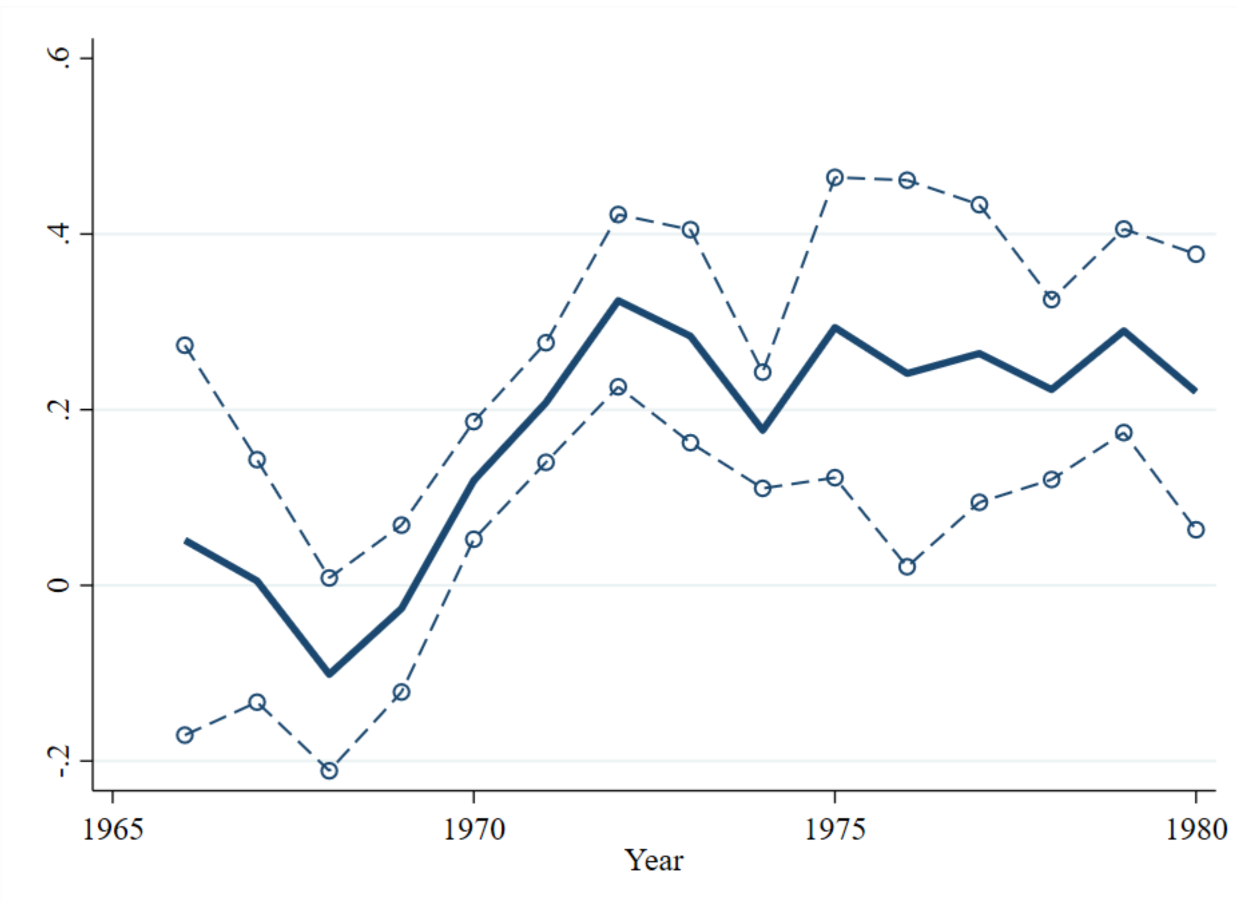
To fix ideas, let F_{it} denote women's enrollment at insitution i in time t, and let E_{it} denote total enrollment at insitution i in time t. In each period, each institution chooses the gender composition of its incoming class according to some assignment rule so that $F_{it} = A_{it}(E_{it})$;

we can approximate local changes via differentiation, giving us that $\mathrm{d}F_{it} = A'_{it}(E_{it})\mathrm{d}E_{it}$. I estimate the discrete time version of this expression:

$$\triangle F_{it} = \beta_t \triangle E_{it} + \varepsilon_{it} \tag{14}$$

The outcome of interest is the change in women's enrollment between year t and $t-1$, $\triangle F_{it}$, and the independent variable is $\triangle E_{it}$, which gives the change in total enrollment at institution i between year t and $t-1$. I am interested in capturing their reduced form relationship, β_t, which I allow to change over time to explore changes in this relationship.

Figure 4: Seats Captured by Women



These results are contained in Figure 4. I document a clear shift in the ability of women to capture new seats, starting around 1970. I summarize these results by aggregating estimates in each decade. In the 1960s, women essentially capture no new seats, while in the 1970s they capture 23% (2%) of all new slots. Further, while women's representation grows continuously over this period, their capture of new seats remains relatively constant around its mean, suggesting that this is a function of a change in school policy and not driven by the rapidly increasing demand for medical education.

A quick back of the envelope calculate suggests that enrollment expansions are an important part of women's entry during the 1970s. Between 1970 and 1980, 6,035 new first-year seats were created; the OLS results from above suggest that women captured 1,388 of these, representing roughly 40% of their gain of 3,742 seats during this time period. Unfortunately, it is difficult to conclude definitively from this evidence that enrollment expansions "made room" for women, as they might have made inroads with or without additional seats. In light of this, I focus on a couple of case studies in medical school expansion and utilize a synthetic control design to estimate what women's enrollment would have been in the absence of these expansions to understand the true contribution of additional seats.

5.2 Construction Grants: Existing Schools

In addition to capitation grants, the main way the government funded enrollment expansions was through providing grants for the construction of new teaching facilities (and the renovation of existing capital). These grants were attached to a specific number of first-year places that a medical school would add as a condition of receiving this funding.

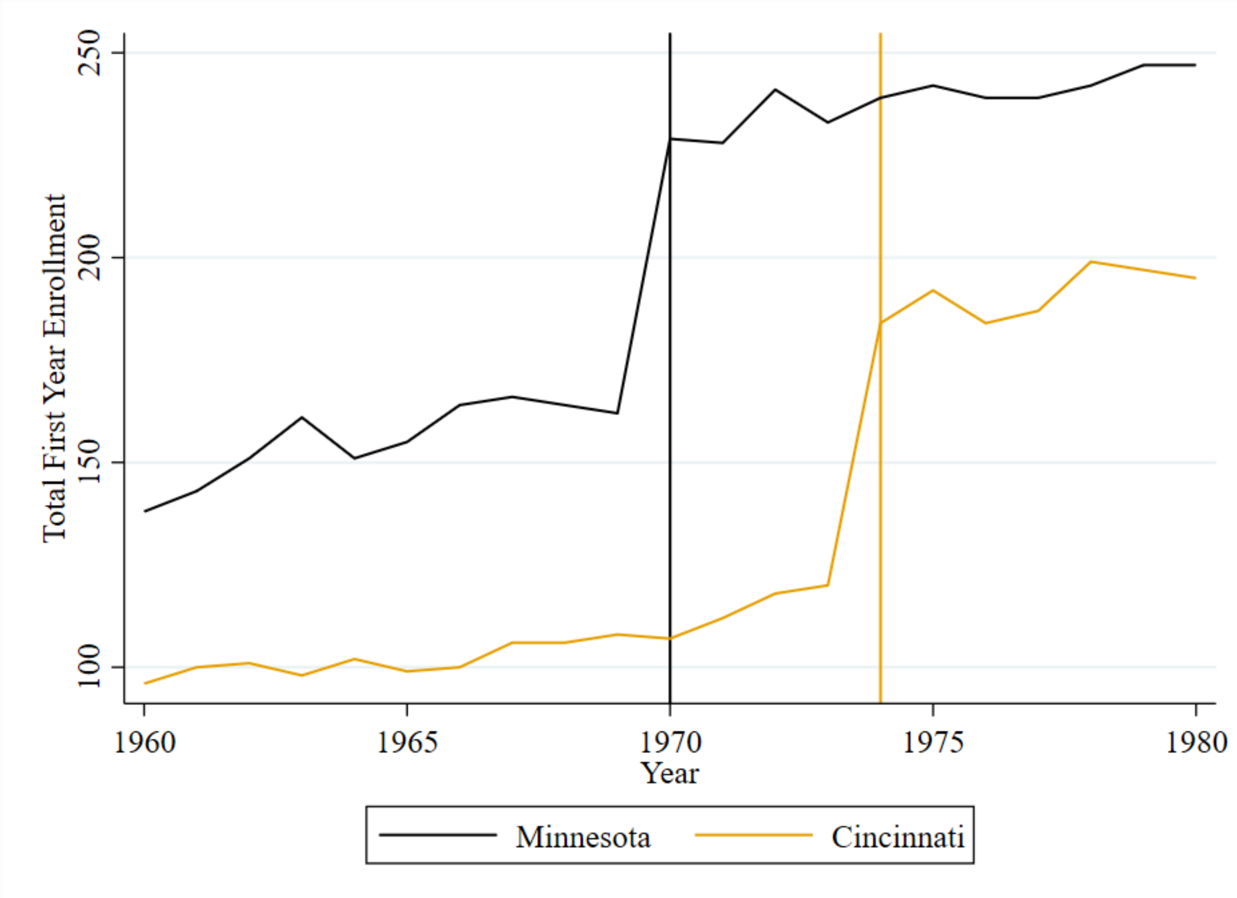
I consider two case studies to understand the impact of large changes in enrollment on women's entry. Among schools that exist throughout my sample, the two with the largest single year changes in enrollment at the University of Minnesota, in 1970, and the University of Cincinnati, in 1974. These increases can be tied directly to construction financed in part by Health Manpower policy: Minnesota receives a grant in 1971 promising an increase of 57 students, and Cincinnati receives a grant in 1970 promising an increase of 86 students. These increases are plotted in Figure 5. It is evident from the time series that the completion of construction leads to a large increase in the number of students enrolled.

To estimate women's enrollment under the counterfactual where each school does not expand, I utilize a synthetic control design. Using data on all construction grants awarded from 1965 - 1979 (CITE), I construct a donor pool of 28 medical schools meet the following criteria:

1. Exist throughout the entire sample period

2. No construction, as evidenced by either:

Figure 5: Total Enrollment



- No construction grants received
- Construction grants received with no enrollment increase attached

5.3 Construction Grants: New Schools

6 Extensions

6.1 Heterogeneity: Construction Grants

6.2 New Schools in the 1970-1980 Period