Breaking Barriers? Female Doctors in Male Fields

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Abstract

We study the long-term effects of a Pakistani reform that exogenously increased the share of female doctors by collecting original data on 650 medical doctors. Using a difference-in-differences strategy, we show that 20 years on, female doctors who were new entrants in male-dominated specialties are more likely to consult for free, work in public hospitals and spend less time per patient relative to their counterparts in a female-dominated specialty, and to male doctors in their own specialty. They also receive fewer serious disciplinary actions. These differences are explained by place of work, and by female doctors remaining in junior roles compared to men of the same cohort. Overall, the reform exacerbated labor market segmentation between male and female doctors.

Keywords: Development; economics of gender.

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1 Introduction

A number of once male-dominated jobs now comprise a female majority, including post-secondary teachers, advertising sales agents, and artists (247 Wall Street, 2021). Perhaps nowhere is this change as dramatic as in medicine: an industry worth $9.8 trillion dollars and 10 percent of GDP globally (World Economic Forum, 2024). Only 6 percent of US medical students were female in 1960, and 55 percent were female by 2020 (AAMC, 2023; Heiser, Stuart, 2017), with similar trends in a few other countries (Penny et al., 2014). Occupations with more women are often associated with lower pay and shorter hours (Harris, 2022; Goldin, 2014). The entry of women in medicine, therefore, could affect the price, quantity and quality of healthcare (AAMC, 2018). But it is difficult to determine if women alter an occupation by entering it, or if they enter when it has already changed and become welcoming to them. We fill this research gap by using a plausibly exogenous shock to the medical labor force to examine how medical practice changes in the long run after an increase in its female share of medical doctors.

Our empirical strategy uses a novel natural experiment. In 1992, Pakistani courts struck a 20 percent cap on women's seats in medical schools and replaced it with merit-based admissions. The female share in medicine increased by 10 percentage points immediately (Aqeel, 2024). Almost all medical specialties were affected by the reform, with two notable exceptions: gynecology and urology. For cultural and religious reasons[1], gynecology is almost completely female and urology is male[2]. First, we compare specialties where the female share increased ("treated fields") to plausible control specialties (gynecology and urology)[3] and examine how the entry of female

[1]For example, the website "Islam QA" provides the following information: *"If a woman has a wound in a part of the body that is impermissible for a male to look at (meaning other than the face, hands & feet), it will be impermissible for her to receive treatment from a male doctor, rather a female should be instructed to treat her...". The rule is relaxed if no female doctor of similar qualifications as a male doctor is available.*

[2]Medical doctor registration data from the Pakistan Medical and Dental Council show that 95 percent of gynecologists are female, 99 percent of urologists are male, and gender ratios did not substantially change in these specialties after the reform: the female share in gynecology increased by 5 percent and in urology by 4.3 percent after the reform.

[3]We use the homogenously female field gynecology as a control for female doctors in mixed, or "treated"

doctors changed mixed-gender fields relative to homogenous fields. Our results are robust to an alternate specification which uses medical specialty-level gender ratios directly, but notably, these ratios are determined endogenously. Second, we examine labor market segmentation by comparing female and male doctors *within* treated specialties. The combination of the exogenous medical school reform, and certain specialties remaining unaffected for cultural reasons, allows us to address selection concerns.

We address remaining selection concerns through the data we collect. In 2022 and 2023, we worked with Gallup Pakistan to collect data on 653 randomly selected Pakistani doctors across the country[4]. In addition to questions about medical practice, in the second round of data collection[5] we collected information on doctors' test scores, background characteristics and motivation for choice of specialty. Wherever possible, we supplement our data with official medical doctor registration data, including on the disciplinary cases faced by doctors. To the best of our knowledge, our combination of large-count administrative data and detailed survey data provide greater information on medical practice in a developing country than any other available source.

We find that an increase in the share of female doctors did not change medical specialties overall, but it worsened pay for female doctors in those specialties. When comparing fields where the female share increased to the female-only field of gynecology, average consulting fee, pay and output are not substantially different. This is unlike recent findings which show female entry to reduce the average pay in a field (Harris, 2022; Oldenziel, 2001; Li, 2024) and may be because women remained a minority in many specialties. We find, however, that *female* doctors who entered those fields after the reform have lower consulting fee and pay. In fact, these doctors are 44 percent more likely to

fields, and the homogenously male field urology for men in mixed fields. To have an overlapping control group for men and women, we also compare men in mixed fields to gynecology in a separate exercise.

[4]We randomly sampled doctors from the registration data, and provided them to Gallup Pakistan for data collection. Gynecologists and urologists (in the second round) were oversampled to serve as control groups.

[5]The second round increased the sample size of the survey, as opposed to interviewing the same doctors twice.

consult with patients for free compared to the control group and to pre-reform doctors. These differences are largest in fields that are more male-dominated, such as General Surgery, and are not explained by ability changes.

Instead, they are partly explained by where post-reform female doctors work. As their numbers in treated specialties have grown, post-reform female doctors are 61 percentage points more likely to work in lower-paying public hospitals instead of expensive private hospitals as in previous cohorts. They are also 20 percentage points more likely to have *started* their careers at public hospitals, which indicates some persistence in place of work. In contrast, female doctors who graduated before the reform are largely unaffected in fee and where they work, even though they were at least partly exposed to the post-reform work environment. This further suggests that initial conditions at doctors' point of entry in the labor market have long-lasting influences on their careers.

Next, we show that post-reform doctors adjust differently to the time requirements of their specialties. Treated fields have trended toward higher patient volumes and doctors with two practices over time relative to the control. Potentially to compensate for higher patient loads, however, female doctors in these fields spend 24 percent *less* time per patient relative to the control, while male doctors do not. Consistently, these female doctors also spend fewer consulting hours at their primary practice, and are more likely to report burnout. With doctors working 50 to 60 hours per week in treated fields, time allocation adjustments may be one way that female doctors balance work with caregiving responsibilities at home, as existing research suggests.

Within mixed-gender fields, the reform created segmentation between male and female doctors. Twenty years on, post-reform female doctors are 24 percentage points more likely to consult for free compared to their male counterparts. This difference is partly explained by female doctors being in junior positions compared the same cohort of men, and partly place of work. We measure differences in the quality of care provided by male and female doctors through reported disciplinary cases. About 64 percent of

disciplinary cases are against male doctors overall. After the reform, the number of disciplinary cases in treated fields increased relative to the control, and male doctors within these fields received harsher penalties. One reason this could occur is that male doctors in treated fields were disproportionately pushed into greater risk and reward roles and performed riskier procedures in these fields, while females remained in junior roles.

Overall, when a medical school reform exogenously increased the share of women in certain specialties, the price and quantity of medical practice did not change relative to a more homogenous control specialty. Instead, certain outcomes for female doctors in these specialties worsened, and the market for male and female doctors within those specialties became more segmented.

We contribute to literature on pay inequality, and policy research on reforms that affect healthcare. While the gender pay gap has narrowed in several fields (Blau and Kahn, 2020; McFall et al., 2024), recent work shows that the overall pay in occupations decreases as women become more prevalent (Harris, 2022; Oldenziel, 2001; Li, 2024). This can occur through a variety of mechanisms, such as a decrease in prestige (Goldin, 2014), or a shift/preference for higher non-pecuniary amenities or flexibility (Lee and Thompson, 2019; Wiswall and Zafar, 2018; Mas and Pallais, 2017). Our results are different from both these findings. Instead, we show that twenty years on, female doctors affected by the reform charge less for consultations than their counterparts. Our results are consistent with an increase in specialized labor supply pushing females into lower paying hospitals, and the existence and widening of a segmented labor market (Pelley and Carnes, 2020). One reason that the segmentation exists is because women remain in lower paying roles even within the same occupation or job function (Bolotnyy and Emanuel, 2022; Adams-Prassl et al., 2023), which is what we find to be the case as well. To our knowledge, this is the first paper that documents long-run labor market patterns after the plausibly exogenous entry/expansion of women in an occupation.

Second, our paper contributes to policy literature on healthcare provision (Das et al., 2008; Das and Hammer, 2005). A large question in this literature is how medical reforms affect the quality of care (Alexander, 2020; Das et al., 2016). We show that the admissions reform increased the ability of medical doctors, especially of male doctors. Doctor ability is positively related to patient outcomes. In our data, the highest scoring doctors spend more time with each patient, all else equal. The reform also increased the accessibility of female doctors in terms of place of practice and consultation fee. On the one hand, a back-of-the-envelope calculation reveals that consulting fees could be 6.6 percent higher without female doctors. On the other hand, female doctors spend relatively less time per patient than their counterparts, which is a margin along which the quality of care could have decreased (Ganguli et al., 2020). Among other reasons, this could be due to tight work and life balance time constraints faced by female doctors (Majid, 2020; Majid and Siegmann, 2021).

The remaining paper is structured as follows. In section 2 we describe the policy change in medical schools and the structure of healthcare in Pakistan. Section 3 describes our data and identification strategy. Section 4 discusses our main findings, followed by robustness checks in section 5. Finally, we present our conclusions in section 6.

2 Background

Health Care in Pakistan and Medical Schools: As of 2022, health care in Pakistan represented approximately 1.2 percent of GDP annually (International Trade Administration, 2022). The government spent 38 USD per capita on health care in 2023, which was lower than in other developing countries such as India, Ghana and the Phillippines (Khan et al., 2023). There has traditionally been a shortage of health resources for the population: in 2022, 68 percent of all births were attended by skilled staff, 85 percent of children between 12 to 23 months old were immunized against diphtheria,

tetanus, and pertussis (DPT), and the overall physician to population ratio at 1.1:1000 in 2019 was lower than that recommended by the WHO in 2024 (2.5:1000)(World Bank, 2024). Until about 2020, 88 percent of health costs are paid out-of-pocket by patients in Pakistan (Naz and Sriram, 2024), which increases the risk that households fall into a health poverty trap. Recent efforts to improve the health system include a universal healthcare program introduced in 2019 (Khan et al., 2023). Partly as a result of these, between 2010 and 2020 out-of-pocket expenditures as a percentage of current health expenditure decreased from 67 to 55 percent, but remain substantial.

In the current system, healthcare is provided by both the public and private sectors. Though the private health care sector is small, it caters to a large proportion of the urban population. In 2016, 35 percent of all physicians worked in the private sector and were consulted by 75 percent of the urban population at least once (World Health Organization, 2016). Similarly, of the 1,982 hospitals in 2022, 700 (35 percent) were private and 1,282 (65 percent) were public hospitals (International Trade Administration, 2022). The cost of care at private hospitals is usually higher, and the salary that doctors earn at private hospitals can be three times that of public hospital[6]. The fee charged of patients at public hospitals is minimal, usually ranging from zero to 500 PKR ($0 to $1.80). By comparison, the fee at private hospitals can be as high as 2000 to 5000 PKR ($15-$30). For context, an individual who earns $10 to $40 a day is considered middle class in Pakistan[7]. In keeping with overall cost structures, the cost of public hospital care grew by 300 percent between 1996 and 2014, and grew by 700 percent in private hospitals (Pakistan Bureau of Statistics (PBS), 2018). The number of doctors in Pakistan has grown steadily from 48 in 1947 when it was founded to about 274,000 in 2022[8]. Applications to medical school take place directly after completing the appropriate pre-medical courses in high school. According to the PMDC, medical school admissions are determined by an entrance exam

[6] https://www.hippocraticadventures.com/practicing-medicine-in-pakistan/

[7] https://profit.pakistantoday.com.pk/2022/12/04/income-culture-and-inequality-who-are-pa

[8] Pakistan Ministry of Health and Planning Commission, and Pakistan Medical Council.

score (which accounts for 50 percent of the overall candidate score), high school grades (40 percent of the overall score) and middle school grades (10 percent of the overall score). Before the year 2000, a candidate's score was determined by high school and middle school grades alone (Andrabi and Singh, 2015). After five years of medical school, medical graduates register to practice with their basic M.B.B.S degree[9], or pursue a residency (locally also known as a "house-job") and fellowship in a chosen medical specialty.

The Policy Change: The quota for women in medical school was started in 1948 to reserve 20 percent of medical college seats in public and private colleges for women, and 80 percent for men. Over time, more women applied to medical college, and the number of female applicants outgrew the number of reserved female seats (Masood, 2019). In the early 1980s, concerns about the quality of medical education led to a reduction in the total number of medical seats. Within the women's quota, the entry threshold of scores increased and became 8 percent higher for women than for men (Andrabi and Singh, 2015).

The quota was removed after a 1989 court case when a group of female applicants to medical school, led by Shrin Munir, alleged that they were denied admission despite scoring higher than several men. A court ruling decided that the old admissions policy was unconstitutional, stating that "the selection procedures violated [sections of] the Pakistani Constitution prohibiting discrimination [...] on the basis of sex" (Shrin Munir and others v. Government of Punjab through Secretary Health, Lahore and another (PLD 1990 SC 295)[10]. A few months later, a similar case was won in the province of Sindh[11]. Subsequently, the admissions policy was changed in 1991 to being based purely on merit. Women and men had an equal opportunity of being admitted to medical school for all

[9]M.B.B.S stands for Bachelor of Medicine, Bachelor of Surgery. It is equivalent to being a Doctor of Medicine.

[10]Available through: https://pakistanconstitutionlaw.com/pld-1990-sc-295/

[11]https://pakistanconstitutionlaw.com/p-l-d-1990-karachi-342/

cohorts starting in 1992. The first cohort affected by the reform is expected to have graduated in 1997 and begin their residency.

3 Data and Empirical Framework

3.1 Data

We collected two rounds of surveys data on doctors across Pakistan for a total of 658 doctors. The surveys were carried out by Gallup Pakistan from May to September of 2022 and May and September of 2023. In the first round, we collected data on 420 doctors and oversampled gynecologists to have a main comparison group for our analysis. In the second round, we collected data on 268 additional doctors and oversampled urologists in addition to gynecologists based on early feedback on the need for a male dominated field as a control group for men. We also included questions about doctor test score ability and background such as birth place and parental education in the second round.

For each survey round, we started with a list of doctor names and information from doctor registration data available on the website of the Pakistan Medical and Dental Association. We randomly sampled doctors from this list while oversampling control group doctors, and gave Gallup ten times as many doctor names as our target survey sample size. The Gallup team first found contact information on these doctors and approached them via email and social media. If there was no response, the doctors were contacted by phone or in person. Eighty percent of the surveys were completed in person, 13 percent on the phone, and the remaining through other means such as email or social media. The survey team reported a response rate in both rounds of about 86 percent conditional on the doctor being located and contacted.

In table A1 we present summary statistics on the overall sample. The average doctor in our sample is 43 years old, 76 percent have an urban place of birth and 93 percent currently practices in an urban place. Forty-five percent of the sample are female, only a

third are married, almost all currently practice, and fifty percent of these practice in the public sector. About 27 percent also have a secondary private practice, and the average doctor in our sample spends more hours a week in practice than in research or teaching[12].

In table 1, we present differences between doctors by treatment and control groups for doctors who graduated before the reform[13]. Consistent with cultural norms, only 29 percent of non-gynecologists are female in the survey, while 100 percent of gynecologists are female. Non-gynecologists also less urban, score almost 5 percentage points lower on test scores, and have more doctor family members and are less likely to be married than gynecologists. In terms of medical practice, the non-gynecologists who graduated before the reform are less likely to have an urban or a public practice, spend less time in out-patient consulting hours although they spend more time practicing, consult with fewer patients and spend less time per patient than gynecologists. Treatment and control doctors are balanced on the fee charged per patient and monthly salary.

Since the reform changed the gender composition of the doctor labor force, we also examine how female doctors differ from male doctors among those who graduated before the reform. Many differences mirror those between gynecologists and non-gynecologists, underlining the pre-existing gender composition of the treatment and control groups. For example, male doctors are from a less urban background, lower scoring and have more doctors in the family (table 1). In terms of medical practice, male doctors are 9 percentage points more likely to have an urban practice, spend less time consulting with patients but more time at their practice overall, and spend less time per patient. Male and female doctors who graduated before the reform are equally likely to have a second practice, but female doctors are more likely to consult with patients in the afternoon. Differently from in the comparison between gynecologists and non-gynecologists, male doctors have a higher base salary than female doctors.

Finally, the reform changed admissions to be more competitive, so that average test

[12]Total time per patient and hours spent on practice are categorical variables.
[13]The first class affected by the reform (in the year 1997).

scores should be higher for doctors affected by the reform than those who were not. In table A2, doctors who graduated after the reform score higher on their secondary school and middle school exit exams, but are not different in most other ways. These averages are reassuring in that the main difference between cohorts who graduated before and after the reform are in their test score ability, and not in other background characteristics.

3.2 Comparing our survey to the PMDC doctor registration data

Doctor registration data, publicly available from the Pakistan Medical and Dental Council (PMDC) website, contains a complete count of doctors who registered to practice anywhere in Pakistan. Doctors are legally bound to register to practice in Pakistan (PMDC)[14].

The PMDC data provide the name of the university that doctors received their Bachelors in Medicine, and their university of specialization, where applicable. Unfortunately, if students receive their degree from a medical college, only the university that the college is affiliated with is listed. In the PMDC data, 92 percent of doctors between 1952 and 2018 received their Bachelors in Medicine (MBBS) from a public university (the share is similar for female doctors at 91 percent)[15]. Completing an MBBS from a public university is associated with an 11 percentage point increase in the likelihood of specializing from a public hospital. Ninety-seven percent of all doctors and female doctors specialized from a public hospital between 1952 and 2018.

Whle the PMDC does not provide information on the place of current practice, in 2016, 65 percent of Pakistani doctors practiced in the public sector, and in the registration data 47.59 percent of doctors are female. Therefore, our sample has a slightly lower share of female doctors (45 percent) and private practice doctors (65 percent). We address the

[14]The data contain information on the district of current practice, the university where the doctor received their bachelors, and if applicable, their specialization degree, what they specialized in, their gender, name and father's name.

[15]The share increased to 94 percent for the time period between 1987 and 2007 (92 percent for female doctors).

latter of these two discrepancies in section 5. Also, 95 percent of gynecologists are female in PMDC, whereas 100 percent are female in our data.

We classify the 10 largest cities in Pakistan as "urban" in the PMDC data. This is a more conservative definition than in the Census of Pakistan, which designates smaller cities an urban status as well. On average, 72 percent of MBBS doctors and 80 percent of specialists between 1952 and 2018 practiced in urban areas at the time of their most recent registration[16]. Specialists are more likely to work in urban areas, where most larger hospitals with technical facilities exist. In our data, 84 percent of MBBS doctors and 94 percent of specialists practice in urban areas, which is slightly more urban than in the registration data, but qualitatively similar.

While the PMDC registration data provide information on several important features of a census of doctors, they do not provide information on other career aspects, such as where doctors completed their residency, on their current work practices. Our survey fills this the gap by measuring details on doctor practices, and is the only national level survey to our knowledge that collects this information.

3.3 Identification

The medical school reform increased the female share of medical students (figure 1, and Aqeel (2024)) and subsequently, female doctors in most specialty fields (including no specialty).

Figure 2 plots the change in the share of female doctors in specialties (including no specialty) by their pre-reform share[17]. The pre-reform share of women in a field is positively correlated with its increase in female share after the reform. In fact, a 1 percent increase in the pre-existing share of females is associated with a 38 percentage point

[16]Between 1987 and 2007, the share increases to 79 percent for MBBS doctors and specialists, which indicates a greater urbanization of medical doctors and especially of MBBS doctors.

[17]Pre-reform is defined as cohorts who were issued a license between 1971 and 1997 in the medical registration data. The year 1971 is chosen to be consistent with the cohorts in our survey.

Treated and Control Doctors

	Mean (Treated)	Mean (Control)	Difference	SE	N
Age	57.21	54.80	-2.42***	0.78	229
Urban Birthplace	0.61	0.86	0.25***	0.08	116
Secondary School Score (%)	85.56	90.45	4.90***	1.02	114
Middle School Score (%)	83.86	87.34	3.48***	0.91	103
Mother's Education	12.36	11.86	-0.50	0.42	116
Father's Education	13.21	12.89	-0.32	0.33	116
No. Other Doctors	2.46	0.77	-1.69***	0.33	116
Married	0.42	0.75	0.33***	0.07	230
Currently Practice	0.93	1.00	0.07***	0.02	227
Urban Practice	0.88	1.00	0.12***	0.03	215
Public Practice	0.44	0.58	0.14*	0.08	215
Have a Second Practice	0.22	0.27	0.05	0.07	215
Hours Consulting Patients (daily)	4.53	5.59	1.06***	0.40	230
Log(Fee)	5.13	5.42	0.30	0.41	212
Log(Fee 2)	6.31	7.22	0.91***	0.28	50
Salary	4.42	4.14	-0.28	0.31	113
Total Time per Patient	2.57	3.02	0.44*	0.23	230
Total Time per Patient 1	2.07	2.36	0.29**	0.14	230
Time per Patient 2	0.50	0.66	0.16	0.18	230
Total Number Patients (daily)	30.52	42.36	11.84***	4.03	230
Total Number Patients 1 (daily)	26.32	36.10	9.79***	3.08	230
Number Patients 2 (daily)	4.20	6.25	2.05	1.66	230
Practice Hours (wk)	2.72	2.41	-0.32**	0.13	215
Teaching Hours (wk)	0.61	0.81	0.20	0.13	229
Research Hours (wk)	0.64	1.41	0.77***	0.14	229

Male and Female Doctors

	Mean (Male)	Mean (Female)	Difference	SE	N
Age	57.58	54.59	2.99***	0.77	229
Urban Birthplace	0.59	0.88	-0.29***	0.08	116
Secondary School Score (%)	85.99	89.53	-3.55***	1.15	114
Middle School Score (%)	84.25	86.66	-2.41**	0.98	103
Mother's Education	12.41	11.83	0.58	0.43	116
Father's Education	13.26	12.83	0.43	0.33	116
No. Other Doctors	2.41	0.98	1.43***	0.35	116
Married	0.44	0.63	-0.19***	0.07	229
Currently Practice	0.93	0.99	-0.05**	0.02	226
Urban Practice	0.88	0.97	-0.09***	0.03	215
Public Practice	0.45	0.51	-0.06	0.07	215
Have a Second Practice	0.23	0.24	-0.02	0.06	215
Hours Consulting Patients (daily)	4.46	5.55	-1.09***	0.40	229
Log(Fee)	5.12	5.37	-0.24	0.38	212
Log(Fee 2)	6.25	7.23	-0.98***	0.28	50
Salary	4.53	4.00	0.53*	0.31	113
Total Time per Patient	2.52	3.05	-0.53**	0.22	229
Total Time per Patient 1	2.01	2.45	-0.44***	0.14	229
Time per Patient 2	0.52	0.61	-0.09	0.16	229
Total Number Patients (daily)	31.88	37.38	-5.51	3.69	229
Total Number Patients 1 (daily)	27.44	32.00	-4.56	2.92	229
Number Patients 2 (daily)	4.44	5.38	-0.94	1.47	229
Practice Hours (wk)	2.73	2.46	0.27**	0.13	215
Teaching Hours (wk)	0.59	0.82	-0.23*	0.13	229
Research Hours (wk)	0.65	1.22	-0.58***	0.13	229

Note: The table presents differences in means between groups. "Treated" refers to non-gynecologists and "control" to gynecologists. Data are collected by the authors in 2022 and 2023.

Table 1: Differences in Means

increase in the share of female doctors after the reform[18]. In the next section, we begin our analysis with how the change in female share is associated with medical practice. Notably, however, while the overall increase in female doctors due to the reform was plausibly exogenous, figure 2 implies that female doctors may have sorted into specialties that were already attractive for women.

Our main empirical strategy addresses selection by exploiting two fields that did not experience a substantial change in female share plausibly for exogenous cultural reasons: gynecology and urology. Before the reform, 95 percent of gynecologists and 1 percent of urologists were female. After the reform, the shares increased by about 4.7 and 4.4 percentage points, respectively, while the mean change in other fields was 22 percentage points. Gynecology and urology, two fields where patients work intimately with their doctors, are plausibly dominated by one gender due to exogenous cultural factors in this conservative setting. For example, the website Islam QA provides the following information[19]: *"If a woman has a wound in a part of the body that is impermissible for a male to look at (meaning other than the face, hands & feet), it will be impermissible for her to receive treatment from a male doctor, rather a female should be instructed to treat her...*[20]*"*. The saturation of gynecology with female doctors suggests that there was not much room for the female share of gynecologists to increase. Meanwhile, urology, like other male-dominated fields such as general surgery, did have room for its female share to grow. But while the female share in general surgery increased by 17 percentage points, the share in urology changed very little.

To examine medical practice in mixed fields overall, and for female doctors in mixed fields, we estimate:

[18]This estimate is found using a simple regression of change in female share on pre-existing female share, and controlling for specialty group and graduation year (gynecology is removed for this regression as an outlier). When gynecology is included, the coefficient falls to a 5 percentage point increase.

[19]https://islamqa.org/

[20]The rule is relaxed if no female doctor of similar qualifications as a male doctor is available.

$$Y_{ist} = \beta_0 + \beta_1(Treated * Post)_{st} + \beta_2 SpecialtyGroup_s + \gamma X_{ist} + \alpha_r + \alpha_t + u_{ist} \quad (1)$$

In equation 1, Y_{ist} represents the outcome for individual i in treated medical specialty s and graduation cohort t. The group "treated" includes all medical specialties (including non-specialists) except gynecology. The main coefficient of interest is β_1, which estimates the effect of the reform on doctors in treated (or, "mixed") specialties relative to gynecology (or, the "control" group). To reduce the number of specialty fixed effects estimated in $SpecialtyGroup_s$, we group specialties into 7 categories: Non-specialized, surgery, medicine, cardiology, urology, gynecology and all other specialties, which includes specialties with fewer than 20 observations. X_{ist} includes controls for individual age and age-squared. To further isolate treatment effects from selection, we also control for doctors' test score ability in one iteration of the estimation. The α_r are survey round fixed effects, the α_t are graduation year fixed effects, and u_{ist} is an individual-level disturbance term. Standard errors are clustered by grouped medical specialty.

Our empirical strategy relies on the assumption that trends in mixed fields would be the same as in gynecology if the reform did not occur, which we provide suggestive evidence of using event studies. We estimate event studies for our comparison between treated and control groups:

$$Y_{ist} = \beta_0 + \sum_{-26}^{24} \beta_k D_t^k * Treated_s + \beta_3 SpecialtyGroup_s + \gamma X_{ist} + \beta_4 Post_t + u_{ist} \quad (2)$$

The event study is similar in form to equation 1, but the β_k are estimates for treated cohorts relative to gynecologists for every two year graduation cohort. A

second difference is that $Post_t$ groups all graduation cohorts after the reform to reduce the number of fixed effects estimated, since some graduation years have few survey responses.

Our analysis for male doctors uses urology as a control group that was male-dominated before the reform. To have a control group that overlaps for male and female doctors, we separately also compare male doctors in mixed fields to gynecologists, with results in the Appendix. Finally, the reform could have affected male and female doctors differently within mixed fields. To examine "segmentation", or, the existence of relatively separate labor markets for male and female doctors, we estimate equation 1 with "Treated" being replaced with an indicator for being "Female". In this case, β_1 depicts how medical practice changed for female doctors relative to male doctors in treated fields, after netting out pre-reform differences between them.

The first concern for our identification strategy is that gynecology and urology are imperfect control groups, since they are specific fields with their own unique trends. We oversampled doctors from each of these specialties to reduce the likelihood that random shocks or outliers affect our estimates. Additionally, in section5 we provide event study estimates with no control groups that track the evolution of outcomes for doctors in treated fields alone. Second, we repeat our analysis in section 5 by using the pre-existing share of female doctors in a specialty as an intent-to-treat (ITT) instrument. The pre-existing share of female doctors is correlated with the change in female share, and is exogenous to the extent that it is determined before the reform[21].

Second, the graduation years of respondents in our survey ranges from 1971 to 2023, which is a span of almost 50 years. In order to reach our target sample size, we had to widen the range of graduation years we considered for the survey. To account for the spread of our sample, our main regressions estimate the effect of the reform using all respondents, and then focus on respondents who graduated 10 years before or after the

[21]Though it may be somewhat endogenous to characteristics of the field.

first class that was treated (between 1987 and 2007). We include graduation year fixed effects in almost all our regressions. While this can be taxing for certain estimations with a smaller sample size, graduation year fixed effects account for important year-specific factors such as the number of private hospitals and the vacancies in private hospitals.

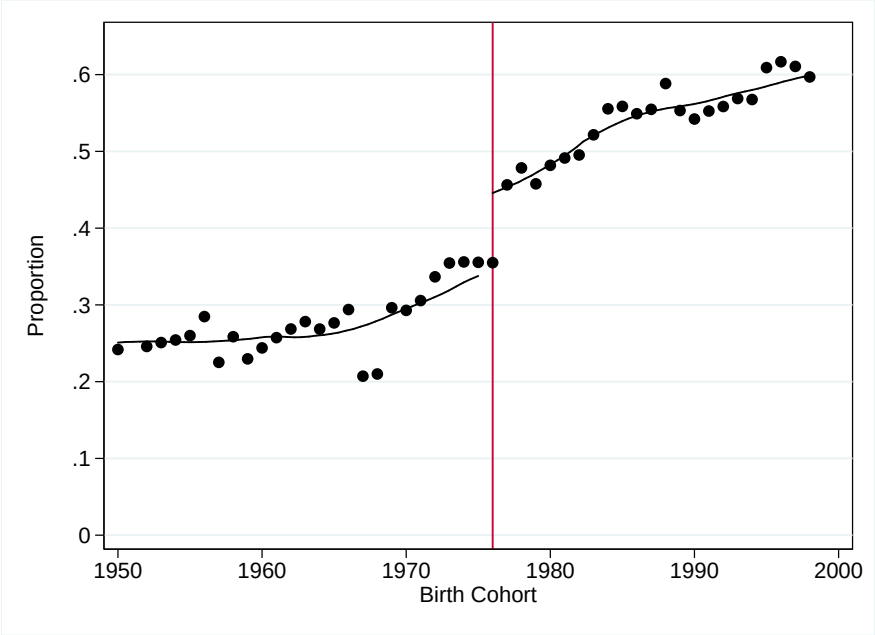
Third, our data mostly reflects the current work practices of doctors. We collected some retrospective data, including on test scores, where a medical residency was completed, and where respondents attended medical school. However, retrospective data on variables such as the fee charged or time spent per patient at a respondent's first job was difficult to collect. There is likely to be some persistence over time in medical practices, and in the type of hospital that doctors work in. But for the most part, we can only speak to how doctors who graduated after the reform currently practice relative to those who graduated before the reform.

Fourth, our analysis could suffer from survivor bias. In other words, our survey captures the select group of individuals who remained in the labor force for a long period of time. Specialists, the major focus of this paper, are less likely to drop out of the labor force early than non-specialists because of their level of investment in the medical profession. We also show using doctor registration data that the rate of drop-off of working doctors is similar for treated and control groups, which is reassuring in that both groups are similarly affected by individuals leaving the profession.

Fifth, the reform did not have a staggered implementation, and our identification is therefore not based on a staggered difference-in-differences design. The reform occurred in a single year in 1992, implying no differential treatment timing across medical fields. However, the reform could induce variation in treatment intensity. Gender ratios may increase to a greater extent in specialties which were more accessible to women in terms of work flexibility. Therefore, we can observe and measure the average treatment effect on the treated (ATT), which is identified using the standard parallel trends assumption. We do not make claims about average treatment effect (ATE), which is identified using a

stricter parallel trends assumption[22](Callaway et al., 2021).

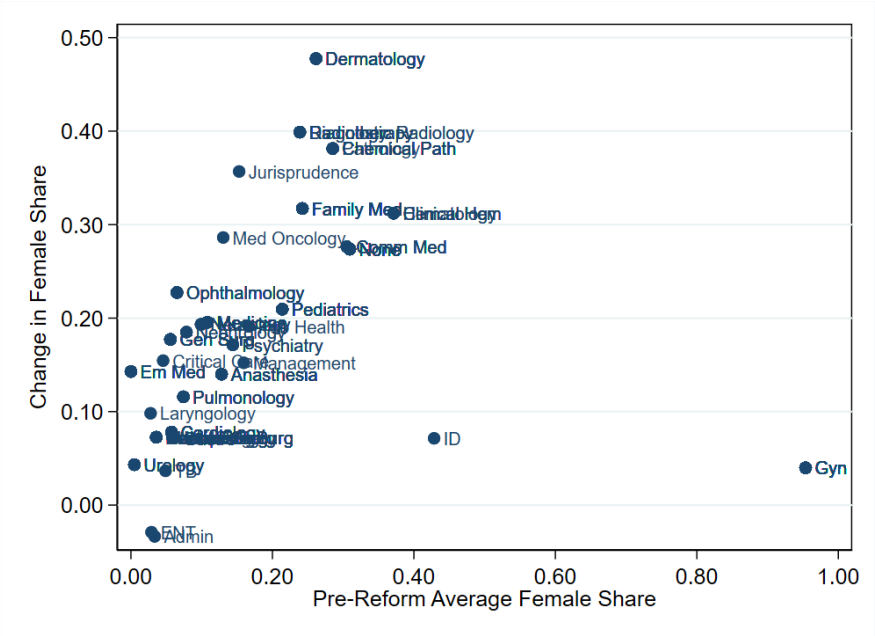
Figure 1: The Female Share of Medical Students



Note: The graphs are made using a census of doctor's registration data from the Pakistan Medical Council between 1952 and 2000. Points represent mean share for the birth cohort, lines are local polynomials of degree 0. Reproduced from (Aqeel, 2024).

[22]The assumption is that fields that receive a different dose would have the same outcome if they received any other dose (and not just no dose as in the control group).

Figure 2: Changes in the Female Share of Specialties



Note: The graph plots the relationship between the pre-reform average share of female specialists and the change in female share of specialists. Data are from the PMC Medical Doctor Database between 1952 and 2018.

4 Results

4.1 Results by the Change in the Share of Female Doctors:

We start by examining how medical practice differs by the change in female share after the reform (table A4)[23]. The coefficient in column 1 implies that female doctors in fields that received more female doctors charged a higher consultation fees in 2022 than those in fields with a low increase in female share, even accounting for specialty group fixed effects. In other words, female dermatologists, where the change in female share was among the highest (figure 2), have higher consulting fees than female general surgeons who graduated in the same cohort. Similarly, a 1 percentage point increase in female

[23]Differences in female share are multiplied by 100.

doctors is associated with a 6 percentage point decrease in the likelihood that female doctors in the specialty charge no fee (column 2). Female doctors in fields that received more women are also more likely to practice in private (column 5), urban settings (column 6).

As expected, some of these differences are due to sorting patterns between fields. In table A4, panel B, women in fields that received more females have lower female test scores (column 1), more educated fathers (column 2), and urban families (column 5) with family connections with other doctors (column 4). On the other hand, women in fields such as general surgery are higher scoring, but are generally from less urban and educated families. The fact that higher scoring women should charge a low fee is puzzling, and while this is descriptive evidence, it suggests that being a minority in a field could be associated with lower fee. Comparing male and female doctors by the share of women received in a specialty reinforces this finding (table A13). Post-reform female doctors in specialties that received fewer than 30 percent additional women are almost 40 percent more likely to consult for free compared to their male counterparts of the same graduation year and specialty group.

In the next section we formalize this discussion by using control groups that were plausibly unaffected in their female share for exogenous cultural reasons.

4.2 How did the reform change the selection of doctors in treated fields relative to the control?

The 1992 reform removed the quota on female medical students in favor of merit based admissions. Consistently, in table A2, overall average test scores improved by 5 percent[24] between doctors who graduated before and after the reform. In table 2, we examine how treated doctors' background characteristics changed relative to the control after the

[24]This is computed as 4.19 as a share of 85.14.

reform, and netting out pre-reform differences[25]. The high school test scores of doctors improved by about 3 percentage points after the reform in treated fields relative to the control. This is a substantial increase given that the range of test scores is narrow between 64 and 98 percent. The improvement in scores is equivalent to the difference between the pre-reform test scores of non-specialist doctors and internal medicine specialists (who have lower average test scores among specialists), and internal medical specialists and surgery specialists[26]. The results are qualitatively similar in columns 1-5 which are for the full sample of doctors, and in columns 6-10 are for the subsample of doctors that graduated within ten years of the first class affected by the reform (between 1987 and 2007). In our data, average scores improved by 8 percentage points among non-specialists, 5 percentage points in internal medicine, and only 1 percentage point in surgery. This suggests that improvements to specialists' scores were larger at the lower tail of the score distribution, as is expected with merit-based admissions. Moreover, higher scoring doctors spend more time with their out-patients (see section 4), so that improvements in test scores could have real consequences for the quality of patient care.

Male doctors' test scores in treated fields increased relative to male-dominated urology and female-dominated gynecology by 5 percent and 3.7 percent relative to the mean, respectively (table A14), which implies that competition improved male doctors' test scores. Female test scores could decrease due to the removal of the women's quota. We find, however, that female test scores did not significantly change in treated fields relative to the control for cohorts that graduated close to the reform (2, column 6), which suggests that female doctors who sorted into treated and control fields were of similar ability[27]. Instead of primarily entering gynecology as these high ability women might

[25]Since we collect data in one round only and have fewer observations for these regressions, we reduce the number of fixed effects estimated in the closer years sample by replacing individual graduation year fixed effects with an indicator for graduating after the reform. The results are qualitatively similar with their inclusion as well.

[26]Gynecology is the highest scoring specialty on average before the reform (90.5 percent score), followed by surgery (87.6 percent score), medicine (83.3 percent score) and non-specialists (80.6 percent score).

[27]In fact, average female test scores worsened by only 0.27 percentage points overall, while those of male doctors improved from 85.98 to 88.58.

previously have, they became more prevalent in treated fields, and were of substantially higher ability than the men in these fields as well (table A14, panel C, column (6)).

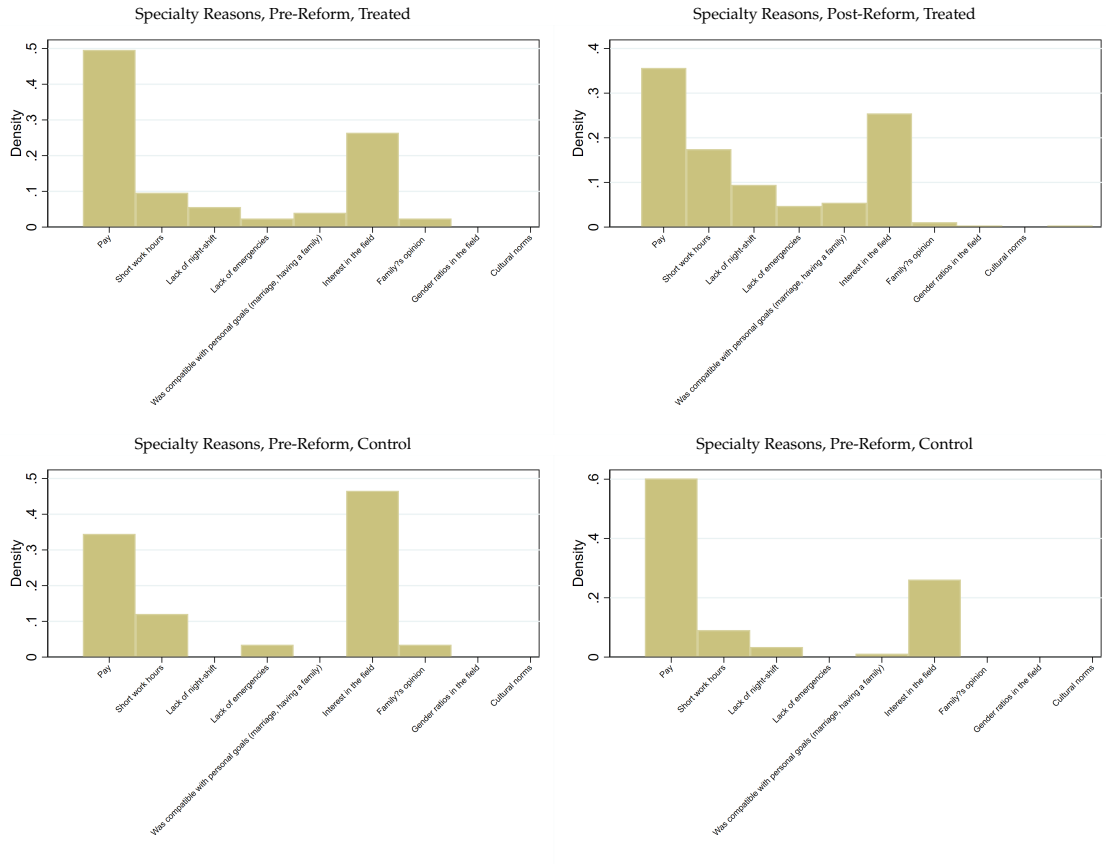
We also collected data on self-reported reasons for specializing in a given medical field. Pay is the most important reasons for choice of medical specialty in our sample among treated and control groups (figure 3), with interest in the field coming second. Short work hours or flexibility are generally not the main reason for doctors' choice of medical specialty. This is reassuring because it indicates that non-gynecologists did not systematically sort into fields with shorter hours relative to gynecology, which is related to some of our outcomes, such as output. One caveat in interpreting these responses is that they may suffer from social desirability bias and demand effects. While we cannot guarantee against those effects, actual specialty selection is consistent with stated preferences to some extent: For example, individuals who reported pay as their primary motivation for specialty choice are in specialties where the average pay is Rs. 1,306 (54 percent of mean earnings) higher than those who did not, while those who selected shorter work hours are in fields where the pay is Rs. 1,561 (64 percent of mean earnings) lower than if not.

	Test Scores (%)	Father's Education	Mother's Education	# Doctors in Family	Urban Birth	Test Scores (%)	Father's Education	Mother's Education	# Doctors in Family	Urban Birth
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: All										
Non-Gyn x Post	3.06*	-0.91**	-1.10***	-1.11*	-0.16	3.00*	-0.01	-0.11	-0.23	0.06
	(1.56)	(0.35)	(0.28)	(0.46)	(0.09)	(1.24)	(0.28)	(0.60)	(0.28)	(0.08)
Observations	242	250	250	250	250	153	157	157	157	157
R^2	0.37	0.24	0.36	0.51	0.33	0.19	0.15	0.27	0.21	0.20
Panel B: Female										
Non-Gyn x Post	9.27***	-0.11	2.66**	-4.04	-0.15	3.04	2.15*	4.55*	-3.07**	0.15**
	(1.41)	(0.75)	(0.79)	(0.78)	(0.09)	(2.76)	(0.34)	(1.64)	(0.82)	(0.03)
Observations	110	115	115	115	115	63	66	66	66	66
R^2	0.56	0.40	0.60	0.39	0.31	0.47	0.15	0.42	0.25	0.21
Mean DV	88.2	13.0	12.0	1.67	0.76	88.2	13.0	12.0	1.67	0.76
Closer Years	N	N	N	N	N	Y	Y	Y	Y	Y
Specialty Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Graduation Year Fixed Effects	Y	Y	Y	Y	Y	N	N	N	N	N

Note: The table presents the results of estimating **??** for the fee of medical doctors in treated fields relative to gynecology. Stars represent statistical significance, standard errors are clustered at the specialty level. All regressions control for age, age^2 and survey round fixed effects. For columns 6-10 for female doctors we use an indicator for post instead of graduation year fixed effects due to a small sample size. Data are from a survey of doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 2: Selection, Treated Doctors Relative to Gynecology

Figure 3: Reasons for Selecting a Medical Specialty



Note: The graph shows respondents' self-reported reasons for specializing in their medical specialty, with multiple factors allowed. Data are from a survey of Pakistani doctors conducted by the authors in 2022 and 2023.

4.3 Changes in Medical Practice: Price

Fee charged per patient: Trends in consultation fee do not change substantially for doctors overall, but the fee charged by female doctors who graduated immediately after the reform is lower than that of pre-reform cohorts. Table 3 presents the results from equation 1 for the logarithm of fee charged per visit at their primary practice (conditional on the fee being positive)[28] and the likelihood of no fee being charged for a doctor's primary and secondary practice (we report monthly salary and constructed total earnings

[28] Log(Fee 2) is the consultation fee at secondary practices, if a doctor has one.

in table A5)[29]. There were no statistically significant changes in fee or salary for all doctors over the full sample of cohorts (table 3, panel A, columns 1-3). For cohorts immediately around the reform, the likelihood that doctors charge no fee per patient is higher by 21 percentage points (table 3, panel A, column 5). Female doctors are twice as likely (44 percentage points) to charge no fee per patient (table 3, panel B, column 5), which suggests that the overall effect is driven by female doctors. In the last three columns of table 3, we control for test score data collected from round 2 of our survey to allow for selection differences due to doctor ability. The likelihood of charging zero fee decreases to 5 percentage points but remains statistically significant for female doctors.

Doctors who graduated before the reform in treated fields are also affected to some extent since part of their career is spent after the reform. These doctors are partly exposed to a post-reform environment with more female doctors. We show, however, that medical practice outcomes are largely unchanged for these pre-reform doctors (table A8). To show this, we create a variable that is the share of doctors' careers (up until the year of our survey) that was spent before the reform[31]. The higher this value, the more assimilated we would expect doctors to be in the older system. There is no significant relationship, however, between a greater share of career before the reform and medical practice. The one exception is for female doctors compared to the control, where spending a larger career share before the reform makes doctors less likely to offer free consultations. Overall, most of our results are driven by doctors who started their career after the reform.

Fee differences translate into lower relative earnings for women in treated groups relative to the control. We construct total earnings per month by combining base salary,

[29] A non-trivial number of doctors, and especially those who work in public hospitals, charge no fee (see figure A2). Since the number of doctors that charge no fee is large, we did not trim the ends of the fee distribution, and we report results separately for charging a positive fee and for charging 0 fee.The average consultation fee in our data is Rs. 964 in private practice and Rs. 433 in public practice, which is 4 percent and 1.8 percent of average monthly wages in Pakistan in 2021, respectively[30].

[31] For example, for doctors surveyed in 2022, this variable is calculated as Pre-Reform Career Share$=\frac{1997-GraduationYear}{2022-GraduationYear}$. The mean value of this variable 0.21 implies that on average these doctors have spent 21 percent of their career before the reform.

the fee and number of patients from each practice[32]. Female doctors who graduated after the reform have lower earnings, even when accounting for ability changes. Since salaries themselves did not decrease, the drop in earnings is likely due to more free patient consultations, or fewer patients consulted with.

To provide support for the parallel trends assumption, we plot the evolution of fee over graduation cohorts relative to the control in figure 5. The outcome "Log(Fee+1)" includes observations where a positive or a zero fee is charged. On average, the figures do not suggest strong pre-trends for all doctors and for female doctors in mixed fields relative to gynecologists. The fee charged decreased, however, for doctors who graduated immediately after the reform in mixed specialties relative to gynecology. From the main results, this is driven mostly by doctors who charged no fee for out-patient visits.

On the other hand, pay for male doctors in treated fields was largely unchanged relative to gynecology or urology (table A15). But post-reform female doctors are 24 percentage points more likely to consult for free than male doctors and pre-reform graduates. In fact, they are 83 percentage points more likely to do so when working in public hospitals which are cheaper (table A12). The gender gap in fee overall worsened for women, but not statistically significantly. The gender gap is highest at the ends of the fee distribution for post-reform doctors: among the more expensive doctors (who charge more than the median fee), male doctors charge more, and more women consult for free at the lower end. Meanwhile, salary and earnings are on average not different from their male counterparts.

The free consultations by female doctors potentially reduced costs for patients, especially in public hospitals. The average fee charged by female public doctors in treated fields is 22 percent lower than their male counterparts[33]. A back-of-the-envelope calculation shows that fee costs alone to patients could be about 6.6 percent higher

[32]This variable is created by first finding the midpoint of each salary categorical variable. For example, the midpoint of the salary range Rs."0-50,000" is Rs. 25,000. This midpoint is then added to the total fee earnings from both practices (Fee x number of patients consulted daily x 20 working days a month).

[33]Female doctors charge Rs. 369 and male doctors charged Rs. 450 on average.

without the increase in female doctors after the reform, assuming that the share of female doctors in public hospitals increased from 26 percent to 56 percent, using PMDC data on the share of specializations at public hospitals[34]. If we assume instead that the increase in public practice was proportional to their overall increase, from 29 percent to 55 percent after the reform, the estimate would be at least 5.2 percent. This would be a substantial decrease, given that 55 percent of health expenditures were paid by patients out-of-pocket in 2020.

	Log(Fee) (1)	Pr(Fee=0) (2)	Log(Fee 2) (3)	Log(Fee) (4)	Pr(Fee=0) (5)	Log(Fee 2) (6)	Log(Fee) (7)	Pr(Fee=0) (8)	Log(Fee 2) (9)
A: All Doctors									
Non-Gyn x Post	0.56	0.07	0.62**	-0.09	0.21*	0.71*	-0.84	0.06	0.12
	(0.39)	(0.05)	(0.24)	(0.62)	(0.09)	(0.29)	(0.56)	(0.07)	(0.19)
Test Score (%)							0.05**	0.01**	0.08**
							(0.01)	(0.00)	(0.02)
Observations	478	610	168	214	284	97	113	150	45
R^2	0.22	0.23	0.49	0.23	0.20	0.39	0.23	0.31	0.73
B: Female Doctors									
Non-Gyn x Post	1.06	0.32**	0.36	0.13	0.44***	-0.85***	-0.76	0.05***	-
	(0.68)	(0.09)	(0.59)	(0.91)	(0.09)	(0.07)	(0.17)	(0.00)	-
Test Score (%)							0.04	-0.02***	-
							(0.03)	(0.00)	-
Observations	226	279	60	83	105	30	45	61	16
R^2	0.31	0.43	0.81	0.42	0.49	0.89	0.09	0.60	0.92
Mean DV	5.0	0.25	3.77	4.9	0.25	3.77	4.9	0.25	3.77
Closer Years	N	N	N	Y	Y	Y	Y	Y	Y
Fixed effects	Y	Y	Y	Y	Y	Y	Y†	Y	Y
Ability Control	N	N	N	N	N	N	Y	Y	Y

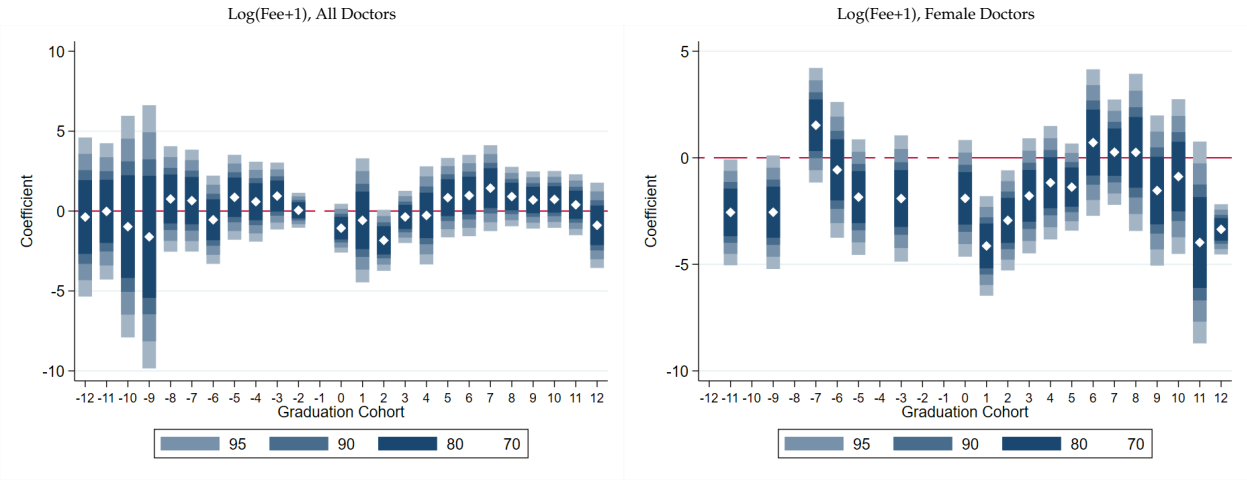
Note: The table presents estimates from equation 1 for the consulting fee per patient of medical doctors in treated fields relative to gynecology. "Log(Fee)" is defined for **non-zero fees**, while "Pr(Fee=0)" measures the probability that no fee is charged. Log(Fee 2) is the consulting fee per-patient at a secondary practice, if applicable, and is always positive. All regressions control for age, age-squared, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. "Closer years" refers to a subsample of the data of doctors who graduated within 10 years of the medical school reform. Stars represent statistical significance, standard errors are clustered at the medical specialty group level. Data are from a survey of Pakistani doctors conducted by the authors. † For column 7, we replaced specialty and graduation year fixed effects with indicators for "post" and "treated" because of a small sample size. "-" implies there were not enough observations for the regression. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 3: Pay, Treated Doctors Relative to Gynecology

Reasons for Differences in Fee: Public vs. Private Practice Some differences in consulting fees could be due to changes in where doctors work. Gynecologists who

[34]The registration data do not have the share of female doctors in public hospitals before and after the reform.

Figure 5: Pay, Treated Doctors Relative to Gynecology



Note: The graph shows event studies of Log(Fee+1) estimated using equation 2, with graduation years grouped in two. Controls for age, age^2, treated, post and round fixed effects are included. Standard errors are clustered at the grouped specialty level. Data are from a survey of doctors conducted by the authors.

graduated before the reform are relatively more likely to work in public, urban hospitals, while females in treated fields from those cohorts are overrepresented in the private sector, where they charge a fee that is 20 percent higher than female gynecologists in our data. In contrast, doctors in treated fields who graduated after the reform are currently 29 percentage points more likely to practice in public hospitals (table 4, column 4)[35]. This change is twice as large for female post-reform doctors, who are 61 percentage points more likely to be public practitioners in 2022 (panel B), potentially because females were more rare in public hospitals before. Male doctors in treated fields also became more likely to practice in public hospitals relative to gynecologists, but by smaller amounts than women (table A16, panel 1A, column 4). Consistently, male doctors are less likely to be public practitioners in treated fields than their female counterparts after the reform (table A12).

Finally, doctors who graduated after the reform in treated fields were more likely to

[35]Note that since most women in our sample work in urban areas, we often did not have sufficient data to examine changes in urbanity.

have *started* their career with a residency at a public hospital (table 4, columns 4 and 7, panel 2A and 2B). Completing a residency at a public hospital makes it 42 percent more likely to be in public practice in 2022 in our data, indicating that there is some persistence in where doctors work over time. Interestingly, male doctors became 19 to 23 percentage points more likely to have started their careers at public hospitals relative to gynecology (table A16, panel 2A, column 4 and 7), but for female doctors the change is only weakly significant (table 4, panel 2B, columns 4 and 7). This suggests that female doctors transitioned to public practice at some point in their careers more so than men.

The increased presence of female doctors is also supported by the PMDC doctor registration data. The PMDC data does not cover information on medical residency, but provides information on place of specialization, which occurs immediately after completing a residency. The share of female doctors in treated fields who specialized at a public hospital more than doubled after the reform, from 26 to 56 percent (figure 9), while the increase was from 34 percent to 57 percent at private hospitals.[36].

Public practice may contribute to fee differences, so we separate fee outcomes by type of practice[37]. While the likelihood of free consultations did not change in public hospitals (table A6, panel A, column 1), female doctors are more likely to charge no fee even within public practice relative to the control and pre-reform graduates (panel B, column 1). As mentioned earlier, female doctors are also 84 percentage points more likely to consult for free relative to males. This suggests that public practice partly explains fee differences, while other factors, explained below, could contribute to the rest.

[36]The horizontal axis plots the year of initial medical license issue for medical doctors, and the vertical lines indicate when the first class affected by the reform would be likely to receive their first medical license (applications for the license can begin a year before expected graduation).

[37]Place of work is an endogenous choice variable. Therefore, we treat these regressions as non-causal but suggestive of the underlying mechanisms at play. Thirty-five percent of female and 39 percent of male doctors in public practice charge no fee in our data. The analogous numbers are 5 percent and 6 percent for female and male doctors in private practice, respectively.

	Probability of Working in:								
	Public (1)	Urban (2)	Large (3)	Public (4)	Urban (5)	Large (6)	Public (7)	Urban (8)	Large (9)
1A: All Doctors, Current Workplace									
Non-Gyn x Post	0.11**	0.07	0.01	0.29***	0.05	-0.03	0.22**	-0.02	-0.24***
	(0.04)	(0.05)	(0.07)	(0.07)	(0.07)	(0.04)	(0.08)	(0.07)	(0.04)
Observations	615	615	615	286	286	286	152	152	152
R^2	0.15	0.13	0.20	0.14	0.20	0.20	0.28	0.23	0.29
1B: Female Doctors, Current Workplace									
Non-Gyn x Post	0.25	0.10	0.23**	0.61**	0.10	0.10	0.27***	-	-0.13*
	(0.19)	(0.08)	(0.07)	(0.21)	(0.21)	(0.13)	(0.00)	-	(0.05)
Observations	282	282	282	106	106	106	62	62	62
R^2	0.22	0.26	0.21	0.28	0.45	0.38	0.48	-	0.38
2A: All Doctors, First Workplace									
Non-Gyn x Post	-0.05	-0.01	0.01	0.15*	0.06	0.03	0.20***	0.08	-0.00
	(0.05)	(0.04)	(0.07)	(0.07)	(0.08)	(0.03)	(0.04)	(0.10)	(0.03)
Observations	643	643	643	299	299	299	153	153	153
R^2	0.16	0.24	0.17	0.11	0.14	0.09	0.17	0.25	0.19
2B: Female Doctors, First Workplace									
Non-Gyn x Post	-0.29**	-0.14	0.09	0.09	-0.08	0.16	0.32*	-	-0.06
	(0.08)	(0.07)	(0.11)	(0.15)	(0.12)	(0.14)	(0.11)	-	(0.04)
Observations	292	292	292	110	110	110	63	63	63
R^2	0.19	0.49	0.21	0.25	0.49	0.32	0.41	-	0.36
Mean DV	0.5	0.9	0.8	0.6	0.9	0.8	0.6	0.9	0.8
Closer Years	N	N	N	Y	Y	Y	Y	Y	Y
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	N	Y	Y	Y

Note: The table presents the results of equation 1 for the medical doctors' place (sector) of work in treated fields relative to gynecology. All regressions control for age, age^2, grouped specialty, graduation year and survey round fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, all other specialties and no specialty. "-" implies there were not enough observations for the regression. Stars represent statistical significance, standard errors are clustered at the specialty level. Data are from a survey of Pakistani doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 4: Place of Work, Treated Doctors Relative to Gynecology

Other reasons for fee differences: Seniority, discrimination or ability? We consider three additional reasons for the fee differences between doctors: position, beliefs about gender discrimination (table A7)[38] and ability. In panel A, female doctors in treated fields are not significantly different from the gynecologists to work in teaching hospitals or to be at higher ranks. In panel B, however, female doctors are less likely to be at teaching hospitals, and at higher positions compared to men in their own field. Post-reform female doctors are 66 percentage points *less* likely to be in high ranking positions (column 4), even conditional on graduation cohort and specialty group. The combination of these results suggests that treated fields do not lag in positions overall, but seniority can partly explain fee differences between male and female doctors. In our data, 32 percent of female doctors in treated fields, and 25 percent of women overall, self-report that household and care responsibilities affected their promotion, compared to 16 percent of men.

On the other hand, doctors in mixed fields are more likely to believe that discrimination from patients affects their pay (table A7)[39]. These responses are conditional on believing that a gender pay gap exists. Interestingly, cohorts who graduated within ten years of the reform are more likely to believe that customer discrimination affects pay. These results should be interpreted with caution, however, since they are based on a small number of observations.

Finally, fee disparities could be due to changes in ability, and ability being correlated positively with higher fee. As noted in table A14 column 6, however, female doctors in treated fields were actually higher scoring than men after the reform, while, females in treated fields were not significantly different from those in the control. Therefore, sorting

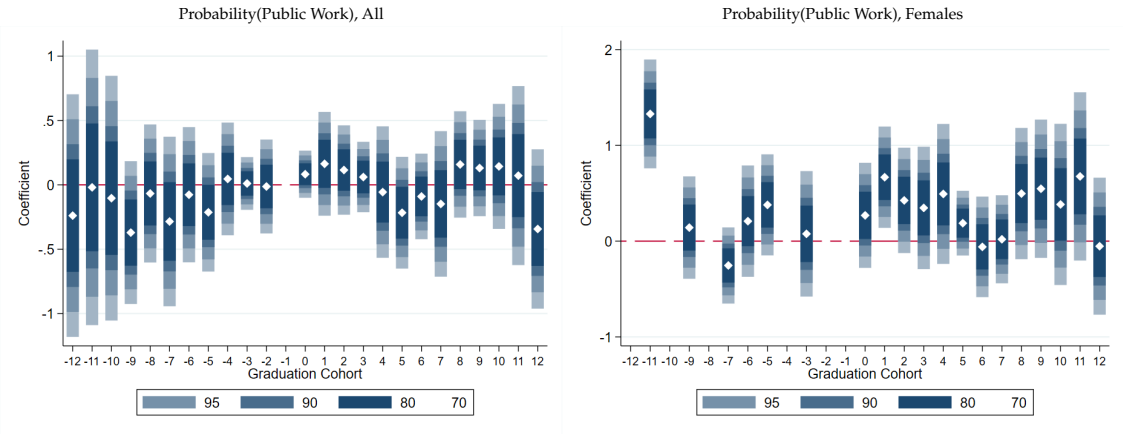
[38] In columns (1)-(2) the outcome "Probability(Tenure Track)" equals 1 if the respondent is an Assistant, Associate or Full Professor, and 0 if not. This variable incorporates the difference between working at a teaching hospital versus not. In columns (3) and (4) the outcome "Position" ranges from 0 to 4 and captures the rank of the doctor. It equals 0 if a doctor is non-tenure track, 1 for an Assistant Professor, and so on. There were not enough tenure track women in treated fields to restrict this variable to tenure track positions alone.

[39] The outcomes in columns (3)-(4) and columns (5)-(6) of table A7 are indicators for whether respondents believe that the gender pay gap in medicine is due to employer discrimination and patient discrimination, respectively. The question on patient discrimination asked if patients are more comfortable with or more likely to seek out a doctor of a specific gender.

on ability does not seem to explain fee differences.

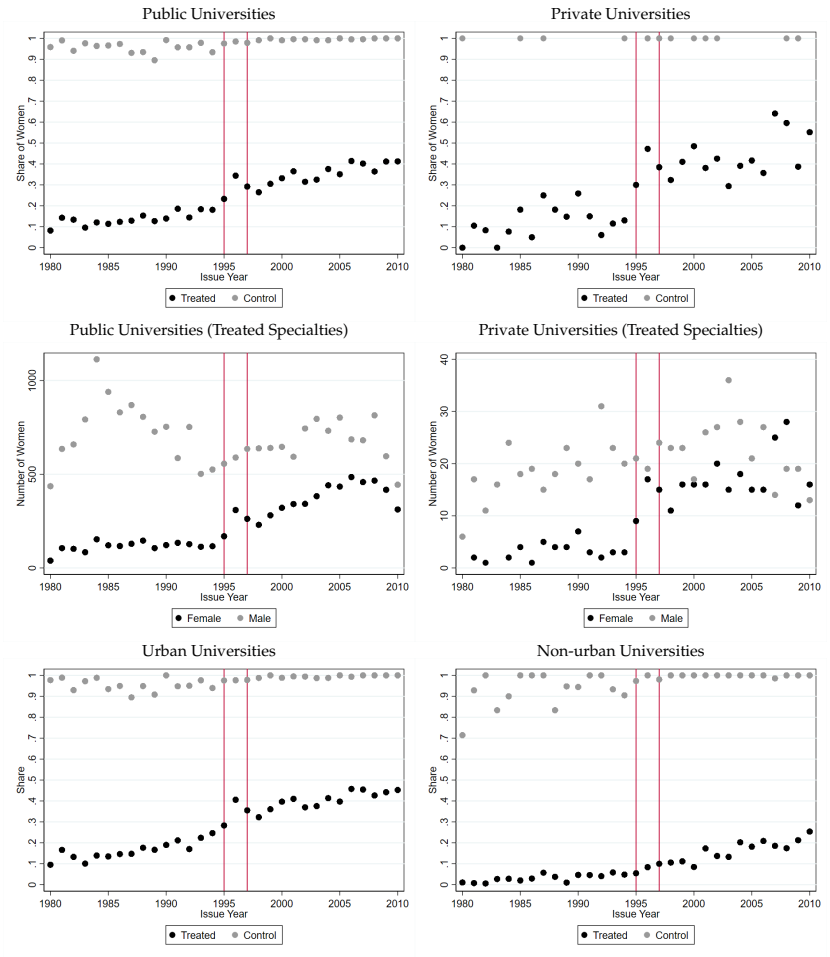
Overall, differences in fee charged, place of practice, and promotion suggests that post-reform male and female doctors in treated fields work in segmented markets. In other words, the reform created two streams of work and practice for these doctors: a stream where doctors charge less, work in smaller public hospitals, or can be promoted in the same type of hospital and field, and the other where doctors charge high fees, work in private hospitals, or can be promoted in the same hospital type and field.

Figure 7: Place of Work, Treated Doctors Relative to Gynecology



Note: The graph shows event studies of place of work estimated using equation 2, with graduation years grouped in two. Controls for age, age^2, treated, post and round fixed effects are included. Standard errors are clustered at the grouped specialty level. Data are from a survey of doctors collected by the authors.

Figure 9: Female Share of Doctors by Type of Specialization University



Note: The graphs depict the female share and number of doctors who specialized at different types of universities. The share is calculated as the number of females over the total number who specialized at a given type of university. Data are from the PMDC data of medical doctor registrations.

4.4 Changes in Medical Practice: Quantity

Patient Complaints and Disciplinary Cases faced by Doctors We begin our analysis of output with unique data on the disciplinary cases that doctors are charged with. Most of these cases are initiated by patients' families, and therefore allow us to quantify one form of patient welfare. We collected information on about 185 cases registered between 2011 and 2021 from the PMDC website, and matched it with the doctor registration data

using medical IDs[40]. About 64 percent of the accused doctors are male, and 82 percent of complaints are registered by men (table 5). In 44 percent of the cases, the complaint was made after a patient died, and the two most common complaints are negligence (49 percent of cases) and having a fake medical license (or doing a task the doctor is not authorized to do with their current license) (11 percent of cases). License revocation or suspension is generally a more serious penalty than a fine or warning, though the three are not mutually exclusive.

Fields with a larger increase in female share are associated with fewer disciplinary cases registered against doctors (table 6, column 1), and fewer cases filed against men conditional on a case being filed (column 2), and within treated fields (column 3), though the former is noisily estimated. These results become positive and statistically insignificant, however, with controls for a doctor's age, age squared, and fixed effects for specialty and year of medical license issue. Of these, fixed effects for medical specialty were the most powerful in soaking up statistical significance[41], which indicates that certain specialties are associated with more medical disciplinary cases, and women tend to be underrepresented in them.

Some evidence suggests that post-reform doctors in mixed fields received more disciplinary cases, cancelled/suspended licenses and warnings relative to the control when specialty fixed effects are included (table 7, panel A, columns 6, 8 and 9). A coefficient of 2.8 implies that a change from control to treated fields increases the likelihood of a disciplinary case by 0.0028 percentage points. In other words, without accounting for time-invariant specialty specific factors, the coefficient in column 1 was biased downwards. Within treated fields, male doctors who graduated after the reform are more likely to have a patient die (panel B, column 7), and receive a serious penalty

[40] About 133 doctors were successfully matched with the registration data. The disciplinary case documents usually (though not always) include the names of the complainant, the names of the accused doctors, the nature of the complaint and some details about the case.

[41] Regressions with age controls and a specialization indicator variable are omitted for brevity and are available upon request.

(panel B, column 8) compared to female doctors, even controlling for age, year of license issue and the type of complaint (negligence or a fake license).

One mechanism that could reconcile these patterns is that the expansion of female doctors in treated fields pushed male doctors into higher risk and reward roles, where they performed riskier tasks (such as higher level surgeons who perform invasive procedures), sometimes with junior female colleagues on their team and sometimes without. As a result, treated fields experienced a rise in disciplinary cases relative to the control, and the outcomes and penalties were worse for male doctors relative to females. Another reason could be that procedures became more risky over time in treated fields, with a learning process for doctors in those fields. While we cannot rule that out, we might expect male and female doctors to be similarly affected by penalties in that case. Finally, we are unable to account for changes in ability. However, doctor ability increased after the reform, and this should theoretically decrease complaints of certain kinds, such as the possession of fake medical licenses.[42].

Time Use and Patient Loads Next, we examine output in terms of the daily number of out-patients that doctors consult with and time spent with each out-patient (table 8). We first sum each of these variables for primary and secondary practices. For doctors overall (panel A) and for female doctors (panel B), the number of patients consulted with daily grew over time relative to gynecology. The overall increase is a substantial 37 percent of the mean of 32 patients a day, and reflects a broad trend where specialists consulted with more patients relative to gynecology. At the same time as the number of patients increased, the average time spent per patient for all doctors did *not* decrease. Time per patient is measured through a categorical variable which increases in units of 5 minutes. An increase of 0.87 units (table 8, column 4), represents an increase by 4.35 minutes spent with each patient. For female doctors, the results on time spent per patient are mixed,

[42]Only two doctors matched with test score data, but the matched doctors were on the lower end of the test score distribution.

Summary Statistics	Mean	SD	Min	Max	N
Male Accused	0.64	0.48	0.00	1.00	177
Male Complained	0.82	0.39	0.00	1.00	137
Patient Died	0.44	0.50	0.00	1.00	163
Complaint: Negligence	0.49	0.50	0.00	1.00	185
Complaint: Fake License	0.11	0.32	0.00	1.00	185
Fined	0.17	0.37	0.00	1.00	185
License Suspend or Revoke	0.34	0.47	0.00	1.00	185
Warning Issued	0.12	0.32	0.00	1.00	185
Pairwise T-tests	μ_1	μ_2	Difference	SE	N
Treated Doctors: Post (μ_1) vs. Pre (μ_2)					
Male Accused	0.73	0.77	0.04	0.07	144
Male Complained	0.87	0.88	0.02	0.07	103
Patient Died	0.32	0.44	0.12	0.09	129
Complaint: Negligence	0.36	0.44	0.08	0.08	151
Complaint: Fake License	0.19	0.05	-0.14***	0.05	151
Fined	0.13	0.19	0.06	0.06	151
License Suspend or Revoke	0.34	0.47	0.13	0.08	151
Warning Issued	0.13	0.06	-0.07	0.05	151
Gynecologyists: Post (μ_1) vs. Pre (μ_2)					
Male Accused	0.17	0.20	0.03	0.14	33
Male Complained	0.63	0.67	0.04	0.17	34
Patient Died	0.58	0.87	0.29*	0.15	34
Complaint: Negligence	0.89	1.00	0.11	0.07	34
Complaint: Fake License	0.05	0.00	-0.05	0.05	34
Fined	0.11	0.33	0.23	0.15	34
License Suspend or Revoke	0.00	0.20	0.20*	0.11	34
Warning Issued	0.16	0.20	0.04	0.14	34
Treated Doctors: Female (μ_1) Vs. Male (μ_2)					
Male Accused	0.00	1.00	-1.00	0.00	144
Male Complained	0.89	0.88	0.01	0.08	99
Patient Died	0.26	0.42	-0.16	0.10	122
Complaint: Negligence	0.25	0.46	-0.21**	0.09	144
Complaint: Fake License	0.22	0.10	0.12	0.08	144
Fined	0.06	0.20	-0.15***	0.05	144
License Suspend or Revoke	0.33	0.44	-0.10	0.09	144
Warning Issued	0.14	0.09	0.05	0.06	144

Note: The table presents the differences in means between pre-reform and post-reform doctors within treated and control fields, separately. Pre-reform refers to doctors who graduated before the reform, and post-reform analogously. Treated group refers to non-gynecologists and control group to gynecologists. Data are collected from the PMDC website. The years of the complaints range from 2011 to 2022.

Table 5: Summary Statistics: Patient Complaints

	Pr(Case) (1)	Pr(Male Accused) (2)	Pr(Male Accused) (3)	Pr(Case) (4)	Pr(Male Accused) (5)	Pr(Male Accused) (6)
Δ Female Share	-0.083***	-0.004	-0.010***	0.156	0.098	0.025
	(0.015)	(0.004)	(0.003)	(0.097)	(0.482)	(0.508)
Observations	245,985	133	122	245,985	133	122
R^2	0.00	0.01	0.05	0.47	0.59	0.61
Mean DV	32	32	13	32	13	32
Samples	All	Case Filed	Treated Fields	All	Case Filed	Treated Fields
Age Controls	N	N	N	Y	Y	Y
Specialty Group Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Note: The table presents the results of regressing outcomes on the female share of doctors. In columns 1 and 4 the outcome probability of a disciplinary case is multiplied by 1000. Columns 1-3 do not include additional control variables, while columns 4-6 include controls for a doctor's age, age-squared, fixed effects for year their medical license was initially issued, and fixed effects for their medical specialty (including no specialty). Robust standard errors are in parentheses. Data are from the PMDC website. The years of the complaints range from 2011 to 2022. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 6: Disciplinary Action by Δ in Female Share of Doctors

	Pr(Case) (1)	Pr(Patient Died) (2)	Pr(License Action) (3)	Pr(Warning Issued) (4)	Pr(Fined) (5)	Pr(Case) (6)	Pr(Patient Died) (7)	Pr(License Action) (8)	Pr(Warning Issued) (9)	Pr(Fined) (10)
Panel A: Treated x Control										
Post x Treated	1.667					2.800***				
	(1.173)					(0.831)				
Post x Treated		0.171	0.069	0.112	0.169		-0.227	0.164**	0.396*	-0.047
		(0.170)	(0.133)	(0.143)	(0.155)		(0.147)	(0.069)	(0.231)	(0.136)
Observations	246,049	163	185	185	185	245,997	115	80	80	80
R^2	0.00	0.11	0.08	0.02	0.02	0.47	0.61	0.63	0.79	0.67
Panel B: Male vs. Female, Treated Fields										
Post x Male	0.621**					-0.085				
	(0.274)					(0.103)				
Post x Male		0.042	0.385**	-0.056	-0.020		0.525**	0.883**	-0.121	-0.055
		(0.216)	(0.186)	(0.122)	(0.115)		(0.196)	(0.377)	(0.195)	(0.309)
Observations	240,255	122	144	144	144	240,211	87	53	53	53
R^2	0.00	0.03	0.05	0.02	0.03	0.52	0.78	0.84	0.92	0.84
Mean DV	32	13	32	13	32	13	32	13	32	12
Samples	All	Case Filed	Case Filed	Case Filed	Case Filed	All	Case Filed	Case Filed	Case Filed	
Controls	N	N	N	N	N	Y	Y	Y	Y	Y

Note: The table presents the results of estimating 1 for medical complaints faced by doctors. Columns 1-5 represent the basic regression without additional controls of fixed effects. In columns 6-10, we include controls for a doctor's age, age-squared, medical specialty and year a doctor's license was initially issues. Columns 8-10, for the outcome of the disciplinary case, additionally control for the type of medical complaint faced (negligence or possession of a fake license). Data are from the PMDC website. The years of the complaints range from 2011 to 2022. Stars represent statistical significance. Standard errors are robust for columns 1-5 which do not include any fixed effects, and are clustered by medical specialty in columns 6-10 which include fixed effects for medical specialty. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 7: Disciplinary Cases, Difference-in-Differences

and change from an increase in time spent to a decrease when test scores are controlled for.

Examining doctor practices separately by primary and secondary practice sheds further light on these results (table A9). Almost the entire increase in patients consulted with per day is at a secondary practice, while there is no change in the number of out-patients or the time spent with each out-patient in primary practice overall[43]. In fact, female doctors *decreased* the time spent per patient at their primary practice by 4.4 minutes per patient. When accounting for ability, the decrease in time is 2.35 minutes per patient, since high ability female doctors spend more time per patient (column 6, panel B, table A9). This finding is further substantiated by event studies relative to gynecology in figure 11, and with no other control group in figure A7. Though our sample sizes are small, we have suggestive evidence that the decrease in time spent per patient in primary practice is largely driven by female doctors with a secondary practice, who plausibly face a greater time cost[44]. Consistently, female doctors also lowered consulting hours at their primary practice (column 4, table A11). Controlling for ability, we find that the smartest female doctors have fewer consulting hours and greater practice hours, where the difference between consulting and practice hours are potentially hours spent in conducting medical procedures.

In contrast, male doctors in treated fields spend the same amount of time and did not change their consulting hours relative to gynecology. Relative to the male dominated field of urology, male doctors in treated fields see 10 fewer out-patients and spend about 2.5 *more* minutes per out-patient after the reform (table A17). Male doctors also spend more time with each out-patient than female doctors, but the coefficient is just under statistical

[43]This is part of a broad trend among specialists relative to gynecologists to work in public hospitals, have a secondary practice, consult with more patients and spend more time per patient at their secondary practice. Doctors with a primary practice in the public sector have an incentive to have a second practice in the private sector, due to the substantial difference in pay and fee between the two sectors. Forty percent of doctors with a public primary practice have a secondary practice in our data, while 16 percent of doctors with a private primary practice do. Female doctors participate in this trend as they respond to labor market incentives (see column 4, table A10).

[44]These results are available upon request.

significance (table A12). Interestingly, while 52 percent of male doctors and 47 percent of female doctors report burnout in treated fields, 34 percent of women in treated fields reported cutting back on hours, compared to 31 percent of men in treated fields and 28 percent of women overall.

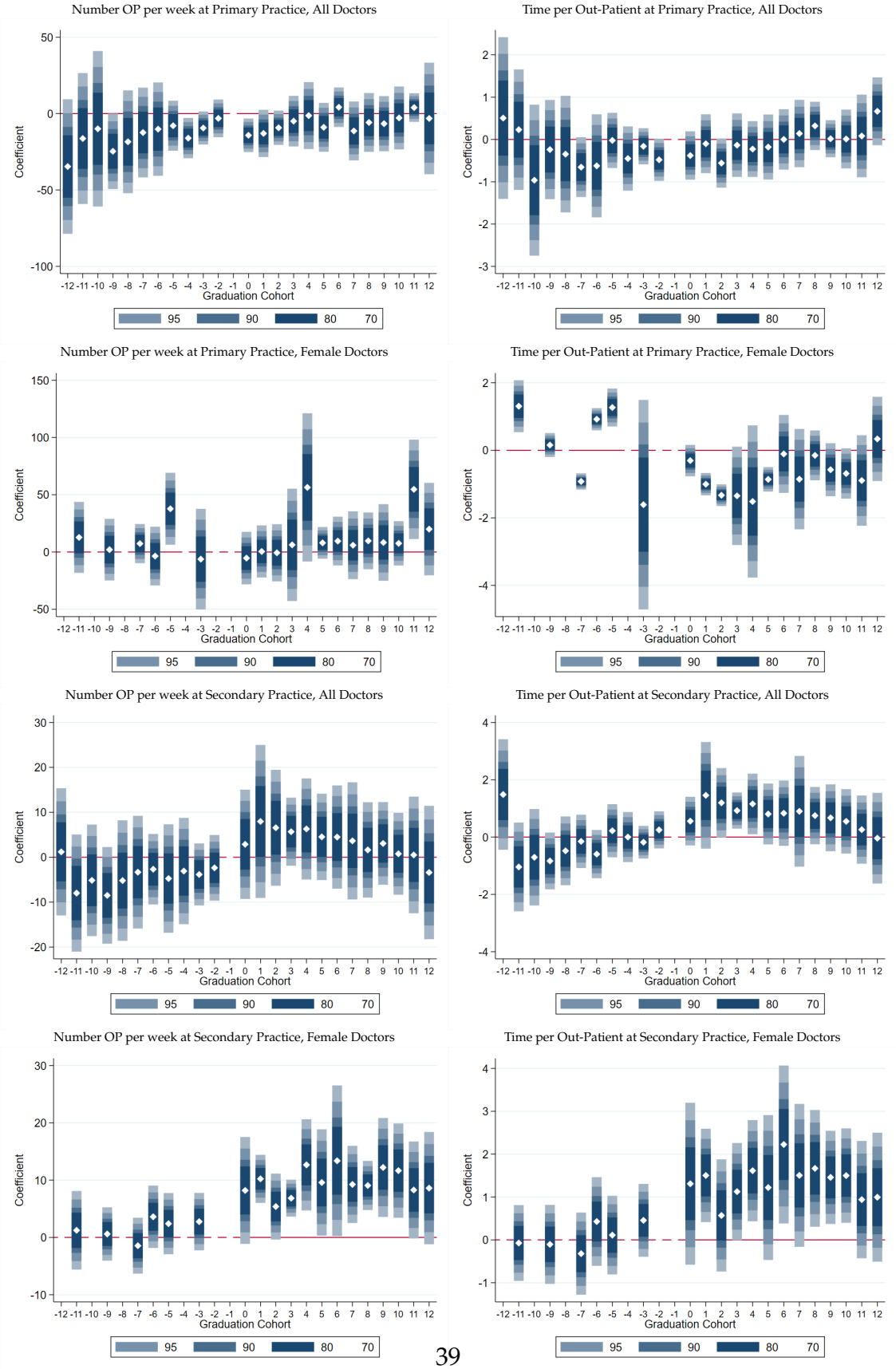
Overall, our findings suggest that as female doctors enter new specialties, they become integrated and adapt to norms, such as by starting secondary practices. At the same time, they operate with different time constraints. Unlike men, therefore, they compensate for the increased consulting time and higher patient loads by reducing the time per person at their primary practice.

	Number of Out-Patients (1)	Time per Out-patient (2)	Number Out-Patients (3)	Time Out-patient (4)	Number Out-Patients (5)	Time Out-Patients (6)
Panel A: All Doctors						
Non-Gyn x Post	5.64*	1.00***	12.04***	0.87***	13.79***	0.32
	(2.68)	(0.25)	(2.98)	(0.20)	(2.48)	(0.38)
Test Score (%)					-0.17	-0.09**
					(0.59)	(0.03)
Observations	644	644	299	299	153	153
R^2	0.16	0.13	0.21	0.15	0.37	0.29
Panel B: Female Doctors						
Non-Gyn x Post	15.88*	0.90*	31.16*	0.42	6.47*	-0.56*
	(6.20)	(0.44)	(14.58)	(0.43)	(2.68)	(0.20)
Test Score (%)					-1.91***	-0.10***
					(0.13)	(0.01)
Observations	292	292	110	110	63	63
R^2	0.25	0.18	0.35	0.16	0.42	0.37
Mean DV	32	13	32	13	32	13
Closer Years	N	N	Y	Y	Y	Y
Fixed Effects	Y	Y	N	N	Y	Y
Ability Control	N	N	N	N	Y	Y

Note: The table presents the results of equation 1 for the number of out-patients consulted by doctors per day and the time spent with each out-patient. Stars represent statistical significance, standard errors are clustered at the specialty level. All regressions control for age, age^2, and survey round fixed effects. Additional fixed effects included are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 8: Output, Treated Doctors Relative to Gynecology

Figure 11: Output, Treated Doctors Relative to Gynecology



Note: The graph shows event studies of doctor output estimated using equation 2, with graduation years grouped in two. Controls for age, age^2, treated, post and round fixed effects are included. Standard errors are clustered at the grouped specialty level. Data are from a survey of doctors collected by the authors.

5 Robustness Checks and Extensions

Using Pre-Existing Shares of Female Doctors: Since the individual pre-existing female shares for specialties have a large spread, with very few observations for some shares, we group medical specialties into 4 groups: no specialty, surgery, medicine and gynecology. The pre-reform female shares in these specialties are 0.29, 0.03, 0.17 and 0.94, respectively. We then create a variable "Shares" that equals 1 minus the pre-existing share, which captures potential for growth in female share after the reform in each group. This is similar to an intent-to-treat variable[45], because the pre-existing female share is correlated with the post-reform change in female share, and because the pre-reform share is exogenous to the degree that is is determined before the reform. We estimate:

$$Y_{ist} = \beta_0 + \beta_1(Shares * Post)_{st} + \beta_2 Shares_s + \gamma X_{ist} + \alpha_r + \alpha_t + u_{ist} \quad (3)$$

β_1 now compares post-reform doctors in fields with a high pre-existing female share with those with low pre-existing female shares, after netting out differences between pre-reform doctors[46]. Consistent with our main results, our results imply that fields where the female share could grow more after the reform experienced an increase in doctors working in public hospitals, an increase in zero consulting fees, and female doctors spending less time per out-patient at their primary practice.

No Control Group Since our main results could be affected by trends in the control group relative to the treated group, we also estimate the evolution of outcomes over graduation year cohorts for treated groups alone:

[45] For example, the room for growth in surgery's female share is 0.97.

[46] Standard errors are clustered by specialty group.

	Public Practice All Doctors	Zero Fee All Doctors	Time/OP Female Doctors
	(1)	(2)	(3)
Using Pre-Existing Female Shares			
Pre-Existing Female Share x Post	0.35**	0.29**	-0.90*
	(0.17)	(0.14)	(0.44)
Observations	286	284	110
R^2	0.10	0.16	0.24
Grouping Specialties: Surgery and Non-Surgery			
Non-Gyn x Post	0.29**	0.22*	-0.78*
	(0.07)	(0.08)	(0.32)
Observations	286	284	110
R^2	0.11	0.16	0.25
Specialists Only			
Non-Gyn x Post	0.35**	0.27**	-0.72**
	(0.09)	(0.10)	(0.14)
Observations	254	252	106
R^2	0.18	0.24	0.33
Re-weighting Public and Private Doctors			
Non-Gyn x Post	0.26**	0.52***	-0.79**
	(0.08)	(0.09)	(0.20)
Observations	286	105	106
R^2	0.12	0.53	0.40
Placebo Treatment Year=1987, Sample Range:1970-1996			
Non-Gyn x Post	-0.23***	-0.06	0.54
	(0.06)	(0.08)	(1.21)
Observations	204	201	67
R^2	0.19	0.22	0.34

Note: The table presents robustness checks for our main results. In panel A, we use the pre-existing share of female doctors in grouped medical specialties, in panel B we change the grouping of medical specialties to surgery and non-surgery. In panel C we restrict the data to medical specialists, and in panel D we use a placebo reform year, 1987, while restricting the sample to 1970 and 1996. In panel E, we re-weight the data to account for the probability of non-response. Data are collected by the authors in 2022 and 2023.

Table 9: Robustness Checks

$$Y_{ist} = \beta_0 + \sum_{-26}^{24} \beta_k D_t^k + \beta_3 SpecialtyGroup_s + \gamma X_{ist} + \beta_4 Post_t + u_{ist} \tag{4}$$

In equation 4, Y_{ist} represents the outcome for individual i in treated medical specialty s and graduation cohort t, the D_t^k are indicators for every two year graduation cohort[47], and the β_k capture how graduation cohorts within the same specialty group evolve. To reduce the number of specialty fixed effects estimated, we group specialties into 7 categories: Non-specialized, surgery, medicine, cardiology, urology, gynecology and all other specialties, which includes specialties with fewer than 20 observations. X_{ist} includes controls for individual age, age-squared, the α_r are survey round fixed effects, the α_t mare graduation year fixed effects, and u_{ist} is an individual-level disturbance term. Standard errors are clustered by grouped medical specialty.

Consistent with our main findings, figures A5 and A7 show that while medical practice in treated fields did not change overall, female doctors who entered these fields immediately after the reform charge a lower fee, are marginally more likely to work in public hospitals, and spent less time per out-patient compared to previous cohorts.

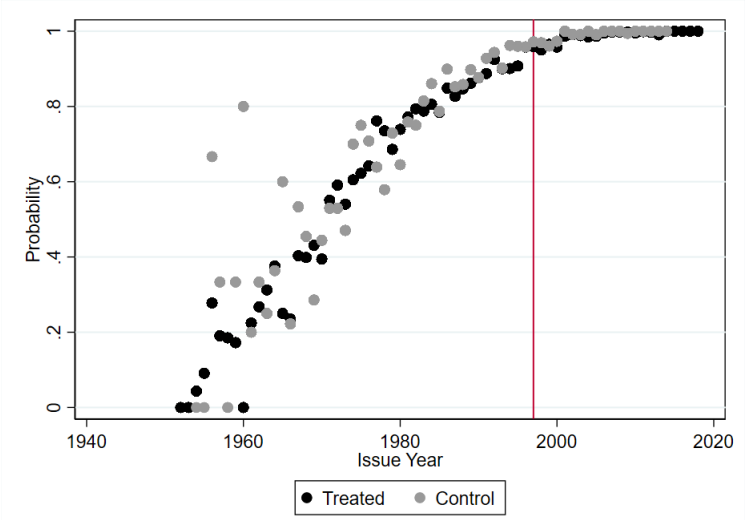
Accounting for Survivor Bias: We interviewed medical doctors in 2021 and 2022, almost two decades after the 1992 reform. Because of the passage of time, many doctors could have dropped out of the labor force, and we are more likely to capture "survivors": doctors who are still practicing in 2021 and 2022 and therefore have long careers. These could be doctors selected on ability or performance, which would imply that we capture an over-estimate of doctors' ability.

To address this concern, we look for differential trends in the likelihood of being

[47] We group cohorts into intervals of two years to avoid small sample sizes for individual years, especially among the earlier cohorts.

active in 2015, which was our cutoff year in sampling. In other words, we had randomly sampled names of doctors who were active in 2015 or after, and provided this list to the survey team (while oversampling gynecology and urology). When we plot the likelihood of being active in 2015 of after, however, we find that treated and non-treated specialists who were issued a license in a given year are similarly likely to be active in 2015. This suggests that while we are more likely to find doctors who are active closer to the current year, there are no strong differences in this likelihood between our treated and control groups.

Figure 13: Probability of Having a Valid License in and after 2015



Note: The figure plots the likelihood that a doctor has a valid license in and after 2015 against the year of initial medical license issue, for medical specialists in treated and control categories. Data are from the PMDC medical doctor registration database.

Specialists Only: Since MBBS doctors and specialists may have different experiences and trends, we repeat our analysis with the exclusion of all 109 MBBS doctors in our sample (table 9). Most of our results remain consistent, and are in fact stronger. One exception is the decrease in time spent per out-patient by female doctors in column (3). These results imply that our results of a higher likelihood of public practice and charging no fee are persistent among and may be driven by female specialists. The reform-induced

change in gender ratios led female specialists to be located in public hospitals, and practice accordingly.

Weighting for non-response: In our data, almost 51 percent of respondents are in the private sector, whereas nationally only 35 percent of doctors work in private hospitals. While we randomized the list of doctors we provided to the survey team, and the survey team did not report different non-response rate by private practice, there might de facto be different response rates between doctors working in the public and private sectors. In this section we use weights to adjust the share of public and private doctors in our sample. The weights are calculated by adjusting the share of private doctors in our sample to match their share in the population, and the same for public doctors. The results in table 9 remain consistent with our main findings.

Placebo Treatment: To test if our results are driven by trends over time, we create a placebo policy in 1987, which is 10 years before the reform (table 9). We restrict our analysis from 1970 to 1996, and include the time period between 1970 and 1977 to allow for a greater number of observations in the placebo policy pre-period. Overall, most results are substantially different from our main results. For example, doctors in treated fields are significantly less likely to be in public practice, and the likelihood of charging no fee is not statistically different from 0. This suggests that our trends are not driven by trends in health care practice over decades.

6 Conclusion

We examine the effects on medical practice of a Pakistani reform that changed gender ratios in medicine. Our data includes surveys of more than 600 doctors that we collected across all provinces in Pakistan, and administrative data on medical doctor registrations. We examine medical graduates who entered "mixed", or, treated fields after the reform,

relative to gynecology and urology, which are two relatively homogenous specialties that remained untreated for cultural reasons.

While mixed fields overall do not change as more female doctors enter, *female doctors* in those fields earn less and are more likely to consult for free in 2022 relative to the control, and relative to male doctors in their own field. These trends are partly explained by female doctors being more present in lower-paying public hospitals, and partly due their remaining in junior positions relative to male doctors. In terms of the quantity of healthcare, we find that female doctors adjust to a higher overall volume of patients by spending less time per out-patient at their primary practice, while male doctors did not.

Even as gender ratios changed in treated fields, medical practice became segmented for male and female doctors, and especially for the initial cohorts affected by the reform. For example, female doctors became more likely to practice in public hospitals, and less likely to be in senior positions relative to men. The segmentation of doctors' labor markets can impede their growth and be inefficient because it limits career mobility. The reform's impact on patient care, on the other hand, are likely to be more mixed. We show that the reform raised average doctor ability, and the presence of female doctors in public practice potentially decreased the fee costs borne by out-patients by 6.6 percent. However, the decrease in time spent with each out-patient by female doctors may be a decrease in the quality of care. The policy implications of these findings involve repairing structural factors that affect labor market segmentation and healthcare quality, which could include capping the number of hours that doctors work, providing alternative schedules or career paths, and improving childcare options.

While our study examines the price and quantity of healthcare by collecting data on doctors, we can make few claims about patients' perspectives, since data on patient outcomes is highly sensitive and difficult to collect. The next steps in this research are to understand how patient well-being is affected in more direct ways as the female workforce in medicine expands, as it continues to do even today.

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APPENDICES

For Online Publication

Breaking Barriers? Female Doctors in Male Fields

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January 15, 2025

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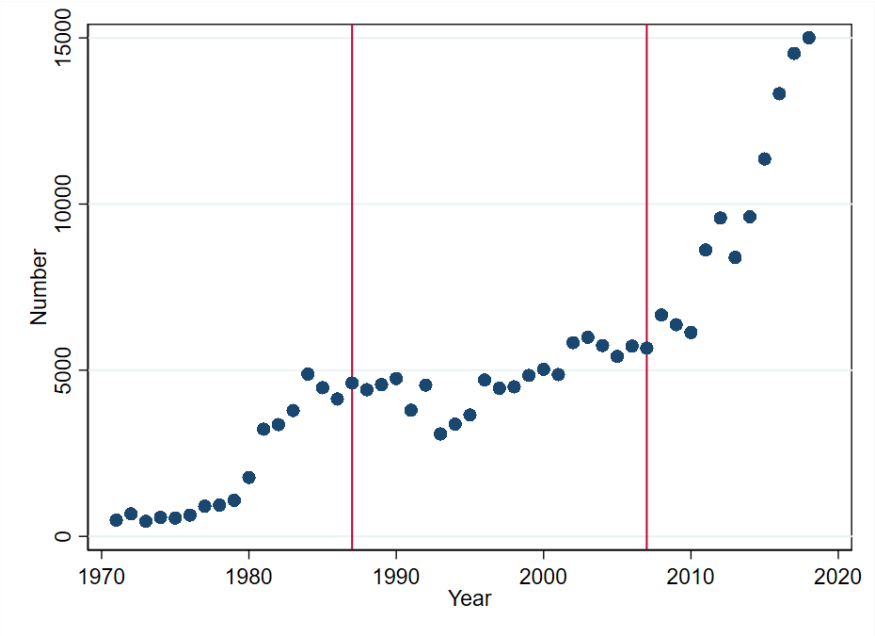
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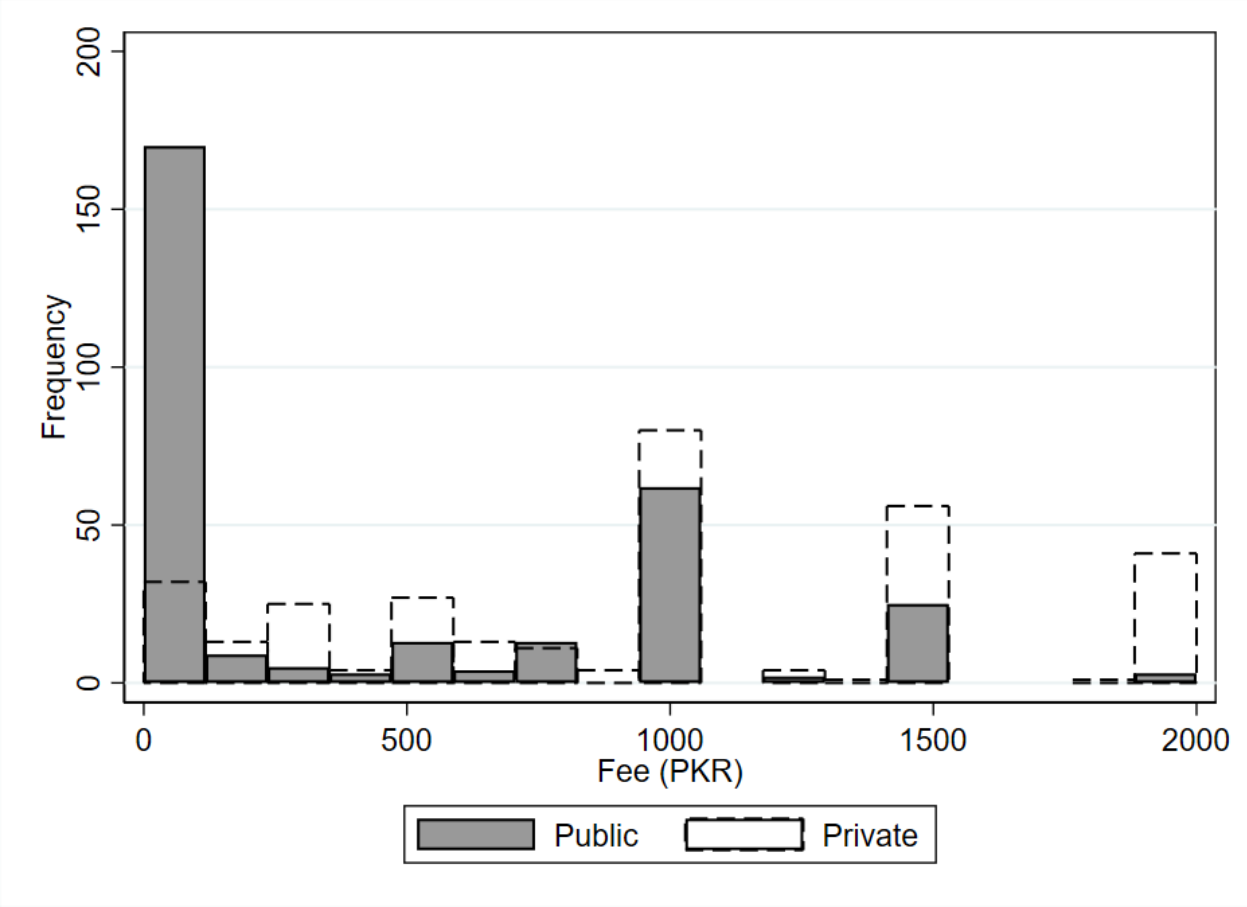
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Figure A1: Total Number of Medical Doctor Registrations



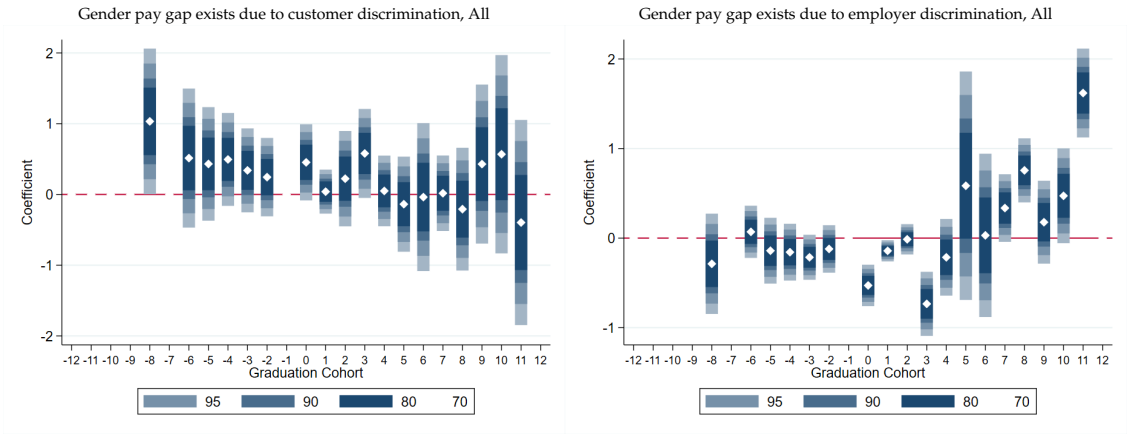
Note: The graph plots the total number of registrations by year, where year is the year of initial medical license issue. Data are from the PMDC registration data between 1952 and 2018.

Figure A2: Fee, Public and Private Hospitals



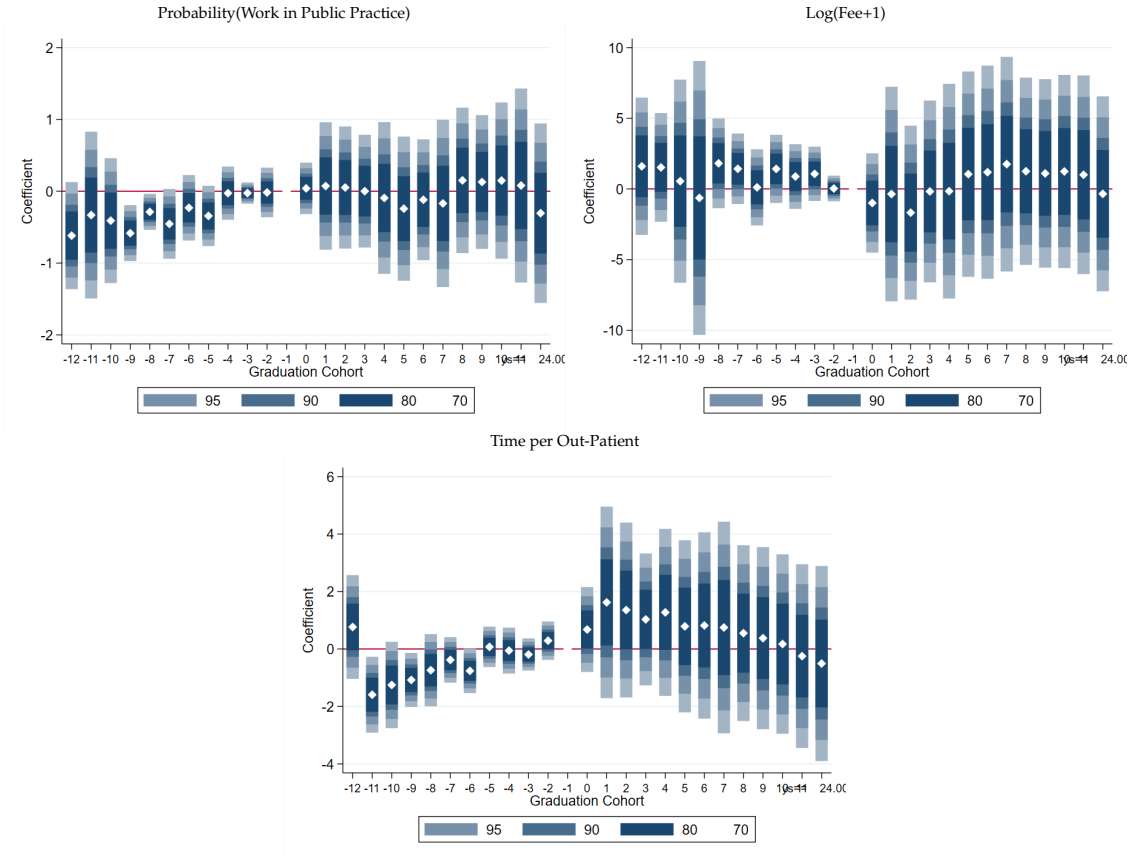
Note: The graph plots a histogram of the consulting fee from the primary practice of public and private practitioners. Data are from the survey of doctors conducted by the authors.

Figure A3: Other reasons for fee changes, Treated Doctors Relative to Gynecology



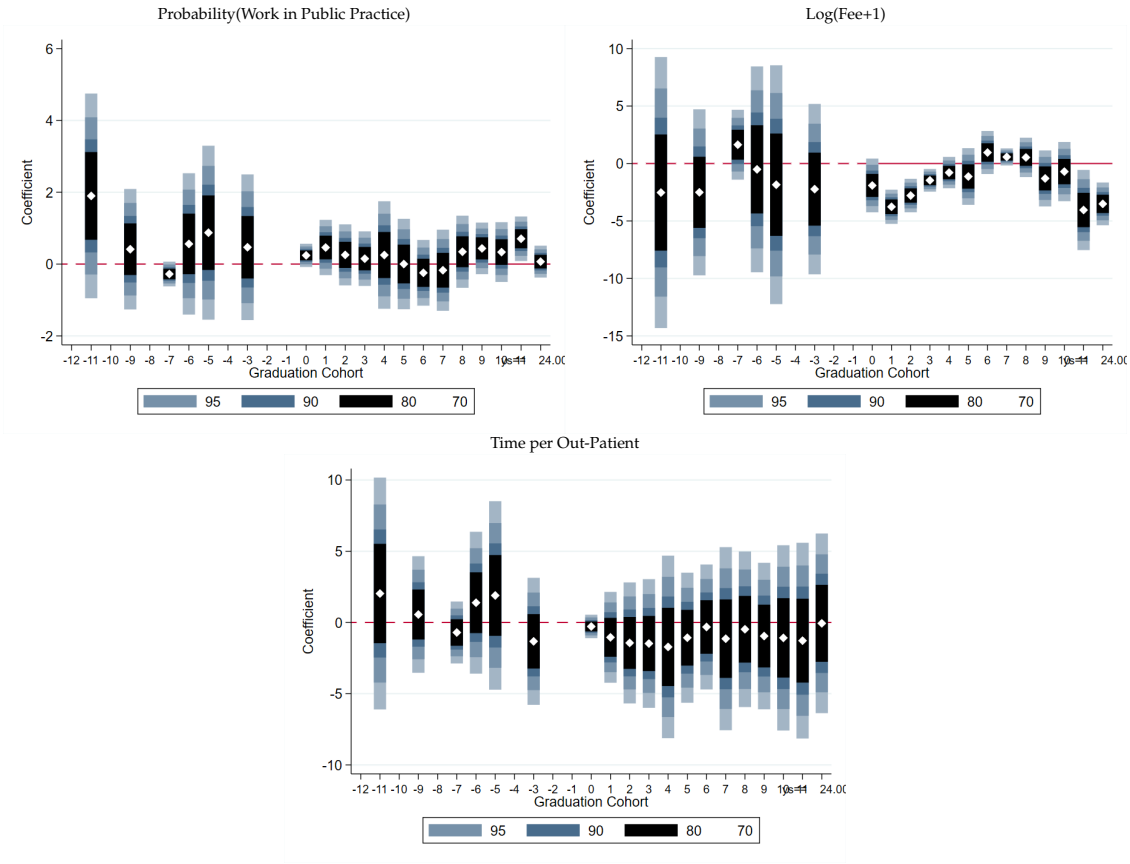
Note: The graph shows event studies of self-reported reasons for the gender pay gap for all doctors, estimated using equation 2, with graduation years grouped in two. Controls for age, age^2, treated, post and round fixed effects are included. Standard errors are clustered at the grouped specialty level. Data are from a survey of doctors conducted by the authors in collaboration with Gallup Pakistan.

Figure A5: Event Studies, No Control



Note: The graph shows event studies of self-reported reasons for the gender pay gap, estimated using equation 1, with graduation years grouped in two. Controls for age, age^2, treated, post and round fixed effects are included. Standard errors are clustered at the grouped specialty level. Data are from a survey of doctors conducted by the authors in collaboration with Gallup Pakistan.

Figure A7: Event Studies, Female Doctors, No Control



Note: The graph shows event studies of self-reported reasons for the gender pay gap, estimated using equation 1, with graduation years grouped in two. Controls for age, age^2, treated, post and round fixed effects are included. Standard errors are clustered at the grouped specialty level. Data are from a survey of doctors conducted by the authors in collaboration with Gallup Pakistan.

	Mean	SD	Min	Max	N
Age	43.43	11.51	23.00	74.00	654
Urban Birthplace	0.76	0.43	0.00	1.00	250
Secondary School Score (%)	88.22	5.96	64.00	98.00	242
Middle School Score (%)	86.83	5.10	65.00	98.00	220
Mother's Education	12.04	2.85	1.00	15.00	250
Father's Education	13.01	2.02	1.00	16.00	250
No. Other Doctors	1.66	2.09	0.00	15.00	250
Married	0.34	0.48	0.00	1.00	659
Currently Practice	0.96	0.19	0.00	1.00	653
Urban Practice	0.93	0.26	0.00	1.00	627
Public Practice	0.50	0.50	0.00	1.00	627
Have a Second Practice	0.27	0.45	0.00	1.00	626
Hours Consulting Patients (daily)	4.91	2.46	0.00	19.00	659
Log(Fee)	4.96	2.85	0.00	7.60	621
Log(Fee 2)	6.74	0.88	0.00	8.29	171
Salary	3.77	1.66	1.00	8.00	244
Total Time per Patient	3.07	1.84	0.00	10.00	659
Total Time per Patient 1	2.34	1.13	0.00	6.00	659
Time per Patient 2	0.73	1.34	0.00	5.00	659
Total Number Patients (daily)	35.47	27.27	0.00	135.00	659
Total Number Patients 1 (daily)	30.61	23.59	0.00	100.00	659
Number Patients 2 (daily)	4.86	9.56	0.00	46.00	659
Practice Hours (wk)	2.59	1.01	1.00	6.00	625
Teaching Hours (wk)	0.61	0.86	0.00	5.00	654
Research Hours (wk)	0.80	0.87	0.00	5.00	654

Note: The table presents summary statistics for the full sample of Pakistani doctors. Data are collected by the authors in 2022 and 2023.

Table A1: Summary Statistics: Full Sample

	Mean (Post)	Mean (Pre)	Difference	SE	N
Age	36.12	57.21	21.10***	0.58	507
Urban Birthplace	0.74	0.61	-0.13*	0.07	166
Secondary School Score (%)	89.32	85.14	-4.19***	1.17	136
Middle School Score (%)	88.31	83.86	-4.45***	0.91	136
Mother's Education	11.70	12.36	0.66	0.50	166
Father's Education	12.84	13.21	0.37	0.34	166
No. Other Doctors	1.66	2.46	0.80**	0.36	166
Marriage Age	27.47	28.15	0.68*	0.36	144
Married	0.19	0.42	0.22***	0.04	541
Age at First Child	29.52	30.26	0.74*	0.38	141

Note: The table presents mean differences between medical doctors who graduated before and after the reform. Data are collected by the authors in 2022 and 2023.

Table A2: Background Characteristics of Medical Graduates

Treated Group	**Relative To**	**Relative To**
Women in Treated Group	Women in Control Group	Men in Treated Group
Pr (Fee=0)	↑	↑
Pr (Public Practice)	↑	↑
Time per OP	↓	No change
Penalty	N/A	↓
Mechanisms		
Public Practice	Yes	Yes
Position	No	Yes
Ability	No	No
Men in Treated Group	Men in Control Group	Women in Control Group
Pr (Fee=0)	No change	No change
Pr (Public Practice)	No change	↑
Time per OP	No change	↑
Penalty	N/A	N/A
Overall Treated Group	Overall Control Group	
Pr (Fee=0)	No change	
Pr (Public Practice)	↑	
Time per OP	No change	
Penalty	No change	

Table A3: Summary of Results

	Log(Fee)	Pr(Fee=0)	Number of Out-Patients	Time per Out-Patient	Public	Urban Practice	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A: Medical Practice, Female Doctors							
Δ Female Share (%)	0.105***	-0.006**	-0.545	-0.031	-0.036**	0.006*	-0.008
	(0.014)	(0.002)	(0.519)	(0.033)	(0.009)	(0.002)	(0.004)
Observations	79	96	100	100	97	97	97
R^2	0.59	0.56	0.39	0.37	0.35	0.62	0.42
Mean DV	5.0	0.22	30.6	11.7	0.50	0.93	0.74
Closer Years	Y	Y	Y	Y	Y	Y	Y
Fixed effects	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	N	N
B: Selection, Female Doctors							
	Test Scores	Father	Mother	Doctors	Urban		
	(1)	(2)	(3)	(4)	(5)		
Δ Female Share (%)	-0.734***	0.097**	-0.623***	0.513***	0.036**		
	(0.031)	(0.020)	(0.025)	(0.062)	(0.011)		
Observations	63	66	66	66	66		
R^2	0.71	0.40	0.63	0.58	0.32		
Mean DV	88.2	13.0	12.0	1.66	0.76		
Closer Years	Y	Y	Y	Y	Y		
Fixed effects	Y	Y	Y	Y	Y		
Ability Control	N	N	N	N	N		

Note: The table presents estimates for outcome changes by the change in female share in specialties. "Δ Female Share" is the change in the mean female share of doctors by specialty before and after the reform, where before is between 1971-1996, and after is 1997-2018. All regressions control for age, age-squared, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Standard errors are clustered by medical specialty group. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A4: Medical Practice by Δ Share of Female Doctors

	Salary			Total Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Doctors						
Non-Gyn x Post	-0.55	-0.85*	-1.34***	0.01	-0.15	-0.27*
	(0.50)	(0.37)	(0.19)	(0.12)	(0.16)	(0.12)
Test Score (%)			0.12***			0.03**
			(0.03)			(0.01)
Observations	244	156	152	239	154	150
R^2	0.42	0.28	0.39	0.50	0.33	0.38
Panel B: Female Doctors						
Non-Gyn x Post	1.03**	-0.08	0.33***	-0.40*	-0.60***	-0.71***
	(0.25)	(0.07)	(0.04)	(0.18)	(0.09)	(0.03)
Test Score (%)			0.05***			0.04***
			(0.00)			(0.00)
Observations	112	65	62	109	64	61
R^2	0.60	0.49	0.49	0.66	0.68	0.71
Mean DV	1.5	1.5	1.5	8.9	8.9	8.9
Closer Years	N	Y	Y	N	Y	Y
Fixed Effects	Y	Y	Y	Y	Y	Y
Ability Control	N	N	Y	N	N	Y

Note: The table presents the results of estimating 1 for the salary and earnings of medical doctors in treated fields relative to gynecology. "Salary" is a categorical variable for monthly salary, where each category represents Rs. 50,000 in salary. "Monthly Total Earnings" are created by first finding the midpoint of each salary categorical variable. For example, the midpoint of the salary range Rs."0-50,000" is Rs. 25,000. This midpoint is then added to the total fee earnings from both practices (Fee x number of patients consulted daily x 20 working days a month). Stars represent statistical significance, standard errors are clustered at the specialty level. All regressions control for age, age-squared, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A5: Salary, Treated Doctors Relative to Gynecology

	Public Hospitals				Private Hospitals			
	Pr(Fee=0)	Log(Fee)	Number OP	Time OP	Pr(Fee=0)	Log(Fee)	Number OP	Time OP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All Doctors								
Non-Gyn x Post	0.19	-0.34	-0.15	0.14	0.09*	0.38*	-0.30	0.75
	(0.17)	(0.79)	(0.15)	(5.98)	(0.05)	(0.17)	(0.23)	(2.60)
Observations	158	93	158	158	129	121	128	128
R^2	0.22	0.34	0.17	0.37	0.25	0.46	0.18	0.32
Female Doctors								
Non-Gyn x Post	0.67***	-0.79***	-0.04	-18.79***	0.00	0.25	-1.28*	-5.09
	(0.16)	(0.00)	(0.12)	(1.92)	(.)	(0.98)	(0.49)	(6.51)
Observations	57	36	58	58	48	47	48	48
R^2	0.64	0.66	0.64	0.58	1.00	0.57	0.41	0.68
Mean DV	0.22	5.0	30.6	11.7	0.22	5.0	30.6	11.7
Closer Years	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	N	N	N

Note: The table presents the results of estimating 1 for the fee and salary of medical doctors in treated fields relative to gynecology. "Log(Fee)" is defined for **non-zero fees**, while "Pr(Fee=0)" measures the probability that no fee is charged. All regressions control for age, age^2, survey round fixed effects and graduation year fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Closer years refers to a subsample of the data of doctors who graduated within 10 years of the medical school reform. Data are from a survey of Pakistani doctors conducted by the authors. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A6: Work Outcomes by Hospital Type

	Probability(Tenure Track)		Position		Discrimination			
					Employers		Patients	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Treated Fields Relative to Control								
Non-Gyn x Post	0.06	-0.06	0.12	0.15	0.01	0.07	0.13***	-0.11
	(0.05)	(0.05)	(0.18)	(0.16)	(0.05)	(0.04)	(0.02)	(0.16)
Observations	66	66	66	66	110	110	110	110
R^2	0.43	0.61	0.32	0.53	0.01	0.33	0.05	0.33
Panel B: Male vs. Female, Treated Fields								
Female x Post	-0.11	-0.19	-0.35	-0.66**	0.05	0.05	-0.02	-0.03
	(0.16)	(0.18)	(0.26)	(0.19)	(0.03)	(0.03)	(0.14)	(0.15)
Female	-0.63***	-0.37***	-0.87***	-0.31**	-0.00	-0.01*	0.10	0.12
	(0.11)	(0.06)	(0.13)	(0.08)	(0.00)	(0.00)	(0.12)	(0.13)
Observations	102	102	102	102	225	225	225	225
R^2	0.32	0.44	0.21	0.34	0.05	0.06	0.03	0.06
Mean DV	0.57	0.57	0.9	0.9	0.04	0.04	0.09	0.09
Closer Years	Y	Y	Y	Y	Y	Y	Y	Y
Fixed Effects	N	Y	N	Y	N	Y	N	Y

Note: The table presents estimates using equation 1 for potential explanations for fee differences between doctors. Panel A focuses on female doctors in treated fields relative to the the control gynecology. Panel B focuses on female doctors relative to male doctors in treated fields. "Probability(Tenure Track)" equals 1 if a doctor is either an Assistant, Associate or Full Professor and 0 if non-tenure track. "Position" equals 1 if a respondent holds a position of Assistant Professor, 2 for Associate Professor and 3 for Full Professor, and is 0 if non-tenure track. "Disrcimination Patients" equals 1 if a doctor believes that patients prefer doctors of a certain gender for religious reasons, trust or comfort, 0 if not, and missing if doctors believe there is no gender pay gap in doctors' salary. "Discrimination Employers" equals 1 if the doctor believes employers discriminate between male and female doctors, 0 if not, and missing if doctors believe there is no gender pay gap in doctors' salary. Stars represent statistical significance, standard errors are clustered at the specialty level. All regressions control for age, age^2 and survey round fixed effects. Data are from a survey of doctors conducted by the authors and Gallup Pakistan. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A7: Reasons for Fee Disparity: Promotion and Discrimination

	Probability(Fee=0)	Probability(Public)	Number Patients	Time Patient
	(1)	(2)	(3)	(4)
Panel A: All Doctors Relative to Gynecology				
Non-Gyn x Pre-Reform Career Share	-0.902	0.222	6.343	-0.160
	(0.49)	(0.31)	(25.77)	(1.04)
Observations	201	204	218	218
R^2	0.23	0.18	0.23	0.19
Panel B: Female Doctors Relative to Gynecology				
Non-Gyn x Pre-Reform Career Share	-2.063***	-0.883	41.960	-1.066
	(0.33)	(0.45)	(22.91)	(1.19)
Observations	69	70	72	72
R^2	0.53	0.41	0.36	0.38
Panel C: Female vs. Male, Treated Fields				
Female x Pre-Reform Career Share	0.953	-0.083	22.375	0.801
	(0.50)	(0.47)	(46.56)	(1.58)
Observations	201	204	218	218
R^2	0.24	0.19	0.24	0.21
Mean DV	0.22	5.0	30.6	11.7
Fixed Effects	Y	Y	Y	Y
Closer Years	N/A	N/A	N/A	N/A

Note: The table presents results from examining how pre-reform graduates were affected by the reform. The sample is restricted to doctors who graduated before the reform. The main dependent variable is the share of doctors' career (upto the current year) that was spent before the reform. A higher share corresponds to having graduated earlier. Panel A compares all doctors in treated fields to those in the control field, panel B does the same for female doctors. Panel C compares female to male doctors within treated fields. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A8: Share of Doctors' Careers Spent Before the Reform

	Number of Out-Patients (1)	Time per Out-patient (2)	Number Out-Patients (3)	Time Out-patient (4)	Number Out-Patients (5)	Time Out-Patients (6)
Panel A: All Doctors, Primary Practice						
Non-Gyn x Post	-0.60	0.12	3.47	-0.10	7.66	-0.33
	(2.30)	(0.10)	(2.91)	(0.17)	(3.96)	(0.28)
Test Score (%)					-0.19	-0.04
					(0.39)	(0.03)
Observations	644	644	299	299	153	153
R^2	0.19	0.11	0.24	0.12	0.39	0.27
Panel B: Female Doctors, Primary Practice						
Non-Gyn x Post	5.57	-0.58***	20.14	-0.88***	2.27	-0.47***
	(7.65)	(0.10)	(16.32)	(0.18)	(1.91)	(0.07)
Test Score (%)					-1.40***	0.02**
					(0.10)	(0.00)
Observations	292	292	110	110	63	63
R^2	0.30	0.19	0.40	0.35	0.48	0.50
Panel C: All Doctors, Secondary Practice						
Non-Gyn x Post	6.24***	0.89***	8.57***	0.97***	6.13**	0.65**
	(1.08)	(0.18)	(1.09)	(0.18)	(2.11)	(0.21)
Test Score (%)					0.02	-0.05***
					(0.22)	(0.01)
Observations	644	644	299	299	153	153
R^2	0.13	0.14	0.12	0.14	0.29	0.27
Panel A: Female Doctors, Secondary Practice						
Non-Gyn x Post	10.31**	1.48**	11.02***	1.30*	4.19**	-0.09
	(2.92)	(0.48)	(2.22)	(0.51)	(0.77)	(0.13)
Test Score (%)					-0.50***	-0.12***
					(0.04)	(0.01)
Observations	292	292	110	110	63	63
R^2	0.23	0.23	0.22	0.18	0.36	0.33
Mean DV	30.6	11.7	30.6	11.7	30.6	11.7
Closer Years	N	N	Y	Y	Y	Y
Fixed Effects	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	Y	Y

Note: The table presents estimates from equation 1 for the number of patients consulted by doctors daily and the time spent on each patient. Estimates are presented separately for primary and secondary practices. Stars represent statistical significance, standard errors are clustered at the specialty level. All regressions control for age, age^2, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. Standard errors are clustered by medical specialty group. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A9: Output at Primary and Secondary Practice, Treated Doctors Relative to Gynecology

	Hours per Week				Consulting	Hours per Week				Consulting
	Practice	Research	Teaching	Two Practices	Hours	Practice	Research	Teaching	Two Practices	Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A: All Doctors										
Non-Gyn x Post	-0.26	0.09	0.06	0.42***	1.06***	0.08	-0.18	-0.12	0.32***	0.76**
	(0.19)	(0.24)	(0.13)	(0.06)	(0.21)	(0.22)	(0.23)	(0.21)	(0.06)	(0.26)
Test Score (%)						0.01	0.02	-0.00	-0.01	-0.02
						(0.03)	(0.01)	(0.03)	(0.00)	(0.08)
Observations	286	299	299	286	299	152	153	153	152	153
R^2	0.18	0.23	0.19	0.15	0.15	0.15	0.33	0.19	0.28	0.15
B: Female Doctors										
Non-Gyn x Post	-0.55	0.28	-0.12	0.59**	1.50	-0.18*	-0.30	-0.88**	0.04	-7.89***
	(0.50)	(0.37)	(0.14)	(0.21)	(1.63)	(0.07)	(0.14)	(0.24)	(0.04)	(0.12)
Test Score (%)						0.05***	0.03**	-0.06**	-0.03***	-0.16***
						(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Observations	106	110	110	106	110	62	63	63	62	63
R^2	0.28	0.35	0.36	0.23	0.21	0.61	0.60	0.48	0.36	0.35
Mean DV	40	6.5	7.5	0.34	6.06	40	6.5	7.5	0.34	6.06
Closer Years	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	Y	Y	Y	Y	Y

Note: The table presents estimates from equation 1 for hours worked. Practice, research and teaching hours are categorical variables where each category represents 20 hours, 10 hours and 10 hours for each variable, respectively. "Two practices" equals 1 if the respondent had a second practice. "Total hours worked" is the sum of hours at the respondent's primary and secondary practices. All regressions control for age, age-squared, and survey round fixed effects. Additional fixed effects included are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A10: Practice Hours, Treated Doctors Relative to Gynecology

	Hours Spent Consulting at					
	Primary	Secondary	Primary	Secondary	Primary	Secondary
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Doctors						
Non-Gyn x Post	-0.18	0.75***	0.09	0.97***	-0.14	0.90***
	(0.33)	(0.11)	(0.17)	(0.19)	(0.37)	(0.18)
Test Score (%)					0.02	-0.04
					(0.04)	(0.04)
Observations	644	644	299	299	153	153
R^2	0.14	0.14	0.14	0.12	0.17	0.22
Panel B: Female Doctors						
Non-Gyn x Post	-0.43	1.30**	0.07	1.43**	-8.36***	0.47*
	(1.27)	(0.36)	(1.26)	(0.47)	(0.05)	(0.16)
Test Score (%)					-0.03***	-0.13***
					(0.00)	(0.01)
Observations	292	292	110	110	63	63
R^2	0.27	0.24	0.28	0.14	0.38	0.32
Mean DV	32	13	32	13	32	13
Closer Years	N	N	Y	Y	Y	Y
Fixed Effects	Y	Y	N	N	Y	Y
Ability Control	N	N	N		N	Y

Note: The table presents estimates of equation 1 for the total number of daily consulting hours with patients at a primary and secondary practice (where applicable). All regressions control for age, age^2, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A11: Total Consulting Hours, Treated Doctors Relative to Gynecology

	Probability(Fee=0)	Probability(Fee=0) in Public Practice	Log(Fee)	Public	Number OP	Time OP
	(1)	(2)	(3)	(4)	(5)	(6)
Female x Post	0.24**	0.83**	0.14	0.10*	9.14	-0.50
	(0.08)	(0.28)	(0.89)	(0.04)	(13.21)	(0.32)
Female	-0.25**	-0.78**	-0.36	-0.18	-7.35	0.49
	(0.10)	(0.29)	(0.61)	(0.19)	(5.86)	(0.42)
Observations	211	113	155	212	225	225
R^2	0.23	0.37	0.26	0.18	0.24	0.14
Mean DV	5.0	0.22	0.38	30.6	11.7	
Closer Years	N	N	Y	Y	Y	Y
Fixed Effects	Y	Y	N	N	Y	Y
Ability Control	N	N	N		N	Y

Note: The table presents results on segmentation within treated fields. We interact the indicator for "Post" in equation 1 with an indicator for being female. Individual terms for post and female are included, as are controls for age, age^2, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Log(Fee) is defined for **non-zero** fees. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A12: Comparing Men and Women in Treated Specialties

	Log(Fee)		Pr(Fee=0)		Time OP		Public	
	High Share	Low Share	High Share	Low Share	High Share	Low Share	High Share	Low Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female x Post	0.397	-0.039	0.542	0.398**	-0.247	-0.563	-0.215	0.159
	(1.481)	(1.439)	(0.334)	(0.146)	(1.309)	(0.604)	(0.695)	(0.214)
Observations	33	122	45	166	50	175	45	167
R^2	0.62	0.28	0.35	0.30	0.36	0.25	0.42	0.22
Mean DV	5.0	0.22	11.7	0.50	5.0	0.22	11.7	0.50
Closer Years	Y	Y	Y	Y	Y	Y	Y	
Fixed effects	Y	Y	Y	Y	Y	Y	Y	
Ability Control	N	N	N	N	N	N	N	

Note: The table presents estimates for outcome changes by the change in female share in specialties. "High Share" corresponds to if the share of females in a specialty increased by more than 30% (the 90th percentile of female share increases), and "low share" is if the change in female share was smaller than 30%. All regressions control for age, age-squared, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Standard errors are clustered by medical specialty group. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A13: Medical Practice by Δ Share of Female Doctors: Male vs. Female Doctors

	Test Scores (%)	Father's Education	Mother's Education	# Doctors in Family	Urban Birth	Test Scores (%)	Father's Education	Mother's Education	# Doctors in Family	Urban Birth
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Male Doctors Relative to Gynecology										
Non-Gyn x Post	2.68*	-0.92**	-1.30***	-0.84	-0.16	3.23**	0.06	0.29	-0.05	0.01
	(1.34)	(0.31)	(0.35)	(0.35)	(0.11)	(1.20)	(0.12)	(0.21)	(0.16)	(0.08)
Observations	216	219	219	219	219	145	146	146	146	146
R^2	0.43	0.28	0.47	0.54	0.36	0.14	0.20	0.29	0.25	0.20
Panel B: Male Doctors Relative to Urology										
Non-Gyn x Post	2.85	2.04**	-0.44	-0.60	0.03	4.31***	0.54	0.32	-0.39	-0.11
	(3.22)	(0.67)	(0.46)	(0.71)	(0.16)	(0.46)	(0.33)	(0.53)	(0.33)	(0.21)
Observations	132	135	135	135	135	90	91	91	91	91
R^2	0.47	0.39	0.57	0.64	0.42	0.13	0.28	0.36	0.20	0.11
Panel C: Males Vs. Females, Treated Fields										
Female x Post	5.89	0.65	-1.75	-2.09	-0.14**	6.58***	0.80	-0.36	-2.23*	-0.11
	(8.18)	(0.48)	(3.22)	(1.11)	(0.05)	(1.41)	(0.69)	(1.06)	(1.08)	(0.21)
Female	-7.97	-0.40**	1.77	0.95	0.21*	-10.00***	-0.64	-1.50**	1.46***	0.37***
	(7.68)	(0.11)	(2.81)	(1.10)	(0.10)	(1.58)	(0.34)	(0.57)	(0.26)	(0.04)
Observations	158	166	166	166	166	98	102	102	102	102
R^2	0.36	0.27	0.31	0.59	0.39	0.21	0.20	0.34	0.16	0.15
Mean DV	88.2	13.0	12.0	1.66	0.76	88.2	13.0	12.0	1.66	0.76
Closer Years	N	N	N	N	N	Y	Y	Y	Y	Y
Specialty Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Graduation Year Fixed Effects	Y	Y	Y	Y	Y	N	N	N	N	N

Note: The table presents the results of estimating **??** for the selection of male doctors. All regressions control for age, age^2 and survey round fixed effects. Data are from a survey of doctors conducted by the authors and Gallup Pakistan. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A14: Selection, Treated Male Doctors

	Log(Fee) (1)	Pr(Fee=0) (2)	Log(Fee 2) (3)	Log(Fee) (4)	Pr(Fee=0) (5)	Log(Fee 2) (6)	Log(Fee) (7)	Pr(Fee=0) (8)	Log(Fee 2) (9)
Panel A: Male Doctors Relative to Gynecology									
Non-Gyn x Post	0.33	0.03	0.48	-0.14	0.18	0.70*	-0.99	0.08	0.12
	(0.39)	(0.06)	(0.30)	(0.67)	(0.10)	(0.34)	(0.60)	(0.05)	(0.19)
Test Score (%)							0.06***	0.01	0.08**
							(0.01)	(0.01)	(0.02)
Observations	376	476	135	190	252	88	108	143	45
R^2	0.23	0.23	0.49	0.23	0.21	0.40	0.25	0.30	0.73
Panel B: Male Doctors Relative to Urology									
Non-Gyn x Post	0.91*	0.01	-1.50	0.44	-0.09	-1.62	-0.61	-0.11	-0.21
	(0.45)	(0.08)	(1.05)	(0.25)	(0.12)	(0.97)	(0.72)	(0.19)	(0.24)
Test Score (%)							0.07***	0.01	0.03
							(0.02)	(0.00)	(0.01)
Observations	252	330	108	125	179	67	67	89	29
R^2	0.28	0.29	0.54	0.38	0.25	0.48	0.44	0.47	0.98
Mean DV	4.96	0.22	6.74	4.96	0.22	6.74	4.96	0.22	6.74
Closer Years	N	N	N	Y	Y	Y	Y	Y	Y
Fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	N	Y	Y	Y

Note: The table presents the results of estimating **??** for the fee of male medical doctors in treated fields. All regressions control for age, age^2, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A15: Pay, Treated Male Doctors

	Probability of Working in:								
	Public (1)	Urban (2)	Large (3)	Public (4)	Urban (5)	Large (6)	Public (7)	Urban (8)	Large (9)
1A: Male Doctors, Current Workplace Relative to Gynecology									
Non-Gyn x Post	0.14***	0.04	-0.06	0.30**	0.05	-0.07	0.24**	-0.03	-0.24**
	(0.04)	(0.04)	(0.09)	(0.10)	(0.05)	(0.04)	(0.09)	(0.08)	(0.07)
Test Score (%)							0.02***	0.00	0.02**
							(0.00)	(0.00)	(0.01)
Observations	479	479	479	254	254	254	145	145	145
R^2	0.19	0.15	0.26	0.14	0.22	0.20	0.26	0.27	0.27
1B: Male Doctors, Current Workplace Relative to Urology									
Non-Gyn x Post	0.12*	0.04	0.17*	-0.00	0.05	0.10	-0.06	-0.14**	-0.18
	(0.05)	(0.03)	(0.08)	(0.07)	(0.05)	(0.10)	(0.14)	(0.05)	(0.12)
Observations	332	332	332	180	180	180	90	90	90
R^2	0.23	0.18	0.32	0.19	0.23	0.22	0.33	0.37	0.43
2A: Male Doctors, First Workplace Relative to Gynecology									
Non-Gyn x Post	0.01	0.04	-0.02	0.19**	0.09	-0.01	0.23***	0.06	0.00
	(0.06)	(0.05)	(0.10)	(0.06)	(0.07)	(0.03)	(0.05)	(0.11)	(0.03)
Test Score (%)							-0.00	0.01	0.01
							(0.01)	(0.01)	(0.01)
Observations	497	497	497	263	263	263	145	145	145
R^2	0.20	0.16	0.23	0.11	0.14	0.12	0.17	0.29	0.14
2B: Male Doctors, First Workplace Relative to Urology									
Non-Gyn x Post	0.16***	0.07	0.05	-0.06	0.04	-0.02	-0.06	0.07	-0.11
	(0.03)	(0.07)	(0.04)	(0.04)	(0.10)	(0.05)	(0.10)	(0.27)	(0.07)
Observations	350	350	350	189	189	189	90	90	90
R^2	0.26	0.16	0.32	0.18	0.14	0.17	0.23	0.35	0.32
Mean DV	0.50	0.93	0.74	0.50	0.93	0.74	0.50	0.93	0.74
Closer Years	N	N	N	Y	Y	Y	Y	Y	Y
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	N	Y	Y	Y

Note: The table presents the results of estimating **??** for the place of work of male medical doctors in treated fields. All regressions control for age, age^2, grouped speciality, graduation year and survey round fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, all other specialties and no specialty. Stars represent statistical significance, standard errors are clustered at the specialty level. Data are from a survey of Pakistani doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A16: Place of Work, Treated Male Doctors

	Number of Out-Patients (1)	Time per Out-patient (2)	Number Out-Patients (3)	Time Out-patient (4)	Number Out-Patients (5)	Time Out-Patients (6)
Panel 1A: Male Doctors, Total Relative to Gynecology						
Non-Gyn x Post	7.03**	1.02***	10.59*	1.00***	12.72***	0.26
	(2.20)	(0.26)	(5.17)	(0.18)	(1.94)	(0.50)
Test Score (%)					-0.29	-0.10*
					(0.43)	(0.04)
Observations	498	498	263	263	145	145
R^2	0.20	0.17	0.20	0.18	0.39	0.33
Panel 1B: Male Doctors, Primary Practice Relative to Gynecology						
Non-Gyn x Post	1.28	0.20	1.55	-0.02	6.58	-0.43
	(1.73)	(0.19)	(4.53)	(0.24)	(3.50)	(0.23)
Test Score (%)					-0.26	-0.04
					(0.33)	(0.03)
Observations	498	498	263	263	145	145
R^2	0.23	0.14	0.23	0.16	0.39	0.27
Panel 1C: Male Doctors, Secondary Practice Relative to Gynecology						
Non-Gyn x Post	5.75***	0.82***	9.04***	1.03***	6.14	0.68*
	(1.24)	(0.08)	(1.88)	(0.15)	(3.20)	(0.33)
Test Score (%)					-0.03	-0.06**
					(0.17)	(0.02)
Observations	498	498	263	263	145	145
R^2	0.16	0.16	0.14	0.16	0.33	0.31
Panel 2A: Male Doctors, Total Relative to Urology						
Non-Gyn x Post	-6.65	-0.01	-13.46**	-0.29	-6.70	-0.14
	(5.21)	(0.26)	(4.14)	(0.35)	(11.51)	(1.26)
Test Score (%)					-0.39	-0.12**
					(0.68)	(0.05)
Observations	351	351	189	189	90	90
R^2	0.23	0.21	0.24	0.26	0.52	0.47
Panel 2B: Male Doctors, Primary Practice Relative to Urology						
Non-Gyn x Post	-6.27	0.03	-9.95**	0.43**	-9.38	0.39
	(4.49)	(0.14)	(3.81)	(0.16)	(8.90)	(0.63)
Test Score (%)					-0.18	-0.06
					(0.48)	(0.03)
Observations	332	331	180	180	90	90
R^2	0.25	0.18	0.28	0.19	0.47	0.28
Panel 1C: Male Doctors, Secondary Practice Relative to Urology						
Non-Gyn x Post	-0.49	-0.05	-1.18	-0.43	2.68	-0.53
	(0.96)	(0.21)	(0.71)	(0.29)	(3.20)	(0.67)
Test Score (%)					-0.21	-0.06**
					(0.22)	(0.02)
Observations	351	351	189	189	90	90
R^2	0.18	0.17	0.19	0.20	0.52	0.46
Mean DV	30.6	11.7	30.6	11.7	30.6	11.7
Closer Years	N	N	Y	Y	Y	Y
Fixed Effects	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	Y	Y

Note: The table presents the results of estimating **??** for the number of patients consulted by doctors and the time spent on each patient. All regressions control for age, age^2, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Data are from a survey of Pakistani doctors conducted by the authors. Stars represent statistical significance, standard errors are clustered at the specialty level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A17: Output at Primary and Secondary Practice, Male Doctors

	Hours per Week				Consulting	Hours per Week				Consulting
	Practice	Research	Teaching	Two Practices	Hours	Practice	Research	Teaching	Two Practices	Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Male Doctors Relative to Gynecology										
Non-Gyn x Post	-0.20	-0.05	0.05	0.43***	1.11**	0.01	-0.21	-0.19	0.37**	1.10
	(0.19)	(0.19)	(0.13)	(0.08)	(0.37)	(0.19)	(0.24)	(0.20)	(0.11)	(0.58)
Test Score (%)						0.02	0.02	-0.00	-0.01**	0.00
						(0.03)	(0.01)	(0.03)	(0.00)	(0.06)
Observations	254	263	263	254	263	145	145	145	145	145
R^2	0.18	0.27	0.18	0.16	0.19	0.18	0.31	0.19	0.31	0.18
Panel B: Male Doctors Relative to Urology										
Non-Gyn x Post	-0.20	-0.05	0.05	0.43***	1.11**	0.01	-0.21	-0.19	0.37**	1.10
	(0.19)	(0.19)	(0.13)	(0.08)	(0.37)	(0.19)	(0.24)	(0.20)	(0.11)	(0.58)
Test Score (%)						0.02	0.02	-0.00	-0.01**	0.00
						(0.03)	(0.01)	(0.03)	(0.00)	(0.06)
Observations	254	263	263	254	263	145	145	145	145	145
R^2	0.18	0.27	0.18	0.16	0.19	0.18	0.31	0.19	0.31	0.18
Mean DV	40	6.5	7.5	0.34	6.06	40	6.5	7.5	0.34	6.06
Closer Years	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ability Control	N	N	N	N	N	Y	Y	Y	Y	Y

Note: The table presents the results of estimating equation 1 for hours worked. Practice, research and teaching hours are categorical variables where each category represents 20 hours, 10 hours and 10 hours for each variable, respectively. "Two practices" equals 1 if the respondent had a second practice. "Total hours worked" is the sum of hours at the respondent's primary and secondary practices. All regressions control for age, age-squared, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Stars represent statistical significance, standard errors are clustered at the specialty level. Data are from a survey of Pakistani doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A18: Practice Hours, Male Doctors

	Hours Spent Consulting at					
	Primary	Secondary	Primary	Secondary	Primary	Secondary
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Male Doctors Relative to Gynecology						
Non-Gyn x Post	0.14	0.73***	0.09	1.02**	0.07	1.03**
	(0.38)	(0.09)	(0.24)	(0.29)	(0.28)	(0.41)
Test Score (%)					0.06	-0.06
					(0.04)	(0.04)
Observations	498	498	263	263	145	145
R^2	0.18	0.15	0.19	0.13	0.20	0.24
Panel B: Male Doctors Relative to Urology						
Non-Gyn x Post	0.14	-0.07	0.06	-0.43	0.70	-0.08
	(0.45)	(0.12)	(0.49)	(0.23)	(0.76)	(0.68)
Test Score (%)					0.09**	-0.09
					(0.03)	(0.05)
Observations	351	351	189	189	90	90
R^2	0.20	0.17	0.23	0.18	0.33	0.40
Mean DV	32	13	32	13	32	13
Closer Years	N	N	Y	Y	Y	Y
Fixed Effects	Y	Y	N	N	Y	Y
Ability Control	N	N	N		N	Y

Note: The table presents the results of estimating equation 1 for the total number of hours consulting with patients at a primary and secondary practice (where applicable). All regressions control for age, age^2, and survey round fixed effects. Additional fixed effects indicated are graduation year and medical specialty group fixed effects. Specialty groups are: gynecology, cardiology, surgery, medicine, urology, all other specialties and no specialty. Stars represent statistical significance, standard errors are clustered at the specialty level. Data are from a survey of Pakistani doctors conducted by the authors. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A19: Total Consulting Hours, Male Doctors