



# The Most Egalitarian of All Professions: Pharmacy and the Evolution of a Family-Friendly Occupation

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A Most Egalitarian Profession:  
Pharmacy and the Evolution of a Family-Friendly Occupation

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## ABSTRACT

Pharmacy has become a highly remunerated female-majority profession with a small gender earnings gap and low earnings dispersion relative to other occupations. Using extensive surveys of pharmacists for 2000, 2004, and 2009 as well as the U.S. Census of Population, American Community Surveys and the Current Population Surveys, we explore the gender earnings gap, penalty to part-time work, demographics of pharmacists relative to other college graduates and evolution of the profession during the last half century. We conclude that technological changes increasing the substitutability among pharmacists, the growth of pharmacy employment in retail chains and hospitals, and the related decline of independent pharmacies reduced the penalty to part-time work and have contributed to the narrow gender earnings gap in pharmacy. Our findings on earnings, hours of work and the part-time work wage penalty are more consistent with a shift in technology than a shift in demand preferences on the part of workers in a model of equalizing differences. The position of pharmacist is among the most egalitarian of all U.S. professions today.

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## A. Introduction: Evolution of a Family-Friendly Occupation

Employee demand for temporal flexibility has grown, particularly among women. How can a firm, industry or sector employ highly-paid professionals and grant them temporal flexibility without a substantial wage penalty? We show that the occupation of pharmacist changed during the last half century and became a family-friendly profession with a high fraction of women and an ability to work part time with little or no hourly wage penalty. The reasons concern a set of technological changes that enhanced the substitutability of one pharmacist for another and decreased self-employment among pharmacists.

As the fraction female increased, the (full-time equivalent) earnings of pharmacists relative to comparable professionals rose—not fell—for both men and women. As illustrated in Fig. 1, from 1970 to 2010 median earnings of full-time, year-round pharmacists increased relative to physicians, lawyers and veterinarians. In addition, the ratio of female to male pharmacist earnings rose substantially. The female to male ratio for median annual earnings of full-time, full-year workers grew from 0.66 in 1970 to 0.92 in 2010. The current gender earnings gap in pharmacy is now smaller than in almost any other high-wage profession.

Earnings among pharmacists are currently high and largely differ by hours of work. Managers, and even owners, earn more than employee pharmacists largely because they work more hours. Women with children earn less largely because they work fewer hours. Pharmacy earnings today are highly linear in hours and therefore pharmacy has a relatively low career cost of family (Goldin and Katz 2011). But in 1970, pharmacists who worked longer hours made significantly more, the self-employed were far more highly remunerated and women with children earned far less than those without children, even holding hours constant.

Pharmacists' hourly earnings today exhibit very low dispersion, especially considering the high mean. Because of the extensive work flexibility and low pecuniary penalty to short hours, female pharmacists with currently active licenses take little time off during their careers even when they have children.<sup>1</sup> In all of these ways, pharmacy has become one of the most

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<sup>1</sup> Knapp, et al. (1992) analyzes the results of a retrospective survey given to all living graduates of a Midwestern pharmacy school. The use of graduating cohorts, rather than just those with active pharmacy

egalitarian of U.S. professions.

We begin by detailing three production and healthcare changes that are the forces behind the evolution of the pharmacy sector. We provide a brief history of the supply side of the pharmacy sector and long-term trends in practice settings, fraction female, earnings, gender pay gap and hours. The sector today is discussed next: income levels, income dispersion and hours that make it among the most egalitarian professions. We then address why the gender gap in earnings narrowed and is currently low and the role of the linearity of pay with regard to hours. Using data from 1970 and 2010, we estimate changes in pharmacist earnings with regard to hours, self-employment, industry, and family composition. We use a compensating differentials framework to show how the three changes, by enhancing substitutability among pharmacists and greatly reducing the premium to ownership, are largely responsible for the time trends and the current state of the profession. We end with a discussion of the lessons for other professions and why some are similar and some are very different.

## B. Technological, Scale, and Production Changes that Shaped the Evolution

The pharmacy sector was not always family-friendly and egalitarian. Ever since the 1970s the sector has been transformed by three related long-run changes.<sup>2</sup>

The first is an increase in the scope and scale of drug stores. These changes produced an increase in corporate ownership of pharmacies (e.g., CVS, Walgreens and Rite-Aid), a decrease in owner-operated pharmacies, and a decrease in fraction of pharmacists working in independent pharmacies.<sup>3</sup> Changes in the healthcare sector have led to an increase of pharmacists who work in hospitals and an increase, more recently, in pharmacists working in mail-order pharmacies.

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licenses, allows them to measure the shift out of pharmacy as well as out of the labor force. Labor force participation rates of women with pharmacy degrees were substantial at all ages (90 to 97 percent).

<sup>2</sup> Because the changes are technological they should have similar impacts across countries. Regulations, however, differ widely and many nations protect “community” (non-publicly traded) pharmacies. On changes in the United Kingdom that are similar to those in the United States, see Bottero (1992). For a discussion of quotas and other restrictions in France, see Bourdon, Ekeland and Brion (2008). For a comparison of Spain, which requires that pharmacies be owned by the pharmacist, and the United Kingdom, which does not (see Lluch and Kanavos 2010).

<sup>3</sup> “Independent” pharmacies are either standalone or have few stores and are not publicly-traded corporations. “Community” pharmacies are generally independents.

The second change is the extensive use of information technology systems and an increase in prescription drug insurance which have both increased the ability of pharmacists to handoff clients. Improvements in information technology have enhanced the ability of pharmacists to leave a coherent and comprehensive record of each client, increasing their substitutability and reducing consumer preferences for particular pharmacists. Because of the increase in insurance coverage, pharmacists can access the prescriptions of clients through Pharmacy Benefit Managers even if the scripts were not filled at that pharmacy.<sup>4</sup>

The third change is the standardization of pharmacy products and services. Medications have been increasingly produced by pharmaceutical companies, rather than being compounded in individual pharmacies and hospitals. The greater standardization of medications has meant that the idiosyncratic expertise and talents of a particular pharmacist have become less important.

The first set of changes increased the fraction of pharmacists who are employees and managers in the corporate sector and decreased the fraction who are self-employed and work for independent practices. The other two changes make pharmacists better substitutes for each other and enable an almost costless handoff of clients.<sup>5</sup>

Structural changes in pharmacy (and for similar reasons in professions such as optometry) were rooted in major shifts in retailing in America, and elsewhere in the world, that increased the benefits of large scale. It would be hard to assign credit for the spread of Wal-Mart, Target, Costco, CVS, Rite Aid, Walgreens, and other chains that have pharmacies to the particularities of the pharmacy industry or to women's increased numbers in the profession.

### C. Historical Trends in the Pharmacy Sector

#### *Long-run sectoral changes*

Using a large number of sources, we have pieced together a history of the pharmacy sector that shows a decline in the fraction of pharmacists in independent practice and an increase

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<sup>4</sup> The pharmacy industry's layers are many and include manufacturers, wholesalers, insurers (including the government), and Pharmacy Benefit Managers (PBM). Most of these layers are fairly concentrated and some have overlapping ownership. The largest PBMs are Express Scripts and CVS Caremark.

<sup>5</sup> See Goldin (2014) on the importance of handoffs in a model of temporal flexibility and earnings.

of those employed in chain stores and hospitals. Time trends also show the increase of women in the profession and an upsurge in the relative earnings of women to men.

Pharmacists today are found in a variety of sectors, although retail sales (independent plus other retail pharmacies) and hospitals together account for almost 90 percent across all years (see Table 1, cols. 1, 2, 3). In 1966 83 percent worked in retail sales and 8 percent in hospitals but by 2009 59 percent worked in retail sales and 30 percent in hospitals. The relative increase of pharmacists working in hospitals has reinforced two other trends apparent in Table 1, namely the increase of pharmacists as employees rather than as owners (col. 4) and the decrease in the fraction working in independent practice (col. 1).

For the most recent years shown, about 5 percent of pharmacists were self-employed (owners or partners), whereas more than 35 percent of were self-employed in 1970 and 40 percent were in 1966 (see Table 1, col. 4). For those older than 40 years in the 2000s, men were owners at four times the rate for women (14 percent versus 3.4 percent).<sup>6</sup>

The trend toward relatively fewer self-employed pharmacists also produced fewer pharmacists employed by independent pharmacies. The fraction employed by independents (as owners, partners and employees) declined from more than 75 percent in the late 1950s to 40 percent in 1980 to just 14 percent in 2009 (see Table 1, col. 1 and Fig. 2).

Increased pharmaceutical employment in large corporations such as chain stores, supermarkets and mass merchandizing has been the main reason for these changes. Interestingly, the size of the prescription department, given by the number of pharmacists and technicians employed, differs little between the independents and the corporate retailers although mass merchandisers and hospitals have larger prescription setups. About 45 percent of pharmacists in both independent practices and corporate retail stores report being the sole pharmacist on duty and another 40 percent or so report being one of two pharmacists.<sup>7</sup> The larger scale of the corporate retailers comes from aggregating all the pharmacies of a chain and also from the larger array of non-pharmacy items in each store.

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<sup>6</sup> These data come from the Pharmacist Workforce Surveys (PWS), which we later present and use.

<sup>7</sup> Computed from PWS data.

The decline in ownership, the decrease of employment in independent pharmacies and the rise of employee status stem largely from the first of the industry changes mentioned earlier involving the increased scale and scope of drug stores.

Owners of independent pharmacies receive a premium to compensate them for added risk, responsibility and time demands. The decrease in the fraction of owners means that relatively fewer pharmacists receive the ownership premium and that longer hours became less valuable. The annual earnings premium to ownership today, we will show, is about 47 log points, but the current ownership premium is primarily due to the greater hours worked by owners. Using Census data we show that self-employment for pharmacists commanded an earnings premium of 16 log points in 1970 but none today (given hours worked for both).<sup>8</sup>

The fraction of pharmacists who work part-time has greatly increased from around 9 percent in 1970 to about 17 percent today (Table 1, col. 5). But almost all of the change has been compositional, driven primarily by the rising share of women in the pharmacy profession (Table 1, col. 7). Female pharmacists in past decades were employed part-time to a greater extent than they are today (Table 1, col. 6). They often located part-time work in independent pharmacies as assistants to the owner, and their earnings were considerably less than those of the owners who were the residual claimants (Henderson 2002). Changes in ownership and employee status are likely to have decreased the costs of temporal flexibility and therefore increased the ratio of female to male earnings since women had a greater demand for the amenity.

#### *Pharmacist training and regulations*

To practice pharmacy in the U.S. today involves a six-year pharmacy course in a college or university resulting in a PharmD, practical experience and licenses.<sup>9</sup> Pharmacy instruction was once based in medical colleges but shifted in the 1800s to pharmacy schools. After the 1880s, pharmacy programs were established mainly within colleges and universities. Ever since 1932 the pharmacy curriculum has been specified by the American Council on Pharmaceutical

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<sup>8</sup> The self-employment measure in Census data is likely less accurate than the ownership measures in our surveys of active pharmacists for the 2000s.

<sup>9</sup> A PharmD can be obtained after a BA or BS from a non-pharmacy school, but the program is generally another four years. The combined PharmD undergraduate and graduate programs are six years.



Education (ACPE), which also accredits pharmacy colleges and programs. Program length is recommended by the American Association of Colleges of Pharmacy (AACP).<sup>10</sup>

In 1907 a two-year program was prescribed by the AACP, which was increased to three years in 1925 and then to four in 1932. In 1960 a five-year BS program was recommended and a six-year combined BS and PhD program, known as the PharmD, was proposed in 1992. In 1997 the ACPE adopted accreditation standards requiring the PharmD and the last five-year BS for pharmacy graduates was granted to the class of 2005. In the Pharmacist Workforce Surveys that we will use 83 percent of those who received their first licenses after 2000 earned a PharmD, whereas 30 percent did who received their first licenses in the 1990s and just 15 percent did who were first licensed in the 1980s.

The demands for pharmaceuticals and pharmacists have greatly increased in recent years with an aging population, Medicare Part D drug coverage, and the expanded use of prescription drugs for a host of chronic diseases. As the demand for pharmacists has increased, the numbers of pharmacy schools and students per school have as well. From 2000 to 2010 the number of schools granting a pharmacy degree increased by 22 percent (from 82 to 100) and total degrees increased by 58 percent (from 7,260 to 11,487).<sup>11</sup>

#### D. Pharmacy Today: Demographic Aspects and Earnings

##### *Pharmacist Workforce Surveys (PWS): 2000, 2004, and 2009*

To better understand the pharmacy sector today, we use individual micro-data from surveys devised by the Midwestern Pharmacy Research Consortium for the years 2000, 2004, and 2009 covering about 5,300 pharmacists with active licenses.<sup>12</sup> The surveys were mailed in each of the years to a randomly chosen group of about 4,500 currently licensed pharmacists. Usable response rates were around 40 percent in each year with quite similar response rates by

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<sup>10</sup> It probably has been ever since the inception of the AACP in 1900. For a history of pharmacy see Kremers, et al. (1986) and Henderson (2002).

<sup>11</sup> These data are from compilations by the AACP, <http://www.aacp.org/about/Pages/Vitalstats.aspx>. The total number of schools increased by 44 percent (from 82 to 118) because 18 had been established in the previous five years but were not yet granting degrees.

<sup>12</sup> Tabulations are in three reports (Midwest Pharmacy Research Consortium 2000, 2005, 2010).

gender.<sup>13</sup> Most of our analyses aggregate the data across years. The data set is termed the Pharmacist Workforce Survey (PWS) and is described in the Data Appendix.

Each of the surveys contains detailed economic information including income from primary and other jobs, bonuses, overtime, hours, weeks, and job experience. Data on education includes post-secondary degrees in pharmacy and other fields. The dates and states of pharmacy licensing are included. Demographic variables include race, ethnicity, marital status, and numbers and ages of children.<sup>14</sup> The three surveys are nearly identical but that for 2009 contains richer information on all job changes during the individual's career.

### *Pharmacist characteristics and practice settings*

The most important demographic change among pharmacists is the increased fraction female. Women were about 8 percent of all pharmacists in 1960 and are about 55 percent today (Table 1, col. 7). The fraction female among pharmacy school graduates increased from 14 percent in the mid-1960s to about 65 percent today (see Fig. 3).

Female pharmacists marry at about the same rate as male pharmacists and have about the same number of children. The fraction of female pharmacists without children by their forties is about 21 percent, which is lower than for other female graduates of four-year colleges in that age group.<sup>15</sup> The fraction of pharmacists 25 to 44 years old who have ever married is somewhat greater for women than men (Table 2). Although the fraction of women 25 to 44 years old without children is higher than for men, the fraction without children in their early forties is more similar (0.18 for men and 0.21 for women). It is likely that the main reason that female and male pharmacists have similar numbers of children is that pharmacy is enabling of family.

The PWS data for 2009 allow the computation of spells out of the workforce and the

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<sup>13</sup> The usable response rates ranged from 34 percent in 2004 to 43 percent in 2000 to 52 percent in 2009. There are no statistically significant differences in response rates by gender in the PWS in 2000 and 2004, the two years for which the survey documentation provides such analyses (Midwest Pharmacy Research Consortium 2000, 2005, 2010).

<sup>14</sup> The 2009 survey includes only children living at home.

<sup>15</sup> Among all U.S. BA women 40 to 44 years old in 2008, 22.8 percent never had children (from CPS, see <http://www.census.gov/prod/2010pubs/p20-563.pdf>). Pharmacy survey data gives 21.0 percent excluding 2009 and 20.2 percent including 2009 (for currently employed pharmacists). The CPS data refer to biological children; the pharmacy surveys could include adopted and step-children.

reason why employment was terminated.<sup>16</sup> Even though more female than male pharmacists experienced a nonwork spell, the average spell was fairly brief. Among those with active pharmacy licenses 13.9 percent of women (5.1 percent of men) ever had a spell out of the workforce. The median cumulative time out for those of all ages who had at least one nonwork spell was 2.4 years for women and was 2.1 years for men. The means were 4.4 and 4.8 years for women and men respectively. Although these data are based on small samples because of the low fraction who ever took time out, they are suggestive that female pharmacists do not take much time out and conditional on taking out time, took about the same as male pharmacists.

The fact that the PWS data are limited to those with active pharmacy licenses could bias the data on labor force persistence for female pharmacists, but information from the American Community Surveys (ACS) on field of degree suggests otherwise. Among women 25 to 64 years old with at least a bachelor's degree in the 2009, 2010 and 2011 ACS, those with a degree in pharmacy had a participation rate of 86.0 percent as compared with 81.3 percent for other college graduate women.<sup>17</sup> Among college graduate women aged 35 to 39 years, the participation gap favoring pharmacy graduates over other fields was even greater (88.3 percent versus 82.1 percent). An unusually high fraction of women with pharmacy degrees persist in the labor force.<sup>18</sup> Rather than taking time off or dropping out, they work part-time.

Practice settings today are fairly similar between men and women with the largest differences that men are found more in independent practice, largely because they are disproportionately the owners, and women are found more in hospital settings (Table 2). Men are more likely than are women to be managers.

### *Earnings levels, change and dispersion*

Not only are female pharmacist earnings relatively high compared with male pharmacist

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<sup>16</sup> Respondents were asked to record the starting and ending dates of all employments since obtaining their pharmacy license and to include periods of non-employment. They were also asked the reasons employment was terminated and the individual was not in the labor force during a spell.

<sup>17</sup> A regression of an indicator for labor force participation on an indicator for a bachelor's degree in pharmacy yields a 4 percentage point gap relative to other college graduate women aged 25 to 64 (a coefficient of 0.040 with a standard error of 0.0058) conditioning on a full set of single-year age dummies and year dummies in the pooled 2009 to 2011 ACS samples.

<sup>18</sup> See also Knapp et al. (1992) for data on those with pharmacy degrees in any employment.

earnings, pharmacist earnings are currently high for both men and women compared with all comparable professions. For full-time, year-round workers in only seven other detailed occupations does the median male worker earn more and in only two others does the median female worker earn more.<sup>19</sup>

Pharmacist earnings have risen relative to most other health care professionals ever since the late 1990s.<sup>20</sup> From 1999 to 2013 pharmacist median annual earnings increased relative to 39 out of the 40 health care professions (that are not top-coded in both years) listed in the BLS Occupational Employment Statistics (BLS-OES).<sup>21</sup> In 1999 pharmacist earnings were 1.15 times chiropractor earnings, for example, but were 1.83 times that in 2013. Pharmacist earnings were 0.87 of optometrist earnings in 1999 but were 1.18 times higher in 2013, and pharmacist earnings rose relative to the four physician specialties in the OES (that do not have top-coded median annual earnings) including internists, pediatricians, and psychiatrists.

Pharmacy is an egalitarian occupation especially given its high average earnings. According to the May 2011 BLS-OES, pharmacists have the lowest wage dispersion of all occupations with earnings exceeding \$60,000 per year (or more than \$40 per hour), where wage dispersion is measured either by the ratio of earnings at the 90<sup>th</sup> percentile relative to that at the 10<sup>th</sup> percentile or similarly for the 75<sup>th</sup> and the 25<sup>th</sup> percentiles.<sup>22</sup> In fact the level for pharmacists would be twice the actual, if one used data on the 800 or so occupations in the OES and predicts wage dispersion on the basis of average earnings. Pharmacist earnings have the lowest dispersion among any of the healthcare occupations.

#### E. Earnings by Sex, Hours and Compensating Differentials

##### *Gender earnings gap in pharmacy*

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<sup>19</sup> The two higher paid occupations for women are nurse anesthetists and physicians. *Source*: 2010 ACS.

<sup>20</sup> Census and ACS data from 1950 to 2010 show that, relative to physicians, pharmacist earnings first declined and then increased. The increase from 1990 to the present has brought the ratio of their median earnings for males back to approximately its level in 1950 (0.57).

<sup>21</sup> [http://www.bls.gov/oes/current/oes\\_nat.htm](http://www.bls.gov/oes/current/oes_nat.htm) was used for 2013 and [http://www.bls.gov/oes/1999/oes\\_nat.htm](http://www.bls.gov/oes/1999/oes_nat.htm) was used for 1999. Only Radiology Therapists, a lower-paying healthcare occupation, had earnings that rose a bit faster from 1999 to 2013.

<sup>22</sup> Tabulations from the National Cross-Industry Estimates of the May 2011 Occupational Employment and Wage Estimates available at [http://www.bls.gov/oes/2011/may/oes\\_nat.htm](http://www.bls.gov/oes/2011/may/oes_nat.htm).

Another aspect of the egalitarian nature of pharmacy is its low gender wage gap. To understand the factors that make this occupation different from many others, we examine the gender gap for currently practicing licensed pharmacists using the Pharmacist Workplace Surveys for 2000, 2004, and 2009.<sup>23</sup> We estimate a standard log earnings equation with (log) hours, (log) weeks, dummies for position (owner, manager, employee) and sector (chain, independents, hospital, other), education (graduates degrees), age as a quadratic, and whether the person has a child.

The raw annual earnings gender gap given in Table 3 col. (1) is 27 log points, using data pooled across the three years. The addition of log hours per week and log weeks worked to the log annual earnings regression reduces the gender earnings gap from 27 to 7.6 log points (col. 2) demonstrating that the gender gap in annual earnings for pharmacists largely reflects differences in hours worked. The specification in col. (2) may understate the role of hours worked with downward biased estimates on the log hours per week and log weeks coefficients because of measurement error in self-reports of hours and weeks worked. The specification in col. (3) addresses this issue by restricting the coefficients on log hours and log weeks in col. (2) to be one. In that specification the gender gap in log hourly earnings is just 4.7 log points.

The shorter work week of female pharmacists is the largest single component of the gender earnings gap. Female pharmacists in our earnings sample work 6.6 fewer hours per week than male pharmacists (36.6 for women per week and 43.2 hours for men) for a 20 log point gap and work 0.7 fewer weeks per year (47.5 weeks for women and 48.2 for men) for a 2 log point gap. Thus, the overall 27 log point annual gender earnings gap consists of 20 log points from gender differences in hours per week and 2 log points from differences in weeks worked per year. The remaining 4.7 log points constitute the hourly wage gap.

We next examine the gender earnings gap conditional on covariates to control for differences in educational attainment, race and ethnicity, potential labor market experience (through a quadratic in age), ownership of a pharmacy and managerial responsibilities, and sector of employment (retail chain, independent pharmacy, hospital, or other setting) in Table 3,

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<sup>23</sup> Related analyses of the gender earnings gap in other professions include Wood, Corcoran and Courant (1993) for lawyers, Bertrand, Goldin and Katz (2010) for MBAs, and Sasser (2005) for physicians.

cols. (4) to (6). The addition of these covariates modestly reduces the gender annual earnings gap from 27 log points to 23.5 log points in the specification without controlling for hours and weeks worked (col. 4) largely because women are more likely to be employees and less likely to be owners or managers (see Table 2). A substantial annual earnings premium is apparent for owners (47 log points) and managers (24 log points) when not controlling for hours. The addition of hours and weeks (col. 5) reduces the owner and manager premium substantially, as does the estimation using hourly earnings. In the hourly estimation, owners earn 5 log points more than employees and managers just 3 log points more.

Differences in age and labor market experience between men and women play no role in the estimated gender earnings gap since there appears to be little labor market return to experience. There is a relatively flat age-earnings profile for licensed pharmacists in the PWS samples. The additional covariates only slightly reduce the gender earnings gap once one controls for hours and weeks (compare cols. 5 and 6 with cols. 2 and 3).

Substantial gender differences in pharmacists' hours worked and in earnings are only apparent for those with children.<sup>24</sup> The gender earnings gap for those without children is 3 log points even without controlling for hours, but the gender earnings gap is 33 log points for those with children (col. 7). In specifications controlling for hours and weeks, the gender earnings gap for those without children is only 1 log point (cols. 8 and 9). Differences in hours worked by sex substantially explain the much larger gender earnings gap for those with children.

Our findings from the PWS are similar to those we find using the ACS for 2009 to 2011. The samples may be somewhat different because the former refers to currently employed pharmacists with active licenses whereas the latter are for individuals who list themselves as employed pharmacists. Using the data from the ACS we find a gender earnings gap of about 25 log points for annual earnings in models controlling for a quadratic in age and dummy variables for educational attainment, race and ethnicity, broad sector and year. Further controls for hours and weeks reduces the gender gap to 7 log points.<sup>25</sup> The results from the rich data in the PWS

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<sup>24</sup> Regressions in Table 3, cols. (7) to (9) are run on only the 2000 and 2004 samples because only the 2009 survey asked about children living at home. Results for cols. (1) to (6) run over the restricted sample produce similar gender differences to those given in Table 3 for the full sample.

<sup>25</sup> The regression sample includes all 8,297 individuals in the 2009, 2010, and 2011 ACS PUMS listing

can be largely replicated using a pharmacy subsample in a nationally representative survey.

The gender earnings gap for pharmacists principally reflects differences in hours worked by male and female pharmacists. These differences in hours for women are strongly related to the presence of children. Owners and managers earn more largely because they work more hours. The number of hours worked is decisive for almost all differences in pharmacy earnings.

#### *Pharmacist hours and part-time employment*

Although male and female pharmacists have similar hours of work at the start of their professional lives, hours for women soon decline (see Fig. 4.A). Total hours for men average around 45 per week whereas they are about 37 for women from their early thirties.<sup>26</sup> Hours of work for pharmacists are relatively low given the income ranking of the profession.

Among women who have children of any age hours of work in the primary job are around six to ten hours lower than for women without children, until the women are in their fifties (see Fig. 4.B). Although hours are lower for women with children than for those without, they are lower for women without children than for all men suggesting that female pharmacists work fewer hours for reasons other than taking care of their children.<sup>27</sup>

Part-time work (fewer than 35 hours per week) in all jobs worked by currently licensed pharmacists is about 6 percent for males and 9 percent for females at the start of their careers (see Fig. 4.C).<sup>28</sup> The fraction part-time falls to about 5 percent for males and rises to around 36 percent for females. For women with children the fraction working part-time at all jobs remains above 40 percent until they are in their late forties showing that those who work part-time when their kids are young continue to do so later in life.

It will be recalled, from Table 1, that the fraction of women working part-time has always been high in pharmacy and probably decreased somewhat over time. The barrier to female

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pharmacy as their current occupation with positive weeks worked in the past year and non-outlier earnings (implied hourly earnings between \$6 and \$300 an hour).

<sup>26</sup> Total hours in pharmacy employment include time spent working in the primary job plus overtime in that position and hours in all secondary positions.

<sup>27</sup> The sample of women without children at older ages is small.

<sup>28</sup> The fraction working part-time across all employments is lower than for the primary job only.

employment in pharmacy in the past was that the earnings penalty to working part-time was large, not that part-time work was difficult to find. The part-time and lower-hours penalty dropped when most pharmacists became employees and few were owners.

The ratio of male to female (mean) earnings for full-time, year-round pharmacists in 1970 was 1.67 (see Table 1, col. 9). Women gained on men over time and by 2011 the ratio had fallen to 1.16. The ratio for median earnings of male to female full-time, year-round pharmacists was 1.52 in 1970 but 1.10 in 2011. The change from 1970 to the present is fairly continuous. Including the part-time and part-year group would increase the female disadvantage at the start relative to the end of the period and produce a larger narrowing of the gender earnings gap.<sup>29</sup>

One factor that enables pharmacy have a low earnings gender gap today is that its remuneration is fairly linear with respect to hours and weeks. In contrast, many lawyers and those employed in the corporate and financial sectors are rewarded considerably more if they work long hours and their earnings are non-linear (convex) with respect to hours worked (Bertrand, Goldin and Katz 2010; Goldin 2014; Goldin and Katz 2011).

The changes in the organization of the pharmacy industry that reduced importance of independent pharmacies and ownership and increased employee status may have enabled lower hours for pharmacists but, according to some in the business, have produced increased workloads per hour and worker stress.<sup>30</sup> The PWS asked questions on workloads, including prescriptions filled per day or week and the perceived work level. For both males and females workloads as measured by prescriptions filled are lower for independents and supermarkets and highest for chains, mass merchandisers and hospitals. The workload at the independents is around 15 to 40 percent higher than for the chains.<sup>31</sup> Workloads and the perception of the load do not differ much by gender. Job satisfaction is highest for those at the independents and lowest at the mass merchandisers. About two-thirds of pharmacists in the chains are reasonably content and female

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<sup>29</sup> In fact, the ratio for median (mean) annual earnings of all male to all female pharmacists with positive earnings including the part-time and part-year workers fell from 2.07 (2.04) in 1970 to 1.11 (1.23) in 2011 using the 1970 Census and 2011 ACS public use samples.

<sup>30</sup> See, for example, Miller (2012).

<sup>31</sup> Prescriptions filled per day are available for 2004 only. Active pharmacist males working for a chain filled 165 and females filled 159. Those in supermarkets filled 119 for both males and females. Non-owner men in independents filled 125 and non-owner women filled 138.



pharmacists are generally more content than are male pharmacists in the same work setting.

### *Hourly wage penalty to part-time employment*

We have shown that pharmacy is a fairly egalitarian occupation with only modest hourly wage premia for ownership and managerial responsibilities. We now examine the hourly wage penalty to working part-time (fewer than 35 hours per week) for pharmacists. We limit the PWS sample to those directly reporting hourly earnings and weekly hours to avoid measurement error (division bias) problems.<sup>32</sup>

The 2000 and 2004 PWS allowed respondents to report earnings in their preferred manner. The majority of the respondents (59 percent overall: 56 percent of males and 63 percent of females) directly reported hourly earnings. Col. (1) of Table 4 repeats the log (hourly earnings) regression specification in col. (6) of Table 3 adding a part-time work indicator variable and restricting the sample only to those reporting hourly earnings. The gender hourly earnings gap narrows to 2.5 log points for this sample and the part-time hourly earnings penalty is nonexistent.<sup>33</sup> The part-time hourly earnings penalty is also essentially zero when looking only at female pharmacists in the 2000 and 2004 PWS (col. 2). More generally (in unreported regressions) we find no significant systematic relationship between hourly earnings and weekly hours for pharmacists who directly reported hourly earnings.

Is pharmacy an occupation with a low penalty for part-time work in comparison with other occupations? The question is addressed here using the point-in-time information on hourly wages for workers paid by the hour, weekly earnings for all wage and salary workers, and usual weekly hours in the large nationally-representative Current Population Survey Merged Outgoing Rotation Group (CPS MORG) samples for 2005 to 2013.

We first explore the gender hourly earnings gap and part-time wage penalty for pharmacists and other college graduate wage and salary workers. Because most college graduates are salaried workers and do not report an hourly wage in the CPS, we use the log of

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<sup>32</sup> These problems arise from using constructed hourly earnings from retrospective reports of annual earnings, hours, and weeks worked.

<sup>33</sup> There is enough precision to rule out even a 2 log point wage penalty for part-time work.

constructed hourly earnings, that is log (weekly earnings/usual weekly hours), as the dependent variable in Table 4, cols. (3) to (5) to compare pharmacists with all other college graduates.

The estimates in col. (3) indicate a 26 log point part-time work penalty and 19 log point gender hourly earnings gap for non-pharmacist college graduates and a much smaller part-time penalty (6 log points) and gender earnings gap (9 log points) for pharmacists. The addition of a full set of detailed (three-digit) occupation dummies in col. (4) reduces the non-pharmacist part-time wage penalty to 14 log points and gender earnings gap to 13 log points.<sup>34</sup> But the substantially smaller part-time work and gender hourly earnings penalties for pharmacists remain intact. A part-time work penalty is nonexistent for female pharmacists (see col. 5) but is almost 21 log points for other female college graduates. Similarly, a much smaller part-time work penalty and gender hourly earnings gap for pharmacists than other occupations and no part-time wage deficit for female pharmacists are found when we use the log (hourly wage) based on direct reports for current hourly wages for workers paid by the hour in the CPS (see cols. 6 to 8).

The part-time wage penalty for pharmacists, as we have shown, is small in recent data. We now show that it has declined since 1980, using the earliest CPS MORG samples for 1979, 1980, and 1981. In col. (9) of Table 4, in a regression analogous to that of col. (7) with a full set of occupation dummies, we find no significant difference in the part-time wage penalty for non-pharmacist hourly workers (14 log points) and hourly pharmacists (14 log points) around 1980. We should note that one cannot rule out a modestly lower part-time wage penalty for pharmacists in 1980 given the modest sample size of hourly pharmacists and imprecision of the estimates.<sup>35</sup> We similarly find no significant difference in the part-time wage penalty for non-pharmacist college graduates (10 log points) and pharmacists (11 log points) using the 1979-81 CPS data in a specification analogous to col. (4) of Table 4. Thus, the part-time wage penalty for pharmacists has shrunk and essentially disappeared for female pharmacists during the last three decades during which pharmacy employees became better substitutes for each other with improved information technology and more standardized products, whereas a substantial part-

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<sup>34</sup> This specification has greater comparability to the within-occupation analysis for pharmacists in Table 4, col. (1).

<sup>35</sup> The low gender hourly earnings gap in pharmacy for hourly (as well as for wage and salary) workers in 1979-81 partially reflects the large share of high-earning male pharmacists who were self-employed and do not report earnings the CPS Outgoing Rotation Group samples.

time wage penalty has persisted for other comparable workers.

*Changing roles of hours, self-employment and family among pharmacists, 1970 to 2010*

We showed in Table 1 that the gender earnings gap among (full-time, full-year) pharmacists decreased considerably since the late 1960s along with the fraction self-employed and working in independent practice. The implication of our explanation for these changes is that the premium to working longer hours should have greatly decreased over the ensuing decades. Whereas longer hours in 1970 should have increased earnings by a lot, longer hours today should not be as remunerative. In addition, since women with children, particularly younger children, would have a greater demand for temporal flexibility, the penalty to them should have been greater in the past. We now demonstrate these time trends in Table 5 using the 1970 U.S. Census and the 2009-2011 American Community Surveys for all employed pharmacists (not just those working full-time and full-year).<sup>36</sup>

The pharmacy profession looked quite different in 1970 than it does today. Women were 11 percent of pharmacists in 1970 as compared with 56 percent in 2010 among those 25 to 64 years old with at least a bachelor's degree. One third of pharmacists were self-employed in 1970 and less than 5 percent were in 2010. And over 82 percent of pharmacists worked in retail stores in 1970 versus 61 percent in 2010. The difference in self-employment for male and female pharmacists was large in 1970 (36.4 percent for males versus 7.7 percent for females) and modest in 2010 (7.7 percent for males versus 2.2 percent for females). In 1970 male pharmacists worked about 10 hours more per week than did female pharmacists (45.6 versus 35.7 hours) but just 4 hours more in 2010 (41.6 versus 37.3 mean usual weekly hours).<sup>37</sup>

The gap in annual earnings between male and female pharmacists in 1970 was a whopping 80 log points (Table 5, col. 1) controlling for basic demographics and educational

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<sup>36</sup> We focus on pharmacists 25 to 64 years old with at least a bachelor's degree for comparability across the long time span covered and to avoid retirement issues.

<sup>37</sup> The 1970 Census only provides categorical information on hours worked last week and does not have information on usual weekly hours for the previous calendar year. The 1980 Census has continuous measures of both hours worked last week and usual weekly hours last year. We impute usual weekly hours for the 1970 Census using the mean usual weekly hours in each discrete category for hours worked last week from the 1980 Census 5 percent public use sample.

attainment, and 75 log points (col. 2) when differences in sector and self-employment are added. The gender earnings gap falls to 34 log points when hours and weeks are added (col. 3). The gap was much larger for mothers (47 log points relative to fathers) than for women without children (18 log points relative to men without children) in 1970 (col. 4). Note, as well, that the self-employed in 1970 earned about 15 log points more than other pharmacists even conditioning on hours worked.

These results change radically in 2010 reflecting the much smaller gender differences in hours worked and lower returns to long hours and self-employment. The basic annual gender earnings gap much smaller, only 23 log points (col. 5), and the addition of hours and weeks yields just a 7 log point gap (col. 7). Furthermore, once hours are included, the presence of children for a woman no longer significantly expands the gender earnings gap (col. 8). In addition, the self-employed earn no more than other pharmacists, once hours worked is included.

In 1970 a female pharmacist with a child earned 46 log points less than a male pharmacist with a child (and 37 log points less than a male pharmacist without a child) even with hours, sector and self-employment status held constant. But in 2010 a female pharmacist with a child earned only 8 log points less than a male pharmacist with a child (and had almost identical earnings to a male pharmacist without a child) given hours, sector and self-employment status.

#### *Pharmacist versus other college graduate earnings and gender gaps in pay*

We now look at the earnings premium to being a pharmacist or having a pharmacy degree relative to other college graduates using the large and nationally representative 2009, 2010, and 2011 ACS public use samples. The 2009 to 2011 ACS samples provide information on the detailed field of undergraduate degree for all individuals with at least a bachelor's degree. The ACS samples are well suited for examining earnings differences among full-time, year-round workers since information is given on annual earnings and usual weekly hours in the past year, but the ACS has only categorical information on weeks worked in the previous year.

The log (annual earnings) regression for full-time, full-year college graduates, ages 25 to 64 in col. (1) of Table 6 shows a substantial earning premium of 25 log points for male pharmacy bachelor's degree holders in comparison with other college graduates (conditional on potential

experience, higher degrees, race and ethnicity). The premium for female pharmacy bachelors is 36 log points.<sup>38</sup> These results imply an 11.5 log point smaller conditional mean gender earnings gap for pharmacy bachelor's relative to other college graduates (17 versus 28 log points). The lower dispersion in earnings for pharmacists means the earnings premium for pharmacy bachelors is even larger and the gender earnings gap smaller when examining conditional median earnings differences in a median (quantile) regression. The gender earnings gap remains significantly smaller for pharmacy bachelors (by 7 log points) than other college graduates even for within field-of-degree comparisons (see col. 3).

The high earnings premium for pharmacy degree holders is substantially driven by individuals employed as pharmacists, particularly for women. The specification in col. (4) shows that the earnings premium for pharmacy bachelors is lower for those not working as pharmacists and that the earnings premium for working as a pharmacist is large, especially for women (18 log points for men and 39 for women).

The specifications in cols. (5) to (7) of Table 6 explore the earnings premium and gender earnings gap for pharmacists relative to other college graduates in specifications that do not include field of degree controls. The gender earnings gap is much smaller for pharmacists than for other college graduates. Even using within-occupation comparisons, the gap remains 18 log points for non-pharmacists and is less than 10 log points for pharmacists (col. 7).

The bottom line from our exploration of earnings by field of degree and occupation in the 2009 to 2011 ACS is that male and female pharmacy degree holders earn substantially more than other college graduates with comparable advanced degrees and potential experience. The earnings premium to a pharmacy undergraduate degree largely reflects the returns to working in the pharmacy field. The gender earnings gap, moreover, is significantly smaller in pharmacy than in almost any other college graduate field.<sup>39</sup>

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<sup>38</sup> Altonji, Blom and Meghir (2012) similarly find that pharmacy bachelor's degree holders have the sixth highest earnings for men and fifth highest earnings for women out of 171 detailed field-of-degree categories for full-time, full-year college graduates, 23 to 59 years old in specifications controlling for potential experience, higher-degree dummies, and race in the 2009 ACS. And female pharmacy degree holders have the highest earnings for any degree field with a significant female presence.

<sup>39</sup>The immigrant share of pharmacists of 22.1 percent is higher than the overall immigrant share for U.S. college graduates (working full-time, full-year) of 15.6 percent in the 2009 to 2011 ACS. The immigrant

Pharmacy is an egalitarian occupation not only by gender. It also has smaller racial and ethnic wage differentials than are typical for college graduates.<sup>40</sup> Although women have flocked to pharmacy in recent decades, tabulations from the 2009-11 ACS indicate that blacks and Hispanics are underrepresented in pharmacy relative to their overall share of college graduates. The black and Hispanic representation in pharmacy, however, is similar to that in other healthcare professions requiring graduate training.

We also observe in Table 7 how pharmacy has evolved into a distinctive profession for college graduates. In 1970 male pharmacists typically worked longer hours than other male college graduates (45.6 hours per week versus 42.0 hours per week) and were far more likely to be self-employed (36.4 percent versus 14.5 percent).<sup>41</sup> But male pharmacists in 1970 did not earn much more than other comparably-trained college graduates (col. 1) and actually had an earnings deficit after conditioning on self-employment and hours worked (cols. 2 and 3). The gender earnings gap was only modestly lower in pharmacy than for other college graduates (col. 1), and female pharmacists with children were heavily penalized for their shorter hours (col. 4).

By 2010 each of these features had dramatically changed. Male pharmacists now work shorter hours on average than other male college graduates (41.6 versus 44.4 hours per week) and are less likely to be self-employed. Pharmacists (especially female pharmacists) currently receive a large earnings premium relative to other college graduates and the child penalty for women is lower in pharmacy than in other professions, as seen in cols. (5) to (8) of Table 7.<sup>42</sup>

#### F. Why the Evolution in Pharmacy Relatively Benefited Women: The Compensating Differentials Framework

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share is greater for female pharmacists (24.9 percent) than for male pharmacists (19.2 percent). But the smaller gender earnings gap in pharmacy than in other highly-education occupations does not reflect an immigrant composition effect. The findings in Table 6 of a much smaller gender earnings gap and large wage premium for pharmacists are almost identical when controlling for immigrant status and an interaction of immigrant and female, or when restricting the sample to U.S. natives.

<sup>40</sup> The black-white earnings differential in pharmacy is 0.130 log points narrower (with a s.e. of 0.039), and the Hispanic-white earnings differential is 0.084 log points narrower (with a s.e. of 0.047), from regressions analogous to col. (5) of Table 6 (using the 2009 to 2011 ACS) expanded to include interactions of “pharmacist” with the race and ethnicity dummies.

<sup>41</sup> These tabulations are from the 1970 Census for employed college graduates 25 to 64 years old.

<sup>42</sup> The same pattern of little difference in the gender earnings gap in pharmacy versus other occupations for college graduates in 1970 and a much narrower gender gap in pharmacy in 2010 is found in specifications including three-digit occupation dummies (using 1990 Census occupation codes).

We have emphasized the roles of various exogenous technological and production changes in the evolution of the pharmacy profession and have downplayed the increased supply of women and changing preferences among pharmacists. The compensating differentials framework is a useful tool for understanding the roles of supply and demand in determining the price of the amenity—temporal flexibility.

Workers sort across occupations and firms because of differences in their preferences for workplace amenities that enable career-family balance. Occupations with a lower cost of workplace flexibility will be demanded relatively more by workers, such as women, who disproportionately value it.

Temporal flexibility in the workplace is an amenity that often entails a wage price to the worker and a cost to the firm. The price of workplace flexibility to the worker will depend on the cost to the firm due to job interruptions, short weeks, part-time work and work flexibility during the day. Self-employment in professions with office practices (e.g., dentists) or in retail sales (e.g., pharmacists) often requires more hours of work from the owner because of classic agency problems. On the supply side, firms face different costs of providing these amenities.

The choice that employees make is not simply between having workplace flexibility and having none. Instead, they chose how much to “pay” for the amenity. Employees differ in their demand for workplace flexibility and thus their willingness to pay for it. The equilibrium cost of workplace flexibility is the tradeoff between earnings and the amenity. It derives from the supply and the demand for the amenity. The labor market equilibrates the two sides of the market (the demand for the amenity and the supply of it) and generates different amounts of the amenity and its costs.

The framework of compensating differentials (also known as equalizing differences) is implicit in our work.<sup>43</sup> It reveals the impacts of demand-side changes by workers concerning their willingness to pay for the amenity and supply-side changes by firms regarding the shifting costs of providing the amenity. The two types of changes have different effects on relative earnings and allow us to discriminate between whether the changes we observe were caused

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<sup>43</sup> See Rosen (1986). The full model is in the Theory Appendix.

largely by changes in tastes or changes in the production technology.

On the supply side of the market firms are assumed to be heterogeneous in the productivity benefit of the disamenity and thus in the costs of getting rid of it. For some firms (or sectors) the provision of part-time work or temporal flexibility is not costly whereas for others it is. In equilibrium the supply of the amenity is equal to the demand for the amenity at the going wage differential.

Two main changes can alter the equilibrium. The first is a labor supply shift. An influx of women (who are assumed to be more willing than men to pay for the amenity) into an occupation will mean that, at the going wage differential, the demand for the amenity will exceed supply and the price of the amenity will rise. A larger wage differential between jobs with and without the amenity will result, the fraction of jobs offering the amenity will increase, and the fraction of men who opt for the amenity will decrease since they are less willing to pay for it.

If, on the other hand, the cost of providing the amenity (or, alternatively, the productive benefit of the disamenity) decreases, more firms would want to offer the amenity at the current wage differential and pressure will mount for the equilibrating wage differential to decrease to attract more workers to purchase the amenity. More men and more women will shift into flexible jobs, but it is likely that relatively more women will be enticed into these positions.

Individuals with a greater willingness to pay for the amenity, mainly women, earn less than others, mainly men, and a decrease in the cost of supplying the amenity is likely to increase women's relative earnings. An increase in the supply of individuals who value the amenity, mainly women, will increase the equilibrium amount paid for the amenity and tend to decrease women's relative earnings.

The compensating differentials framework includes two cases. A demand side shift raising the demand for the amenity from an influx of women into the occupation implies: (a) an *increase* in the cost of the amenity and by implication a likely decrease in women's relative earnings, and (b) an increase in the fraction of the total workforce with the amenity (but a decrease in the fraction of men with the amenity since its price rises). A supply side shift lowering the costs to firms of providing the amenity implies: (a) a *decrease* in the cost of the



amenity and by implication a likely increase in women's relative earnings, and (b) an increase in the fraction of the total workforce with the amenity (and an increase in the fraction of men with the amenity since its price decreases). The facts we have described of a decline in the penalty to part-time work and to the premium to ownership and long hours in pharmacy from 1970 to the present are more consistent with the second set of factors.

One might have expected, *ceteris paribus*, that improved non-pecuniary benefits from greater temporal flexibility in pharmacy would have reduced the wages of pharmacists. But, as we noted earlier, the earnings of pharmacists have increased substantially relative to most other professions in recent decades. The rapid increase in the demand for pharmacists from advances in pharmaceuticals, the growth of the pharmaceutical industry and an aging population appear to have outstripped the growth of new pharmacy degree programs and the supply of new pharmacists. The consequence has been the need to provide higher wages, despite better workplace amenities, to attract and retain pharmacists.

#### G. Comparisons with Other Professions

We have emphasized aspects of the pharmacy profession that have made its professionals extremely good substitutes for each other, thereby enhancing the ability of employees to handoff clients and patients with little loss in fidelity. In addition, agency problems in ownership have been circumvented through use of the corporate form. In that way, the premium to long, on-call, and irregular hours has been greatly reduced. We find no penalty to short hours in pharmacy. In addition, women have greatly increased in numbers and the gender gap in pay has declined considerably.

What about other professions, particularly those that share the "big box" aspects of pharmacy? The profession most similar to pharmacy in its level of training, standardization of product and switch from ownership to the corporate form is optometry. Optometrists are located in some of the same retail chains as are pharmacists, such as Costco, and they are hired in optical retail outlets owned by chains. The increase of women has been even larger in optometry than in pharmacy. The fraction female among optometry graduates increased from less than 5 percent in the 1960s to more than 60 percent in the 2000s. The fraction of male optometrists who are self-

employed declined during the past several decades, from 81 percent in 1980 to 63 percent in 2000, but is still considerably higher than in pharmacy. The gender gap in pay has also decreased and is now among the lowest among health care professionals, although somewhat larger than in pharmacy.

Many other healthcare professionals also share some of the features of pharmacists. Physicians, veterinarians, and dentists have all experienced decreased self-employment. Dental and veterinary practices have increased in scale and many are now owned by chains. But, just as in optometry, few have witnessed as large a decrease in self-ownership as has pharmacy. Veterinary medicine has experienced a decrease in on-call and long hours with the increase in regional veterinary hospitals that serve as emergency departments. In many healthcare professions patients have less of a preference for one doctor over another, but probably not to the same degree as in pharmacy where the service is more standardized.<sup>44</sup>

The legal and financial sectors have seen less change.<sup>45</sup> Technological or regulatory reasons are occasionally at fault. A trial lawyer must face the jury every trial day and cameras are not allowed. Idiosyncratic case-specific information is not easily conveyed to substitute lawyers. Traders in the financial sector are generally required to be in their office during market hours. The clients of most MBAs, lawyers, and accountants do not treat these professionals as perfect substitutes for each other, possibly because of non-standard services, poorly designed information systems, or a culture that emphasizes face-time and personal relationships.

The high degree of substitutability among pharmacists also is suggested by the flatter age-earnings (or experience-earnings) profile for pharmacists than for other comparable professions. Recent pharmacy degree recipients appear to be closer to their peak productivity than novices in other professions. We find that the age-earnings profile for pharmacists is about two-thirds as steep as that for the typical college graduate and noticeably (and statistically

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<sup>44</sup> The gender earnings gaps conditional on hours, weeks, and self-employment in specifications comparable to cols. (4) and (8) of Table 7, using the 1970 Census and 2009 to 2011 ACS, were modestly narrower for veterinarians and dentists than for pharmacists in 1970 and were significantly wider for veterinarians and dentists in 2010.

<sup>45</sup> Male pharmacists worked longer hours on average than male lawyers in the 1970 Census (45.6 versus 43.7 hours per week) and the gender earnings gap was wider for pharmacists than for the lawyers. The pattern reversed by 2010 with male lawyers working almost 7 more hours per week than male pharmacists and a much larger gender earnings gap for lawyers using the 2009 to 2011 ACS.

significantly) flatter than for physicians, lawyers, business occupations, optometrists, veterinarians and dentists.<sup>46</sup>

Many professions do share some of the characteristics of pharmacists. But pharmacy appears to have a larger number of them that have made its professionals very good substitutes for each other and, in consequence, have reduced the cost of temporal flexibility.

## H. Conclusion

Pharmacy, today, is a highly remunerated profession with a low gender earnings gap and a modest part-time work wage penalty relative to comparable occupations. It has become a family-friendly profession and is now a female majority profession.

We conclude that increased substitutability among pharmacists is a large part of the reason for these changes. Pharmacists are better able to handoff clients because of uniform training, standardization of products, and extensive use of information technology. The growth of large pharmacy chains, mail-order pharmacies and hospitals, and the related decline of independent pharmacies, reduced the premium to ownership. The fraction of pharmacists who work low hours increased and the hourly earnings of female relative to male pharmacists rose. All of these factors led to the creation of a more family-friendly pharmacy profession.

Earnings of pharmacists today are mainly a function of their hours of work. Conditional on hours of work, female pharmacists earn only 4 to 7 log points less than comparable male pharmacists (see Table 3, cols. 5 and 6). Managers, conditional on hours, earn only about 7 percent more than employees and owners earn about 12 log points more than employees, once again conditional on hours (see Table 3, col. 5). In the hourly estimation owners earn only 5 log points more than employees and managers 3 log points more. Owners work more hours per week relative to employees (7.6 hours for men; 10.5 for women) and the same is true for managers (3.9 hours for men and 8.3 for women).<sup>47</sup>

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<sup>46</sup> These estimates are for full-time, full-year workers aged 25 to 64 using the 2009 to 2011 ACS. The specifications are analogous to col. (5) of Table 6 expanded to include an interaction of age and “pharmacist” as well as main effects and interactions with age for the other occupations.

<sup>47</sup> Hours differences are computed from a regression of hours in primary job on a cubic in age, and position dummies (manager, owner) on a sample of active pharmacists less than 70 years old. Differences

We find no penalty to working short hours using the PWS data for all years (see Table 4, cols. 1 and 2). In our comparison of pharmacists with other college graduates using CPS data, pharmacists earn 26 log points more than other college graduates. Their penalty to part-time employment is just 5 log points whereas it is 25 log points for the entire group of college graduates (see Table 4, col. 3). For women, the penalty to part-time employment for pharmacists is effectively zero whereas it is 20 log points for all college graduates (see Table 4, col. 5). The hourly earnings penalty to part-time work in pharmacy has virtually disappeared during the past four decades whereas it has remained substantial for other college graduates.

But in 1970, before the major changes in the industry, pharmacy was not as highly paid a profession relative to others for college graduates and did not have a narrower gender pay gap. Male pharmacists were more likely to be self-employed and to work longer hours than other male college graduates. Self-employed pharmacists earned a considerable premium and women, particularly those with children, earned far less relative to men than today.

In sum, the position of pharmacist is probably the most egalitarian of all professions in the United States today. The facts we have presented concerning changes in the pharmacy profession are more consistent with the labor market effects of changes in technology and in the structure of the industry. They are less consistent with those stemming solely from an increase in the demand for family-friendly workplace amenities. The changes, moreover, do not appear to have resulted from legislation or anti-discrimination policy or licensing requirements or regulation specific to the pharmacy profession.<sup>48</sup> Rather, a host of structural changes outside the realm of the labor market increased the demand for pharmacists and reorganized work in ways that have made pharmacy a more family-friendly and female-friendly profession.

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for total hours are somewhat less for men compared with employees (3.4 hours for managers and 6.1 hours for owners) and about the same for women (8.0 hours for managers and 10.3 hours for owners).

<sup>48</sup> See Kleiner and Krueger (2013) on the impacts of occupational licensing on labor market outcomes.

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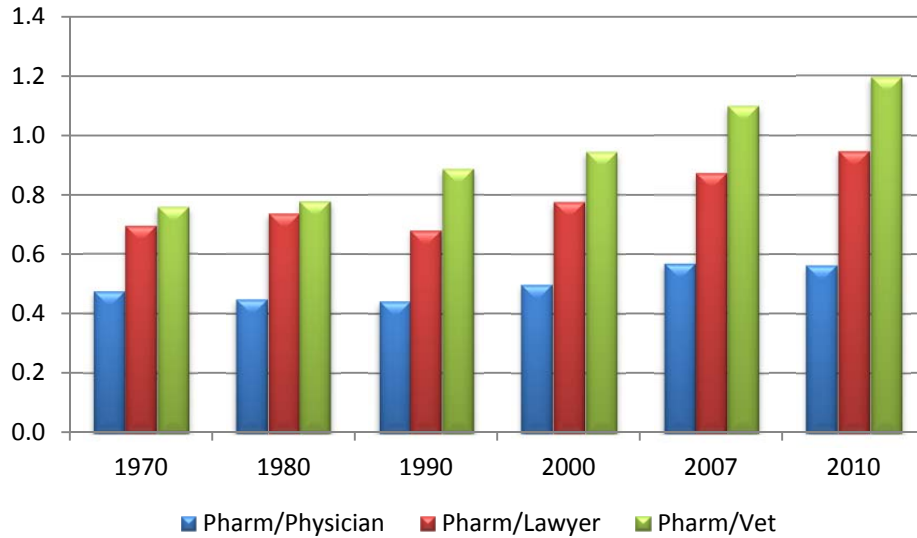
U.S. Department of Health, Education and Welfare, Public Health Service, Health Resources Administration. 1969. *Pharmacy Manpower, United States – 1966*. U.S.: G.P.O.

U.S. Department of Health, Education and Welfare. 1978. *Pharmacy Manpower Resources*. U.S.: G.P.O.

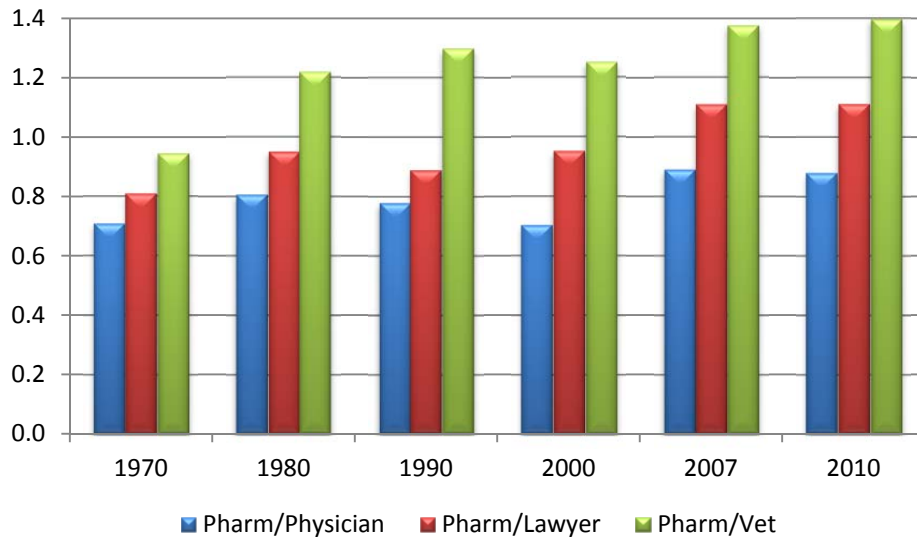
Wood, Robert G., Mary E. Corcoran, and Paul N. Courant. 1993. "Pay Differences among the Highly Paid: The Male-Female Earnings Gap in Lawyers' Salaries," *Journal of Labor Economics* 11 (July), 417-41.

Figure 1: Median Earnings of Full-Time, Year-Round Pharmacists Relative to Other Professions: 1970 to 2010, by Sex

A. Males



B. Females

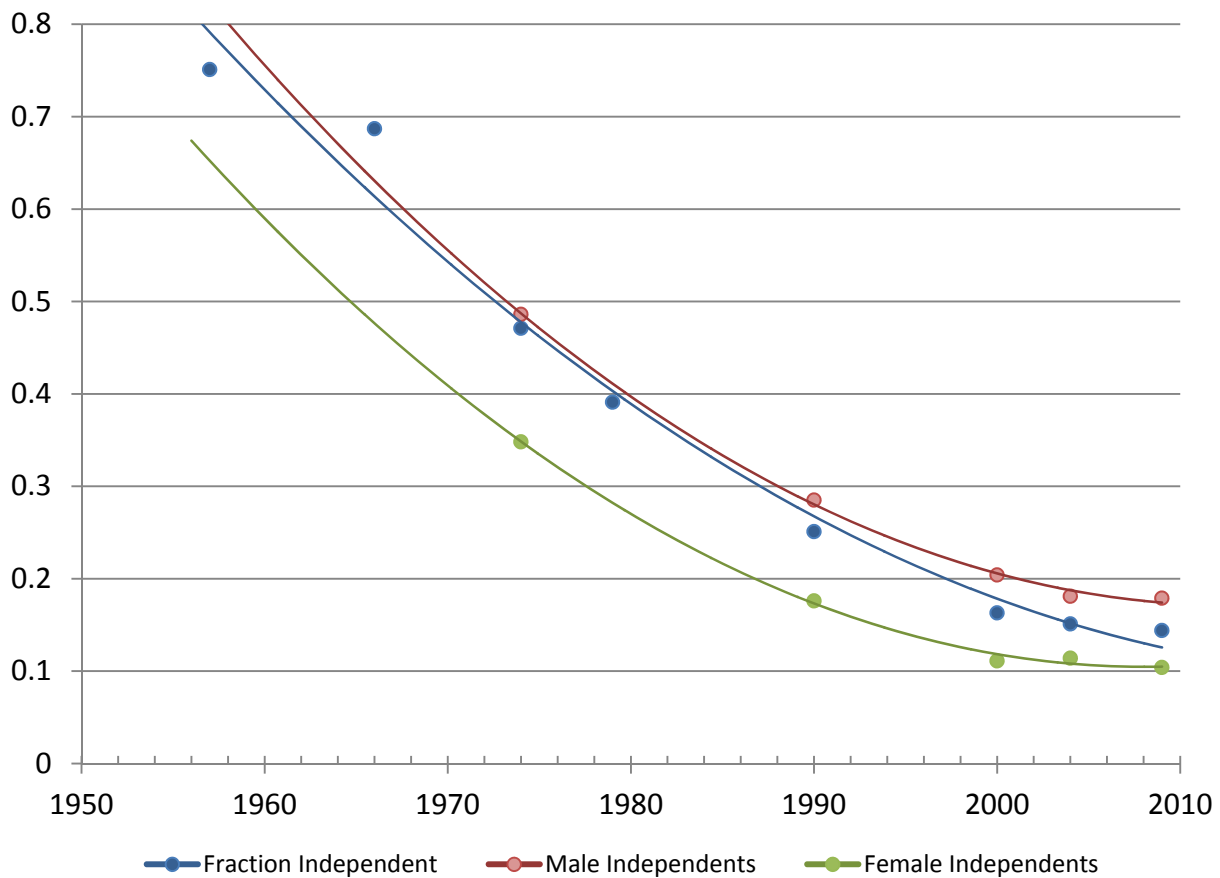


Sources: 1970 to 2000: U.S. Census of Population, public use samples. 2006 to 2011: American Community Survey (ACS) public use samples. 1970 aggregate six 1 percent samples; 1980 to 2000 are 5 percent samples. The 2006 to 2010 ACS are 1 percent samples each year. 2007 is the average of 2006, 2007, and 2008; 2010 is the average of 2009, 2010 and 2011.

Notes: Earnings is the sum of wage and salary, business, and farm incomes. The samples are restricted to 25 to 64 year old full-time (35 or more hours per week) and full-year (40 or more weeks per year) workers.



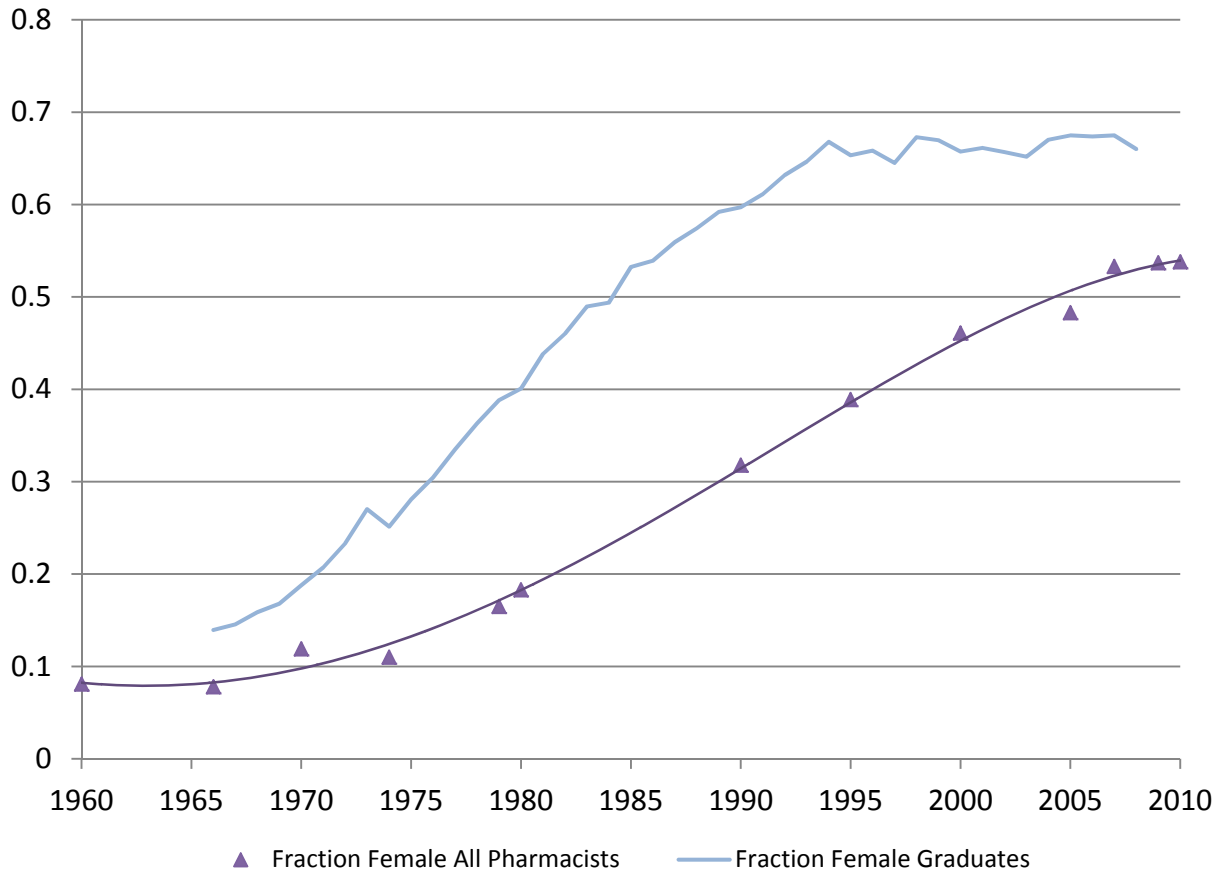
Figure 2: Fraction of Pharmacists Working in Independent Practices, by Sex: 1957 to 2009



*Sources:* U.S. Department of Health, Education and Welfare (1969), Fulda (1974), U.S. Department of Health, Education and Welfare (1978), Kapantais (1982), U.S. Department of Health and Human Services (2000); and Pharmacist Workforce Surveys for 2000, 2004, and 2009 (see Data Appendix).

*Notes:* A pharmacist working in an independent practice can be an owner or an employee. By “independent practice” is meant a unit or series of units for which one of the owners makes the majority of the decisions. Independent practices can have several stores, but are not “chains” in the sense that they are not run by large corporations. The fraction in independent practice is obtained by taking the number in independent retail practice relative to all active pharmacists. The trend lines are quadratics.

Figure 3: Fraction Female among All Pharmacists and among Pharmacy Graduates

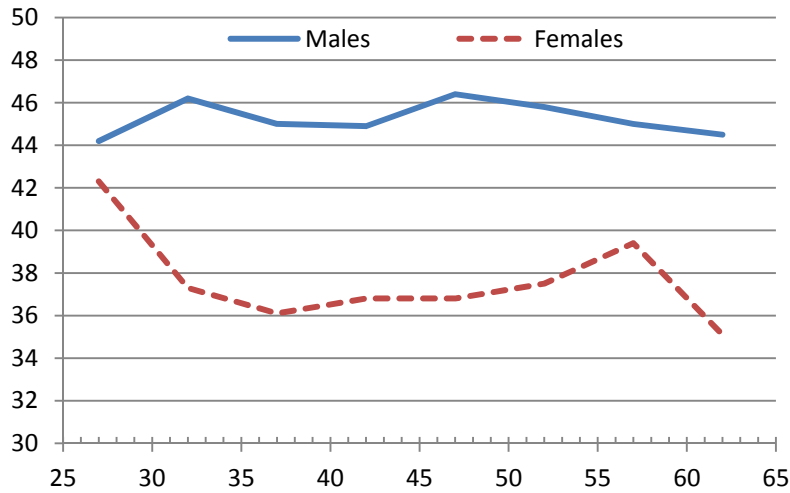


Sources: Fraction female among pharmacists for 1960 to 2010 from Table 1, col. (7). Fraction female among graduates of pharmacy programs, U.S. Department of Education, *Digest* (various years).

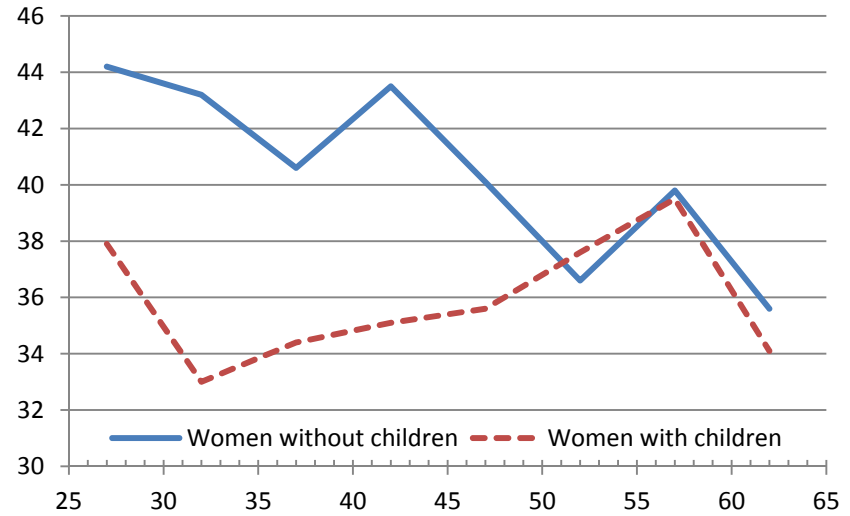
Notes: Graduates of pharmacy programs include all who have attained a first professional degree. The first professional pharmacy degree changed over the period; see text. Trend line for the fraction female pharmacists is a fourth-degree polynomial.

Figure 4: Hours of Work and Part-time Employment for Male and Female Pharmacists

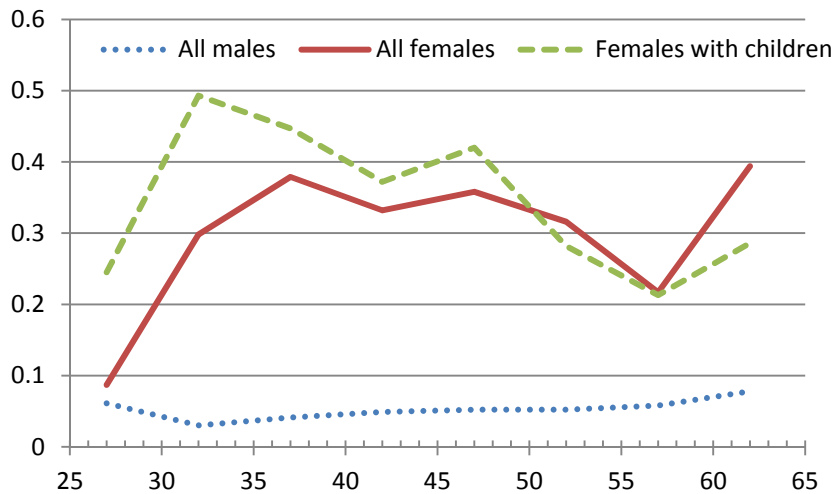
A. Hours of work (in all jobs) for all pharmacy positions by age



B. Hours of work (in all jobs) for women by age



C. Fraction part-time (including all employments) by age



*Source:* Pharmacist Workforce Surveys. See Data Appendix.

*Notes:* Figure A and the “all” lines for Figure B are for all years (2000, 2004, 2009); Figure B “females with children” and Figure C are for years 2000 and 2004 only because of the different reporting of children in 2009. All figures refer to currently employed individuals with active pharmacy licenses and positions as pharmacists. Total hours include those on the primary job, overtime on the primary job, and hours in secondary and other positions. Part-time is defined as working fewer than 35 hours in all employments.

Table 1: Time Series on Pharmacists: Workplaces, Hours, Fraction Female, and Relative Earnings by Sex

Year	Fraction Employed in Setting (cols. 1, 2, 3 do not sum to 1)			Fraction Part-time (at primary job, 25 to 64 year olds)			Male/Female (Full-time, Full-year) Earnings		
	(1) Independent Pharmacies	(2) Other Retail Pharmacies	(3) Hospitals	(4) Fraction Self- employed	(5) All	(6) Females	(7) Fraction Female <sup>b</sup>	(8) Median	(9) Mean
2011				0.049	0.164	0.210	0.545	1.101	1.156
2010				0.044	0.175	0.260	0.538	1.095	1.176
2009	0.142	0.447	0.302	0.054	0.183	0.249	0.537	1.056	1.180
2007				0.056	0.183	0.272	0.533	1.068	1.209
2005							0.483		
2004	0.148	0.474	0.275	0.070					
2000	0.163	0.443	0.267	0.074	0.157	0.269	0.461	1.129	1.286
1995							0.389		
1990	0.251	0.330	0.246	0.127	0.141	0.286	0.318	1.139	1.316
1980				0.233	0.122	0.345	0.183	1.268	1.370
1979	0.391	0.289	0.199	0.231			0.165		
1974	0.471	0.267	0.146				0.110		
1970				0.354	0.0863	0.361	0.119	1.515	1.666
1966	0.685	0.140	0.080	0.402			0.078		
1960							0.081		
1957	0.775 <sup>a</sup>	0.130 <sup>a</sup>	0.034						
1950							0.087		

<sup>a</sup> Total for (1) and (2) is given in source. The 0.775 figure assumes fraction non-independent retail is 0.130.

<sup>b</sup> The data given for each year are from the most reliable of our sources.

*Sources:*

col. (1) Independent pharmacies. 1957: U.S. Department of Health, Education and Welfare (1966); 1966: Fulda (1974); 1974: U.S. Department of Health, Education and Welfare (1978); 1979, 1990, 2000, 2004: same as (1); 2009: 2009 PWS.

col. (2) Non-independent retail and col. (3) Hospitals: Same as for col. (1).

col. (4) Self-employed. 1966: U.S. Department of Health, Education and Welfare (1969), p. 12; 1970, 1980: U.S. census public use samples (1970 aggregates six 1 percent samples; 1980 is a 5 percent sample); 1979: Karpantais (1982); 1990: Midwest Pharmacy Workforce Research Consortium (2005); 2000, 2004: Pharmacist Workforce Surveys (PWS, see Data Appendix), for those currently practicing pharmacy; 2007: American Community Survey (ACS), 1 percent sample with three years (2006, 2007, 2008) aggregated; 2009, 2010, 2011: ACS.

cols. (5), (6) Part-time (defined as fewer than 35 hours in the primary job) for those 25-64 years old. 1970, 1980, 1990, and 2000: U.S. Census of Population public use samples; 2007, 2009, 2010, 2011: ACS same as in (4).

col. (7) Fraction female. 1966: U.S. Department of Health, Education and Welfare (1966); 1950, 1960, 1970: Northrup et al. (1979, p. 19) data from U.S. population census publications; 1974: U.S. Department of Health, Education and Welfare (1978); 1979: Karpantais (1982); 1980 to 2000 from U.S. Department of Health and Human Services (2008) data from BLS; 2005, 2007: BLS *Employment and Earnings*, Table 11 (Jan. 2006, Jan. 2008); 2009, 2010, 2011: ACS.

cols. (8) and (9) Male/Female mean and median full-time, year-round earnings for those 25-64 years old. 1970, 1980, 1990, 2000: U.S. Census of Population public use samples; 2007, 2009, 2010, 2011: ACS same as (4).

*Notes:* Cols. (1), (2), and (3) do not sum to 1. The remaining group is clinic, mail service, home health, academic, industry, and other. The samples from the U.S. Census and ACS public use samples consist of pharmacists who worked at least one week in the previous year. Cols. (5), (6), (8), and (9) are restricted to those from 25 to 64 years old. Hours are based on “usual hours worked in a week” except in 1970 where part-time status is based on hours worked last week. Part-time means less than a 35-hour work week. Mean and median earnings are the sum of wage and salary earnings plus self-employment (business, farm, and professional practice) income. The estimates of mean and median incomes include only those aged 25 to 64 years who worked full-time and full-year (that is, more than 39 weeks per year and more than 34 hours per week) with implicit hourly earnings greater than one-half the minimum wage in that year. Top-coded incomes are multiplied by 1.4 in the Census of Population samples. “2007” includes 2006 to 2008.

Table 2: Characteristics of Pharmacists and Pharmacist Workplaces, 2000 to 2009

	Males	Females
Setting type, fraction (sums to 1)		
Independent	0.190	0.112
Chain	0.276	0.253
Mass merchandiser	0.0596	0.0603
Supermarket	0.102	0.0987
Hospital	0.242	0.313
Other patient care	0.105	0.124
Other	0.0260	0.0384
Position, fraction (sums to 1)		
Employee	0.543	0.738
Manager	0.337	0.235
Owner	0.120	0.0269
Demographics (for 25-44 year olds)		
Ever-married, fraction	0.813	0.825
Number of children <sup>a</sup>	1.343	1.213
Number of children conditional on having one <sup>a</sup>	2.02	1.99
No children, fraction	0.333	0.392
No children, 40-44 years, fraction <sup>a</sup>	0.180	0.210

<sup>a</sup> For the 2000 and 2004 surveys only. See Data Appendix.

*Source:* Pharmacist Workforce Surveys, 2000, 2004, 2009. See Data Appendix.

*Notes:* The merged sample from the three years is used and data are tabulated for those with active pharmacy licenses who are currently employed as pharmacists. Owner = owner, partner, executive. Gender differences in setting and position are not much affected by age differences between men and women pharmacists. “Chains” are retail pharmacies owned by corporations. “Independents” that have several stores are not considered chains.

Table 3: Log Annual and Hourly Earnings Regressions for Active Pharmacists

Variable	(1) Annual	(2) Annual	(3) Hourly	(4) Annual	(5) Annual	(6) Hourly	(7) Annual	(8) Annual	(9) Hourly
Female	-0.2700 (0.0157)	-0.0764 (0.0095)	-0.0472 (0.0093)	-0.2354 (0.0166)	-0.0737 (0.0102)	-0.0402 (0.0102)	-0.0337 (0.0351)	-0.0100 (0.0193)	-0.00645 (0.0197)
Child							0.0360 (0.0327)	0.0538 (0.0180)	0.0559 (0.0183)
Female × child							-0.302 (0.0411)	-0.0843 (0.0229)	-0.0522 (0.0230)
Log hours		0.8656 (0.0141)			0.8228 (0.0145)			0.867 (0.0166)	
Log weeks		0.9020 (0.0192)			0.9017 (0.0186)			0.914 (0.0186)	
Owner				0.4682 (0.0365)	0.1208 (0.0223)	0.0527 (0.0223)	0.462 (0.0440)	0.0962 (0.0248)	0.0441 (0.0246)
Manager				0.2416 (0.0170)	0.0670 (0.0104)	0.0326 (0.0104)	0.251 (0.0205)	0.0648 (0.0116)	0.0383 (0.0115)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age quadratic	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Education	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity, race	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Sector	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number observations	3,508	3,508	3,508	3,508	3,508	3,508	2,610	2,610	2,610
R-squared	0.132	0.708	0.235	0.231	0.728	0.273	0.220	0.765	0.204
Standard error of estimate	0.465	0.270	0.275	0.439	0.261	0.268	0.452	0.249	0.253



*Source:* Pharmacist Workforce Surveys, 2000, 2004, and 2009. See Data Appendix.

*Notes:* The regressions merge the three years in the survey except for cols. (7) to (9), which are restricted to 2000 and 2004. The survey only includes pharmacists with active pharmacy licenses. The sample here is restricted to those currently working in pharmacy. Child is having had any child. Education dummies are BS (base group), PharmD, PhD, MBA, other education and missing degree information. Sector dummies are chain including mass merchandisers and mail order (base group), independents, hospital, other, and missing sector. Race and ethnicity dummies are white (base group), black, Asian, Hispanic, and other. Standard errors are listed in parentheses under the coefficients. An age missing dummy is included when age is added; a dummy variable for missing information on class of worker is included when the manager and owner dummies are included in the regression specification.

Table 4: Hourly Wage Penalty for Part-time Work by Pharmacists and Other Occupations

	PWS 2000, 2004		CPS 2005-2013, College Graduates			CPS 2005-2013 Hourly Workers			CPS 1979-1981, Hourly Workers
	All	Female	All	All	Females	All	All	Females	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female (dummy)	-0.0247 (0.00768)		-0.186 (0.0166)	-0.132 (0.00171)		-0.150 (0.00104)	-0.104 (0.00118)		-0.267 (0.0207)
Part-time (dummy)	-0.00416 (0.00863)	-0.00348 (0.00908)	-0.263 (0.00276)	-0.144 (0.00262)	-0.207 (0.00305)	-0.232 (0.00137)	-0.151 (0.00126)	-0.179 (0.00158)	-0.138 (0.00214)
Pharmacist (dummy)			0.253 (0.0157)		0.319 (0.0159)	0.455 (0.0179)		0.475 (0.183)	
Pharmacist × female			0.0943 (0.0217)	0.0539 (0.0197)		0.0898 (0.0236)	0.0513 (0.0208)		0.202 (0.0448)
Pharmacist × part-time			0.201 (0.0293)	0.0701 (0.0266)	0.213 (0.0323)	0.150 (0.0271)	0.0586 (0.0238)	0.196 (0.0311)	0.00224 (0.0550)
Occupation dummies			No	Yes	No	No	Yes	No	Yes
R <sup>2</sup>	0.568	0.622	0.149	0.299	0.102	0.248	0.423	0.262	0.500
Number observations	1,640	827	429,248	429,248	221,105	660,447	660,447	345,452	217,821
Pharmacist observations	1,640	827	2,502	2,502	1,365	1,298	1,298	763	238

*Sources:* Pharmacist Workforce Surveys (PWS), 2000 and 2004 (see Data Appendix); Current Population Survey Merged Outgoing Rotation Groups (CPS), 1979 to 1981 and 2005 to 2013.

*Notes:* Cols. (1) and (2) include currently-employed pharmacists with active licenses who directly reported hourly earnings in the PWS. Cols. (3) to (5) include college graduate wage and salary workers, 25 to 64 years old. Cols. (6) to (9) include workers paid on an hourly basis, 25 to 64 years old. The dependent variable in cols. (1) and (2) is log (hourly earnings). The dependent variable in cols. (3) to (5) is log(weekly earnings/usual weekly hours). The dependent variable in cols. (6) to (9) is log (hourly wage). Part-time dummy is 1 for those working less than 35 hours per week. Pharmacist dummy is 1 for those employed as pharmacists. All regressions include age and age squared, educational attainment dummies (advanced degree indicators in cols. 1 to 5 and dummies for individual years of schooling and degree categories in cols. 6 to 9), race and ethnicity dummies, and year dummies. Cols. (1) and (2) include dummy variables for ownership or management of a pharmacy, and pharmacy sector (e.g., hospital, independent). Cols. (4), (7) and (9) include (three-digit) CPS occupation dummies. The regression samples in cols. (3) to (9) are restricted to those with hourly earnings (or hourly wage) greater than one-half the federal minimum wage and less than \$140 an hour (\$100 an hour in col. (9)); CPS top-coded weekly earnings are multiplied by 1.4. Cols. (3) to (9) are weighted using CPS earnings weights.

Table 5: Gender Log Annual Earnings Gap for Pharmacists, 1970 Census and 2009-11 ACS (Pharmacists, 25 to 64 Years Old with at least a College BA)

	1970 Census				2010 (2009-11) American Community Survey			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.7961 (0.0263)	-0.7502 (0.0267)	-0.3364 (0.0249)	-0.176 (0.0348)	-0.2292 (0.0184)	-0.2318 (0.0185)	-0.0709 (0.0123)	-0.0627 (0.0168)
Child				0.103 (0.0177)				0.0620 (0.0180)
Female × child				-0.2909 (0.0464)				-0.0156 (0.0232)
Self-employed		0.2147 (0.0188)	0.1582 (0.0171)	0.1528 (0.0170)		0.0713 (0.0430)	-0.0179 (0.0283)	-0.0217 (0.0283)
Hospital		0.0493 (0.0255)	0.024 (0.0218)	0.0221 (0.0217)		0.0661 (0.0199)	-0.0105 (0.0129)	-0.0111 (0.0129)
Other industry		0.0544 (0.0394)	0.0492 (0.0329)	0.0525 (0.0327)		0.0745 (0.0342)	-0.0267 (0.0221)	-0.0246 (0.0221)
Demographics & education	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hours, weeks	No	No	Yes	Yes	No	No	Yes	Yes
Number observations	4,309	4,309	4,309	4,309	7,264	7,264	7,264	7,264
R <sup>2</sup>	0.209	0.232	0.472	0.479	0.108	0.110	0.632	0.633
Standard error of estimate	0.543	0.535	0.444	0.441	0.749	0.748	0.482	0.481

Sources: 1970 U.S. Census (six 1 percent public use samples); American Community Surveys (ACS) for 2009, 2010, and 2011.

Notes: The dependent variable is log (annual earnings) where annual earnings is the sum of wage and salary and self-employment (business, farm, and professional practice) income. Controls for demographics and education are a quartic in age, race and ethnicity dummies, and an advanced degree dummy. Controls for hours worked are a full set of weekly hours dummies for the 1970 Census hours categories (1-14, 15-29, 30-34, 35-39, 41-48, 49-59, 60 or more hours per week with 40 as the omitted group). Hours represent hours last week for 1970 and usual hours for 2010. There also is a dummy for 0 hours last week in 1970. Controls for weeks worked are dummy variables for 1-13, 14-26, 27-39, 40-47, 48-49 weeks (with 50-52 as the omitted group). Self-employed is an indicator variable for self-employment. Child is an indicator variable for having at least one own child present in the household. The omitted industry is retail drug stores; hospital is an indicator for working in hospitals or another health services industry. Regressions are restricted to those with implied hourly earnings greater than one-half the federal minimum wage. Top-coded incomes in 1970 are multiplied by 1.4. Cols. (5) to (8) are weighted by the IPUMS person weights.

Table 6: Earnings Premium and Gender Log Earnings Gap for Pharmacy Bachelor's Degree Holders and Pharmacists Relative to Other College Graduates (College Graduate, Full-Time Full-Year Workers, 25 to 64 Years Old)

	OLS	Median	OLS	OLS	OLS	Median	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.282 (0.00122)	-0.300 (0.00139)	-0.211 (0.00132)	-0.282 (0.00122)	-0.282 (0.0122)	-0.300 (0.0138)	-0.183 (0.00121)
Pharmacy BS	0.246 (0.0109)	0.329 (0.0121)		0.141 (0.0140)			
Female × pharmacy BS	0.115 (0.0161)	0.181 (0.0180)	0.0657 (0.0155)	-0.0233 (0.0204)			
Pharmacist				0.183 (0.0151)	0.278 (0.0118)	0.325 (0.0130)	
Female × pharmacist				0.211 (0.0210)	0.185 (0.0165)	0.236 (0.0183)	0.0937 (0.0146)
Field of degree dummies	No	No	Yes	No	No	No	No
Occupation dummies	No	No	No	No	No	No	Yes
R <sup>2</sup>	0.189	0.111	0.235	0.189	0.189	0.111	0.369
Number observations	1,021,008	1,021,008	1,021,008	1,021,008	1,021,008	1,021,008	1,021,008

Source: American Community Surveys (ACS) for 2009, 2010, and 2011.

Notes: The dependent variable is log (annual earnings) where annual earnings is the sum of wage and salary and self-employment (business, farm, and professional practice) income. All regressions include controls for a quartic in potential experience, graduate degree dummies (MA, professional, and PhD degrees), race and ethnicity dummies, and year dummies. The number of observations with a pharmacy bachelor's degree is 5,938 and the number of pharmacists is 5,662 in all the regressions. Pharmacy BS = 1 for those with a bachelor's degree in pharmacy. Pharmacist = 1 for those employed as a pharmacist. Field of degree dummies are a full set of dummies for the ACS field of bachelor's degree codes. Occupation dummies are a full set of detailed (3-digit) ACS occupation dummies. The pseudo R<sup>2</sup> for the median regressions are reported as the R<sup>2</sup> in cols. (2) and (7). Full-time, full-year workers are those who worked 35 or more hours per week and 40 or more weeks. The regression samples are restricted to individuals with implied hourly earnings (annual earnings/[usual hours × weeks worked]) greater than one-half the federal minimum wage. All regressions are weighted using IPUMS person weights except the median regressions in cols. (2) and (7) are unweighted.

Table 7: Gender Log Annual Earnings Gap for Pharmacists Relative to Other College Graduates (25 to 64 Years Old), 1970 Census and 2009-11 ACS

	1970 Census				2010 (2009-11) American Community Survey			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pharmacist	0.0527 (0.0116)	-0.0046 (0.0116)	-0.0722 (0.0090)	0.0774 (0.0216)	0.3826 (0.0166)	0.3680 (0.0166)	0.4083 (0.0116)	0.4253 (0.0224)
Female	-0.8088 (0.0022)	-0.7812 (0.0022)	-0.4041 (0.0020)	-0.3897 (0.0031)	-0.4660 (0.0016)	-0.4777 (0.0016)	-0.2187 (0.0012)	-0.2892 (0.0022)
Female × pharmacist	0.0451 (0.0346)	0.0900 (0.0344)	0.1107 (0.0268)	0.1613 (0.0532)	0.2027 (0.0222)	0.2056 (0.0222)	0.1886 (0.0155)	0.1141 (0.0314)
Child				0.2804 (0.0026)				0.2557 (0.0024)
Child × pharmacist				-0.1353 (0.0253)				-0.1234 (0.0330)
Female × child				-0.7270 (0.0043)				-0.4012 (0.0032)
Female × child × pharmacist				-0.0413 (0.0687)				0.2101 (0.0441)
Demographics & education	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Self-employed	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Hours, weeks	No	No	Yes	No	No	No	Yes	No
Number observations	518,548	518,548	518,548	518,548	1,281,009	1,281,009	1,281,009	1,281,009
R <sup>2</sup>	0.28	0.289	0.568	0.327	0.123	0.129	0.574	0.140
Standard error of estimate	0.716	0.711	0.554	0.692	0.922	0.919	0.643	0.914

Sources: 1970 U.S. Census (six 1 percent public use samples); American Community Surveys (ACS) for 2009, 2010, and 2011.

Notes: The dependent variable is log (annual earnings) where annual earnings is the sum of wage and salary and self-employment (business, farm, and professional practice) income. Pharmacist = 1 for those employed as a pharmacist. Controls for demographics and education are a quartic in age, race and ethnicity dummies, and an advanced degree dummy. Hours and weeks controls, sample earnings restrictions, and top coding adjustments are the same as in Table 5. Self-employed is an indicator variable for self-employment. Child is an indicator variable for having at least one own child present in the household. Cols. (5) to (8) are weighted by the IPUMS person weights.

## Data Appendix: Pharmacist Workforce Surveys<sup>49</sup>

The National Pharmacist Workforce Surveys were collected in three years: 2000, 2004, and 2009. The surveys were commissioned by the Pharmacy Manpower Project (PMP), now called the Pharmacy Workforce Center. The PMP is comprised of the major pharmacy associations (including the AACP, discussed in the text). The Midwest Pharmacy Workforce Research Consortium conducted the surveys and designed the project. The Consortium contains six principal investigators from five universities.

The primary purpose of the surveys was to collect reliable information on demographic and work characteristics of the pharmacist workforce in the United States. The project obtained information from a nationally representative sample of pharmacists. The principals developed a survey questionnaire covering employment status and situation (working or not, setting, position, years employed and in current position), compensation and hours worked, work environment (hours the prescription department is staffed, time spent in professional activities, number of staff working, workload, and perceptions of workload and workload impact), future work plans (leave or stay with current employment and reasons therefore), and individual demographic background information.

The survey methodology and size of the project for each year is as follows. In each year the data were collected via mailed survey using KM Lists, Inc., a national medical marketing data warehouse that maintains a list of about 250,000 licensed pharmacists in the United States.

2000: Data for 2000 were collected from a random sample of 5,000 licensed pharmacists. The overall response rate (subtracting surveys that were undeliverable) was 46 percent (2,250/4,895) and the net useable response rate was 43 percent (2,092/4,895).

2004: Data for 2004 were collected from a random sample of 6,000 pharmacists. The principals randomly chose 5,000 from this list and retained a hold-back sample of 1,000. To compensate for initial bad addresses, a replacement sample of 435 pharmacists was randomly chosen from the hold-back group. Usable forms were received from about 1,500 for a response rate of about 34 percent. The survey design was almost identical to that in 2000.

2009: Questions comprising each section of the 2009 survey were taken from previous workforce surveys and most of the items used for the 2009 survey also were used in 2000 and 2004. The initial size of the group was smaller in 2009 than in previous years but better methods were employed to obtain a higher response rate. A randomly selected sample of 3,000 names yielded about 2,667 with usable addresses. Surveys from almost 1,400 pharmacists were returned or about a 51 percent response rate.

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<sup>49</sup> Some of the wording in this Appendix closely follows the description of the surveys in the sources listed at the end.

The 2009 survey has fewer young pharmacists than the other two surveys, possibly because of the increase in the fraction with PharmD degrees. Because of the lower fraction in the twenties, few have very young children relative to the previous years.

The three surveys were analyzed separately by the principals in a series of publications. Around 2010 one of the principals, Jon Schommer at the University of Minnesota, and a graduate student merged the three surveys and created a data set with largely consistent variables. Some variables changed over the years but most remained the same. In 2011 Schommer made the data available to us and we then cleaned it further.

The merged data set has the following number of respondents by year and distributions by sex and age:

Age group	Fraction Female			Fraction by Age Group		
	2000	2004	2009	2000	2004	2009
25-29	0.751	0.751	0.714	0.0999	0.0509	0.0146
30-34	0.629	0.629	0.713	0.129	0.110	0.0838
35-39	0.633	0.633	0.701	0.137	0.110	0.106
40-44	0.566	0.566	0.572	0.147	0.110	0.119
45-49	0.324	0.324	0.532	0.144	0.144	0.110
50-54	0.261	0.261	0.336	0.0971	0.139	0.160
55-59	0.171	0.171	0.280	0.0805	0.104	0.141
60-64	0.143	0.143	0.191	0.0520	0.0760	0.109
> 64	0.0996	0.137	0.140	0.115	0.156	0.156
Totals with sex, age by year	2,197	1,542	1,386	2,185	1,515	1,372

#### Data Appendix References

Midwest Pharmacy Workforce Research Consortium. 2000. *Final Report of the 2000 National Pharmacist Workforce Survey: 2000*. Pharmacy Manpower Project, Inc.

Midwest Pharmacy Workforce Research Consortium. 2005. *Final Report of the 2004 National Sample Survey of the Pharmacist Workforce to Determine Contemporary Demographic and Practice Characteristics*. Pharmacy Manpower Project, Inc.

Midwest Pharmacy Workforce Research Consortium. 2010. *Final Report of the 2009 National Pharmacist Workforce Survey to Determine Contemporary Demographic and Practice Characteristics*. Pharmacy Manpower Project, Inc.

## Theory Appendix:

### A Compensating Differentials Framework of Gender Differences in Earnings and Occupations

Many professions have increased their workplace flexibility in the past few decades and some occupations and firms are more enabling of family than are others. What these statements translate into is that occupations and professions differ in the pecuniary penalties to certain characteristics that are considered family-friendly amenities.

What happens in the labor market when there is a shift in worker demand for greater flexibility? What happens when there is a technological change that reduces the costs of providing such flexibility? To explore these questions we develop a model of an occupation having an amenity that is costly to offer.

We model the provision of the amenity, such as workplace flexibility, by borrowing from Sherwin Rosen's (1986) model of "compensating differentials," which in turn is a formalization of ideas dating back to Adam Smith. Our framework is, as well, a generalization of that in Mincer and Polachek (1974), which emphasizes the impact of career interruptions for the gender wage gap and occupational choice. Whereas Mincer and Polachek treat the mix of jobs as given, we endogenize it. The model will reveal the differential impacts of an increase in the demand for the amenity (or a decreased willingness to work with the disamenity) and a decrease in the cost of providing the amenity (or reducing the disamenity).

Consider that various aspects of work are disamenities to some but are not overly bothersome to others. These disamenities can include workplace hazards but we focus on workplace flexibility in all its forms. The ability to shift hours during the day may be highly valued by some but not worth much to others. The fact that some professions heavily penalize job interruptions and disproportionately tax short hours may be more important to some workers than to others. The same is true with other aspects of workplace family friendliness including the provision of on-site daycare and paid leave policy.

The amenity we consider is job flexibility and it is modeled as a discrete variable. Jobs are either inflexible or flexible. The inflexible jobs come with a disamenity ( $D = 1$ ). Alternatively, jobs can be flexible and not have the disamenity ( $D = 0$ ).



Workers are assumed to be heterogeneous in their tastes for the disamenity (D). If  $Z$  = the compensating variation required for indifference between  $D = 1$  and  $D = 0$  and  $C$  = worker's consumption, then  $U(C, D) \rightarrow U(C^*, 1) = U(C_0, 0)$  and  $Z = (C^* - C_0)$ .  $Z$  is continuously distributed  $Z \sim G(Z)$ . The compensating differential in earnings between a job with the disamenity and one without is  $\Delta W = [W(D = 1) - W(D = 0)] > 0$ .

If  $G(Z)$  is given by the distribution drawn in Appendix Fig. 1.A and the compensating differential for the disamenity in the occupation or firm is  $\Delta W^*$ , all individuals to the right of  $\Delta W^*$  will opt for the job without the disamenity. The offered wage difference of  $\Delta W^*$  is insufficiently high for those to the right of the dashed line to be fully compensated for the disamenity. Those to the left, however, express a willingness to take the job with the disamenity since the wage difference is higher than the amount that would make them indifferent between having and not having the disamenity. That is, a worker chooses the disamenity,  $D = 1$ , if  $\Delta W > Z$ .

Similarly, the firms' technologies that produce the amenity (or that ameliorate the disamenity) are assumed to be distributed continuously. On the supply side of the market, firms are assumed to be heterogeneous in the productivity benefit of the disamenity (B) and thus in the costs of getting rid of it, such that  $B \sim F(B)$ . If  $F(B)$  is given by the distribution drawn in Appendix Fig. 1.B and  $\Delta W^*$  is the given wage differential the firms are paying, firms to the left of  $\Delta W^*$  would provide the amenity and the firms to the right of the dashed line would not. The firm chooses to have jobs with the disamenity,  $D = 1$ , if  $\Delta W < B$ .

The market equilibrium for the amenity occurs when its supply equals its demand. In equilibrium, the share of jobs with the amenity ( $D = 0$ ) is:  $[1 - G(\Delta W)] = F(\Delta W)$ . In the case drawn in Appendix Fig. 1 the supply of the amenity appears to be equal to the demand at the going wage differential. If it were greater than demand, the price of the amenity would fall and if it were less than demand, the price of the amenity would rise.

The model can be elaborated on by dividing workers into two groups, for example males and females. As depicted in Appendix Fig. 1.C, the  $G(Z)$  distribution for women lies to the right of that for men. At every  $\Delta W$ , and at  $\Delta W^{**}$  in particular, women demand more of the amenity than men, and men, instead, walk away with the higher salary and the disamenity.

Two main changes can alter the equilibrium. The first is a labor supply shift. An influx of women into an occupation (who presumably are more willing than men to pay for the amenity) will lead to a rightward shift in the distribution  $G(Z)$ . At the going wage differential, demand will exceed supply and the price of the amenity will rise, in consequence. A larger wage differential between jobs with and without the amenity will result, the fraction of jobs offering the amenity will increase, and a greater fraction of men who opt for the amenity will decrease since it has become more expensive.

If, on the other hand, the cost of providing the amenity (or, alternatively, the productive benefit of the disamenity) decreases, the distribution  $F(B)$  would shift to the left. At the current wage differential more firms would want to offer the amenity ( $D = 0$ ) and pressure will mount for  $\Delta W$  to decrease to attract more workers to purchase it. More men and women within the occupation will shift into flexible jobs since the price of the amenity is lower.

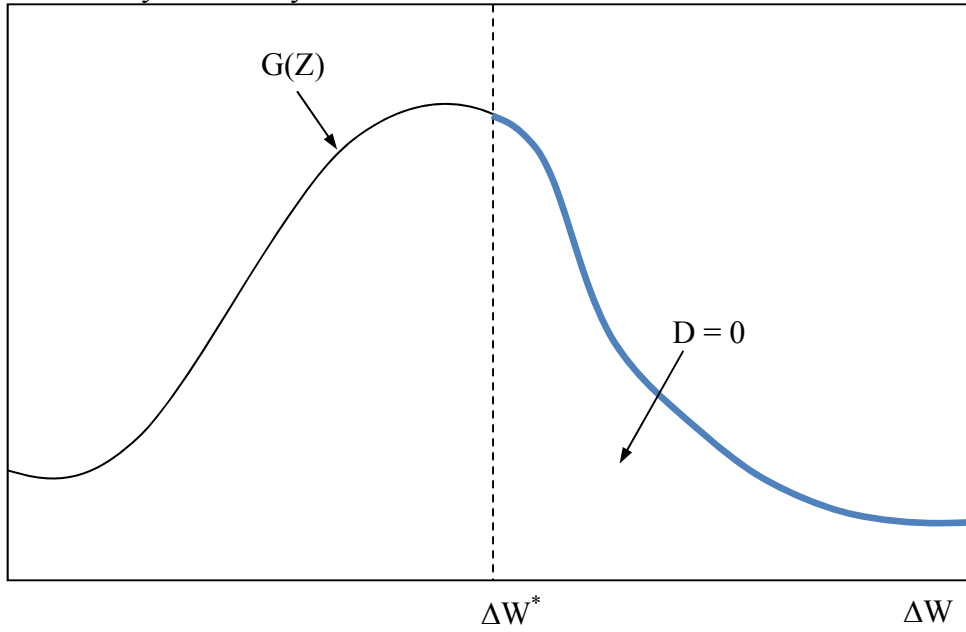
In sum, the framework shows that individuals with a greater willingness to pay for the amenity earn less than others and that a decrease in the cost of supplying the amenity increases their relative earnings. An increase in the supply of individuals to the occupation who value the amenity will increase the equilibrium amount paid for the amenity and widen the gap in earnings between those with a lower valuation of the amenity (disproportionately men) and those with a higher valuation of the amenity (disproportionately women).

#### Theory Appendix References

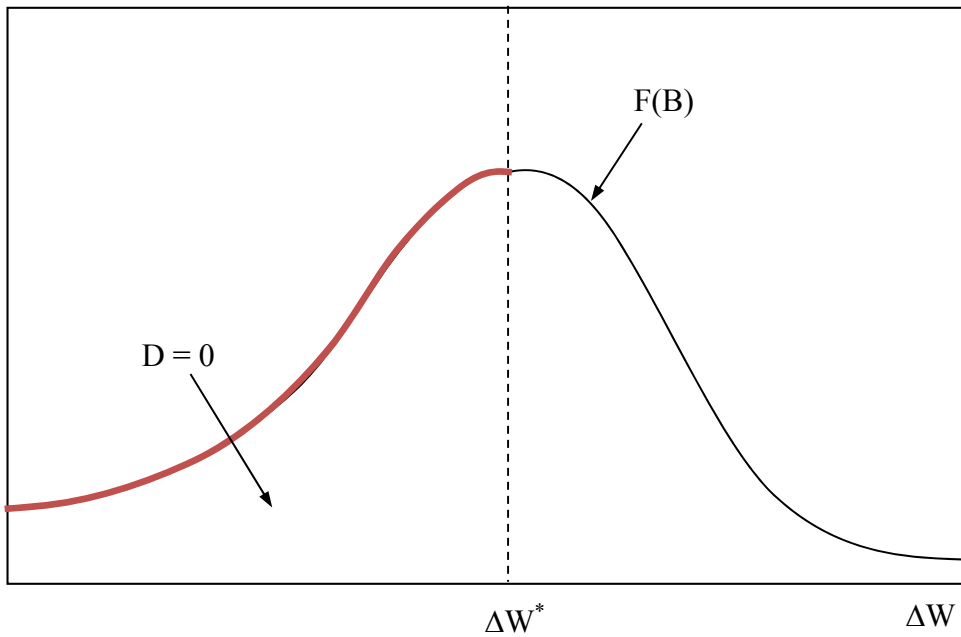
- Mincer, Jacob, and Solomon Polachek. 1974. "Family investments in human capital," *Journal of Political Economy* 82 (March-April): S76-S108.
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Appendix Fig. 1: Schematic Representation of the Market for an Occupational Amenity ( $D = 0$ )

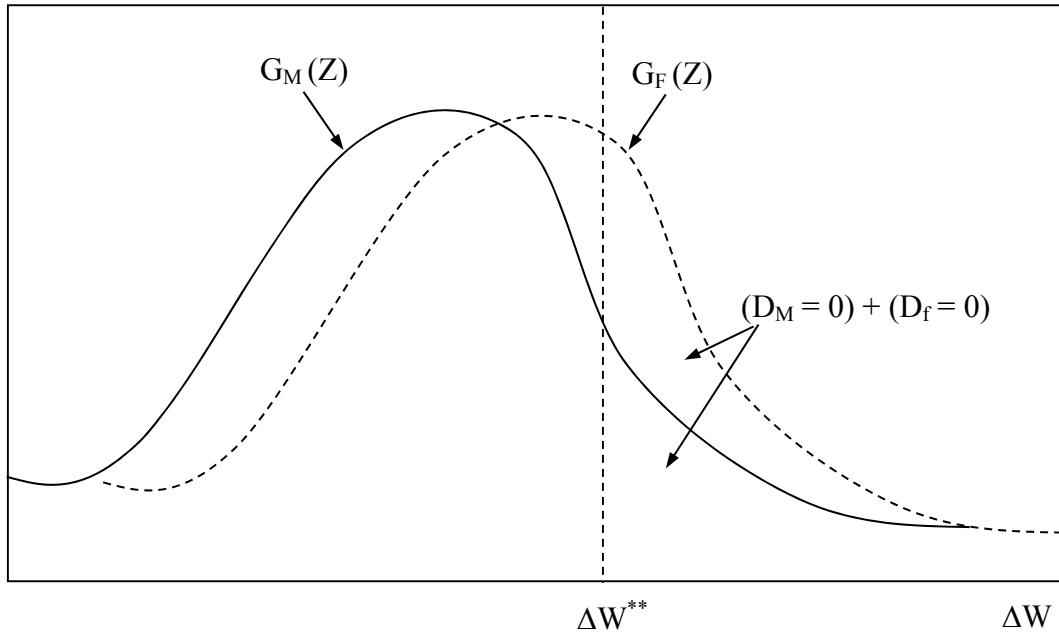
Part A: Amenity demand by workers



Part B: Amenity supply by firms



Part C: Amenity demand by two types of workers



*Note:*  $D = 1$  represents the disamenity and  $D = 0$  represents the amenity.  $G(Z)$  is the distribution of  $Z$  (the compensating variation required for indifference between  $D=1$  and  $D=0$ ) and  $F(B)$  is the distribution of  $B$  (the productivity benefit of the disamenity).  $G_M(Z)$  and  $G_F(Z)$  are the distribution of  $Z$  for males and females respectively.  $\Delta W$  is the compensating differential between the occupation without the amenity (i.e., with the disamenity) and that one with the amenity (i.e., without the disamenity). For workers it is a compensating payment; for firms it is a benefit (a negative cost).  $\Delta W^*$  and  $\Delta W^{**}$  are hypothetical earnings differentials that workers receive and firms pay.