# THE MOST EGALITARIAN OF ALL PROFESSIONS:
# PHARMACY AND THE EVOLUTION OF A FAMILY-FRIENDLY OCCUPATION

Claudia Goldin
Lawrence F. Katz

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## ABSTRACT

Pharmacy has become a female-majority profession that is highly remunerated with a small gender
earnings gap and low earnings dispersion relative to other occupations. We sketch a labor market
framework based on the theory of equalizing differences to integrate and interpret our empirical findings
on earnings, hours of work, and the part-time work wage penalty for pharmacists. Using extensive
surveys of pharmacists for 2000, 2004, and 2009 as well as samples from the American Community
Surveys and the Current Population Surveys, we explore the gender earnings gap, the penalty to part-time
work, labor force persistence, and the demographics of pharmacists relative to other college graduates.
We address why the substantial entrance of women into the profession was associated with an increase
in their earnings relative to male pharmacists. We conclude that the changing nature of pharmacy
employment with the growth of large national pharmacy chains and hospitals and the related decline
of independent pharmacies played key roles in the creation of a more family-friendly, female-friendly
pharmacy profession. The position of pharmacist is probably the most egalitarian of all U.S. professions
today.

Claudia Goldin
Department of Economics
Harvard University
Cambridge, MA 02138
and NBER
cgoldin@harvard.edu

Lawrence F. Katz
Department of Economics
Harvard University
Cambridge, MA  02138
and NBER
lkatz@harvard.edu

The eighth highest paid occupation for men in the United States is also the third highest for women among more than 460 detailed occupations.[1]  It is a profession that was once dominated by men working in independent practice, many of whom owned their own businesses. But for the past three decades more than 60 percent of new hires in this occupation have been women and most have been hired by large corporations, the government, and hospitals.  Few work long hours and part-time employment is common, particularly among women.  The educational requirement to enter this field was until recently a five-year undergraduate degree; in the past decade it changed to a six-year combined BS and doctoral program.  Does a highly-paid, relatively short-hour, moderately high education, majority-female occupation sound too good to be true?  It is true and the field is pharmacy.

This paper concerns how the occupation of pharmacist changed during the last half century and how it became a family-friendly profession with a high fraction of women and a great ability to work part time.  Pharmacy today has little or no hourly wage penalty for part-time work.  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 Figure 1, from 1970 to 2010 and especially since 2000 median earnings of full-time, year-round pharmacists increased relative to physicians, lawyers and veterinarians.

Not only have the earnings of male and female pharmacists increased relative to other professions, the ratio of female to male pharmacist earnings has also risen 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 is now smaller for pharmacy than for almost any other high-wage profession.

Earnings among pharmacists are high and largely differ by hours of work rather than other job and individual characteristics.  Managers and even owners earn more than employee pharmacists largely because they work more hours.  Women with children earn less largely

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[1] These rankings are for the median annual earnings by detailed occupation and sex of full-time, full-year workers (those working 35 or more hours per week and 40 or more weeks in the year) from 25 to 64 years old in the 2010 American Community Survey (ACS).  Annual earnings are the sum of wage and salary and self-employment income.  Median annual earnings in 2010 were $115,000 for male pharmacists and $105,000 for female pharmacists (in 2010 dollars).  The rankings include ACS occupation-sex cells (491 for men and 463 for women) with at least 5 observations meeting the sample restrictions.

because they work fewer hours.  Pharmacy earnings appear to be highly linear in hours and in that sense pharmacy has a relatively low "career cost of family" (Goldin and Katz 2011, forthcoming).  In addition, pharmacists' hourly earnings exhibit a low level of 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.[2]  Pharmacy has become the "most egalitarian" of all U.S. professions.

The pharmacy sector has greatly changed in the US and elsewhere mainly because of an increase in scale economies that can be reaped by nationwide chains.  Drugs are increasingly produced by pharmaceutical companies, not compounded in pharmacies and hospitals.  Added to this factor is the growing demand for pharmaceuticals with an aging population, Medicare Part D drug coverage, and the many remarkable advances in  medicine that have increased the use of prescription drugs for a host of chronic diseases.  These and other changes in the industrial organization of pharmacy have altered the working environment and conditions.

The bottom line is that pharmacy is a family-friendly profession and one that is highly remunerated with a low gender earnings gap relative to the occupations of other college graduates.  We sketch a labor market framework based on the theory of equalizing differences to integrate and interpret our empirical findings on earnings, hours of work, and the part-time work wage penalty for pharmacists.  We address why the substantial entrance of women into the profession was associated with an increase in their earnings relative to male pharmacists.  We conclude that the changing nature of pharmacy employment with the growth large national pharmacy chains and hospitals and the related decline of independent pharmacies played key roles in the creation of a more family-friendly pharmacy profession.

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[2] Knapp, et al. (1992) analyzes the results of a retrospective survey given to all living members of a Midwestern pharmacy school.  The use of graduating cohorts, rather than those with active pharmacy 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).

# I.       A Compensating Differentials Framework

Workplace flexibility is an amenity that entails a wage price to the worker and a cost to the firm.  The price of workplace flexibility to the worker includes penalties 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.  Workers sort across occupations and firms for various reasons, the career-family goal being one of them.  Occupations with a lower cost to workers of workplace flexibility will be demanded relatively more by those who disproportionately value it, such as women.

The choice that employees make is not simply between having some 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 workplace flexibility.  The labor market equilibrates the two sides of the market (the demand for flexibility and the supply of it) and generates different amounts of workplace flexibility and its costs.

The implicit framework we use here is one of compensating differentials (also known as equalizing differences).[3]  The framework 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 largely by changes in tastes or technology.

Characteristics of work that are disliked by or noxious to some may be of no consequence to others.  Working in an environment free of peanuts will of great value to those who are allergic but of little worth to others.  The ability to shift hours during the day will be highly valued by those with family responsibilities but of less worth to others.  The same may be true of on-site daycare and paid family leave.

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[3] See Rosen (1986).  Our full model is contained in Goldin and Katz (forthcoming).

The amenity of job flexibility (or family friendliness) is assumed in this model to be a discrete variable. Jobs are either inflexible or flexible. Inflexible jobs come with a disamenity (D = 1). Alternatively, jobs can be flexible and not have the disamenity (D = 0).

On the demand side of the market, workers value income and are assumed to be heterogeneous in their tastes for the disamenity (D). Assume that the compensating differential in earnings between a job with the disamenity and one without is $\Delta W$. Workers who highly value the amenity will opt for the job without the disamenity and will pay $\Delta W$ for it. Alternatively, those who have a low value for the amenity, will not.

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. The firms' technology that produces the amenity (or that ameliorates the disamenity) is assumed to be distributed continuously. For some firms (or sectors) the provision of part-time work is not costly whereas for others it is. If $\Delta W^*$ is the given wage differential firms are paying to employees who take the disamenity, the firms with lower costs of providing the amenity would do so and firms with higher costs would not.

The equilibrium occurs when amenity supply equals amenity demand. If the supply of the amenity is equal to the demand for the amenity at the going wage differential, then the market is in equilibrium. If the supply of the amenity was greater than its demand, the price of the amenity (the wage differential) would fall, and if the supply were less than the demand, the price of the amenity would rise.

The model can be made relevant to the issues explored here by considering two types of workers: males and females. If at every $\Delta W$ women demand more of the amenity than men, men will walk away with a higher salary and incur the disamenity, about which they care little.

Two major changes can alter the equilibrium. The first is a labor supply shift. An influx of women (who are more willing than men to pay for the amenity) into an occupation will mean that, at the going wage differential, 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 ΔW 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 than men will be enticed into these positions.

Individuals with a greater willingness to pay for the amenity earn less than others and a decrease in the cost of supplying the amenity will increase their relative earnings. An increase in the supply of individuals who value the amenity will increase the equilibrium amount paid for the amenity and tend to widen the gap in earnings between men and women.

To summarize, the compensating differentials framework includes two cases. In one case the change in workplace flexibility arises because of an increase in the group with the greater demand for the amenity or because of a change in preferences for the amenity. The implications of this demand side shift are: (a) an increase in the cost of the amenity and by implication a likely relative decrease in women's 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). In the other case, the costs to firms of providing the amenity or of reducing the amount of the disamenity decrease. The implications are: (a) a decrease in the cost of the amenity and by implication a likely relative increase in women's 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).

In both cases—the demand side change or the supply side shift—a higher fraction of workers will take the amenity after the change. The major difference concerns the equilibrium wage effect. In the case of an increased demand for the amenity, the price of the amenity (e.g., the part-time work penalty) rises, thereby tending to widen the gender earnings gap. In the case of an increase in the supply of the amenity, the price of amenity falls tending to narrow the gender earnings gap.

We explore these implications to see if the cost of workplace flexibility is lower for pharmacists than for comparable professionals and how the pharmacy profession was altered by

the rise of chains and hospitals.  Because some of the data used in this study are not widely known we first discuss our sources.

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

We use individual micro-data on about 5,300 pharmacists with active licenses from surveys devised by the Midwestern Pharmacy Research Consortium for the years 2000, 2004, and 2009.[4]  The surveys were mailed in each of the years to a randomly chosen group of about 4,500 currently licensed pharmacists.  Response rates were around 40 percent in each year.  Most of the analyses here 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.[5]  The three surveys are nearly identical but that for 2009 contains richer information on all job changes during the individual's career.

## III.    Pharmacist Training and the Pharmacy Sector

To practice pharmacy today involves training in a college or university, practical experience and a license.  Pharmacy instruction was originally based in medical colleges but shifted in the 1800s to dedicated pharmacy schools.  After the 1880s most new pharmacy colleges were established within existing colleges and universities.  Since 1932 the pharmacy curriculum has been specified by the American Council on Pharmaceutical Education (ACPE), the group that accredits pharmacy colleges and programs.  The length of the program is

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[4] Tabulations are contained in three reports (Midwest Pharmacy Research Consortium 2000, 2005, 2010).
[5] The 2009 survey includes only children living at home.

recommended by the American Association of Colleges of Pharmacy (AACP), as it probably has been ever since the inception of the AACP in 1900.[6]

In 1907 a two-year program was prescribed by the AACP, although some schools offered advanced degrees. The standard program was increased to three years in 1925 and to four in 1932. In 1960 a five-year BS program was recommended and in 1992 a six-year combined BS and PhD program, known as the PharmD, was proposed. 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 Survey 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.

As the demand for pharmacists has increased, so has the number of schools and the enrollment per school. In 2010 there were 118 U.S. colleges and schools of pharmacy with active PharmD degree programs and 100 of them granted the degree in that year (11,487 degrees).[7] In 2005 when the PharmD was first required of all pharmacy schools there were 92 active programs; in 2000 there were 82 schools granting either a PharmD or a BS in pharmacy. Pharmacy program enrollment increased by 65 percent (from 34,481 to 56,841) and enrollments per school by 14 percent (from 421 to 482) from 2000 to 2010. Similarly, total degrees increased by 58 percent (from 7,260 to 11,487) and degrees per school increased by 22 percent (from 94 to 115). Despite the increase in the size of each school, more than two-thirds of the total increase in enrollments during the decade occurred because of the expansion in the number of schools rather than in the size of the average school.[8]

Pharmacists are found in several sectors. The largest sector by employment today is retail sales, although the sector was relatively larger in the past. Pharmacists are also employed in hospitals, government, industry, and academia. In 2009 59 percent of all pharmacists were

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[6] For a history of pharmacy see Kremers, et al. (1986) and Henderson (2002)

[7] The 18 that were not currently granting degrees had been established in the previous five years.

[8] These data are from compilations by the American Association of Colleges of Pharmacy available on a special part of their website. See http://www.aacp.org/about/Pages/Vitalstats.aspx for the main site and http://www.aacp.org/resources/research/institutionalresearch/Documents/Forms/AllItems.aspx?RootFolder=%2fresources%2fresearch%2finstitutionalresearch%2fDocuments%2fTrendData&FolderCTID=&View=%7bD75638BD-228A-42B8-8071-8A3790AD8426%7d for the historical data [accessed last 8/24/12].

employed in retail, 30 percent in hospitals, and 11 percent in the remaining sectors (see Table 1). In 1966 83 percent of pharmacists worked in retail sales and just 8 percent worked in hospitals.

The increase in the fraction of pharmacists working in hospitals has reinforced another important trend. During the past half century the fraction of pharmacists who are employees rather than owners has soared. In addition, the fraction of pharmacists who work for large corporations in the retail sector rather than for independent pharmacies has also increased greatly. The relative shift into hospitals has strengthened the trend to employee status.

Of all practicing pharmacists across the three PWS samples in the 2000s, 7.5 percent were self-employed (that is, owners or partners), 28.8 percent were managers and the remaining 63.7 percent were employees. Men were owners at four times the rate of women: 12 percent versus 3 percent. In contrast, more than 35 percent of all pharmacists were self-employed in 1970 and 40 percent were in 1966 (see Table 1). Increased pharmaceutical employment in chain stores and supermarkets has been the largest single reason for the industry changes. Just 14 percent of pharmacists were employed by non-independent retailers (e.g., chains) in 1966 but 45 percent were across the three samples in the 2000s. The overall self-employment rate for pharmacists declined from 40 percent in the mid-1960s to less than 5 percent in 2010.

The decrease in the fraction self employed has meant that the fraction who are employees—in chains, independent practice, hospitals, or elsewhere—has increased. More recently (in 2009) about 54 percent of males and 71 percent of females working as licensed pharmacists are employees. The rest are managers and owners.

Because there are relatively fewer self-employed pharmacists and more pharmacists employed by the non-independents, there are also relatively fewer employed by independent pharmacies. The fraction of pharmacists who were either owners or employees in independent practice declined substantially (see Figure 2). In the late 1950s about 75 percent of all pharmacists were owners or were employed by an independent practice. Around 1980 40 percent were and recently just 14 percent are.

Each of the changes mentioned—the decline in ownership and independent pharmacies and the rise of employee status—has had major implications for the pharmacy work environment

and for women in particular. The relative increase in employees decreased the implicit pecuniary penalty to pharmacists from working part-time and part-year. In the corporate and hospital sectors, pharmacist employees became better substitutes for each other. Similarly, the decrease in the fraction owners decreased the implicit penalty for not being owners or equity stakeholders. The impact on the relative earnings of female pharmacists has been substantial. These changes are probably the single most important factors prompting the enormous increase in female pharmacists and accounting for the fact that women are the majority of pharmacists.

The fraction of pharmacists who work part-time has greatly increased in the 40 years after 1970, from around 9 percent to about 20 percent. But almost all of the change has been compositional and driven by the rising share of women in the pharmacy profession. Female pharmacists in past decades were employed part-time to about the same extent they are today and often located part-time work in independent pharmacies as assistants to the owner (Henderson 2002). Their earnings were considerably less than those of the owners who were the residual claimants and the main decision makers. As chain stores expanded more pharmacists became employees. Their earnings no longer included a premium to compensate for the added risk and responsibility and their hours in consequence could be reduced without much additional earnings penalty. The annual earnings premium to ownership, we will show, is about 45 log points but three quarters of the premium is due to the greater hours worked by owners than employees.

## IV.    Demography of Pharmacists

The pharmacy industry experienced major structural changes precisely when female pharmacists greatly increased in number. Women were about 8 percent of all pharmacists in 1960 and are more than 55 percent today. The fraction female among pharmacy school graduates increased from 14 percent in the mid-1960s to about 65 percent today (see Figure 3).

Large organizational and structural changes in the pharmacy industry apparently decreased the costs to retail establishments of offering various job amenities to all of their employees without large earnings penalties, such as the ability to work short hours. Changes in retail sales also reduced the compensating differential to ownership, long hours, and being the residual claimant. 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 WalMart, Target, Costco, CVS, Rite Aid, Walgreens, and other chains that have pharmacies to women's increased numbers in the pharmacy profession.[9]

In most professions in which women have greatly increased their numbers, men and women differ greatly in their demographics. The most obvious difference is that women are much younger than men. But in most professions, even given age, a lower fraction of women than men are married and a far lower fraction have children even among those who are married.

But in the case of pharmacy, these differences are less evident especially for those younger than 45 years. Part of the reason is that parity between male and female graduates of pharmacy colleges began around 1984, whereas near parity in law for example was achieved around 2000. Another reason is that pharmacy is more enabling of family. 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.[10]

As seen in Table 2, the fraction of (active) pharmacists 25 to 44 years old who have ever married is somewhat greater for women than men. 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).

The 2009 Pharmacist Workforce Survey (PWS) asked respondents to record the starting and ending dates of all of their employments and to include periods when they were not in the labor force. They also asked the reason employment had been terminated and why the individual was not in the labor force during any spell. The surprising finding is that even though women had more spells out of the labor force than men, the spells for women were few and the length of

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[9] See Bottero (1992) for a similar discussion of pharmacy in the United Kingdom.
[10] Among all BA women in the United States 40 to 44 years old in 2008, 22.8 percent never had children (derived from CPS data, see http://www.census.gov/prod/2010pubs/p20-563.pdf ). Comparable data from the pharmacy surveys shows 21.0 percent excluding 2009 and 20.2 percent including 2009 (for currently employed pharmacists). The CPS data refer to "biological" children whereas the pharmacy surveys could include adopted and step-children.

time spent away from work was brief.

According to the 2009 PWS 11.1 percent of women (but 4.3 percent of men) with active pharmacy degrees (but not limited to those currently employed as pharmacists) ever had a spell out of the workforce. The fraction for women increases to 15.2 percent for those 45 years and older but does not change for men. The median total time out for women who had at least one spell was about 1.8 years and was 2 years for men. The means were 3.4 and 4.4 for women and men respectively. Although these data are based on a small sample because of the low fraction of individuals who ever took time out, they are suggestive that female pharmacists do not take much time out and conditional on taking out time, did not take more than did male pharmacists.

Because the Pharmacist Workforce Surveys are limited to those with active licenses, the data may create a false impression that female pharmacists persist in the labor force. But information from the 2009 and 2010 American Community Surveys (ACS) on the field of degree suggests otherwise and indicates that women with a bachelor's degree in pharmacy (and not limited to those whose occupations are given as "pharmacist") have higher labor force participation rates than other educated women.

Among all women 25 to 64 years old with at least a bachelor's degree in the 2009 and 2010 ACSs, those with a BS in pharmacy had a labor force participation rate of 85.6 percent as compared with 81.5 percent for other college graduate women. And among college graduate women aged 35 to 39 years, the labor force participation gap favoring pharmacy graduates over other fields is even greater (88.6 percent as opposed to 82.2 percent). The bottom line is that an unusually high fraction of women with pharmacy degrees persist in the labor force.[11] Rather than taking time off, they work part-time.

## V.    Pharmacist Hours and Part-time Employment

Pharmacist earnings per unit time are relatively high despite a large fraction working part-time and fairly low hours for a high-powered profession. Male and female pharmacists have similar total hours of work when young but hours of work for women subsequently decline.

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[11] See also Knapp et al. (1992) for data on those with pharmacy degrees in any employment.

They then level off and rise a bit before decreasing prior to retirement (see Figure 4.A). Total hours in pharmacy employment include time spent working in the primary job plus overtime in that position and hours in all secondary positions. Total hours for men average around 45 per week and are about 37 for women. In terms of hours in their primary job, men work about 43 hours throughout their working lives; women begin at around 41 hours and decrease to 36 hours in their early thirties and for just about the rest of their career.

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, at least until women are in their fifties when hours are about the same for both groups (see Figure 4.B). Hours are a bit higher for men with children than for those without, consistent with the well-known finding that married men with children earn more than observationally comparable men without. Although hours are lower for women with children than for those without, they are lower for women without children than for men suggesting that female pharmacists work fewer hours for reasons other than taking care of their children.[12]

Part-time work in all jobs, defined as working fewer than 35 hours per week, is about 6 percent for males and 9 percent for females at the start of their careers. But the fraction part-time falls to about 5 percent for males where it remains until close to retirement and rises to around 36 percent for females. For females the fraction part-time peaks around age 50 in the cross section and then decreases for those currently employed as pharmacists before it rises prior to retirement.[13] A similar pattern is found for women with children. The fraction working fewer than 35 hours at all jobs remains above 40 percent until women are in their late forties. It would appear from these data that female pharmacists who work part-time when their kids are young continue to work part-time even when their children are grown.

It will be recalled from the data in Table 1 that women have always worked part-time in pharmacy. In 1970 36 percent of female pharmacists worked part-time and the fraction decreased over time.[14] The barrier to female employment in pharmacy in the past was not that

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[12] The sample of women without children at older ages is small.
[13] The fraction working part-time across all employments is lower than for the primary job only, of course.
[14] The most recent data come from the ACS. The 2004 PWS figure for part-time in the primary job seems

women could not work part-time, at least for part of their career. It was that the earnings penalty to working part-time must have been far greater when the female part-time pharmacist was often an assistant of a male pharmacist who owned the business. The implicit part-time and lower-hours penalty dropped as most pharmacists became employees.

As more pharmacists became employees and as the pecuniary penalty to part-time work decreased, female pharmacist earnings gained on those of male pharmacists. 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 2010 the ratio had fallen to 1.18. The ratio for median earnings of male to female full-time, year-round pharmacists was 1.52 in 1970 but 1.10 in 2010. 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 of the period relative to the end and produce a larger narrowing of the gender earnings gap for all pharmacists.[15]

We will now see how earnings for male and female pharmacists vary with hours of work, type of sector, and position. Our focus will be on the degree to which there is a penalty to women from working shorter hours, fewer weeks, and for taking time off and how this penalty fell over time leading to the relative increase in female pharmacists and in their relative earnings.

## VI.   Earnings and the Gender Gap for Pharmacists

### A.   Earnings levels, change, and dispersion

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

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too high (also for 2009); even the value for all jobs is high (0.322 for 2004).

[15] In fact, the ratio for median annual earnings of all male to all female pharmacists with positive earnings (including the part-time and part-year workers) fell from 1.99 in 1970 to 1.13 in 2010 using the 1970 Census and 2010 ACS public use samples.

occupations does the median male worker earn more and in only two others does the median female worker earn more.[16]

Pharmacist earnings have been rising relative to most other health care professionals ever since the late 1990s.[17]  From 1999 to 2010 pharmacist earnings have risen relative to 41 out of the 42 health care professionals listed in the BLS Occupational Employment Statistics (OES).[18]  In 1999 pharmacist earnings were 0.89 of chiropractors', for example, but were 1.33 times that in 2010.  Pharmacist earnings were 0.81 of optometrists' in 1999 but were on par with them in 2010, and pharmacist earnings rose relative to the seven major physician specialties listed in the OES even relative to surgeons and anesthesiologists.

Pharmacy is an extraordinarily egalitarian occupation especially given its high average earnings.  Using the May 2011OES pharmacists have the lowest wage dispersion of any of the occupations with earnings greater than $60,000 per year (or more than $40 per hour), where wage dispersion is measured either by the ratio of earnings at the 90th percentile relative to that at the 10th percentile or similarly for the 75th and the 25th percentiles.[19]  In fact, if one uses data on the 800 or so occupations in the OES and predicts wage dispersion on the basis of average earnings, the level for pharmacists would be twice the actual.  Pharmacist earnings have the lowest dispersion among any of the healthcare occupations.

The bottom line is that pharmacy is a high paying and relatively egalitarian profession economically.  One factor that enables pharmacy to be so equal is that its remuneration is fairly linear with respect to hours and weeks.  Individuals who work more hours earn more.  But they are not, by and large, rewarded any more than would be predicted by a linear relationship among earnings, the hourly wage, and hours.  In contrast, many lawyers and those employed in the corporate and financial sectors are rewarded considerably more if they work long hours (Bertrand, Goldin, and Katz 2010; Goldin and Katz 2011; Goldin and Katz forthcoming).

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[16] The two higher paid occupations for women are nurse anesthetists and physicians. *Source*: 2010 ACS.
[17] 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 back to approximately its level in 1950 (0.57).
[18] http://www.bls.gov/oes/current/oes_nat.htm was used for 2010, for example.  Only Radiology Therapists, a lower-paying healthcare occupation, had earnings that rose a bit faster from 1999 to 2010.
[19] Tabulations from the National Cross-Industry Estimates of the May 2011 Occupational Employment and Wage Estimates available at http://www.bls.gov/oes/oes_dl.htm.

Part of the mechanism behind this linearity is that pharmacists are good substitutes for each other. Their training is similar; they take the same national certification exams. But that is also true of other professions in which there is significant non-linearity of earnings with respect of hours. The way in which the case of pharmacy differs from the others is that there are no great gains to having a pharmacist work 60 hours a week as opposed to having two pharmacists each work 30 hours a week. The same is not the case in the legal and financial sectors often because of real reasons. A trial lawyer, for example, has to be in front of the jury every trial day and no camera equipment and Skyping are allowed. Traders in much of the financial sector are generally required to be in their office during market hours.

The linearity in earnings with respect to hours and the apparent relative homogeneity among pharmacists have implications for the gender gap in pharmacy. Although there is a substantial raw gender gap in annual earnings, it is almost entirely explained by differences in the hours of female and male pharmacists. Even the annual earnings premium to being a manager or owner is largely due to their longer hours. Although women with children have lower earnings, that is largely due to their shorter hours of work. Furthermore, shorter hours early in one's career or time off do not appear to lead to lower hourly earnings later in life.

One set of factors that appear unlikely to be responsible for the egalitarian structure of earnings in pharmacy is the licensing and regulation of the profession. A host of other professions require licensing but do not exhibit such an egalitarian earnings structure. Many physicians become board certified and all need licenses to practice medicine, lawyers take the bar exam, CPAs must pass a battery of national exams before becoming "certified," and engineers typically are required to have a state license. We know of no particular regulations that would enforce greater uniformity of hourly earnings on pharmacists.

To make these points more precise, we examine the gender earnings gap for currently practicing licensed pharmacists using the Pharmacist Workplace Surveys for 2000, 2004, and 2009. 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, 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. 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 just 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 is no significant labor market return to experience. There is a surprisingly flat age earnings profile for licensed pharmacists. 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.[20] 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 found using the ACS for 2009 and 2010. The samples are 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 26 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 8 log points.[21] The results from the rich data contained in the PWS 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.

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[20] Regressions in Table 3, cols. (7) to (9) are run on only the 2000 and 2004 samples because the 2009 survey asked only 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.

[21] The regression sample includes all 5,615 individuals in the 2009 and 2010 ACS PUMS listing 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).

## B.    Hourly wage penalty to part-time employment

Pharmacy is a fairly egalitarian and standardized 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.[22]

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.[23]  The part-time hourly earnings penalty is also essentially zero when looking only at female pharmacists in the 2000 and 2004 Pharmacist Workforce Surveys (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) samples for 2005 to 2011.

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 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.

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[22] These problems arise from using constructed hourly earnings from retrospective reports of annual earnings, hours, and weeks worked.
[23] There is enough precision to rule out even a 2 log point wage penalty for part-time work.

The estimates in col. (3) indicate a 25 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 (5 log points) and gender earnings gap (10 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.[24] 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 20 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).

We have demonstrated that the part-time penalty for pharmacists is small in recent data. But has it declined as pharmacists have shifted out of independent practice? The answer is that the part-time penalty has substantially declined in the past four decades. We have estimated the analogous hourly earnings regression to that of Table 4, col. (4) using the CPS Merged Outgoing Rotation Group samples for 1979, 1980, and 1981 with all college graduate wage and salary workers (25 to 64 years old) and a full set of 3-digit occupation dummies. In those data, we find no significant difference in the part-time wage penalty for non-pharmacist college graduates (10 log points) and pharmacists (11 log points). Thus, the part-time wage penalty has shrunk and essentially disappeared for pharmacists during the last three decades, whereas a substantial part-time wage penalty has persisted for other college graduates.

### C.      Earnings premium and gender earnings gaps: Pharmacists versus other college graduates

Pharmacists, as we have shown, are well paid and their work often entails low hours with little penalty for part-time work. We now look at the earnings premium to being a pharmacist or having a pharmacy professional degree using the large and nationally representative 2009 and 2010 ACS public use samples. The 2009 and 2010 ACS samples provide information on the

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[24] This specification has greater comparability to the within-occupation analysis for pharmacists in Table 4, col. (1).

detailed field of undergraduate degree for all individuals with at least a bachelor's degree. The ACS samples are best suited for examining earnings differences among full-time, year-round workers since they provide information on annual earnings, usual weekly hours in the past year, but 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 shown in col. (1) of Table 5 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 another 9 log points larger or 34 log points.[25] These results imply a 9 log point smaller conditional mean gender earnings gap for pharmacy bachelor's relative to other college graduates (19 log points versus 28 log points). The lower dispersion in earnings for pharmacists means the earning premium for pharmacy bachelors is even larger and the gender earnings gap even smaller when examining conditional median earnings differences in a median (quantile) regression. The gender earnings gap remains significantly smaller for pharmacy bachelors (by 5 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 those who work as pharmacists and that particularly true 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 (19 log points for men and exceeding 40 log points for women).

The specifications in cols. (5) to (7) of Table 5 further 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 considerably smaller for pharmacists than for other college graduates. The finding holds even using within-occupation

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[25] 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.

comparisons and, as shown in col. (7), the gender earnings gap remains 18 log points for non-pharmacists and is less than 10 log points for pharmacists.

The bottom line from our exploration of earnings by field of degree and occupation in the 2009 and 2010 ACS is that male and female pharmacy degree holders earn substantially more than other college graduates with comparable potential experience and advanced degrees. 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 fields.

### D.     Cross section and cohort data

A curious finding from the 2000, 2004, and 2009 Pharmacists Workforce Surveys is that although pharmacist earnings are substantial, their earnings during the past decade have not increased much with time on the job. The earnings profiles are almost flat using age or work experience. In contrast, their real earnings rose considerably by cohort. Because we have three similar cross sections, we can also create synthetic cohort real earnings data. We show these men and women separately in four synthetic cohorts, given in Figure 5.

For both men and women earnings rise within cohort. But the cross section earnings are sufficiently flat so that younger and older workers earn, on average, the same amount even though each cohort earns more as it ages.

It is not clear why earnings are so flat in cross section. One possibility is that there is no accumulation of on-the-job training and therefore no reason for firms to award higher earnings for greater seniority. Another is that the 1990s and 2000s were anomalous decades in which demand for pharmacists has outpaced supply. Signing bonuses for new graduates became more common in the 1990s (U.S. Department of Health and Human Services 2000) and an increased demand for new workers could temporarily skew the earnings profiles.

# VII. Conclusion

Pharmacy is now a female majority profession. The fraction of active pharmacists who are women increased from about 5 percent in 1960 to around 55 percent more recently. The fraction of pharmacy graduates who are women reached 50 percent in around 1980. Rather than being accompanied by falling incomes, as occurred in so many other feminized professions, earnings among pharmacists have increased in recent decades. The position of pharmacist in the occupational wage structure has risen, not fallen. Female pharmacists, moreover, have increased their earnings relative to their male counterparts, from 1970, at least, to 2010. And the profession as a whole has relatively low dispersion of earnings.

The pharmacist profession became feminized as the "career cost" of working low hours and part-time in pharmacy decreased. The hourly earnings penalty to part-time work in pharmacy has virtually disappeared during the past four decades whereas it has remained about the same for other college graduates. Small independent pharmacies have been replaced by large corporate-owned chains. Hospital employment of pharmacists increased. Pharmacists no longer own their own operations, by and large, and no longer earn rents from that ownership. They have become primarily employees and are fairly good substitutes for each other.

Earnings of pharmacists today are mainly a function of their hours of work. We have shown that, 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).[26]

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[26] 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 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).

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. For women, the penalty to part-time employment for pharmacists is effectively zero whereas it is 20 log points for all college graduates.

In sum, the position of pharmacist is probably the most egalitarian of all professions in the U.S. 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 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 the regulation specific to the pharmacy profession. Rather, a host of structural changes outside the realm of the labor market has increased the demand for pharmacists and reorganized work in ways that have made pharmacy a more family-friendly and female-friendly profession.

References

Altonji, Joseph G., Erica Blom and Costas Meghir. 2012. "Heterogeneity in Human Capital Investments: High School Curriculum, College Major, and Careers." NBER Working Paper no. 17985, April.

Bertrand, Marianne, Claudia Goldin and Lawrence F. Katz. 2010. "Dynamics of the Gender Gap among Young Professionals in the Corporate and Financial Sectors," *American Economic Journal*: *Applied Economics*, 2 (July), pp. 228-55.

Bottero, Wendy. 1992. "The Changing Face of the Professions? Gender and Explanations of Women's Entry to Pharmacy," *Work, Employment and Society* 6 (September), pp. 329-46.

Fulda, Thomas. 1974. *Prescription Drug Data Summary.* U.S. Department of Health, Education and Welfare. U.S.: G.P.O.

Goldin, Claudia and Lawrence F. Katz. 2011. "The Cost of Workplace Flexibility for High-Powered Professionals," *The Annals of the American Academy of Political and Social Science*, 638 (November), pp. 45-67.

Goldin, Claudia and Lawrence F. Katz. Forthcoming. "Career Cost of Family."

Harris, Norma. 1995. "How Does Your Salary Compare?" *American Druggist*, 211, no. 6.

Henderson, Metta Lou. 2002. *American Women Pharmacists: Contributions to the Profession*. New York: Pharmaceutical Products Press.

Kapantais, Gloria. 1982. "Summary Data from the National Inventory of Pharmacists: United States 1978-79." *NCHS Advance Data.* Vital Health Statistics of the National Center for Health Statistics: U.S. Department of Health and Human Services. Number 85 (October 8).

Knapp, Katherine K., Marianne J. Koch, Linda Norton and Michael A. Mergener. 1992. "Work Patterns of Male and Female Pharmacists: A Longitudinal Analysis 1959-1989," *Evaluation & the Health Professions* 15 (June), pp. 231-49.

Kremers, Edward, Glenn Sonnedecker and George Urdang. 1986. *Kremers and Urdang's History of Pharmacy*. Fourth edition. Madison, WI: American Institute of the History of Pharmacy.

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.

Mott, David A., William R. Doucette, Caroline A. Gaither, Craig A. Pedersen and Jon C. Schommer. 2002. "A Ten-Year Analysis of Pharmacist Participation in the Workforce." *American Journal of Pharmaceutical Education.* Vol. 66 (Fall).

Northrup, Herbert R., Douglas F. Garrison and Karen M. Rose. 1979. *Manpower in the Retail Pharmacy Industry.* Philadelphia, PA: University of Pennsylvania, Wharton School Industrial Research Unit.

Rosen, Sherwin. 1986. "The Theory of Equalizing Differences." In *The Handbook of Labor Economics*, vol. 1, eds Orley Ashenfelter and Richard Layard. Amsterdam: Elsevier, pp. 641-92

U.S. Bureau of Labor Statistics. 2010. *Occupational Employment Wage Estimates 1997-2009.*

U.S. Department of Commerce, Census Bureau. 2010. "Table 1050 Summary Statistics for the United States 2002." *Statistical Abstract of the United States.* http://www.census.gov/compendia/statab/cats/wholesale_retail_trade.html (accessed: 4 May 2010 12:02).

U.S. Department of Education, National Center for Education Statistics. Various years. *Digest of Education Statistics*. http://nces.ed.gov/programs/digest/

U.S. Department of Labor. http://www.bls.gov/oes/oes_data.htm (Accessed: 2 April 2010 14:39).

U.S. Department of Health and Human Services. 2000. *Report to Congress: The Pharmacist Workforce A Study of the Supply and Demand for Pharmacists*. (December) U.S.: G.P.O.

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.

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

A. Males
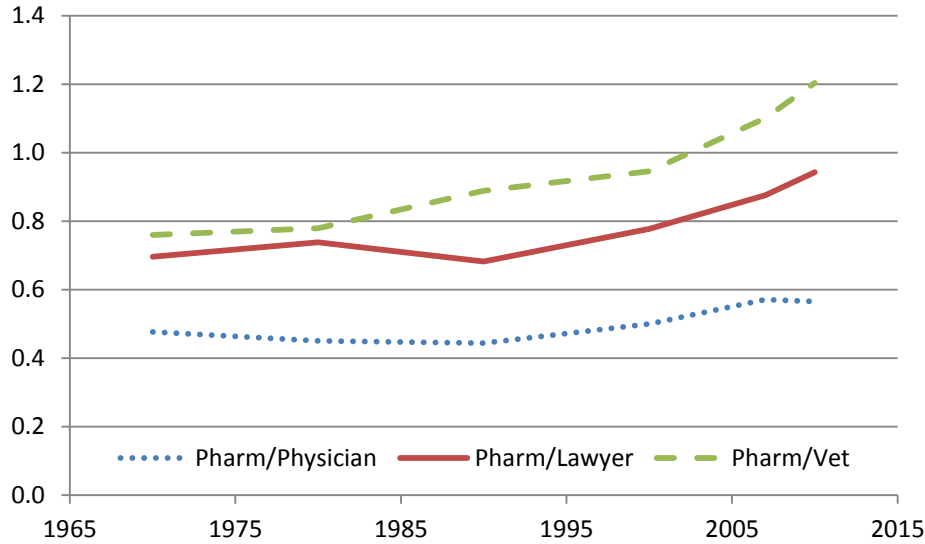


B. Females
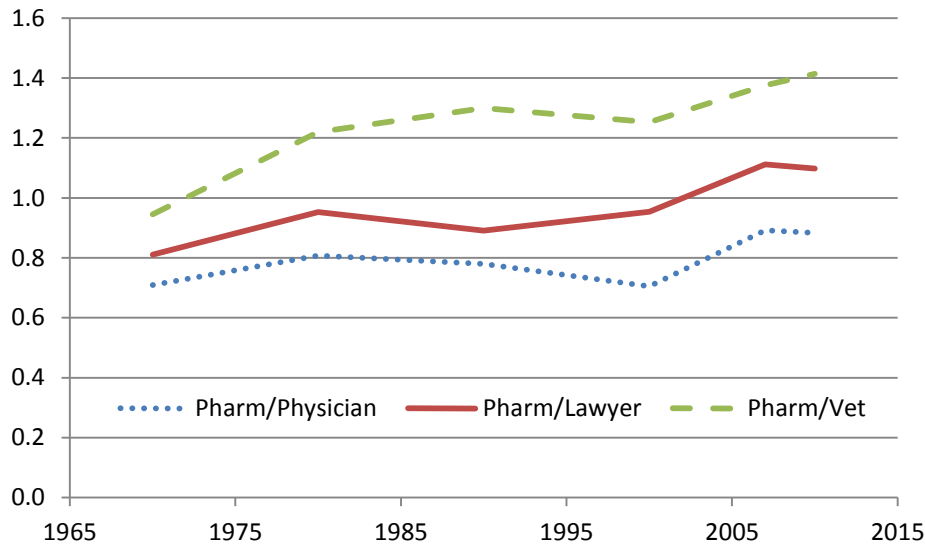


*Sources*: 1970 to 2000: U.S. census of population, public use samples. 2006 to 2010: American Community Survey (ACS) public use samples. 1970 aggregate six 1 percent samples; 1980 to 2000 are 5 percent samples. The 2006 to 2010 ACS are 1 percent samples each year. 2007 is the average of 2006, 2007,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

*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
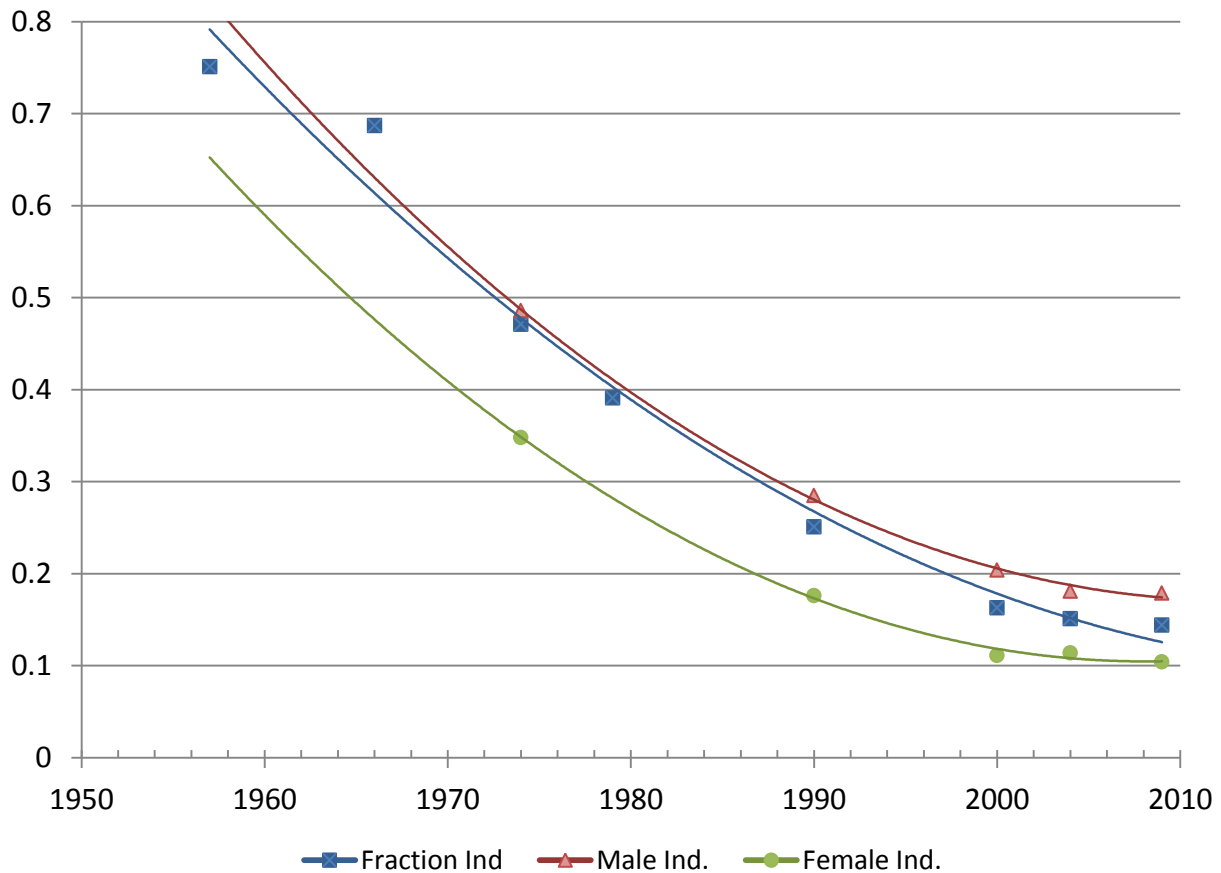


*Sources*: U.S. Department of Health, Education and Welfare (1969), Fulda (1974), U.S. Department of Health, Education and Welfare (1978), Kapantais (1982), U.S. Department of Health and Human Services (2000); and Pharmacist Workforce Surveys for 2000, 2004, and 2009 (see Data Appendix).

*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. Pharmacists can be employed by retail establishments, hospitals, industry, academia, and government. The fraction in independent practice is obtained by taking the number in independent retail practice relative to all active pharmacists.

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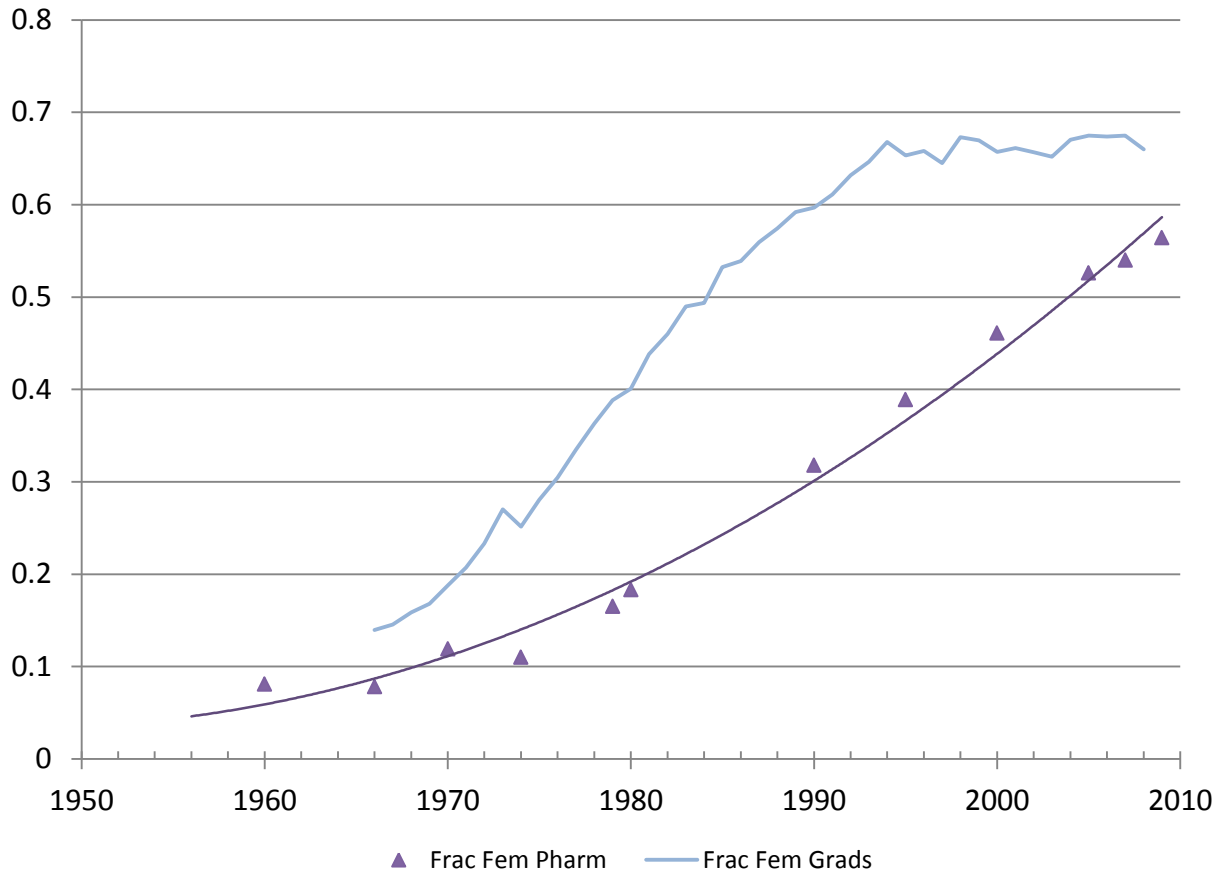


Sources: Fraction female among pharmacists: see Table 1, col. (7). Fraction female among graduates of pharmacy programs, U.S. Department of Education, *Digest* (various years).

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 third-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
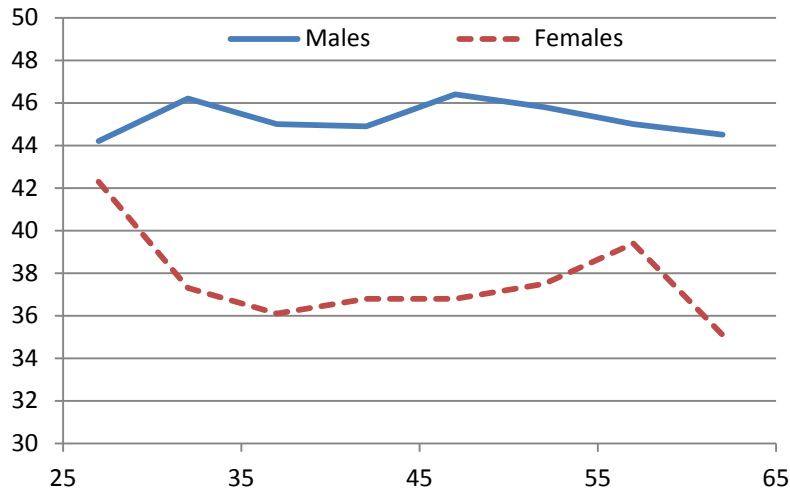
B. Hours of work (in all jobs) for women by age
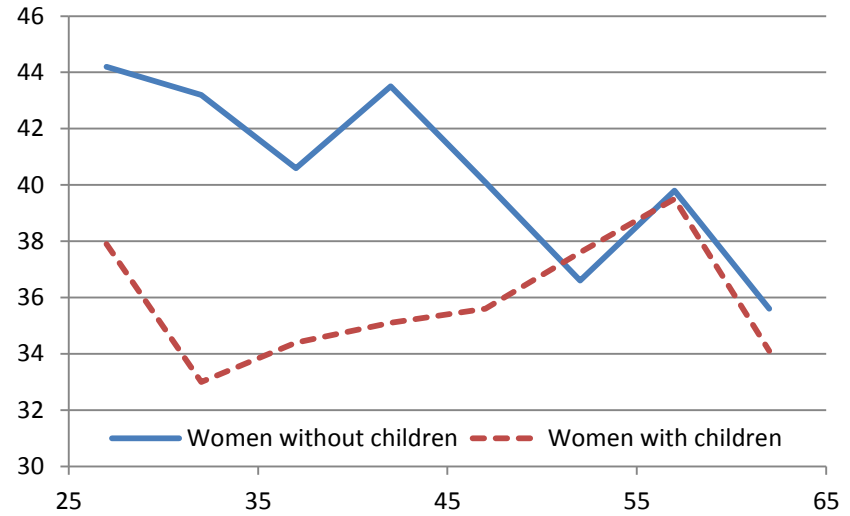
C. Fraction part-time (including all employments) by age
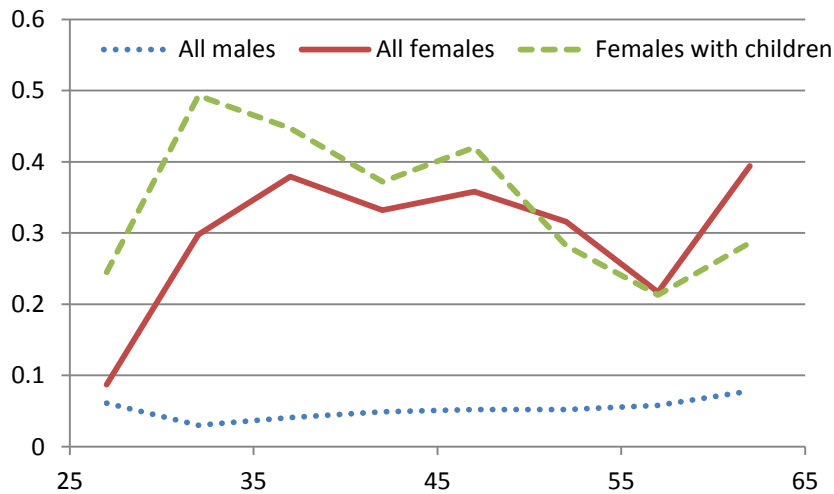
*Source*: Pharmacist Workforce Surveys.  See Data Appendix.

*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.

Figure 5: Pharmacist Earnings (in 2009 dollars) by Synthetic Cohorts

A. Males by age
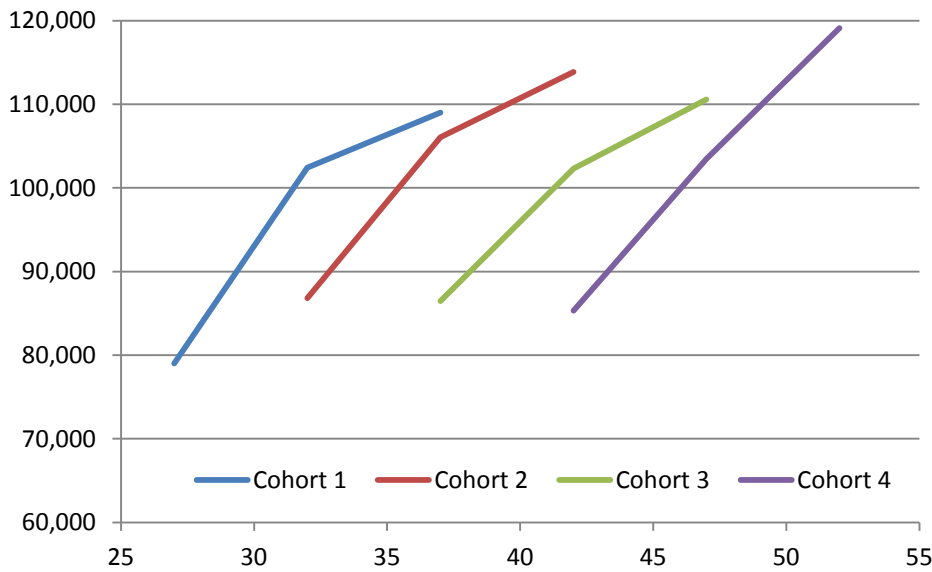


B. Females by age
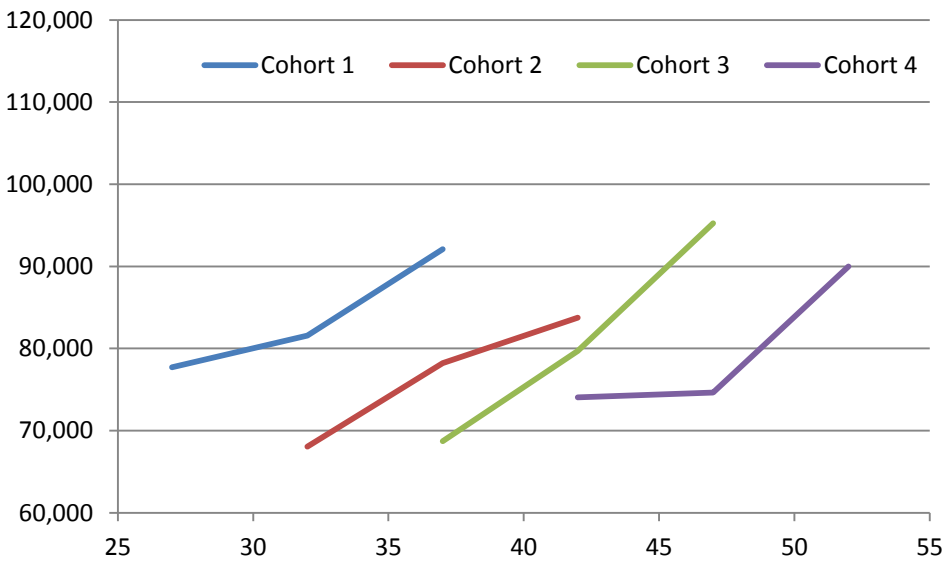


*Source*: Pharmacist Workforce Surveys. See Data Appendix.
*Notes*: The three points for each cohort line correspond to the survey years 2000, 2004, and 2009. Cohort 1 is approximately 27 years old in 2000 and 36 years old in 2009. Similarly cohort 4 is about 42 in 2000 and 51 in 2009. Data are grouped by five years and the means of the age groups are shown. Mean earnings from primary job are given.

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

| Year | (1) Fraction Self-employed | (2) Fraction Independent Pharmacies | (3) Fraction Non-Independent Retail | (4) Fraction Hospitals | Fraction Part-time (primary job, 25 to 64 year olds) | | (7) Fraction Female[b] | Male/Female (Full-time and Full-year) Earnings | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | (5) All | (6) Females | | (8) Median | (9) Mean |
| 2010 | 0.044 | | | | 0.187 | 0.273 | 0.551 | 1.095 | 1.176 |
| 2009 | 0.051 | 0.142 | 0.447 | 0.302 | 0.196[c] | 0.261[c] | 0.564 | 1.057 | 1.180 |
| 2007 | 0.056 | | | | 0.183 | 0.272 | 0.540 | 1.068 | 1.209 |
| 2005 | | | | | | | 0.526 | | |
| 2004 | 0.070 | 0.148 | 0.474 | 0.275 | 0.199 | 0.343 | | | |
| 2000 | 0.074 | 0.163 | 0.443 | 0.267 | 0.157 | 0.273 | 0.461 | 1.129 | 1.286 |
| 1995 | | | | | | | 0.389 | | |
| 1990 | 0.127 | 0.251 | 0.330 | 0.246 | 0.160 | 0.293 | 0.318 | 1.139 | 1.316 |
| 1980 | 0.233 | | | | 0.122 | 0.345 | 0.183 | 1.268 | 1.370 |
| 1979 | 0.231 | 0.391 | 0.289 | 0.199 | | | 0.165 | | |
| 1974 | | 0.471 | 0.267 | 0.146 | | | 0.110 | | |
| 1970 | 0.354 | | | | 0.0865 | 0.361 | 0.119 | 1.515 | 1.666 |
| 1966 | 0.402 | 0.685 | 0.140 | 0.080 | | | 0.078 | | |
| 1960 | | | | | | | 0.081 | | |
| 1957 | | 0.775[a] | 0.130[b] | 0.034 | | | | | |
| 1950 | | | | | | | 0.087 | | |

[a] Total for (2) and (3) is given in source. The 0.775 figure assumes fraction non-independent retail is 0.130

[b] The data given for each year are from the most reliable sources. There are slight differences using other sources. For example, for census years the data using the public use samples are: 0.471 for 2000; 0.356 for 1990; 0.226 for 1980; 0.117 for 1970.

[c] The data from the PWS is 0.232 for "All" and 0.358 for "Females."

*Sources*:
(1) 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: ACS.
(2) 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.
(3) Non-independent retail and (4) Hospitals: Same as in (2).
(5), (6) Part-time (defined as fewer than 35 hours in the primary job): 1970, 1980: U.S. Census of Population; 1990: Mott, et al. (2002); 2000, 2004: same as in (1); 2007: Same as in (1); 2009, 2010: ACS.
(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 2005 from U.S. Department of Health and Human Services (2008) data from BLS, 2005 is a projection; 2007: ACS, 1 percent sample with three years aggregated; 2009, 2010: ACS.
(8) and (9) Male/Female mean and median full-time, year-round earnings. 1970, 1980: same as (1); 1990, 2000: U.S. Census of Population; 2007: same as (1); 2009, 2010: ACS.

*Notes*: Cols. (2), (3), and (4) do not add 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 individuals aged 25 to 64 years who worked at least one week in the previous year. Hours are based on "usual hours worked in a 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 | | |
| Independent | 0.190 | 0.112 |
| Chain | 0.276 | 0.253 |
| Mass merchandiser | 0.0593 | 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 | | |
| Employee | 0.543 | 0.738 |
| Manager | 0.337 | 0.235 |
| Owner | 0.120 | 0.0269 |
| Demographics (for 25-44 year olds) | | |
| Ever-married | 0.813 | 0.825 |
| Number of children[a] | 1.343 | 1.213 |
| Number of children conditional on having one[a] | 2.02 | 1.99 |
| No children[a] | 0.333 | 0.392 |
| No children, 40-44 years[a] | 0.180 | 0.210 |

[a] 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.

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 | -0.0764 | -0.0472 | -0.2354 | -0.0737 | -0.0402 | -0.0337 | -0.0100 | -0.00645 |
| | (0.0157) | (0.0095) | (0.0093) | (0.0166) | (0.0102) | (0.0102) | (0.0351) | (0.0193) | (0.0197) |
| Child | | | | | | | 0.0360 | 0.0538 | 0.0559 |
| | | | | | | | (0.0327) | (0.0180) | (0.0183) |
| Female × child | | | | | | | -0.302 | -0.0843 | -0.0522 |
| | | | | | | | (0.0411) | (0.0229) | (0.0230) |
| ln(Hours) | | 0.8656 | | | 0.8228 | | | 0.867 | |
| | | (0.0141) | | | (0.0145) | | | (0.0166) | |
| ln(Weeks) | | 0.9020 | | | 0.9017 | | | 0.914 | |
| | | (0.0192) | | | (0.0186) | | | (0.0186) | |
| Owner | | | | 0.4682 | 0.1208 | 0.0527 | 0.462 | 0.0962 | 0.0441 |
| | | | | (0.0365) | (0.0223) | (0.0223) | (0.0440) | (0.0248) | (0.0246) |
| Manager | | | | 0.2416 | 0.0670 | 0.0326 | 0.251 | 0.0648 | 0.0383 |
| | | | | (0.0170) | (0.0104) | (0.0104) | (0.0205) | (0.0116) | (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 the 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 (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 2005-2011, College Graduates | | | CPS 2005-2011 Hourly Workers | | |
| | All | Female | All | All | Females | All | All | Females |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Female (dummy) | -0.0247 | | -0.185 | -0.131 | | -0.155 | -0.107 | |
| | (0.00768) | | (0.0249) | (0.00195) | | (0.00118) | (0.00134) | |
| Part-time (dummy) | -0.00416 | -0.00348 | -0.249 | -0.135 | -0.195 | -0.225 | -0.147 | -0.172 |
| | (0.00863) | (0.00908) | (0.00313) | (0.00298) | (0.00345) | (0.00156) | (0.00143) | (0.00178) |
| Pharmacist (dummy) | | | 0.262 | | 0.321 | 0.472 | | 0.485 |
| | | | (0.0177) | | (0.0185) | (0.0203) | | (0.211) |
| Pharmacist × female | | | 0.0854 | 0.0465 | | 0.0800 | 0.0426 | |
| | | | (0.0429) | (0.0226) | | (0.0271) | (0.0237) | |
| Pharmacist × part-time | | | 0.195 | 0.0684 | 0.200 | 0.148 | 0.0591 | 0.167 |
| | | | (0.0334) | (0.0304) | (0.0367) | (0.0308) | (0.0270) | (0.035) |
| Occupation dummies | | | no | yes | no | no | yes | no |
| $R^2$ | 0.568 | 0.622 | 0.143 | 0.294 | 0.0971 | 0.245 | 0.421 | 0.258 |
| Total # of observations | 1,640 | 827 | 329,845 | 329,845 | 169,309 | 518,767 | 518,767 | 271,936 |
| Pharmacist observations | 1,640 | 827 | 1,891 | 1,891 | 1,022 | 993 | 993 | 586 |

*Sources*: Pharmacist Workforce Surveys (PWS), 2000 and 2004 (see Data Appendix); Current Population Survey Merged Outgoing Rotation Groups (CPS), 2005 to 2011.
*Notes*: The samples in cols. (1) and (2) are restricted to 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 (8) 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(constructed hourly earnings), where constructed hourly earnings is (weekly earnings/usual weekly hours). The dependent variable in cols. (6) to (8) 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 the following controls: age and age squared, educational attainment dummies (advanced degree indicators in cols. 1 to 5 and a full set of dummies for CPS years of schooling and degree categories in cols. 6 to 8), race and ethnicity dummies, and year dummies. Cols. (1) and (2) also include dummy variables for ownership or management of a pharmacy, and pharmacy sector (e.g., hospital, independent). Cols. (4) and (7) include a full set of detailed (three-digit) CPS occupation dummies. The CPS regression samples in cols. (3) to (8) are restricted to those with hourly earnings (or hourly wage) greater than one-half the federal minimum wage and less than $140 an hour; CPS top-coded weekly earnings are multiplied by 1.4. Regressions in cols. (3) to (8) are weighted using the CPS earnings weights.

Table 5: Earnings Premium and Gender 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 | -0.281 | -0.281 | -0.210 | -0.281 | -0.281 | -0.282 | -0.181 |
| | (0.00149) | (0.00161) | (0.00160) | (0.00149) | (0.0149) | (0.0156) | (0.00148) |
| Pharmacy BS | 0.247 | 0.336 | | 0.140 | 0.282 | | |
| | (0.0132) | (0.0135) | | (0.0169) | (0.0142) | | |
| Female × pharmacy BS | 0.094 | 0.136 | 0.0489 | -0.0491 | | | |
| | (0.0196) | (0.0205) | (0.0188) | (0.0251) | | | |
| Pharmacist | | | | 0.187 | 0.282 | 0.337 | |
| | | | | (0.0184) | (0.0174) | (0.0140) | |
| Female × pharmacist | | | | 0.215 | 0.174 | 0.204 | 0.086 |
| | | | | (0.0257) | (0.0200) | (0.0200) | (0.0178) |
| Occupation dummies | no | no | yes | no | no | no | yes |
| $R^2$ | 0.188 | 0.101 | 0.234 | 0.189 | 0.189 | 0.110 | 0.368 |
| Number of observations | 690,366 | 690,366 | 690,366 | 690,366 | 690,366 | 690,366 | 690,366 |

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

*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 a year dummy for 2010. The number of observations with a pharmacy bachelor's degree is 4,016 and the number of pharmacists is 3,843 in all the regressions. Pharmacy BS = 1 for those with a bachelor's degree in pharmacy. Pharmacist = 1 for those currently employed as a pharmacist. Occupation dummies are a full set of detailed (3-digit) ACS occupation dummies. The pseudo $R^2$ for the median regressions are reported as the $R^2$ 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.

Data Appendix: Pharmacist Workforce Surveys[27]

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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[27] 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 |

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.