The Shifting Supply of Men and Women to Occupations: Feminization in Veterinary Education

Anne E. Lincoln, *Southern Methodist University*

A confining limitation for the occupational sex segregation literature has been the inability to determine how many persons of one sex *would* have entered an occupation had the other sex not successfully entered instead. Using panel data from all American colleges of veterinary medicine (1976-1995), a fixed-effects model with lagged independent variables finds support for the *concurrent* effects of many hypothesized feminization mechanisms. Declining relative earnings and policies aimed at increasing production of graduates affect applications from men and women similarly, but feminization is driven by the decline in men's college graduation and their avoidance of fields dominated by women. The findings demonstrate the relative contributions and interdependence of supply and demand to occupational sex composition and the job search process more broadly.

Discussions about the dearth of women in science and engineering inevitably stoke the larger and perpetually-smoldering social debate concerning the origins and remedies of the differential distribution of women and men across occupations. Occupational sex segregation is a core issue in the study of gender inequality because it accounts for much of the persistent wage gap that exists between women and men (Cotter et al. 1997; Roos and Gatta 1999). A burgeoning literature documents the contributory aspects of the phenomenon, typically conceptualized in terms of supply (workers' characteristics) and demand (the characteristics of employers, workplaces and jobs). These complementary literatures have contributed substantially to our understanding of the forces that shape the sex composition of occupations; however, data limitations have restricted integration of the two components primarily to theoretical grounds. As a result, the important question of how much employer discrimination contributes to an occupation's sex composition and how much stems from employee's decisions, remains unresolved. Expectations for the supply-demand point of conjunction have been gleaned from workers' job search strategies (Drentea 1998; Granovetter 1985), and otherwise inferred from the supply-side evidence for individual preferences, aspirations and attributes (Shu and Marini 1998), discriminatory employer recruitment, hiring and promotion practices on the demand side (Kmec 2005; Reskin and McBrier 2000), and the sex-segregated employment outcomes evinced by labor statistics (e.g., Reskin and

I thank the Association of American Veterinary Medical Colleges and the Washington State University School of Veterinary Medicine for making the data available. Special thanks go to Michael P. Allen. Appreciation goes to Julie Kmec and Tom Rotolo. Direct correspondence to Anne E. Lincoln, Department of Sociology, Southern Methodist University, P.O. Box 750192, Dallas, TX 75275-0192. E-mail: lincoln@smu.edu.

Roos 1990). However, the key linkage of supply-side factors to occupational sex segregation remains open to empirical verification. As Coventry (1999) points out, the degree to which women and men actually furnish themselves–both successfully and unsuccessfully–to different occupations remains largely unknown.

Researchers are working to bridge this gap. The sex composition of the occupations to which youths aspire is predictive of the sex composition of their actual jobs 14 years later (Okamoto and England 1999), but the substantial disjuncture between specific occupational aspirations and the actual occupation entered (Jacobs 1989) indicates the presence of additional intermediary sorting processes. To that end, recent experimental research testing the mechanisms of the career choice process demonstrates that cultural influences produce gendered self-assessments of ability (Correll 2004), which in turn contribute to the selection of gendered educational tracks by high school and post-secondary students (Correll 2001). Other research suggests that men avoid college majors and graduate academic fields that are 24 to 54 percent female (England and Li 2006; England et al. 2007). Insofar as gendered educational trajectories are a factor in the sex composition of skilled labor pools (Granovetter and Tilly 1988), these findings clarify the way that macro-level belief structures about gender can produce what are ostensibly preferences and prompt the differential accumulation of career-relevant human capital by boys and girls. However, the portion of occupational sex segregation explained by aspirations and educational specialization relative to demand-side forces remains unresolved without the crucial information about how individuals then act on these accrued characteristics in the context of employment seeking.

This article presents one of the first efforts to empirically disentangle the contribution of *multiple* supply-side factors *relative to* demand-side factors at a point where individuals can act on their preferences and accumulated human capital. Unique organization-level data linked with state-level public data sources illuminate the gendered sorting process at the entry point of the requisite professional education track of one scientific field, veterinary medicine. Longitudinal data on the applicant pool to all American veterinary medical colleges demonstrates decline and growth in men's and women's attempts to enter the profession during a period of substantial compositional change, feminization. Compositional change emphasizes the gendered nature of the assortative matching process that can be otherwise obscured in occupations that exhibit more stable sex compositions. Such transformations therefore present the opportunity to elucidate the concomitant factors that contribute to both fluctuation and, by inference, stability in the sex composition of occupations and inform the worker-job matching process more generally. These data permit tests of four hypotheses advanced in the sex segregation and feminization literatures regarding the concurrent effects and relative strengths of occupational expansion, male flight, declining earnings and occupational competition on the supply of aspiring veterinarians over the course of two decades.

The difficulty in obtaining suitable data must be mentioned. In addition to the rarity of this kind of data, the structure of veterinary medical graduate education presents an unusual opportunity to test previously hypothesized feminization mechanisms. Like several firm-level case studies of hiring (Fernandez, Castilla and Moore 2000; Fernandez and Sosa 2005; Fernandez and Weinberg 1997; Petersen, Saporta and Seidel 2000), the present analysis exchanges breadth for depth by examining compositional change in the professional education track of this occupation. The limitations to generalizability posed by case studies should not dissuade researchers from using such data to delve deeply into specific cases to test conjectured relationships, refine or qualify theory, and put forth new hypotheses on the basis of the findings.

Stability and Change in Occupational Sex Composition

Meritocratic assumptions figure prominently in supply-side accounts of labor market disparities and occupational sex composition. However, sociological research demonstrates the power that self-perceptions of merit have to influence career-relevant decisions (Correll 2001; Fiorentine 1987),[1] and that these self-perceptions can be manipulated when cultural beliefs about differences in ability between the sexes are invoked (Correll 2004). Consequently, to more fully understand supply-side contributions to occupational sex composition, it is imperative to determine to what extent women and men *act* on their accumulated socialization, abilities and attributes, and what factors influence women and men in this process (Marini 1989).[2]

Some recent accounts of occupational sex segregation emphasize the work-family nexus as the primary contributor to an occupation's sex composition, over conventional explanations of socialization and discrimination (Polachek 2006). A derivative of human capital theory in economics and the status attainment tradition in sociology, these explanations maintain that individuals engage in personal cost-benefit analyses when planning their eventual entry into the labor market. More specifically, women's lower levels of labor force participation than men is argued to stem from differential commitment planned in order to accommodate childbearing and family responsibilities. Accordingly, women and men differentially invest in education or on-the-job-training (Becker 1985), though gender differences in average lifetime labor force commitments are converging (Polachek 2006). Consequently, occupations that experience compositional change are of great interest to sex segregation researchers.

Several theorists have sought to knit together supply and demand to explain an occupation's sex composition. Building on Thurow (1975), relative attractiveness theory (Strober and Arnold 1987) and gender queuing theory (Reskin and Roos 1990) are complementary explanations for the interaction between supply and demand in occupations that experience compositional transition. Generally in these perspectives, both workers and employers make comparisons of each other in terms of their comparative appeal. On the demand side, employers may

prefer male employees if they believe that men will be more productive or provide other advantages over women (Correll, Benard and Paik 2007), such as meeting customers' expectations of male employees. Employers have also justified male incumbents in jobs that require lifting despite the ease with which the skill can be tested and even when other predominantly-female jobs in the same firm require the same physical abilities (Reskin and Padavic 1988). Net of the preferences that are enacted in employee recruitment, promotion and hiring practices, employers are constrained by the supply of potential employees (Reskin, McBrier and Kmec 1999). Consequently, on the supply side of the process, it is argued that prospective employees weight occupations on the basis of their wages, flexibility, promotion opportunities and prestige relative to other occupations with similar worker human capital characteristics and requirements.

The increasing workforce participation of women over the past four decades has not resulted in their equal distribution across the occupational structure. While women have moved into some occupations in great numbers, they remain seriously underrepresented in others, (Weeden 2004). At the extreme, some occupations that were once male enclaves have become female-dominated. Precisely because predominantly-female jobs historically have had fewer appealing attributes than male-dominated jobs, there ostensibly has been less incentive for men to move into female-dominated occupations. Accordingly, when an occupation experiences compositional change, it is more likely to feminize than masculinize (Reskin and Hartmann 1986).

While the term evokes images of a growing female presence in an occupation, feminization often entails a change in male presence. In some instances, a scarcity of male workers may prompt employers to recruit women, as the automobile and electrical manufacturing industries did during World War II (Milkman 1987). In other cases, demand prompts occupational expansion, in which case the number of male workers is retained or even increased while women are added, as in many health professions in the 1970s (Phipps 1990). At the other end of the spectrum is male abandonment. The general finding of Reskin and Roos (1990) is that male exodus prompted, then accelerated, compositional turnover in some occupations that were feminizing in the 1970s. However, support is not ubiquitous across occupations for the notion of "male flight."(Wright and Jacobs 1994)

Though men do not always flee feminizing occupations, they may be deterred from entering those occupations. The feminization literature suggests that any combination of factors–declines in occupational prestige, employment security, promotion prospects, and real earnings, and deskilling–prompt men to revise their career plans. This body of research suggests a series of hypotheses relevant to the pattern by which men and women supply themselves to an occupation.

Occupational Expansion

Feminization research often cites an increase in demand for a good or service (e.g., Roos and Manley 1996). Though demand may be compounded by a shortage of

qualified workers, an occupation may respond to growing demand by increasing the number of workers in the occupation (Milkman 1987; Reskin and Roos 1990). By itself, there is no reason to believe that occupational expansion only attracts one sex.

H1: If the demand for labor in an occupation grows, more prospective workers will attempt to enter the occupation.

Preemptive Flight

The exodus of entrenched incumbents often occurs when members of a lower-status group begin to enter (but, see Coventry (1999) and Wright and Jacobs (1994). Less is known about the extent to which *potential* entrants are dissuaded from entering by the presence of a lower-status group. Men avoid undergraduate majors and doctoral degree programs as the proportion of women in those fields increases (England and Li 2006; England et al. (2007). The devaluation of women's labor may stigmatize occupations with higher proportions of women in them (England, Hermsen and Cotter 2000), such that jobs performed largely by women pay less than comparable jobs done by men (England 1992), and men's wages within an occupation are lower the more heavily female-dominated it is. Men may prefer to work with other men, perhaps to preserve their masculinity (Williams 1989), although this may apply more to manual occupations (Reskin and Roos 1990). Finally, women may be perceived as less competent than men (Goldin 2006). Consequently, the presence of women may signal to prospective male entrants that a field has undesirable remunerative, promotional, or prestige characteristics (Reskin and Hartmann 1986; Strober 1984).

H2: If the proportion of women in an occupation grows, fewer men will attempt to enter it.

Conversely, the presence of women in an occupation may prompt other women to enter. Most social contacts are between people who are similar (McPherson, Popielarz and Drobnic 1992). Thus, information networks are, in part, sex-based, and women will tend to distribute information about employment or education opportunities to other women (Drentea 1998; Granovetter 1973, 1985). In addition, the presence of women can demonstrate to other women that entry is an attainable goal. These women may serve as mentors and role models (Ely 1994), as well as influence internal processes to allow subsequent women to be accepted and promoted (Cohen, Broschak and Haveman 1998; Fernandez and Sosa 2005).

H3: If the proportion of women in an occupation grows, more women will attempt to enter it.

Stagnant Wages

An occupation in which earnings decline may fail to draw or retain enough men to outpace feminization (Reskin and Roos 1990). Wage stagnation may occur prior to women's entry due to technological developments that reduce or change the requisite skills or the course of feminization itself may depress salaries if women command lower wages than men in the occupation (Pfeffer and Davis-Blake 1987). The cross-sectional nature of much labor data makes this assertion difficult to test empirically (Catanzarite 2003), though some research is beginning to address the problem (see England, Allison and Wu 2006). Regardless, any decline in earnings should make the field less appealing to men who are looking to maximize their earnings.

> H4: If the wages of an occupation decline over time relative to the wages of the male labor force, fewer men will attempt to enter it.

Women value income to the same degree as men (Jencks, Perman and Rainwater 1988), so women should be motivated to move into a male-dominated occupation that is feminizing because it will be more lucrative than the female-dominated occupations that have been previously been available to them (Reskin and Roos 1990). For a time, then, the wages in a feminizing occupation should still be an improvement for women compared to other occupations.

> H5: If the wages of an occupation decline over time relative to the wages of the female labor force, fewer women will attempt to enter it.

Occupational Jostling

Occupations compete within a labor market for qualified workers. When occupations jostle for workers, the socio-demographic compositions of each field are relative to each other such that declines in one correspond to increases in another (Rotolo and McPherson 2001). This is a more specific version of the stagnant wages thesis.

Aspirants may compare occupations that have similar skills requirements and attempt to enter them according to their relative rankings in their particular queue. Some men reserved pharmaceutical careers as a contingency if they were not admitted to medical or dental school Phipps (1990).

Prestige, a component of an occupation's queue ranking, is thought to be a factor in the jostling process (Reskin and Roos 1990). A substantial literature documents historical stability in relative occupational prestige rankings. Therefore, when men compare similar occupations, both their wages and prestige are important:

> H6: If the wages of occupations with similar specific human capital requirements and prestige diverge over time,

fewer men will attempt to enter the lower-paid, less-prestigious occupation.

In contrast, although women and men differ little in the extent to which they value an occupation's income (Jencks, Perman and Rainwater 1988), a male-dominated occupation that is feminizing initially should be appealing to women because the occupations that have historically been available to women have not been as lucrative and because women are less likely to expect to be the primary breadwinner for their families (Polachek 2006). However, over time:

H7: If the wages of occupations with similar specific human capital requirements and prestige diverge over time, fewer women will attempt to enter the lower-paid, less-prestigious occupation.

Hypotheses 6 and 7 apply to not only an occupation in which wages are higher than the declining occupation in question, but also one in which wages are lower. In longitudinal studies, the wage trajectories can diverge, converge or remain in parallel.

Research on occupational sex composition and change generally has relied upon descriptive statistics to identify changing sex ratios, historical turning points, prestige changes and earnings ratios that influenced the entry of women or resulted in the flight of men. However, the selection bias inherent in labor statistics—of employed persons only—prejudices assessments of the gendered sorting processes that match workers to employment. To effectively address the effects of supply and demand in the job search process, research must also include failed employment attempts. Rarely, researchers have been able to examine job applicants. These single-employer studies shed much-needed light on the process by which employers make hiring decisions and match candidates to jobs, but cannot address the sex composition of the applicant pool nor explain gender differences in the decision to apply (Fernandez, Castilla and Moore 2000; Fernandez and Weinberg 1997; Petersen, Saporta and Seidel 2000).

Recognizing this problem, England and Li (2006) examined the choices of college undergraduate students because degree majors are generally open to any aspirant. In support of devaluation theory, they found a curvilinear relationship between women's enrollment in certain fields of study and men's subsequent enrollment in those majors, but found no support for the queuing theory prediction that salaries positively affect male entry. These studies provide important information about the supply side of the feminization process, but are limited in the number of processes they examine.Finally, Fernandez and Sosa (2005) examine a series of supply and demand-side processes on the applicant pool for the female-dominated customer service representative job at a financial service institution. This important study is the first, to my knowledge, to empirically

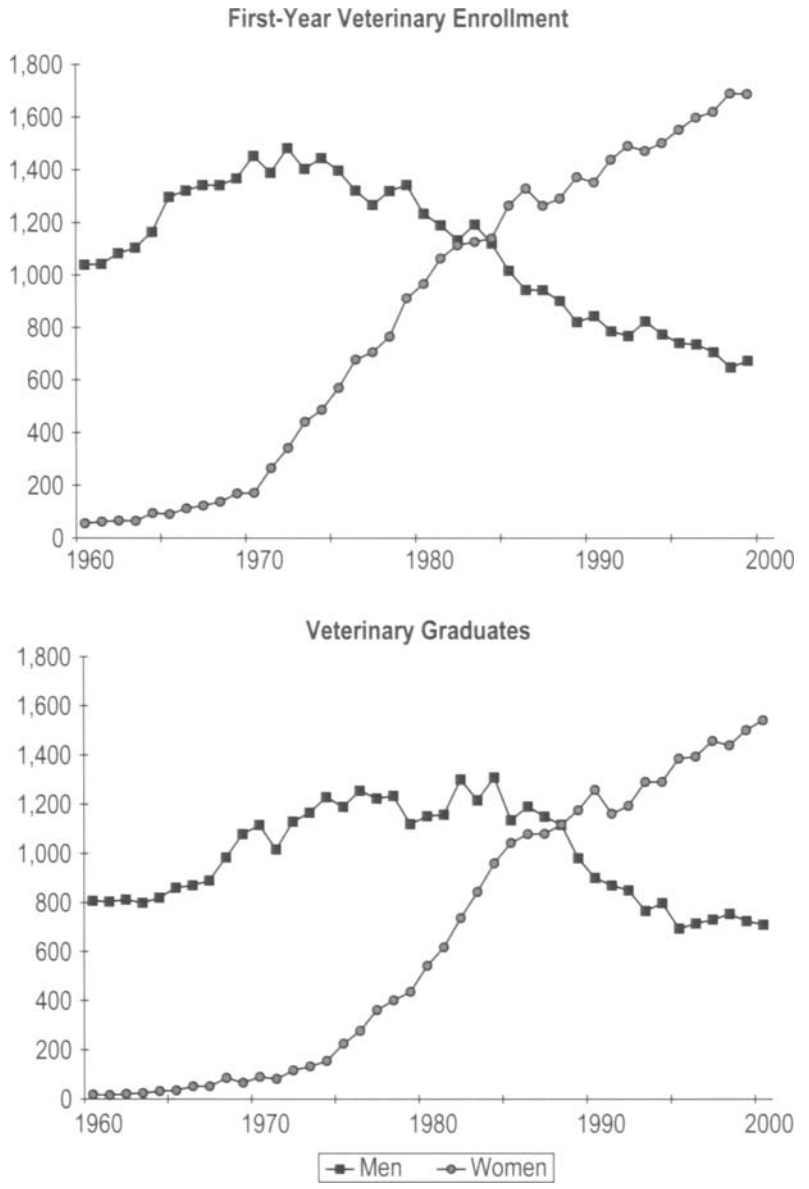
examine pre-hire mechanisms, many of which never go beyond the theoretical due to the extreme difficulty in obtaining data of this nature. They find that gendered social networks play a role in the sex composition of applicant pools, that female incumbents are more likely to refer an applicant than men, and both sexes are more likely to make a same-sex referral. Using U.S. Census data on the local labor pool, they also infer that the relatively low advertised starting salary attracted more female applicants, who comprise a larger segment of the local low-wage distribution. Their study is a deep examination of one firm's applicants and its screening practices, providing valuable insight with obvious limitations. In this case, they cannot test the concurrent influence of some feminization mechanisms on the applicant pool directly, including the expansion of the job (adding employees), its wages or male avoidance.

The Feminization of Veterinary Medicine

Once the country's most male-dominated profession (Weeden 2004), veterinary medicine has shifted from 98 percent male in 1960 (U.S. Bureau of the Census 1960), to 50.9 percent female today (American Veterinary Medical Association 2010). As professions tend to retain incumbents for life due to investments in training (Reskin and Roos 1990), veterinary medicine has integrated directly from the increase in female practitioners (Verdon 1997), which stems from gender changes in the veterinary colleges' enrollment and graduation (Figure 1). Since applicant record-keeping began in 1976, a decline in men's enrollment followed a decline in men's applications, which occurred despite Congressional initiatives to combat predicted shortages of health care professionals, including veterinarians.

The application structure of veterinary education is particularly favorable for an analysis of feminization. Entry into the veterinary programs is unbounded by undergraduate prerequisites.[3] Consequently, applicants are not prohibited by late entry into the science "pipeline."(Xie and Shauman 2003) However, unlike many other professional programs, aspirants are restricted by state of residence. As state-supported institutions, veterinary colleges have historically been state institutions first and professional institutions second. Most colleges give preference to state residents, and many do not admit any nonresidents at all (American Association of Veterinary Medical Colleges 1975-1995). Some have exclusive agreements to consider applicants from specific states that do not have a veterinary college. Thus, veterinary applicants historically have been limited to a single institution, either in their own state or in the one state with which their state contracts (Kavanaugh 1975). Ultimately, most students who apply to the veterinary colleges are residents of the state in which the college is located (Pritchard 1989). For comparison, in 2006, there were 125 accredited medical schools in 45 states and more than three-quarters of American medical programs enrolled more nonresidents than residents in first-year classes (AAMC 2006).

Figure 1A-B. Sex Composition of First-Year Enrollment and Graduates of All American Colleges of Veterinary Medicine, 1960-2000



Sources: Association of American Veterinary Medical Colleges (first-year enrollment); Phyllis Larsen, DVM, Association for Women Veterinarians (graduates)

Data and Methods

The primary data source is the *Comparative Data Report*, the AAVMC's annual, confidential survey of all American veterinary medical colleges. State-level data on the profession comes from the *Veterinary Demographic Data Reports*, an intermittent publication of the AVMA, and the *Journal of the American Veterinary Medical Association*. Other state-level information comes from the decennial U.S. Census, the Current Population Survey, the American Medical Association, the AAVMC, the National Center for Education Statistics, the 1 and 5 percent samples from the Integrated Public Use Microdata Series at the University of Minnesota (Ruggles et al. 1997), and the Current Population Survey (King, Ruggles and Sobek 2003).

Table 1 presents descriptive statistics for all variables, and Table 2 reports correlations. The unit of analysis is the college year. The data are unbalanced panel data, as the same colleges report each year, but there are varying numbers of observations over time for each college. Since 1975, the first year observed in this study, nine additional American veterinary medical colleges have opened, bringing the total to 27.

Independent analyses are conducted on the two dependent variables: the number of qualified male and female applicants for the Doctor of Veterinary Medicine degree to each of the American veterinary medical colleges annually from 1975 through 1995. A relative measure, the proportion of women in the colleges' applicant pools, is inappropriate because it is not independent of male applicants.

The colleges define qualified applicants as those who meet the minimum standards for application, including grades and residency. Unqualified applicants are not reported. The 1976-1977 academic year, the first year the veterinary programs reported the number of qualified applicants, is the first year of the analysis. The study ends in 1995 because the AAVMC implemented substantially different application procedures in 1996, including a centralized service that reported all applicants regardless of academic qualifications or residency.

State- and college-level variables control for the annual tuition, number of bachelor's degree recipients, and whether the veterinary college accepts applicants from another state. State-level data on the sex composition of bachelor's degree recipients has only been collected sporadically and is insufficient for analysis (Snyder 2004). To distinguish between change over time and variation between the colleges, the analysis controls for year, ensuring that the college and state coefficients are year-specific and demonstrate deviations from the annual mean. Other variables, including state population and level of urbanization were highly correlated with bachelor's degrees and did not contribute anything to the analysis. The independent variables are adjusted by one year to address timing differences between date of application and the college attributes and market conditions of the previous year.[4]

Table 1: Descriptive Statistics, 1976-1995

Variables	Description	1975	1995
Dependent			
Male applicants	Number of qualified male applicants, adjusted one year	387.26 (148.56)	141.33 (41.49)
Female applicants	Number of qualified female applicants, adjusted one year	185.53 (105.75)	321.59 (123.11)
Independent and Control			
Tuition	One year of veterinary tuition (1,000s)	1.12 (.90)	9.20 (.47)
B.A. degrees	Number of bachelor's degree recipients in a state year (1,000s)	28.70 (20.25)	36.19 (24.71)
Nonresident contract	College has formal contract to accept another state's qualified residents	accepts another state's students = 1	
Class size	Number of seats for incoming class	89.37 (25.28)	84.81 (23.96)
Female students	Proportion of women students enrolled	.14 (.06)	.63 (.10)
Female faculty	Proportion of women veterinary faculty	.04 (.03)	.24 (.07)
Female veterinarians	Proportion of women veterinary practitioners	.11 (.05)	.32 (.08)
Male professional-veterinarian earnings ratio	Ratio of a state's male labor force earnings and mean veterinary earnings in a state	.80 (.12)	.83 (.12)
Female professional-veterinarian earnings ratio	Ratio of a state's female labor force earnings to mean veterinary earnings in a state	.37 (.05)	.44 (.06)
Physician-veterinarian earnings ratio	Ratio of a state's mean physician to veterinarian earnings	1.66 (.26)	2.17 (.36)
Lawyer-veterinarian earnings ratio	Ratio of a state's mean lawyer and veterinarian earnings	1.10 (.21)	1.45 (.22)
Pharmacist-veterinarian earnings ratio	Ratio of a state's mean pharmacist and veterinarian earnings	.83 (.14)	.90 (.13)
Optometrist-veterinarian earnings ratio	Ratio of a state's mean optometrist and veterinarian earnings	1.11 (.16)	1.23 (.25)
Female physicians	Proportion of female physicians in a state	.11 (.02)	.22 (.03)
Female pharmacists	Proportion of female pharmacists in a state	.21 (.05)	.41 (.04)
Female lawyers	Proportion of female lawyers in a state	.11 (.02)	.24 (.03)
Female optometrists	Proportion of female optometrists in a state	.08 (.05)	.18 (.08)
Year	Year	1975 = 1	

Note: Numbers in parentheses are standard deviations.

Table 2: Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Male applicants	1.0																			
(2) Female applicants	.48	1.0																		
(3) Tuition	-.17	.54	1.0																	
(4) BA degrees	.28	.62	.26	1.0																
(5) Nonresident contract	.16	.17	.16	.07	1.0															
(6) Class size	.33	.33	-.09	.39	.20	1.0														
(7) Female students	-.41	.46	.67	.33	.05	-.06	1.0													
(8) Female faculty	-.40	.28	.57	.11	.03	-.02	.71	1.0												
(9) Female practitioners	-.28	.47	.61	.27	.09	-.00	.79	.62	1.0											
(10) Male professional earnings ratio	-.08	.03	.07	-.002	.18	.11	.10	-.004	.20	1.0										
(11) Female professional earnings ratio	-.23	.18	.32	.19	.22	.01	.43	.24	.46	.90	1.0									
(12) Female physicians	-.32	.48	.72	.42	.07	.01	.83	.71	.70	.01	.36	1.0								
(13) Physician wage ratio	-.39	-.11	.09	-.33	.05	-.16	.30	.30	.32	.64	.66	.08	1.0							
(14) Female lawyers	-.38	.38	.64	.34	.17	.06	.81	.73	.70	.12	.44	.84	.25	1.0						
(15) Lawyer wage ratio	-.35	.11	.29	.11	.08	-.01	.50	.39	.50	.69	.85	.41	.78	.53	1.0					
(16) Female pharmacists	-.56	.20	.47	.06	-.08	-.08	.74	.66	.65	.12	.33	.72	.35	.75	.47	1.0				
(17) Pharmacist wage ratio	-.08	.01	-.04	-.04	.13	-.02	.16	.04	.28	.80	.79	-.02	.75	.13	.71	.13	1.0			
(18) Female optometrists	-.21	.15	.49	.03	.09	.01	.36	.30	.39	.18	.35	.45	.19	.50	.38	.32	.19	1.0		
(19) Optometrist wage ratio	-.10	-.28	-.31	-.33	.03	-.01	-.24	-.24	-.09	.50	.33	-.39	.56	-.28	.37	-.13	.61	-.15	1.0	
(20) Year	-.56	.25	.59	.06	.02	-.09	.84	.76	.68	-.03	.29	.80	.44	.79	.51	.78	.11	.42	-.08	1.0

Occupational Expansion: The number of positions available in the entering class.

Preemptive Flight: The proportion of female veterinarians in the state and the annual proportion of women enrolled and on the faculty in each college's veterinary program.

Stagnant Wages: Mean male and female professional/managerial labor force earnings in a state relative to mean veterinary earnings in that state.

Occupational Jostling: Veterinarians historically have compared themselves to physicians and chafed at not being accorded the prestige afforded their counterparts in human medicine (e.g., Koltveit 1972). That the basic graduate courses for veterinarians and physicians traditionally have been combined at some universities may have contributed to this sense of inequity (Redisch 1971). Perhaps in response, the AAVMC prints a comparison of application and enrollment rates at the medical and veterinary colleges in its annual *Veterinary Medical School Admission Requirements* and emphasizes the fact that veterinary colleges are far more selective than medical programs (AAVMC 1986).

Medicine has historically been more prestigious and lucrative than veterinary medicine (Blau and Duncan 1967; Nakao and Treas 1994). How do other occupations jostle with veterinary medicine when they differ in earnings and prestige? Law, pharmacy, optometry, medicine and veterinary medicine all score similarly on scales of socio-economic skill, indicating that they all require a similar type and level of human capital, despite considerable variation in prestige and earnings.[5] The annual CPS does not contain enough physicians, pharmacists, lawyers, optometrists or veterinarians in each state to compute each profession's mean annual earnings; STATA's *ipolate* command calculated values for each state for the years between each decennial census. Interpolation, a single imputation procedure appropriate for use with panel data, linearly calculates missing values with respect to time based on non-missing values in the dataset (StataCorp 2003). Sex differences in wages cannot be distinguished for these occupations. Individually, the income variables are highly correlated with each other and the year; using wage ratios circumvents this problem.

Method

A pooled time series of cross-sections is robust to the issue of unequal periods between the time-series data. The data are in the form of x_{it}, for which x_{it} is a vector of observations for unit i and time t. The analyses are conducted with a fixed-effects model using generalized least-squares estimation procedures. Cross-sectional time-series data are prone to autocorrelation, in which there is serial correlation in the errors of prediction for each observation over time. The generalized least-squares technique corrects for autocorrelation in time-series data and produces unbiased estimates of the standard errors. The fixed-effects model is preferred to the random-effects model, though the fixed-effects model discards information about the stable over-time variation between the colleges (Green

1990). A Hausman test verifies that a fixed-effects model is more appropriate than a random effects model for both men (chi-square = 102.47, P < .0000) and women (chi-square = 79.76, P < .0000).

The general equation for the fixed-effects model is written as:

$$y_{it} = \alpha_0 + \sum_{k=1}^{K} \beta_k x_{it} + \alpha_i + \varepsilon_{it}$$

in which $i = 1,\ldots,N$, $t = 1,\ldots,T_i$, $E[\varepsilon_{it}]=0$, and $Var[\varepsilon_{it}]=\sigma E^2$. t signifies the year of observation and T_i marks the number of observations for a given veterinary medical college, i. Standardized coefficients permit direct comparisons of the effect size between the feminization mechanisms.

Results

Both the medical and veterinary medical professions more than doubled in size between 1970 and 2000. During this same period, the proportion of women practicing professionally as veterinarians increased by a factor of eight to 39.5 percent, while female physicians increased to 26.8 percent from 7 percent (U.S. Census Bureau 2000). This is partly because medical school enrollment has only recently reached rough gender parity (AAMC 2007), whereas veterinary medicine enrollment sex-integrated two decades earlier. The differences prompt investigation into the social and economic changes that caused the earlier transposition in the veterinary college applicant pool (Figure 2).

Separate regression analyses were conducted for the annual number of male and female applicants to the colleges (Table 3). Model 1 demonstrates baseline state-level and organizational effects. Increasing tuition costs reduce applicants to the programs. Reflecting the increasing gender disparity among college graduates, the effect of the bachelor's degree variable on male applicants is nearly three times that of the effect for women. Colleges that accept nonresidents do not receive significantly more applicants.

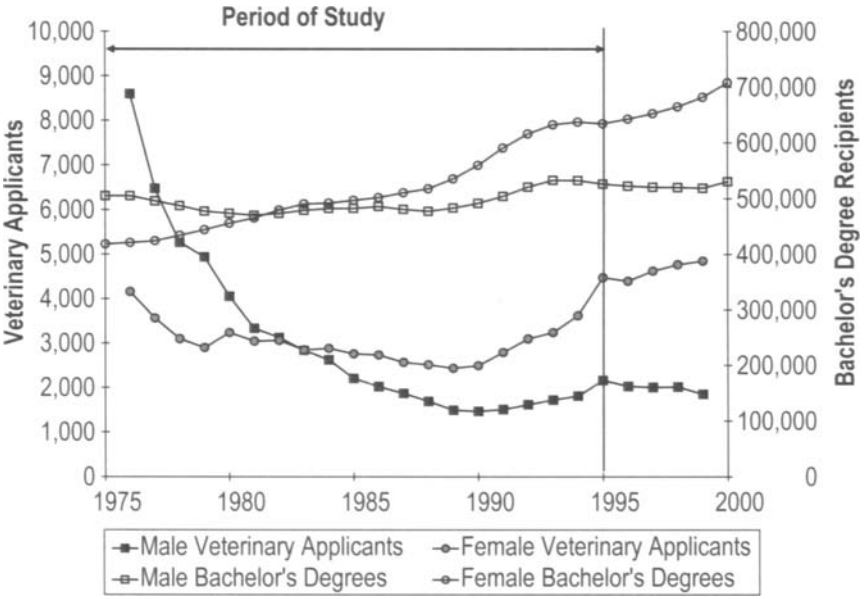
Models 2 through 6 test the hypothesized feminization mechanisms concurrently in several different permutations.

Occupational Expansion: As anticipated, the increasing class sizes prompted by Congress significantly spurred the number of applications to the colleges from women and men, except for men in Model 4.

Preemptive Flight: As women's enrollment in the veterinary programs grew, fewer men applied to the veterinary programs, but the increasing presence of women on the faculty and as practitioners was immaterial. There is no effect of female enrollment, faculty or practitioners on the number of female applicants.

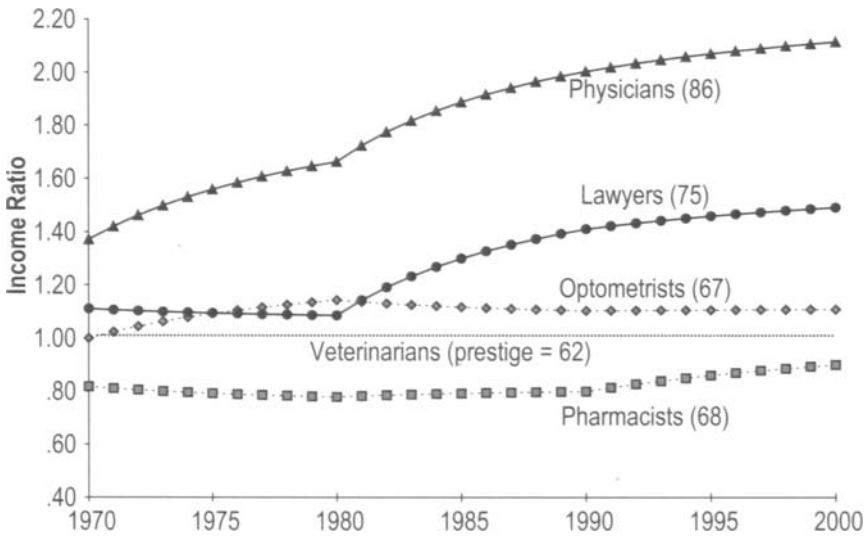
Following England and Li (2006), Model 2a for men includes a squared term for women's enrollment, because it was significant in Model 2, to measure whether men are linearly discouraged from applying by female students. The squared term is positive and significant, indicating that applications from men are not

Figure 2. Sex Composition of Applicant Pool to All American Colleges of Veterinary Medicine and Bachelor's Degree Recipients, 1975-1999



Sources: Association of American Veterinary Medical Colleges (1976-1979) ; Association of American Veterinary Medical Colleges (1985-1995); U.S. Department of Education, National Center for Education Statistics. "Table 247; Earned degrees conferred by degree-granting institutions, by level of degree and sex of student." Obtained from http://nces.ed.gov/programs/digest/d01/dt247.asp.

Figure 3. Ratio of Four Professions' Earnings to Veterinary Earnings, 1970-2000



Source: U.S. Census (www.ipums.org)

dampened linearly relative to women's enrollment. The inflection point is .64, indicating that male applications began to increase again when the proportion of women enrolled in the veterinary programs reached 64 percent.[6]

Stagnant Wages: In support of queuing theory predictions, the decline in veterinary earnings compared to the professional/managerial labor force had a significant negative effect on applications from men and women.

Occupational Jostling: Veterinary earnings stagnated relative to the earnings

Table 3: Standardized Coefficients from the Fixed-Effects Regression of the Number of Male and Female Applicants to U.S. Veterinary Medical Colleges on Measures of Feminization, 1976-1995

Applications From Men	Model 1	Model 2	Model 2a	Model 3	Model 4	Model 5	Model 6
Tuition	-.45***	-.36***	-.22*	-.33**	-.35***	-.39***	-.41***
	(-4.15)	(-3.34)	(-1.97)	(-3.05)	(-3.27)	(-3.68)	(-3.73)
Bachelor's degrees	1.27**	.91*	.11	.74	.58	1.12**	1.13**
	(2.99)	(2.13)	(.24)	(1.69)	(1.31)	(2.64)	(2.63)
Nonresident contract	-.17	-.20*	-.16	-.20*	-.23*	-.10	-.20
	(-1.73)	(-2.02)	(-1.60)	(-2.06)	(-2.32)	(-1.02)	(-1.95)
H1: Class size	—	.23*	.24**	.22*	.12	.23*	.21*
		(2.39)	(2.63)	(2.27)	(1.24)	(2.46)	(2.23)
H2, H3: Female students	—	-.39**	-1.24***	-.36**	-.42***	-.41***	-.44***
		(-3.10)	(-5.09)	(-2.97)	(-3.43)	(-3.35)	(-3.51)
Female students squared	—	—	.97***	—	—	—	—
			(4.04)				
H2, H3: Female faculty	—	.001	.005	-.01	-.01	.02	.01
		(.02)	(.10)	(-.18)	(-.14)	(.53)	(.16)
H2, H3: Female veterinarian practitioners	—	.08	.07	.09	.18	-.06	-.01
		(.61)	(.76)	(.95)	(1.80)	(-.64)	(-.09)
H4: Professional-veterinarian wage ratio	—	-.20***	-.15	—	—	—	—
		(-2.57)	(-1.94)				
Female physicians	—	—	—	.28	—	—	—
				(1.67)			
H6, H7: Physician-veterinarian wage ratio	—	—	—	-.32***	—	—	—
				(-3.46)			

of all four comparison occupations during the period under study (Figure 3). However, only the growing wage gap for medicine and law significantly reduced the number of applicants to the colleges. The overarching pattern that emerges from the four models suggests that men and women are similarly sensitive to the relative differences in wages between occupations, and second, that prestige seems to be less important than relative wage trajectories among occupations with similar human capital requirements.

Female lawyers	—	—	—	—	-.08 (-.50)	—	—
H6, H7: Lawyer-veterinarian wage ratio	—	—	—	—	-.44*** (-4.29)	—	—
Female pharmacists	—	—	—	—	—	.42** (3.05)	—
H6, H7: Pharmacist-veterinarian wage ratio	—	—	—	—	—	.17* (2.16)	—
Female optometrists	—	—	—	—	—	—	-.15 (-1.87)
H6, H7: Optometrist-veterinarian wage ratio	—	—	—	—	—	—	-.07 (-1.03)
Year	-.26** (-2.61)	.03 (.18)	-.12 (-.76)	-.09 (-.39)	.31 (1.49)	-.23 (-1.18)	.19 (1.11)
Constant	.12* (2.47)	.22*** (3.69)	.12 (1.92)	.21*** (3.54)	.23*** (3.95)	.23*** (3.93)	.25*** (4.11)
R^2	.41	.45	.47	.47	.48	.45	.45
Rho	.94	.94	.91	.94	.94	.94	.94
N	344	344	344	344	344	344	344

Applications From Women	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Tuition	-.27** (-3.07)	-.21* (-2.44)	-.20* (-2.32)	-.22* (-2.49)	-.26** (-2.98)	-.28** (-3.12)
Bachelor's degrees	.14 (.40)	-.10 (-.28)	-.15 (-.42)	-.29 (-.79)	.17 (.47)	.19 (.54)
Nonresident contract	-.11 (-1.32)	-.15 (-1.86)	-.14 (-1.67)	-.15 (-1.89)	-.06 (-.77)	-.12 (-1.51)

A variation of the male flight thesis argues that within an occupation, men monopolize the best opportunities in the higher-paying, more desirable jobs. Unfortunately, it is impossible to ascertain from the data sources whether a veterinary applicant relocated to a state that has a strong college. Unlike colleges of medicine and law, there is no clear prestige hierarchy among the veterinary colleges during the period under study according to the author's reading of their journals. One measure, the *US News & World Report* rankings, did not begin

Table 3 *continued*

H1: Class size	—	.23**	.24**	.16*	.24**	.24**	
		(3.07)	(3.02)	(2.09)	(3.10)	(3.01)	
H2, H3: Female students	—	-.04	-.06	-.10	-.10	-.13	
		(-.39)	(-.62)	(-1.02)	(-1.02)	(-1.25)	
H2, H3: Female faculty	—	-.02	-.02	-.02	.01	-.01	
		(-.57)	(-.60)	(-.53)	(.19)	(-.21)	
H2, H3: Female veterinarian practitioners	—	.05	.02	.10	-.09	-.06	
		(.60)	(.35)	(1.14)	(-1.21)	(-.83)	
H5: Professional-veterinarian earnings ratio	—	-.27***	—	—	—	—	
		(-3.89)					
Female physicians	—	—	.19	—	—	—	
			(1.36)				
H6, H7: Physician-veterinarian wage ratio	—	—	-.25***	—	—	—	
			(-3.30)				
Female lawyers	—	—	—	-.09	—	—	
				-.76			
H6, H7: Lawyer-veterinarian wage ratio	—	—	—	-.34***	—	—	
				(-4.07)			
Female pharmacists	—	—	—	—	.13	—	
					(1.11)		
H6, H7: Pharmacist-veterinarian wage ratio	—	—	—	—	.11	—	
					(1.78)		
Female optometrists	—	—	—	—	—	-.14*	
						(-2.15)	
H6, H7: Optometrist-veterinarian wage ratio	—	—	—	—	—	-.02	
						(-.36)	

ranking the veterinary colleges until 1997, and not all the colleges participated. To the extent that a top 5 or top 10 placement in 1997 is at all *retrospectively* accurate, adding these variables to Model 2 finds that rank is not significant for men or women.[7] Absent other empirical evidence, there is no basis to conclude that cross-state relocation was an important influence on applicants given that neither formal contracts to accept nonresidents nor the program ranking have significant effects on applicants to the colleges during this time period.

Discussion

Although conclusions about individual-level decisions cannot be drawn from organization-level data (Reskin 2003), the effects of the feminization mechanisms on the veterinary applicant pool over 21 years demonstrate a great deal of consistency with the expectations generated by the feminization literature. In terms of demand for trained workers, the Congressionally-mandated expansion of the veterinary colleges to avert practitioner shortfall spurred applications, while relative wage stagnation depressed applications. But, consistent with the thesis that professions are "relatively attractive," applications to the veterinary colleges waned relative only to fields with the largest wage gaps and highest prestige. Finally, as women's veterinary enrollment surged, fewer men applied to the colleges. The analysis suggests that men avoided feminizing occupations like pharmacy on the basis of both women's presence in pharmacy and its lower wages. However, the slightly higher wages and prestige of optometry, the least feminized of the four comparison occupations, were not sufficient to overcome interest in veterinary medicine the way that the wages/prestige of medicine and law were.

Beyond the empirical confirmation of many hypothesized feminization mechanisms, the analysis demonstrates that feminization mechanisms can function simultaneously and specifies the manner in which they do so relative to each other for men and women. In particular, these findings suggest that policies such as the Congressional directives for practitioner increases can wield nearly

Year	.53***	.61***	.53**	.84***	.56***	.75***		
	(6.45)	(4.64)	(2.88)	(4.86)	(3.33)	(5.24)		
Constant	.01	.02	.02	.03	.03	.05		
	(.26)	(.32)	(.36)	(.69)	(.70)	(1.10)		
R^2	.26	.32	.32	.32	.29	.30		
Rho	.68	.74	.74	.72	.71	.74		
N	344	344	344	344	344	344		

Note: Values in parentheses are t-ratios.
*p < .10 **p < .05 ***p < .01 (two-tailed tests)

as much influence over behavior as economic factors. Of key import, the results reveal substantial similarities between the applicant behavior of women and men. In fact, of the hypotheses tested, only the effect of women's enrollment differed between men and women. The size, direction and rank order of the standardized feminization coefficients indicates that for the most part, men and women respond quite similarly to social and economic forces. One social influence, the increased class sizes resulting from Congressional action, generated more applications from men and women. Another social influence–women's enrollment in the veterinary colleges–was generally the largest negative influence on applications from men. Economic factors in terms of relative incomes and tuition costs also played a substantial role. Tuition costs consistently had a larger negative effect on men's applications than those from women. For women, the declining economic position of the profession had the largest depressive effect, but this was largely offset by the increase in class sizes. The size and direction of the coefficients are broadly consistent with other research that finds that men and women place similar value on occupational attributes (Jencks, Perman and Rainwater 1988) and suggest that this is largely true even as occupations experience a significant change in sex composition.

Does the presence of women stigmatize occupations to men? Certainly, the same stratification processes may undergird the seemingly disparate motives and mechanisms of inequality for different ascriptive groups (Reskin 2003). Therefore, if social contacts are hypothesized to prompt women's interest in an occupation, the possibility that networks factor in men's candidacy should be considered, as well. The networking and homophily arguments applied to predict women's application behavior are also descriptive of men's behavior, inasmuch as the colleges that enrolled a smaller proportion of men received significantly fewer applications from men, a finding that is consistent with the patterns of referrals that Fernandez and Sosa (2005) found among customer service representative applicants. Conversely, the proposition that women's presence stigmatizes an occupation should be equally plausible for women. The negative effect of women's enrollment on male applications supports devaluation theory and suggests that men may indeed choose not to enter feminizing occupations. However, since the proportion of female practitioners had no effect on male applications, then at first glance, the female threat threshold for male aversion would seem to be greater than 32 percent (the highest proportion of female practitioners during the study), which is consistent with other studies that find 30 to 40 percent female induces compositional changes (Nesbitt 1997; Pfeffer and Davis-Blake 1987), or even as great as the 54 percent found at the bachelor's degree level (England and Li 2006). However, the representation of women in the student body did have a significant effect on male applications from the beginning of the study, when the proportion of women students was much lower–24 percent in 1975. Consequently, it appears that the role of women as peers may be a greater factor than women's general proportional representation in men's decisions not to apply.

The results of the analysis indicate that for every 1 percent increase in women in the veterinary college student body, about 1.7 fewer men will apply the subsequent year. (By comparison, each $1,000 increase in tuition reduces the number of male applicants by about 1.2.) However, the curvilinear relationship between applications from men relative to women's enrollment adds nuance to devaluation theory, which expects a linear male aversion to all women's roles. Finally, contrary to the female role model and inroads expectations, women's increasing presence does not measurably encourage women. This finding also is contrary to research that finds that women's presence negatively affects women's receipt of doctorate degrees after a discipline reaches 38 percent female (England et al. 2007).

In their classic work on occupational feminization, Reskin and Roos (1990) did not classify veterinary medicine as a feminizing occupation. Veterinary medicine also did not appear in a more recent study of integrated occupations, those that by 1990 were between 45 and 55 percent female (Gatta and Roos 2005). Why, then, is veterinary medicine feminizing? Both the profession and the popular press have put forward a variety of explanations for women's increasing presence, ranging from technological change (improvements for animal restraint), more role models, a family-friendly flexible work schedule, reduced admission discrimination and the socialization of women as nurturers, while decreased applications from men have been rationalized by stagnant incomes, the "stigma" of working with women," and loss of autonomy and prestige (Schweitzer 2007; Smith 2006). Most of these explanations are not easily tested empirically.

The explanation of reduced barriers to admission for women has merit, although it fails to explain why other professions that have also eliminated that bias have not feminized or not at the same rate. Veterinary colleges historically have shaped the sex composition of the profession by excluding women entirely or employing annual enrollment caps. The veterinary college at Texas A&M, the last program to exclude women, required the force of the Texas state legislature to sex-integrate in 1963 (*JAVMA* 1963). Nevertheless, women's opportunities remained sharply limited even in programs that had been nominally integrated for decades. Prior to the enactment of the 1972 Title IX education amendment that formally prohibited sex discrimination by federally-funded education programs, the veterinary college at Cornell University employed an annual enrollment cap of two women (Sandler 2007). After Title IX, the veterinary programs continued to play an important, albeit different, role as a gatekeeper to the profession. Since 1976, the first year of recordkeeping, roughly the same percentage of the male and female applicant pool enrolled in the veterinary programs. For example, in 1976, 15.4 percent of male candidates and 16.3 percent of female candidates enrolled. At that time, women comprised 32.6 percent of the applicant pool. In 1995, when women comprised 67.5 percent of candidates, the colleges continued to enroll nearly equivalent proportions of the male and female applicant pools, 34.3 percent and 34.7 percent, respectively. I found the same pattern for graduate programs of law, osteopathy and medicine

(Figure 4) as did Weaver et al. (2005) for dental colleges and Cole (1986) for medical colleges. Presumably, men and women are similarly qualified, and this explains the similarities in enrollment rates. After the artificial restraints on women's enrollment were removed by Title IX, it seems highly likely that veterinary graduate school admissions procedures were egalitarian and ensured that compositional changes in programs and professions have a supply-side component.

The results of this study demonstrate only one consistent difference between male and female application patterns – men's strong negative response to women's increasing enrollment. During the period under study, increasingly more women

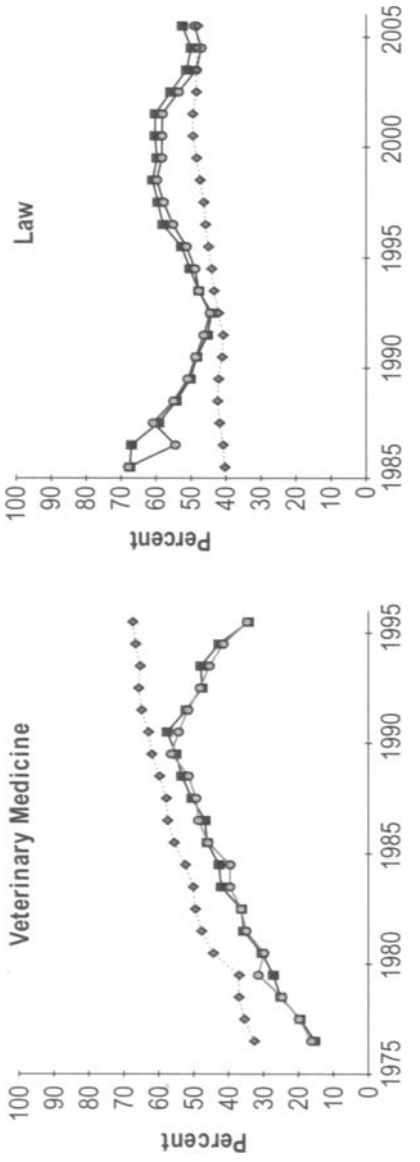
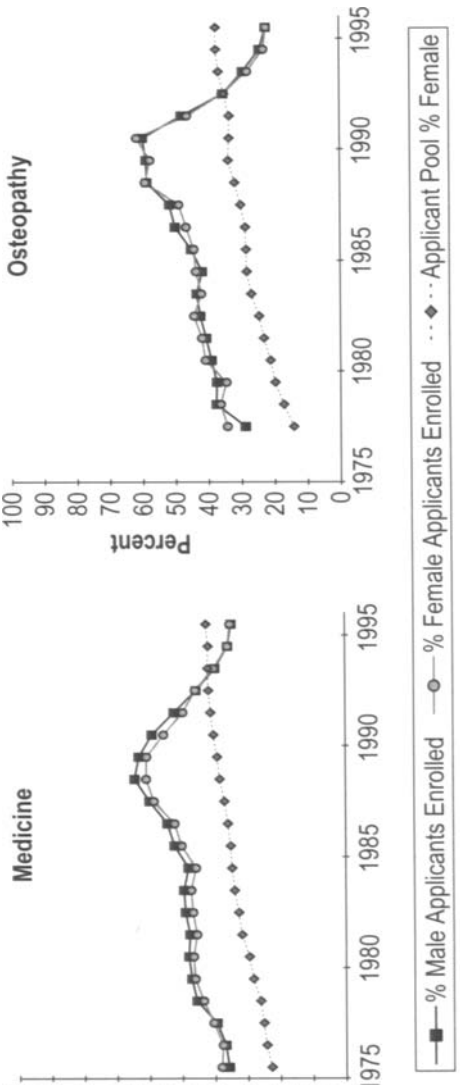


Figure 4. Proportion of Male and Female Applicant Pools Enrolled in All American Colleges of Veterinary Medicine, Medicine, Law and Osteopathy, and Sex Composition of Applicant Pool, 1976-1995

than men graduated from college, placing a larger percentage of women in the applicant pool from which the colleges drew sex-proportionate cohorts. Men then increasingly avoided the feminizing veterinary programs. Consequently, the engine of feminization is not fueled by women who are inordinately attracted to veterinary medicine, but rather driven by men's lower rates of college graduation and their aversion to women students. Additionally, the finding that men fled the more feminized pharmacy to veterinary medicine, but also fled from veterinary medicine as its wages declined relative to medicine and law, suggests that feminization is passed along between occupations.



Sources: AAVMC (1976-1995), AMA (2005), AAMC (2005), AAOC (2005), LSAC National Statistical Reports (2006)

The points raised herein prompt the question of whether sex integration in veterinary education will be associated with the eventual occupational outcomes that Reskin and Roos (1990) identified: resegregation, in which occupations become female-dominated, or ghettoization, in which men control the more lucrative specialties in an occupation. The evidence suggests that veterinary medicine will resegregate, as the number of women graduating has held a sharp lead over men for the past 20 years, and veterinary applications and enrollment continue to be female-dominated. Indeed, national figures show a veterinary applicant pool that has hovered at 80 percent female since 2004. Ghettoization seems less likely. Women have surpassed men in one of the most lucrative specialties, companion animal practice (AVMA 2009), which accounts for two-thirds of private practice employment, while men dominate the less lucrative domain of large food animal medicine, a point that received national attention recently (Belluck 2007).

Conclusion

As overt demand-side gender inequality declines (Blau, Brinton and Grusky 2006), scholars increasingly are scrutinizing those forces that structure supply and the nexus between supply and demand. Supply-side explanations of occupational sex segregation, which focus on the attributes that workers bring to the employment process, posit that workers select occupations for a variety of economic and social reasons. However, many of the consequential factors implicated in research on occupational sex segregation and feminization have resisted hypothesis testing due to the limitations of the available data and the difficulty inherent in studying changes in the sex composition of an entire occupation.

This article presents an empirical test of multiple simultaneous effects of proposed feminization mechanisms on supply-side behavior. Longitudinal applicant behavior explains some of the compositional change while circumventing the demand-side selection pitfall of examining only employed workers and the supply-side unreliability of career predictions found in surveys of occupational aspirations. By studying compositional changes at the point of entry to professional education, this research was able to specify mechanisms that are–and are not–contributing to feminization at a key point. The analyses demonstrate that gender differences in behavior are minimal and clarify the predictions of queuing and devaluation theories.

Certainly, findings from the study of professions should necessarily be interpreted conservatively and assume limited generalizability to other occupations, notably those that do not have the same structured entry requirements or require specialized investment in graduate training or a college degree. Nevertheless, that many of the feminization hypotheses have been generated from research on occupations other than the professions lends support that the feminization processes identified herein to apply to a wide variety of occupations.

Beyond the factors examined in this study, what initially prompts a field's feminization? Initially, women's ambitions probably expanded beyond traditional careers

due to the women's movement (Shu and Marini 1998) coupled with legislation that granted women equal access to education. Accordingly, women became freer to move into previously male-dominated educational tracks, and the sex composition of higher education grew more reflective of the applicant pool. This suggests that continued attention should be directed toward factors that influence gender differences at all stages of educational trajectories (e.g., Correll 2001, 2004), particularly those feminization variables identified as influential in this analysis.

Twentieth-century sex segregation trends demonstrate that levels of sex integration wax and wane in accordance with historical events and are, to some extent, occupation-specific (Weeden 2004); hence, the integration trajectory of one vocation may not be fully descriptive of another. Weeden found substantial variation between occupations in the pace of integration and even reversals at times. Nevertheless, the present analyses have implications for understanding the relative contributions of supply- and demand-side factors to the sex composition of occupations and the employment search process generally. As with pharmacy and veterinary medicine two decades prior, more women than men applied to American medical colleges for the first time in 2003 (AAMC 2008). Recent medical journal discourse emphasizes two decades of wage stagnation in physician residency programs and posits that law or business may have drawn more male applicants as a result (Paik 2000). While it is likely that the medical profession, and indeed any other occupation, may be jostled in favor of more lucrative employment alternatives, the present study suggests that occupational prestige is intertwined in the competition for applicants, and the prestigious, lucrative alternatives to medicine are few. Indeed, an exclusive emphasis on economic jostling ignores men's declining rates of college graduation and male aversion to women students. However, since 1999, medical schools have consistently increased class sizes; subsequently, the number of applications from women and men also increased. Ultimately, as Figure 4 demonstrates, these findings are important in the context of the gender-egalitarian graduate program admissions policies that enable the supply-side contribution to the sex composition of occupations.

Notes

1. Female undergraduate premedical majors of modest abilities are less likely than comparable men to apply to medical school (Fiorentine 1987). Fiorentine and Cole (1992) concluded that female premed students have more "normative alternatives" to their medical career goals than men should they encounter challenges during their post-secondary education.
2. Worker preferences may be further influenced by sex-role socialization and the perceptions of what jobs are available (Cole 1986; Reskin and McBrier 2000).
3. Historically, no specific undergraduate major has been required for enrollment in the veterinary colleges or other health professions. In 2005, 41 percent of medical school matriculants earned bachelor's degrees in a major other than biological sciences or health sciences; 12 percent were social science majors (AAMC 2006).

4. Time lags up to 10 years indicate that a one-year correction results in the best-fitting model.
5. The historical stability and relative distance of these scores is well documented. Blau and Duncan's (1967) classic measure of occupational status ranks physicians and lawyers in the 90-96 point range, pharmacists in the 80-84 range, and veterinarians in the 75-79 range. Optometrists do not appear on the ranking. On the Duncan SocioEconomic Index, they score 92, 89, 93, 97 and 90, respectively. On the Nakao and Treas (1994) scale, veterinarians score a 62, optometrists 67, pharmacists 68, lawyers 75 and physicians 86.
6. Models 3 through 6 yield similar inflection points ranging from 63.9 percent to 66.8 percent.
7. A random effects model was required because a fixed-effects model drops the unvarying top-10 rank variable.

References

American Medical Association. 2001. "Physicians in the United States and Possessions by Selected Characteristics." Available at: http://www.ama-assn.org/ama1/pub/ upload / images/373/internettable.gif.

American Veterinary Medical Association. 1996. *Economic Report on Veterinarians and Veterinary Practices*. Schaumburg, IL: Center for Information Management.

_____. 2010. "Market Research Statistics: U.S. Veterinarians -2009." Available at: http:// www.avma.org/reference/marketstats/usvets.asp.

Association of American Medical Colleges. 2002. *Medical School Admission Requirements, United States and Canada, 2003-2004*. Washington, DC: Association of American Medical Colleges.

_____. 2007. "Women Enrollment and Graduates in U.S. Medical Schools, 1961-2006." Available at: http://www.aamc.org/data/facts/2007/women-count.htm.

_____. 2008. "Table 7: Applicants, First-Time Applicants, Acceptees, and Matriculants to U.S. Medical Schools by Sex, 1996-2007." Available at: http://aamc.org/data/ facts/2007/2007summary2.htm.

Association of American Veterinary Medical Colleges. Various Years. *Comparative Data Report.* Washington, DC: AAVMC.

_____. Various Years. *Veterinary Medical School Admission Requirements in the United States and Canada.* Betz Publishing Company.

Becker, Gary S. 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3(1, Part 2):S33-S58.

Belluck, Pam. 2007. "A New Problem for Farmers: Few Veterinarians." *The New York Times* Feb. 7. Available at: http://www.nytimes.com/2007/02/06/us/06vets.html.

Blau, Francine D., Mary C. Brinton and David B. Grusky. 2006. "The Declining Significance of Gender?" Pp. 3-34. *The Declining Significance of Gender?* Francine D. Blau, Mary C. Brinton and David B. Grusky, editors. Russell Sage Foundation.

Blau, Peter M., and Otis Dudley Duncan. 1967. *The American Occupational Structure.* Wiley & Sons.

Catanzarite, Lisa. 2003. "Race-Gender Composition and Occupational Pay Degradation." *Social Problems* 50(1):14-37.

Center for Information Management. 1996. *Veterinary Demographic Annual Reports.* Schaumburg, IL: AVMA.

_____. 1993, 1994, 1996, 1999. *Economic Report on Veterinarians and Veterinary Practices.* Schaumburg, IL: AVMA.

Cohen, Lisa E., Joseph P. Broschak and Heather A. Haveman. 1998. "And Then There Were More? The Effect of Organizational Sex Composition on the Hiring and Promotion of Managers." *American Sociological Review* 63(5):711-27.

Cole, Stephen. 1986. "Sex Discrimination and Admission to Medical School, 1929-1984." *American Journal of Sociology* 92(3):549-67.

Correll, Shelley. 2001. "Gender and the Career Choice Process: The Role of Biased Self-assessments." *American Journal of Sociology* 106(6):1691-730.

_____. 2004. "Constraints Into Preferences: Gender, Status, and Emerging Career Aspirations." *American Sociological Review* 69(1):93-113.

Correll, Shelley, Stephen Benard and In Paik. 2007. "Getting a Job: Is There a Motherhood Penalty?" *American Journal of Sociology* 112(5):1297-338.

Cotter, David A., JoAnn DeFiore, Joan M. Hermsen, Brenda Marsteller Kowalewski and Reeve Vanneman. 1997. "All Women Benefit: The Macro-Level Effect of Occupational Integration on Gender Earnings Equality." *American Sociological Review* 62(5):714-34.

Coventry, Barbara Thomas. 1999. "Do Men Leave Feminizing Occupations?" *The Social Science Journal* 36(1):47-64.

Drentea, Patricia. 1998. "Consequences of Women's Formal and Informal Job Search Methods for Employment in Female-Dominated Jobs." *Gender & Society* 12(3):321-38.

Ely, Robin J. 1994. Effects of Organizational Demographics and Social Identity on Relationships Among Professional Women. *Administrative Science Quarterly* 39(2):203-38.

England, Paula. 1992. *Comparable Worth: Theories and Evidence.* Aldine de Gruyter.

England, Paula, Joan M. Hermsen and David A. Cotter. 2000. "The Devaluation of Women's Work: A Comment on Tam." *The American Journal of Sociology* 105(6):1741-51.

England, Paula, and Su Li. 2006. "Desegregation Stalled: The Changing Gender Composition of U.S. College Majors, 1971-2002. *Gender & Society* 20(5):657-77.

England, Paula, Paul Allison, Su Li, Noah Mark, Jennifer Thompson, Michelle J. Budig and Han Sun. 2007. "Why Are Some Academic Fields Tipping Toward Female? The Sex Composition of U.S. Fields of Doctoral Degree Receipt, 1971-2002." *Sociology of Education* 80(1):23-42.

Fernandez, Roberto M., Emilio J. Castilla and Paul Moore. 2000. "Social Capital at Work: Networks and Employment at a Phone Center." *The American Journal of Sociology* 105(5):1288-356.

Fernandez, Roberto M., and Nancy Weinberg. 1997. "Sifting and Sorting: Personal Contacts and Hiring in a Retail Bank." *American Sociological Review* 62(6):883-902.

Fernandez, Roberto M., and M. Lourdes Sosa. 2005. "Gendering the Job: Networks and Recruitment at a Call Center." *American Journal of Sociology* 111(3):859-904.

Fiorentine, Robert. 1987. "Men, Women, and the Premed Persistence Gap: A Normative Alternatives Approach." *American Journal of Sociology* 92(5):1118-39.

Fiorentine, Robert, and Stephen Cole. 1992. "Why Fewer Women Become Physicians: Explaining the Premed Persistence Gap." *Sociological Forum* 7(3):469-96.

Goldin, Claudia. 2006. "The Rising (And Then Declining) Significance of Gender." Pp. 67-101. *The Declining Significance of Gender?* Francine D. Blau, Mary C. Brinton and David B. Grusky, editors. Russell Sage Foundation.

Granovetter, Mark. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78(6):1360-80.

_____. 1985. *Getting A Job: A Study of Contacts and Careers, Second Edition*. University of Chicago Press.

Granovetter, Mark, and Charles Tilly. 1988. "Inequality and Labor Processes." Pp. 175-221. *Handbook of Sociology*. Neil Smelser, editor. Sage Publications.

Greene, William H. 1990. *Econometric Analysis, Fourth Edition*. Prentice Hall.

Jacobs, Jerry A. 1989. *Revolving Doors: Sex Segregation and Women's Careers*. Stanford University Press.

JAVMA Editorial. 1963. "Texas A&M To Admit Women to School of Veterinary Medicine." *Journal of the American Veterinary Medical Association* 143(4):418-19.

Jencks, Christopher, Lauri Perman and Lee Rainwater. 1988. "What Is A Good Job? A New Measure of Labor-Market Success." *American Journal of Sociology* 93(6):1322-57.

Kavanaugh, John F. 1975. "The Unsuccessful Veterinary College Applicant Must Also Be Considered." *Journal of Veterinary Medical Education* 26(2):62-65.

King, Miriam, Steven Ruggles and Matthew Sobek. 2003. *Integrated Public Use Microdata Series, Current Population Survey: Preliminary Version 0.1*. Minneapolis: Minnesota Population Center, University of Minnesota. Available at: http://www.ipums.org/cps.

Kmec, Julie A. 2005. "Setting Occupational Sex Segregation in Motion." *Work and Occupations* 32(3):322-54.

Koltveit, A.J. 1972. "Prestige and Respect–by Acclamation or Proclamation?" *Journal of the American Veterinary Medical Association* 160(7):808-9.

Marini, Margaret Mooney. 1989. "Sex Differences in Earnings in the United States." *Annual Review of Sociology* 15:343-80.

McPherson, J. Miller, Pamela A. Popielarz and Sonja Drobnic. 1992. "Social Networks and Organizational Dynamics." *American Sociological Review* 57(2):153-70.

Milkman, Ruth. 1987. "Gender at Work: The Dynamics of Job Segregation by Sex during World War II." University of Illinois Press.

Nakao, Keiko, and Judith Treas. 1994. "Updating Occupational Prestige and Socioeconomic Scores: How the New Measures Measure Up." Pp. 1-72. *Sociological Methodology, Volume 24*. Blackwell.

Nesbitt, Paula D. 1997. "Clergy Feminization: Controlled Labor or Transformative Change?" *Journal for the Scientific Study of Religion* 36(4):585-98.

Okamoto, Dina, and Paula England. 1999. "Is There a Supply-Side to Occupational Sex Segregation?" *Sociological Perspectives* 42(4):557-82.

Paik, Jodi Elgart. 2000. "The Feminization of Medicine." *Journal of the American Medical Association* 283(5):666.

Petersen, Trond, Ishak Saporta and Marc-David L. Seidel. 2000. "Offering a Job: Meritocracy and Social Networks." *American Journal of Sociology* 106(3):763-816.

Pfeffer, Jeffrey, and Alison Davis-Blake. 1987. "The Effect of the Proportion of Women on Salaries: The Case of College Administrators." *Administrative Science Quarterly* 32(1):1-24.

Phipps, Polly A. 1990. "Industrial and Occupational Change in Pharmacy: Prescription for Feminization." Pp. 111-27. Barbara F. Reskin and Patricia A. Roos, editors. *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations*. Temple University Press.

Polachek, Solomon W. 2006. "How the Life-Cycle Human Capital Model Explains Why the Gender Wage Gap Narrowed." Pp. 102-24. *The Declining Significance of Gender?* Francine D. Blau, Mary C. Brinton and David B. Grusky, editors. Russell Sage Foundation.

Pritchard, William R. Editor. 1989. "Future Directions for Veterinary Medicine." Durham, NC: Duke University, Pew National Veterinary Education Program.

Redisch, Robert I. 1971. "Letters: Medical Education–Human and Veterinary–At MSU." *Journal of the American Veterinary Medical Association* 158(5):540.

Reskin, Barbara F. 2003. "Including Mechanisms in Our Models of Ascriptive Inequality." *American Sociological Review* 68(1):1-21.

Reskin, Barbara F., and Heidi I. Hartmann. Editors. 1986. *Women's Work, Men's Work: Sex Segregation on the Job*. Washington, DC: National Research Council.

Reskin, Barbara F., and Debra B. McBrier. 2000. "Why Not Ascription? Organizations' Employment of Male and Female Managers." *American Sociological Review* 65(2):210-33.

Reskin, Barbara F., Debra B. McBrier and Julie A. Kmec. 1999. "The Determinants and Consequences of the Sex and Race Composition of Organizations." *Annual Review of Sociology* 25:335-61.

Reskin, Barbara F., and Irene Padavic. 1988. "Supervisors as Gatekeepers: Male Supervisors' Response to Women's Integration in Plant Jobs." *Social Problems*. 35(5):401-15.

Reskin, Barbara F., and Patricia A. Roos. 1990. *Job Queues, Gender Queues: Explaining Women's Inroads Into Male Occupations*. Temple University.

Roos, Patricia A., and Mary L. Gatta. 1999. "The Gender Gap in Earnings: Trends, Explanations, Prospects." Pp. 95-123. *Handbook of Gender and Work*. Gary N. Powell, editor. Sage Publications, Inc.

Roos, Patricia A., and Joan E. Manley. 1996. "Staffing Personnel: Feminization and Change in Human Resource Management." *Sociological Focus* 29(3):245-61.

Rotolo, Thomas, and J. Miller McPherson. 2001. "The System of Occupations: Modeling Occupations in Sociodemographic Space." *Social Forces* 79(3):1095-130.

Ruggles, Steven, Matthew Sobek et al. 1997. *Integrated Public Use Microdata Series: Version 2.0. Minneapolis: Historical Census Projects, University of Minnesota*. Available at: http://www.ipums.org.

Sandler, Bernice Resnick. 2007. "Title IX: How We Got It And What A Difference It Made." *Cleveland State Law Review* 55(4):473-89.

Schweitzer, Sarah. 2007. "Veterinary Schools Turn Increasingly Female." *The Boston Globe*, August 22. Available at: http://www.boston.com/news/education/higher/articles/2007/08/22/veterinary_schools_turn_increasingly_female.

Shu, Xiaoling, and Margaret Mooney Marini. 1998. "Gender-Related Change in Occupational Aspirations." *Sociology of Education* 71(1):43-67.

Smith, Carin A. 2006. "The Gender Shift in Veterinary Medicine: Cause and Effect." *Veterinary Clinics Small Animal Practice* 36(2):329-39.

Snyder, Thomas. 2004. Personal correspondence, Feb. 3. Washington, DC: National Center for Education Statistics.

Strober, Myra H. 1984. "Toward a General Theory of Occupational Sex Segregation: The Case of Public School Teaching." Pp. 144-56. *Sex Segregation in the Workplace: Trends, Explanations, Remedies*." Barbara F. Reskin, editor. National Academy Press.

Strober, Myra H., and Carolyn L. Arnold. 1987. "The Dynamics of Occupational Segregation Among Bank Tellers." Pp. 107-48. *Gender in the Workplace*. Clair Brown and Joseph A. Pechman, editors. Washington, DC: Brookings Institution.

Thurow, Lester C. 1975. *Generating Inequality: Mechanisms of Distribution in the U.S. Economy*. Basic Books.

United States Bureau of the Census. 1960. *Statistical Abstract of the United States.* Bureau of Statistics, Treasury Department. Washington, DC: Government Printing Office.

Verdon, Daniel R. 1997. "Exclusive Survey: DVMs Wouldn't Change Careers If They Could Do It Again." *DVM Newsmagazine* 28(11):17-20.

Weaver, Richard G., Satyan Ramanna, N. Karl Haden and Richard W. Valachovic. 2005. "U.S. Dental School Applicants and Enrollees: 2003 and 2004." *Journal of Dental Education* 69(9):1064-72.

Weeden, Kim A. 2004. "Profiles of Change: Sex Segregation in the United States, 1910-2000." Pp. 131-78. *Occupational Ghettos: The Worldwide Segregation of Men and Women.* Maria Charles and David B. Grusky, editors. Stanford University Press.

Williams, Christine L. 1989. *Gender Differences at Work: Women and Men in Nontraditional Occupations*. University of California Press.

Wright, Rosemary, and Jerry A. Jacobs. 1994. "Male Flight From Computer Work: A New Look at Occupational Resegregation and Ghettoization." *American Sociological Review* 59(4):511-36.

Xie, Yu, and Kim Shauman. 2003. *Women in Science: Career Processes and Outcomes.* Harvard University Press.