Job Matching in Pharmacy Labor Markets: A Study in Four States*

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Purpose. Reports from various pharmacy labor market sectors suggest that the United States may be experiencing a shortage of pharmacists. To guide policy making and planning with respect to this shortage, it is necessary to develop a better understanding of the process by which pharmacists choose jobs. Using the economic theory of job matching, this study sought to understand how (*a*) attributes of the practice setting, (*b*) characteristics of pharmacists, and (*c*) regional and urbanization variables are associated with pharmacy practice setting choices.

Methods. A secondary database containing information about employment characteristics and work histories of 541 pharmacists in four states was used. The data were augmented with information on the relative number of employment opportunities in each of three practice settings (large chain, institutional, and independent) in the year the respondent's most recent employment change occurred. Practice setting choices were modeled using multinomial conditional logit regression.

Results. A total of 477 pharmacists represented in the database met the inclusion criteria for the study. Multivariate analyses showed that the impact of search costs and wage differentials varied with the practice setting chosen. Pharmacists choosing independent settings over large chain settings were more likely to be white and to have worked in an independent setting in their prior job. Pharmacists living in Oregon were less likely to choose institutional settings compared to those living in Massachusetts, whereas those living in areas with populations greater than 50,000 were more likely to choose institutional settings.

Conclusions. Pharmacist job matching appears to be a complex process in which diverse factors interact to produce a final match. Our results suggest that the pharmacy labor market may actually be composed of two distinct labor markets: an ambulatory market and an institutional market.

KEY WORDS: job choice; pharmacy labor markets; discrete choice modeling.

INTRODUCTION

Recent reports from large chain, independent, and institutional pharmacy practice settings suggest that the United States may be in the midst of a pharmacist shortage (1–5). For example, late in 1998 the National Association of Chain Drug Stores reported that as many as 40 states might soon face a pharmacist labor shortage with approximately 2600 full-time positions vacant among its constituents (1). In a recent study, 58% of independent pharmacy owners reported anticipating difficulty finding pharmacists to fill vacancies in the year 2000 (4). The American Society of Health-Systems Pharmacists (ASHP) found over 40% of pharmacy directors reporting vacancy rates higher than 5 years ago in a 1999 staffing survey (5). Because pharmaceuticals serve as a primary treatment modality for many disease states, a shortage of pharmacists might ultimately impede access to these products for consumers. Thus, the current shortage is of concern not only to organizations that employ pharmacists, but also to national healthcare manpower planners.

Rational policy making with respect to this situation requires health care manpower planners to develop an excellent understanding of pharmacists' labor market behaviors. Past researchers have provided valuable studies of several of these behaviors, including pharmacist job turnover (6), the factors underlying pharmacists' labor supply decisions (7), and reasons for choosing part-time work (8). One subject that has received comparatively little attention, however, is that of pharmacists' job choices. Job choice is a fundamental labor market behavior that logically precedes most others. More complete knowledge of the process of job choice can provide information to better recruit and/or retain pharmacists to positions through at least two mechanisms. First, knowledge of the types of persons likely to value select job attributes may aid firms in maximizing their recruiting efforts. Second, understanding how practice setting attributes are valued by employees may allow employers and policy makers to design jobs in such a way that their likelihood of being chosen is maximized.

Conceptual Model of Job Choice

The study of job choice can be framed within the economic theory of job matching. Briefly, job matching is defined as a process in which firms and individuals pair such that profits are maximized for the firm and utility is maximized for the individual (9). In turn, it is reasonable to expect that individuals' utility functions are a function of both observable and unobservable characteristics. In the case of pharmacists, observable characteristics might include gender, marital status, and race. Unobservable characteristics of the pharmacist might include factors such as tastes, preferences, and other subjective experiences not captured by demographic or work history variables. The theory also suggests that job matching is a dynamic process in which the individual develops more perfect knowledge of the labor market as his or her stock of work experience increases (10,11). Thus, it is reasonable to expect variables such as the number of years employed as a pharmacist, the pharmacist's past employment settings, and the number of past employers to have a significant influence on job choice.

If all jobs in the pharmacy labor market were similar then it would be reasonable to expect that individuals would be randomly distributed among them. However, it is apparent that jobs in this market differ with respect to a number of important attributes. For example, jobs in institutional settings might offer significant opportunities for pharmacists to exercise their clinical skills (12), whereas positions in large chain pharmacies might offer large pecuniary returns (13).

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Some of these attributes are easily observable to the pharmacist (e.g., the prevailing wage rate), whereas others become known only after experience (e.g., opportunities for self-actualization). Given this variability in the attributes of practice settings, we might expect the subjective utility of these attributes to vary with the individual. For example, a young graduate with a large number of student loans might consider pay the most important attribute of a job. Conversely, a pharmacist with a highly paid spouse might downplay the importance of wages and instead pay most attention to working conditions and flexibility of schedule.

Finally, a pharmacist's choice of jobs is also a function of regional and urbanization characteristics such as state of residence and local population. These characteristics might influence many job attributes, including the prevailing wage rate and the number and quality of employment opportunities in each practice setting. Implicit in the theory of job matching is the notion that individuals attempt to find the best balance of these attributes given their tastes and preferences and the current labor market conditions at hand (9).

Past Studies of Pharmacist Job Choice

Information about the factors influencing pharmacists' job choices has come primarily from studies employing one of two methodologies. In the first, investigators have studied large cohorts of practicing pharmacists to better understand the association between factors such as gender (14) and changes in the health care environment on the practice setting choices of pharmacists (15). For example, Sauer and Koda-Kimble compared 1982 University of California graduates with 1995 graduates. These authors found fewer 1995 graduates working in traditional institutional and community settings and more working in settings such as home infusion and health maintenance organizations (HMOs) (15). The authors attributed these changes to a significant increase in managed care penetration in California during these years.

The second methodology employed in studies of pharmacist job choice has been to elicit first job preferences from current pharmacy students or recent graduates and then relate these choices to factors such as perceived job attributes (16,17) or demographics (18). For example, Bessier and Jang (16) found that pharmacy students' subjective evaluations of job attributes such as salary and potential for personal fulfillment were positively correlated with their first job preferences. In a study of recent pharmacy graduates, Carter and Segal found that perceptions of the degree to which a job would prove personally rewarding were positively related to the first job choices of recent pharmacy graduates (17). More recently, Carvajal and Hardigan found ethnic background predictive of first job preferences of pharmacy students, with African-American, Hispanic, and Asian-American students more likely to express a preference for hospital pharmacy than non-Hispanic white students (18). These studies suggest that both job attributes and interpersonal differences are important in pharmacists' job choices.

Although these studies have provided valuable insights into the process of job choice among pharmacists, a number of methodological and conceptual issues have limited their utility. The frequent use of pharmacy students and recent graduates in these studies is at odds with labor economic theory, which considers jobs as "experience goods" that can be evaluated only after working in them for some period (10,11,19). If this theory is valid, results obtained from studies using pharmacy students or recent graduates with little or no work experience as registered pharmacists may be unreliable. Studies of large cohorts of pharmacists have avoided this problem but suffer from other limitations. For example, many of these studies have focused on pharmacists practicing in a single state, making it difficult to understand the role of regional and urbanization characteristics in job choices. In addition, these studies often fail to use appropriate multivariate statistical methods to simultaneously control for the effects of all relevant variables on job choices. Finally, many of these studies have lacked a firm theoretical or conceptual basis. Thus, there is a paucity of information regarding the interaction of pharmacist characteristics, regional and urbanization characteristics, and practice setting attributes in the process of job choice among actively practicing pharmacists.

Study Purpose

The purpose of this study is to examine factors associated with the job choices of pharmacists who have been working and switched jobs. We use the conceptual model of job choice to examine how practice setting characteristics, pharmacist characteristics, and regional and urbanization variables are associated with job change. Multivariate statistical methods are used to explore the relationships among the study variables.

METHODS

Data

Data for this study were obtained from a secondary database of employment and work information obtained from a sample of licensed pharmacists in four states. The database was developed to examine factors associated with pharmacist labor supply and turnover behavior.

Data were collected using a cross sectional descriptive survey design. Subject sampling proceeded via a two-stage process. In the first stage, one state was first randomly selected from each of the four census regions of the United States (East; Massachusetts, Midwest; Ohio, South; Alabama, and West; Oregon). In the second stage, lists of licensed pharmacists were obtained from each chosen state's licensing board. Systematic random sampling was used to select 400 pharmacists (200 females and 200 males) from each state to serve as study participants. Females were oversampled to ensure adequate response from this group. A pilot test ($n = 80$) was conducted as a check for readability and item nonresponse. Because no changes were made to the survey instrument these responses were analyzed with those from the main mailing. Surveys were fielded in the summer months of 1997. A chance to win a $100 dollar lottery was offered in each state as an incentive to induce response. Approximately 1 week after the initial mailing, a reminder postcard was mailed to each participant.

The survey instrument requested information on variables related to individual, family, and employment characteristics of licensed pharmacists. Data concerning demographics, current work and salary schedules (i.e., weekly hours worked, weekly compensation), and family character-

istics (marital status, number of children currently living at home) were provided by each respondent. A unique aspect of this survey was that it collected information about respondents' work histories. Variables pertaining to work history include the number of employers for whom each respondent had worked as a pharmacist and detailed information concerning their five most recent employers. Specifically, the data include the practice setting, dates of employment, position(s) held, and salary and work schedules for each job. The database contains information for 541 pharmacists.

Dependent Variable

The dependent variable was a pharmacist's job choice. For the purposes of this study, we defined a job choice as occurring when a pharmacist made the transition from their most recent past employer to their current employer. We chose a pharmacist's most recent job transition to limit recall bias on the part of the respondent. Thus, a job choice occurred only when an individual actually changed employers and not if the pharmacist accepted a promotion from a current employer. In addition, we defined job choice as a choice among a limited number of practice settings. All jobs were classified into one of three practice settings: independent/small chain, large chain, and institutional. Independent pharmacies included single proprietorships and small regional chains with less than five units. Large chain pharmacies were defined as chains with five or more units. Institutional pharmacies included hospital, nursing home, and home health care settings.

Independent Variables

In keeping with our model of pharmacists' job choices, independent variables used in this analysis described the individual pharmacist, regional and urbanization characteristics of the pharmacist's residence, or attributes of the practice setting.

Individual Work History Characteristics

Variables describing individuals included demographic traits such as race, gender, years of post high school education, marital status, and the presence of children under the age of 5 years in the home at the time of transition.

Work History Characteristics

Each respondent's work history as a pharmacist included years of labor market experience, number of past employers, and practice setting in which the pharmacist was employed immediately prior to their current job.

Regional and Urbanization Characteristics

Regional and urbanization characteristics were proxied by two variables: state of residence and the local population where the pharmacist resides.

Employment Sector Characteristics

One practice setting attribute a pharmacist might consider when a job transition occurs is the prevailing wage in that setting. All else being equal, pharmacists will prefer practice settings in which the wage is greater. Using respondents' wage and salary schedules for their current and most recent jobs, we were able to estimate the hourly wage rates obtained in the practice settings actually chosen. However, because the job transitions of the pharmacists in our study sample occurred over a number of years and geographic areas, using nominal wage rates in our statistical analyses was not permissible. To address this problem we defined the prevailing wage as the ratio of the difference between the new and old wage to the old wage. Thus, this variable is interpreted as the increment (or decrement) to her or his current wage that the pharmacist received when their last job transition occurred.

For valid inferences to be made about the association of wage differentials with job choice, it was necessary to know the wage differential that might have been obtained by the pharmacist if he or she had accepted a job in each of the three practice settings. Because we observe only the wage differential actually obtained in the chosen practice setting, we utilized the stochastic regression imputation procedure (20,21) to predict the unobservable wage rates in the practice settings not chosen. This procedure uses observed variables to make conditional estimates of missing values and then adds a stochastic (i.e., random) component to this estimate in order to reduce bias. To implement this procedure, we estimated an ordinary least-squares regression equation for respondents choosing each practice setting (independent, chain, and institutional). The dependent variable in each equation was the wage increment or decrement and the independent variables were education, labor market experience, state of residence, and the year the transition occurred. Each equation was estimated using only the subsample that actually chose a particular practice setting. These equations were then used to forecast wage increments for pharmacists in the practice settings not chosen. A stochastic element, corresponding to a random draw from each regression's residual distribution, was then added to each predicted value.

Another practice setting attribute a pharmacist might consider when choosing a job is the relative number of opportunities available in each practice setting. It likely requires more effort in terms of search costs on the part of the pharmacist to find a position in a practice setting in which opportunities are scarcer. We expect that the higher the proportion of employment opportunities in a particular practice setting, the more likely it is to be chosen, *ceteris paribus*. This variable also serves (with state of residence and local population) as an indicator of the structure of the local labor market in the year in which the pharmacist made the job transition.

To determine the relative number of opportunities in each practice setting available to each pharmacist when their most recent job transition occurred, it was first necessary to determine the number of pharmacies in each practice setting specific to each year and state. These data were taken from the National Association of Boards of Pharmacy *Annual Survey of Pharmacy Law*. For job transitions that occurred before 1987 (when these statistics were first reported), we estimated the number of pharmacies in each practice setting using a regression model for each setting with number of pharmacies as the dependent variable and time as the independent variable.

Second, the average number of jobs per pharmacy was estimated by consulting published reports of staffing practices for each practice setting. For independent pharmacies we es-

timated that there were approximately 1.5 full-time positions for each outlet using recent editions of the *National Community Pharmacists Association—Searle Digest*. The average number of pharmacists for each hospital (8.25) was determined from a recently published study of hospital staffing practices (22). We estimated that there were approximately 2.5 positions for each large chain pharmacy using the results of a recent National Association of Chain Drug Stores (NACDS) study (23). The average number of positions for each pharmacy type was then multiplied by the number of pharmacies in each practice setting to obtain an estimate of the number of opportunities in that setting in the state and year in which the respondent's last job transition occurred.

Finally, estimating the number of opportunities across the three settings requires a consideration of the job turnover rate in each setting. The number of jobs in each practice setting would not be an accurate proxy if turnover rates were disparate across the settings. For example, if pharmacists in a given setting changed jobs once a year on average, whereas those in another changed jobs only once every 3 years on average, there would be significantly more opportunities in the former. However, a recent study suggests that these rates are similar in each practice setting (24).

Data Analysis

Data analysis for this study was conducted in two steps. In the first step, descriptive statistics were calculated for each study variable. These included means and standard deviations for each continuous variable and proportions for each categorical variable. The data were then classified by practice setting choice and the bivariate relationship of each independent variable to practice setting choice was examined using a series of one-way analyses of variance and chi-square tests. In the second step, the association of all independent variables with pharmacists' practice setting choices was modeled using a discrete choice model, the multinomial conditional logit model.

In this study, we assumed that when a pharmacist transitioned from one job to another, she or he faced a classic discrete choice problem wherein they chose from one of three practice settings. For convenience, we can call the set of practice settings K and index the settings within this set by J_x where $x = 1$ for independent pharmacies, 2 for large chain pharmacies, and 3 for institutional pharmacies. According to the conceptual model proposed in this paper, this choice is one in which the pharmacist chooses setting J in such a way that expected utility is maximized according to the function:

$$U_{ij} = f(P, L, A) \tag{1}$$

where U_{ij} is the utility of practice setting J for individual I, f is a function mapping the determinants of utility to the practice setting choice, P is a vector of pharmacist demographic and work history characteristics, L is a vector of regional and urbanization variables, and A is a vector of practice setting attributes. We then assume that an individual chooses practice setting J if and only if the subjective expected utility for J exceeds that of all others in the choice set K. More formally,

$$U(J_x) > [U(J \neq J_x) \in K] \tag{2}$$

Our conceptual model of practice setting choice consists of variables that vary at two levels, requiring estimation techniques other than multinomial logit or probit regressions. The model includes characteristics that vary at the individual level (such as pharmacists' demographics) and characteristics that differ at the level of each choice that a pharmacist could make when choosing a practice setting (such as wage differentials). The estimation technique used to model the association of variables varying at both the individual and the choice level is the mixed logit or multinomial conditional logit (MCL) model (25,26). This model enables us to simultaneously model the association of practice setting attributes, pharmacist characteristics, and regional and urbanization characteristics with practice setting choice. This model has the form:

$$L_{ij} = \Sigma\beta_{jk}x_{ik} + \Sigma\gamma_{jm}(z_{ij,m} - z_{i,l,m}) + v \tag{3}$$

where L_{ij} is the logit (or log odds) for the ith person choosing the jth employment sector, x_{ik} is the value of the kth individual-level explanatory variable for the ith person, β_{jk} is the parameter relating the kth individual-level explanatory variable to the jth practice setting, $z_{ij,m}$ is the value of the mth practice setting characteristic for the ith person and the jth practice setting, $z_{i,1,m}$ is the value of the mth practice setting characteristic in the reference category for the ith person, γ_{jm} is the parameter relating the mth practice setting characteristic to the jth practice setting, and v is a stochastic error term assumed to have a Type II extreme error distribution that captures the influence of unobserved individual characteristics and practice setting attributes on practice setting choice.

Model estimation produces a set of coefficients representing both individual characteristics (β_{jk}) and practice setting attributes (γ_{jm}). Estimation produces a set of $J - 1$ coefficients for the β_{jk} terms, with one practice setting excluded to identify the parameters of the other two. Large chain pharmacy served as the excluded category in this study. A set of J coefficients (γ_{jm}) relating practice setting attributes to choices is estimated. The coefficients for the individual-level variables are interpreted as the change in the log odds (or logit) of selecting a practice setting due to a unit change in the individual-level variable. The coefficients for the practice setting attributes are interpreted as the change in log odds of selecting a practice setting due to the difference among settings on that particular attribute.

The model was estimated using the STATA version 6.0 software via maximum likelihood. Because of the exploratory nature of this study and the relatively small sample size for maximum likelihood estimation (27), we elected to evaluate all coefficients at a minimum significance level of 0.10. The significance level of each coefficient in the model was evaluated using the t-statistic. The overall fit of the model was assessed using the pseudo R-squared ($\sim R^2$), a summary statistic with an intuitive, though not substantive, interpretation similar to the familiar R^2 (coefficient of determination) from ordinary least-squares regression.

RESULTS

The overall adjusted response rate to the survey used to construct the database was 34.5%. Two methods were utilized to assess potential nonresponse bias. First, we compared the first 20%of respondents to the last 20% on several demographic characteristics that included gender, race, marital status, age, and the number of children currently living in the home. No significant differences were found. Second, we

compared characteristics of the sample to those of a nationally representative survey sample of pharmacists (8). The average age of pharmacists in the two samples was not significantly different (42.7 vs. 43.3 years) although males appear to be underrepresented in the current sample (44.7% vs. 58.6%; $\chi^2 = 5.97$, $p < 0.05$). In addition, there were no significant differences in the proportion of pharmacists that were married or whose spouse was employed.

We removed respondents represented in the database based on two exclusion criteria. Because our research objective was to better understand the practice setting choices of actively practicing pharmacists, all respondents who were retired ($n = 21$) or reported being out of the labor market ($n = 27$) were excluded. In addition, because our conceptual model of job choice considered jobs to be experience goods, respondents currently working in their first job (i.e., had not transitioned to a new job) as a registered pharmacist were excluded ($n = 16$). Thus, 477 respondents met the inclusion criteria and were used in all subsequent analyses.

The majority of pharmacists in the study sample was female (55.8%) with an average age of 34.5 years (Table 1). Most respondents were white (93.9%) and married (76.3%), with slightly more than 18% reporting the presence of a child under the age of 18 years in the household at the time of their last job transition. The average pharmacist had 9.34 years of labor market experience as a registered pharmacist and previously had worked for approximately three employers as a pharmacist.

Table 2 displays all study variables cross-classified by practice setting choice. These results suggest that a number of factors are associated with practice setting choices. For example, pharmacists choosing independent pharmacies were older and had more years of labor market experience than those choosing large chain or institutional settings. This contrasts with respondents choosing large chain settings who had fewer past employers than pharmacists choosing either independent or institutional settings. Choice of practice setting also was significantly associated with marital status, population of area in which a respondent practiced, and state of residence.

The cross-classification of current practice setting by immediate past practice setting is often termed a transition matrix (see Table 3). It shows how past practice setting is related to present practice setting. The significant chi-square test suggests that past practice setting is related to present practice setting. Except for respondents previously employed in independent settings, a majority of respondents previously practicing in a setting chose the same setting for their new job. The greatest percentage of respondents previously employed in independent settings chose to work in large chain settings.

There was variation in the number of pharmacies in each practice setting in each state across time (see Table 4). The general trend in all four states was a decrease in the number of independent pharmacies and an increase in the number of large chain settings. The means and standard deviations for the wage increments are featured in the last row of Table 4. These data suggest that pharmacists considering positions in independent settings could expect to receive a somewhat lower wage rate than their current position, whereas those considering positions in large chains could expect a somewhat higher wage rate. The very large value (0.62) for those considering positions in institutional settings results from the fact that many pharmacists choosing this setting were employed in hospital residency programs (where pay is typically a fraction of typical jobs in the setting) in their immediate prior jobs.

Table 1. Descriptive Statistics for Study Sample ($N = 477$)

	Continuous variables	
	Mean	Standard deviation
Age at time of choice	34.47	10.71
Years of education	5.92	1.61
Years of practice experience at time of choice	9.48	10.43
Number of past employers	3.18	1.70
	Categorical variables	
	N	(%)
Immediate past employment sector		
Large Chain	125	26.2
Independent	219	45.9
Institutional	133	27.9
Current employment sector		
Large Chain	207	43.4
Independent	104	21.8
Institutional	166	34.8
Gender		
Male	211	44.2
Female	266	55.8
Marital status		
Married	364	76.3
Single	113	23.7
Any children under age 5 years in household?		
Yes	56	11.7
Race		
White	448	93.9
Nonwhite	29	6.1
Population where respondent practices		
0–50,000	155	32.5
>50,000	322	67.5
State where respondent practices		
Alabama	124	26.0
Massachusetts	96	20.1
Ohio	110	23.1
Oregon	147	30.8

Table 5 displays the results of multinomial conditional logit estimation relating the independent variables to practice setting choice. There was no relationship between the proportion of outlets in the independent practice setting and the likelihood of selecting this setting. The proportion of outlets was, however, associated with the choice of those selecting large chain and institutional settings. Wage differentials were related to employment sector choices for pharmacists choosing both independent and large chain settings.

In terms of individual-level variables, the model results are similar (but not identical) to those obtained from our cross-classifications of pharmacist characteristics and current practice setting (see Tables 2 and 3). The model shows that pharmacists choosing independent pharmacies over large chains were more likely to be white and married. Those se-

Table 2. Bivariate Relations of All Independent Variables to Employment Sector Choice ($N = 477$)

	Current employment sector		
	Independent	Large chain	Institutional
	Continuous variables (mean (SD))		
Age at time of choice[a]	37.47 (12.97)	33.66 (9.93)	33.61 (9.77)
Years of education[a]	5.60 (1.50)	5.77 (1.49)	6.31 (1.76)
Years of practice	12.48 (12.11)	8.47 (10.14)	8.87 (9.32)
Experience at time of choice[a]			
Number of past employers[a]	3.47 (1.75)	2.83 (1.64)	3.44 (1.67)
	Categorical variables (N (%))[b]		
Gender			
Male	49 (23.2)	99 (46.9)	63 (29.9)
Female	55 (20.7)	108 (40.6)	103 (38.7)
Marital status[c]			
Married	88 (24.2)	155 (42.6)	121 (33.2)
Single	16 (14.2)	52 (46.0)	45 (39.8)
Any children under age 5 years in household			
Yes	10 (17.9)	29 (51.8)	17 (30.4)
No	94 (22.3)	178 (42.3)	149 (35.4)
Race			
White	101 (22.5)	194 (43.3)	153 (34.2)
Nonwhite	3 (10.3)	13 (44.8)	13 (44.8)
Population where respondent practices[c]			
0–50,000	48 (28.7)	78 (46.7)	41 (24.6)
>50,000	56 (18.1)	129 (41.6)	125 (40.3)
State where respondent practices[c]			
Alabama	20 (20.0)	51 (51.0)	29 (29.0)
Massachusetts	25 (24.8)	33 (32.7)	43 (42.6)
Ohio	23 (18.3)	57 (45.2)	46 (36.5)
Oregon	36 (24.0)	66 (44.0)	48 (32.0)

[a] = ANOVA, $p < 0.01$.
[b] = All percentages are row percentages.
[c] = Chi-square, $p < 0.01$.

lecting independents also were more likely to have worked in an independent setting in their prior job. Pharmacists who chose institutional settings over chains had more past employers and were more likely to have worked in an institutional setting in their prior job. Pharmacists practicing in Oregon were less likely to choose institutional settings relative to those in Massachusetts, whereas pharmacists practicing in Ohio were more likely to choose institutional settings relative to those in Massachusetts. Pharmacists living in areas with populations greater than 50,000 were more likely to choose institutional settings.

Table 3. Transition Matrix for Study Sample ($N = 477$)

Immediate past practice setting	Current practice setting (N (%))[a]		
	Independent	Large chain	Institutional
Independent	60 (27.4)	105 (47.9)	54 (24.7)
Large chain	25 (20.0)	76 (60.8)	24 (19.2)
Institutional	19 (14.3)	26 (19.5)	88 (66.2)

[a] All percentages are row percentages.
$\chi^2 = 86.79$, $p < 0.01$.

Table 4. Practice Setting Attributes for Study Sample

	Independent	Large chain	Institutional
	Proportion of jobs (range)		
Alabama	0.27–0.38	0.24–0.35	0.36–0.45
Massachusetts	0.18–0.31	0.26–0.43	0.38–0.42
Ohio	0.13–0.27	0.40–0.59	0.28–0.32
Oregon	0.23–0.38	0.17–0.38	0.42–0.48
	Mean wage increment (SD)		
	–0.06 (0.52)	0.07 (0.68)	0.62 (0.86)

DISCUSSION

The differing values that pharmacists choosing among the three practice settings appear to place on job attributes are notable. This information may be of significant value to employers in various settings. For example, our results suggest that pharmacists who wish to minimize the search costs of finding a new job and wish to simultaneously increase their salaries are likely to choose large chain settings. Thus, firms in the large chain setting may be able to maximize returns on their recruitment efforts by targeting pharmacists with appeals that emphasize these attributes.

Like those choosing large chain settings, those choosing independent settings appear to place significant value on pay. However, these pharmacists seem to ignore search costs when choosing jobs. This finding suggests that these pharmacists are willing to expend extra effort in order to find a job in this setting. The fact that these individuals sought out employers in this setting despite their decreasing numbers suggests that there are other unobserved attributes of these settings that are of significant value. This finding is consistent with studies suggesting that independent pharmacies may differ from large chain settings on a number of subjective attributes. For example, McHugh (28) found that pharmacists practicing in independent settings were more satisfied with their jobs and less likely than those in other ambulatory settings to be interrupted when filling prescriptions or to experience complaints from patients.

Pharmacists choosing institutional settings consider the search costs involved when searching for a position, but seem to place little value on wage differentials when choosing a job. These individuals seem willing to trade this attribute for other, unmeasured attributes of jobs in this practice setting. Given that these individuals are the most highly educated in our sample, they may be more likely to search for positions that allow them to exercise special skills and allow greater contact with other professionals. These findings suggest that employers in the institutional setting could increase the efficacy of their recruitment and retention efforts by increasing their understanding of institutional-setting-specific components of job satisfaction and appealing to more highly educated individuals.

One goal of this research was to better understand how regional and urbanization characteristics are associated with pharmacist's job choices. Our results showed that pharmacists living in areas with populations greater than 50,000 were more likely to select institutional settings at their last job

Table 5. Multinomial Conditional Logit Model Coefficients Predicting Employment Sector Choice ($N = 477$)

	Independent	Large chain	Institutional
Intercept	–1.60 (0.88)	–	–5.01 (1.67)*
Employment sector characteristics			
Wage increment	3.16 (8.05)***	2.08 (7.80)***	–0.20 (1.28)
Proportion of employers in Sector	–1.23 (0.41)	5.66 (2.38)**	11.49 (1.80)*
Individual characteristics			
Years of education	0.05 (0.46)		0.10 (1.18)
Male gender	–0.30 (0.88)		–0.08 (0.26)
Married	0.85 (2.19)**		0.05 (0.15)
Children age 5 years or under in Household	–0.48 (0.95)		–0.58 (1.40)
White race	1.43 (1.70)*		0.23 (0.43)
Work history characteristics			
Labor market experience	0.03 (1.57)		–0.02 (1.22)
Number of past employers	0.20 (1.79)*		0.19 (1.85)*
Immediate past employment sector			
Large chain	Excluded		Excluded
Independent	0.78 (2.12)**		0.51 (1.54)
Institutional	0.29 (0.63)		2.27 (6.07)***
Regional and urbanization characteristics			
Local population >50,000	–0.22 (0.71)		0.51 (1.75)*
State where respondent practices			
Alabama	–0.44 (0.94)		–0.49 (1.16)
Massachusetts	Excluded		Excluded
Ohio	–0.20 (0.35)		2.19 (2.57)***
Oregon	–0.71 (1.54)		–1.46 (2.90)***

Note: *t*-statistics in parentheses.
Model $\chi^2 = 353.30$ (34 df), $p < 0.01$, $\sim R^2 = 0.34$.
*** = $p < 0.01$.
** = $p < 0.05$.
* = $p < 0.10$.

transition. One possible reason for this finding is that these areas provide more opportunities for institutional employment with more densely populated areas supporting more institutional settings. Our results also show that when compared to those residing in Massachusetts, pharmacists living in Oregon were less likely to choose institutional settings relative to large chains, while those living in Ohio were more likely to choose institutional settings. These results may be because Ohio is a relatively densely populated state with several large metropolitan areas, whereas Oregon is more rural with fewer metropolitan areas.

With few exceptions, demographic characteristics were not predictive of practice setting choices. White race was positively associated with the choice of independent pharmacies in our multivariate model. This result is consistent with those of Carvajal and Harding (18), who found that students of color were less likely to express preferences for this practice setting compared to white students. No demographic variables were able to predict the choice of institutional settings over large chain settings. As in another previous study of actively practicing pharmacists (14), gender was not associated with practice setting choices.

Our multivariate analysis showed that respondents were more likely to choose a practice setting which was the same as their previous employment setting. One explanation for this is that pharmacists develop levels of human capital (skills) that are specific to certain practice settings (29). As such, when pharmacists decide to switch employers, they can reduce the psychic costs of switching employers by remaining in the same practice setting. For example, a pharmacist previously working in an institutional setting who moves to an independent setting may have to learn a new process of dispensing medications, a process he or she did not follow in the institutional setting. The propensity for pharmacists previously employed in institutional and independent settings to choose these settings again when changing jobs is noteworthy given the growth of large chain settings during the years when the majority of job transitions in this sample occurred.

The multivariate results combined with the results from our transition matrix (Table 4) may point to the existence of two labor markets within the overall pharmacy labor market. One market might consist of pharmacists who seek employment in ambulatory settings with significant pecuniary returns, whereas the second market might consist of pharmacists who seek job opportunities in institutional settings. An important implication of this finding relates to the development of specialized education "tracks" within pharmacy schools. These tracks could provide specialized training for these two practice types that might be of considerable value for students who develop a preference for one of these labor markets early in their careers.

Future Research

An important topic for future research is better elucidating the observable attributes of jobs that are important to different kinds of pharmacists. In this study, we examined two attributes that were objectively measurable and observable. Future studies could be conducted in more well-controlled environments in which researchers could collect more reliable

measures of these, as well as a multitude of other, job attributes. Two obvious candidates for inclusion in such studies include distance from the pharmacist's home to jobs in each of the practice settings and some measure of the desirability of the work hours in each of these settings.

Past studies suggest that an individual's subjective evaluation of practice setting attributes is also important in their job choices (16,17). These studies found that factors such as "personal fulfillment" and "interesting work" were important in pharmacists' practice setting choices. We suggest that future studies of pharmacist job choice will yield more insights if they combine objectively measurable variables with subjective evaluations of practice setting attributes. Future research could focus on two major agendas: (*a*) understanding the relative importance of these factors to pharmacists in general, and (*b*) understanding how these factors interact with pharmacist characteristics to produce final job matches.

More research is required to better understand the job matching process in pharmacy labor markets. This study suggests at least two future directions for research into pharmacist's job choices. First, exploratory, qualitative research could be used to inform future studies with respect to job attributes that pharmacists are most likely to consider when changing employers. Subsequently, the results of this research could be incorporated into future studies of pharmacist labor market dynamics using panel designs with frequent repeated observations. Together, these research agendas have the potential to provide a more complete understanding of these behaviors, and by extension, provide policy makers and employers with valuable information.

Limitations

The response rate to the mailed survey was somewhat low (34.5%). Although we attempted to assess the extent of this potential bias by extrapolation and comparing the demographics of our sample with another national sample of pharmacists, it is difficult to ascertain whether respondents differed from nonrespondents in other important ways. Although we sampled pharmacists from four geographically diverse states, the extent to which their behaviors can be generalized to pharmacists residing in other states is not known and the reader is advised to exercise caution in generalizing the findings.

As a secondary analysis of data collected for other purposes, this study suffers from limitations related to this methodology. For example, several potentially relevant variables are not available. Measures of the importance of various job attributes to each individual would likely increase the explanatory power of the logit model, as would the respondent's subjective estimates of the difficulty in obtaining a job in each practice setting.

Another potential limitation of the current study is the fact that these data likely contain errors resulting from recall bias of respondents. Respondents were asked to recall specific data about previous employers. It is difficult to assess the reliability of these data without reference to some other objective source (e.g., administrative records). However, because these errors are likely present for pharmacists in all three practice settings, and because we wish to make inferences about differences (and not absolute values) across these settings, we submit that the importance of these errors is minimized in the current study.

We classified all jobs into one of three common settings. Although this approach is often used in pharmacy labor force research, it is limited because it does not account for differences that may exist within each setting. For example, we grouped pharmacists practicing in long-term care and home health settings with those practicing in more traditional inpatient settings because there were too few to form a separate category ($n = 29$). To test for possible bias that may have been introduced by this practice, we removed these individuals from the data set and re-estimated our multivariate model. Our substantive results remained unchanged, suggesting that at least in the current study, aggregating jobs in this manner was not problematic. Another limitation concerns our assumption that pharmacists in this study could choose from all three practice settings. It is possible that some respondents did not have available all alternatives when choosing a job. To the extent that this is true, estimates of the effects of explanatory variables will be biased in unpredictable ways.

CONCLUSION

In this study, a model of pharmacists' job choices was proposed and tested. This model posited job attributes, pharmacist characteristics, and regional and urbanization characteristics as determinants of these choices. Data collected from a geographically diverse sample of actively practicing pharmacists were used to test the model. In contrast to past studies, the multivariate statistical technique used in this study allowed us to model simultaneously the relationships between factors that vary at both the individual level and at the choice level.

In general, it appears that pharmacist job matching is a complex process in which a number of factors interact to produce a final match. Characteristics of pharmacists, the environment in which they reside, and attributes of practice settings all proved to be significantly related to employment sector choice, although the impact of these factors varied depending on the practice setting chosen.

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