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Three essays in labor and health economics

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THREE ESSAYS IN LABOR AND HEALTH ECONOMICS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Economics

By

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To Mom, Geraldine, and Michele

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ABSTRACT

This Dissertation is primarily focused on the study of U.S. workforce trends. Research over the past fifty years, with respect to the choices that individuals make in terms of maximizing their own well-being, has covered several areas. Additionally, the legal climate has changed dramatically over this time period and research in this area has covered the possible effects on economic outcomes, including an individual's well-being.

The first essay focuses on the trend in trade union membership in the U.S. over the last few decades. We revisit what is known as the government substitution hypothesis which basically addresses the question of why trade union membership has fallen on average for more than 50 years. We use an updated data set, which includes state level data over time. Additionally, we have developed what we consider more appropriate measures of government provided services that might be perceived by employees as substitutable for the services that unions normally provide. After testing for and finding support to use the fixed effects model, we find evidence that supports the government substitution hypothesis.

The second essay observes the choices that registered nurses in Louisiana are making. Specifically, we model the educational and occupational choices of registered nurses in this state and attempt to gain an inference on how their choice toward occupations might change when their choice on education has changed. We hypothesize that a registered nurse who invests in additional levels of human capital, seeking to receive a return on his or her investment, might do so by moving to another position within the nursing field. We use a multinomial logit model to obtain information on the positions that registered nurses are likely to hold given certain characteristics of the nurses. Additionally, we also use a mixed logit model to estimate the occupational choice of registered nurses, using data on occupational-specific variables. Finally, we use the multinomial logit model to estimate the likelihood that a registered nurse will hold a staff nurse position conditional on education and a change in education. We find supporting evidence that the likelihood that a registered nurse will be in a staff nurse position decreases when the registered nurse invests in additional units of human capital after controlling for potential experience. We also find that salary positively affects the choices of these registered nurses who have invested in additional units of human capital relative to those registered nurses who have not invested in additional units of human capital.

The third essay observes when a states' court might take action and therefore, can help us to better model the effect that these actions will have on economic outcomes. We analyze state level data over time to model the supply and demand factors that affect the likelihood that a state will move away from the common law interpretation of the employment-at-will doctrine and recognize any of the three main exceptions to the employment-at-will doctrine. This analysis takes advantage of the erosion of a once practical barrier and will reduce the bias when estimating this type of model. We estimate a nonlinear fixed effects model assuming a normal distribution. This enables us to control for the heterogeneity across states and we can generate the probability that a state will recognize any of the three main exceptions to the employment-at-will doctrine under

various scenarios. Using the fixed effects probit model, we are able to confirm a number of our hypotheses on the supply and demand factors that affect the likelihood of a state recognizing any of the three main exceptions to the employment-at-will doctrine.

CHAPTER 1

CONVERGING TOWARD A CONSENSUS: REVISITING THE GOVERNMENT SUBSTITUTION HYPOTHESIS

1.1. Introduction

A commonly used method for analyzing union membership and changes in membership over time is through supply and demand framework. What is assumed is that, in the static state, we are in equilibrium and due to some factors in the economic environment, changes in that equilibrium occur and the new equilibrium quantity and price of union membership is analyzed through comparative statics. What is common in these studies on trade unions is that the concern is mainly on the quantity of union membership, leading to the analysis of a reduced-form equation in which union membership, defined as the number of workers in a union, normalized in some way (usually by the labor force), is a function of several variables, which can be argued to determine supply, demand or in some cases both. The first section is intended as a review of the structural variables that are a function of union membership, as hypothesized by the professionals in the field of labor economics. Some have argued that changes in these variables over time are the predominant reasons for the decline in union membership. Others have maintained that structural changes can only explain a fraction of the decline in membership over the periods studied and offer additional insights.¹ With regard to the structural variables possibly lending support to explaining union membership and changes in membership over time, it is assumed that either the supply of or demand for union membership is affected. The second section offers an hypothesis that a firm's opposition toward being unionized is a factor of membership and being able to successfully oppose unions through elections has contributed to the decline in unionization over time. The third section analyzes the literature on changes in public policy and how this is hypothesized to have affected union membership.

1.2. Literature Review

1.2.1. Structural Hypothesis

1.2.1.1. The Usual Suspects

Tastes for unions will affect the demand side of union organization. It is the expected differences from belonging to a union compared to not being a union member that workers observe in order to make the rational decision of whether or not to join. The pecuniary and nonpecuniary benefits associated with belonging to a union not only

¹ The studies that analyze the determinants of union membership and those that study changes in membership over time have, for the most part, been concentrated around the mid 1950s to the mid to late 1980s. Data on union membership is only available for a couple of years prior to 1964 and changes in the variables argued to determine membership have occurred during the period mentioned. It should also be noted that these variables are explaining union membership in the private sector even though the measure for membership includes the public sector as well. A separate section is devoted to explaining the measure of union membership. Availability issues and shortcomings will be addressed in that section.

decide the preferences for unions but also help to determine the general attitudes workers have toward unions. It is argued that groups of individuals form different expectations of what benefits unions provide and not each group incurs the same costs to join a union.² Therefore, we would expect to observe different groups of individuals with different demands for union membership. Moore and Newman (1985) offer several factors (which can be grouped) that have been shown to be significantly correlated with union membership. Among them are age, work experience, sex, race, education, and occupation. Most of these factors have been hypothesized on their relationship with union membership.

Scoville (1971) examines what he considers as the most appropriate factors to analyze union membership. To the extent that union membership is a normal good, income will be positively correlated with an individual being in a union. Females should be relatively less unionizable compared to males, as should nonwhites compared to whites. The South should have a lower likelihood of being unionized relative to the Northeast and workers in the agricultural industry should have a lower probability of being in a union compared to workers in manufacturing. Additionally, during this time period, the wage premium to college graduates was probably large enough that high school educated individuals were more likely to be in a union relative to college graduates. The results, contrary to what is expected, are that nonwhites are significantly more likely than whites to be in a union. Also, low levels of income are negatively correlated with the probability of being in a union. Scoville offers as a possible explanation that union organizers may not have focused their organizing efforts in these areas during the period studied. Finally, although the coefficient on females is negative, it is not statistically significant, implying that females are just as likely to be in a union in 1966 as are males.

1.2.1.2. Not So Fast My Friend

Henry Farber (1985) addresses the issue of how much of the decline in unionization is possibly accounted for by sectoral shifts in employment. When doing so, he takes these shifts as given and in some cases explains the logic for their inclusion. For selected years, 1956-1978, Farber shows the percentage distribution of nonagricultural employment by industrial sector. It is apparent that within the private sector, employment in the manufacturing sector is falling while increasing in the nonmanufacturing sector. Additionally, the government sector is increasing in employment during the 1956-78 period. During this same period, Farber shows that the national union membership as a percentage of nonagricultural employment is monotonically decreasing for both the manufacturing and nonmanufacturing sector while monotonically increasing within the government sector. Within every selected year observed over the stated period, the manufacturing sector is the most highly organized. Therefore, given that the manufacturing sector is the most heavily organized and employment within this sector has been constantly declining, inclusion of the latter in helping to explain union density seems plausible. What Farber shows next, however, by decomposition, is that if there was no decline in employment within the manufacturing sector from 1956 to 1978, the

² This could also hold if each group incurred the same costs as long as benefits to each were different.

hypothetical decline in unionization would have been from 34.5% to 26.8% compared to the actual decline to 25.1%. This means that the decline in unionization explained by the change in employment away from manufacturing is only 18% or 1.7 percentage points of the 9.4 percentage point drop in the extent of unionization. Given that over this time period 18% was explained by the change in employment within the manufacturing sector, inclusion again seems plausible with the understanding that a better explanation of the decline in union density remains further ahead.

Another structural change witnessed over the post World War II period was the change in nonagricultural employment in the South. Using the period 1953-78, Farber shows that the percentage of nonagricultural employment in the South grew from 19.9% to 26.9% while in the Nonsouth it fell from 80.1% to 73.1%. Observing union membership over this same time period for the same region, Farber shows that not only was the South less unionized than the Nonsouth but constantly declining over the entire period. Farber mentions that care must be taken in shedding light on unionization with respect to regions and over time due to data availability and collection. This holds for our quantitative analysis as well and is addressed in the following section. With that in mind, Farber again decomposes the decline in unionization that can be explained due to an increase in the percentage of employment in the South region. If the South did not change in employment from 1953 to 1978, the extent of unionization would have hypothetically been 26.3%. Compared to the actual 25.1%, the shift in employment toward the South could possibly explain 16% of the actual decline in unionization. Put another way, of the 7.5 percentage point drop in the extent of unionization, 1.2 percentage points are explained by regional changes in employment. Following this study over this time period, so far industrial and regional changes (i.e. structural changes) have accounted for 3 percentage points of the overall drop in union density. A conclusion at this point would be not to disregard these changes but to also look deeper within the structural changes.³

In doing so, Farber demonstrates that another major change in the U.S. labor force composition over the post World War II period up to the late 1970s was a movement away from blue-collar occupations, known to be more heavily unionized toward the less unionized white-collar occupations. Again, Farber mentions problems associated with union data yet is convincing in showing that blue-collar workers in the 1977 Current Population Survey had a unionization rate of 42.6% compared to the overall sample of 30.5%. In regards to the labor force, in 1958, blue-collar workers made up 40.5% and by 1977, this percentage had fallen to 34.4. Going by these statistics, it is clear that blue-collar workers have a relatively higher propensity to being unionized and their overall percentage of the labor force has been falling over time. Therefore, including this structural variable would seem reasonable in helping to explain union density and the possible correlation over time.

³ Farber (1983) observes the effect of right-to-work laws on union organizing, among other outcome measures. He shows the proportion of the labor force that are union members for the South and Non-South regions and for RTW and Non-RTW states. Farber shows that even after controlling for RTW laws, unionization is considerably lower in the South than outside the South.

Over the time period studied by Farber, another major change has taken place in the composition of the U.S. labor force. The percentage of females employed in 1956 was 32% while in 1978 was 41%. Cross-section evidence from the 1977 Current Population Survey shows that possibly 20.6% of working females were union members compared to 38.1% of males. Compared to males, then, females are less likely to be organized and their participation in the labor force has been growing over time. It has been observed that women are more likely to move in and out of the labor force. Alternatives such as home production, choice of leisure, etc. are possible explanations. This effect of the increase in females in the labor force on union density over time should not be taken as a final point, however. Ehrenberg et al. (2000) argues that the substitution effect for women has tended to dominate the income effect but that as time has passed, the dominance has appeared to diminish. If this is true, and depending on the relative sizes over time, women may have been more committed to remaining employed over some period and therefore more likely to be a union member. Additionally, over time, women have taken roles in occupations once dominated by men and therefore are more likely to be organized once taking these positions.

Altogether, Farber concludes that up to three-quarters of the decline in unionization over the time period studied can be attributed to the structural changes mentioned with the change in blue-collar occupations and the increase in the number of females in the labor force weighing heavier than the shift away from manufacturing jobs or toward the South region. However, it is also argued that the structural changes that have taken place over the sample period are not themselves independent and a method is used to take into account the correlations across these structural variables. Taking the shift over the sample period in the proportion of the work force with a given characteristic and multiplying it by the regression coefficient for the same variable gives Farber a crude estimate of the decomposition of decline in unionization during the sample period. Overall, the decomposition shows that only 40% of the 9.8 percentage point drop in the extent of unionization can be accounted for by gross shifts in the structural changes described in this study. Clearly, other explanations are needed as well to help clarify the reason for the decline in union membership from the mid 1950s onward. Some other possible structural variables and explanations follow.

Neumann and Rissman (1984) observe the role that structural changes have played on the decline of union density over time. For census years 1900-1980 they first look at total union membership as well as the percentage of nonagricultural employment that is unionized. Consistent with Farber (1985), NR find that after 1953, union membership monotonically declined. Also mentioned is that the union density in 1980 is almost identical to that of 1939. Keeping in mind that there was a sharp decline in membership up to the Great Depression in 1929 and that membership peaked in the mid 1950s, the comparable rate between 1939 and 1980 is put somewhat into perspective.

Neumann and Rissman also present the percentage unionized by industry over the 1900-1980 period. In all nonagricultural industries (Mining, Manufacturing, Construction and Transportation) the trend shows an increase in union density up to the late 1940s and mid 1950s and a reversal in membership from that point to 1980. The All Other category,

consisting of the public sector, has an increasing percentage in unionization over the sample period. NR decompose changes in the aggregate union density into changes in the within-industry unionization rate, employment shares held constant, and changes in industry shares, unionization rates held constant. This decomposition allows NR to isolate the change in union membership as a percentage due to factors within the industry and due to changes in industry composition. NR show that the latter accounts for a decrease of one-third at best. Additionally, by normalizing out the interaction effects, NR are able to show that 56% of the 1956-1978 decline is attributed to changes within-industry while the remainder is associated with shifts in industry composition. Normalizing over the 1956-1980 sample period shows that 60% of the decline is due to within-industry changes. The two different sample periods are used due to comparability issues with unionization rates over time, specifically 1980 BLS union density. Again, this issue will be addressed in a separate section. Within the framework of changes in union membership being a function of changes in the composition of the labor force, NR conclude that this cannot be the definitive explanation.

Freeman and Medoff (1984) argue the fact that all major western economies (Canada especially) have witnessed identical changes in the labor force and that if these structural changes were of major importance in explaining changes in union membership within the U.S. we should see them affecting other countries' membership rates in similar fashions but maybe not similar magnitudes. Observation that unionization has grown in the other western economies, compared to the decline in the U.S., is FM's proof that the structural change hypothesis has little explanatory power.

An additional objection to the structural change hypothesis is that FM claim this argument assumes that the proportion of workers in a given sector who are unionized remains fixed over time. Given that increases in union membership has at times included those once deemed unorganizable, decreases in certain industries that are highly organized cannot alone explain the fall in union membership.

The third problem FM have with the structural change hypothesis goes as follows: NLRB elections determine union density and lack of success in NLRB elections is a primary explanation for the decline in union density over time. Evidence shows that the groups associated with the change in the workforce that are somewhat replacing the section of the workforce that is unionized actually have opposite effects on the proportion who would vote for a union in an NLRB election. Put another way, females are as likely to vote "yes" as men and nonwhites and young workers are more likely than others to vote "yes".

FM do yield that the structural change hypothesis holds other factors constant or does not allow other determinants to change union density. This may imply that while not crediting structural changes in the labor force with a major portion of explaining the decline in union membership over time we can at least agree that these factors do make it more difficult to organize and their inclusion is therefore appropriate.

Freeman (1988) observes the percentage of private wage and salary workers who are members of unions, both by industry and occupation over the years 1980-1986. Using this period allows for close examination of possible factors during a time when the rate of decline was especially severe. It is shown that union membership falls from 1980 to 1986 for all industries including those traditionally highly organized and even less organized. For instance, in transportation and public utilities, which includes the trucking industry once dominated by the Teamsters, membership fell from 48% organized to 35%. And in the service and trade sectors, membership fell from 9% and 10% to 6% and 7%, respectively. Observing changes in union density within occupations across the time period shows the similar decline from 1980 to 1986 with a large and understated measure of 45% to 31% for transport and equipment. This is an understated measure because public sector labor is included and union density within this sector has increased over this period. Freeman also shows that collective bargaining contracts fell in all regions of the U.S. during this time period. A fact he claims implies that there is more to explaining the decline in union membership in the 1980s than structural changes by themselves.

Farber (1990) uses CPS data for May 1977 and May 1984 to confirm the decline in unionization. 26.8% of the workers in the May 1977 CPS sample reported being members of unions while 21.4% of the workers in the May 1984 sample reported being members. The sample size of each survey is 9,912 and 10,676, respectively. Farber continues to study this trend by trying to gain an inference as to how much of the decline in union density can be attributed to the change in structural components of the labor force. He reports the mean sample values for each year for a set of variables representing various dimensions of labor force structure along with the fraction of workers in each group who reported themselves to being unionized. In both periods men made up more than 50% of the sample and had a higher fraction unionized compared to women. Whites made up the majority of both sample periods but reported lower numbers of unionization compared to nonwhites. The Nonsouth region made up about 70% of the sample for both periods and has higher unionization rates compared to the South region. Blue-collar jobs made up a higher fraction of the sample for both periods and were more unionized compared to professional, clerical, service and sales jobs, or, white-collar jobs. Finally, across industries, the three nonagricultural goods producing sectors (Manufacturing, Construction and Transportation) had higher union membership rates than Trade, Finance and Services. Farber also invokes that observing across the two sample periods, yields the fact that the female labor force has grown, the number of nonwhites in the sample has increased, and workers answering that they work in the South region increased marginally from 1977 to 1984. Additionally, all three traditionally nonunionizable sectors grew in size in the 1984 sample. Finally, the sample of blue-collar workers decreased and those occupations fitting into the label “white collar” grew from the 1977 to 1984 sample. Farber uses the decomposition method to determine how much of the decline (5.4 percentage points) in unionization can be attributed to shifts in labor force structure. Unlike his previous work, instead of using OLS, which may produce misleading standard errors, Farber uses a probit model where the worker is unionized only if some latent variable is greater than zero. The latent variable represents the worker’s utility on a union job versus the utility on a nonunion job. There are some characteristics used that in general, we believe would cause some individuals to become union members or not.

Included in these characteristics are all the structural variables discussed up to this point. Farber can observe the change in probability of being a union member given a change in some characteristic holding other characteristics constant at any value. The interesting value for this decomposition is to hold the within-sector probability of union membership fixed at the estimated 1977 value and to allow the labor force structure to change. The portion due to the change in the labor force structure is estimated to be -.01101 and the overall estimated average change in the probability of union membership is -.0545. Therefore, Farber concludes that only approximately 20% of the decline in union membership from the 1977 survey to the 1984 survey can be accounted for by structural changes in the labor force and the remainder is explained by declines in the within-sector probabilities of union membership.

1.2.1.3. Additional Structural Variables and Theories

Hunt and White (1983) (HW hereafter), when analyzing the effects of right-to-work legislation on union outcomes, include the number of females as a percentage of the state's labor force and the percentage of blacks in the state population as a proxy for costs of organization. HW argue that "groups with relatively high turnover, traditionally are women and blacks and these groups are usually presumed to perceive union membership negatively."⁴ Additionally, HW contend that economies of scale will have organizers concentrating on large firms. This is standard medicine but also offered by HW is that individual bargaining power will be higher in smaller firms implying an inverse relationship between firm size and union membership. To date, it is unclear if the opposing effects of firm size on union density have been decomposed. Perhaps if this were possible, one could present union organizers with opportunities for future organizing success.⁵

Moore and Newman (1975) use the percentage of nonwhites in the civilian labor force without speculating a sign on the coefficient due to countervailing forces. MN offer Kornhauser's (1961) take that because nonwhites are the minority, collectively (by joining unions) they might have a stronger voice. In contrast, the possibility of racial discrimination in unions could lead to an inverse relationship between nonwhites in the labor force and union membership. This is somewhat in line with the thought that the union hierarchy is concentrated with whites at the top and nonwhites are concerned with the ability to have their needs met within the union. Both forces work against each other but affect the demand side of union organization.

The degree of urbanization is defined as the percentage of the population in a state living inside metropolitan areas as reported in the U.S. Census of Population. The United States Office of Management and Budget defines metropolitan statistical areas according

⁴ Hunt and White (1983, pp.53).

⁵ Incidentally, the coefficient on SMALLEM, defined as the percentage of employees in establishments with fewer than 50 employees, is positive and significant at the 0.01 level (0.293) when the dependent variable is ELECTION RATIO, defined as the number of new elections held by state, per thousand union members. The coefficient on SMALLEM is positive but not significant (10.0) when the dependent variable is WINS, defined as the relative number of wins by union, by state.

to published standards that are applied to Census Bureau data. The general theory of a metropolitan statistical area is that of a focal point area containing a substantial population nucleus, coupled with adjacent communities having a high degree of economic and social integration with that focal point area.

1949 was the first year in which definitions were issued for metropolitan areas. “A “standard metropolitan area” (SMA) was first defined as the term and later changed to “standard metropolitan statistical area” (SMSA) in 1959. In 1983, the term was changed to “metropolitan statistical area” (MSA). Finally, in 1990 the term “metropolitan area” (MA) was adopted and refers collectively to MSA’s, consolidated metropolitan statistical areas (CMSA’s), and primary metropolitan statistical areas (PMSA’s).⁶ Under the 2000 standards, each MSA must contain at least one urbanized area of 50,000 or more inhabitants. Under the 1990 standards, if an area that qualifies as an MA has more than one million persons, PMSA’s may be defined within it. PMSA’s consist of a large urbanized county or cluster of counties that demonstrates very strong internal economic and social links, in addition to close ties to other portions of the larger area. When PMSA’s are established, the larger area of which they are component parts is designated a CMSA. Finally, metropolitan statistical areas are relatively free standing MA’s and are not closely associated with other MA’s. These areas are typically surrounded by nonmetropolitan counties.”⁷ Therefore, when observing the effects of urbanized areas on union membership, it should generally be thought of as an area consisting of population size 50,000 or greater and the MSA is the “smaller” of the “big” areas.⁸

There appear to be both demand and supply side implications when hypothesizing the sign of the coefficient for urbanization rate. On the supply side, it is argued that the costs of organizing are lower in more populated areas. On the demand side, commonly accepted is that rural residents have relatively hostile attitudes toward unions. Given that both implications work in the same direction, expectations are that there is a positive relationship between urbanized areas and union organizing.

Moore and Newman (1985) claim that on the demand side, the wage premium earned by union members over nonmembers, holding job characteristics constant, has a positive relationship with union organizing. If this premium is nontrivially attainable, proxies such as age and racial composition are used as instruments. Moore and Raisan (1983) show that nonwhite workers, younger workers, and blue-collar workers are inclined to receive above average union wage benefits. This implies that these groups would tend to be relatively more likely to be in a union.

⁶ MSA’s, CMSA’s, and PMSA’s are defined in terms of counties except in New England, where cities and towns are the building blocks.

⁷ www.census.gov/population/www/estimates/metroarea.html

⁸ Consequently, there have been changes in the definitions of the statistical areas since the 1950 census. These changes have predominantly consisted of the recognition of new areas as they reached the minimum required city or urbanized area population and the addition of counties to existing areas as new decennial census data showed them to qualify. Because of the historical changes in geographic definitions of metropolitan areas, it is stressed that using this data for time series analysis must be done in a cautious manner. The Census Bureau provides historical metropolitan area definitions for 1950, 1960, 1963, 1970, 1973, 1981, 1983, 1990, 1993, and 1999.

Moore and Newman (1988) include as control variables, the age composition of the labor force. They control for the percentage of the labor force that is between the ages 16-24, and age 55 and older. There is no way of knowing, when observing labor force over time, if the group that made up the 16-24 workers (i.e. in 1950) is the same cohort that makes up the 55 and older workers (i.e. in 1990).⁹ Therefore, inferences about signs of coefficients for different ages of the labor force at different points in time are useless. Additionally, within the same age group of the labor force, the sample of individuals does not remain fixed over time.¹⁰

The structural variables reviewed are not an exhaustive list of possible determinants of union membership. However, they offer as a controlling mechanism, a recognized and acceptable means to further explore other possible determinants of unionization and causes of the secular decline that has been witnessed in the private sector to date. These other possible causes are to where we now turn our attention.

1.2.2. The Management Opposition Hypothesis

Within the supply and demand framework, a firm's opposition to union organizing increases the costs to unions to organize and decreases the benefits to workers to joining unions causing a decrease in demand and a decrease in supply. The effect, if significant, would be a lower quantity of union services and therefore a negative effect on union density.

It is not surprising that management opposition to unions, once measured, can be traced back to the time period where we observe the peak in union membership. The Taft-Hartley Act of 1947 was a federal law, or amendment to the National Labor Relations Act of 1935, which gave management some of the bargaining powers that had been lost to unions in preceding years. Specifically, Section 8I added as follows:

The expressing of any views, argument, or opinion, or the dissemination thereof, whether in written, printed, graphic, or visual form, shall not constitute or be evidence of an unfair labor practice under any of the provisions of this Act, if such expression contains no threat of reprisal or force or promise of benefit.

The amendment in Section 8I provided that speech did not constitute and would not be evidence of unfair labor practices and endowed to employers a tool with which to use not only for unfair labor practice proceedings but in preelection conduct as well. Following its inception, in the 1950s, employers gained access and the ability to defeat

⁹ Indeed, data sources are numerous both across variables and more importantly within variables. This makes the likelihood almost nil that we could be observing the same cohort from one time period to another.

¹⁰ Obviously those in the workforce who are 20 years old in 1950 are not in the 16-24 age group in 1980. This mobility across age groups in the labor force makes it difficult to nail down a hypothesis for the correlation between a specific age group and union membership, as it could be more likely that specific economic events cause attitudes and preferences to change. Additionally, like Scoville (1971) offered, unions might not focus organizing efforts on a specific group at some period.

employee-organizing efforts. Several studies show the impact that management's opposition to union organizing, through different degrees of emphasis, has on NLRB elections and therefore union density. Taken as given that management, seeking the goal of profit maximization, would prefer to remain nonunion, these studies then observe the effect that opposition has on the NLRB electoral process, which determines union success. First, is the evidence against the management opposition hypothesis.

1.2.2.1. Evidence against the Management Opposition Hypothesis

Getman et al. (1976) filter out the proportion of potential union voters who voted against union representation in three types of campaigns: Clean, Unlawful, and Bargaining Order elections. The voters were classified on the basis of their predispositions. Overall, the largest fraction of voters who decided "against" union were those who stated prior to the election that they were "undecided". The other roughly 20-40 percent stated that their intention was to vote union, actually signed a union authorization card, or had been predicted to vote union based on their perceived attitudes.

Of the elections listed under a clean campaign, 60 percent of those voting nonunion were grouped as having been undecided. Those elections listed under an unlawful campaign had 65 percent of the votes coming from workers who were undecided. Finally, the elections in which the NLRA later ruled on a bargaining order had 79 percent of the votes for nonunion coming from workers who were undecided. Some explanation is warranted at this point. After the fact, the National Labor Relations Board rules on elections in which charges or objections are filed. If charges or objections are not filed, arguable speech and conduct can still be submitted on an informal basis to an NLRB administrative law judge. As if they are submitted to him in his official capacity, the law judge rules on the charges and decides the appropriate remedy. Getman et al. studied 31 elections and the employer was found to have engaged in unlawful campaigning in 22 of those elections, violations serious enough to warrant bargaining order were found in 9 of those elections. A clean campaign is one in which there is no unlawful campaigning found or no charges or objections filed, official and unofficial. The F-statistic for those who were undecided and voted nonunion across types of campaigns is .77 and not statistically significant. In other words, Getman et al. found that there was no group of potential voters in which there was a significantly greater share that voted against union in either type of campaign. The authors did find, however, significant differences in that those who signed cards voted against unions more in unlawful elections compared to clean elections. When combined with bargaining order elections, there was no significant difference compared to clean elections, however. Getman et al. conclude that not only do workers pay little attention to either firm or union campaigns but also most workers' have decided far in advance of the major firm and union campaigning. Additionally, they decide that unlawful campaigning has no greater effect on workers' votes (and therefore union success) than does legal campaigning. Finally, the authors conclude that it is impossible to discriminate between "successful" and "unsuccessful" campaigns.

1.2.2.2. Evidence for the Management Opposition Hypothesis

Getman et al.'s study has been the topic of heated debate since its' conception. Dickens (1983) attempts to reconcile the conflicting results by re-analyzing the data collected by Getman et al. for their study. Dickens' motivation for this re-analysis is: 1) if the campaigns that management runs have no effect on how workers vote, why over time do we continue to see firms engage in them? 2) "...lack of statistical significance that there is no effect of campaigns on voting ...is to assume that the "apparent relationship" between those factors is due only to chance. Such a conclusion is as unwarranted as the conclusion that a relationship does exist."¹¹ Another major problem that Dickens has with Getman et al.'s study is that grouping according to voting intent is done at the time of the statistical testing. However, information on these individuals is gathered during the first wave of interviews. Dickens acquires the data from the Getman et al. study and observes that the first wave of interviews had a mean of nine weeks after the date of petition and three and one-half weeks prior to the elections. In other words, workers were interviewed and were categorized according to the researchers' inference as to how the employee would vote on election day. However, election day was not the next day, as the data shows. Dickens points out that workers could change, according to which category they should be placed, during the campaigning period. For example, prior to the campaign, a worker could have been categorized as "intending to vote for union." During the campaign, assuming effective management opposition, that same worker could have moved to be "undecided." On election day that worker then votes nonunion but according to Dickens, is erroneously estimated in the percentage that voted against union and categorized as "intending to vote for union."

Dickens uses a Probit model for estimation using as the dependent variable, the individual's voting behavior (union yes=1, 0 otherwise). As a function to decide on the latent variable, he uses among other variables, campaign measures by the firm (both legal and illegal). All three illegal measures (illegal speech, illegal actions, and threats and actions) have negative coefficients but only threats and actions is significantly different from zero. The marginal effects show that the probability of voting union decreases when the firm takes these illegal measures. The asymptotic standard errors on the coefficients are large and therefore lead to uncertainty about the magnitude of the particular effects. Dickens argues that it is likely there is high correlation between the illegal practice variables and moves to examine this category as a whole. The percentage of elections in which each type of violation occurred is multiplied by the estimated coefficient for each action and then summed. The estimate's value is -.177, analogous to a 4 percent decrease in the average employee voting union. With an asymptotic standard error of .092, the effect is statistically significant at the .05 level. Dickens' conclusion is that illegal speech and general illegal tactics by employers show a decrease in the probability of an employee voting union but neither is significant. The effect of such actions, on average, results in a reduction in the probability of voting union by 2 percentage points but the 95 percent confidence interval ranges from a 10 percent increase in the probability of voting union if workers decide they need the services of union to a 15 percent reduction if they

¹¹ Dickens (1983, pp. 562).

do not. Only threats and actions against employees identified as union supporters are associated with a statistically significant average decrease in the probability of voting union by 15.5 percent. After running a simulation analysis, he also shows that a relatively small change in the probability of workers voting union has important implications on the outcome of union representation elections. By running 31,000 simulated elections, it is shown that a one percent change in the probability of voting union translates into roughly a 2 percent change in the number of elections won by unions. Additionally, for the sample of elections studied by Getman et al., and here by Dickens, a five percent increase in probability of voting union increases the change in number of elections won by unions by almost ten percent. In essence, when firms engage in campaigns against union representation, either legal or illegal, there is a decline in the probability of the average employee voting union and this decline in probability has a negative effect on the amount of elections that a union wins.

Freeman (1985) focuses on unfair management practices due to data availability over time and across states. The approach taken by firms in the mid 1950s onward has been to hire labor-management consultants whose main objective is to defeat unions in representation elections. There are basically three tactics that the consultants have available. One is to duplicate a union-like environment consisting of higher wages, better fringe benefits, etc. This is what was earlier described as a clean campaign. Another method used by the consultant is to perform a legal but highly active campaign in which there is much communication between the employer and employee. This is done by holding meetings, sending out letters to the employee, etc., which allows the employer to display to the employee what the implications of turning union might mean to the workplace. This is also a clean campaign but we would expect some charges of unfair labor practices to be alleged when this process is administered. Finally, the consultant's job could be to hold an illegal campaign by committing obvious unfair labor practices. Obviously, the firm could engage in any one or combination of the three tactics without hiring a consultant. The implication of hiring a consultant, however, is that management is serious enough to oppose union success by increasing the cost of doing so.

Obviously, it is expected that legal opposition (hiring consulting firms, meetings with workers etc.) has a negative effect on union success, however, firms are not likely to divulge the information needed to proxy for this opposition nor are they likely to report accurate estimates of any kind to the NLRB. Using illegal campaigns then, Freeman shows that employer opposition has a sizeable and highly significant depressant effect on union success rates. Across states, within states over time, and over time, Freeman estimates the impact of a ten percent increase in unfair practices per election on the proportion of workers newly organized in NLRB elections. Across states during the period 1950-1978, the estimated impact is -2.5 percent. Within states over the same period the estimated impact is -3.4 percent. Finally, in a comparison of union success over the time period 1950-1989, the estimated impact of a ten percent increase in unfair practices is -6.0 percent. During this period, unfair labor practices increased sixfold and

Freeman concludes that management opposition explains anywhere from 25-50 percent of the decline in union success in organizing through NLRB elections.¹²

Freeman (1988) argues that management opposition is the main determinant of the decline in union density over the 1950-1980 period within the private sector and makes the point that because the public sector does not have management opposition, union density has not declined, but rather increased over this same period. One might consider Canada and their absence of the Taft-Hartley Act of any shape or form and argue that this is why they too have not witnessed management opposition nor a decline in union membership, holding everything else constant. Freeman shows graphically the rate at which management opposition, as a percentage of elections held, has grown over the 1950-1983 period. He warns us that what is shown are unfair practices claimed or charged and not actions found to be illegal but Weiler (1983) finds that the proportion of charges upheld has been almost constant at 30 to 40 percent over this period. Given that, the ratio is monotonically increasing at an increasing rate over the entire period. As for legal opposition toward union membership, Freeman claims that a study done by Kochan et al. (1986) observes 45 percent of firms in their Personnel Practices Forum had “operating union free” as a labor policy goal in 1983 compared to 31 percent in 1977.

Freeman develops a schematic model to infer the implications of management opposition on union success. The model has three relationships or functions; the determination of organizing success, management opposition, and union and worker organizing effort. Both management opposition and organizing effort are a function of the union wage premium. A higher premium provides an incentive for more opposition by management due to lower profits while providing an incentive for unions to increase organizing activity due to increased profits. Given the opposing effects following an increase in the wage premium, can it be determined which one dominates? Freeman argues that there is “triangle” inefficiency taking place, in which unions are extracting rents from firms through monopoly wage increases, the loss to firms exceeding the transfer to workers (higher wages). This presents an incentive for firms to possibly spend more resources to oppose unionization than both unions and workers spend to organize. If the outcomes are matched by the expenditures made by each side, the increase in the wage premium will cause a reduction in union success. Also a function of union and worker organizing effort is union density at the beginning of the period. This allows for a cumulative effect once the ball gets rolling. In this example, and as shown over the period studied by Freeman, the argument is that once management opposition is successful, union density will fall and the increased cost of organizing causes less organizing effort producing a cumulative effect. This schematic, along with the Freeman 1985 study showing the impact of an increase in unfair practices on NLRB elections (union success), is Freeman’s argument that management opposition is the underlying factor in the decline of union density over the 1950-1980 period.

¹² Freeman (1985) also lists a table of studies of how company opposition affects union success in NLRB elections, legal and illegal. The list contains the study name, date of study, and results. Among the 12 studies, only the Getman et al. (1976) study offers no statistically significant proof that management opposition negatively affects election outcomes.

Farber (1990) observes union representation activity for selected years 1960-84. The number of elections in 1977 was 9484 compared to 4405 in 1983. The percentage of nonunion workers eligible to vote was 1.15 percent in 1970 and only .27 percent in 1983. Eligible voters are workers who worked in potential bargaining units where elections were held. The percentage of elections won by unions decreased monotonically during the entire period studied by Farber. This is not surprising given that the Taft-Hartley Act was passed in 1947, and by 1970, the effect already had a head of steam. Farber presents his proof that employers acted more aggressively toward union organizing efforts by listing the unfair labor-practice complaints per election over time, which is constantly increasing. In 1960, this number was 1.78 and in 1982, it was 7.45. These numbers are somewhat in line with Freeman's (1985) paper, where the period studied covered 1950-89 and he observed a sixfold increase in unfair labor practices.

Farber gives two explanations for the negative correlation between management opposition and organizing activity. In the case of hostility toward unions, consisting of either highly active or illegal campaigns for example, unions and workers will sense a lower likelihood of success in elections and the result is that fewer elections will be held. If employers' anti-union reaction is to duplicate the union-like environment (described by Freeman (1985)), unions will estimate a lower demand for representation among workers, resulting in fewer elections.

Farber gives his reasons for why management opposition has increased over the time period studied. Given that he believes it is "increase-cost" related, demand for labor-management consultants has increased. The changes in the climate of the U.S. economy over this time period consist of an increased level of foreign competition and the deregulation of some heavily unionized industries. Foreign competition has increased in the manufacturing sector, known to be highly unionized. In 1958 2.5 percent of manufacturing sales were imports compared to 7.2 percent in 1977. Farber implies that without foreign competition the firm could share some of the gains with the employees, due to a union wage premium. With foreign competition, the gains are not there because consumers will not pay a higher price for domestic goods, given that the world price is lower. With deregulation, government takes more of a "back-seat" role giving management more capacity to resist union effort.

Reder (1988) offers an alternative explanation for the continuing decline in the percentage of union victories in NLRB elections. Prior to the passing of the Taft-Hartley, during the period in which unions were exerting much of their power, firms were adjusting, or laying out their strategies. During this period, employers developed ideas on how to plan for such matters as compensation, plant location, and personnel selection, as well as others. After Taft-Hartley passed, more firms engaged in resistance against union organizing efforts. The firms that planned accordingly were located in "low-wage" areas, employing workers who had the ability to gain increased awareness. The employees could rationalize the possibilities of long-term employment, given the outcome (union/wage premium versus nonunion/relatively low wage). Reder argues that if this is the case, antiunion votes were a result of rational preference by employees and antiunion campaigns served as the mechanism with which to spread the information. Reder has no

empirical evidence to back this theory but instead offers it as an alternative to such explanations provided by other authors such as Freeman and Medoff (1984).¹³

Flanagan (1987) makes the argument that while election outcomes determine the rate of unionization, the outcomes are not the only, or even during some periods, the main controlling factor of union membership. Following Getman et al. (1976), he argues that individuals have their minds made up and campaigning, legal or otherwise, has little bearing on the outcome. Workers, upon entering the campaign period, have strong predispositions related to job and income satisfaction and have an idea of how unions can influence those conditions. Flanagan maintains that the structural variables are also main components that influence the union representation choice. Flanagan cites the Getman et al. (1976) and Dickens (1983) study as examples of how campaigns don't matter and that workers choices are a function of more than management's ability to manipulate. Flanagan does point out that a validated criticism of Getman et al. (1981) is that even a small effect of illegal campaign activity can change an election result. Dickens (1983), he points out, addresses this issue.

1.2.2.3. Proxying for Management Opposition

Several studies emphasizing the determinants of the decline in union membership over the last 50 years have used as a measure for management opposition, the number of unfair labor practices charged against management. This data is available on a yearly basis for each state in the United States. Table 6A in the Annual Report of the National Labor Relations Board lists the geographic distribution of cases received for the respective year. CA cases, defined as "A charge that an employer has committed unfair labor practices in violation of Section 8(a)(1), (2), (3), (4), or (5), or any combination thereof," is commonly used in studies to isolate the effects that firms have on election results and therefore, union success. Moore and Newman (1988) (MN hereafter) use the number of CA cases in NLRB certification elections deflated by the number of eligible voters.¹⁴ In a simple reduced-form model, MN's goal is to measure the contribution of the explanatory variables on the dependent variable, the degree of unionization. MN use cross-sectional (state) data over four years (1950-1980 census years) to gain an inference on the degree to which these variables can account for the constant decrease in union density over the period studied. As it turns out, UNFAIR, the management opposition proxy, is the opposite of the expected sign but not significant albeit the 1950 regression. MN offer no possible intuition for the positive and significant coefficient for the 1950 census year. Taft-Hartley was passed in 1947 and it could be that the effect was not immediately felt and the number of CA cases was negligible in 1950. Indeed, Reder (1988) points out that the success rate declined from 76 percent during 1950-54 to 37 percent during 1975-79. New York, arguably a relatively highly unionized state in 1950,

¹³ Freeman and Medoff (1984) is the same analysis as Freeman (1988), covered earlier in this document.

¹⁴ By definition from the NLRB, and Farber (1990) earlier in this document, Eligible Voters are employees within an appropriate bargaining unit who were employed as of a fixed date prior to an election, or are otherwise qualified to vote under the Board's eligibility rules. Moore and Newman (1988) use eligible voters in each state to normalize.

had 640 unfair labor practice cases.¹⁵ In 1960, the number of cases increased twofold to 1538, while in 1970 decreased back down to 994. In 1980, the number of cases blew up to 2402. The insignificance of the other three census years provides an incentive to “clean” the management opposition variable, if possible. Neumann and Rissman (1984) (NR hereafter) examine the effect of social welfare benefits on union membership using time-series data. NR don’t use management opposition in their regressions, however, they do attempt to analyze the role of the legal and institutional environment captured by the fraction of representation elections won by unions. The data for the number of representation elections held and the number won is published in the annual reports of the NLRB and is available on the state level. To the extent that Taft-Hartley had a positive impact on the degree to which management opposes unions, legal or otherwise, we would expect the number of representation elections won to decrease. This would imply a negative effect on union membership. Therefore, the %WON variable would favor positively on union density, with the implication that, as management opposition over time has increased, union membership has declined. NR’s estimated coefficient on representation elections is positive and significant across all sample periods adding some security to the argument that management opposition negatively effects union membership.¹⁶

1.2.3. Public Policy Hypothesis

In addition to changing public attitudes and preferences toward unions over time, both state and federal legislation, in regards to labor unions and the collective bargaining process, have not remained constant. The National Labor Relations Act of 1935 was a shot in the arm for unions and could be hypothesized to have increased the supply of union services, *ceteris paribus*. In 1947, after World War II, the federal government moved legislation that worked against union organizing. The Taft-Hartley Act of 1947, among other things, gave individual states the right to pass right-to-work laws. In general, an RTW law prohibits the requirement that an individual become a union member, or promise to become a union member as a condition of employment.¹⁷ If indeed there is an independent effect from the passing of right-to-work laws then this would cause a decrease in the demand for union services. In the labor market, prior to the New Deal legislation of the 1930s, freedom of contract was the general legal doctrine. The most common doctrine, the employment-at-will doctrine stipulated that if an employment arrangement was no longer satisfactory to either party, the dissatisfied party was free to end the arrangement at any time. Over time several states have recognized at least one of the three wrongful dismissal theories, referred to as exceptions to the “employment –at-will” rule. The effect of any of these exceptions would be to decrease the demand for union services as workers would no longer need unions for security or to recover damages. Additionally, government has adopted programs once monopolized by unions,

¹⁵ This number represents (CA) cases, i.e. those alleged against employers.

¹⁶ Moore, Newman, and Scott (1987) replicate Neumann and Rissman (1984) using a simultaneous equations approach. The estimated coefficient on %WON, while not as large, is positive and significant at the 0.05 level.

¹⁷ The passing of Taft-Hartley also gave firms the capacity to oppose unions, as was discussed in the previous section.

and these public services are arguably taking the place of the need for unions causing demand for union services to decrease. This section reviews some of the literature testing the effects of these public policy variables and whether or not they truly matter.

1.2.3.1. Right-To-Work Laws

In the right-to-work literature there are three possible explanations for the observed inverse correlation between the laws and unionization. The first is that the RTW laws permit free riders by allowing workers to enjoy the benefits of unionization without bearing any of the costs. It is argued that unions have to fairly represent all workers in the bargaining unit in RTW states, but cannot collect membership or dues payments from those who choose not to join. Additionally, nonmembers who are working in jobs covered by a collective bargaining agreement are compensated at the rate negotiated by the union.

The second possible explanation for the observed negative correlation between right-to-work laws and union density is that workers in RTW states have a lower demand for union representation on nonpecuniary grounds. This suggests that RTW laws merely act as a proxy for unobserved preferences for nonunion employment on the part of workers. Much of the empirical work on RTW laws and unionization deals with this “tastes” hypothesis due to the possible simultaneity issue.

The third competing explanation for the inverse relationship between right-to-work laws and the extent of union membership is based on the notion that RTW laws weaken the ability of unions to deliver services to its members, such as wage premiums or an outlet for grievances. The “strike enforceability” or “bargaining power” hypothesis claims that a union’s bargaining position is weakened because unions are allowed to discipline only those workers who are members of the union. The ability to persuade workers to strike is reduced when the union cannot gain overwhelming support and this support cannot be acquired in RTW states where nonmembers do not face disciplinary measures, such as fines.

All three hypotheses claim that, empirically, the rate of unionization will be negatively related to the presence of right-to-work laws and to decompose each possible effect proves to be quite a task as neither hypothesis is mutually exclusive. Nevertheless, work has been done to successfully complete this endeavor. Table 1.1. is a list of the states with RTW laws coupled with the year of enactment.¹⁸

Lumsden and Petersen (1975) (LP hereafter) use a trivial yet appealing method for decomposing any independent effects that RTW laws may have on union membership within a state. The argument, per the “tastes” hypothesis, is simply that an RTW law has been enacted due to individuals’ prior tastes for unions and any possible correlation between RTW laws and measurement of unionization is symbolic of these priors.

¹⁸ Indiana enacted a right-to-work law in 1957 and repealed it in 1965.

Table 1.1. Right-to-Work Law States			
Alabama	1953	Nevada	1951
Arizona	1946	North Carolina	1947
Arkansas	1944	North Dakota	1947
Florida	1944	South Carolina	1954
Georgia	1947	South Dakota	1947
Iowa	1947	Tennessee	1947
Kansas	1958	Texas	1947
Louisiana	1977	Utah	1955
Mississippi	1954	Virginia	1947
Nebraska	1946	Wyoming	1963

Following a model of the supply and demand for union services, developed by Ashenfelter and Pencavel (1969), and Pencavel (1971), LP proxy for costs as well as tastes and preferences. Included as explanatory variables are the percentage of workers in mining, manufacturing, construction, and transportation-public utilities as well as median wage salary income. Additionally, the percentage of the work force that is female and nonwhite is used along with the dummy variable for states with right-to-work laws. LP use three years of data (1939, 1953, and 1968) to observe the effects of an RTW law on union membership over time.¹⁹ Because there were no right-to-work laws in effect in 1939, the dummy variable indicates states that will eventually adopt right-to-work laws by 1953. This, LP argue, is a way to proxy a measure for a state's tastes and preferences concerning unionization in 1939, given that 13 states would adopt right-to-work laws by 1953. The estimated coefficient on the RTW variable for 1939, therefore, reflects only tastes and preferences. In 1953, however, the estimated coefficient reflects not only tastes and preferences but also additionally any effects culminating from the adoption of the right-to-work laws. The difference in the coefficients for RTW in 1953 from 1939 will be the additional impact from the effect of the laws, assuming tastes and preferences remain constant. Hotelling's T-squared test of the difference between two estimated coefficients is proposed by LP as a formal way of testing. LP point out that if no right-to-work law effect is found in 1953, and therefore would not be statistically different from the 1939 coefficient, a possible explanation could be due to the fact that the laws had not been in effect long enough to observe any effects. No effect in 1968, however, would provide a stronger case against any real independent effect of the right-to-work laws on union membership and would give confidence in inferring only a symbolic effect.

The main results of LP's work is that the RTW variable has a negative and statistically significant coefficient for all three years but more importantly the coefficient on RTW for 1953 is smaller than the RTW coefficient for 1939, *ceteris paribus*, suggesting that there are no independent effects. LP claim that no formal tests have to be run due to this outcome. Additionally, the coefficient on the RTW variable in 1968 is

¹⁹ The dependent variable used is the percentage of the nonagricultural work force unionized. For 1939 and 1953, Troy (1957) data was used. For the 1968 data on union membership, BLS (1970) data was used. Lumsden and Petersen caution the reader on issues of comparability when evaluating the results of estimations. Once again, this is covered in a separate section dealing with the dependent variable.

smaller than the 1953 RTW variable, again suggesting no independent effects. LP therefore conclude that the hypothesis of no impact of right-to-work laws cannot be rejected for 1953 and for 1968.

Additionally, LP perform a test of the effect of right-to-work laws by using a trend variable representing the number of years a state had a right-to-work law in force by 1968. Using a subset of the original data of states, which had passed RTW laws by 1968, no statistical significance was found between the trend variable and union membership. LP propose, given light of the results found in their exercise, that the power of right-to-work laws is one of symbol rather than substance.

Warren and Strauss (1979) (WS hereafter) attempt to specify and estimate a model of the relationship between RTW legislation and unionization, which can accommodate the joint determination of the two variables. The possible simultaneity between the variables stems from the “tastes” hypothesis and WS tend to deal with it using a mixed logit procedure. One of the dependent variables takes on the value of one (state has an RTW law) or zero (state has no RTW law). The other dependent variable is continuous and is a measurement of the percentage of nonagricultural employment in a union.²⁰ Other explanatory variables are the usual suspects including percentage of total employment in white-collar occupations.

The coefficient on the RTW variable in the union equation and the coefficient on the union variable in the RTW equation are both negative and significant at the 0.05 level. WS surmise that this implies both variables are jointly determined and one can reason with some confidence that the states with relatively higher union densities are less likely to pass RTW laws, *ceteris paribus*, and that states that have passed RTW laws, have lower union densities, everything else constant.

To hammer the point about the simultaneity issue, WS include the coefficients from the estimates of the single equation model. Upon observation of the RTW equation, the single logit model estimates a coefficient on the union variable that is negative but not significant at the 0.05 level.²¹ WS conclude that there is not strong evidence in favor of a negative effect of union membership on the presence or absence of RTW laws in a state when using the simple logit procedure. As this lies in contradiction to what was observed from the mixed logit procedure, WS caution that previous studies estimating single equation models on the relationship between union membership and RTW laws may have been incompletely characterized. They go further in giving notice that care must be taken when analyzing any legislation due to possible endogeneity.

Davis and Huston (1995) (DH hereafter) increase the reliability of estimating the effects of RTW laws by using micro level data. Moore (1998) points out the problem of endogeneity is greatly reduced using micro data because individuals by themselves do not

²⁰ UNION comes from U.S. Bureau of the Census 1972. The sample period is for 1970 for the 50 states.

²¹ The estimate on the coefficient for UNION is -.203 and the asymptotic t-ratio is 1.82, which is not significant at the 5 percent level for a two-tailed test (+/- 1.96) but is significant at the 10 percent level for a two-tailed test (+/- 1.645).

influence the passage of RTW laws. Using micro data will also increase the sample size compared to state data because the latter is limited to 50 observations when using cross-sectional data. The use of micro data also helps to filter out employees not covered by Taft-Hartley.²² Additionally, they deal with the possibility of omitted variable bias, which can be due to regional attitudes toward unions, by using a measure of the proportion of votes cast by a state's members of Congress that correspond with the AFL-CIO's legislative program. DH argue that if an individual lives in a state with high regard toward unions, a higher percentage of the state's congressional delegates are expected to vote with the AFL-CIO.

DH employ a simple probit model and for expositional purposes, a two-stage probit model. DH are less compelled to use two-stage regressions because for the time period studied, 1991, many of the RTW laws had been passed for quite some time and an individual's decision to join a union in or around 1991 was less closely related with the passing and implementation of RTW laws. Additionally, DH claim that the first stage modeling of RTW laws might not produce a better measurement of attitude toward unions than variables formed from the voting records of elected officials in the state, for which they have data. In any case, DH produce results of both the probit and two-stage probit model. In both models, the estimate of the coefficient is negative and significant at the 0.01 level. Quantifying the marginal effects of RTW laws on unionization in the single probit model, the implications are that the effect of a state going from having no RTW law to having a RTW law decreases the probability of union membership by 8.2 percentage points.

DH offer the fact that they increased the sample size by using micro data and filtered out those employees not covered by Taft-Hartley as an explanation for the significant results found in their study. Additionally, the results did not change when compared to a two-stage estimation procedure. These adjustments, they contend, are the underlying reasons for the results they observe compared to previous studies.

Moore and Newman (1975) (MN75 hereafter) at first assert that RTW laws have an independent effect in impeding the growth of unionism. In their basic OLS model for the year 1970, they report a 3.94 percentage point decline in union density for RTW states versus non-RTW states.²³ The hypothesis that there was equality among the constants in the non-RTW and RTW equations for pooled data was rejected. The non-RTW equation had a higher intercept, implying RTW states are harder to organize, even after controlling for other factors. Additionally, MN75 inform of the "considerable" sums of money that the labor movement has spent on fighting the passage of right-to-work laws as well as seeking repeal of the existing laws through lobbying efforts.²⁴ On the grounds of increasing costs, why would unions incur these opportunity costs if they

²² These include self-employed, supervisory, government, airline, railroad, and agricultural workers. Davis and Huston claim that filtering out these workers will concentrate the effects of RTW laws.

²³ The t-statistic for SRTW is 1.988, which is significant at the percent level for a two-tailed test (+/- 1.96). Additionally, OLS regressions were estimated for 1950, 1960 and all three years pooled. Only the coefficient on SRTW for 1950 was not significant but had the expected sign.

²⁴ Moore and Newman (1975, pp. 442).

didn't think there was a negative effect on union membership due to these laws? Instead of elaborating on this issue, MN75 decide to tackle the possibility that the significant independent effect found from the OLS model could be due to simultaneous equations bias. Compared to the outcome derived from OLS, the two-stage procedure produces different results. MN75 claim the R-squared is reduced to 0.59 from 0.64. Additionally, the coefficient on the RTW variable is smaller and no longer significant at any level.²⁵

Out of the seven studies that Moore and Newman (1985) (MN85 hereafter) review that observe the effects of RTW legislation on union membership using a single-equation model, four were found to have significant coefficients on the RTW variable. This includes state, SMSA, and micro level data, with no particular type determining the significance. When MN85 review the literature on those who have estimated the effects of RTW legislature on union membership using simultaneous-equation models but RTW is an exogenous variable, three out of the four models provided statistically significant coefficients on the RTW coefficient. The "tastes" hypothesis was formalized by employing simultaneous-equation models with the RTW variable being endogenously determined. MN85 review three studies and two out of the three revealed no significant effects.²⁶ Given that there seems to be no definitive consensus on whether or not RTW legislation imposes a negative effect on union membership (a stock measure), other studies have steered toward observing if RTW legislation has effects on other outcome measures, specifically flow measures. Given that this review of the right-to-work literature is not the core of what is being analyzed in this study, and that my dependent variable is union density (a stock measure), only a short summary of the literature on flow methodologies will be given.

One way to possibly examine the effects of RTW laws on unions indirectly is to explore the impact of these laws on the flow into union membership through the vehicle of representation elections. This provides a means of observing sensitivity to changes in the economic environment in a smoother fashion. Specifically, Ellwood and Fine's (1983) (EF hereafter) goal is to argue that flow models are more sensitive as indicators of the impact of right-to-work laws. EF observe the changes in union success through certification elections on an annual basis over the years 1951 to 1977 using what is similar to a partial adjustment accelerator model of union organizing. However, instead of using as the dependent variable, the number of elections won in NLRB elections, they use the number of employees in bargaining units in which unions won an NLRB election.²⁷ Even if it is assumed that an equilibrium level is achieved, EF maintain that some union plants are going out of business and new ones will enter the industry so that organizing is not remaining constant. EF are also able to adjust for possible omitted-variable and simultaneity bias. The former is tested by using state fixed effects. The latter

²⁵ The estimated coefficient for `SRTW is -.302 with a t-statistic of 0.095. Moore and Newman report that the two-stage equation is re-estimated without `SRTW and the R-squared increases to 0.60, putting to rest any claims of multicollinearity.

²⁶ In this review, Davis and Huston (1995) was also reviewed. Again, the conclusion reached from DH (using micro data) was that RTW legislation has a significant negative effect on union organizing at the individual level.

²⁷ The dependent variable is the natural log of ORG/LF. ORG is what was previously stated. LF is the nonagricultural labor force in a state.

is possible because they have data on seven of the fifty states before RTW legislation passed. This, they argue, gives an idea of the seven states “tastes” for unions prior to the RTW laws. This is somewhat analogous to Lumsden and Peterson (1975) in which they had data for 1939, obviously before any right-to-work laws had been passed. However, whereas Lumsden and Peterson were to use Hotelling’s T-squared test for significance, EF use Granger-Sims causality tests.²⁸

EF find that the passage of an RTW law reduces the equilibrium level of union membership. Additionally, using the partial adjustment model, the short-run effects (first five years) infer that organizing is lessened by an astounding 46 percent. The next five years organizing is reduced by roughly 30 percent.²⁹

When using the subsample of the seven states to which they have data prior to any RTW laws being passed, EW find that before the RTW laws, organizing was not suppressed.³⁰ This gives possible evidence that the “tastes” hypothesis does not hold (at least for the seven states sampled). The fixed-effect results show that, in the first ten years after RTW laws go into effect, union organizing is depressed by 32 percent.

EF conclude that there is not sufficient evidence for omitted variable bias or simultaneity. Additionally, they claim that their results strongly suggest that union organizing is considerably depressed during a short period of time (roughly ten years) after an RTW is passed but that there is no significance into the long run.³¹

Additional outcome measures used to study the effects of right-to-work laws are the wages of employees, both in unions and nonunions and the union wage premium. These possible measures will not be analyzed in this review.

1.2.3.2. Exceptions to the Employment-At-Will Doctrine

There are three exceptions to the employment-at-will doctrine. The first is the Public Policy Tort theory. It permits terminated employees to recover damages resulting from their termination when they can successfully show that a termination jeopardized recognition of a public policy reflected in a state or federal constitution, statute, administrative regulation or formal code of conduct for a profession. This definition includes not only a clear (narrow) interpretation but also a more broad interpretation in which the court would determine recognition.

The second theory is the Implied in Fact Contract theory, permitting a terminated employee to recover damages when the employee can prove breach of an implied-in-fact contract. Under this theory, employees are permitted to establish a contract right not to be

²⁸ Lumsden and Peterson (1975) did not Hotelling’s T-squared test because the coefficients on the RTW variable for 1953 and 1968 were smaller than the 1939 coefficient.

²⁹ Ellwood and Fine do not report the later years, claiming the inability to determine significance due to insufficient data.

³⁰ The coefficient on the Pre-RTW variable is positive (.255) but not significantly different from zero. (standard error = .198).

³¹ However, the authors do claim the possibility of a slight reduction in organizing permanently.

terminated at will, based on informal employer promises of employment security, such as those made orally at the time of hire, or those contained in employee handbooks or personnel policies.

The third theory is the Implied Covenant of Good Faith and Fair Dealing theory. This theory permits dismissed employees to recover damages for breach of an “implied covenant of good faith and fair dealing.” One of the earliest exceptions to the EAW doctrine, it has somewhat taken a backseat to the Public Policy and Implied Contract exceptions on the grounds that it leaves too much to the jury. It has not been disclaimed, however, due to the future possibility that it may permit relief when cases don’t fit the requirements of the other two exceptions. This exception is considered the broadest departure from the employment-at-will doctrine and is interpreted to mean either that the employer is subject to a “just cause” criterion or that terminations made in bad faith are prohibited.

The recognition of either a public policy or implied contract exception to the EAW doctrine is perceived by each state and the definition varies from state to state, but most states either narrowly limit the definition to clear statements in their constitutions or statutes, or permit a broader definition that enables the judicial process to infer or declare a state’s public policy beyond the state’s constitution or statutes. The collection of data for determining if a state has recognized these exceptions can prove to be quite burdensome, depending on how one chooses to define. However, courts in only a very few states have not yet ruled in cases brought under these theories, so work has been done to identify the states that recognize these exceptions and the year in which they began recognition. Walsh and Schwarz (1996) (WS hereafter), upon providing this data, list numerous sources that have performed the task. They warn the reader, however, that across sources, there is noticeable disagreement. The discrepancies, they contend, “are accounted for by differing dates of publication, use or nonuse of federal court decisions interpreting state law, substantial ambiguities within many of the decisions themselves, and a tendency for the courts to fail to acknowledge conflicting rulings.”³² To “clean up” this potential problem WS have read the relevant cases themselves and referred to federal court decisions only when state court decisions fail to provide clear solutions.

The determination of a public policy exception proves to be less problematic relative to the implied contract exception. The latter proves to be difficult because typically, employment is not governed by a contract. However, an employee can bring suit against a former employer based on what is implied, even though no express, written mechanism regarding the employment relationship exists. In addition to reliance on the oral representation, an employee may have perceived security through contents in employee handbooks. In these handbooks, employers may state that employees will only be disciplined or terminated for “just cause”, or in writing may be the specific procedures that the employer will follow in the case of discipline and/or termination. WS specify, however, that most courts rule against the former employee “due to lack of consideration beyond remaining on the job, no mutuality of obligation, an absence of bargaining over terms, lack of intent by the employer to be bound, the ability of the employer to change

³² Walsh and Schwarz (1996, pp. 647).

policies unilaterally, no signing of the document in question, insufficient specificity, violation of the statute of frauds, and absence of a fixed term of employment.”³³

WS’s goal is to categorize the states into either recognition or nonrecognition of the three exceptions and to attempt to distinguish between states that recognize, with either “narrower” or “broader” interpretations of these exceptions.³⁴ This leads to the implication that, the “broader” a state’s interpretation of an exception, the more situations there are in which employees could successfully challenge employers’ termination decisions. This would increase the likelihood that a particular state has recognized a particular exception when it is not already explicitly statutory.

WS describe how they determine what constitutes a “broad” versus “narrow” recognition of a public policy exception to the EAW doctrine. For actions by employees, consider: A = when an employee is fired for exercising a legal right (filing a worker’s compensation claim) or for refusing to commit an illegal action on behalf of the employer (not throwing trash into the ocean when working on an oil rig). B = employee engages in “whistle-blowing” by reporting suspected employer/co-worker wrongdoing, or has otherwise acted in accordance with a broad notion of civic duty or the public good (attending jury duty). A court’s interpretations and therefore rulings, in terms of sources, can be restricted to: C = explicit statutory language. Lesser restrictive sources would be: D = court decisions, administrative regulations, constitutional provisions, and professional codes. Finally, in terms of how courts treat public policy cases, consider: E = tort claims or, F = contractual claims, which are more restrictive because these claims are predicated on an implied provision in all employment contracts that termination was not in violation of public policy.³⁵ WS label “broader” exceptions as: $(A+B) + (C+D) + (E)$. Exceptions are categorized as “narrower” if either $(A+B)$, $(C+D)$, or (E) are not found.

WS use two criteria when categorizing states that recognize an implicit contract exception as either “broader” or “narrower”. Consider: A = oral representations by employers, and B = written representations by employers. Additionally, C = refuse disclaimers that negate employer statements implying a term of employment, reliance on just cause criteria, or provision of due process in termination decisions. States classified as having “broader” exceptions are those that recognize $A + B + C$. Otherwise, the exceptions in those states are categorized as “narrower.”

When categorizing states that recognize the Implied Covenant of Good Faith and Fair Dealing exception, consider: A = plaintiffs permitted to sue in tort or B = plaintiffs are restricted to sue under contractual remedies. Additionally, in terms of application of the covenant, consider C = recovery of earned benefits denied through termination or D = situations where a “special relationship” of trust and reliance exists, cases involving fraud

³³ Walsh and Schwarz (1996, pp. 648-49).

³⁴ The source WS use for this compilation is Postic (1994).

³⁵ Only three states (Arkansas, South Dakota, and Wisconsin) restrict damages by viewing cases as contractual claims. However, of the 42 states that have recognized a public policy exception, only 16 are categorized as holding a “broader” interpretation. This implies that the majority of the explanation differing states with public policy exceptions as “narrow” versus “broad” is explained by $(A+B)$ or $(C+D)$.

and deception, or where an express or implied contract renders the employment relationship no longer at will. WS classified states as having “broader” exceptions as those that recognize A, or when D has been determined and the court allows beyond C.

Forty-two states recognize the public policy exception and thirty-eight recognize the implied contract exception. Only ten states recognize the covenant of good faith and fair dealing exception. Seven states recognize all three doctrines while four states (Florida, Georgia, Louisiana and Rhode Island) recognize none.³⁶ Additionally, one state (Maine) is classified as unclear in regards to a public policy exception and two states (Maine and West Virginia) are classified as unclear in regards to an Implied Covenant of Good Faith and Fair Dealing exception.³⁷

Observing WS’s categorization of either “broader” or “narrower” exceptions for each state, one can take notice of some possible implications. Across the exceptions, the majority of states that recognize any one or combination of the exceptions does so on a “narrower” framework. For example, 26 of the 42 states that recognize the public policy exception do so in a stricter manner as do 23 of the 38 states that acknowledge the implied contract exception and 6 of the 10 states that observe the covenant of good faith and fair dealing exception. One is lead to ponder, then, how far away have the exceptions to the employment-at-will doctrine actually moved, in terms of security of employment or perceived security or employment for employees? Additionally, what if any, are the effects of the movement away from the EAW doctrine on other outcome measures? Specifically, can we observe any effects within a state that recognizes any one or more of the exceptions to the EAW doctrine on the quantity of unionization within that state? This is an empirical question that few have addressed in the past. Within the supply and demand framework of unionization, the implications are that a state which recognizes some form of exception to the EAW doctrine will provide to employees what has arguably been provided by unions in the past, causing the demand for union services to decline. This government protection is provided to workers without workers incurring the costs of union dues. Given that there are three defined exceptions to the EAW doctrine, observing the effects empirically is somewhat of a straightforward manner.

Neumann and Rissman (1984) use pooled cross-sectional data to observe the effects of these exceptions to the EAW doctrine on state unionization rates.³⁸ The years they observe are biennially for 1964-1980. At this time, only nineteen states had recognized a public policy exception and twelve states recognized an implied contract

³⁶ Additionally, thirty states recognize two-out-of-three of the exceptions and the majority (25) of those states recognize the public policy and implicit contract exceptions. WS warn the reader not to interpret this as uniformity among the states with regard to the laws. Rather, they propose there are meaningful differences across states in their interpretations of particular doctrines. A worthwhile exercise might be to develop a model that determines the likelihood of recognizing these specific exceptions across states.

³⁷ New Hampshire adopted the Implied Covenant of Good Faith and Fair Dealing exception in 1974, under a “broader” measure but later restricted the doctrine to public policy cases in 1980.

³⁸ NR observe the effects of the public policy and implied contract exceptions and not the covenant of good faith and fair dealing exception. Their claim is that this particular exception is not relevant when analyzing the effects on unionization.

exception.³⁹ In addition to an indicator variable for the EAW exceptions, NR construct a trend variable for the two exceptions to observe if importance increases or decreases over time. The results are mixed. The coefficients on the public policy variables (indicator and trend) are negative but not significant. The coefficients on the implicit contract variables, however, are both negative and highly significant, indicating that union density falls in response to this form of exception to the EAW doctrine. NR offer that the more robust specification of the indicator variable relative to the trend variable might be due to the recent recognition of these exceptions. Additionally, NR suggest that the protections afforded to employees by the public policy exception are typically not services that unions have provided to members in the past. As NR contend, these protections are of minor importance to blue-collar workers or those more likely to be union members. The implicit contract exceptions, however, provide protection to no particular group of worker yet provide the very service unions supply.

Block et al. (1987) try to shed some light on the question of whether or not workers view exceptions to the EAW doctrine as substitutable for unions by observing the effect of the exceptions on NLRB representation elections. Before presenting their model, however, Block et al. make an important point. The percentage of the workforce belonging to unions peaked somewhere in the mid 1950s and has been monotonically decreasing from that point to present.⁴⁰ The authors suggest that even if there were a contribution from the exceptions to the EAW doctrine in the decline of union density, the timing would suggest that it is not a major cause of the decline.⁴¹

The dependent variable is a dichotomous variable that represents whether an employee chose union or not. The independent variables of primary interest are the presence or absence of a court decision providing employees some protection from unjust discharge in a state in which the election occurred and at least one year prior to the year in which the election occurred. The lag allows time for information to network through the labor force. All three exceptions to the EAW doctrine were included in the model.⁴² Other variables used as controls were the unemployment rate in the state, the percentage of the workforce in the state that are members of unions, and a RTW dummy variable for the states that had an RTW law. The union variable is intended to capture either a

³⁹ It should be noted that NR's compilation of states and exceptions to the EAW doctrine are at odds with Krueger's (1991) and Walsh and Schwarz's (1996) compilations. This is aside from the fact that the studies were performed in different years. For example, NR's data covers the years 1964-1980 and they list New York as recognizing a public policy exception (year recognized was not given). However, neither Krueger (1991) nor WS (1996) show New York as a state that recognizes a public policy exception. Additionally, NR show North Carolina as recognizing an implicit contract exception, however both Krueger (1991) and WS (1996) list North Carolina as not recognizing that exception. It is not clear why this discrepancy occurs. Also unclear is where NR acquired the EAW data implying that a means of checking at this point remains impossible. One way to check for robustness is to run regressions using the three sets of EAW data separately and observing for changes and significance in the coefficients.

⁴⁰ The percentage of the workforce in the private sector that are members of unions has actually been declining. The public sector has actually witnessed an increase in union membership over this time period.

⁴¹ The first state recognizing an exception to the EAW doctrine did not recognize until the mid 1960s, after the decline in unionization had started.

⁴² The three exceptions are the public policy exception, implicit contract exception, and the implied covenant of good faith and fair dealing exception.

saturation effect, implying a negative coefficient, or prounion attitudes, implying a positive coefficient. The unemployment rate is controlling for cyclical effects while the RTW variable is intended to pick up “tastes” for unions. The regression analysis was run on pooled election data and the time period covered for this analysis was January 1978 to August 1985.

Block et al. observe coefficients on the exception variables that do not provide support for the hypothesis that they are substitutable for union services, indirectly through representation elections. In fact, the coefficient on the implied contract exception, the exception most likely to represent a union-like service, is the opposite sign, implying an increase in the likelihood of a union victory. Block et al.’s conclusion is that there is no evidence to suggest that judicial decisions causing recognition of exceptions to the EAW doctrine have had an adverse effect on the ability of unions to win representation elections. The authors offer a couple of suggestions, however. If workers don’t know they are protected or if they know but sense as if the protection won’t help them, it is less likely that any significant effects will be observed. In other words, workers may expect that getting the courts to rule in their favor is unlikely. The union, however, has more experience in the area of workers’ job security. If a worker does not know that he or she is protected, the exceptions are not included in the worker’s choice set during the voting period.

Kesselring and Pittman (1993) (KP hereafter) use a probit model to observe the factors included in a state’s decision to protect workers through the exceptions to the employment-at-will doctrine. The model is set up based on court decisions, in which each of the fifty states was classified as either providing a significant degree of employment protection or as providing no protection. States that are classified as non-protect states are those in which the courts refused to create new employee protections that distinctly depart from prior legal positions. Alaska, California, Massachusetts, and Montana were classified as protected states because the courts reversed prior law and held that an implied covenant of good faith and fair dealings exists in employment contracts. Given that this is the broadest interpretation of the exceptions to the EAW doctrine, the authors imply that this is a form of protection that goes beyond the exceptions involving ordinary contract principles such as offer, acceptance, and consideration requirements. Additionally, New Hampshire and Pennsylvania were classified as protected because the former provides protection from bad-faith discharges and the latter recognizes wrongful termination when an employee is fired with specific intent to harm. Finally, Michigan and Hawaii are classified as protected because these states’ courts recognize wrongful termination when employers’ statements in personnel manuals and such create an employment atmosphere that requires good-faith discharges. This form of protection goes further than the implied contract exception because it is not required that the term of employment be stipulated. Neither required is that the employee bargained for discharge protection. Finally, it is not required that the employee prove reliance on the implied-contract doctrine.

The variables used to control and explain the outcome (protect versus non-protect) are percentage of total income derived from agriculture and a RTW dummy

variable. These variables serve as indicators of anti-union, anti-protective employment views. KP postulate a negative relationship between the at-will position of the state and these variables. The percentage of the state's workforce unionized is used as a pro-union proxy implying a positive relationship. The percentage of Congressional Delegation affiliated with the Democratic Party is hypothesized to have a positive relationship with "broad" protection.

Structural variables include a measure of the state's urban population, education (high school diploma or greater) and age. The population density variable is hypothesized to have a positive relationship to a state's protection due to greater awareness of employment problems. KP argue that higher educated individuals might be inclined to disfavor the EAW doctrine and unjust dismissals, implying a positive relationship with the likelihood of "broad" protection.⁴³ KP contend that older individuals are more concerned about irregular dismissals, which is indirectly related to the difficulty that older individuals have in finding employment.

The state's average blue-collar wage rate was used to get a proxy for the position of the labor market. High relative wage rates imply a relatively tighter labor market, which implies a lower likelihood of workers favoring protection. The state's average unemployment rate was used because KP argue that a higher unemployment rate generates interest of some form of protection against unjust dismissals.

A dummy variable was used to indicate if judges sitting on a state's highest court are appointed or elected. KP claim that elected officials should be more sensitive to the issues affecting the general population. The coefficient (appointed = 1, elected = 0), therefore, should be negatively related to the likelihood of "broad" protection.

The results of interest are either those of significance or those of significance with signs opposite of what is hypothesized. The coefficients on the variables in the probit model indicate the effect on the likelihood of "broad" protection in a state. The union variable is positive and significant. This implies that a more unionized workforce increases the likelihood of "broad" protection. It is not clear how, if at all, this plays a part in whether or not a court recognizes "broad" protection in its' judicial decisions. What is interesting, however, is whether or not the union variable does proxy for members' tastes for "broad" protection from the courts when it is generally considered that this is a service arguably supplied by unions.

The coefficient on the variable indicating how judges acquire their seats is significant but is opposite of the anticipated sign. KP offer a suggestion as to why they might have observed the unanticipated result, however, due to a lack of making an interesting point in this explanation results in it not being provided here.

⁴³ KP defines the limited dependent variable as PROTECT and NON-PROTECT. However, their interpretation of protect is in the broad sense comparable to what was discussed in the Walsh and Schwarz (1996) paper. Therefore, non-protect would not be interpreted as "no unjust dismissal protection", although it certainly is included, but also included is "narrow" protection, as discussed in Walsh and Schwarz.

It appears that the biggest contribution made from this work is that KP's model was able to predict the correct outcome (protect vs. non-protect) for 47 of the 50 states. Out of the 8 states that they classified to have "broad" protection, the model predicted 6. Out of the 42 states KP labeled as not having "broad" protection, the model predicted one as having "broad" protection, leading to a correct prediction 94 percent of the time.

1.2.3.2a. The Future of Restrictions on the Employment-At-Will Doctrine

The future of public policy in regards to wrongful discharge legislation will undoubtedly be helped or hindered by special interest groups. Perritt (1986) offers his theory on six groups and their views on the movement away from common-law liability towards legislation in the protection of employees from wrongful termination.

Employers historically have opposed legislative or judicial action that puts a constraint on their business practices in regards to employment and the liability they face for harmful action against employees. However, there is evidence that employers are in favor of such legislation when it decreases the unpredictability of outcomes and limits the liability of the employer in regards to damages. Indeed, Krueger (1991) observed that unjust-dismissal legislation is more likely to be proposed in states where the departure from the traditional EAW doctrine by the courts has been most extreme.⁴⁴ The legislation is "designed to limit employer liability, expedite dispute settlements, reduce legal costs, and clarify property rights."⁴⁵

Perritt classifies the defense bar as opposing legislation that increases exposure to liability by defendants. However, like employers, the defense bar may shift views toward statutory reform if the result is more predictable outcomes and limited liability.

Trade unions have historically backed legislation in favor of employees. Additionally, it is well known that this special interest group is influential with legislators. However, given the possibility of protective legislation acting as a substitute for some of the services that trade unions provide, some employees may have an incentive to remain unorganized and those who are members may decide that the benefits do not outweigh the costs. To the extent that employees do treat public policy of this form as substitutable for union services, it is expected that trade unions would then be opposed to such protective legislation as opposed to common-law liability. These offsetting views may be the reason for observing no overwhelming consensus in regards to the effects of this legislation on union membership.⁴⁶

Perritt claims that the plaintiff bar could move to a position of favoring legislation and move away from its general position of expanding the exceptions to the EAW doctrine. Traditionally, these groups favored "broad" protection in order to increase their

⁴⁴ In this case, departures most extreme would imply more rulings against the employer and higher costs (damage awards) to the firm.

⁴⁵ Krueger (1991, pp.658).

⁴⁶ The possibilities in reference are that exceptions to the EAW doctrine, through legislation, could positively, negatively, or not significantly effect union membership.

profits. Even with caps on damages under legislation, the idea of possibly simplifying litigation would reduce costs for these lawyers and could reverse the position that some within this group hold. Again, the opposing effects result in not being able to reach a definitive solution in regards to the direction of their efforts.

Non-union employees would gain the most from public policy legislation in the form of expanded protection against wrongful discharge. This reform would increase their protection with no increase in costs. Perritt asserts that this is no increase in “identifiable costs.” Those who are opposed to any movement away from the traditional EAW doctrine argue that this increases firms’ costs without increasing productivity and the result will be little or no wage growth. Fewer employees will remain on jobs in which wages are mandated (i.e. minimum wage jobs) and those who do will bear the brunt of the increased protection through lower wages and fringe benefits. The tradeoff is simple according to those who oppose legislation: job destruction or wage reduction. Following traditional labor economics, the lowest-wage workers are the highest at risk to lose their jobs. Given that this group is poorly organized and is generally less informed about the protection afforded to them, it is not expected to be a major component of deciding the future of policy. Possibly expressed more appropriately, because this group has no “voice”, the future of unjust-dismissal legislation will not hinge on this groups involvement in the process. However, Hoerr et al. (1985) hypothesizes an employee-rights movement that will force revolutionary changes in the workplace and the way firms manage workers. As exactly expressed, “in today’s nonunion climate, the court’s and state legislatures are becoming the most effective champions of employee rights.”⁴⁷

Finally, Perritt describes the most vocal group in favor of wrongful dismissal legislation is academic lawyers. These experts are “influential because they provide technical assistance to legislators and because they link new proposals to well accepted legal doctrines, and thus improve the perceived legitimacy of proposals for legislative change.”

The future of wrongful-termination legislation it seems is going to be determined by the opposition or proposition of employers and the defense bar. However, before an attempt is made to forecast exactly how much of an effect these groups will have, it might prove educational and motivating to model what has determined the movement away from common law liability toward the current legislation in the protection of employees from wrongful termination. Given that we can now arguably determine what is conceived as “broad”, “narrow”, or no protection, the underlying factors that determine these ranges of protectionism are certainly attainable. The ability to gain this important information would undoubtedly go a long way in helping to understand the effects of the amount of protection for employees in state on other outcome measures.

A final comment on the issue of the exceptions to the employment-at-will doctrine is one of caution. As it can be with any other legislative action, causality is a concern when observing these effects on outcome measures. In the case of union membership, for example, we could observe a negative relationship between the implied

⁴⁷ Hoerr et al. (1985, pp. 72).

contract exception and union membership as Neumann and Rissman (1984) were able to show. However, observing the decline in union membership may be one reason why state courts are increasingly willing to put the employee above the interests of the employer. And to the extent that any or all of the special interest groups previously mentioned are in favor of unjust-dismissal legislation, the possibility of causality becomes more important in analyzing.

1.2.3.3. Social Welfare Payments

1.2.3.3a. Government Substitution Hypothesis

As Ashenfelter and Pencavel (1969) showed readers many years ago, a rather simple model of the demand for and supply of union activity can be used to explain the forces that influence union membership. On the demand side, employees will seek membership based on the price of membership (initiation fees, monthly dues, opportunity cost of spending time performing union tasks, etc.). Everything else equal, the law of demand holds and as the price of membership increases, quantity demanded of union services will decline. Determinants of the demand for union services other than price can be generalized to almost any good produced in the market.⁴⁸ An individual's taste for a certain good determines that individual's demand for that good, *ceteris paribus*. If tastes change, the individual's demand for that good will change. If the price of a related good decreases, standard micro theory tells us that the demand for the good in question will change. If the related good is considered a substitute, the individual will demand less of the good in question and more of the related good. The service that unions provide to members is bargaining with employers over various aspects of the employment contract, which includes both pecuniary (wages and benefits) and nonpecuniary (conditions of work, overtime, job assignment, promotion, layoffs, grievance procedures, etc.) features. Reder (1988) points out that prior to the New Deal legislation, unions provided their members with unemployment insurance, industrial accident insurance, education, pensions, and so on. After the New Deal up through the 1970s, Reder claims that the public sector increased their supply of these types of services. Again, following standard micro theory, if the services that the public sector supplies are considered a substitute, and they are being provided as a public good, we would expect to see the demand for union services decline, *ceteris paribus*.⁴⁹

Neumann and Rissman (1984) (NR, hereafter), in attempting to model the demand for and supply of union services and gain an understanding on the determinants of the decline in unionization over time, hypothesized that a government substitution effect was taking place and could account for some portion of the decline. Given that NR found that more than 50 percent of the decline over the time period 1900-1980 could be explained within-industry, they set out to provide additional explanations for the decline.

⁴⁸ It is assumed here that one individual who is a union member consumes one unit of union services. One unit of services consists of all services provided by unions to the member.

⁴⁹ The assumption is that, being a public good, the government provided substitutes have a lower price than what is observed in the private market.

NR used time-series data and followed Ashenfelter and Pencavel's (1969) (AP, hereafter) model as a point of reference. They used many of AP's explanatory variables but instead of using the change in union membership from one period to the next (a flow measure), NR used a stock measure, the percentage of the work force organized. Included as possible substitutes for union services were unemployment compensation, workmen's compensation, education expenditures, and veterans' benefits. These expenditures were aggregated and observed over the 1904-1960 and 1904-1980 periods. NR's estimated coefficient on the welfare variable takes the hypothesized sign but only gains significance when estimating over the 1904-1980 time period. With the estimated coefficients from the 1904-1960 model, with and without the welfare variable, NR forecast union density rates for 1961-1980. The model excluding the welfare variable predicts union density rates that are consistently higher than the actual rates for almost all years and is actually almost 12 percent higher in 1980. With the inclusion of the welfare variable, even though it was shown to be not significantly different from zero, the predicted union density rates are more in line with the actual rates for 1961-1980. These predictions are not listed in NR's paper but they include the results of the F-statistics testing the null hypothesis that the actual observations on union density were drawn from the models that NR estimated. Thus, without rejecting the null hypothesis, coupled with the significant coefficient on the welfare variable over the longer period 1904-1980, NR argue that there is some reliance in assuming that government services act as substitutes for union services.

Freeman (1986) hesitates to hold the same contention as Neumann and Rissman. He analyzes the possible association between social welfare spending and union density across countries and finds no relationship. The cross-country evidence he has is intended to show that if government welfare spending reduces the need for unionism then countries spending relatively more money on these services will be associated with lower union densities. For thirteen developed western countries, in 1970 and the 1980s, Freeman observes two measures of the extent of social welfare activity: the share of GNP spent on social welfare, and the ratio of current disbursements of government to GNP. He compares these measures to the percentage point change in union density between the years. Differences in comparability of both union measures and what is counted in social welfare expenditures across countries aside, there are actually positive correlations that exist between the spending variables and changes in union density. With rank correlations of .48 (change in union density and welfare spending) and .42 (change in union density and current disbursements of government), Freeman asserts that unions have actually managed better in countries with a greater welfare state in the 1970s and 1980s.

As an additional source of argument, Freeman offers that during the Reagan era, union density was declining but this also was a period in which social welfare expenditures fell relative to GNP. Thus it is possible that during this time period, we could also observe a positive correlation between union density and welfare expenditures.

Finally, in regards to the Neumann and Rissman (1984) paper, Freeman warns the reader that a change in model specification and/or period covered would yield the insignificant results found in the shorter period (1904-1960).

Moore et al. (1988) offer the fact that Freeman's (1986) analysis using cross-country evidence did not control for other factors that affect cross-country differences in union density. Their contribution is an illuminating analysis of the government substitution hypothesis in which they cover several modeling issues. They use three alternative models to deal with the sensitivity issue in regards to specification and sample period. Additionally, they include as welfare expenditures only those types of programs that clearly compete with union services. Finally, Moore et al. allow for the possibility that the direction of causality between welfare expenditures and union density may run in both directions by running a two-stage regression in which welfare expenditures are modeled in the first stage and union density is explained in the second stage.⁵⁰

To get a more robust test of the government substitution hypothesis, Moore et al. use educational expenditures but exclude general education expenditures. Instead of including all veterans' expenditures, they exclude all expenditures on health and medical programs. In addition to these expenditures, Moore et al. include total expenditures by the Occupational Safety and Health Administration (OSHA). These expenditures, argued by the authors, will give a more accurate representation of substitutes for services normally provided by unions.

For the period 1929-1983, Moore et al. find no significant coefficients on the welfare variable in any model. After presenting evidence of a structural break in U.S. labor markets following the passage of the Wagner Act in 1936, Moore et al. estimate the three models again and find significant negative coefficients for the BE and NR model but not the AP model.⁵¹ This, they agree, offers some support for the government substitution hypothesis. As a point of reference, and maybe also as an argument that more work in this area is needed, Moore et al. ran additional regressions on the three models using NR's original definition of welfare expenditures. Of the 25 estimates obtained, only 9 added credence to the government substitution hypothesis.

1.2.3.3b. Forms of Social Insurance

Legislation in the U.S. requiring that employers insure their workers against injury was the first type of social insurance to be adopted. New York enacted the initial Workers' Compensation law in 1910, and by 1948, Mississippi was the 48th state to adopt some provision of workers' compensation. As of now, all states have some form of workers' compensation, however, because it is a state responsibility, their contents vary greatly.

⁵⁰ The three models used by Moore et al. are Ashenfelter and Pencavel (1969) (AP), Bain and Elsheikh (1975) (BE), and Neumann and Rissman (1984) (NR). AP and BE use the annual percentage change in trade union membership as their dependent variable and NR use the percentage of the work force organized as their dependent variable.

⁵¹ For evidence of a structural break following the passage of the Wagner Act of 1936, see Mancke (1971) and Sheflin et al. (1981).

Workers' Compensation Benefits consist of the payments that are received by individuals with employment-related injuries and illnesses and by the survivors of individuals who died of employment-related causes. The payments are from both Federal and state government funds.

In 1950 maximum weekly payments during disability rarely exceeded \$50, and the maximum duration was often shorter than the disability. Administration of workers' compensation was often poor and claims were processed slowly. In 1985, maximum weekly benefits allowed in New York were \$300 and in Pennsylvania the criteria is to compensate injured workers up to two-thirds of their lost income.

In order for worker's to perceive workers' compensation as a substitute for union services, the benefits received from the former must at least equal the benefits of the latter minus costs to be a union member, which include the opportunity costs of time spent on union activities. Rather than trying to collect information on prices, (and quantify opportunity costs) researchers observe the revealed preferences of workers, in regards to joining unions or remaining non-union, and assume rationality has allowed them to compare the benefits and the costs of each possible choice.

Unemployment Insurance is a form of insurance guarding against the economic risk of unemployment. In the case of unemployment, (i.e. the worker is available for work but has none) the worker is partially offset for the decline in income. State unemployment compensations are benefits consisting mainly of the payments received by individuals under state-administered unemployment insurance (UI) programs, but they include the special benefits authorized by Federal legislation for periods of high unemployment. The provisions that govern the eligibility, timing, and amount of benefit payments vary among the states, but the provisions that govern the coverage and financing are uniform nationally.

State unemployment insurance programs provide three types of benefits-regular, extended, and reimbursable. In most states, regular benefits cover the first 26 weeks that the worker is unemployed. In most cases, the following 13 weeks cover the extended benefit period. Reimbursable benefits are paid under an alternative program available to state and local governments and to private non-profit organizations. These groups, instead of paying unemployment insurance taxes, may choose to reimburse the unemployment insurance trust fund for the benefits paid to former employees. It is argued by Reder (1951) that a major inadequacy of the UI program was that most states limit the number of weeks (26) of unemployment benefits a worker can receive in one benefit year. In 1970, the system was amended to automatically extend the benefits for up to 13 additional weeks during periods of high unemployment at the state and/or national levels. It is expected that with the inception of the extended benefit period, this variable has increased in value as a possible substitute for union services.

Unemployment compensation of Federal civilian employees is the UI program for Federal employees, which is administered by the state employment security agencies acting as agents for the U.S. Government.

Unemployment compensation of railroad employees are benefits which are the payments that are received by railroad workers who are unemployed because of sickness or because work is unavailable. This UI program is administered by the Railroad Retirement Board under a Federal formula that is applicable throughout the Nation.

Unemployment compensations of veterans are benefits which are received by unemployed veterans who have recently separated from military service and who are not eligible for military retirement benefits.

Trade adjustment allowances are the payments received by workers who are unemployed because of the adverse economic effects of international trade arrangements.

All of the above descriptions are aggregated to form the Unemployment Insurance Benefits to Employees. One or more of these may be considered relatively less substitutable for union services and then would not be included as a proxy for welfare expenditures.

Veterans' Pension and Disability Payments consist mainly of the payments that are received by veterans with service-connected disabilities and by the survivors of military personnel who died of service-connected causes. In addition, these benefits include the payments that are received by war veterans who are 65 years old or older, who have non-service-connected disabilities, who are permanently and totally disabled, and who meet specified income requirements.

Veteran's Readjustment Payments are the allowances for tuition and other educational costs that are received by veterans and by the spouses and the children of disabled and deceased veterans; and for automobiles, conveyances, and specially adapted housing for disabled veterans.

Veterans' Life Insurance Benefit Payments consist of the payments received by the beneficiaries of veterans' life insurance policies and the dividends received by the policyholders from the five veterans' life insurance programs administered by the Department of Veterans Affairs (DVA).

Other Assistance to Veterans are benefits that consist of the state and local government payments of assistance to indigent veterans, and the state and local government payments of bonuses to veterans.

The above mentioned veterans' payments are aggregated to form Veterans' Benefits Payments. It is considered that one or more of these payments may not be regarded as a substitute for services that unions provide and therefore would have no relationship with union membership.

Reder (1951) points out that "almost all collective bargaining agreements impose a number of restrictions on employer practices governing working conditions. One major

objective is worker safety.”⁵² Although the reduction of risk of injury on the jobsite in most instances can not be reduced to zero, firms have found that the costs of reducing risk are not as high as the costs of insurance in high risk work areas. Therefore, it can be argued that former firm opposition toward union pressure and legislation aimed at compelling the creation of safer working conditions has turned to acceptance and concern for worker safety.

1.2.3.4. The Occupational Health and Safety Act of 1970

The enactment of the Occupational Safety and Health Act of 1970 implemented an administration that among other features, is authorized to conduct workplace inspections and investigations to determine whether employers are complying with standards issued by the agency for safe and healthy workplaces. The Occupational Safety and Health Administration (OSHA) also enforces the “General Duty Clause,” which requires that every working man and woman must be provided with a safe and healthy workplace.

States are independently allowed and encouraged to administer their own occupational safety and health program but must adopt standards and enforce requirements at least equal in effectiveness as federal requirements. Currently, there are 26 states and territories with OSHA-approved safety and health plans. 23 states cover both the public and private sector while the other 3 cover only the public sector.

There are different types of inspections, categorized according to priority. Imminent danger situations receive top priority because OSHA believes there is reasonable certainty that a danger exists. When a catastrophe or fatal accident occurs on the jobsite, OSHA conducts an inspection. This situation gets second priority. Third priority goes to formal employee complaints of unsafe or unhealthy working conditions and to referrals from any source about a workplace hazard. Unions could be the source of referral.⁵³ Next in priority are programmed inspections aimed at specific high-hazard industries, workplaces, occupations, or health substances, or other industries identified in OSHA’s current inspection procedures.⁵⁴ Lastly, a follow-up inspection is performed to determine if the employer has corrected previously cited violations.

After findings are reported by the compliance officer, the Area Director determines whether or not to issue citations or propose penalties. Citations inform the employer of the actions needed to correct the alleged hazards. Penalties are monetary fines that range from serious to other-than-serious in importance.

⁵² Reder (1951, pp. 197).

⁵³ In fact, it is believed that there may be a correlation between inspections due to complaints and referrals and firms that are unionized. This is an empirical question, which will be analyzed in the future.

⁵⁴ From the enactment of the OSHA act in 1970 to the current period inspections across states are not a purely random selection and it is not expected that the criteria remains constant for determining the following period’s programmed or planned inspections. OSHA may develop special emphasis programs that are local, regional, or national in scope, depending on the distribution of the workplaces involved. Additionally, OSHA normally will conduct safety inspections in manufacturing in those establishments with lost-workday injury rates at or above the Bureau of Labor Statistics’ national rate for manufacturing.

It has been hypothesized that unions have in some form or fashion favored protective legislation for employees. Freeman (1986) notes, “in ensuing decades the unions’ attitude toward legislation to protect labor changed significantly and unions have come to play an increasingly large role lobbying for social legislation that protects workers and benefits the poor.”⁵⁵ Coupled with Reder’s (1951) comment on union’s objective of worker safety, one would expect that unions were in favor of the Occupational Safety and Health Act of 1970. However, is there a possibility that their positive support actually caused workers’ desire for union services to decline indirectly due to the administration of OSHA? In this case, we would expect to see a negative correlation between some form of OSHA activity and union membership. But what if a positive correlation is observed between the two variables? It could be hypothesized that unions use the complaint and referral procedure as a means of increasing the costs to the firm in order for the union to reach its goal, whatever that goal may be.⁵⁶

Finally, OSHA has many other services and programs in addition to the state programs mentioned previously. Consultation assistance is available on request to employers who want to help in establishing and maintaining a safe and healthy workplace. This service is funded by OSHA, so the service is provided at no cost to the employer. Volunteer Protection Programs are designed to recognize outstanding achievements by firms that have developed and implemented effective safety and health management systems. This program is designed to establish a cooperative relationship between employers, employees, and OSHA. Finally, Strategic Partnership Programs help to encourage safety by building relationships with groups of employers as well as OSHA and trade unions, among others.

These programs developed by OSHA to build relationships among the stated groups could cloud the analysis when observing if there is a relationship between OSHA activity and union membership. The bottom line, however, should be that OSHA, since 1970, has worked to provide a service to employees that prior to 1970, was supplied by unions. Empirically, we will soon see if there is an effect.

1.3. Union Membership Variable

In order for researchers to gain an accurate representation on the effects of structural variables, social legislation, management opposition, etc. on union membership, it is important to generate or gain access to precise data on union membership. Troy and Sheflin (1984) claim that despite this requirement, reliable and comprehensive data on American union membership do not exist.

It is common to use the unionized percentage of the civilian labor force, or of nonagricultural employment, in most studies on trade unions. There are many issues,

⁵⁵ Freeman (1986, pp. 1).

⁵⁶ It could be that the unions are concerned with the members’ safety, and to uphold or create a positive image between themselves and members, as well as increase safety, unions may utilize the complaint and referral procedure as a tool.

however, when this is the case. For example, depending on the question trying to answer, the researcher also has to ask, should retired, part-time, inactive, or unemployed members be included in this measure? Additionally, is it more precise to use average annual membership or membership at a point in time? And as we see in other studies, (Ashenfelter and Pencavel (1969)) Canadian or other foreign membership is sometimes mistakenly included in U.S. figures. Finally, the researcher has to determine if it is appropriate to include employee associations.

Once the correct measure is determined for the numerator, it is equally important to have comparable coverage in the denominator. For example, if included in the membership figures are those that are unemployed, then the denominator should include labor force data, which include those that are unemployed as opposed to some measure of an only an employed sector.

Data on union membership has been broken down from aggregate figures including state, geographic, industry, occupation, and demographic levels. There are advantages to using any of these measures, depending on the question at hand.

1.3.1. Aggregate Level Membership Data

Data on union membership at the aggregate level from the Bureau of Labor Statistics, U.S. Department of Labor (BLS), is one of the earliest developed sources. The Directory of National Unions and Employee Associations, which contains information reported by labor unions to the Federal Government, started supplying figures of union membership biennially in 1964. Membership data were obtained from a mail questionnaire to national unions, employee associations, and AFL-CIO State organizations. The BLS Directory compiled the data on a state format and could then be aggregated for the national figures. Troy (1965), however, actually provided an earlier source of national data on membership. Using reported dues receipts, Troy developed estimates of the annual dues-paying membership of every U.S. international union between 1935 and 1962.

Both the BLS Directory and Troy membership data suffer from weaknesses. However, it could be argued that Troy's estimates are viewed as more reliable than those of the BLS Directory. In regards to the BLS Directory data, the figures are self-reported estimates of "annual average dues-paying membership." Estimates of non-reporting organizations are developed from other sources, including the AFL-CIO's biennial convention reports. The BLS Directory seems to overstate total membership by including members that are retired. In fact, it has been argued by Troy (1965), Thieblot (1978), and Ginsburg (1970) that BLS Directory figures have overstated membership anywhere from 10 to 40 percent. Hirsch et al. (2001) note that state estimates in the BLS Directory are not precise due to problems with recordkeeping within union headquarters. An example given is that for the 1978 data, the BLS had to interpolate for 28 percent of the 174 national unions. Other problems include differing practices across unions in reporting unemployed, part-time and inactive members. Canadian members are included by unions

but extracted from the U.S. figures, although Troy and Sheflin (1984) seem uncomfortable with this approach.

The Troy (1965) data suffer from some conceptual problems resulting from the use of “average” dues rates. Additionally, there are issues due to the inclusion of part-time and apprentice members as well as inactive and retired members who pay lower rates.

On the aggregate level, it appears that a consensus has emerged indicating the Troy data is more reliable and estimates are significantly lower than the BLS Directory data. The argument is that the Troy data correspond relatively more closely with “potential membership” and provide more detail in regards to geographic and union-specific components.

1.3.2. Disaggregated Level Membership Data

Hirsch et al. (2001) (HMF) have a state union density data set for the years 1964-current available on their website⁵⁷ In addition to the data available, it is constantly being updated. The following is a description and explanation of this data.

The BLS Directory data of 1964-1972 was compiled on the state level and aggregating it resulted in national data. The surveys sent out to national unions, employee associations, and AFL-CIO State organizations requested state estimates. BLS then aggregated the information sent from these organizations within each state to yield overall state estimates on union membership. For years 1973 to the 1981 state estimates are based on Current Population Survey (CPS) data, a monthly survey of U.S. households. From 1983 to present, estimates are based on the CPS Outgoing Rotation Group (CPS-ORG) monthly earnings files. The following is an examination of the 1973 to current data, in which issues are addressed.

HMF note that during the years 1973-76, two problems emerge requiring the need for adjustment. First, prior to 1977, the survey did not include the phrase “or employee association” in the union membership question. In the CPS, union density is shown to increase from 22.4 percent in 1976 to 24.1 percent in 1977, despite the fact that membership was falling over this entire period (before and after 1977). BLS annual figures based on union financial reports, however, observed a change in union density from 24.5 percent in 1976 to 24.1 percent in 1977, a 0.4 percentage point decline. Assuming (or requiring) consistency between the CPS and BLS, it is necessary to adjust the CPS data during this time period to show a 0.4 percentage point drop in union density. To do this, a multiple of 1.094 is required to adjust upward pre-1977 figures to the post-1977 CPS definition, which includes the phrase “or employee association.” The 1.094 national adjustment rate is applied to 1973-76 CPS figures for all states.

The second issue prior to 1977 deals with the compilation of 38 states into ten multi-state groupings. State estimates for these 38 states are explained as follows:

⁵⁷ See www.unionstats.com.

individual state union density rates for the 38 states are used from the May 1977-81 CPS. With these individual rates, a ratio of each state's union density to its state-group union density is calculated. Each of the 38 state's union density for 1973-76 is calculated by multiplying this ratio by each year's state-group union density.

The 1977-81 union density estimates are calculated using data from the May 1977 through May 1981 CPS. The May 1982 survey did not include any union status questions. Therefore, the figures for 1982 state union density rates are an average of 1981 and 1983 CPS estimates.

From 1983 to present, estimates are based on the CPS Outgoing Rotation Group (CPS-ORG) monthly earnings files. Sample sizes averaged about 177,000 during the 1983-1995 period and 157,000 since 1996.

Among other compilations of state estimates of union density rates are Kokkelenberg and Sockell (1985) (KS), Freeman and Medoff (1979) (FM), and Curme, Hirsch, and Macpherson (1990) (CHM). KS calculate annual state union densities among all workers aged 14 and older using the May 1973 through May 1981 CPS. FM provide union densities for all private sector wage and salary workers based on the combined 1973-75 May CPS. CHM provide state union densities using the BLS definition of all wage and salary workers aged 16 and older using the monthly CPS-ORG earnings files beginning in 1983. Additionally, Hirsch and Macpherson (annual) compiled and have available union densities on the state level from 1983 to present disaggregated into public, private, and private manufacturing sectors workers.

The foundation of HVM's database is the study by Vroman (1999) in which he gathered a 1966-1998 series of state union density rates based on the BLS Directories, CPS state density rates for 1973-1981 from KS, and CPS state density rates for 1983 forward from Hirsch and Macpherson's *Annual Data Book*.

1.3.3. Calculation of Union Density Rates for States

Following HVM, union density in state j is calculated as follows:

$$(1.1.) \quad \% Mem_j = 100 \left(\sum w_{ij} M_{ij} / \sum w_{ij} \right) = 100(\text{Membership/Employment})$$

where i indexes individual CPS respondents and j indexes the state (or metropolitan area, industry, occupation, etc.) over which density is being calculated. Employment is measured by $\sum w_{ij}$, the sum of the sample weights across the i individuals in state j .⁵⁸ Those included in employment are all nonagricultural workers. In other words, not included are agriculture, fishing, or forestry industries.

⁵⁸ Hirsch, Macpherson, and Vroman (2001, pp. 54).

1.3.4. Other Issues

1.3.4.1. Flow Measures versus Stock Measures

“Membership, obviously, is not a perfect index of trade union growth and influence. It may, for example, yield an inadequate or erroneous impression at any given moment of the wage job unions are doing for their constituents, of the internal stability of the organizations, of their political effectiveness.”⁵⁹

As Bernstein (1954) did so many years ago, it is continuously offered that research in the course of trade union membership is somehow flawed by the use of a stock measure, in most cases union membership as a percentage of some type of the labor force. However, Bernstein also concurs, “Over the long pull, however, it seems reasonable to assume a rough correspondence between membership and factors of this sort.”⁶⁰ In his 1954 study, Bernstein actually uses the number of union members corrected by the size of the labor force. This measure gives us the union density rate commonly used today.⁶¹

Ashenfelter and Pencavel (1969) define their dependent variable as the annual percentage change in union membership, rather than using the change in the ratio of union density, used by Bernstein. The reasons stated for using the former measure rather than the latter is due to the ability to eliminate a possible source of spurious correlation with the change in employment in the unionized sectors and to reduce the problem of measurement error in the union membership data.

Ellwood and Fine (1987) explore the impact of Right-to-Work Laws on union organizing as a flow measure. They argue that this gives more insight given the area that they are exploring. More importantly, using their flow measure allows the authors to address the possibility of omitted variable bias and simultaneity common to studies on factors influencing union membership. The flow measure they use, then, is the number of employees in bargaining units in which unions have won an NLRB election.⁶² Each year a state with a positive number of NLRB elections will result in a change in union membership due to some fraction of wins within the state. Workers joining those unions within that state then change the number of union members within that state. Additionally, some unionized firms are exiting the industry causing a decrease in membership. The importance of a flow measure, as Ellwood and Fine see it, is that membership is constantly changing and it should be captured in order to gain an accurate interpretation of the factors that influence this outcome.

⁵⁹ Bernstein (1954, pp. 300).

⁶⁰ Bernstein (1954, pp. 300).

⁶¹ In addition to this measure, he observes the change in the ratio over time to observe the change in union membership, a flow measure.

⁶² Ellwood and Fine actually take the natural log of this measure as the dependent variable.

Bain and Elsheikh (1975), in addition to Ashenfelter and Pencavel (1969), develop a model of union growth. Therefore, their dependent variable is a flow measure, the annual percentage change in trade union membership.

1.3.4.2. Time-Series Models

Quite a few studies that examine the effects of stated variables on union membership do so over time. Given that the series may not be consistent, in regards to data source, caution must be displayed to the reader when interpreting results. Lumsden and Petersen (1975) analyze the effects of RTW laws on unionization in the U.S. over time using three time periods (1939, 1953, and 1968). Due to scarcity in state membership data during this time period, Lumsden and Petersen had to piece sources together. Their 1939 and 1953 membership data was taken from Troy (1957) and the 1968 data was acquired from the BLS. As it was covered earlier, there are issues with both sources of data and they may not be exactly comparable. One method of addressing the issue of comparability, if the data is plentiful, is to use different sample periods, including and excluding the period in question and observing if the results change. If they do change, it is important to make the reader aware of this situation. Without a large sample period, and therefore without a solution, Lumsden and Petersen offer only a word of caution when comparing the results. It seems in most cases that is the only solution.

1.3.4.3. Reliability of the Estimates

Statistics gathered from surveys are subject to both sampling and nonsampling error. When a sample, rather than the entire population, is surveyed, there is a chance that the sample estimates may differ from the “true” population values they represent. The goal is to minimize this “deviation” between the sample estimates and the “true” values.

Nonsampling errors occur in surveys when there is failure to sample a segment of the population, inability to collect information for all respondents in the sample, and inability or unwillingness of respondents to provide correct information.

At this point, when putting together a data set in order to make inferences on factors that have affected trade union membership over time, there are a host of sources to use for the dependent variable. For disaggregated data, specifically state level, it is generally accepted that multiple sources of this data are probably not going to be perfectly comparable. However, it appears that Hirsch et al. (2001) have covered at least some of the comparability issues. In this case, for the present purposes of this work, HMV’s union membership data will be considered the primary data source.

1.4. Model Variables and Hypotheses

In this section, we will consider the specific variables used to test the government substitution hypothesis. In addition, we will explain how these variables are expected to affect the outcome measure, union density. Following Ashenfelter and Pencavel (1969),

these variables will affect the demand for and/or supply of union services. This section first engages in a description of the structural variables. These variables have been used in prior studies on union membership and their hypothesized effects are well noted. We therefore will only briefly describe these variables.

1.4.1. Structural Variables

The structural variables used in the model are the proportion of the civilian labor force that are female, non-white, age 16-24, and age 55-64 within a state. We expect that females in the labor force are going to have a negative influence on the extent of unionization within a state. It is argued that women, with respect to the labor force, are relatively more mobile. If this is correct, we should expect them to have a relatively lower demand for union services after comparing the benefits and costs to union membership. We do not hypothesize any specified effect from either the race or age variables. Moore and Newman (1975) use the percentage of non-whites in the civilian labor force without speculating a sign on the coefficient due to countervailing forces. Moore and Newman offer Kornhauser's (1961) perspective that because nonwhites are the minority, collectively (by joining unions) they might have a stronger voice. In contrast, the possibility of racial discrimination in unions could lead to an inverse relationship between nonwhites in the labor force and union membership. This is somewhat in line with the thought that the union hierarchy is concentrated with whites at the top and non-whites are concerned with the ability to have their needs met within the union. Both forces work against each other but affect the demand side of union organization. For reasons discussed in the section reviewing the literature, following Scoville (1971) and Moore and Newman (1988), we will not hypothesize an effect from the "young" or "senior" proportion of the labor force within a state on union membership.

We use the proportion of the state's population living in urban areas to capture both differences in the demand for and supply of union services. In short, urban areas are described as places of 2,500 or more persons incorporated as cities, villages, boroughs, and towns but excluding the rural portions of "extended" cities.⁶³ Rural residents have a tendency to display relatively more hostile attitudes toward unions and urban environments are more conducive to collectivist attitudes.⁶⁴ Therefore, we expect a positive relationship between urbanization rate and union density within a state.

We control for the number of firms with five hundred or more employees within a state to capture the possibility of economies of scale. This is standard medicine but Hunt and White (1983) hypothesize that individual bargaining power will be higher in smaller firms implying an inverse relationship between firm size and union membership. The

⁶³ For a more complete definition of "urban" and "urban area" see www.census.gov/population/censusdata/urdef.

⁶⁴ See Moore and Newman (1975) for evidence of the former. In the case of the latter, Bernstein (1953) points out that advances in the direction of homogeneity are an active force in the difficulty of unions to organize.

standard interpretation of large firm size will affect the supply of union services while the one offered by Hunt and White will affect the demand side. We expect, however, to observe a positive relationship between large firm size and union density, arguing that the standard interpretation will outweigh Hunt and White's novel concept.⁶⁵

We use the percentage of the state's labor force that are employed in the construction, manufacturing, mining, and transportation and public utilities industries to capture the concentration of union membership within these industries. Consequently, we expect a positive relationship between the goods producing sector and union density within a state.

1.4.2. Management Opposition

Several studies emphasizing the determinants of the decline in union membership over the last 50 years have used as a measure for management opposition, the number of unfair labor practices charged against management. This data is available on a yearly basis for each state in the United States. Table 6A in the Annual Report of the National Labor Relations Board lists the geographic distribution of cases received for the respective year. CA cases, defined as "A charge that an employer has committed unfair labor practices in violation of Section 8(a)(1), (2), (3), (4), or (5), or any combination thereof," is commonly used in studies to isolate the effects that firms have on election results and therefore, union success. Following Moore and Newman (1988) we will proxy as management opposition, the number of CA cases in NLRB certification elections deflated by the number of eligible voters.⁶⁶ To the extent that management's antiunion tactics, legal or otherwise, have a depressing effect on representation elections, we expect a negative relationship between the number of CA cases brought about against employers and union membership within a state.

1.4.3. Public Policy Variables

Using the data from Walsh and Schwarz (1996), we define an indicator variable equal to one in the year (and all subsequent years) in which a state recognizes an exception to any and all of the three exceptions to the employment-at-will doctrine. Table

⁶⁵ Hunt and White (1983) analyze the effects of right-to-work legislation on union success (using several dependent variables), controlling for other factors. The coefficient on SMALLEM, defined as the percentage of employees in establishments with fewer than 50 employees, is positive and significant at the 0.01 level (0.293) when the dependent variable is ELECTION RATIO, defined as the number of new elections held by state, per thousand union members. The coefficient on SMALLEM is positive but not significant (10.0) when the dependent variable is WINS, defined as the relative number of wins by union, by state.

⁶⁶ By definition from the NLRB, and Farber (1990), Eligible Voters are employees within an appropriate bargaining unit who were employed as of a fixed date prior to an election, or are otherwise qualified to vote under the Board's eligibility rules. Moore and Newman (1988) use eligible voters in each state to normalize.

3.1 lists the states and the year in which the state first recognized each of the three exceptions. Additionally, we define a trend variable for each exception for each state that takes the value of unity in the year in which the exception is first recognized and increases by one unit thereafter.⁶⁷ The advantage to using the Walsh and Schwarz data compared to other data sources such as Neumann and Rissman (1983) and Krueger (1991) is that the recentness of the study allows for an updated version of the states that recognize these departures from the common law interpretation of the employment-at-will doctrine. It is believed that this updated version will provide us with a better inference about these exceptions' effects on union services. Figure 3.1 depicts the recognition of each of the three exceptions from 1974 to current. After observing figure 3.1, it is apparent that the majority of adoptions occurred during the 1980's. The most rapid growth in the number of states adopting the public policy exception occurred during the 1984-86 period while most states adopted the implied contract exception between 1983 and 1987. The covenant of good faith and fair dealing displays a pattern of occasional adoption from the early 1970's on into the 1990's but never more than two states in a year. We expect that each of the exceptions to the employment-at-will doctrine will have a negative relationship with union membership as employees within a state construe this type of security to be substitutable for some of the services that unions provide causing, *ceteris paribus*, the demand for union services to decline.

To reexamine the impact that government welfare expenditures has on an individual's demand for services we had to develop a refined measure or a more narrow interpretation of these services to better account for changes in workers' tastes and differences in contributions across states. Unlike Neumann and Rissman (1983) and Moore et al. (1987) we filter out workers' compensation in a state from government payments to individuals in that state. Additionally, we have a measure for unemployment insurance provided by both the federal and state governments for each state. From this aggregate, we are able to disentangle forms of expenditures that would arguably be more or less substitutable for union services. The following describes the different programs extracted from the aggregated unemployment insurance program.

State unemployment insurance programs provide three types of benefits-regular, extended, and reimbursable. In most states, regular benefits cover the first 26 weeks that the worker is unemployed. In most cases, the following 13 weeks cover the extended benefit period. Reimbursable benefits are paid to under an alternative program available to state and local governments and to private non-profit organizations. These groups, instead of paying unemployment insurance taxes, may choose to reimburse the unemployment insurance trust fund for the benefits paid to former employees. It is argued by Reder (1951) that a major inadequacy of the UI program was that most states limit the number of weeks (26) of unemployment benefits a worker can receive in one benefit

⁶⁷ In the case of Missouri, with respect to the implicit contract exception and New Hampshire, with respect to the covenant of good faith exception, separate state court rulings reversed the power from the employee back to the employer and therefore we count these states as no longer recognizing the respective exceptions. Because of this outcome, the dummy and trend variables within these states take the value of zero in the year in which this reversed ruling takes place.

year. It is expected that with the inception of the extended benefit period, this variable has increased in value as a possible substitute for union services.

Unemployment compensation of Federal civilian employees (UCFE) is the UI program for Federal employees, which is administered by the state employment security agencies acting as agents for the U.S. Government.

Unemployment compensation of railroad employees (UCRE) are benefits which are the payments that are received by railroad workers who are unemployed because of sickness or because work is unavailable. The Railroad Retirement Board under a Federal formula that is applicable throughout the Nation administers this UI program.

Unemployment compensations of veterans (UCX) are benefits that are received by unemployed veterans who have recently separated from military service and who are not eligible for military retirement benefits.

We argue that while unemployment compensation to individuals has a negative relationship with union services and therefore acts as a substitute for services that unions provide, unemployment compensation to federal civilian employees and veterans could dissolve this relationship causing the coefficient on the unemployment compensation variable to be biased toward zero. Compensation to federal employees could have no effect on a federal employee's decision to become a union member or not because other forces have been causing membership in this sector to be growing over time. Additionally, compensation to unemployed veterans is distributed to those who have only recently left military service and most likely do not have the decision to join or not join a union in their current choice set. Therefore, we include in our analysis, aggregate expenditures on unemployment compensation in a state and additionally include a separate measure of state unemployment compensation. We hypothesize a negative relationship between the latter expenditure measure and union membership.

Moore et al. (1987) first included activity by the Occupational Safety and Health Administration (OSHA) as a possible substitute for union services by including total expenditures by OSHA. In this analysis, we will use OSHA inspections in a state to capture any substitutability that may exist between this federal agency and unions. There are different types of inspections, categorized according to priority. Imminent danger situations receive top priority because OSHA believes there is reasonable certainty that a danger exists. When a catastrophe or fatal accident occurs on the jobsite, OSHA conducts an inspection. This situation gets second priority. Third priority goes to formal employee complaints of unsafe or unhealthy working conditions and to referrals from any source about a workplace hazard. It should be mentioned that unions could be the source of referral. Next in priority are programmed inspections aimed at specific high-hazard industries, workplaces, occupations, or health substances, or other industries identified in

OSHA's current inspection procedures.⁶⁸ Lastly, a follow-up inspection is performed to determine if the employer has corrected previously cited violations. We do not
□isaggregate inspections according to priority but do expect a negative relationship between this activity and union membership within a state.

Table 1.2. provides a list of the variables and the summary statistics. Additionally, table A.1.1. in the appendix provides an analysis of the summary statistics over time. Specifically, we provide the means and standard deviations over the entire sample period, analogous to Table 1.2. as well as the means and standard deviations of the variables for the year 2002. This allows us to form an idea of what is happening to the characteristics over time.

1.5. Empirical Model

The panel data set used in this analysis is one that follows the same sample of states over time and thus provides multiple observations on each state in the sample. Like cross-section data, panel data describe each of a number of individuals, firms, states etc. Like time-series data, they describe changes through time. By blending characteristics of both cross-section and time-series data, more reliable research methods can be used in order to investigate occurrences that could not otherwise have been treated.

To investigate these occurrences, it is useful to consider economic variables as taking one of three forms: individual-time-invariant, period-individual-invariant, and individual-time-varying variables.⁶⁹ The individual-time-invariant variables are variables that are the same for a given cross-sectional unit through time but which vary across cross-sectional units. An example within the context of this study could be attributes of individual state variables such as state legislation. The period-individual-invariant variables are variables that are the same for all cross-sectional units at a point in time but that vary through time. An example within the context of this model is the GDP price deflator. Finally, the individual-time-varying variables are variables that vary across cross-sectional units at a point in time and also vary across time. Examples within the context of this model are firm size, percentage of females in the labor force, urbanization rates, etc. In fact, most of the variables used in this study are of the individual-time-varying sort.

⁶⁸ From the enactment of the OSHA act in 1970 to the current period inspections across states are not a purely random selection and it is not expected that the criteria remains constant for determining the following period's programmed or planned inspections. OSHA may develop special emphasis programs that are local, regional, or national in scope, depending on the distribution of the workplaces involved. Additionally, OSHA normally will conduct safety inspections in manufacturing in those establishments with lost-workday injury rates at or above the Bureau of Labor Statistics' national rate for manufacturing.

⁶⁹ This follows from Intriligator et al. (1996).

Table 1.2. GSH Descriptive Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
Union density	1584	17.261	7.938	3.300	41.800
Female labor force	1584	44.489	2.982	4.600	49.900
Non-white labor force	1584	9.068	8.604	0.000	35.200
Labor force age 16-24	1584	19.201	3.784	1.800	63.400
Labor force age 55-64	1584	10.877	2.050	0.800	16.400
Goods producing sector	1584	29.835	8.237	14.694	127.919
Urbanization rate	1584	68.074	14.621	32.200	94.400
Large firm size	1536	0.240	0.091	0.020	0.518
Management opposition	1584	9.681	9.788	0.442	141.177
Workers' compensation	1584	\$61.61	\$236.05	\$0.07	\$2,799.84
Unemployment compensation	1584	\$220.06	\$626.74	\$2.22	\$8,686.63
State unemployment compensation	1584	\$208.36	\$603.35	\$2.14	\$8,435.48
Other unemployment compensation	1584	\$2.05	\$21.08	\$164.47	\$397.90
OSHA inspections	1440	2012.535	2505.579	0.000	33090
Public policy exception	40*	1983	5.942	1959	1993
Years of public policy exception	1584	5.515	7.331	0.000	35.000
Implicit contract exception	36*	1984.000	2.748	1976	1989
Years of implicit contract exception	1584	4.285	6.277	0.000	27.000
Good faith and fair dealing exception	11*	1985	5.787	1974	1994
Years of good faith and fair dealing exception	1584	1.037	3.567	0.000	26.000
N = 1584 for years 1966-2002, with some gaps					
For Large firm size, year 2002 not yet available					
For OSHA, OSHA Act passed in 1972; data available for 1973-2002					
* Number of total states that recognized these exceptions at any year over the sample period					

Consider the model used in this analysis

$$(1.5.1) \quad y_{it} = x'_{it}\beta + v_{it}, \quad i = 1, \dots, N; \quad t = 1, \dots, T.$$

where v_{it} represents the effects of all the omitted variables with the decomposition characterized below. In the notation y_{it} , i represents the state and t denotes the time period (in our case, year). The number of states is 48 and the years available are 1966-2002, with some gaps.⁷⁰ We are analyzing an unobserved effects model for union density

⁷⁰ We leave out Alaska, Hawaii and the District of Columbia, due to data availability. The years available are 1966, 1970, 1972, and 1974 – 2001. All years were not available because we were unable to attain union data and/or labor force data.

for the U.S. states over time. Therefore the x_{it} represents an explanatory variable that affects trade union membership in each state across time.⁷¹

When applying econometric methods using panel data we can assume that the effects of period-individual-invariant variables can be joined with the effects of the individual-time-varying variables so that the effects of omitted variables v_{it} can be represented by

$$(1.5.2) \quad v_{it} = \alpha_i + u_{it}, \quad i = 1, \dots, N; \quad t = 1, \dots, T.$$

Here, the α_i represent the individual specific effects, or fixed effects, while u_{it} represent the individual period varying effects. The latter is referred to as the idiosyncratic error or time-varying error, because it represents unobserved factors that change over time and the former captures all unobserved, time-constant factors that affect y_{it} . Because α_i does not change over time it has no t subscript. Since i denotes different states, we can call α_i an unobserved state effect or state fixed effect. Furthermore, it represents all factors affecting state union density rates that do not change over time. It might be argued that “tastes” for unions is captured in the α_i . Many factors may not be exactly constant, but it could be argued, once we contemplate what these factors are, that they may not change much over time.

1.5.1. Pooled OLS and First-Difference Equations

There are three methods we can consider to estimate the parameters of interest, β_j . One method is pooled OLS, which is just pooling the years and applying ordinary least squares. At least one weakness to using pooled OLS, however, is based on the fact that we must assume the unobserved effect α_i is uncorrelated with x_{it} , the explanatory variables, in order for OLS to produce a consistent estimator of the β_j s. If α_i and x_{it} are correlated, pooled OLS is biased and inconsistent, caused from omitting a time-constant variable.

It could be that we want to allow for the unobserved effect, α_i , to be correlated with the explanatory variables. Given that α_i is constant over time, we can difference the data across time periods and the unobserved effect will no longer appear in the model: it has been “differenced away.” For example, consider a cross-sectional observation i for two years as

$$(1.5.3) \quad y_{i2} = (\beta_0 + \delta_0) + \beta_1 x_{i2} + \alpha_i + u_{i2} \quad (t = 2)$$

⁷¹Using one explanatory variable is for simplification purposes. The description of the actual variables used in the model, along with their hypothesized signs, were presented in the previous section.

$$(1.5.4) \quad y_{it} = \beta_0 + \beta_1 x_{it} + \alpha_i + u_{it} \quad (t = 1)$$

If we subtract equation (1.5.4) from (1.5.3), we get

$$(1.5.5) \quad (y_{i2} - y_{i1}) = \delta_0 + \beta_1 (x_{i2} - x_{i1}) + (u_{i2} - u_{i1}), \text{ or}$$

$$(1.5.6) \quad \Delta y_i = \delta_0 + \beta_1 \Delta x_i + \Delta u_i,$$

where “ Δ ” denotes the change from $(t = 1)$ to $(t = 2)$. Again, the unobserved effect does not appear in the first-differenced equation. The key assumption for this model is that Δu_i is uncorrelated with Δx_i .

$$(A.1.1) \quad E(\Delta u_{it} | X_i) = 0, t = 2, \dots, T.$$

This assumption holds if the idiosyncratic error at each time t is uncorrelated with the explanatory variable in both time periods and rules out the case where x_{it} is the lagged dependent variable, $y_{i,t-1}$. The first-differenced equation allows for x_{it} to be correlated with unobservables that are constant across time. If Δu_i and Δx_i are correlated, however, this will lead to bias in the OLS estimator. Ways to fix this include adding more variables that are being picked up by Δu_i .

It is also important that Δx_i has variation across i . If an explanatory variable does not change over time, or if it changes by the same amount for every observation, equation (1.5.3) cannot be estimated by OLS. Such variables include gender, or in the present analysis, states located in the South. In this case, by allowing α_i to be correlated with x_{it} , there is no way to separate the effect of α_i on y_{it} from the effect of any variable that does not change over time.

Another assumption needed is that (1.5.3) satisfies the homogeneity assumption, or, the variance of the differenced errors, conditional on all explanatory variables, is constant.

$$(A.1.2) \quad \text{Var}(\Delta u_{it} | X_i) = \sigma_u^2 \quad t = 2, \dots, T$$

If we presume that this assumption does not hold, we can apply the appropriate techniques to test and correct for heteroskedasticity.⁷²

A word of caution is in order when using panel data and the first-difference equation. It may be that after differencing Δx_i does not have much variation. The little

⁷² The methods for dealing with heteroskedasticity are Breusch-Pagan (1979) and White (1980) tests for heteroskedasticity. As we cover the issue of heteroskedasticity in the next section, we will actually force it from the model, given that we are aware of the form and which variable is the cause.

variation in Δx_i could lead to large OLS standard errors. It may not be much of an issue if we have a large cross-section, but this is not always possible, given the analysis. It might be better served to difference over longer spans of time, to increase variation.

The usual case, when using panel data, is that we want to difference for more than two periods and in this situation, we would use pooled OLS after differencing. If the number of time periods is small relative to the number of cross-sections, a year dummy variable should be included to account for secular changes that are not being modeled. When differencing, the time dummies allow for a separate intercept for each time period.

The crucial assumption is that, after taking out the unobserved effect, α_i , the explanatory variables are strictly exogenous. In other words, the idiosyncratic errors are uncorrelated with the explanatory variables in each time period:

$$(A.1.3) \quad \text{Cov}(x_{itj}, u_{is}) = 0, \text{ for all } t, s, \text{ and } j.$$

The j denotes a variable label. This assumption rules out the possibility of using lagged dependent variables as explanatory variables, or whereby future explanatory variables react to current changes in the idiosyncratic errors. Omitting an important time-varying variable will cause the above assumption to be violated and measurement error in one or more of the explanatory variables can cause the above assumption to be false.

The methodology for estimating a difference equation with more than two periods follows that of the two-period model and the importance of organizing the panel data cannot be stressed enough. Within each cross-section, it is a good idea to have all time periods adjacent to each other. Thus, it is easier to construct the differences.

When using more than two time periods, we are assuming that Δu_{it} is uncorrelated over time for the usual standard errors and test statistics to be valid.

$$(A.1.4) \quad \text{Cov}(\Delta u_{it}, \Delta u_{is} \mid X_i) = 0 \quad t \neq s$$

This assumption will not hold if we assume that the original idiosyncratic errors, u_{it} , are uncorrelated over time. If we assume that the u_{it} are serially uncorrelated with constant variance, then the correlation between Δu_{it} and Δu_{is} , $t \neq s$, can be shown to be -.5.⁷³

⁷³ If u_{it} follows a stable AR(1) model, then Δu_{it} will be serially correlated. When u_{it} follows a random walk, Δu_{it} will be serially uncorrelated. A test for serial correlation can be performed in which we run two regressions. Letting $r_{it} = \Delta u_{it}$ denote the first difference of the original error, if r_{it} follows an AR(1) model $r_{it} = \rho r_{i,t-1} + e_{it}$, then we can test $H_0 : \rho = 0$. First, estimate the difference equation by pooled OLS and obtain the residuals, \hat{r}_{it} . Then, run the regression with $\hat{r}_{i,t-1}$ as an additional explanatory

1.5.2. Fixed Effects Estimation

The fixed effects estimator, like first differencing, uses a transformation to remove the unobserved effect, α_i , prior to estimation. Additionally, any time constant explanatory variables (in our case, the South dummy variable) are removed along with the fixed effects, α_i .

For the fixed effects transformation, also called the within transformation, consider a model with a single explanatory variable that is not constant across time periods: for each i ,

$$(1.5.7) \quad y_{it} = \beta_1 x_{it} + \alpha_i + u_{it}, \quad t = 1, 2, \dots, T.$$

For each i , average this equation over time. In this case, we get

$$(1.5.8) \quad \bar{y}_i = \beta_1 \bar{x}_i + \alpha_i + \bar{u}_i,$$

where $\bar{y}_i = T^{-1} \sum_{t=1}^T y_{it}$, $\bar{x}_i = T^{-1} \sum_{t=1}^T x_{it}$, and $\bar{u}_i = T^{-1} \sum_{t=1}^T u_{it}$.

Because α_i is fixed over time, it appears in both (1.5.7) and (1.5.8). However, subtracting (1.5.8) from (1.5.7), for each t , we have

$$(1.5.9) \quad y_{it} - \bar{y}_i = \beta_1 (x_{it} - \bar{x}_i) + u_{it} - \bar{u}_i, \quad t = 1, 2, \dots, T \text{ or}$$

$$(1.5.10) \quad \ddot{y}_{it} = \beta_1 \ddot{x}_{it} + \ddot{u}_{it}, \quad t = 1, 2, \dots, T,$$

where $\ddot{y}_{it} = y_{it} - \bar{y}_i$ is the time-demeaned data on y , and similarly for \ddot{x} and \ddot{u} . After the transformation, the unobserved or fixed effect α_i has disappeared. Performing pooled OLS on (1.5.9) gives us an estimator that is based on the time-demeaned variables. This fixed effects estimator is also called the within estimator because OLS on (1.5.9) uses the time variation in y and x within each cross-sectional observation.

The between estimator is obtained as the OLS estimator on the cross-sectional equation (1.5.8), including an intercept, in which time-averages are used for both y and

variable. The coefficient on $\hat{r}_{i,t-1}$ is an estimate of ρ and we can use the usual t statistic to test $H_0 : \rho = 0$.

x and then a cross-sectional regression is run. This will be covered when we analyze the random effects model in the following section.

Adding more explanatory variables is trivial to the analysis. Simply use the time demeaning on each explanatory variable, including all dummy variables, and then perform pooled OLS using all the time-demeaned variables.

Like the assumptions for the first-differencing estimator, we assume for the fixed effects estimator that for each t , the expected value of the idiosyncratic error, given the explanatory variables in all time periods and the unobserved effect is zero:

$$(A.1.5) \quad E(u_{it} | X_i, \alpha_i) = 0$$

Under this strict exogeneity assumption on the explanatory variables, the fixed effects estimator will be unbiased. The fixed effects estimator does allow for arbitrary correlation between the unobserved α_i and the explanatory variables in any time period, like the first-differencing model, and because of this, any explanatory variable that is constant across time for all i gets “swept” away by the transformation.

The other assumptions needed for a straightforward OLS analysis to be valid are that the errors are homoskedastic and serially uncorrelated:

$$(A.1.6) \quad Var(u_{it} | X_i, \alpha_i) = Var(u_{it}) = \sigma_u^2, \text{ for all } t = 1, \dots, T$$

$$(A.1.7) \quad Cov(u_{it}, u_{is} | X_i, \alpha_i) = 0, \quad t \neq s$$

A final word of caution is due for the fixed effects estimator and determining the degrees of freedom. Absent software packages that automatically compute the degrees of freedom, we would have to do the time-demeaning and the estimation by pooled OLS, and would have to correct for the standard errors and test statistics. When estimating the time-demeaned equation (1.5.10) by pooled OLS, there are NT observations and k independent variables.⁷⁴ Normally, then, we would have $NT - k$ degrees of freedom. This is not the case, however, because for each cross-sectional observation we lose one degree of freedom due to time-demeaning. The correct degrees of freedom is $df = NT - N - k = N(T - 1) - k$.

1.5.3. Dummy Variable Estimation

Traditionally, the approach to fixed effects estimation is to assume that the unobserved effect, α_i , is a parameter to be estimated for each i . Therefore, the α_i in equation (1.5.7) is the intercept for state i (or firm, person, city, SMSA, etc.) that is

⁷⁴ There is no intercept because it got “differenced away.”

estimated along with β_1 .⁷⁵ We can estimate an intercept for each i by creating a dummy variable for each cross-sectional observation, along with the explanatory variables.⁷⁶

The dummy variable regression gives us the same estimates of the β_j that would be obtained from the fixed effects regression on the time demeaned data along with identical standard errors. Therefore, the fixed effects estimator can be obtained by the dummy variable regression.

A word of caution is now in order for the dummy variable regression. When creating variables, in this case dummy variables for each cross-section, we are explaining a major portion of the variation in our dependent variable (union membership) using state dummies (and most likely year dummies). This will most likely give us a large R^2 yet we should not be surprised due to the variables added in the regression.

1.5.4. Random Effects Estimation

Consider the same unobserved effects model (1.5.4) with more than one explanatory variable,

$$(1.5.11) \quad y_{it} = \beta_0 + \beta_1 x_{it1} + \dots + \beta_k x_{itk} + \alpha_i + u_{it},$$

where an intercept is included so the assumption can be made that the unobserved effect, α_i , has a zero mean. Previously, with first-differencing or fixed effects estimation, the goal was to “sweep away” α_i because it is thought to be correlated with one or more of the x_{itj} . If it can be argued that α_i is uncorrelated with each explanatory variable, however, using any transformation to eliminate α_i would result in inefficient estimators. In this case, when we assume that the unobserved effect, α_i , is uncorrelated with each explanatory variable, we can estimate (1.5.11) with random effects estimation. The assumption is

$$(A.1.8) \quad \text{Cov}(x_{itj}, \alpha_i) = 0, \quad t = 1, \dots, T, \quad j = 1, 2, \dots, k.$$

As it turns out, the random effects assumptions include all of the fixed effects assumptions in addition to the above requirement that α_i is independent of all

⁷⁵ Remember, equation (1.5.7) considers a model with one explanatory variable. In models with more than one explanatory variable, α_i will be estimated with all β_j $j = 1, \dots, k$.

⁷⁶ As was mentioned previously, we would probably include year dummy variables as well to capture secular trends compared to some base year.

explanatory variables in all time periods.⁷⁷ Therefore, if we cannot assume the above, we must decide on fixed effects or first differencing.

To estimate the β_j in (1.5.11) with random effects, just run OLS of y_{it} on the explanatory variables (including year dummies). The β_j can actually be estimated by using a single cross section but this leaves out useful information gathered from the other time periods. The OLS procedure produces consistent estimators of the β_j under the random effects assumption but disregards a major feature of the model. Earlier we joined the effects of period-individual-invariant variables with the effects of the individual-time-varying variables, or equation (1.5.2) was shown to be

$$(1.5.2) \quad v_{it} = \alpha_i + u_{it}.$$

Given the strict exogeneity assumption for both the idiosyncratic error and the unobserved effect, we can rewrite (1.5.7) to get

$$(1.5.12) \quad y_{it} = \beta_0 + \beta_1 x_{it1} + \dots + \beta_k x_{itk} + v_{it}$$

Because α_i is in the composite error (1.5.2), in each time period, the v_{it} are serially correlated across time. In fact, under the random effects assumptions,

$$\text{Corr}(v_{it}, v_{is}) = \sigma_\alpha^2 / (\sigma_\alpha^2 + \sigma_u^2), \quad t \neq s,$$

where $\sigma_\alpha^2 = \text{Var}(\alpha_i)$ and $\sigma_u^2 = \text{Var}(u_{it})$.⁷⁸ The usual pooled OLS standard errors and test statistics will be incorrect because they ignore this positive serial correlation. A way to deal with this is to use generalized least squares to estimate these models with serial correlation.

Rewrite (1.5.12) for all T time periods as

$$(1.5.13) \quad y_i = X_i \beta + v_i$$

⁷⁷ From the fixed effects model, we assume $E(u_{it} | X_i, \alpha_i) = 0, t = 1, \dots, T$ (A.1.5) and in addition, for the random effects model we assume $E(\alpha_i | X_i) = E(\alpha_i) = 0$ (A.1.9). Other assumptions for the random effects model are that we assume there are no perfect linear relationships among the explanatory variables (A.1.10) and in addition to the homoskedasticity assumption on the idiosyncratic error, $E(u_{it}^2) = \sigma_u^2$ (A.1.11) we assume that the idiosyncratic errors are serially uncorrelated, $E(u_{it} u_{is}) = 0$ all $t \neq s$ (A.1.12) and additionally, homoskedasticity on α_i , $\text{Var}(\alpha_i | X_i) = \sigma_\alpha^2$ (A.1.13). That is, we assume that the conditional variances are constant.

⁷⁸ $\text{Var}(\alpha_i)$ and $\text{Var}(u_{it})$ are the constant unconditional variances on the unobserved effects and idiosyncratic errors, respectively. They assume homoskedasticity. For the idiosyncratic error variance, we assume it is constant across t .

and v_i can be written as $v_i = \alpha_i e_T + u_i$ where e_T is the $T \times 1$ vector of ones. We define the unconditional variance of v_i as

$$\Omega \equiv E(v_i v_i')$$

a $T \times T$ matrix assumed to be positive definite.⁷⁹

For generalized least squares to be consistent we need to assume that there are no linear relationships among the regressors. The rank condition is therefore

$$(A.1.14) \quad E(X_i' \Omega^{-1} X_i) = K.$$

The random effects model allows us to utilize the unobserved effects contained in v_{it} , giving Ω a special form. Using the constant unconditional variance on the idiosyncratic errors assumption (A.1.11) and the assumption that these errors are serially uncorrelated (A.1.12), we can derive the variances and covariances of the elements of v_i .

$$E(v_{it}^2) = E(\alpha_i^2) + 2E(\alpha_i u_{it}) + E(u_{it}^2) = \sigma_\alpha^2 + \sigma_u^2.⁸⁰$$

Additionally,

$$E(v_{it} v_{is}) = E[(\alpha_i + u_{it})(\alpha_i + u_{is})] = E(\alpha_i^2) = \sigma_\alpha^2 \quad \text{for all } t \neq s.$$

Therefore,

$$\Omega \equiv E(v_i v_i') = \begin{bmatrix} \sigma_\alpha^2 + \sigma_u^2 & \sigma_\alpha^2 & & \sigma_\alpha^2 \\ \sigma_\alpha^2 & \sigma_\alpha^2 + \sigma_u^2 & & . \\ . & \sigma_\alpha^2 & . & . \\ . & . & . & \sigma_\alpha^2 \\ \sigma_\alpha^2 & . & & \sigma_\alpha^2 + \sigma_u^2 \end{bmatrix}$$

We can rewrite the matrix as

$$\Omega = \sigma_u^2 I_T + \sigma_\alpha^2 e_T e_T'.⁸¹$$

⁷⁹ One of the assumptions from the fixed effects model that is also assumed for the random effects model is that we have a random sample in the cross-sectional dimension (A.1.15). Given this assumption, the Ω matrix is necessarily the same for all i .

⁸⁰ The middle term $2E(\alpha_i u_{it})$ drops out given the strict exogeneity assumption (A.1.5).

⁸¹ $e_T e_T'$ is a $T \times T$ matrix whose every element contains unity.

We can conclude that Ω depends only on the two parameters σ_α^2 and σ_u^2 .

The following is the assumption that the variance matrix of v_i conditional on X_i is constant. That is,

$$(A.1.15) \quad E(v_i v_i' | X_i) = E(v_i v_i')$$

When this assumption holds, feasible GLS is efficient and Ω takes the above form.

Consider the following:

$$(A.1.16) \quad E(u_i u_i' | X_i \alpha_i) = \sigma_u^2 I_T \text{ and}$$

$$(A.1.17) \quad E(\alpha_i^2 | X_i) = \sigma_\alpha^2$$

where (A.1.16) assumes a constant conditional variance and that the conditional covariances are zero for the idiosyncratic errors. Assumption (A.1.17) is the homoskedasticity assumption on the unobserved effect α_i .

Define $\sigma_v^2 = \sigma_\alpha^2 + \sigma_u^2$ and assume that we have consistent estimators of σ_α^2 and σ_u^2 . We then form $\hat{\Omega} \equiv \hat{\Omega}_u I_T + \sigma_\alpha^2 \hat{e}_T \hat{e}_T'$, a $T \times T$ matrix assumed to be positive definite. The feasible generalized least square estimator using this $T \times T$ matrix is known as the random effects estimator:

$$(1.5.14) \quad \hat{\beta}_{RE} = \left(\sum_{i=1}^N X_i' \hat{\Omega}^{-1} X_i \right)^{-1} \left(\sum_{i=1}^N X_i' \hat{\Omega}^{-1} y_i \right)$$

As long as the assumptions on the conditional expectations of the idiosyncratic errors and the unobserved effect hold (A.1.5) and the appropriate rank condition hold, $\hat{\beta}_{RE} \xrightarrow{p} \beta$ as $N \rightarrow \infty$.

Earlier we assumed we had consistent estimators of σ_α^2 and σ_u^2 . In order to run the random effects procedure we must obtain $\hat{\sigma}_\alpha^2$ and $\hat{\sigma}_u^2$ by either first finding $\hat{\sigma}_v^2 = \hat{\sigma}_\alpha^2 + \hat{\sigma}_u^2$, or using alternative methods to estimate σ_α^2 and σ_u^2 .⁸² Under assumption (A.1.16) we can show

⁸² Wooldridge (1999) states that the idiosyncratic error variance can be estimated using the fixed effects method. Additionally, he shows that a common estimator of σ_α^2 is based on the between estimator of β .

$$\sigma_v^2 = T^{-1} \sum_{t=1}^T E(v_{it}^2) \text{ for all } i.$$

A consistent estimator of σ_v^2 is then

$$\hat{\sigma}_v^2 = \frac{1}{(NT - K)} \sum_{i=1}^N \sum_{t=1}^T \tilde{v}_{it}^2,$$

where \tilde{v}_{it} denote the pooled OLS residuals taken from the estimation of $\tilde{\beta}$, the pooled OLS estimator.

Recall that $E(v_{it}v_{is}) = \sigma_\alpha^2$, all $t \neq s$. Wooldridge (1999) shows that a consistent estimator of σ_α^2 is

$$\hat{\sigma}_\alpha^2 = \frac{1}{[NT(T-1)/2 - K]} \sum_{i=1}^N \sum_{t=1}^{T-1} \sum_{s=t+1}^T \tilde{v}_{it} \tilde{v}_{is}$$

Given $\hat{\sigma}_v^2$ and $\hat{\sigma}_\alpha^2$, it is straightforward to form $\hat{\sigma}_u^2 = \hat{\sigma}_v^2 - \hat{\sigma}_\alpha^2$.

1.5.5. Deciding between Random Effects or Fixed Effects Estimation

One of the assumptions for the random effects model was that we are drawing randomly from a large population. If this is not the case, as Wooldridge (1999) implies for state level data, fixed effects estimation is probably the best procedure to use. In this case, we would think of the α_i not as random outcomes but as actual parameters to estimate.

Unfortunately, there are limitations when using either model. The main disadvantage of the fixed effects model is that it requires estimation of a separate parameter for all N cross-sections (in our case, states) in the sample. This causes problems because much of the variation that exists in the data is used up by estimating these dummy variables. As a result, it may be difficult to accurately estimate the coefficients on the other included explanatory variables. The fixed effects model uses a deviation from the means approach. In this approach, the parameters of the model are estimated using the deviations between a state's characteristics at a point in time and the state's long-run average characteristics. For some states, the characteristics may have changed very little (or in the case when using regional dummies there is no change) so these observations essentially would be eliminated from the analysis.

A random effects model has different limitations. One major limitation is that its assumptions are rather strict, in particular the main assumption that the random effect is

uncorrelated with any of the explanatory variables over the entire time period. However, it seems plausible that there may be characteristics of states that are not included in the model that may also be related to some of the included characteristics. This omitted-variable bias would violate the assumptions of the random effects model, and estimates resulting from this model would be biased.

The decision process on specification can be made in part on logical grounds and additionally by formal testing. First, Hausman (1978) suggests following de Finetti's exchangeability criterion, which is both necessary and sufficient for random sampling. The logical consideration is whether or not we can argue that the constant for New York can be exchanged for the constant in New Jersey while maintaining the same subjective distribution. If this logical criterion is satisfied, then the random effects specification could be the suitable specification. In the present analysis, it might be reasoned that we could perform the exchange of the α_i 's from the previously mentioned states but when we are observing 48 states, it is less likely that this argument would hold.⁸³

Second, Hausman (1978) has a test in which we compare the estimates between the random effects and fixed effects models to decide if there is correlation between the α_i and the x_{it} , assuming that the idiosyncratic errors and the explanatory variables are uncorrelated across all time periods. Along with applying intuition regarding state level data, the Hausman test will give us an additional tool in which we can then argue in favor of the most plausible model to use in this analysis.

The Hausman test, however, is not without its limitations. Specifically, the test depends on asymptotics and is based on the difference between two separately estimated covariance matrices being positive definite. In finite samples it is common that the difference is not positive definite and in this case, the Hausman test is undefined. Wooldridge (2002) suggests when testing more than one parameter, it is somewhat more trivial to use an F statistic version of the Hausman test. For example, consider the extended model

$$(1.5.15) \quad \tilde{y}_{it} = \tilde{x}_{it}\beta + \tilde{w}_{it}\xi + error_{it} \quad t = 1, \dots, T; i = 1, \dots, N$$

where ξ is an $M \times 1$ vector. \tilde{x}_{it} and \tilde{y}_{it} are the quasi-demeaned data, in which the random effects procedure removes a fraction of the time average from the explanatory and dependent variables at each time period, t . The fraction removed is

$$\hat{\lambda} = 1 - \left\{ 1 / \left[1 + T(\hat{\sigma}_\alpha^2 / \hat{\sigma}_u^2) \right] \right\}^{1/2}$$

where $\hat{\sigma}_\alpha^2$ and $\hat{\sigma}_u^2$ are consistent estimators of σ_α^2 and σ_u^2 . Therefore,

⁸³ New York and New Jersey may be similar because they border each other but consider New York compared to South Carolina when analyzing the effects of our explanatory variables on union density. It is a well-known fact that there are some underlying beliefs about unions that make the South different from other regions, in their "tastes" for unions.

$$\tilde{y}_{it} = y_{it} - \lambda \bar{y}_i \text{ and } \tilde{x}_{it} = x_{it} - \lambda \bar{x}_i$$

are the quasi-demeaned dependent and explanatory variables, where, as shown earlier,

$$\bar{y}_i = T^{-1} \sum_{t=1}^T y_{it}, \text{ and } \bar{x}_i = T^{-1} \sum_{t=1}^T x_{it}.$$

We let w_{it} denote a $1 \times M$ subset of time-varying elements of x_{it} , excluding any time dummy variables. Therefore, \tilde{w}_{it} denote the time-demeaned version of w_{it} . The test is implemented by testing $H_0 : \xi = 0$ using pooled OLS analysis. The restricted SSR is obtained from the pooled regression of

$$\tilde{y}_{it} \text{ on } \tilde{x}_{it}, \quad t = 1, \dots, T; i = 1, \dots, N$$

in which we obtain $\hat{\beta}_{RE}$, the random effects estimator. This is the sum of squared residuals from the restricted model, SSR_r . The unrestricted SSR, denoted SSR_{ur} , comes from the pooled OLS estimation of equation (1.5.15). The F statistic is then

$$F = \frac{(SSR_r - SSR_{ur})}{SSR_{ur}} \cdot \frac{(NT - K - M)}{M}$$

where K is the number of explanatory variables in the restricted model and M is the subset number of explanatory variables in the unrestricted model.

The test $H_0 : \xi = 0$ is a test of assumptions (A.1.5), (A.1.6), (A.1.9), (A.1.3) and (A.1.16). The goal for this analysis is to decide between the random effects model and the fixed effects model in which we are observing the effect of public policy variables on union membership in states. Therefore, we have implemented the F - test using a model consisting of only structural variables and the full model in which the policy variables are included with the structural variables.

The value of this test statistic is 2.211. The F-critical value $F_{40,1089,0.01} = 1.61$, so we reject the null hypothesis that $\xi = 0$ ($p > F = 0.000$) and conclude that x_{itj} and α_i are correlated, arguing against the random effects model. Coupled with the logical interpretation that the α_i 's cannot be exchanged, we argue in favor of the fixed effects specification to analyze our cross-sectional time series data.

1.6. Empirical Results

The estimates from the fixed effects procedure for the years 1966-2001 are reported in Table 1.3.⁸⁴ The dependent variable is the percentage of the nonagricultural labor force that are union members.⁸⁵ We report two regressions: a regression including only the structural variables (1) and a one of the full model (2). Observing the structural model, we find that all of the variables have significant coefficients and most have the expected signs, if hypothesized. The coefficient on the proportion of the labor force that is non-white is positive, indicating that the demand for union services by minorities outweighs any discrimination on the part of unions during the organizing process. Interestingly though, the regional variable (Urbanization Rate) attains the opposite sign as hypothesized. It could be the fact that over this time period, urban areas did not change in size to a considerable extent or that the areas did change but the composition moved in a direction less amiable towards unions and union membership. Overall, the structural model explains about 92 percent of the variance in the degree in union membership among the states over the sample period.⁸⁶

Getting to the heart of the matter, we now focus our attention on the full model, allowing us to analyze the government substitution hypothesis. Upon inclusion of the management opposition proxy, as well as the public policy variables, the proportion of the variation in union membership among the states across the sample period that the full model now explains is 93 percent. The coefficients on the structural variables are again generally consistent with their hypothesized signs. The coefficients on labor force aged 16-24, non-white labor force, and urbanization rate, however, are no longer significant.⁸⁷

⁸⁴ The years estimated are with some gaps due to data availability. Missing years include odd years 1967-1973.

⁸⁵ The possibility of heteroskedasticity was raised given the argument that the variances of the error term do not remain constant within a cross-section over time. The cause of the non-constant variances in the errors is due to way the dependent variable was calculated and from how the data on this variable was acquired. The F-statistic for the Goldfeld-Quandt test is 2.298. The F-critical value, $F_{173,1226,0.01} = 1.30$ ($p > F = 0.000$), leading us to reject the null hypothesis of homoskedasticity. For the Goldfeld-Quandt test, the decision of where to divide the sample into two groups was made based on how the data for union density were collected as well as an observation of the residuals across time. Prior to 1973, union membership figures were gathered from the Bureau of Labor Statistics Directory. For years 1973 to 2001 state estimates are based on CPS data and the CPS Outgoing Rotation Group. Therefore, we chose as our break, the year 1973. It also appears, by observing a plot of the residuals, that there was some type of structural break prior to 1975. Because we could not reject the null hypothesis of homoskedasticity, we forced heteroskedasticity from our model by performing weighted least squares. The method used to correct for heteroskedasticity is included in the appendix, which can be acquired from the authors by request.

⁸⁶ The regression includes state dummy variables, which in part explains the high adjusted R^2 .

⁸⁷ The possibility of multicollinearity exists as we try to infer about the changes in significance of some of the structural variables when we add the rest of the explanatory variables to the model. If multicollinearity exists, the standard errors of the estimates will be relatively higher, leading to smaller t-statistics. The variables in question are those that once had significant coefficients in the structural model only to lose significance in the full model. When observing the variance inflation factor (Greene, pp. 257) for these variables, we cannot conclude that there is serious multicollinearity. Additionally, we ran a separate regression including only the variables used to test the government substitution hypothesis. When adding the structural variables, the signs and significance of the welfare variables do not change.

We find no support for the management opposition hypothesis. We proxied for this hypothesis by measuring the number of CA cases in a state normalized by the number of eligible voters in that state. Included in CA cases are possible violations of Section 8(a)(1), (2), (3), (4), (5), or any combination thereof. To the extent that an employer's violation of any of these sections does not deter an employee's decision upon joining a union, this would bias the coefficient toward zero. Additionally, if the tactics used by employers to weaken an employee's demand for unions are in some form "positive labor relations" or "tough legal campaigns," relative to "illegal campaigns," then the growth in either one or both of the first two mentioned might weaken the ability to pick up the effects of the number of CA cases in a state on union membership within that state.

The coefficients on the three exceptions to the employment-at-will doctrine all take the expected sign and all are significant. These results are somewhat consistent with Neumann and Rissman (1984), although when the authors include the exceptions in a regression, the coefficient on the public policy exception takes a positive sign.⁸⁸ Unlike Neumann and Rissman, we included the covenant of good faith and fair dealing exception. Perhaps its exclusion by Neumann and Rissman was due to the infancy of its notoriety across states during the time of their study.⁸⁹ With respect to the public policy exception, compared to the good faith exception, the trend variables tell a different story. As the time period that a state has recognized the public policy exception increases, the negative effect on union membership within that state diminishes. It appears, however, that over time the negative effect of the good faith exception on union density gets stronger. This effect is significant even though the effect of the good faith exception on union density is not significant. We have no evidence of any significant effects of the implicit contract exception on union density over time.⁹⁰

The coefficient on OSHA inspections is negative and significant, indicating that there is some support for the argument that OSHA activity has had an unfavorable effect on union membership within a state over time. Moore et al. (1987) included OSHA expenditures in their aggregated welfare expenditure variable and found support for the government substitution hypothesis in two-out-of-three model specifications. Given the ability to isolate OSHA activity across states over time, we increase the reliability of these earlier findings.

⁸⁸ Neumann and Rissman (1984) offer that the public policy exception is more relevant in white-collar occupations, arguably a sector less likely to be unionized.

⁸⁹ In fact, out of the ten states recognizing the covenant of good faith exception by 2001, only two had court rulings determining recognition prior to 1980, the last year of Neumann and Rissman's data.

⁹⁰ It is quite possible that our modeling of (linear) and how we coded the time trend is not realistic. We would expect that the effects of these exceptions to the employment-at-will doctrine on union density would be insignificant at some point after they were first recognized by the state's court. Therefore, we do not put very much emphasis on the effects of these trend variables and note that there is a need to better model (perhaps as a quadratic) the likelihood of saturation over time.

Table 1.3. Empirical Results of the Fixed Effects Procedure			
t -statistics in parentheses			
Variable	Anticipated signs	(1)	(2)
		N = 1536	N = 1536
Female Labor Force	(-)	-0.4050***	-0.338***
		(5.15)	(12.62)
Non-White Labor Force	(+)	0.1716***	-0.01
		(3.70)	(0.48)
Labor Force Age 16-24	(+ or -)	0.8131***	0.03
		(7.53)	(1.46)
Labor Force Age 55-64	(+ or -)	0.1632**	0.658***
		(2.89)	(14.73)
Goods Producing Sector	(+)	0.1443*	0.045**
		(1.71)	(2.65)
Urbanization Rate	(+)	-0.1777***	0.02
		(4.87)	(0.82)
Large Firm Size	(+)	7.8950**	6.121***
		(2.35)	(3.67)
Management Opposition	(-)		0.003
			(0.55)
Workmen's Compensation	(-)		0.001**
			(2.09)
Unemployment Compensation	(-)		0.01***
			(3.29)
State Unemployment Comp.	(-)		-0.01***
			(3.25)
OSHA Inspections	(-)		-0.0001***
			(4.31)

(Table 1.3. continued)

(Table 1.3. continued)

Public Policy Exception	(-)		-0.349*
			(1.77)
Years of Public Policy Exception	(+ or -)		-0.281***
			(15.01)
Implicit Contract Exception	(-)		-0.643**
			(2.85)
Years of Implicit Contract Exception	(+ or -)		0.023
			(1.16)
Good Faith and Fair Dealing Exception	(-)		-2.12***
			(6.90)
Years of Good Faith and Fair Dealing Exception	(+ or -)		0.083***
			(3.08)
Constant		21.1066	20.29086
		(3.43)	(9.96)
Adjusted R-squared		0.92	0.93
***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively			

The welfare coefficients present us with some mixed results. The coefficients on all welfare variables are significant yet two are not the hypothesized sign. Workers' compensation appears to have a positive impact on union membership within a state. As mentioned by Moore et al. (1987), unions have played an increasing role in supporting and advocating social policies that protect workers. With regards to workers' compensation, it may be that at this point unions use this stance as a platform when campaigning for increased membership.

Unemployment compensation also appears to have a positive effect on union density within a state. As we argued previously, it could be that compensation to both federal employees and veterans are mitigating the effects of the aggregate measure of unemployment compensation on union density.⁹¹ Therefore, by disaggregating unemployment compensation into what is arguably more substitutable with the services that unions provide we should be able to make more reliable inferences. Upon doing so we observe that the coefficient on state unemployment compensation is negative and significant indicating that this measure of welfare negatively affects union density.

⁹¹ We performed numerous additional specifications, including a combined measure of the expenditures made to federal employees and veterans in an attempt to consider more robust results. The coefficient on this variable was positive and significant but perhaps more interesting was that the "disaggregated" aggregate unemployment compensation measure was still positive but smaller and no longer significant.

1.7. Conclusion

The goal of this paper was to converge toward a consensus in regards to the effects of public policy and government provided services on union membership within a state. With regard to the marginal worker, one who is “on-the-fence” when making the decision either to join a union or remain uncovered, we hypothesized that the establishment of welfare services provided by government would lead to the decision to substitute away from unions and their services. It is the marginal worker, we argue, whose decision would be affected not by the pecuniary aspects of employment bargained for by unions but the nonpecuniary aspects such as worker safety and some form of insurance in the event of economic downturns or in the case of on-the-job injuries. Up-to-date, there have been mixed results with probably and understandably a heavier lean towards no significant effect. We have argued that a more refined measure was needed in order to capture what workers regard as substitutable for the services that unions have historically supplied. In the spirit of Ashenfelter and Pencavel (1969), we used a reduced form demand and supply model to hypothesize that the inception and knowledge of these services provided by government would result in a decrease in demand for and/or supply of union services. We used cross-sectional time-series data to better capture substitutability by allowing for more variation in welfare provisions as well as controlling for differences in general attitudes toward unions across states. Upon attainment and analysis of these refined measures, we show evidence that the government substitution hypothesis is meaningful in explaining a portion of the secular decline in union density over the time period studied. With a positive significant relationship regarding a state’s distribution of workers’ compensation and union density, we offer the explanation that over time unions actually work toward increasing this provision for the protection of its’ members and nonmembers. The negative relationship between a state’s provision of unemployment compensation and union density reinforces Neumann and Rissman’s (1984) earlier findings that the government substitution hypothesis has merit. We find comfort in the fact that the coefficient on the aggregate measure of unemployment compensation becomes smaller and insignificant when we disaggregate components argued not to be substitutable with the services that unions provide. Finally, in regards to the exceptions to the employment-at-will doctrine, our evidence harmonizes with that of Neumann and Rissman (1984) and shows additionally that the broadest departure from the doctrine has a significant negative relationship with union density.

CHAPTER 2

THE EDUCATIONAL/OCCUPATIONAL CHOICE OF REGISTERED NURSES IN LOUISIANA

2.1. Introduction

The health services industry is one of the largest in the country, with more than 11 million jobs. The largest health care occupation, with more than 2 million jobs, is a registered nurse. According to the Occupational Outlook Handbook, a registered nurse position is one of the 10 occupations projected to have the largest number of new jobs. Through 2010, employment of RNs is expected to grow faster than average (increase 21-35%) for all occupations. Many new jobs will be created as the population of retired citizens grows. Additionally, the need to replace those experienced nurses who leave the occupation due to retirement could increase the gap between the quantity of registered nurse labor supplied and quantity demanded.

There are three major educational paths to becoming a registered nurse: associate degree in nursing, baccalaureate of science degree in nursing, and diploma. Associate degree programs, offered by community and junior colleges, take about 2 to 3 years to complete. About half of the 1,700 RN programs in 2000 were at the associate degree level. Baccalaureate programs, offered by colleges and universities, take 4 to 5 years. More than one-third of all programs in 2000 offered degrees at the baccalaureate level. Diploma programs, administered in hospitals, last 2 to 3 years. Only a small number of programs offer diploma-level degrees. Generally, licensed graduates of any of the three program types qualify for entry-level positions as staff nurses.

In all states, students must graduate from an approved nursing program and pass a national licensing examination to obtain a nursing license.⁹² All states require periodic license renewal, which may involve continuing education.

Baccalaureate programs encompass all of the course work taught in associate degree and diploma programs in addition to a more in-depth treatment of the social and physical sciences, nursing research, public and community health, nursing management, and the humanities. To the extent that substantial heterogeneity exists between the baccalaureate program and the associate degree and diploma programs, one might argue that the former would better prepare entry-level nurses for the increasing complexity of the scope of practice for RNs. The National Advisory Council on Nurse Education and Practice (NACNEP), in its *Report to the Secretary of the Department of Health and Human Services on the Basic Registered Nurse Workforce*, found that nursing's role for the future requires critical thinking and problem solving skills; a sound foundation in a broad range of basic sciences; knowledge of behavioral, social and management sciences; and the ability to analyze and communicate data. NACNEP argues that the baccalaureate degree in nursing, with its broader and stronger scientific curriculum, best fulfills these

⁹² Graduates of all three programs must pass the same NCLEX-RN examination.

requirements and provides a firm foundation for addressing the complex health care needs of today and the future in a variety of nursing positions.

Many associate degree and diploma-educated nurses later enter baccalaureate programs to prepare for a broader scope of nursing practice. They can often find a staff nurse position and then take advantage of tuition reimbursement programs to work toward a baccalaureate degree.

Some career paths in nursing are open only to nurses with bachelor's or advanced degrees. A baccalaureate degree is often necessary for administrative positions, and it is a prerequisite for admission to graduate nursing programs in areas such as teaching and advanced practice.⁹³

An interesting question therefore arises to, when an individual makes the decision to become a registered nurse, why is the choice of a particular education path chosen over another path? Human capital theory predicts that, *ceteris paribus*, individuals with more education will receive higher wages. Schumacher (1997) and Link (1992) observe, however, that the returns to a baccalaureate degree in nursing relative to the associate degree and diploma program is not large enough to compensate for the forgone earnings and higher tuition costs associated with the baccalaureate degree. Spetz (2002) confirms this observation as well and suggests that, due to the fact that 30 percent of new nurses are receiving the baccalaureate degree as their basic nursing educational preparation, non-monetary factors are also important to a RN's choice of education.⁹⁴

With an anticipated increase in the demand for registered nurses in the coming years, an important factor will be the ability to recruit and retain individuals as registered nurses. The issues surrounding the need to recruit and retain can possibly be addressed by federal and state legislation as well as through public and private partnerships. For example, some believe in the importance of increased funding for what is known as the RN-to-BSN program. This program allows registered nurses with a diploma or associate's degree to continue their education in attaining a baccalaureate degree in nursing. This will increase the supply of RNs with a BSN and it is argued that a percentage would continue their education, with a master's degree or doctorate, ultimately increasing the number of nurse faculty.

A policy debate could develop by asserting that increased funding to increase the supply of nursing students would not work to the level of need. After all, a large part of the financial assistance goes to those students who already made the decision to become a nurse. Further, as with any policy analysis, the outcome should be based on the overall

⁹³ A factor explaining at least part of the nursing shortage includes the increased age of nurse educators. To the extent that nurse educators are reaching retirement age and relatively fewer registered nurses are earning a baccalaureate degree as their nursing educational preparation, the need to replace nurse educators will not be met. This will affect the number of admissions allowed in nursing schools.

⁹⁴ Additionally, in an informal interview with several registered nurses whose educational preparation is the associate degree, the question was asked why they chose that particular level of education. All agreed that due to no expected difference in wages, the associate degree prepared them for the market in less time.

goals. For example, if there is a registered nurse labor supply shortage, then the policy goal should be to increase the supply of registered nurses.

Does providing extra financial assistance for RN-to-BSN education meet the goal of increasing the supply of registered nurse labor? The plan of this paper is to empirically address this question by observing the occupational choices of registered nurses conditional on certain events. The choices are: staff nurse, mid-level manager or charge nurse, administrative officer, advanced practice registered nurse, and school of nursing faculty. The conditional events are level of education based on the three basic paths to become a RN as well as a master's of science and doctorate degree. Additionally, this paper will add to the existing literature on occupational choice by allowing for a registered nurse's education level to change. In other words, our model will also estimate the probability of choosing each occupation in the choice set conditional on current educational preparation. We believe that as an RN increases his or her level of education, the likelihood of staying at the bedside, delivering direct patient care as a staff nurse, will decline.

By estimating the probabilities of all occupational choices conditional on having a baccalaureate degree as current education level (where basic educational preparation is not a BSN), we hope to draw inferences about increased funding toward the RN-to-BSN education. In doing so, there are a few econometric issues that arise, specifically from the data set that I will be using. Some of the issues will be addressed while others will simply be noted. The sample contains observations from registered nurses. Therefore, there is a selection bias by not having a random sample drawn from non-nurses as well. One weakness is that we are unable to attain a valid proxy or instrument for a registered nurse's ability. Therefore our results on choice of education and occupation across registered nurses will be made without controlling for different endowments in innate ability?

To assess the impact of a change in educational preparation on a registered nurse's occupational choice, we estimate a mixed model. A strict assumption of both the multinomial logit and conditional logit models is that the outcome categories have the property of independence of irrelevant alternatives (IIA). This property basically states that the relative probabilities of choosing any two occupations are independent of the attributes of any other alternative in the choice set. We will use a Hausman-McFadden type test of the IIA property to observe if there is any systematic change in the coefficients after we exclude one of the outcomes from the model.⁹⁵

We continue this section with a comparison between the registered nurse population in the state of Louisiana and the national registered nurse population. Our goal is to be able to make comparisons to the National Sample Survey of 2000, thereby arguing that any inferences made from this analysis may be also applied on the national level. Section II provides a review of the literature on registered nurses. Specifically, the

⁹⁵ In addition to the Hausman-McFadden test, we will estimate a series of probit models, each time changing the reference occupation. We will then compare the coefficients to illustrate the independence. Finally, we will use a Small-Hsiao test for the IIA assumption.

section introduces some organizations that argue in favor of registered nurses having a baccalaureate degree or higher as their nursing educational preparation and possible reasons why a registered nurse would choose to attain a baccalaureate degree. Section III describes the data and the survey methodology used from the Louisiana registered nurse population. In section IV we describe the theory, model and estimation technique. In section IV we observe the results and section V will conclude.

2.2. Sample Comparison

The following section is a comparison between the registered nurse population in the state of Louisiana and the national registered nurse population. We make this comparison using a survey performed by the Division of Economic Development and Forecasting at LSU, funded by the Louisiana State Nurses' Association, and findings from the National Sample Survey of Registered Nurses. The former survey was performed in the early part of 2001 while the National Sample collected data as of March 2000. It is our argument that there are favorable comparisons between the two groups of registered nurses across several dimensions. Given the similarities between the two groups of registered nurses, we will then agree that our analysis of Louisiana registered nurses can be extended on the national level.

2.2.1. Age

The average age of the total RN population (including retired nurses and those not employed in nursing) was an average of 45.2 years for the National Sample while 38.2 percent of the sampled Louisiana nurses were between the ages of 41-50 (larger than any other age group). For the National Sample, 9.1 percent of the RN population were under the age of 30 and 31.7 percent were under the age of 40 compared to 10.5 percent under the age of 30 and 34.7 percent under the age of 40 in the Louisiana Sample.

2.2.1.1. Age and Year of Graduation by Basic Nursing Educational Preparation

Overall, the number of Louisiana registered nurses whose basic educational preparation was the Diploma has declined since 1965. Out of the 513 nurses sampled, 88 answered that they received the Diploma as their basic nursing education (see Table A.2.1.). Fifty percent of those nurses graduated between 1965 and 1974. That number fell to below twenty-three percent for those who graduated between 1975 and 1984 and less than seven percent of the sampled registered nurses received the Diploma as their basic nursing education between the years 1985 to 1994.

Comparing those registered nurses whose basic nurse education is the Diploma for the age group 51-60 and graduated between 1965-74 (30) to the registered nurses who are 41-50 and graduated between 1975-84 (12) and to the registered nurses aged between 31-40 and graduated between 1985-94 (1), we observe a secular decline.⁹⁶ The same

⁹⁶ We argue that we are comparing different cohorts. The dimension in which they are different is by year of graduation. We can compare the different cohorts because at the year of graduation, each cohort is

trend is observed when we compare the sample of Louisiana registered nurses aged 41-50 and graduated between 1965-74 (13), those RNs aged 31-40 and graduated between 1975-84 (5), and those RNs aged 21-30 and graduated between 1985-94 (1).

Of the 513 RNs sampled, 206 received the Associate's degree as their basic education (see Table A.2.2.). Just fewer than 5 percent of those nurses graduated between 1965-74. That number increased to 28 percent for the RNs who graduated between 1975-84 and increased to just less than 39 percent for those RNs who graduated between 1985-94. We actually observe a decline in the percentage of RNs receiving the Associate degree as their basic education for those who graduated in 1995 or thereafter (27.7 percent).

Table A.2.2. allows us to observe the sample of Louisiana registered nurses whose basic education is the Associate degree by year of graduation and age group. When comparing the different cohorts (for example, aged 41-50 and graduated 1975-84 (38), aged 31-40 and graduated 1985-94 (32), and aged 20-30 and graduated 1995 or later (16)), we observe the same trend displayed in Table A.2.1. There is a decline across cohorts for those Louisiana RNs who receive the Associate degree as their basic education but levels off somewhere between 1985 and 1994 and then declines after 1995.⁹⁷

In the sample of 513 Louisiana registered nurses, 219 received a baccalaureate or higher as their basic educational preparation (see Table A.2.3.).⁹⁸ There is an upward trend from pre-1965 to 1984 (5.5 percent to 33.3 percent) for those graduating with at least a baccalaureate degree as their basic education but declines thereafter (19.2 percent after 1995).

Analogous to Tables A.2.1. and A.2.2., we can compare different cohorts (in terms of year of graduation) to support what we observe in Table A.2.3. Specifically, the number of RNs aged 51-60 who graduated between 1965-74 is 20 in the sample. The next cohort are those RNs aged 41-50 who graduated between 1975-84, which is 52. The number of RNs aged 31-40 who graduated between 1985-94 is 41 and the last cohort, aged 21-30 and graduated 1995 or later consists of 25 RNs.

Finally, we can get a better understanding of the Louisiana registered nurse population, in terms of basic educational preparation, by observing Table A.2.4. Observing across year of graduation and within the Diploma as a registered nurse's response to the basic educational preparation, we see that those receiving this degree decreased as a percentage relative to other degrees over the entire period. In other words, 60 percent of the total nurses sampled who graduated before 1965 earned the Diploma as

approximately the same age. The numbers in parentheses are the number of RNs in the said age group who graduated in said year.

⁹⁷ Table A.2.2. can also be used to compare the cohort, age group 51-60 and graduated between 1965-74, to the other cohorts; age group 41-50 and graduated between 1975-84, age group 31-40 and graduated 1985-94. When doing so, the same trend appears.

⁹⁸ Of the 219, 17 responded that a Master's degree was their basic educational preparation. No one responded that a Doctorate was his or her basic education.

their basic education. This number fell to just over 57 percent for those RNs who graduated between 1965-74 and earned the Diploma as their basic education and declined even more for the year of graduation between 1975-84 (just over 13 percent) as well as year of graduation 1985-94 (just below 4 percent).

When observing the Associate degree as a registered nurse's basic educational preparation in Table A.2.4., we see that across year of graduation there is a monotonically increasing trend. For example, just fewer than 13 percent of the sampled nurses who graduated between 1965-74 earned an Associate degree as their basic education. For year of graduation 1995 or later, just fewer than 58 percent of the total earned the Associate degree.

In Table A.2.4., if we observe those RNs who earned a Baccalaureate degree or higher as their basic educational preparation, across year of graduation, we see no apparent trend. However, we could maintain that relative to other types of basic educational preparation, the Baccalaureate degree is the most consistent across time.

2.2.2. Family Status

According to the National Sample survey of registered nurses in March of 2000, 71.5 percent of all RNs were married and 28.8 percent were either single, divorced, widowed or separated. The LSNA survey of 2001 reported that 70.2 percent of the 494 respondents were married and 29.8 percent were divorced, single or other. Additionally, for the Louisiana survey, 52.8 percent of RNs have dependent children living at home compared to 52 percent of RNs from the National survey.

Registered nurses in Louisiana were more likely to work part-time in nursing when they have dependent children living at home relative to not having dependent children. Observing Table A.2.5., we see that in 2000, 66 percent of the RNs who worked part-time had dependent children compared to 44 percent working part-time without dependent children. For the RNs working full-time, 51 percent had dependent children compared to 49 percent who had no dependent children. Of the RNs with dependent children, 84 percent worked full-time in 2001 compared to 91 percent of RNs who worked full-time without dependent children.

2.2.3. Nursing Educational Preparation

2.2.3.1 Basic Education Versus Highest Nursing Education

The basic educational preparation for the largest proportion of RNs in the National Sample is the associate degree at 40 percent. The same can be said for the Louisiana sample as 210 out of the 524 respondents received the associate degree as their initial degree in nursing (see Table A.2.6.). Almost equivalent, 39 percent of Louisiana RNs attended baccalaureate programs as their initial nursing education while roughly 17 percent of the Louisiana sampled RNs chose the diploma program as their basic educational preparation. This is somewhat different from the National Sample, which

reports equal proportions (about 30 percent) for the diploma and baccalaureate degrees as basic educational preparation.

Table A.2.6. provides us with a preliminary glimpse of how mobile the Louisiana registered nurse population is in terms of education. For example, out of the 91 RNs whose initial nursing education was the diploma, 69 (76 percent) responded that the same degree was their highest nursing-related education. Additionally, there are 210 of the Louisiana RNs whose initial nursing education was the associate degree. The number of Louisiana RNs who responded that the associate degree was their highest nursing-related education was 182 (87 percent). Finally 176 of the 206 (85 percent) RNs initially earning a baccalaureate degree in the Louisiana survey responded that the baccalaureate degree was their highest nursing-related education. In comparison, on the national level, the percentage of RNs who indicated that their current education is the same as their basic education in March of 2000 was: 75.3, 84.5, and 81.5 percent for the diploma, associate degree, and baccalaureate degree, respectively.

2.2.3.2 Current Enrollment in Nursing and Non-nursing Education

The National Sample of March 2000 reports that 6.7 percent of the country's RNs were enrolled in formal education programs leading to a nursing or nursing-related degree. For those enrolled in academic programs, 72 percent were employed in nursing full-time. The Louisiana survey reports that 18 percent of Louisiana RNs were enrolled in academic programs both in nursing related and non-nursing related degrees (see Table A.2.7.). Roughly 14.5 percent of the Louisiana sampled RNs were seeking nursing related degrees. For those RNs enrolled in nursing related academic programs almost 92 percent are working full-time in nursing.

2.2.4. RNs in the Workforce

In the National Sample survey of March 2000, 59.1 percent of RNs worked in hospitals. The next largest group was 18.2 percent of RNs working in public/community health settings including various types of community health centers, student health services, and occupational health services. In regards to this question in the Louisiana survey, there were 499 respondents and about 68.5 percent (342 RNs) answered that they worked in the hospital setting. Like the National Sample survey, the next largest group was almost 14 percent of the RNs who worked in either the public, community, occupational, or school settings. Additionally, the Louisiana survey compares favorably with the National Sample survey at around 9.5 percent of those RNs who work in outpatient/ambulatory care settings. Roughly 4.6 percent of the Louisiana RNs work in nursing homes/extended care/assistive facilities compared to 6.9 percent of the National respondents. Finally, comparable to the National Sample survey, the remaining group in the Louisiana survey was those RNs working in nursing education (3.81 percent for the Louisiana survey).

2.2.5. Characteristics within Employment Setting

2.2.5.1. Part-time Versus Full-time Registered Nurses

An estimated 28.4 percent of the RNs in the National Sample survey were working part-time in March 2000. The percentage of RNs working part-time in Louisiana according to the LSNA survey was around 13.1 percent (see Table A.2.8.). In reference to employment setting, for the National Sample survey, the highest percentage of part-time workers were those RNs working in ambulatory care settings. The highest percentage of part-time workers in the Louisiana survey were those RNs working in a hospital setting (71.9 percent of part-time RNs) and the second highest were those RNs working in ambulatory care (12.5 percent of part-time RNs). The lowest percentage of part-time workers in the National Sample were those RNs working in nursing homes and other extended care facilities and occupational health settings while according to the LSNA survey, the lowest percentage of part-time workers were those RNs working in nursing education (3.1 percent of part-time RNs).

2.2.5.2. Hours-Per-Shift Worked

In Louisiana, for the RNs working full-time in the hospital setting, most (40 percent) responded that their usual shift was a twelve-hour shift while almost 3.5 percent reported having no usual pattern in terms of hours-worked-per-shift. For all other settings, most RNs worked eight hours as their usual hours-per-shift.

2.2.5.3. Employment Setting and Age

According to the National Sample survey, younger nurses are more likely than older nurses to be employed in hospitals. The average age of the hospital nurse was 41.8 compared to 43.3 for ALL employed RNs in the National Sample. In the Louisiana survey, 85.2 percent of RNs aged between 20-30 worked in a hospital setting compared to 66.7 percent of RNs aged 51-60 (see Table A.2.9.). However, out of the 341 RNs working in the hospital, the largest age group was 41-50 or 34.6 percent of all RNs working in the hospital were between the ages of 41-50.

2.2.5.4. Employment Setting and Current Nursing Education

In the National Sample survey, in most employment settings, the majority of RNs had an associate or baccalaureate degree as their highest educational preparation. Seventy-four percent of the RNs working in a hospital in March 2000 had an associate or baccalaureate degree; 57 percent had less than a baccalaureate. Results of the Louisiana survey show that a little more than 80 percent of RNs working in a hospital had an associate or baccalaureate degree; 37.8 percent had less than a baccalaureate (see Table A.2.10.).

2.2.6. Position Titles

2.2.6.1. Employment Setting and Position Title

More than 60 percent of the employed nurses in the National Sample survey in 2000 were in staff-level positions.⁹⁹ Table A.2.11. shows that of the 484 respondents in the 2001 Louisiana registered nurse survey answering questions of employment setting and position title, 298 were staff nurses (62 percent). This percentage matches that of the National Sample. The largest proportion of staff nurses worked in hospitals (73.2 percent) while the next largest worked in public, community, occupational, or school settings (12.1 percent). Of all possible employment settings, most position titles worked in hospitals except for those RNs whose position title was in the school of nursing faculty. Eighty-eight percent of nursing faculty worked in nursing education while 11.8 percent worked in hospitals.

2.2.6.2. Position Title and Highest Education

Table A.2.12. shows the variation in educational preparation according to position title for Louisiana registered nurses. The largest percentage of staff nurses, with regards to highest education, are RNs with a baccalaureate degree (45 percent), however almost 52 percent of staff nurses have less than a baccalaureate as their highest educational preparation. Additionally, 52 percent of mid-level managers, or charge nurses, have less than a baccalaureate degree as their highest educational preparation. Finally, Table A.2.12. shows that more than one-half of nurses employed with position titles other than staff nurse had baccalaureate preparation or higher. In comparison, the data from the National Sample of 2000 show that 60 percent or more of those with position titles of staff nurse, supervisor, and private duty nurse have less than a baccalaureate degree as their highest nursing-related educational preparation. And except for head nurse, more than 50 percent of nurses employed with other position titles had at least a baccalaureate degree as their highest educational preparation.

2.2.6.3. Employment Setting, Position Title and Annual Salaries

According to the National Sample survey, in March 2000, the average annual earnings of full-time registered nurses in their principal nursing positions was \$46,782.¹⁰⁰ Table A.2.13. shows that there were 412 responses for annual salaries based on full-time employment setting and position held in 2001. With regard to staff nurses working full-time in a hospital, only 3 percent made \$30,000 or less in 2001 while 17.8 percent made more than \$50,000. Upon observation of the remaining staff nurses in other employment

⁹⁹ Findings from the National Sample Survey of Registered Nurses for 2000 also contain comparative information from previous survey years. An interesting fact is that although the number of staff nurses has increased in 2000, their proportion of the total nurse workforce has declined from 67 percent in 1988 to 62 percent in 2000. It is this fact that will be addressed when we observe the change in the likelihood of being a staff nurse given an RN's change in education.

¹⁰⁰ The Louisiana State Nurses' Association survey for 2001 was a categorical survey. Due to this type of survey, we were unable to report average salaries. Instead, of course, we will report the proportions of RNs across salary ranges.

settings, we can see that most full-time nurses earn more than \$31,000 per year. Additionally, this trend can be observed when looking at all other position titles in Table A.2.13. except those nurses working in advanced practice, which are shown to earn higher salaries.¹⁰¹

When analyzing the National Sample survey, annual earnings varied according to the setting in which the RN was employed. The average annual earnings for those working full-time in the hospital setting in 2000 was \$47,759, which was higher than the overall full-time earnings average across all types of settings (\$46,782).

Comparing salaries and employment setting for Louisiana registered nurses, only nursing education had a higher percentage of RNs earning greater than \$41,000 per year in 2001 (81 percent) relative to RNs in the hospital setting (74 percent).

2.2.6.4. Position Title, Highest Education and Annual Salaries

According to the National Sample survey, in March 2000 average annual salaries varied according to the highest level of nursing educational preparation. As expected, nurses with advanced degrees achieved higher earnings (Master's prepared nurses averaged \$61,262). The overall average earnings for those RNs whose highest educational preparation was a diploma was \$46,624, while it was \$46,570 for those whose highest nursing education was a baccalaureate degree.

Table A.2.14. shows the earnings of Louisiana registered nurses employed full-time according to position title and highest nursing-related educational preparation. Except for the diploma as the highest educational preparation, the trend on salaries appears as we would expect when education level is increased. Fifty-five percent of RNs with the associate degree as highest educational preparation earned more than \$41,000 per year in 2001. For those RNs whose highest education is a baccalaureate, 59 percent earned more than \$41,000. The percentage of RNs earning more than \$41,000 per year in 2001 increases to 85 percent for those with a Master's degree and 100 percent for those with a doctorate degree as their highest level of nursing-related educational preparation.¹⁰²

When observing across highest education levels for Louisiana registered nurses, for those RNs with a diploma, 38 percent earned between \$41,000-\$50,000 in 2001. For

¹⁰¹ Advanced practice nurses typically have higher educational preparation and/or training, which human capital theory tells us should lead to higher compensation. Table A.2.14. shows that over 80 percent of advanced practice nurses have a Master's degree as their highest educational preparation.

¹⁰² For those nurses whose highest education level was the diploma in 2001, 72 percent earned more than \$41,000 per year. A possible explanation for the competitiveness between salaries of RNs with a diploma and RNs with higher educational levels could be that those RNs with the diploma degrees have been in the workforce longer, leading to more years of experience relative to those RNs with higher levels of education. Referring back to Table A.2.1., we can see that for those RNs graduating between 1965-1974, 57 percent listed the diploma as their basic educational preparation (43 percent for associate and baccalaureate degree). In comparison, those RNs graduating between 1975-1984, only 13 percent listed the diploma as their basic educational preparation (87 percent for associate and baccalaureate degree).

those RNs with an associate degree as the highest educational preparation, 34.9 percent earned between \$31,000-\$40,000 in 2001. Thirty percent of RNs whose highest nursing-related educational preparation was a baccalaureate degree earned between \$41,000-\$50,000 in 2001 and for those RNs whose highest level of education was a Master's degree or a Doctorate, the percentage earning greater than \$50,000 in 2001 was 56.6 and 67 percent, respectively.¹⁰³

Within the National Sample survey in 2000, just over 28 percent of RNs worked part-time in nursing with either one principal position or a principal and secondary positions. Fifteen percent of all the employed nurses held other paid nursing positions in addition to their principal nursing position.

Within the Louisiana sample, 13 percent of employed registered nurses worked part-time and 39 percent of those working part-time had more than one position held in 2001. For the remaining RNs in the sample working full-time, 21.6 percent held other positions in addition to their principal position. Compared to the National Sample (15 percent), 23.9 percent of all the employed nurses in the Louisiana sample held other paid nursing positions in addition to their principal nursing position.

2.2.7. Job Satisfaction

The March 2000 survey of the National Sample of registered nurses was the first time questions were included on job satisfaction. The following section will analyze the responses given on the national level relative to those given by RNs in the state of Louisiana.

Just over two-thirds (69.5 percent) of the entire national sample reported being satisfied in their current position. This number is lower than that reported by the employed general population. Data from the General Social Survey of the National Opinion Research Center indicate that 85 percent of workers in general and 90 percent of professional workers expressed satisfaction with their job.¹⁰⁴

Across all position titles, 15.8 percent of Louisiana registered nurses in 2001 were at least dissatisfied with their career choice in nursing with roughly 57 percent of those at least dissatisfied working as a staff nurse and 35.5 percent of those at least dissatisfied working as a mid-level manager or charge nurse.¹⁰⁵

When observing job satisfaction and employment setting within the state of Louisiana, 83 percent of RNs who reported being dissatisfied or very dissatisfied worked

¹⁰³ These figures should be considered only with the understanding that we have not controlled for experience. Therefore, it could be that we gain little insight in analyzing earnings and differences in education from Table A.2.14.

¹⁰⁴ This is for years 1986 through 1996. Source: National Opinion Research Center, "General Social Survey, Data Information and Retrieval System," 15 March 1999, www.icpsr.umich.edu/GSS99 (17 November 2000).

¹⁰⁵ At least dissatisfied includes both possible choices: dissatisfied and very dissatisfied.

in hospitals (see Table A.2.15.). The remaining percentage of those RNs at least dissatisfied was distributed fairly evenly across the remaining employment settings.

In Table A.2.16., we observe the likelihood, as reported by the Louisiana registered nurses, that an RN will be practicing as a professional nurse in five and ten years along with reasons going into making those decisions. Almost 19 percent of the RNs sampled responded that it is unlikely or very unlikely that they would be practicing nursing in five years, and 38.6 percent answered that it is unlikely or very unlikely that they would be practicing as a professional nurse in 10 years. The number one factor for deciding to stay in nursing or leave for both time frames is wage level. Sixty-eight percent of the RNs who are at least unlikely to remain in nursing in five years and 70 percent of the RNs who are at least unlikely to remain in nursing in ten years are at least in part basing their decision on the wages they receive. The same factor appears to be the main focus when making a favorable decision to remain in nursing for the next five and ten years (see Table A.2.16.).

2.2.8. Geographic Distribution of the Louisiana RN Population

This section observes several dimensions of the Louisiana registered nurse population based on the geographical area of the state. Obviously, this section is not intended as a tool for comparison with the National Sample.

2.2.8.1. Geographic Distribution and Employment Status

If we first observe the number of RNs in Louisiana working full-time and part-time, we might be able to infer if there is a region of the state relatively more concentrated with RNs. Table A.2.17. shows that the highest concentration of RNs, both full and part-time, is in the Southeast section of the state. This is somewhat obvious as New Orleans is located in this area. The next highest concentration for both full and part-time RNs is in the Central area, which includes Baton Rouge.

2.2.8.2. Geographic Distribution and Highest Educational Preparation

Within each geographical region of Louisiana, Table A.2.18. shows that the Northwest, Southeast, and Southwest areas are relatively more educated. In these regions the percentage of RNs having at least a baccalaureate as their highest educational preparation is 71, 51.6, and 60.8 percent, respectively. Within the Northeast and Central regions, 54.2 and 58.4 percent of RNs have less than a baccalaureate degree, respectively.¹⁰⁶

¹⁰⁶ When normalized, or taking into account the total number of RNs per region, the distribution of RNs with a baccalaureate degree as their highest educational preparation is fairly uniform, with the Southwest region having a slightly higher proportion and the Central region having a slightly lower proportion. The same cannot be inferred when observing the associate degree or the diploma as the highest educational preparation. For the associate degree, the Northeast and Central region have a distinctly higher proportion relative to the Northwest, Southeast, and Southwest regions. For the diploma, the Southeast and Southwest

2.2.8.3. Geographic Distribution and Age

Except for the Northwest region, the majority of RNs in the Louisiana sample are between the ages of 41-50 (see Table A.2.19.). The Northwest region is slightly younger, with 36.7 percent of RNs are between the ages of 31-40 (50 percent are younger than 41 years of age). The Southwest region of Louisiana contains the oldest population of RNs, as 25.9 percent of RNs are younger than 41 years of age. This is compared to 36 percent, 37.2 percent, and 34.5 percent for the Northeast, Central, and Southeast regions, respectively. The youngest nurses (age 20-30) are mostly located in the Southeast region. However, once controlling for the number of RNs, for all ages, across all regions, the concentration of younger nurses appears to be uniformly distributed. Only the Central region, with 113 total RNs, has a lower distribution of younger nurses (9 RNs age 20-30 out of 53 RNs in all regions age 20-30).

2.2.8.4. Geographic Distribution and Employment Setting

When observing across all regions in Louisiana, registered nurses are mostly working in hospitals (see Table A.2.20.). The next highest concentration of employment setting appears to be in the Public/Community/Occupational/School setting. As the face of health care continues to go through changes in the upcoming years, we would argue that the demand for registered nurses in this setting will increase and therefore more RNs will either enter the profession in this area or migrate from the hospital setting. The next highest concentration across all regions in Louisiana is the Outpatient/Ambulatory Care setting. For the same reasons, we expect this setting to grow in terms of the number of registered nurses' work setting. The number of registered nurses working in nurse education appears to be evenly distributed across all regions of Louisiana except for the Northeast region. Although roughly 16 percent of all RNs in nurse education are located in the Northeast (5 total regions), the concentration of all RNs in this region is only 5 percent. Therefore, we see a higher concentration of registered nurses in this setting in the Northeast region.

2.2.8.5. Geographic Distribution and Salaries

When observing the salaries of registered nurses (see Table A.2.21.) it is apparent that most RNs are earning more than \$30,000 per year. We are observing only full-time RNs but have not controlled for any other factors (i.e. experience, work setting, position, shift normally worked etc.). When observing within each region, we see that most RNs are earning more than \$41,000 per year yet the proportion of RNs earning this salary or higher is not the same across all regions. For example, the percentage of RNs earning more than \$41,000 per year in the Northwest region is a little over 89 percent. Within the Central and Northeast regions, the percentage of RNs earning the same salary or higher is only 55.9 and 55 percent, respectively. In terms of the percentage of RNs earning a salary

regions have a noticeably higher proportion relative to the rest of the regions and the Central region is markedly lower than all regions.

of \$41,000 per year or greater, the Southeast and Southwest regions are located somewhere in between at 74.3 and 74.6 percent, respectively.

2.2.9. A Final Note on the Sample Comparisons

In this section, we have attempted to make comparisons and point out similarities between the registered nurse population from the National Sample survey and the registered nurse population from the Louisiana sample across several characteristics. By doing so, we expect that the results from our empirical research from the Louisiana sample will provide insight on the national level as well. In addition, we are not attempting to quantify the aggregate effect of a change in RN characteristics on the change in RN position held. In other words, our hypothesis is that the likelihood of holding a staff nurse position will decrease, conditional on a registered nurse's additional investment in human capital to the baccalaureate degree or higher, *ceteris paribus*. We are not, however, attempting to estimate the number of RNs that will leave the bedside. Table 2.1. provides a final comparison, which shows the distribution of characteristics for registered nurses in both the national and Louisiana sample. For the majority of the characteristics in Table 2.1., the distributions are very similar across samples.¹⁰⁷ One exception to the similarities is within the basic education characteristic. It appears that relative to the Louisiana sample, the national sample has a larger proportion of nurses with a diploma as their basic educational preparation in nursing and relatively fewer RNs with a baccalaureate or higher as their initial education. This difference is maintained when we observe registered nurses and their highest educational preparation. Another dissimilarity across the two different samples is the number of registered nurse working as a staff nurse and those employed in a hospital. However, we will assume that a difference of roughly 13 and 7.5 percentage points respectively does not imply that the samples are not comparable when we perform our analysis.¹⁰⁸ Finally, it appears that relatively more registered nurses in the Louisiana sample are working full-time. Again, given that the focus of this paper is on changes in the characteristics of the registered nurse, and not levels, we expect that this disparity will not cloud the issue.

2.3. Literature Review

It is argued that more than one million nurses will be needed by the year 2010.¹⁰⁹ Health care practitioners and technical occupations are expected to account for 1.6

¹⁰⁷ The sample sizes are not the same for each characteristic within a sample because some nurses did not respond to all questions in the surveys. For this reason, the sample sizes for each sample are not included in the table.

¹⁰⁸ It appears that in Louisiana, there are more charge nurses relative to the national sample. In many circumstances, the charge nurse is one who is regularly a staff nurse but is either delegated or chooses to add the task of floor management in addition to the regular duties of a staff nurse (with the payoff of a wage differential of course). When we aggregate those RNs who are either a staff nurse or a charge nurse for the national and Louisiana samples, the percentages (86.66 and 87.52, respectively) are more comparable.

¹⁰⁹ See www.nursingworld.org.

Table 2.1. Distribution of Registered Nurse Characteristics					
	National	Louisiana		National	Louisiana
Age			Employment Status		
20-30	8.69%	10.47%	Full-time	71.83%	87.21%
31-40	22.88%	24.22%	Part-time	28.17%	12.79%
41-50	35.62%	38.18%			
51-60	21.80%	23.64%	Marital Status		
61 or greater	11.01%	3.49%	Married	72.16%	71.04%
			Divorced	18.28%	15.07%
Year of Graduation			Single	9.56%	13.89%
1984 or earlier	35.57%	50.67%			
1985-1994	45.14%	30.21%	Primary Position		
1995 or later	19.29%	19.12%	Staff Nurse	74.31%	61.76%
			Mid-Level Manager/ Charge Nurse	12.35%	25.76%
Basic Education			Advanced Practice	N/A	3.27%
Diploma	28.44%	17.43%	Administrative Officer	8.89%	5.73%
Associate's degree	41.13%	40.04%	School of Nursing	4.45%	3.48%
Baccalaureate degree or higher	30.43%	42.53%			
Highest Education			Employment Setting		
Diploma	21.33%	13.37%	Hospital	61.02%	68.53%
Associate's degree	34.85%	34.88%	Nursing Education	2.31%	3.81%
			Nursing Home/ Extended Care/ Assistive Facilities	7.45%	4.61%
Baccalaureate degree	33.44%	39.15%			
			Public/ Community/ Occupational/ School Settings	18.94%	13.63%
Master's degree	9.74%	12.02%			
			Outpatient/ Ambulatory Care	10.28%	9.42%
Doctorate	0.64%	0.58%			

million new jobs during the 2000-2010 period.¹¹⁰ Registered nurses, who represent the largest occupation in this group, should account for more than one-third of those new jobs.¹¹¹ This growth, coupled with current trends of nurses retiring or leaving the

¹¹⁰ See Occupational Outlook Handbook 2002-2003 edition.

¹¹¹ Ibid.

profession and less new nurses entering, could lead to a shortage of more than one million nurses by the end of the decade.¹¹²

Registered nurses held about 2.2 million jobs in 2000. About 3 out of 5 jobs were in hospitals. Others were in offices and clinics of physicians and other health practitioners, home healthcare agencies, nursing homes, temporary agencies, schools and government agencies.

Research on the shortage of registered nurses at first focused on the possibility of monopsony power within the market. If there is one demander of labor, there is a likelihood of vacancy rates coupled with relatively low wages.¹¹³ While some claim that in order for monopsony power to be present, the suppliers of labor have to lack geographic mobility (Hurd 1972), others have refuted this claim (Hirsch and Schumacher 1995).

Hurd (1972) finds the presence of monopsony power in towns and relatively small cities. He develops a measure of concentration to determine how many nurses are located in a geographical area and compares wage levels to these concentration measures.¹¹⁴ His conclusion is that given the significant negative relationship between the concentration ratio and wages, it could be argued that monopsony market structures exist.

Hirsch and Schumacher (1995) examined the prediction that wage rates for registered nurses and other nursing personnel would be lower in relatively small labor markets with a limited number of employers. They found no evidence that the relative wages of nursing personnel were related to either labor market size or the number of hospitals. Additionally, they found no evidence of a positive relationship between nursing wage rates and the employment of registered nurses, as indicated by a monopsony model with an upward sloped supply curve.

The goal of this paper is not to test the possible existence of monopsony market structures. However, it is important to point out that the literature to date shows mixed support for such a hypothesis. Therefore, we expect that other determinants are more important in explaining perceived shortages of registered nurses. Moreover, we expect that these determinants lie not on the demand side, as suggested by the hypothesis of monopsony power, but on the decisions that nurses make themselves, with regards to their participation in the field of nursing or otherwise.

The literature on the labor force participation of registered nurses is plentiful.¹¹⁵ Within this wide body of literature, key determinants and their expected relationships have been tested. The most widely accepted determinants for the labor supply of registered nurses are those that we observe for other occupations as well. This includes

¹¹² Ibid.

¹¹³ In the case of monopsonies, wages would be below the competitive market level.

¹¹⁴ Hurd (1972) uses data from non-profit hospitals only.

¹¹⁵ For research on the determinants of labor supply of registered nurses, see Benham (1971), Bognanno, Hixson, and Jeffers (1974), Sloan and Richupan (1975), Link and Settle (1979), and Link and Settle (1981).

wages of workers (hourly or salary), spouse's wage or salary, household nonemployment income, and the number of dependent children at home. Except for a worker's wage, all determinants listed are expected to decrease the likelihood of being in the labor force or decrease the number of hours worked.

Contrary to Benham's (1971) findings of significant positive estimates of the wage elasticity of nurses' labor force participation rate in 1960 across states, Bognanno et al. (1974) observe no case in which the probability that the wife will be a labor force participant is significantly related to her market opportunity wage rate.¹¹⁶ Sloan and Richupan (1975), on the other hand, estimate own-wage elasticities of nurse labor supply range as high as 2.8 for their sample of married nurses. However, in comparison to these findings, Link and Settle (1979) address possible data and model framework issues raised in Sloan and Richupan (1975) and conclude that an increase in the registered nurse wage will lead to a much smaller increase in the supply of nursing services.¹¹⁷ Mahoney and Ahlburg (1994) address the issue of self-selection bias by first modeling the factors affecting the decision to work as an RN and then modeling the factors affecting the number of hours worked by the RN. Upon doing so, they find a significant, although small, positive effect of wages on the registered nurse labor supply.¹¹⁸

In regards to recent perceived shortages of registered nurses, possible explanations include an increase in demand for health care services from a shock to the older age groups. This factor implies an increase in demand for registered nurses, while factors such as an aging nursing workforce and dissatisfaction on the job or within the career of nursing imply a decrease in the supply of registered nurses.¹¹⁹ As future public policy will be aimed at addressing upcoming issues related to the argument that a shortage exists within the registered nurse occupation, it is important to realize if these factors are indeed plausible and the extent to which they will affect health market outcomes.¹²⁰ Before doing so, however, it might be useful to review areas of research that observe the choices that registered nurses make at the beginning of their careers such as: choice of education, choice of primary position, and choice of work setting.

There are three major educational paths to becoming a registered nurse: associate degree in nursing, baccalaureate of science degree in nursing, and diploma. Associate degree programs, offered by community and junior colleges, take about 2 to 3 years to

¹¹⁶ Bognanno et al. (1974) use data from a random sample of individual married female nurses.

¹¹⁷ Additionally, Link and Settle (1979) find that the own-wage elasticity of nurse labor supply declines as the wage rate rises. For married nurses, this implies that eventually they could have a backward-bending labor supply curve. Finally, policy implications are that if current wages are located in the inelastic region, other factors to induce nurse labor force participation should be explored.

¹¹⁸ A 10 percent increase in wages, *ceteris paribus*, leads to an increase in labor supplied by 1.8 percent, or an elasticity of .18.

¹¹⁹ This perceived shortage, or excess demand for nursing services, is only realized if wages are held constant. Of course, if the market is allowed to operate unimpeded, wages will rise until equilibrium is restored.

¹²⁰ Another possibility is that a perceived shortage exists of certain types of RNs, such as experienced or educational preparation. This, in turn, may have an effect on certain health market outcomes. For example, in a sample of Pennsylvania hospitals, Aiken et al. (2004) show that the number of fatalities increases as the number of RNs whose educational preparation is a baccalaureate degree decreases.

complete. About half of the 1,700 RN programs in 2000 were at the associate degree level. Baccalaureate programs, offered by colleges and universities, take 4 to 5 years. More than one-third of all programs in 2000 offered degrees at the baccalaureate level. Diploma programs, administered in hospitals, last 2 to 3 years. Only a small number of programs offer diploma-level degrees.¹²¹ Generally, licensed graduates of any of the three program types qualify for entry-level positions as staff nurses.

Given that some of the previous research has shown that the return to the BSN relative to the associate degree is negligible, non-monetary factors have been postulated as being key determinants in the decision making process for an individual when choosing educational preparation in nursing.¹²²

Spetz (2002) finds that there are non-monetary factors involved when an individual decides on the educational path to become a nurse. Personal characteristics as well as professional goals appear to have the greatest influence on choice of education. Spetz (2002) observes that older prospective students are more likely to choose the associate degree training, as are those who are married and have children. Given that the associate degree prepares the student for the job market in less time, implying a lower immediate opportunity cost, this result seems realistic. Prospective students who have previous health or business education are more likely to choose the BSN perhaps because the BSN provides relatively more job mobility for the nurse in the future. However, Spetz (2002) is unable to confirm significant differences in job mobility across education types.¹²³ In terms of management opportunities, the likelihood of holding a managerial or administrative position is higher for a BSN nurse relative to an associate degree or diploma nurse for all the years studied.¹²⁴ Spetz (2002) was able to examine the NSSRN data, which contained information on specific tasks performed by nurses at their jobs. What was observed was that non-managerial BSN nurses spend less time on direct patient care relative to associate degree nurses, but the difference is very small.¹²⁵ Finally, Spetz (2002) concludes from the NSSRN data that BSN nurses are relatively more likely than associate degree nurses to move into employment outside of the nursing profession but within the field of health.¹²⁶

¹²¹ In Louisiana, as of 2000, only one diploma program (Baton Rouge General Medical Center) existed that was approved by the Louisiana State Board of Nursing.

¹²² Mennemeyer and Gaumer (1983), Booton and Lane (1985), Link (1988), and Lehrer, White, and Young (1991) are some of the earlier researchers showing the results opposite of what human capital theory predicts. Spetz (2002) is a more recent article confirming what this previous literature has shown.

¹²³ The data used in Spetz (2002) was from the National Sample Survey of Registered Nurses (NSSRN) for several years. For the issue of job mobility, in 1996, the survey asked if the nurse was with the same employer this year as in the previous year. Seventy-five percent of BSN nurses, compared to 74 percent of associate degree nurses answered yes to this question.

¹²⁴ The years include: 1977, 1980, 1984, 1988, 1992, and 1996. The possible positions held were: Staff nurse, supervisor, and administrator. The results were computed from an ordered probit regression.

¹²⁵ In comparison, BSN nurse spent 80 percent of their time compared to associate degree nurses who spent 83.2 percent of their time on direct patient care.

¹²⁶ No formal testing was done to reach this conclusion. Spetz (2002) observed the percentage of BSN and associate degree nurses employed outside of nursing. The percentages are 4.4 and 2.9 percent, respectively. Because RNs rarely forfeit their licenses, unless leaving nursing, and the NSSRN does not survey those who have allowed their licenses to lapse, a valid conclusion should not be implied in regards to

Lehrer et al. (1991) find that among nurses with less than five years of experience, baccalaureate registered nurses are relatively more likely to work in hospitals and the probability of moving out of the hospital increases with experience for all education levels.

Lehrer et al. (1991) point out that experience in the nursing career typically involves movement to nonstaff positions. Their research shows that among nurses with five or more years of experience, those with BSN degrees are more likely to have been promoted to these positions.¹²⁷ However, for those RNs with experience levels of less than 5 years, the associate degree RN has a higher likelihood relative to the BSN RN of being promoted. In contrast, Link (1988) finds that BSN and associate degree nurses are equally likely to hold nonstaff positions after 15 years. Lehrer et al. (1991) argue that because place of employment, specifically hospitals, is included in Link's (1991) model, it fails to pick up an indirect effect on the probability of promotion into nonstaff areas when holding a BSN relative to holding the associate degree. In other words, the BSN advantage is mitigated by including employment setting. Nurses with a baccalaureate degree are relatively more likely to work in a nonhospital setting, where the probability of holding a nonstaff position is higher.¹²⁸

In conclusion, Lehrer et al. (1991) confirm what is found in Mennemeyer and Gaumer (1983) and Link (1988). That is, in terms of wage premiums, the associate degree route is superior to the baccalaureate degree.¹²⁹ The question is raised, then, why is BSN training up from previous years relative to associate degree training?¹³⁰ The authors' research shows that BSN nurses may have better access to nonstaff positions. Additionally, BSN training might lead to more "opportunities to interact with a wider range of individuals and nonmarket returns to investments in general human capital."¹³¹ This possibility raises the issue of whether or not nurses with a baccalaureate degree are relatively more likely to leave the field of nursing and pursue other occupations. Finally,

employment outside of the nursing profession relative to education. In addition, as Spetz (2002) points out, neither should we conclude that the BSN generates more or better non-nursing employment opportunities relative to the associate degree or the diploma, given the NSSRN data.

¹²⁷ The probability of promotion to nonstaff positions for RNs with 10-19 years of experience is 0.38 for BSN RNs compared to 0.29 for associate degree RNs.

¹²⁸ Lehrer and White (1987) also argue that type of position and place of employment should not be included as regressors in wage equations because the returns to baccalaureate education will be underestimated. The argument is that the BSN degree is more likely to lead to better chances of promotion to higher paid positions.

¹²⁹ Assuming 43 years of employment after graduation and a zero discount rate, the extra benefits from a BSN are calculated as \$60,996 compared to the opportunity costs (sacrificed earnings and extra tuition) of \$57,629. Relaxing the assumption of a zero discount rate results in higher costs relative to the benefits.

¹³⁰ On the national level, between 1996 and 2000, the number of RNs who received their basic education in baccalaureate programs increased at a higher rate than those who received their basic education in associate degree programs (increases of 17 percent and 13 percent, respectively). Source: Finding From the National Sample Survey of Registered Nurses, March 2000. Within Louisiana Parishes, during the 1997-2000 period, the growth rate for nurses prepared at the BSN level was 9.2 percent compared to 6.9 percent for associate degree training. Source: Louisiana State Board of Nursing Annual Report 2002.

¹³¹ Lehrer et al. (1991 p. 377).

Lehrer et al. (1991) point out that the costs of baccalaureate training are reduced for those individuals whose education was subsidized by scholarships or fellowships.¹³²

Perhaps the decision on basic educational preparation is based on the proximity of approved nursing programs within a state and the mobility of the prospective nursing student. Within the state of Louisiana, the Louisiana State Board of Nursing has approved 8 associate degree programs, 1 diploma program and 13 baccalaureate programs. Places such as Hammond, Lafayette, and Monroe have only baccalaureate programs approved by the Louisiana State Board of Nursing. Comparatively, Alexandria, Eunice, and Ruston have only associate degree approved programs. To the extent that a prospective nursing student lacks geographic mobility, the decision on basic educational preparation in nursing will be weighed heavily on the available approved program within that students travel range.

To date, there is little research on registered nurses and their decision to increase education level beyond their basic level of preparation. Some of the work previously cited deals with the likelihood of an outcome given one level of nursing education relative to another. Given that registered nurses do make the decision to increase education levels beyond their basic levels, it would be interesting to not only gain an understanding of why this choice was made but to also observe future outcomes given a change in education. This research is directed toward drawing inferences on the latter. First, however, we consider who might benefit from an average increase in education of the registered nurse labor force.

The American Nurses' Association is an advocate for the requirement that all registered nurses have baccalaureate training. Spetz (2002) describes the American Nurses' Association's (ANA) recommendation for all RNs to have baccalaureate degree training as the idea that the role of nursing is growing more complex as technologies in health care and the organizational structure of the health care markets change. This more complex role requires a higher level of education, resulting in an increase in demand for registered nurses education levels beyond the diploma and associate degree level. Additionally, the ANA believes that a higher education standard will increase the supply of registered nurses. Due to the lesser human capital investments of becoming a RN through the diploma program or the associate degree, the RN profession lacks prestige, arguably a determinant an individual observes when deciding on a career. Having the BSN requirement, the ANA argues that nursing will be more highly regarded and this will ultimately increase the overall supply of nurse labor.

Schumacher (2002) finds that technological change results in an increase in demand for higher skilled workers, arguably registered nurses with education levels beyond the diploma associate degree level. As health care technology continues to advance, and these advances are skill-biased (high), Schumacher advises that recent trends suggest a growing demand for high-skilled labor relative to lower skilled workers.

¹³² The reduction in costs also holds for those RNs whose basic educational preparation is either a diploma or associate degree but have made the choice to pursue a baccalaureate degree in nursing. Given that this is the focus of our research, we will need to acknowledge this possibility later.

If capital and labor are gross complements, an increase in technology will tend to increase the demand for skilled labor. And because complementary factors of production have to be gross complements, health care technological change is more likely to increase the demand for higher-skilled labor relative to lower-skilled labor. Finally, technological change requires employees to be able to adjust and make changes in their tasks and procedures. It can be argued that individuals with relatively higher education levels adapt more easily to change and are better able to adjust. Moreover, due to growth in technology, health care employers may demand that prospective labor bring more to the table than previously.

The American Association of Colleges of Nursing (AACN) is the national voice for university and four-year-college education programs in nursing. Specifically designed to work in support of baccalaureate and graduate degrees in nursing education, the AACN represents more than 560 member schools of nursing nationwide. They offer widespread support for articulation programs in nursing from the nation's four-year colleges and universities. The majority of the AACN's members (87.5%) offer RN-to-BSN programs for graduates of associate degree programs wishing to complete a bachelor's degree. As of fall 2001, more nursing schools offer RN-to-BSN programs (610) than entry-level BSN programs (569).

The AACN claims that the future of health care in the U.S. is shifting away from the hospital and that the traditional role of the nurse as the bedside caregiver is changing to other points of delivery. The hospital, the AACN claims, is focusing its' future on acute care. Because of these changes, the AACN argues that professional nurses must possess a level of educational preparation that allows them to function efficiently and warrants the increased responsibility to be placed upon them. The increased responsibility will be placed on the professional nurse as health care shifts toward health maintenance organizations, community health and outpatient centers, homes, public schools, and workplaces. It is in these settings that the nurse will have to function more independently in health related decision-making activities.

The AACN cites a 1996 report by the National Advisory Council on Nurse Education and Practice in which it urges that at least two-thirds of the basic registered nurse workforce have a baccalaureate or higher degree in nursing by 2010.¹³³ Additionally, a survey conducted by the American Hospital Association found that many nurse executives indicated the preference for the majority of hospital staff nurses to be prepared at the baccalaureate level in order to meet the more complex demands of today's patient care.¹³⁴ Finally, the AACN points out that the Veteran's Administration, which is the nation's largest employer of registered nurses, has instituted the baccalaureate degree

¹³³ See National Advisory Council on Nurse Education and Practice. (October 1996). *Report to the Secretary of the Department of Health and Human Services on the Basic Registered Nurse Workforce*, p. 9. Washington D.C.: Division of Nursing, Health Resources and Services Administration.

¹³⁴ See American Hospital Association. (1987). *Report of the Hospital Nursing Personnel Survey*, p. 36. Chicago.

as the minimum preparation its nurses must have for promotion beyond the entry-level in 2005.¹³⁵

In summary, studies such as Mennemeyer and Gaumer (1983), Booton and Lane (1985), Link (1988), Schumacher (1997), and Spetz (2002) have shown that the returns to a baccalaureate degree in nursing relative to the associate degree are not large enough to compensate for all opportunity costs associated with the baccalaureate degree. Additionally, Spetz (2002), after observing that baccalaureate degree RNs relative to associate degree RNs spend almost the same amount of time on direct patient care, points out that “employers have no reason to offer a wage premium if the jobs performed by differently educated RNs are the same.”¹³⁶ The AACN conducted a survey, funded by the Division of Nursing, HRSA, from 1986-88 to provide national data about RN-to-BSN education. When respondents were asked to indicate “all that apply”, only 28.6 percent chose “expectation of a higher salary” as a leading factor influencing their decision to advance their educational preparation to a baccalaureate degree.¹³⁷ Mennemeyer and Gaumer (1983) disagree with the American Nurses’ Association’s policy recommendation that the registered nurse licensure should be restricted to future graduates of BSN programs, concluding “that neither employers nor a large segment of the nursing profession would benefit from recent proposals to require that all nurses obtain the baccalaureate degree.”¹³⁸ Mahoney and Ahlburg (1994) found that registered nurses with more years of nursing education were more likely to leave the profession relative to those with less education. In conclusion, they assert that their findings on educational level “suggest that if government monies are to be used to fund RN education in hopes of increasing the RN supply, it appears most efficient to fund individuals in associate programs as opposed to baccalaureate degree RNs.”¹³⁹

2.4. Data, Survey Methodology, Variable Descriptions and Interpretation Issues

The data used is from the Louisiana Registered Nurse Population Survey during the year 2000. The survey was initially distributed in the Louisiana State Nurses’ Association Newsletter.¹⁴⁰ Survey respondents were asked to fill out the survey and return it to the survey lab. As an alternative, rather than mailing in the survey, registered nurses were informed of the IP address in which they could respond to the survey via the Internet. Finally, the survey was mailed out to a list of RNs compiled by the LSNA. Of the 524 respondents, 26.5 percent responded via the Internet, 52.1 percent responded to the mail survey, and 21.4 percent responded to the survey from the newsletter. Almost 69 percent of the RNs worked in a hospital while 17.44 percent worked in either nursing education or school settings.

¹³⁵ See www.va.gov/pressrel/98nni.htm. Accessibility to this press release was verified by the AACN on December 12, 2000.

¹³⁶ Spetz (2002, p. 81).

¹³⁷ There were 742 respondents for a 68 percent response rate.

¹³⁸ Mennemeyer and Gaumer (1983, p. 32).

¹³⁹ Mahoney and Ahlburg (1994, p. 9).

¹⁴⁰ Given the method in which this survey was distributed, only registered nurses were included in the survey.

Because more than half of the survey respondents completed the survey through the mailing list compiled by the LSNA, our goal was to first determine if there was a response bias. To do so, we looked at some of the characteristics of the RNs across the different methods of completing the surveys to observe any differences across the subsamples. Table 2.2. provides a view of the different characteristics of the Louisiana RN sample stratified by the method used to complete the survey. We would expect to find that within each characteristic, the majority of the responses should be within the LSNA mailing and this is what we observe from table 2.2. Only in situations where there are very few observations within a characteristic do we find any potential problems. For example, when observing RN earnings, we see that there are no RNs making less than \$20,000 who responded through the Internet. However, only 4.3 percent of all RNs that responded to the earnings question (22 out of 511) earn less than \$20,000 per year. Another example is that only one-third of those RNs responding through the LSNA mailing have a doctorate as their current level of education.

Table 2.2. Subsample Comparison by RN Characteristics								
	Internet		Mail		News		Total	
	N = 139		N = 273		N = 112		N = 524	
Age Group	Freq.	Percent	Freq.	Percent	Freq.	Percent	Total	Percent
20-30	15	27.78	33	61.11	6	11.11	54	100
31-40	36	28.8	75	60	14	11.2	125	100
41-50	15	27.78	33	61.11	6	11.11	54	100
51-60	25	20.49	57	46.72	40	32.79	122	100
61 or older	3	16.67	9	50	6	33.33	18	100
Kids								
Yes	76	28.15	146	54.07	48	17.78	270	100
No	61	24.9	122	49.8	62	25.3	245	100
Marstat								
Married	100	27.55	185	50.96	78	21.49	363	100
Divorced	15	19.48	45	58.44	17	22.08	77	100
Single	21	29.58	36	50.7	14	19.72	71	100
Region								
NW	4	12.9	19	61.29	8	25.81	31	100
NE	10	40	11	44	4	16	25	100
Central	41	36.28	55	48.67	17	15.05	113	100
SE	48	18.32	151	57.63	63	24.05	262	100
SW	33	40.74	30	37.04	18	22.22	81	100

(Table 2.2. continued)

(Table 2.2. continued)

Setting								
hospital	79	23.1	184	53.8	79	23.1	342	100
nursing home	9	39.13	10	43.48	4	17.39	23	100
education	6	31.58	7	36.84	6	31.58	19	100
school	34	50	27	39.71	7	10.29	68	100
outpatient	9	19.15	32	68.08	6	12.77	47	100
Position								
staff	82	27.15	159	52.65	61	20.2	302	100
mgr/charge	38	30.16	59	46.83	29	23.01	126	100
advanced	1	6.25	13	81.25	2	12.5	16	100
admin	7	25	15	53.57	6	21.43	28	100
faculty	6	35.29	6	35.3	5	29.41	17	100
Annual Earnings as an RN								
less than \$20,000	0	0	17	77.27	5	22.73	22	100
\$21,000-\$30,000	10	32.26	18	58.06	3	9.68	31	100
\$31,000-\$40,000	48	35.82	60	44.78	26	19.4	134	100
\$41,000-\$50,000	47	28.49	86	52.12	32	19.39	165	100
more than \$50,000	33	20.76	83	52.2	43	27.04	159	100
Basic Ed								
diploma	25	27.48	34	37.36	32	35.16	91	100
associate	65	31.1	104	49.76	40	19.14	209	100
bsn	46	22.44	122	59.51	37	18.05	205	100
master's	1	5.88	13	76.47	3	17.65	17	100
Current Ed								
diploma	19	27.54	26	37.68	24	34.78	69	100
associate	62	34.44	86	47.78	32	17.78	180	100
bsn	47	23.27	118	58.41	37	18.32	202	100
master's	9	14.52	39	62.9	14	22.58	62	100
doctorate	1	33.33	1	33.34	1	33.33	3	100
Sat with Career Choice								
very satisfied	45	27.44	85	51.83	34	20.73	164	100
satisfied	74	28.03	135	51.14	55	20.83	264	100
dissatisfied	14	22.95	31	50.82	16	26.23	61	100
very dissatisfied	3	18.75	9	56.25	4	25	16	100

However, there are only three RNs in the entire sample that have this degree. In conclusion, given the results provided by Table 2.2., we assert that there is no cause to use any weighting scheme for our analysis.

In general, in regards to the Louisiana RN sample, if we refer back to Table A.2.6., we can see that forty percent of those surveyed have an associate degree as their basic education, 17.43 percent have a diploma, and 39.27 percent have a baccalaureate. A little over 3 percent have a master's degree as their basic education. Responding to "highest degree currently held", the diploma program, associate degree, and BSN were lower at 13.37 percent, 34.88 percent and 39.15 percent, respectively, while master's degree increased to 12.02 percent and 0.58 percent have a doctorate. Table A.2.6. provides another way of observing education levels and mobility across education levels. For those RNs whose basic education was through the diploma program only 76 percent currently hold a diploma.

For those whose basic education was an associate degree or baccalaureate degree, the percentages whose current degree is associate or baccalaureate are 86.7 and 85.4, respectively.

Although not shown in the table, results of the survey indicate that just over 14 percent of the respondents confirmed that they were currently in school to obtain a higher degree in nursing while 39.61 percent of the respondents reported that they were likely to continue their nursing education in the next five years. Almost 21 percent claimed that they were likely to go back to school outside of nursing within the next five years while at the time of the survey, almost 4 percent were actually in school seeking a degree outside of nursing.

2.4.1. Individual-Specific Variables

One of the preliminary tasks associated with this analysis is reaching a decision on which variables to use when estimating the models. We essentially utilized a three-step process to do this, weighing each additional step more heavily than the previous.

Guided by economic intuition, the first step is to include in the model the variables hypothesized to have explanatory power within the context of the theory which is motivating this analysis. Because we are using maximum likelihood to estimate the coefficients in the model, we can then perform a series of likelihood-ratio tests, comparing nested models. The likelihood ratio test involves fitting the full model (include all variables from our first step), generating a likelihood-ratio statistic from the full model, fitting a restricted model (one or more variables are excluded), generating a LR statistic from the restricted model, computing the difference, and with J dependent categories, the statistic is distributed as chi-squared with $J - 1$ degrees of freedom if the null hypothesis is true. Our chi-squared statistic is:

$$(2.4.1) \quad LR_{diff}^2 = LR_F^2 - LR_R^2$$

Because we have J dependent categories, there are $J - 1$ nonredundant coefficients associated with each independent variable x_k . Because we have five outcomes, we have four coefficients associated with each independent variable and the null hypothesis that x_k does not affect the dependent variable can be written as

$$(2.4.2) \quad H_0: \beta_{k,1|b} = \dots = \beta_{k,J|b} = 0$$

where b is the base category.¹⁴¹ STATA has a straightforward command for performing this test. In addition, there exists an even simpler command in STATA which automatically computes the tests for all independent variables by making repeated calls to the former command.¹⁴²

The final step in this procedure is to once again apply economic intuition in regards to the theory which is driving this analysis. Even though, upon formal testing, there were variables found not to be significantly different from zero, we included some of these variables. The reason for this is that when computing our predictions of attaining occupation j , conditional on certain characteristics of the registered nurse, we want these characteristics in the model. Our goal in this research is to observe the change in probability of holding a staff nurse position when educational preparation changes from either a diploma or associate degree to a baccalaureate degree or higher. However, we want to observe these probabilities and changes in probabilities for ideal types of registered nurses. Therefore, the age or potential experience variable might not be significantly different from zero, given the results of the likelihood-ratio test, but we want this characteristic of the registered nurse in the model in order to control for certain registered nurses in the sample.

2.4.2. Choice-Specific Variables

In 2004, again working with the Louisiana State Nurses Association, the Public Policy Research Lab at LSU conducted another survey of the registered nurses in Louisiana. This was three years after the initial survey was conducted and this permitted us to use some of the information from the later survey to develop the choice-specific variables in this analysis. Specifically, we used a continuous measure of average income, stratified by geographical region and primary position to proxy for expected income in 2004 for those RNs in the 2000 survey. With this income variable, we assume that RNs in 2000 have formed expectations on the average income across RN positions given their regional status. We are observing the choices that RNs made, in terms of their primary positions, prior to and up to the time of the initial survey. We are therefore assuming that the registered nurses in the initial survey have an idea of what salaries will be like in the future and that these expected salaries are similar to those observed from the 2004 survey. We make this assumption based on the argument that the three year gap is a relatively short time period and there are no, or minimal, unexpected changes in salaries

¹⁴¹ Because $\beta_{k,b|b}$ is necessarily equal to 0, the null hypothesis imposes constraints on $J - 1$ parameters.

¹⁴² The code for these tests, along with the results is included in an appendix, which is available upon request.

within geographical region and primary positions. Additionally, we assume that there are minimal, if any, unexpected changes in the differences in salaries across geographical regions and primary positions over this time period. Finally, we are able to use the 2004 information because we are drawing this information from the same universe, registered nurses within the state of Louisiana.

We also construct a measure for the amount of time a registered nurse spends working directly with patients. To proxy for this, we use the RN-to-patient ratio where obviously a relatively higher number implies that a registered nurse is in charge of relatively more patients during a given shift. It is a stylized fact that at least in part, job satisfaction is negatively correlated with fatigue and stress. Both are arguably fostered as the number of patients a registered nurse is in charge of increases. From the 2004 survey, we created a measure of the RN-to-patient ratio for our analysis by averaging this ratio after stratifying by position and employment setting.

The survey was designed to cover seven areas of characteristics of the registered nurse population within the state of Louisiana. These areas (# of questions) include: education (8), salary and benefits (10), work environment (18), job satisfaction/career variables (12), work place safety (8), staffing (16), and demographics (10). For the purpose of this study, it was not necessary to include all variables as controls nor did we include all areas of the characteristics. The variables chosen from the survey are individual specific and are used to help understand how registered nurses make decisions.¹⁴³ In other words, we want to be able to understand how reactions vary for different types of registered nurses. For example, we would expect to find that older registered nurses are less likely to make the decision to invest in additional units of human capital because they have a smaller present value of total benefits relative to younger registered nurses. Further, older nurses have relatively more experience and therefore have a higher opportunity cost associated with acquiring additional units of human capital.¹⁴⁴ Given this, it is less likely that older nurses will move to different occupations, those occupations requiring additional units of human capital.

The variables used in the models are described in Table 2.3. The choice-specific variables are continuous variables and their means and standard deviations are given. One remark at this point is needed in regards to the RN-to-patient ratio. Table 2.3. lists the mean at almost seven patients to one RN. However, this statistic is derived after withdrawing all RNs who work as school nurses. The reason this was done is because most respondents working as school nurses tend to have a relatively large caseload of students that they are responsible for during a given shift. However, it is highly unlikely that the school nurse will ever have to provide patient care for this relatively large

¹⁴³ We will address the issues of using individual-specific variables in a mixed model when we later describe the model.

¹⁴⁴ Griliches (1977) claims that individuals with higher earnings opportunities at each level of education (i.e., with higher intercepts in their log earnings functions) may invest less in schooling, since they have a higher opportunity cost of attending school. To the extent that the RN-to-BSN program is an opportunity cost of working, RNs with more seniority (assuming relatively higher wages, benefits, etc.) are less likely to consider the program.

number of patients during a given shift. To get a more accurate description of how many patients an RN in Louisiana is in charge of providing care for, we report the mean for all RNs other than school nurses.

The individual-specific variables are categorical and issues about interpretation when estimating regression models with categorical dependent variables will be covered in the next subsection. Here we will briefly describe what it means to go from one category within a variable to another. An example probably explains it best.

Basic education is the respondent's initial educational preparation for a career in registered nursing. The possible responses, as shown in Table 2.3. are: diploma, associate degree, baccalaureate degree, and master's degree. When we observe the coefficient on this variable we are observing whether there is a positive or negative effect of moving from a diploma, associate, baccalaureate, or master's degree on attaining occupation j relative to occupation b , where b is the base category, in our case, staff nurse.

Table 2.3. Variable Descriptions			
Variable	Description	Min	Max
	A. Registered Nurse Characteristics		
	Primary registered nurse position	1	5
Position	1=Staff RN 2=Mid-level mgr/charge RN 3=APRN 4=Admin officer 5=RN faculty		
	Basic educational preparation in nursing	1	4
Edbasic	1=Diploma 2=Associate degree 3=Baccalaureate degree 4=Master's degree		
	Potential experience derived from the RN's year of graduation using mid-point	3	40
Potexp	3=1995-2000 10=1985-1994 20=1975- 1984 30=165-1974 40=before 1965		
	RN's reported earnings	1	5
Earnings	1=Yes 0=No		
	RN's marital status	1	3
Marstat	1=Married 2=Divorced 3=Single		
	Current education is BSN or higher and basic education is either Diploma or Associate degree	0	1
RN_BSN_or_more	1=Yes 0=No		

(Table 2.3. continued)

(Table 2.3. continued)

		Mean	Std. Dev.
	B. Occupational Characteristics in 2003		
Income4	Salary of occupation j in 2003 by geographical region	\$53,901.88	\$9,537.68
	Continuous		
Rnpatratio	Usual rn-to-patient ratio for occupation j in 2003 by employment setting	6.88	5.63
	Continuous		
Note: In the regressions, the categorical variables listed here have been broken up into a series of binary indicators.			

For example, if we observe a positive coefficient on basic education under the category mid-level manager/charge nurse, this implies that an RN with a higher level of basic education is more likely to attain a mid-level manager/charge nurse's position relative to a staff nurse's position. As will be discussed below, the standard output from logistical regressions is limited to this type of interpretation. The main thing to keep in mind is that these individual-specific variables are not continuous. Therefore, when we try to interpret the effects of a discrete change in earnings on an outcome, our unit increase is based on a grouping and not a specific salary level.

2.4.3. Interpretation of the Variables in the Models

In regards to interpretation of the multinomial logit, conditional logit, and mixed model, because we have many independent variables that are categorical, it is more straightforward to enter each variable into the model as a set of binary variables. For example, if we break up our basic education variable into a set of four binary variables, we would then interpret the effect of having a certain basic education level relative to all other basic education levels on the logit of attaining occupation j relative to the base category. We did this when testing for which variables to include in the model and when interpreting the models using odds ratios. When computing the predicted values, however, we reversed the binary indicators for potential experience and stratified the probabilities by this characteristic.

Because models for categorical outcomes are nonlinear, interpretation is not as straightforward as linear models. Suppose for example that we have a linear model being fitted as

$$(2.4.3) \quad y = \alpha + \beta x + \delta d$$

where y is the dependent variable, x is a continuous independent variable, and d is a binary independent variable. For simplicity, we are assuming there is no error term.

The effect of x on y is the partial derivative or slope of the line relating x to y , called the marginal change:

$$(2.4.4) \quad \frac{\partial y}{\partial x} = \frac{\partial(\alpha + \beta x + \delta d)}{\partial x} = \beta$$

This equation defines an infinitely small change in x , holding d constant. In a linear model, the marginal change is the same at all values of x and d . Accordingly, when x increases by one unit, y increases by β units regardless of the current values for x and d . In other words, the slope of a linear curve is constant and in our case, that constant is equal to β .¹⁴⁵

The effect of d is not computed as a partial change because d is a discrete variable. The discrete change in y as d changes from 0 to 1, holding x constant is

$$(2.4.5) \quad \frac{\Delta y}{\Delta d} = (\alpha + \beta x + \delta 1) - (\alpha + \beta x + \delta 0) = \delta$$

When d changes from 0 to 1, y changes by δ units regardless of the level of x .¹⁴⁶

In terms of interpretation of linear models, the bottom line is that the effect of a given change in an independent variable is the same regardless of the value of that variable at the start of its change and regardless of the level of the other variables in the model. Interpretation in the linear case only needs to specify which variable is changing, by how much, and that all other variables are being held constant.

For a nonlinear model, suppose we have a logit equation

$$(2.4.6) \quad \Pr(y = 1) = \frac{\exp(\alpha + \beta x + \delta d)}{1 + \exp(\alpha + \beta x + \delta d)}$$

where $y = 1$ when the outcome occurs and we are assuming the same characteristics for x and d . The nonlinearity of the model implies that neither the marginal nor the discrete change with respect to x is constant:

$$(2.4.7) \quad \frac{\partial \Pr(y = 1)}{\partial x} \neq \beta \text{ and } \frac{\Delta \Pr(y = 1)}{\Delta x} \neq \delta$$

¹⁴⁵ We are changing x by one unit in this example, therefore the slope is $\beta/1$.

¹⁴⁶ In this case, because the model is linear, the discrete change equals the partial change.

In other words, in nonlinear models, the effect of a change in a variable depends on the values of all the variables in the model and is not equal to one of the parameters in the model.

Interpretation of the nonlinear models in this analysis will be approached by computing marginal and discrete changes in the outcome utilizing representative values of the independent variables.¹⁴⁷ Because discrete changes do not fully illustrate the dynamics among the outcomes, we will use odds ratios as an alternative.¹⁴⁸ In addition to this type of interpretation, we will compare predicted values for substantively meaningful “profiles” of the independent variables. More detail on discrete changes and predicted values is contained in the model section.

2.5. Theoretical and Empirical Framework

2.5.1. Theoretical Considerations

We follow in part Becker (1975) and Mincer (1974) in our theoretical framework involving occupational choice.¹⁴⁹ It is assumed that an individual i selects an occupation j so as to maximize expected utility, $E[U(Y_j, X_i)]$ across all potential occupations, where U is an indirect utility function, Y_j is a vector of characteristics within occupation j , and X_i are attributes of individual i .¹⁵⁰ The choice of occupation may vary across individuals for several reasons, most notably due to differences in human capital or differences in tastes, specifically differences in attitudes toward job characteristics.¹⁵¹

It is well known that the maximization of expected utility takes place subject to constraints imposed by a “human capital production function”. The inputs to this production function are own time as well as purchased goods (education, tuition, books, etc.). In terms of time, the individual is required to allocate his or her time between “earning” and “learning”. In addition, Becker (1975) points out that current endowments in human capital do not have the same productivity. In other words, current levels of human capital across individuals add to the production of human capital at different rates. This implies that the current level of human capital in an individual is included in that individual’s human capital production function. The output associated from this

¹⁴⁷ For our choice-specific variables, we will compute marginal changes and for our individual-specific variables, we will compute discrete changes.

¹⁴⁸ For example, a unit increase in basic education might increase the probability of attaining both an administrative position and an advanced practice position. The odds ratios (factor change coefficients) will deal with the issue of how the unit increase in basic education affects the odds of a registered nurse choosing an administrative position relative to an advanced practice position.

¹⁴⁹ For other and more recent literature on occupational choice, see Siow (1984), Zarkin (1985) and Orazem and Mattila (1991).

¹⁵⁰ A typical theoretical framework for occupational choice might also include income that is independent of occupational choice (see Freeman 1975). We do not include this in our framework because we do not condition for it in our empirical analysis.

¹⁵¹ Heterogeneity in human capital across individuals allows for differences in wage offers, which would then lead to differences in occupational choice due to differences in expected lifetime earnings.

investment is one's own human capital. Therefore, what we typically see as an individual's human capital production function is

$$(2.5.1) \quad h = f(H, R, T, B)$$

Where H is the investor's current endowment of human capital, R is rate of input of other resources, T is the investor's own time and B is the investor's physical and mental powers.¹⁵² Included in R would be schooling and the resources associated with this activity.

An extension to the basic model of occupational choice is a transformation of the initial investment decision into a sequential decision process, whereby the initial investment decision may be revised at a later point in time. Schömann and Becker (1995) denote this revised period as sort of an 'external shock' and use of examples include technological change, organizational changes and societal integration. Other plausible explanations for revising the investment decision would be a change in opportunities due to government subsidies or other assistance. In effect, an increase in opportunities for education would cause an outward shift of the supply curve for education, *ceteris paribus*, causing the marginal rate of return to fall. This would lead to an increase in the amount of human capital attained through education for those registered nurses falling within the distribution where the marginal benefits are greater than the marginal costs. The registered nurses falling in the distribution of those choosing not to increase education primarily differ in their capacity to benefit from the investment in human capital.¹⁵³ For these RNs, we can assume that the shift in supply, due to the subsidy, is along the portion of the registered nurse's demand curve that is discontinuous, or "lumpy", resulting in no change in human capital investment.

Why would a registered nurse invest in additional units of human capital when, *ceteris paribus*, the salaries as a staff RN do not differ across educational preparation (i.e. diploma, associate degree, and baccalaureate degree)? Potential explanations are either to move to a non-staff position, where wages may be relatively higher, or maybe there are other non-wage differentials associated with having a BSN relative to a lesser degree. Additionally, a possible explanation could be that the registered nurse expects wages and salaries across educational levels to differ in the future, *ceteris paribus*. This may be argued if the demand for higher educated RNs increases relative to lower educated RNs. How would RNs get the information leading them to expect higher wages in the future (increase in demand for higher educated RNs)? One possible answer is the government's role in the investment in the production of human capital of RNs with a baccalaureate degree. When government provides subsidies for an increase in education for RNs (RN-

¹⁵² The general functional form of this production function is taken from Becker (1962,1964).

¹⁵³ Initially, or in the early stages of an individual's life, the value of one's own time is small. However, as the individual ages and continues to invest, time becomes more valuable as there is less of the total available. It is also commonly known that investments in human capital carried out in the later stages of an individual's life will add relatively less to total benefits as there is less time to acquire the returns on the investment. Although the goal of this paper is not to provide possible explanations why some RNs choose not to invest in further human capital given the RN-to-BSN subsidy, these are potential areas to investigate.

to-BSN), a registered nurse can take government's action as a signal that it expects an increase in demand for higher educated RNs. If government information about where the economy is going is more complete than that of private groups or individuals, the subsidies provide information of a future increase in demand for RNs with a BSN relative to those with less than a BSN. It is plausible, and most likely the case, that those who train registered nurses and government are working together to address the issues facing the health care labor market in the near future. In this case, both expect an increase in demand for health care leading to an increase in demand for registered nurses.

So far we have discussed the possibility that government is trying to increase the number of RNs with a baccalaureate degree but we haven't covered possible reasons why. To the extent that those who train registered nurses have successfully argued that higher educated RNs are not substitutable with lower educated RNs, the goal of government is to increase the quantity of higher educated registered nurses.¹⁵⁴ It could be that government is attempting to increase the number of individuals choosing nursing as a career. Either on its own, or with the help of those within the nursing profession, government has formed the perspective that the current growth rate of registered nurses is not enough to offset the growing need. Coupled with this is the fact there is a shortage of nurse faculty and this has led to denied admission into registered nurse programs for some qualified applicants. By increasing the number of RNs with a baccalaureate degree, this will positively affect the number of future RN faculty.¹⁵⁵ And again, if individuals expect an increase in the demand for higher educated RNs, they can also expect an increase in the salaries paid to higher educated RNs.¹⁵⁶

For each individual registered nurse in our sample, utility from occupation j is assumed to be a linear function of the previously mentioned characteristics:

$$(2.5.2) \quad U(Y_j, X_i) = Z_{ij1}\beta_1 + Z_{ij2}\beta_2 + \dots + Z_{ijk}\beta_k + \varepsilon_{ij},$$

where Z_{ij} are the variables that affect utility, β is a vector of parameters, and k is the total number of variables.¹⁵⁷ The error term ε_{ij} appears due to the randomness in individual utility. In other words, we allow for individuals' tastes to differ.

¹⁵⁴ For an analysis on the change in requirements and characteristics of the registered nurse, see Spetz (2002) and Schumacher (2002). This change in the characteristics of the registered nurse could be the driving force for reducing the substitutability of RNs with different educational levels.

¹⁵⁵ Today, registered nurse faculty, at either the graduate or undergraduate level, are required to have at least a baccalaureate degree. By increasing the number of RNs with a baccalaureate degree, the potential number of future RN faculty has been increased.

¹⁵⁶ The goal of this paper is not to test any hypotheses about why government subsidizes study within the nursing profession. And, as stated previously, nor is it the goal to model why an individual chooses to increase nursing education beyond the basic level. However, we feel that in order to understand what the data and our empirical analysis show, it is worthwhile to sort of set the stage as to what is going on prior to the time that the RN makes the choice on whether or not to invest in additional units of human capital.

¹⁵⁷ Occupational characteristics directly affect utility by affecting an individual's preferences for both pecuniary and nonpecuniary occupational attributes. This will also have an effect on utility when we later

In our analysis, we are looking for those registered nurses who choose to increase educational preparation from either the diploma or associate degree to the baccalaureate degree in nursing or higher. Some of these RNs choose to invest in further education with the goal of moving from occupation j to occupation k , where there may be a minimal amount of educational preparation required in occupation k such as the baccalaureate degree. The costs associated with investments in human capital are both monetary and nonmonetary.

When government provides a subsidy toward education, like the RN-to-BSN program, the monetary costs to acquire the baccalaureate degree decline. For some RNs, the utility derived from occupation k will now be relatively higher, leading these registered nurses to invest in further human capital with possibly the goal of moving to occupation k .¹⁵⁸ The registered nurse chooses the option that maximizes her utility subject to her budget constraint, which is her human capital production function.¹⁵⁹

$$(2.5.3) \quad \text{Choose } Y_k \text{ iff } U(Y_k, X_i) \geq U(Y_j, X_i) \quad \forall k \neq j$$

A registered nurse chooses one alternative from a group of choices, and as shown below, the labeling of choices is arbitrary.

2.5.2. The Models (Multinomial, Conditional, and the Mixed Logit Model)

Consider the outcomes $1, 2, \dots, j$ recorded in y , and the conditioning variables Y and X . In this model there are $j = 5$ outcomes or primary positions. The choices for the registered nurse are “staff nurse”, “mid-level manager/charge nurse”, “APRN”, “administrative officer”, and “nurse faculty/educator” and these values of y are unordered. In other words, although the outcomes are coded 1, 2, 3, 4, and 5, the numerical values are arbitrary in the sense that 1 is not less than 2 just as well as 2 is not less than 3 and so on.

analyze the decisions of some registered nurses to participate in further education. For ease of exposition, we have collapsed occupational-specific and individual-specific characteristics into Z .

¹⁵⁸ Or, as one might argue, the goal for the RN who acquires more education is to move away from occupation j . If we consider that an RN eventually derives disutility from direct patient care or an increase in the number of patients, and an increase in education to the baccalaureate degree establishes the potential to move away from the bedside, then the RN may experience a higher level of utility after further investments in human capital coupled with a change in occupation. Indeed, even if the RN is experiencing diminishing marginal utility of direct patient care, total utility could be increased by substituting away from time spent in direct patient care.

¹⁵⁹ From Willis (1986 p.542), “The human capital production function, as a budget constraint, represents the worker’s ability to transform inputs of his own time and purchased goods into outputs of human capital and by his time budget which, as stated earlier, requires him to allocate his time between learning and earning.”

We are interested in how changes in the elements of X , ceteris paribus, affect the response probabilities, $\Pr(y = m | X_i)$. Letting X_i be a $1 \times K$ vector with the first element unity, the multinomial logit model has response probabilities defined by the following:

$$(2.5.4) \quad \Pr(y = m | X_i) = \frac{\exp(X_i \beta_{m|b})}{\sum_{j=1}^J \exp(X_i \beta_{j|b})},$$

where β_j is $K \times 1$ and b is the base category. To identify the model, and deny the possibility of an identical set of probabilities, one of the β_j is arbitrarily set to zero. The remaining coefficients measure the change relative to the j set to zero.

Given the sample of $T = (?)$ independent observations, the likelihood function is

$$(2.5.5) \quad l = \prod_{n=1}^T f(y_n) = \prod_{n=1}^T P_n^{y_n} (1 - P_n)^{(1-y_n)}$$

$$(2.5.6) \quad l = \prod_{n=1}^T F(X_n' \beta)^{y_n} [1 - F(X_n' \beta)]^{(1-y_n)}$$

where $F(\cdot)$ is the logistic cumulative density function. Taking the log of the likelihood function, we have

$$(2.5.7) \quad \ln l = \sum_{n=1}^T y_n \ln F(X_n' \beta) + \sum_{n=1}^T (1 - y_n) \ln [1 - F(X_n' \beta)],$$

which is maximized using the iterative procedure called the Newton-Raphson method. The properties of the log-likelihood function for the logistic c.d.f. guarantee that this method will converge to the global maximum based on any set of starting values. Additionally, the maximum likelihood estimators are consistent, asymptotically efficient and asymptotically normally distributed. Finally, using the delta method, we are able to obtain asymptotic standard errors.

2.5.3. Changes in Predicted Probabilities

Discrete changes in the multinomial logit model are defined as

$$(2.5.8) \quad \frac{\Delta \Pr(y = m | X_i)}{\Delta x_i} = \Pr(y = m | X_i; x_i = x_E) - \Pr(y = m | X_i; x_i = x_s),$$

where the value of the change depends on the size of the change that is being made and the levels of all variables in the model.¹⁶⁰ Interpretation of this discrete change is that for a change in variable x_i from x_E to x_S , the predicted probability of an event changes by $\Delta \Pr(y = m | X_i) / \Delta x_i$, holding all other variables constant. Economic intuition will guide us in determining both the size of the change in a variable and the level of all other variables in the model. Equally important will be the starting level of the variable that is being changed.

We are also interested in observing the probability of a registered nurse holding an occupation j when conditioning for the effects of changes in key variables. In other words, we will isolate changes in the variables included in the human capital production function of our model and observe the probability of an RN holding occupation j before and after the change.

Because we have been able to develop variables for characteristics of the j occupations, we are also able to study the choice behavior of registered nurses using a conditional logit model.¹⁶¹ The data need to be reorganized when using a conditional logit model but STATA provides a straightforward application to do so. There will be a total of $i \times j$ observations as the data are organized as a pairwise combination of each registered nurse with each occupation.¹⁶²

The response probabilities for the conditional logit model appear as

$$(2.5.9) \quad \Pr(y_i = m | Z_i) = \frac{\exp(Z_{im}\gamma)}{\sum_{j=1}^J \exp(Z_{ij}\gamma)} \text{ for } m = 1 \text{ to } J$$

where Z_{im} contains values for the independent variables for occupation m for individual i . The parameter γ measures the effects of the independent variables. For the conditional logit model, these independent variables are outcome-specific and vary across individuals.

The mixed model is a combination of the multinomial logit and conditional logit formulas:

¹⁶⁰ Depending on the data, marginal and/or discrete changes can be computed. The independent variables included in this data set are polychotomous, and therefore, interpretation about changes in predicted probabilities is made more intuitive when changes in the variables are discrete.

¹⁶¹ The form of the likelihood function in a conditional logit regression is similar to that of a multinomial logit model but the variables in the former are choice-specific rather than individual-specific characteristics.

¹⁶² In the conditional logit model, there must be variation within the strata because the likelihood of choosing each occupation is calculated relative to the alternatives. Therefore, individual-specific characteristics cannot be included as they would difference out in all of the equations.

$$(2.5.10) \quad \Pr(y_i = m | X_i, Z_i) = \frac{\exp(Z_{im}\gamma + X_i\beta_m)}{\sum_{j=1}^J \exp(Z_{ij}\gamma + X_i\beta_j)} \text{ where } \beta_1 = 0$$

Like the conditional logit model, Z_{im} contains values for the choice-specific variables for outcome m for individual i , and γ contains the effects of the choice-specific variables. Like the multinomial logit model, X_i contains individual-specific information for individual i , and β_m contains coefficients for the effects on outcome m relative to b , the base category.

Estimation of the mixed model means that we are using characteristics of the agents as well as occupational-specific characteristics to observe how both may affect the likelihood of an individual choosing a particular occupation. We fit the mixed model just as we do the conditional logit model, however, because the former contains individual-specific variables, we have to create interaction terms in order to keep these variables from dropping out of the regression.

2.5.4. IIA Assumption

A weakness of both the multinomial logit and conditional logit model is the independence of irrelevant alternatives assumption. This property basically states that the relative probabilities of choosing any two occupations is independent of the attributes of any other alternative in the choice set. We will use a formal Hausman test of the IIA property to observe if there is any systematic change in the coefficients after we exclude one of the outcomes from the model. Given that there are nonsimilarities in the description of the characteristics of these occupations, this intuition leads us to expect to find that the IIA assumption has not been violated.

The Hausman-McFadden (1984) test consists of estimating the full model (all choices) and then a model with one choice pulled out of the set. The same set of regressors are used for both the restricted and unrestricted models. The Hausman-McFadden test statistic is calculated as

$$(2.5.11) \quad q = [\hat{\beta}_u - \hat{\beta}_r][V_r - V_u]^{-1}[\hat{\beta}_u - \hat{\beta}_r],$$

where V_r and V_u are the variance-covariance matrices of the estimates under the restricted and unrestricted models. The Hausman-McFadden test statistic follows a χ^2 distribution with degrees of freedom equal to the difference between the number of parameters. The null hypothesis (i.e., $H_0: \beta_u = \beta_r$) states that the parameters from both models are equal and a large value of q will lead to a rejection of the null hypothesis.

In addition to the Hausman-McFadden test, we will also compute Small and Hsiao's (1985) test of IIA. In this test, the sample is divided into two equal subsamples and the unrestricted multinomial logit model is estimated on both of these subsamples. A

weighted average of the coefficients is used to attain the unrestricted likelihood-ratio statistic. Next, a restricted sample is created from the second subsample by eliminating all cases with a chosen value of the dependent variable and the multinomial logit model is estimated on this restricted subsample. The Small-Hsiao statistic is asymptotically distributed as a chi-squared with $K + 1$ degrees of freedom, where K is the number of independent variables.

A less formal approach to test the IIA assumption is one in which we estimate a series of probit models, each time changing the dependent variable to a different RN position, and compare the coefficients across each equation.¹⁶³ And finally we will make a comparison of the unrestricted multinomial logit model with a series of restricted models. Each restricted model excludes one choice but includes the same explanatory variables as the unrestricted model. We will compare the estimates from the restricted and unrestricted models to determine whether the interpretation of the results differs between the models.

2.6. Results

2.6.1. The Effects of Registered Nurse Characteristics on Occupational Attainment

Our tests for the independence of irrelevant alternatives assumptions lead to mixed results. Whereas none of the Hausman tests rejected the null hypothesis that IIA holds, our Small-Hsiao tests indicated that IIA has been violated. Table A.2.22. provides the results from these tests. In addition, Table A.2.23. presents both a series of probit models in which the dependent variable is changed across specifications and a comparison of the unrestricted multinomial logit model with a series of restricted models. Each restricted model excludes one choice but includes the same explanatory variables as the unrestricted model. In the end, our conclusion in regards to the IIA assumption is weighted more heavily on Mcfadden's (1973) suggestion that these models can be used when the outcome categories "can plausibly be assumed to be distinct and weighed independently in the eyes of each decision maker". Given our definitions and characteristics associated with each nursing position, the analysis on the occupational choice of registered nurses will continue by estimating the multinomial and conditional logit model. In the future, the goal is to estimate other models such as a nested logit and a multinomial probit model and compare those results to those found here.

Table A.2.24. displays how individual-specific characteristics affect the likelihood of attaining occupation j relative to that of a staff nurse. We use the multinomial logit model to observe this relationship. The following will review the individual results for each occupation j relative to the staff nurse position.

¹⁶³ Specifically, there will be five different probit equations. For equation 1, the dependent variable takes the value 1 if the choice is a staff nurse, 0 for all other choices. In equation 2, the dependent variable takes the value 1 if the choice is a mid-level manager/charge nurse and 0 for all other choices. Each equation will allow the dependent variable to take the value 1 for a different occupation.

2.6.1.1. Mid-Level Manager/Charge Nurse

We use year of graduation from initial nursing program as a proxy for potential experience. We then break this categorical variable up into a series of binary indicators and use the lowest amount of potential experience as our reference category. Given that the proxy variable is not continuous but is ordinal, we are not concerned with exactly how much actual experience an RN has but we are concerned about the possibility of placing an RN in the wrong category of potential experience. Given how the groupings were defined for year of graduation, these concerns will be mitigated as long as we assume that no RN has left the labor force for a time period in excess of five years.¹⁶⁴ The results for the mid-level manager/charge nurse (charge nurse, hereafter) imply that an RN with relatively more experience is more likely to attain this position relative to a staff nurse position. This does not imply that a registered nurse needs no other requirements to attain the charge nurse position. However, the definition of a charge nurse indicates that it is not necessary to have a baccalaureate degree in order to attain this position. When we look at the effect of an increase in education to the BSN or beyond, we see a positive and significant effect on the charge nurse position. Given both of these results, we may be able to infer that experience and education are substitutable when a registered nurse considers moving from a staff nurse to a charge nurse position.

In terms of income, we have included dummy variables for RNs earning \$30,000 per year or less and those earning between \$31,000 and \$50,000 per year. Our reference category is therefore, over \$50,000 per year (high income, hereafter). The coefficients on both income variables are negative and significant, indicating that charge nurses are paid relatively more than staff nurses. This provides at least some evidence that there is a payoff for becoming a charge nurse.¹⁶⁵

Finally, the coefficient on single is negative and significant. This indicates that relative to staff nurses, charge nurses are more likely to be married or divorced. To the extent that being single indicates a relatively younger less experienced RN, we might have further evidence that charge nurses are more experienced relative to staff RNs.

¹⁶⁴ According to the National Sample Survey of Registered Nurses, in March 2000, 78 percent of those RNs who were seeking employment had been employed in nursing less than five years prior. In contrast, the length of time since worked as an RN was 5 years or longer for 46.6 percent of the sample. However, this figure is for RNs not employed in nursing and includes RNs who may not be seeking work as an RN and those RNs with other occupations outside of nursing. Our Louisiana sample differs from the National Sample in that we sent it out according to a list of active members of the Louisiana Nurses' Association. To the extent that these active members continue to have an interest in nursing, we assume that time spent away from nursing is less than what the National Sample might imply.

¹⁶⁵ A possible issue is that the coefficient on income can be driven by whether or not, within an occupation, there are a substantial amount of part-time RNs. In our sample, 9 percent of all RNs indicated they were working part-time. A little over 88 percent (88.37) of part-time workers are staff nurses compared to 9.3 who are charge nurses. However, almost 60 percent (59.23) of the RNs in the sample are staff nurses compared to 28 percent who are charge nurses. Finally, for those staff RNs working part-time, 63.16 percent indicated earning \$30,000 or less compared to 75 percent of charge nurses working part-time in the same income category.

2.6.1.2. Advanced Practice Registered Nurse

Because there are four different positions within the advanced practice registered nurse position (APRN, hereafter), we might expect to attain less information from the multinomial logit regression results, especially if requirements are not the same across these subpositions and if some of the requirements are similar to a staff nurse position.¹⁶⁶ It appears that relative to holding a baccalaureate degree, RNs with a master's degree as initial preparation are more likely to be an APRN relative to a staff nurse. This result might indicate that the APRNs in the sample chose their initial education level with the intention of moving across positions or had the intentions of being an APRN. We also see, however, evidence that APRNs have had less than a baccalaureate degree as their initial education and have increased to a BSN or beyond. This suggests that those RNs with a BSN or more are more likely to hold an APRN position relative to a staff nurse position.

Like the charge nurse position relative to the staff nurse, an APRN is more likely to have higher levels of potential experience. Although only significant for one of the binary indicators, this indicates that relative to approximately three years of potential experience, a RN with approximately twenty years of potential experience is more likely to hold an APRN position relative to the staff nurse position.

Both income indicators have negative coefficients although only the middle income indicator is significant. In other words, relative to the staff nurse position, the APRN is more likely to earn a high income compared to an income in the range of \$31,000-\$50,000.

2.6.1.3. Administrative Officer

The results for the administrative officer (admin, hereafter) position are very similar to that of the APRN position. It could be true that there is variation within this position as well that is not captured in this model. Initial education and the RN-to-BSN-or-more variable indicate that the admin position is more likely to have higher beginning levels of education compared to the staff nurse position and are more likely to have increased education from less than a BSN as their basic educational preparation in nursing.

In regards to potential experience, there is evidence that suggests there is a positive relationship between potential experience and attaining an admin position relative to a staff nurse position.

¹⁶⁶ We did not provide a question in the survey to capture this subcategory. Given the fact that only 3.25 percent of our sample is made up of APRNs, we do not expect variation within this occupation to be problematic.

2.6.1.4. Faculty

It appears that relative to a staff nurse, an RN faculty member is less likely to have less than a baccalaureate degree as her initial educational preparation in nursing. In contrast, a positive and significant coefficient on the RN-to-BSN-or-more variable implies that those RNs who do start out in nursing with less than a BSN and eventually increase education are relatively more likely to attain a faculty position. For these RNs, this suggests that even those teachers who start out in a nursing field other than education intend to further their careers beyond the staff nurse or other position. These two contrasting results supply mixed evidence on whether or not the goal should be to increase the number of RNs with a BSN as their initial education in order to increase the number of RN faculty. However, there does appear to be some indication that an increase in the number of RNs who take part in an RN-to-BSN program will result in an increase in the number of RN faculty, *ceteris paribus*.

Finally, and once again, potential experience has a positive relationship with attaining a faculty position relative to a staff nurse position. Relative to an RN with approximately three years of potential experience, an RN with approximately thirty years of potential experience is more likely to attain a faculty position relative to a staff nurse position.

2.6.2. Marginal Effects

Next, we observe how a discrete change in the RN's characteristics affects the likelihood of holding occupation *j* relative to a staff nurse position, everything else constant. Table A.2.25. lists the marginal effects from our multinomial logit regression.

2.6.2.1. Basic Education

We can see from this table that it is more likely that a faculty member relative to a staff nurse has a higher level of initial education. For example, the likelihood of an RN being a faculty member decreases by almost 91 percent when we compare those RNs who have a diploma as their initial education relative to at least a BSN. The likelihood changes by even more when we compare at the associate degree level. Here, the probability decreases by 97 percent for those who have an associate degree relative to a baccalaureate. The likelihood for both the APRN and administrative officer position increases when basic education is a master's degree compared to the BSN. An RN is 59 and 7 times more likely to hold an APRN and administrative officer position, respectively, when receiving the master's degree as initial education relative to the BSN.

2.6.2.2. RN-to-BSN-or-more

Table A.2.25. shows that there is an increase in the probability of holding all other occupations, relative to the staff nurse position, when an RN has increased her education to the baccalaureate level or beyond. It is almost 3 times more likely that an RN will be a charge RN, relative to a staff nurse, when it is true that she has increased education.

Similarly, an RN is almost 4 times more likely to be an administrative officer, compared to a staff nurse, when she has increased education to the BSN or higher. The effects are even more powerful, although probably less surprising, when we observe the results for the APRN and RN faculty. It is 20 and 35 times more likely that an RN will hold an APRN and RN faculty position, respectively, relative to a staff nurse position, when the RN has increased her education to the baccalaureate level or higher.¹⁶⁷

2.6.2.3. Income and Marital Status

The marginal effects on income levels show the increase in likelihood of holding a position other than staff nurse, relative to a staff nurse, when income levels are relatively higher. Although only significant for the charge RN position, there is a decrease in the likelihood of holding all positions other than the staff nurse position, when income is less than or equal to \$30,000. When observing the income category, \$31,000-\$50,000, we see more significant effects. Therefore, we can infer that, compared to income levels greater than \$50,000, lower income levels are associated with a lower likelihood of holding occupation j , relative to a staff nurse position. For example, when income levels are less than \$51,000, the likelihood of being a charge RN or administrative officer, relative to being a staff nurse, decreases by 70 percent. Finally, there is a decrease in probability of 90 percent that an RN will be an APRN, relative to a staff nurse, when income is less than \$51,000.

In terms of marital status, it appears that relative to a staff nurse, all other RN occupations are more concentrated with married or divorced RNs, although this evidence is only significant when comparing the charge RN to a staff nurse.

2.6.2.4. Potential Experience

When comparing higher experience levels to three years of potential experience, the marginal effects provide less significant results. This is because, apart from twenty years of potential experience, there is little variation in the distribution of experience across RN positions.¹⁶⁸ As was stated earlier, we divided the potential experience variable up into a series of binary indicators. Therefore, the results of the marginal effects for each binary indicator are relative to the reference group, in our case three years of potential experience. However, because we have only significant results for our twenty

¹⁶⁷ These results by themselves may appear remarkable but if we keep in mind that we are making our comparison with those RNs who have a baccalaureate as their initial education but have not changed education levels, this is even more impressive. In other words, the RN-to-BSN-or-more variable takes the value 1 if an RN has less than a BSN as initial education and increases education to the BSN or higher, 0 otherwise. The zero includes those RNs who have a BSN as initial education and have not invested in more human capital. It could be argued, then, that the RNs who are increasing education levels are the ones most likely to be mobile. We don't know, however, how much of this mobility is intended prior to the decision to invest in additional human capital.

¹⁶⁸ The fact that there is little variation in the distribution of experience across positions should strengthen the practicality of our results when we later observe the changes in probabilities of holding occupation j , relative to staff nurse, when an RN has invested in additional human capital.

years of potential experience indicator, the effects are relative to “other than” twenty years of potential experience. It would seem more problematic than it is worth to try and provide intuition for these results given that most of the marginal effects for potential experience are not significant. As was stated in a previous footnote, at the end of the day we are probably more pleased that we do not have more significant results for the marginal effects on potential experience.

2.6.3. Mixed Model

Table A.2.26. provides the results for the mixed model. Here we observe the marginal effects of occupational-specific characteristics on the choice of occupation j relative to a staff nurse position for registered nurse i .¹⁶⁹

In our first specification (1), we observe no effect of income or RN-to-patient ratio on an RN’s choice of position within the nursing field. Our hypothesis is that we would expect an increase in income (benefit) for occupation j to have a positive effect on the likelihood of choosing occupation j , relative to occupation k . Alternatively, we hypothesize that an increase in the number of patients that a registered nurse is in direct care of (cost) would have a negative effect on the likelihood of choosing occupation j , relative to occupation k . Therefore, within the entire sample, including all characteristics of the RNs, we find nothing significant about the occupational-specific variables on occupational choice.

In our second specification (2), the effects of expected income and the RN-to-patient ratio differ by RN characteristics. In specification (2), the effect of income and the RN-to-patient ratio in occupation j on RNs who have increased education to a baccalaureate or higher is examined using an interaction term. Whereas neither income nor the RN-to-patient ratio significantly affected an RN’s probability of choosing a particular nursing position, the same is not true for those RNs who have invested in additional units of human capital. Although an increase in the RN-to-patient ratio is not found to have a negative effect on the likelihood of choosing occupation j relative to occupation k , an increase in income of \$10,000 increases the likelihood of choosing a nursing position other than staff nurse by as much as 49 percent. For example, the coefficient for the marginal effects in specification (2) for the charge RN interaction term is 0.000030. This coefficient is based on a one dollar increase in income. When we multiply the value of this coefficient by \$10,000 and compute the factor change in odds, the results are that a \$10,000 increase in income for the charge RN position increases the odds of choosing that position by 35 percent. The value of the coefficient for the administrative officer interaction is the same as the charge RN interaction, implying the same percentage increase in odds of choosing the administrative officer position with a \$10,000 increase in income for that position. The APRN and RN faculty interactions each have the same values for their coefficients (0.000040). This implies that a \$10,000

¹⁶⁹ We have excluded the control variables, or individual-specific characteristics from the table for the purpose of saving space. These variables are the same variables included in the multinomial logit model and the sign and significance of each control is the same across models.

increase in income for either the APRN or RN faculty position increase the odds of choosing that position by 49 percent.

The results of our second specification provide evidence that relative to those RNs who have not invested in additional amounts of human capital, those who did are expecting a return on their investment. It appears as though the return can be found by moving away from the staff nurse position to any of the other positions in our analysis. Finally, specification (2) provided no evidence that RNs find direct patient care to be enough of a deterrent to cause a move away from the staff nurse position.

2.6.4. Predicted Probabilities

The goal of this paper was to observe the probability of occupational outcomes conditional on some of the registered nurse's characteristics. Specifically, we want to look at how the probability of holding a staff nurse position might change when the RN invests in additional amounts of human capital. Table A.2.27. gives us a closer look at what we hypothesize.

We used the multinomial logit model to estimate the effect of changes in the RN's characteristics on the likelihood of attaining occupation j relative to a staff nurse position. From this model, we then computed the predicted values of being in a staff nurse position for RNs whose basic education is either the diploma or the associate degree. Within these groups, we then computed the predicted values for those RNs who either increased education to the baccalaureate or higher or have not invested in additional levels of human capital. To get an indication on whether or not experience plays a role in the likelihood of holding a staff nurse position, we stratified the probabilities by potential experience.¹⁷⁰ In our last column in Table A.2.27., we have the probability of being a staff nurse when basic education for the RN is a baccalaureate and the RN has not invested in additional units of human capital.

If we at first consider each basic education level with no change in education levels, we would expect that an RN with a BSN should have a lower likelihood of holding a staff nurse position. This is because we would expect, everything else constant, that RNs with relatively higher levels of education would have more opportunities (i.e. the ability to move across nursing positions would be greater for the BSN nurse). Therefore when comparing columns (2) and (4) to column (6), we should see lower probabilities in the latter. Indeed, in almost all cases, this is the true. For example, at 3 years of potential experience, the probability is 0.846 for an RN earning \$30,000 or less, who is either married or divorced, and has a diploma as her basic education level. The probability is 0.798 for an RN with the same characteristics except she has a BSN as her basic education level. The change in probability, given different basic education levels is 6 percent. At the same level of potential experience, with the same characteristics,

¹⁷⁰ The potential experience proxy was generated from our year of graduation variable. As was stated earlier in the paper, we used a midpoint in each grad year grouping and subtracted from the year 2000 to get potential experience.

comparing the RN with an associate degree to that of an RN with a BSN shows a change in probability of 2 percent.

When we make these observations at higher levels of potential experience, it appears as though the change is even greater. At 30 years of potential experience, when comparing a diploma RN to that of a BSN RN, holding other characteristics the same as the previous example, the change in probability is 16 percent. Additionally, the change is 7 percent when we compare the associate degree RN to that of a BSN RN. In fact, if we observe the change in probability within each basic education level we find that as potential experience increases, the RN with a BSN has the greatest decrease in likelihood of being in a staff RN position. For example, the change in probability for the diploma RN from 3 to 30 years of potential experience is a decline of 14 percent. For the associate degree RN and BSN RN, the change is a decline of 18 and 23 percent, respectively. This provides some indication that in addition to education, experience plays some role in the mobility of registered nurses.

If we observe the change in probability given higher income levels the same trend continues. For example, the change in probability of being a staff RN for an RN with a diploma as his basic education when income goes from less than \$30,000 per year to over \$51,000 per year is 34 percent. In comparison, the associate degree RN's likelihood of being a staff RN declines by 40 percent and the BSN's likelihood declines by 45 percent. This result might imply that BSN RNs are not only relatively more mobile, but they are moving to relatively higher paid positions.

Our hypothesis within this analysis is that an increase in education will lead to a lower likelihood of an RN holding a staff RN position, *ceteris paribus*. Based on this hypothesis, we would expect the probabilities in column (3) to be lower than those in column (2) and the probabilities in column (5) to be lower than those in column (4). We can see that this is indeed true, for every case. In the occurrence of an RN whose basic education is the associate degree and current education is the BSN or higher, the difference in probability of being a staff nurse is -0.285 for an RN with 10 years of potential experience who is making \$30,000 or less in income and is either married or divorced. That is a change of over 36 percent. As one can see from the table, the likelihood of being a staff nurse when the RN has invested in additional levels of human capital decreases to 0.50 and below for a lot of the cases. Furthermore, for both categories of basic education, the difference grows as potential experience increases. If we observe the change in probability by changing one of the characteristics we find even more glaring results. For example, an RN whose basic education is the associate degree, with 3 years of potential experience and is single making between \$31,000 and \$50,000 per year has the likelihood of being a staff nurse equal to 0.899 when she has not increased her education. The likelihood of being a staff nurse, for an RN whose basic education is the same but has increased education to the BSN or higher, and who is also single but making over \$50,000 per year, is 0.421. The difference is -0.478, or a 53 percent change. This provides some evidence that the investment in additional human capital provides mobility into higher paid positions.

If we observe the probabilities of holding a staff nurse position across basic education levels, for those RNs who have invested in additional levels of human capital, we notice that the likelihood is lower for the associate degree RN. This is true for all levels of potential experience and across all RN characteristics. This might imply that, although both types of RNs are increasing education, assuming the goal is to move to another nursing position, the associate degree RN is taking more action. If we assume that diploma RNs are relatively older, it is possible that they are less likely to move to another position even after investing in additional levels of human capital.¹⁷¹ Of course, there is also the possibility that having a higher level of education, such as the BSN, provides the option of mobility. To the extent that this option has value, and this benefit is greater than the costs, some RNs will invest in additional human capital to have the option of mobility. Finally, on this subject, it could be true that within the staff nurse position, there are additional benefits received with a baccalaureate that may not be realized with either the diploma or associate degree. This is a possible topic of further research.

Finally, Table A.2.27. provides results for changes in probabilities when an RN increased education to the baccalaureate level or higher. We provided theoretical considerations in part, based on the RN-to-BSN program. Therefore, when observing the probabilities when RN-to-BSN-or-more equals one, we are also looking at those RNs who have a current education level higher than the BSN. If there are a relatively large number of RNs who have increased education beyond the BSN, the difference in probabilities could be driven by this fact. To that end, we have also provided an additional table of predicted probabilities, when additional investment in human capital is restricted to the baccalaureate level. We also provide information on the differences, comparing the “restricted” to the “unrestricted” probabilities. Table A.2.28. and Table A.2.29. presents these results, respectively. When basic education is the associate degree, restricting the observations to those RNs who have increased education to the BSN level, compared to the probabilities of those RNs who increased education to the BSN level or higher, the restricted probabilities are higher, as we expected. Furthermore, across all characteristics, the difference grows with potential experience. However, when observing the actual levels of these probabilities, the difference is negligible. When basic education is the diploma, the differences in probabilities are even slighter and some are even negative, implying that there are some RNs who have increased education higher than the baccalaureate and hold a staff nurse position. These cases are at lower levels of potential experience and it could be that the RN has not yet made the decision to move to another nursing position.

¹⁷¹ While it is not straightforward to understand why a nurse would invest in additional human capital and not seek a return, (in the form of a higher paid position or one with a noncompensated differential) it is more intuitive why a relatively older RN would not move to another nursing position. Older people, in general, seem to be more attached to what they have and less attracted to change. In our sample, 1.4 percent of the RNs have a diploma as their basic education and are at the age of 40 or younger. In comparison, 14.7 percent of the sample is associate degree RNs at the age of 40 or younger.

2.7. Conclusion

We have provided two models in estimating the determinants of a registered nurse's choice of position within the nursing field. The multinomial logit model gave us insight into the characteristics of the RN so we could make comparisons with the general population of the Louisiana registered nurse population. The conditional logit model allowed for heterogeneity in the positions that registered nurses hold or may soon choose. The goal by using this model was to utilize that variation by estimating the effect of costs and benefits on the choice of nurse position. The mixed model is a combination of both individual and occupational-specific variables. We found evidence that an increase in education increases the likelihood that an RN holds a position other than the staff nurse position. In addition, there was minor evidence that an increase in potential experience is associated with an increase in the likelihood of holding a position other than the staff nurse position. Whereas we found no negative effect of an increase in the amount of direct patient care, or positive effect of an increase in income, on a registered nurse's choice of positions, the same was not true for all nurses. Those who have invested in additional levels of human capital were influenced by the incomes associated with the positions they chose, although there was no influence from direct patient care.

Using the occupational choice model, we observed the probabilities that registered nurses would be in a staff nurse position for RNs who did and did not invest in additional levels of human capital for different types of nurses. Comparing these probabilities provided evidence that when a registered nurse increases her level of educational preparation in nursing, the likelihood that she will remain in a staff nurse position declines. This finding holds across all RN characteristics for both levels of basic nurse education. Additionally, we found that the percentage change in the difference in probabilities increases as the RN's potential experience increases.

Finally, we found that for all registered nurses who invest in additional levels of human capital, it is more likely that the RN whose basic education is the associate degree, relative to the diploma prepared RN, will exercise the option of mobility by moving to another nursing position. *Ceteris paribus*, evidence also indicates that these are higher paid positions.

We have used a sample of registered nurses from Louisiana to make these inferences. We compared characteristics of these nurses with the characteristics of registered nurses in the national sample and found several similarities. Because of these similarities we would argue that what was found in this local analysis could be generalized on the national level. What we found in this analysis is that registered nurses increase their mobility when investing in additional units of human capital. This evidence implies that if the goal is to increase the number of registered nurses working at the bedside, giving direct patient care, careful attention must be given in how to reach that goal. The intended effect of a subsidy such as the RN-to-BSN program, which is to increase the number of registered nurses with a baccalaureate degree as their educational preparation, might be offset with the unintended effect of registered nurses exercising their option of mobility into other nursing positions, away from the bedside. To the extent

that registered nurses are needed in these other areas of the nursing profession, this would not be considered an unintended effect. Further research should therefore be applied into the area of observing the mobility of registered nurses outside of the nursing profession, when the RN has increased her education to the baccalaureate level or higher.

CHAPTER 3

MODELING A STATE'S RECOGNITION OF THE EXCEPTIONS TO THE EMPLOYMENT-AT-WILL DOCTRINE

3.1. Introduction

Over the past two decades there have been dramatic changes in the legal environment in regards to employment law. Starting in the early 1980s, with respect to the common law employment-at-will doctrine, which allows employers to end the employment relationship for good cause, bad cause, or no cause at all, state courts have taken a more aggressive position toward protection of the employee by recognizing exceptions to the common law doctrine. Based on a reduced form model on supply of and demand for these exceptions to the employment-at-will doctrine, we set out to model the factors underlying the decision of a state's court to either rule in favor of the employee and therefore change the status from an employment-at-will state to one with increased protection of its' employees or to rule in favor of the employer leaving status unchanged.

The endogeneity of these changes in the legal environment is important to model as this will allow for robustness when simultaneously studying the effects of these changes in the common law doctrine on other outcomes such as employment and wages.

We will estimate a fixed effects probit model using data on 48 states during the time period 1978-2002 for this analysis. The benefit of using cross-sectional time-series data is that we will be able to allow for not only variation across states but also changes in characteristics within the states over time. Additionally, with few exceptions, the fixed effects estimator has had little use in nonlinear models.¹⁷² As reviewed in the following section, previous research on modeling the factors that explain the changing legal environment, in terms of exceptions to the employment-at-will doctrine, is limited to one case in which panel data is used. And in this case, the researchers pool the sample and estimate a logistic regression. By using this method, the sample is treated as an independent cross section and it is assumed that the error term includes only unobservable factors affecting the dependent variable that are not systematically related to the observable explanatory variables. However, when analyzing economic data when the unit of observation is the state, it is difficult to maintain that there is no correlation between an unobservable effect and at least one of the regressors in the model.¹⁷³ And if this unobserved effect is correlated with any of the explanatory variables, then pooling the sample will be biased and inconsistent. Using the fixed effects probit model will allow us to estimate the individual state effect and possibly provide more robust estimates of the parameters. In addition, with the probit model, we are able to compute probabilities and marginal effects. Compared to the previous literature using a pooled sample, these

¹⁷² See Heckman and MacCurdy (1980) and Hsiao (1993, 1996).

¹⁷³ For example, an unobserved characteristic on the state level could be a general "attitude" toward labor policy and/or legislation (we would argue that some states are known to be relatively more "labor friendly"). By including the percentage of the state that is unionized as a regressor in the model, it is difficult to argue that the unobserved effect is not correlated with this variable.

probabilities and changes in probabilities should give us a better indication of the true effects of labor conditions on employment-at-will legislation.

In the following section, we provide a review of the literature on protective legislation, specifically the exceptions to the EAW doctrine. We review previous work that defines when a state recognizes any one or all three of the exceptions. This will provide us with our dependent variable used in this analysis. In addition, we review previous work on modeling the factors that explain the changing legal environment. Next, we review some of the analysis on the effect of this protective legislation on economic outcomes. Finally, we review Perritt's (1986) analysis on what may be in store in the future, in terms of the erosion of the common law interpretation of the employment-at-will doctrine.

We follow the literature review with a section describing the factors that will be used in this analysis to model the supply and demand for protective legislation within a state. The next section will introduce the empirical model used for estimating our cross-sectional time-series data. We will then present our results comparing them to the results from previous work and the final section will conclude this analysis.

3.2. Literature Review

3.2.1. Exceptions to the Employment-At-Will Doctrine

There are three exceptions to the employment-at-will doctrine. The first is the Public Policy Tort theory. It permits terminated employees to recover damages resulting from their termination when they can successfully show that a termination jeopardized recognition of a public policy reflected in a state or federal constitution, statute, administrative regulation or formal code of conduct for a profession. This definition includes not only a clear (narrow) interpretation but also a more broad interpretation in which the court would determine recognition.

The second theory is the Implied in Fact Contract theory, permitting a terminated employee to recover damages when the employee can prove breach of an implied-in-fact contract. Under this theory, employees are permitted to establish a contract right not to be terminated at will, based on informal employer promises of employment security, such as those made orally at the time of hire, or those contained in employee handbooks or personnel policies.

The third theory is the Implied Covenant of Good Faith and Fair Dealing theory. This theory permits dismissed employees to recover damages for breach of an "implied covenant of good faith and fair dealing." One of the earliest exceptions to the EAW doctrine, it has somewhat taken a backseat to the Public Policy and Implied Contract exceptions on the grounds that it leaves too much to the jury. It has not been disclaimed, however, due to the future possibility that it may permit relief when cases don't fit the requirements of the other two exceptions. This exception is considered the broadest

departure from the employment-at-will doctrine and is interpreted to mean either that the employer is subject to a “just cause” criterion or that terminations made in bad faith are prohibited.

3.2.2. Defining a State’s Recognition of an Exception

The recognition of either a public policy or implied contract exception to the EAW doctrine is perceived by each state and the definition varies from state to state, but most states either narrowly limit the definition to clear statements in their constitutions or statutes, or permit a broader definition that enables the judicial process to infer or declare a state’s public policy beyond the state’s constitution or statutes. The collection of data for determining if a state has recognized these exceptions can prove to be quite burdensome, depending on how one chooses to define. However, courts in only a very few states have not yet ruled in cases brought under these theories, so work has been done to identify the states that recognize these exceptions and the year in which they began recognition. Walsh and Schwarz (1996) (WS hereafter), upon providing this data, list numerous sources that have performed the task. They warn the reader, however, that across sources, there is noticeable disagreement. The discrepancies, they contend, “are accounted for by differing dates of publication, use or nonuse of federal court decisions interpreting state law, substantial ambiguities within many of the decisions themselves, and a tendency for the courts to fail to acknowledge conflicting rulings”.¹⁷⁴ To “clean up” this potential problem WS have read the relevant cases and referred to federal court decisions only when state court decisions fail to provide clear solutions.

The determination of a public policy exception proves to be less problematic relative to the implied contract exception. The latter proves to be difficult because typically, employment is not governed by a contract. However, an employee can bring suit against a former employer based on what is implied, even though no express, written mechanism regarding the employment relationship exists. In addition to reliance on the oral representation, an employee may have perceived security through contents in employee handbooks. In these handbooks, employers may state that employees will only be disciplined or terminated for “just cause”, or in writing may be the specific procedures that the employer will follow in the case of discipline and/or termination. WS specify, however, that most courts rule against the former employee “due to lack of consideration beyond remaining on the job, no mutuality of obligation, an absence of bargaining over terms, lack of intent by the employer to be bound, the ability of the employer to change policies unilaterally, no signing of the document in question, insufficient specificity, violation of the statute of frauds, and absence of a fixed term of employment”.¹⁷⁵

WS’s goal is to categorize the states into either recognition or nonrecognition of the three exceptions and to attempt to distinguish between states that recognize, with either “narrower” or “broader” interpretations of these exceptions.¹⁷⁶ This leads to the implication that, the “broader” a state’s interpretation of an exception, the more situations

¹⁷⁴ Walsh and Schwarz (1996, pp. 647).

¹⁷⁵ Walsh and Schwarz (1996, pp. 648-49).

¹⁷⁶ The source WS use for this compilation is Postic (1994).

there are in which employees could successfully challenge employers' termination decisions. This would increase the likelihood that a particular state has recognized a particular exception when it is not already explicitly statutory.

WS describe how they determine what constitutes a "broad" versus "narrow" recognition of a public policy exception to the EAW doctrine. For actions by employees, consider: A = when an employee is fired for exercising a legal right (filing a worker's compensation claim) or for refusing to commit an illegal action on behalf of the employer (not throwing trash into the ocean when working on an oil rig). B = employee engages in "whistle-blowing" by reporting suspected employer/co-worker wrongdoing, or has otherwise acted in accordance with a broad notion of civic duty or the public good (attending jury duty). A court's interpretations and therefore rulings, in terms of sources, can be restricted to: C = explicit statutory language. Lesser restrictive sources would be: D = court decisions, administrative regulations, constitutional provisions, and professional codes. Finally, in terms of how courts treat public policy cases, consider: E = tort claims or, F = contractual claims, which are more restrictive because these claims are predicated on an implied provision in all employment contracts that termination was not in violation of public policy.¹⁷⁷ WS label "broader" exceptions as: (A+B) + (C+D) + (E). Exceptions are categorized as "narrower" if either (A+B), (C+D), or (E) are not found.

WS use two criteria when categorizing states that recognize an implicit contract exception as either "broader" or "narrower". Consider: A = oral representations by employers, and B = written representations by employers. Additionally, C = disclaimers that negate employer statements implying a term of employment, reliance on just cause criteria, or provision of due process in termination decisions. States classified as having "broader" exceptions are those that recognize A + B + C. Otherwise, the exceptions in those states are categorized as "narrower."

When categorizing states that recognize the Implied Covenant of Good Faith and Fair Dealing exception, consider: A = plaintiffs permitted to sue in tort or B = plaintiffs are restricted to sue under contractual remedies. Additionally, in terms of application of the covenant, consider C = recovery of earned benefits denied through termination or D = situations where a "special relationship" of trust and reliance exists, cases involving fraud and deception, or where an express or implied contract renders the employment relationship no longer at will. WS classified states as having "broader" exceptions as those that recognize A or (C + D).

Forty-two states recognize the public policy exception and thirty-eight recognize the implied contract exception. Only ten states recognize the covenant of good faith and fair dealing exception. Seven states recognize all three doctrines while four states

¹⁷⁷ Only three states (Arkansas, South Dakota, and Wisconsin) restrict damages by viewing cases as contractual claims. However, of the 42 states that have recognized a public policy exception, only 16 are categorized as holding a "broader" interpretation. This implies that the majority of the explanation differing states with public policy exceptions as "narrow" versus "broad" is explained by (A+B) or (C+D).

(Florida, Georgia, Louisiana and Rhode Island) recognize none.¹⁷⁸ Additionally, one state (Maine) is classified as unclear in regards to a public policy exception and two states (Maine and West Virginia) are classified as unclear in regards to an Implied Covenant of Good Faith and Fair Dealing exception.¹⁷⁹

3.2.3. Previous Literature on Modeling Exceptions to the EAW Doctrine

Kesselring and Pittman (1993) (KP hereafter) use a probit model to observe the factors included in a state's decision to protect workers through the exceptions to the employment-at-will doctrine. The model is set up based on court decisions, in which each of the fifty states was classified as either providing a significant degree of employment protection or as providing no protection. States that are classified as non-protect states are those in which the courts refused to create new employee protections that distinctly depart from prior legal positions. Alaska, California, Massachusetts, and Montana were classified as protected states because the courts reversed prior law and held that an implied covenant of good faith and fair dealings exists in employment contracts. Given that this is the broadest interpretation of the exceptions to the EAW doctrine, the authors imply that this is a form of protection that goes beyond the exceptions involving ordinary contract principles such as offer, acceptance, and consideration requirements. Additionally, New Hampshire and Pennsylvania were classified as protected because the former provides protection from bad-faith discharges and the latter recognizes wrongful termination when an employee is fired with specific intent to harm. Finally, Michigan and Hawaii are classified as protected because these states' courts recognize wrongful termination when employers' statements in personnel manuals and such create an employment atmosphere that requires good-faith discharges. This form of protection goes further than the implied contract exception because it is not required that the term of employment be stipulated. Neither required is that the employee bargained for discharge protection. Finally, it is not required that the employee prove reliance on the implied-contract doctrine.

The variables used to control and explain the outcome (protect versus non-protect) are percentage of total income derived from agriculture and a RTW dummy variable. These variables serve as indicators of anti-union, anti-protective employment views. KP postulate a negative relationship between the at-will position of the state and these variables. The percentage of the state's workforce unionized is used as a pro-union proxy implying a positive relationship. The percentage of Congressional Delegation affiliated with the Democratic Party is hypothesized to have a positive relationship with "broad" protection.

¹⁷⁸ Additionally, thirty states recognize two-out-of-three of the exceptions and the majority (25) of those states recognize the public policy and implicit contract exceptions. WS warn the reader not to interpret this as uniformity among the states with regard to the laws. Rather, they propose there are meaningful differences across states in their interpretations of particular doctrines.

¹⁷⁹ New Hampshire adopted the Implied Covenant of Good Faith and Fair Dealing exception in 1974, under a "broader" measure but later restricted the doctrine to public policy cases in 1980.

Structural variables include a measure of the state's urban population, education (high school diploma or greater) and age. The population density variable is hypothesized to have a positive relationship to a state's protection due to greater awareness of employment problems. KP argue that higher educated individuals might be inclined to disfavor the EAW doctrine and unjust dismissals, implying a positive relationship with the likelihood of "broad" protection.¹⁸⁰ KP contend that older individuals are more concerned about irregular dismissals, which is indirectly related to the difficulty that older individuals have in finding employment.

The state's average blue-collar wage rate was used to get a proxy for the position of the labor market. High relative wage rates imply a relatively tighter labor market, which implies a lower likelihood of workers favoring protection. The state's average unemployment rate was used because KP argue that a higher unemployment rate generates interest of some form of protection against unjust dismissals.

A dummy variable was used to indicate if judges sitting on a state's highest court are appointed or elected. KP claim that elected officials should be more sensitive to the issues affecting the general population. The coefficient (appointed = 1, elected = 0), therefore, should be negatively related to the likelihood of "broad" protection.

The results of interest are either those of significance or those of significance with signs opposite of what is hypothesized. The coefficients on the variables in the probit model indicate the effect on the likelihood of "broad" protection in a state. The union variable is positive and significant. This implies that a more unionized workforce increases the likelihood of "broad" protection. It is not clear how, if at all, this plays a part in whether or not a court recognizes "broad" protection in its' judicial decisions. What is interesting, however, is whether or not the union variable does proxy for members' tastes for "broad" protection from the courts when it is generally considered that this is a service arguably supplied by unions.

The coefficient on the variable indicating how judges acquire their seats is significant but is opposite of the anticipated sign. It appears that appointed judges are more sympathetic to limiting the employment-at-will doctrine relative to elected justices.

It appears that the biggest contribution made from this work is that KP's model was able to predict the correct outcome (protect vs. non-protect) for 47 of the 50 states. Out of the 8 states that they classified to have "broad" protection, the model predicted 6. Out of the 42 states KP labeled as not having "broad" protection, the model predicted one as having "broad" protection, leading to a correct prediction 94 percent of the time.

Dertouzos and Karoly (1992) (DK hereafter) explore the factors that are associated with the variation from state to state in the pattern and timing of the adoption

¹⁸⁰ KP defines the limited dependent variable as PROTECT and NON-PROTECT. However, their interpretation of protect is in the broad sense comparable to what was discussed in the Walsh and Schwarz (1996) paper. Therefore, non-protect would not be interpreted as "no unjust dismissal protection", although it certainly is included, but also included is "narrow" protection, as discussed in Walsh and Schwarz.

of the exceptions to the employment-at-will doctrine by using their definitions of a departure from the common law EAW rule. In addition to characterizing the legal environment for the 48 contiguous states, as well as Alaska and Hawaii, from 1980 to 1987 in terms of whether or not they recognize any of the exceptions to the EAW doctrine, (broad or narrow), DK also use a classification by making a distinction between legal environments in which there is a contract cause of action available to an employee who has been terminated versus one in which there is a tort cause of action.¹⁸¹ The difference in this classification is in regards to the damages that can be recovered. DK use this classification of protection to analyze the effects of protective legislation on labor-market outcomes.

In terms of possible explanations for the legal changes that occurred in the 1980s, DK hypothesize that because the U.S. workforce is declining in regards to those that are union members, state judiciaries are more willing to adopt wrongful-termination doctrines. Therefore, DK expect a negative relationship between the change in unionization and the probability that a state recognizes an exception to the EAW doctrine.¹⁸²

DK also expect that an economic downturn, such as that witnessed in the early 1980s, increases the number of unemployed workers. They hypothesize a positive relationship between changes in a state's unemployment rate and the probability of having a wrongful-termination doctrine. As the number of unemployed workers increases, the number of existing employees who would benefit from protective legislation increases.

It is also hypothesized by DK that an increase in litigation will increase the likelihood that a state would recognize protective legislation. To proxy for a degree of litigiousness in a state, DK use the percentage change in the number of lawyers per capita.

It is expected that over time, workers become more aware of their rights. Therefore, each successive year (1981-1987), relative to a reference year (1980), should increase the likelihood of a state recognizing an exception to the EAW doctrine.¹⁸³

¹⁸¹ DK use two different classifications of protective legislation, however, the possible factors explaining a state's decision to protect or not do not differ other than a quadratic form of the spatial factor is used for modeling the recognition of the exceptions to the EAW doctrine. This allows for the possibility of a nonlinear relationship, so that spillover effects may eventually be negative.

¹⁸² The negative relationship between the change in union density and the likelihood of limiting the employment-at-will doctrine is hypothesized because some states have had an increase in union density from time period t to $t+1$ and those states are less likely to pass new labor legislation. Therefore, when union density decreases from t to $t+1$, DK expect an increase in the likelihood of recognition.

¹⁸³ Of course, knowing that, in general, the major growth in recognition of an exception to the EAW doctrine was during the mid-1980s, the year dummy variables could simply be picking this up when referring to a base year such as 1980. In other words, if DK find significantly positive effects of the year dummies on the dependent variable, it is difficult to imply that this is because worker's knowledge of their rights has increased over time. DK do acknowledge this limitation.

Ideological factors, or a state's attitude toward labor, may explain the state's choice on protective legislation. It is presumed that if a state is a right-to-work state, this state is more resistant to adopting new common laws that favor workers over their employers. This implies a negative relationship between RTW states and the likelihood of passing legislation in favor of workers.

DK propose that another ideological factor, unionization rate of a state, may have effects that counter each other. The percentage of the workforce that is unionized indicates a favorable attitude toward labor, implying a lower expectation of the costs of the new doctrines. However, to the extent that these doctrines are substitutable for the services that unions provide, these costs could lead unions toward an unfavorable attitude for this protective legislation. DK also include a measure of the state's conservative attitudes by indicating whether or not a state has a Republican governor.

Finally, DK hypothesize possible spillover effects from one state to another. They imply that it is less costly to follow the precedent set by other states because a state court often cites the number of other states that have already adopted an exception to the EAW doctrine when handing out its decision. Therefore, they hypothesize a positive relationship between the percentage of neighboring states that recognize an exception to the EAW doctrine and the likelihood that the state will rule in favor of the exception. DK also hypothesize that over time, the effect could become negative as holdout states are less likely to favor worker protection. The authors use a quadratic term of the spillover variable to proxy for the effects over time.

Among the general key findings is that over time, the likelihood that a state increases legislation that is favorable to the employee increases. This is most apparent when observing the years 1984 and higher, in reference to 1980, the base year. DK offer increased awareness of worker's rights as a possible explanation. However, as mentioned previously, there is difficulty in assuming the validity of this explanation. Furthermore, DK found evidence of spillover effects as it is more likely that a state increases its protective legislation when the neighboring state has already done so. When the dependent variable is defined as a narrow interpretation of the public policy exception, they also found evidence of a negative effect from the holdout states. DK use a right-to-work dummy variable, to proxy for a state's attitude toward worker's rights. As hypothesized, evidence shows that states with this conservative attitude are less likely to increase protection of worker's rights over time. Another measure of attitudes toward labor, the level of unionization and the change in unionization over time, was used in DK's analysis. They found that both of these factors are positively associated with the likelihood of recognizing the narrow public policy exception to the EAW doctrine.¹⁸⁴ In regards to the results found by DK, our analysis will expand on this and what others have hypothesized as possible explanations for changes in the legal climate.

¹⁸⁴ That is, the coefficient on the change in union density is negative, implying that when the change is negative there is an increase in the likelihood that a state will recognize either the narrow public policy exception, the broad public policy exception, or the broad good faith exception. They found no significant effects of union density or the change in union density on the likelihood that a state will recognize either the implied contract or good faith exception.

3.2.4. Effects of EAW Exceptions on Economic Outcomes

Neumann and Rissman (1984) use pooled cross-sectional data to observe the effects of these exceptions to the EAW doctrine on state unionization rates.¹⁸⁵ The years they observe are biennially for 1964-1980. At this time, only nineteen states had recognized a public policy exception and twelve states recognized an implied contract exception.¹⁸⁶ In addition to an indicator variable for the EAW exceptions, NR construct a trend variable for the two exceptions to observe if importance increases or decreases over time. The results are mixed. The coefficients on the public policy variables (indicator and trend) are negative but not significant. The coefficients on the implicit contract variables, however, are both negative and highly significant, indicating that union density falls in response to this form of exception to the EAW doctrine. NR offer that the more robust specification of the indicator variable relative to the trend variable might be due to the recent recognition of these exceptions. Additionally, NR suggest that the protections afforded to employees by the public policy exception are typically not services that unions have provided to members in the past. As NR contend, these protections are of minor importance to blue-collar workers or those more likely to be union members. The implicit contract exceptions, however, provide protection to no particular group of worker yet provide the very service unions supply.

Block et al. (1987) try to shed some light on the question of whether or not workers view exceptions to the EAW doctrine as substitutable for unions by observing the effect of the exceptions on NLRB representation elections. Before presenting their model, however, Block et al. make an important point. The percentage of the workforce belonging to unions peaked somewhere in the mid 1950s and has been monotonically decreasing from that point to present.¹⁸⁷ The authors suggest that even if there were a contribution from the exceptions to the EAW doctrine in the decline of union density, the timing would suggest that it is not a major cause of the decline.¹⁸⁸

The dependent variable is a dichotomous variable that represents whether an employee chose union or not. The independent variables of primary interest are the presence or absence of a court decision providing employees some protection from unjust

¹⁸⁵ NR observe the effects of the public policy and implied contract exceptions and not the covenant of good faith and fair dealing exception. Their claim is that this particular exception is not relevant when analyzing the effects on unionization.

¹⁸⁶ It should be noted, and will be more apparent when comparing sources in the appendix, that NR's compilation of states and exceptions to the EAW doctrine are at odds with Krueger's (1991) and Walsh and Schwarz's (1996) compilations. This is aside from the fact that the studies were performed in different years. For example, NR's data covers the years 1964-1980 and they list New York as recognizing a public policy exception (year recognized was not given). However, neither Krueger (1991) nor WS (1996) show New York as a state that recognizes a public policy exception. Additionally, NR show North Carolina as recognizing an implicit contract exception, however both Krueger (1991) and WS (1996) list North Carolina as not recognizing that exception. It is not clear why this discrepancy occurs. Also unclear is where NR acquired the EAW data implying that a means of checking at this point remains impossible.

¹⁸⁷ The percentage of the workforce in the private sector that are members of unions has actually been declining. The public sector has actually witnessed an increase in union membership over this time period.

¹⁸⁸ The first state recognizing an exception to the EAW doctrine did not recognize until the mid 1960s, after the decline in unionization had started.

discharge in a state in which the election occurred and at least one year prior to the year in which the election occurred. The lag allows time for information to network through the labor force. All three exceptions to the EAW doctrine were included in the model.¹⁸⁹ Other variables used as controls were the unemployment rate in the state, the percentage of the workforce in the state that are members of unions, and a RTW dummy variable for the states that had an RTW law. The union variable is intended to capture either a saturation effect, implying a negative coefficient, or prounion attitudes, implying a positive coefficient. The unemployment rate is controlling for cyclical effects while the RTW variable is intended to pick up “tastes” for unions. The regression analysis was run on pooled election data and the time period covered for this analysis was January 1978 to August 1985.

Block et al. observe coefficients on the exception variables that do not provide support for the hypothesis that they are substitutable for union services, indirectly through representation elections. In fact, the coefficient on the implied contract exception, the exception most likely to represent a union-like service, is the opposite sign, implying an increase in the likelihood of a union victory. Block et al.’s conclusion is that there is no evidence to suggest that judicial decisions causing recognition of exceptions to the EAW doctrine have had an adverse effect on the ability of unions to win representation elections. The authors offer a couple of suggestions, however. If workers don’t know they are protected or if they know but sense as if the protection won’t help them, it is less likely that any significant effects will be observed. In other words, workers may expect that getting the courts to rule in their favor is unlikely. The union, however, has more experience in the area of workers’ job security. If a worker does not know that he or she is protected, the exceptions are not included in the worker’s choice set during the voting period.

Dertouzos and Karoly (1992) (DK hereafter) analyze the possible effects of wrongful-termination doctrines on employment outcomes, for both the short and long run. Specifically, they examine the effects on the level of aggregate employment, on the speed of employment adjusted, and on different industries and firm types.

DK contend that there is an increase in the cost of labor inputs when firms aim to reduce the risk associated with increased liability. Undoubtedly, firms will have incentives to reduce the number of workers. However, it is unclear how long until these effects will be realized or picked up, empirically, due to information lags, trends in product demand, etc.

In terms of the speed of employment adjustment, DK offer that firms in the short run will be reluctant to vary the size of their labor force and in the long run, the effects are even less certain. They point out that wrongful-termination doctrines could actually have a negative effect on employment, increasing the frequency of terminations as firms become more streamlined in terms of their reviews and evaluation processes because accurate information about poor performers will be more readily available.

¹⁸⁹ The three exceptions are the public policy exception, implicit contract exception, and the implied covenant of good faith and fair dealing exception.

The effects on different industries and firm types may not be consistent. DK explain that firm size will affect the manager's perceptions of risk, the timing and quality of information about potential liabilities, and the ability to finance the alternative solutions.

The results found, in terms of the effects of wrongful-termination doctrines, include a negative effect of the doctrines on total employment. DK used predicted values for the probability of tort and contract doctrines based on the statistical model used to model the likelihood that a state court would rule in favor of protective legislation. From these predicted values, they estimated that for states recognizing tort damages, the effect in the following year was a decline in aggregate employment of 2.9 percent on average.¹⁹⁰ For states recognizing tort damages, the effect was 1.8 percent, though only significant at the 10 percent level. When a state recognized either a broad public policy doctrine or a good-faith tort, the effect was 2.1 percent lower employment, although only significant at the 10 percent level.

In general, DK conclude that the effect of wrongful-termination doctrines on aggregate employment for the time period 1980 to 1987 was about 2 to 5 percent. Additionally, the negative effect is more pronounced in some nonmanufacturing areas such as the service sector, retail trade, and the financial, insurance, and real estate sector.

Krueger (1991) observed that unjust-dismissal legislation is more likely to be proposed in states where the departure from the traditional EAW doctrine by the courts has been most extreme.¹⁹¹ The legislation is "designed to limit employer liability, expedite dispute settlements, reduce legal costs, and clarify property rights."¹⁹²

Krueger uses dummy variables for the three main types of exceptions to the EAW doctrine recognized by the courts in each state as a proxy for employers' expected costs in the absence of legislation. An employer may support or have resistance to an unjust-dismissal statute. If the firm supports the legislation, the explanation is that it will limit liability and clarify property rights. If a firm is opposed to an unjust-dismissal statute, it most likely operates in a state that does not recognize any of the exceptions to the EAW doctrine.

Using state level data for the years 1981 to 1988, on proposed unjust-dismissal statutes and court rulings, Krueger estimates the effect of exceptions to the EAW doctrine on the dependent variable. Even after controlling for other political and economic factors, the exceptions, together, are positive and highly significant.¹⁹³ And although high correlation exists between the three dummy variables, only the implied contract binary indicator is not significantly different from zero. Finally, the aggregate number of

¹⁹⁰ The significance level was at the 0.01 level.

¹⁹¹ In this case, departures most extreme would imply more rulings against the employer and higher costs (damage awards) to the firm.

¹⁹² Krueger (1991, pp.658).

¹⁹³ The joint significance of the three exceptions is tested for using a likelihood ratio test.

exceptions allowed is positive and significant, indicating that the total number of exceptions to the EAW doctrine in a state has a positive effect on the probability that unjust-dismissal legislation will be proposed by the legislature in the following year.

Contrary to the evidence found by Dertouzos and Karoly (1992), Miles (2000) found no significant effects of protective labor legislation (in the form of exceptions to the EAW doctrine) on employment and unemployment. And although the data sets might differ in terms of which state is defined as recognizing an exception to the employment-at-will doctrine, the time periods studied are for the most part identical.¹⁹⁴ Shaughnessy, (2003) in part, is motivated by the fact that Miles found no effect of the EAW exceptions on employment and unemployment. He claims that firms can react to an increase in costs in one of three ways: by reducing employment, by holding employment constant but reducing work-hours-per-individual, or by lowering wages.¹⁹⁵ It is this last possible reaction that Shaughnessy directs his attention. Shaughnessy claims that even though Miles (2000) found no effect on employment, over this same time period, temporary employment was increasing significantly, in the presence of an exception to the EAW doctrine. And because of this, an effect on wages should necessarily follow the increase in temporary employment as firms adjust. If all hypotheses are correct, the effect would be that in periods following a state's recognition of any of the exceptions to the employment-at-will doctrine, employment of permanent workers would not change, leading to an increase in the employment of temporary workers, and to further offset the increase in costs to firms, wages paid to workers would fall.

Shaughnessy used a two-step estimation procedure to capture the effects of the exceptions to the EAW doctrine on a state's average wage level for the years 1977 to 1994. First, a typical wage equation is estimated, including personal characteristics, job characteristics, and a state dummy variable. The dummy variables for each of the three exceptions to the employment at will doctrine are then regressed on the coefficients from the state dummies, excluding Rhode Island, which is an at-will state. The results found are that all three exceptions have a negative effect on the state dummies, in reference to the base state, Rhode Island, although the implied contract exception is not significant. Specifically, Shaughnessy found that there is up to 3.3 percent decline in wages following a state's recognition of an exception to the employment-at-will doctrine, relative to a state that does not recognize any of these exceptions.

3.2.5. The Future of Restrictions on the Employment-At-Will Doctrine

The future of public policy in regards to wrongful discharge legislation will undoubtedly be helped or hindered by special interest groups. Perritt (1986) offers his theory on six groups and their views on the movement away from common-law liability towards legislation in the protection of employees from wrongful termination.

¹⁹⁴ The degree of recognition (broad versus narrow) may differ as well across data sets.

¹⁹⁵ Actually, a fourth possible reaction would be to pass along the increase in costs the consumer, in the form of higher prices.

Employers historically have opposed legislative or judicial action that puts a constraint on their business practices in regards to employment and the liability they face for harmful action against employees. However, there is evidence that employers are in favor of such legislation when it decreases the unpredictability of outcomes and limits the liability of the employer in regards to damages. Indeed, Krueger (1991) observed that unjust-dismissal legislation is more likely to be proposed in states where the departure from the traditional EAW doctrine by the courts has been most extreme.¹⁹⁶ The legislation is “designed to limit employer liability, expedite dispute settlements, reduce legal costs, and clarify property rights.”¹⁹⁷

Perritt classifies the defense bar as opposing legislation that increases exposure to liability by defendants. However, like employers, the defense bar may shift views toward statutory reform if the result is more predictable outcomes and limited liability.

Trade unions have historically backed legislation in favor of employees. Additionally, it is well known that this special interest group is influential with legislators. However, given the possibility of protective legislation acting as a substitute for some of the services that trade unions provide, some employees may have an incentive to remain unorganized and the marginal members may decide that the benefits do not outweigh the costs. To the extent that employees do treat public policy of this form as substitutable for union services, it is expected that trade unions would then be opposed to such protective legislation as opposed to common-law liability. These offsetting views may be the reason for observing no overwhelming consensus in regards to the effects of this legislation on union membership.¹⁹⁸

Perritt claims that the plaintiff bar could move to a position of favoring legislation and move away from its general position of expanding the exceptions to the EAW doctrine. Traditionally, these groups favored “broad” protection in order to increase their profits. Even with caps on damages under legislation, the idea of possibly simplifying litigation would reduce costs for these lawyers and could reverse the position that some within this group hold. Again, the opposing effects result in not being able to reach a definitive solution in regards to the direction of their efforts.

Non-union employees would gain the most from public policy legislation in the form of expanded protection against wrongful discharge. This reform would increase their protection with no increase in costs. Perritt asserts that this is no increase in “identifiable costs.” Those who are opposed to any movement away from the traditional EAW doctrine argue that this increases firms’ costs without increasing productivity and the result will be little or no wage growth. Fewer employees will remain on jobs in which wages are mandated (i.e. minimum wage jobs) and those who do will bear the brunt of the increased protection through lower wages and fringe benefits. The tradeoff is simple

¹⁹⁶ In this case, departures most extreme would imply more rulings against the employer and higher costs (damage awards) to the firm.

¹⁹⁷ Krueger (1991, pp.658).

¹⁹⁸ The possibilities in reference are that exceptions to the EAW doctrine, through legislation, could positively, negatively, or not significantly affect union membership.

according to those who oppose legislation: job destruction or wage reduction. Following traditional labor economics, the lowest-wage workers are the highest at risk to lose their jobs. To the extent that group is relatively poorly organized and generally less informed about the protection afforded to them, it is not expected to be a major component of deciding the future of policy. Perhaps expressed more appropriately, because this group has no “voice”, the future of unjust-dismissal legislation will not hinge on this groups involvement in the process. However, Hoerr et al. (1985) hypothesizes an employee-rights movement that will force revolutionary changes in the workplace and the way firms manage workers. As exactly expressed, “in today’s nonunion climate, the courts and state legislatures are becoming the most effective champions of employee rights.”¹⁹⁹

Finally, Perritt describes the most vocal group in favor of wrongful dismissal legislation is academic lawyers. These experts are “influential because they provide technical assistance to legislators and because they link new proposals to well accepted legal doctrines, and thus improve the perceived legitimacy of proposals for legislative change.”

The future of wrongful-termination legislation it seems is going to be determined by the opposition or proposition of employers and the defense bar. However, before an attempt is made to forecast exactly how much of an effect these groups will have, it might prove educational and motivating to model what has determined the movement away from common law liability toward the current legislation in the protection of employees from wrongful termination. Given that we can now arguably determine what is conceived as “broad”, “narrow”, or no protection, the underlying factors that determine these ranges of protectionism are certainly attainable. The ability to gain this important information would undoubtedly go a long way in helping to understand the effects of the amount of protection for employees in state on other outcome measures.

A final comment on the issue of the exceptions to the employment-at-will doctrine is one of caution. As it can be with any other legislative action, causality is a concern when observing these effects on outcome measures. In the case of union membership, for example, we could observe a negative relationship between the implied contract exception and union membership as Neumann and Rissman (1984) were able to show. However, observing the decline in union membership may be one reason why state courts are increasingly willing to put the employee above the interests of the employer. And to the extent that any or all of the special interest groups previously mentioned are in favor of unjust-dismissal legislation, the possibility of causality becomes more important in analyzing.

¹⁹⁹ Hoerr et al. (1985, pp. 72).

3.3. The Dependent Variables

In this section we briefly describe the dependent variable used in this analysis. We will use Walsh and Schwarz (1996) data on the adoption of employment-at-will exceptions, which lists relevant case law that either overturned or upheld traditional employment-at-will in each state.²⁰⁰ The main reason we chose the Walsh and Schwarz (1996) data for our dependent variable among the other possible sources was the fact that their compilations are the most up-to-date and because we will include a sample period up to the beginning of the 21st century, we expect more robust results.

Each of the three main exceptions will be individually modeled in this analysis. We will be using a binary logit model to analyze the factors that affect the likelihood that a state will recognize any one of the three main exceptions to the employment-at-will doctrine. Therefore, for each exception, if a state in any year recognizes the exception in question, the variable takes the value of 1 and 0 otherwise.

At this time, when defining our dependent variable, we do not make the distinction between a broad or narrow interpretation of the exception to the EAW doctrine.²⁰¹ However, when observing those states that do recognize the public policy doctrine (42), almost 40 percent (16 states) are defined as recognizing a broad interpretation of the doctrine. In regards to the implicit contract doctrine, again there are almost 40 percent (15) of the states that adhere to a broad interpretation. Finally, 40 percent (4) of all states that recognize the covenant of good faith and fair dealing doctrine adhere to a broad interpretation of the doctrine.

3.3.1. Frequency of Exceptions to the Employment-At-Will Doctrine

Table 3.1. provides a list of the states that recognize any of the three main exceptions to the employment-at-will doctrine and the year of recognition. The public policy exception is the most widely recognized exception to the employment-at-will doctrine. Forty-two states recognize either a broad or narrow interpretation of this exception. The implicit contract exception is also widely recognized. Thirty-eight states recognize either a broad or narrow interpretation of this exception. As was stated previously, the covenant of good faith and fair dealing doctrine is less widely recognized. Although one of the earliest exceptions to the employment-at-will doctrine, states have “moved” away from recognition because the decision is weighted too heavily by the jury. As of today, only 10 states recognize this exception to the EAW doctrine.

²⁰⁰ For a listing of the case and citation for each state and year that either overturned or upheld the common law interpretation of the employment-at-will doctrine, see the appendix in Walsh and Schwarz (1996).

²⁰¹ For the methodology used to characterize the states that adhere to “narrow” or “broad” variants of the doctrines, see section 3.3.2. of this paper or Walsh and Schwarz (1996).

Table 3.1.Chronology of Exceptions to the Employment-At-Will Doctrine.							
	Year Exception Recognized				Year Exception Recognized		
State	Public Policy	Implicit Contract	Good Faith	State	Public Policy	Implicit Contract	Good Faith
Alabama		1987	1987	Nebraska		1983	
Arizona	1985	1984	1985	Nevada	1984	1983	1987
Arkansas	1988	1987		New Hampshire	1980	1988	1974**
California	1959	1981	1980	New Jersey	1980	1985	
Colorado	1988	1984		New Mexico	1983	1980	
Connecticut	1980	1985		New York		1982	
Delaware	1986		1985	North Carolina	1985		
Florida				North Dakota	1987	1984	
Georgia				Ohio	1990	1985	
Idaho	1977	1986	1989	Oklahoma	1989	1976	
Illinois	1978	1987		Oregon	1975	1978	
Indiana	1973			Pennsylvania	1978		
Iowa	1988	1989		Rhode Island			
Kansas	1981	1984		South Carolina	1985	1987	
Kentucky	1983	1983		South Dakota	1988	1983	
Louisiana				Tennessee	1984	1981	
Maine		1984		Texas	1984		
Maryland	1981	1985		Utah	1989	1981	1989
Massachusetts	1986		1977	Vermont	1986	1986	
Michigan	1976	1980		Virginia	1985		
Minnesota	1986	1983		Washington	1984	1984	
Mississippi	1993	1985		West Virginia	1978	1986	
Missouri	1985	1983**		Wisconsin	1983	1985	
Montana	1980		1987	Wyoming	1989	1985	1994
* Missouri recognized the Implicit Contract exception in a court ruling in 1983 but later ruled against the plaintiff, thereby removing the recognition of this exception in 1988.							
** New Hampshire recognized the Covenant of Good Faith and Fair Dealing exception in a court ruling in 1974 but later ruled against the plaintiff, thereby removing the recognition of this exception in 1980.							
Source: Walsh and Schwarz (1996).							

3.3.2. Trends in Employment-At-Will Exceptions

Figure 3.1. traces the chronology of the recognition of all three main exceptions to the employment-at-will doctrine. The figure depicts the adoption of each of three

doctrines from 1977 through 2002. Although the timing and pace of recognition has varied across the doctrines, it is plain to see that the major growth for both the public policy and implicit contract exceptions was during the mid-1980s. It also appears that by the early 1990s, recognition leveled off. We include a sample period through 2002, however, based on the chronology depicted here, estimation using alternative sample periods might be relevant in search of robust results.

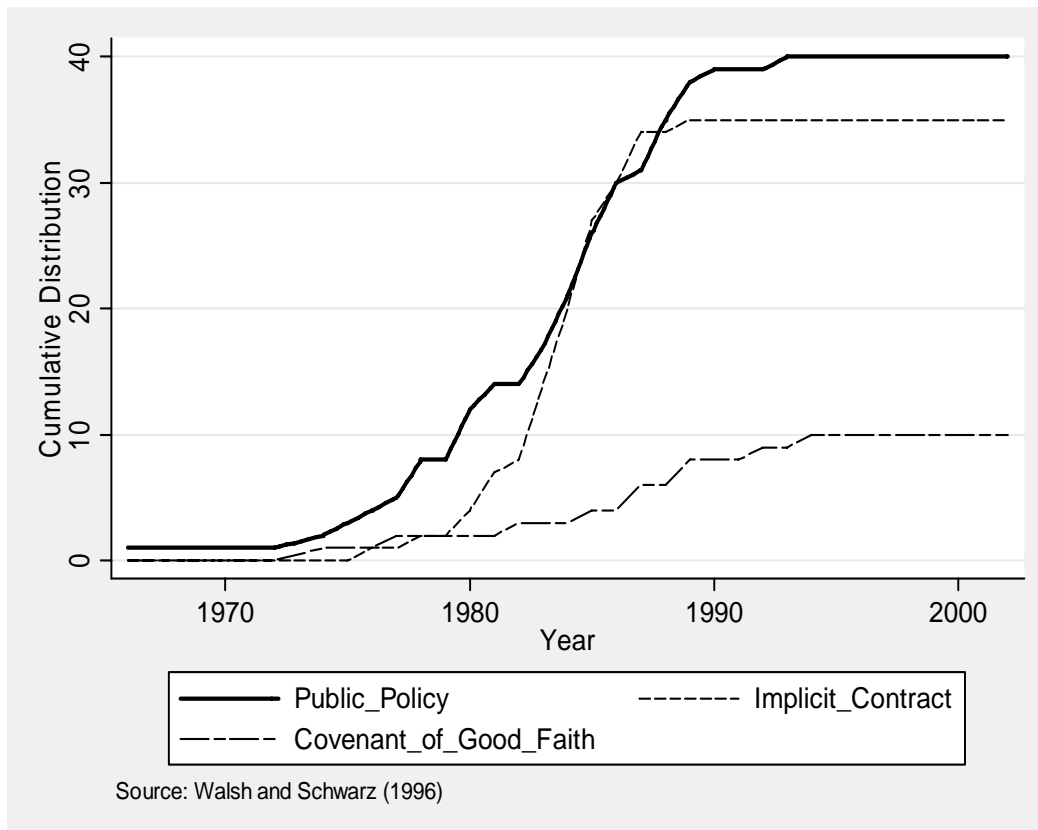


Figure 3.1. Chronology of Exceptions to the Employment-at-will Doctrine

3.4. Supply and Demand Factors

In this section, we review the demand and supply factors that are hypothesized to affect the likelihood of recognition of any of the three main exceptions to the employment-at-will doctrine within a state. Those individuals or groups who would benefit from legal protection determine the demand for the doctrines. These individuals include nonunionized workers, employees in relatively large firms, and possibly female workers and older workers. The supply of legal protection is determined by those who incur the costs of the legal changes, such as employers and the judiciary.

We will develop a reduced-form model of supply and demand for a state's recognition of either of the exceptions to the employment-at-will doctrine in order to gain some insight into the possible explanations for the changes that occurred in this legislation over the past 30 years. As we will show, the frequency of these changes was

highest in the mid-1980s with only a few hold-out states to date.²⁰² If we can determine some of the main factors explaining the change in the legal climate over this time period, we might be able to ascertain the possibility of whether or not any of the hold-out states will eventually change their status. Some of the factors that we will explore are aggregate variables which change over time but not across states. These variables may help to explain the increased recognition of the legal doctrines over our sample period. Most of the demand and supply factors that we will analyze vary across states and over time. These determinants may help explain the variation across states in the pattern and timing of recognition of the legal doctrines.

3.4.1. Spillovers

Walsh and Schwarz (1996) explain the rationale of a state court's decision to recognize the public policy exception to the employment-at-will doctrine is that other judiciaries have already done so. "The primary answer that emerges from the decisions themselves is that acceptance of the public policy claim in other jurisdictions increasingly legitimated the doctrine and made it relatively easy for subsequent courts to do likewise when confronted with cases with which they could sympathize".²⁰³ Dertouzos and Karoly (1992) argue that it is less costly to follow precedent set by other states and also point out that a state's ruling is often comprised with citations of other state's adoption of the doctrine.

To capture the possibility of spillover effects, we have constructed a variable measuring the percentage of a state's geographic neighbors that have previously adopted the new doctrine. Like previous research in this area, we hypothesize a positive relationship between an increase in the likelihood that a state will recognize an exception to the EAW doctrine and the number of other states that have already recognized the exception. In addition to proxying for possible spillover effects, we follow Dertouzos and Karoly (1992) and allow for a possible nonlinear relationship, implying that a hold-out state's decision is negatively affected by their neighbors' decisions.

3.4.2. Unionization Rate

We measure union density as the percentage of a state's labor force that are union members. Previous work on modeling protective legislation (Kesselring and Pittman, 1993, Dertouzos and Karoly, 1996) includes this variable to proxy for a state's attitude toward labor. Therefore, states more heavily unionized expect lower costs of the new doctrines. Of course, a countervailing force could be that protective legislation is substitutable for some of the services that unions provide. To the extent that protection against arbitrary dismissal is a benefit that union organizers offer its members, we would expect unions to disfavor protective legislation resulting in a negative relationship between union density and the recognition of an exception to the EAW doctrine. We include this variable without support of a definitive hypothesis. In fact, Perritt (1986)

²⁰² A hold-out state is one that does not recognize any of the three main exceptions to the employment-at-will doctrine.

²⁰³ Walsh and Schwarz (1996, p. 663).

claims that unions have been ambivalent toward proposals for wrongful discharge statutes, even citing a vetoed assembly bill in 1983, by New York Governor Cuomo. A former employee was refused cause of action for being discharged for refusal to engage in conduct that would violate professional ethical standards. One of the reasons cited for the veto was the uncertain effect of the bill on collectively negotiated grievance mechanisms. Perritt claims that it is reasonable to infer that organized labor played a role in Governor Cuomo's decision.

3.4.3. Change in Union Membership

The decline in union membership is well noted and analyzed.²⁰⁴ In fact, union density has fallen from an average of 24.5 to 11.9 percent from 1966 to 2001. Undoubtedly, nonunion employees would benefit the most from new legal doctrines such as exceptions to the EAW doctrine, *ceteris paribus*.²⁰⁵ However, with no special interest groups taking a voice for nonunion employees, the preferences of these workers will not be known. In addition, it is not necessarily true that the average worker is aware of the legal protection he or she currently is provided. It is not atypical for an employee to realize that he can quit his job with no formal notice to the employer but does not realize that as well he can be fired by his employer for no cause whatsoever. Perritt (1983) claims that until the preferences of workers become a platform in politics, the effect will not be significant. Again, we will include the growth in union membership, in a state over time, without formulating a hypothesis. However, to the extent that the state courts have knowledge of the legal rights of the employee, we would expect a positive influence of the decline in growth in union membership and the likelihood of recognizing a new doctrine.²⁰⁶

3.4.4. OSHA Inspections

We include an activity measure by the Occupational Safety and Health Administration (OSHA) as a possible factor affecting the likelihood that a state recognizes a new protective labor doctrine. To the extent that a state court might be influenced by other increased labor protection within its state, we would expect a positive relationship between OSHA activity and the probability of a new legal doctrine. In this analysis, we will use OSHA inspections in a state to capture this possible effect.²⁰⁷

²⁰⁴ For literature on the decline in unionization, see Freeman and Medoff (1984), Moore and Newman (1988), Neumann and Rissman (1984), among many others.

²⁰⁵ Of course, there may be negative effects as a result of recognizing a new doctrine. Earlier, we cited the literature analyzing the effects of protective labor legislation on economic outcomes.

²⁰⁶ In this case, a negative coefficient on the change in union density variable would provide some evidence toward this hypothesis.

²⁰⁷ Some states have developed and are operating their own OSHA programs. If this is not the case, OSHA has developed regional programs. For those states with their own OSHA programs, a positive effect of OSHA activity on the likelihood of recognizing a new doctrine would imply a state influence. For those states that do not operate their own program, a positive effect would imply a federal influence.

3.4.5. Firm Size

Blades (1967) cited increased dependence of employees on employers as a reason for courts to re-examine the common law interpretation of the employment-at-will doctrine. Additionally, Lopatka (1984) cited this same factor. As firms grow in size, coordination problems are more likely. These problems include discrepancies or lack of communication between the employee and management. In terms of the number of workers that a firm employs, for a larger firm we would expect the employee to be relatively more reliant on accurate information channeled from the manager to the employee. Additionally, larger firms are more likely to develop a strategic plan in accordance to the demand of its shareholders. In this regard, to the firms' long-term success, the shareholders are relatively more important than the employee. A state court might see that the growth in firm size has a negative effect on the employee's ability to maintain consistent employment, when the shareholder becomes relatively more important. We would therefore expect a positive relationship between our proxy for large firms and the likelihood of recognizing an exception to the EAW doctrine.

In addition to an increased dependence of employees on employers as a possible explanation for state protective labor legislation we reviewed previously that employers are inclined to be in favor of labor legislation when it decreases the unpredictability of outcomes and limits the liability of the employer in regards to damages. To the extent that larger firms are relatively more capable of lobbying for this legislation, the positive relationship between larger firms in a state and the likelihood of a state recognizing any of the main exceptions to the employment-at-will doctrine would be even more evident.

3.4.6. Structural Variables

Currently, there are several federal laws in place that prohibit job discrimination. Title VII of the Civil Rights Act of 1964 prohibits employment discrimination based on race, color, religion, sex, or national origin. The Age Discrimination in Employment Act of 1967 protects individuals who are 40 years of age or older. And the Civil Rights Act of 1991, among other things, provides monetary damages in cases of intentional employment discrimination. We argue that while these federal laws are effective, they do not protect these groups in the same way that the exceptions to the employment-at-will doctrine are expected to protect.

We include structural variables to control for changes in the composition of the labor force over time. For example, during the time period studied, the proportion of the labor force that is female has increased in the U.S. from an average of 41.44 percent to almost 47 (46.84) percent. To the extent that at least some percentage of these females are not married and with dependent children at home, protective labor legislation could positively affect their future. We therefore expect a positive relationship between a state's proportion of the female labor force and the likelihood that the state will recognize a new doctrine.

The proportion of a state's labor force that is non-white is included in the model as well and we expect a positive effect on the probability that a state will recognize an exception to the EAW doctrine.

Finally, we include the proportion of a state's labor force that consists of individuals aged 55-64 and expect a positive relationship between this variable and the state's likelihood of increasing its protection of employees.

3.4.7. Year Dummy Variables

In our preliminary regressions, we include year variables to measure the difference in likelihood of recognizing an exception to the EAW doctrine in the year that equals 1 to the base year. As stated previously, it is expected that over time, workers become more aware of their rights. Therefore, each successive year, relative to the base year, should increase the likelihood of a state recognizing an exception to the EAW doctrine.²⁰⁸ Again, however, we should keep in mind that, for the most part, recognition of any of the three main exceptions to the employment-at-will doctrine monotonically increased over the sample period. Implying that this was due to increased employee awareness could be erroneous.

3.4.8. Summary Statistics

Table 3.2. summarizes the data and variable definitions. To get an indication of possible trends within the variables, we include the means and standard deviations for four time periods. As expected, over time, the percentage of neighboring states recognizing an exception to the EAW doctrine increases. This is in accordance with our description of the dependent variable in the previous section.

We also observe that on average, the union density rate is declining over the sample period and the change in union membership is negative, implying negative growth in union membership, on average.²⁰⁹

In regards to the changes in industry size, we observe that over time, the number of large firms is increasing, on average. Finally, we can see that the proportion of the labor force that is female has monotonically increased while the proportion that is non-white or age 55-64 has declined and then increased.

²⁰⁸ We will use 1977 as our base or reference year. Therefore, the coefficient on each year dummy will provide the effect on the likelihood of a state recognizing an exception to the employment-at-will doctrine for that year relative to 1977.

²⁰⁹ Although on average the growth of union membership is negative, there is at least one state with a increase in union membership from one year to the next.

Table 3.2. Variable Descriptions and Summary Statistics					
Variable	Description	Mean (Standard Deviation)			
		<u>1978</u>	<u>1985</u>	<u>1994</u>	<u>2002</u>
Neighboring states public policy	Percentage of bordering states recognizing the Public Policy doctrine	16.71 (23.19)	54.23 (27.68)	86.04 (21.08)	86.04 (21.08)
Neighboring states implicit contract	Percentage of bordering states recognizing the Implicit Contract doctrine	4.79 (10.68)	57.23 (26.29)	74.27 (21.99)	74.27 (21.99)
Neighboring states covenant of good faith	Percentage of bordering states recognizing the Covenant of Good Faith doctrine	6.56 (19.26)	8.31 (13.94)	22.29 (25.00)	22.29 (25.00)
Union density	Number of union members as a percentage of the state's labor force	20.68 (7.27)	16.27 (6.22)	13.85 (5.79)	11.63 (5.26)
Change in union density	Growth rate in union density	-0.01 (0.10)	-0.02 (0.09)	-0.01 (0.09)	-0.02 (0.09)
OSHA activity	Total number of OSHA inspections	1136.71 (1713.44)	2679.69 (2377.13)	2258.60 (2443.74)	2208.35 (2267.21)
Largefirm	Percentage of states with firm size equal to or greater than 99 employees	1.98 (0.46)	1.85 (0.46)	2.07 (0.42)	2.18 (0.41)
Female labor force	Percentage of state's labor force that are female	41.44 (1.75)	44.25 (1.31)	46.22 (1.13)	46.84 (1.33)
Non-white labor force	Percentage of state's labor force that are non-white	9.30 (7.88)	8.39 (8.78)	8.87 (9.29)	9.46 (9.31)
Senior labor force	Percentage of state's labor force that are between the ages 55-64	11.24 (1.26)	10.27 (1.11)	8.96 (0.83)	11.54 (0.95)
* Excluding Alaska, the District of Columbia, and Hawaii					

3.5. Empirical Model

For analyzing the factors that differ between states over time, to model a state's likelihood of recognizing an exception to the employment-at-will doctrine, we basically had two decisions to make. The first decision was whether to estimate a random or fixed effects model. The second was whether the errors take a standard normal or standard logistic distribution. By assuming a standard normal distribution (probit model), coupled with what we determine below, we are able to compute probabilities and marginal effects.²¹⁰

Typically, the fixed effects model has two drawbacks. One, the estimator is inconsistent owing to the incidental parameters problem. Two, the impracticality of estimation of all the parameters (i.e. the K elements of β and all the individual effects) and standard errors make fixed effects estimation unrealistic. In contrast, the random effects model is relatively easier to compute, however the strong assumption of zero correlation between latent heterogeneity and included observed characteristics that is necessary in the random effects model is particularly restrictive.²¹¹

Recently, improvements have been made on the ability of using the probit model to the treatment of fixed effects. Greene (2001) shows that Newton's method can be used to unconditionally estimate the unobserved effects using a probit model. The unconditional estimator is obtained by a direct maximization of the full log likelihood function and estimating all parameters including the group-specific constants. So, no longer are there practical problems with the fixed effects estimator. The statistical issue is that the estimator relies on the number of time periods to be somewhat large for the constant terms to be consistent. If the time period is small, the constants will be inconsistent and because the estimator of the parameters is a function of the estimator of the constants, the maximum likelihood estimation of the parameters will be inconsistent as well. This is known as the incidental parameters problem. Additionally, when the number of time periods is relatively small, there exists a small sample bias in the estimators. Previous literature has provided feedback on the possible severity of the bias. Heckman and MaCurdy (1980), through a Monte Carlo study of a probit model, found that the bias of the slope estimator in a fixed effects model was toward zero and on the order of 10 percent with samples of $n = 100$ and $T = 8$. Because the sample size in this analysis is $T = 25$ and $N = 2100$, we take comfort in Greene's comments that the small sample bias is probably not too severe.²¹²

²¹⁰ Additionally, when observing behavior (in our case, state courts' behavior), assuming a probit distribution is relatively more natural. Overall, the decision to assume a standard normal distribution and use a probit model results from the ability of statistical software to estimate the model and that we can compute probabilities and marginal effects.

²¹¹ In the unobserved effects logit model, no assumptions are made about how the unobserved effect is related to the regressors. The standard conditional maximum likelihood method actually finds a conditional density that depends only on the observable data and the parameter β . See Chamberlain (1980) for details on the conditional likelihood function using fixed effects. This procedure, however, does not work for the unobserved effects probit model.

²¹² Actually, in a more recent study, Greene finds that the bias of the slope estimator on the order of 10 percent is incorrect for the probit model. See Greene (2002) for the latest findings of the bias.

Consider the following equation:

$$(3.1) \quad \begin{aligned} y_{it}^* &= \alpha_i d_{it} + x_{it}'\beta + \varepsilon_{it}, \quad i = 1, \dots, n, \quad t = 1, \dots, T_i, \\ y_{it} &= 1 \text{ if } y_{it}^* > 0, \text{ and } 0 \text{ otherwise} \end{aligned}$$

where d_{it} is a dummy variable which takes the value one for state i and zero otherwise. We define x_{it} to be the factors (which change across states and over time) with potential influence over a state's likelihood of recognizing any of the three main exceptions to the employment-at-will doctrine. The parameters to be estimated are not only the K elements of β , but also the n state-individual constant terms. The log-likelihood for the fixed effects model is

$$(3.2) \quad \ln L = \sum_{i=1}^n \sum_{t=1}^{T_i} \ln P(y_{it} | \alpha_i + x_{it}'\beta)$$

where $P(\cdot)$ is the probability of the observed outcome and for the probit model,

$$(3.3) \quad \Phi[q_{it}(\alpha_i + x_{it}'\beta)].$$

Because we are assuming a symmetric (normal) distribution, as denoted by q_{it} , we can write the probability as

$$(3.4) \quad \text{Prob}(Y_{it} = y_{it} | x_{it}) = P[q_{it}(\alpha_i + x_{it}'\beta)].$$

The likelihood equations for the model are

$$(3.5) \quad \frac{\partial \ln L}{\partial \alpha_i} = \sum_{t=1}^{T_i} \frac{q_{it} f(q_{it} z_{it})}{P(q_{it} z_{it})} = \sum_{t=1}^{T_i} g_{it} = g_{ii} = 0, \text{ and}$$

$$(3.6) \quad \frac{\partial \ln L}{\partial \beta} = \sum_{i=1}^n \sum_{t=1}^{T_i} \frac{q_{it} f(q_{it} z_{it})}{P(q_{it} z_{it})} x_{it} = \sum_{t=1}^{T_i} g_{it} x_{it} = 0$$

where $z_{it} = \alpha_i + x_{it}'\beta$, $f(\cdot)$ is the density corresponding to $P(\cdot)$, and $g_{it} = q_{it} \phi(q_{it} z_{it}) / \Phi(q_{it} z_{it})$. Observing (3.5), it should be apparent that if y_{it} is the same in every period then there is no solution. In other words, if $y_{it} = 1$ in every period, then $\partial \ln L / \partial \alpha_i$ must be positive and it cannot be equated to zero with finite coefficients. These groups will have to be removed from the sample in order to fit the unconditional model. In our analysis, if a state does not change its' status from either one that does not

recognize an exception to the employment-at-will doctrine to one that does, or vice versa, the state will not be included in the model.²¹³

Marginal effects in the fixed effects model are computed at the means of the data and with the sample average of the fixed effects estimates as the constant term. We will use LIMDEP software to employ Newton's method to maximize the unconditional log likelihood and compute the marginal effects. For those factors that significantly affect the likelihood of a state's recognition of any of the exceptions the employment-at-will doctrine, we will plot the probabilities using different scenarios across a sample of states.

3.6. Results from the Fixed Effects Probit Model

Table A.3.1. contains the results of the fixed effects probit model predicting the status of a state's likelihood of recognizing any three of the main exceptions to the employment-at-will doctrine from 1978 to 2002 for the 48 contiguous states. We provide six alternative specifications, three of which use a different doctrine as the dependent variable and also restricting the model by withholding the spatial variable or possible spillover effects.²¹⁴

3.6.1. Public Policy Exception

Columns 1 and 2 in table A.3.1 lists the results for the likelihood of recognizing the public policy doctrine. Observing column 1, it is apparent that there are no significant spillover effects for this exception. In other words, there is no evidence that the greater the fraction of a state's neighbors that have recognized the public policy exception has any affect on the likelihood that the state will also recognize the exception. It does appear, however, that the proportion of a state's economy that is made up of large firms has a positive affect on the likelihood of the state recognizing the public policy exception. This would indicate that either the state's court is aware and sympathetic to an increase in dependence of the employee on the employer in maintaining consistent employment, the employer is in favor of protective labor legislation and has been successful in lobbying for such, or a combination of the two. Additionally, the probability that a state recognizes the public policy exception decreases as the percentage of the workforce that is unionized increases. This outcome that state's more heavily unionized are less likely to recognize the doctrine would imply that unions might not favor protective labor legislation and utilize exertion to prevent such legislation. Although the growth in union density has a negative coefficient, in specification 1, it is not significant. However, in specification 2, withholding the spatial component, the growth in union density has a significant negative effect on the likelihood that a state will recognize the public policy exception. This

²¹³ For example, California is noted as a state that recognizes the Public Policy exception to the employment-at-will doctrine. The ruling of the case that defined this status took place in 1959. Therefore, given our sample covers the years 1978-2002, the California public policy variable is coded as a one throughout and California will not be included in the probit model when the public policy exception is the dependent variable.

²¹⁴ We restricted the models because only when the dependent variable is the implied contract exception is the spatial and spatial squared variable significant. We wanted to observe if results were robust to alternative specifications in addition to possible changes in the signs of the coefficients.

implies that recognition of the doctrine is more likely in states exhibiting the largest decline in unionization. Upon observation of the labor force composition variables, there is a positive effect of the proportion of females in the state's labor force on the probability that a state will recognize the public policy exception. To the extent that the number of families with single women as the head of household has increased throughout the past three decades, the state's court might view this type of legislation as a means to protect and enhance the standard of living for these families. The same cannot be implied for the composition of the labor force that is non-white and aged 55 to 64. In fact, it is less likely that a state will recognize the doctrine, the greater the fraction of a state's labor force that is composed of non-whites and those aged 55 to 64. Although not significant in specification 1, the coefficient for non-whites is negative and significant in specification 2. Finally, although only significant in specification 2, the coefficient on OSHA is positive in both specifications. This provides possible evidence that the state court might also be influenced by other types of labor protection within the state, as measured by the amount of OSHA inspections in the state.

3.6.2. Implied Contract Exception

Columns 3 and 4 contain the results of the probit model when the dependent variable is whether a state recognizes the implied contract exception to the employment-at-will doctrine. In column 3, we can see that the greater the proportion of a state's neighbors that have recognized the implied contract exception, the greater the probability that the state will also recognize the exception. The coefficient on the quadratic of the spatial component is negative and significant, indicating that the spillover effect diminishes, however, as the proportion increases. The results shown here follow Dertouzos and Karoly (1992) and their hypotheses that a hold-out state's decision is adversely affected by its' neighboring states.

Comparing the results of specification 3 and 4, to that of 1 and 2, the results are almost identical, with minor exceptions. One exception is that the effect of the proportion of the non-white labor force on a state's likelihood of recognition is no longer significant in either column 3 or 4. Additionally, when comparing column 4 and 2, the effect of the growth in union density is still negative but no longer significant at the 5 percent level. Finally, when estimating the probit model without the spatial component, the coefficient on large firm size is no longer significant. For the most part, however, when comparing across the two different exceptions to the employment-at-will doctrine, the results are similar and we can argue that the likelihood of recognizing both exceptions are affected in the same manner by the same factors.

3.6.3. Covenant of Good Faith and Fair Dealing Exception

In Table A.3.1., column 5 and 6 contain the results of the effect of economic factors on the likelihood that a state will recognize the covenant of good faith exception. One glaring result is that most of the coefficients are not significant, however a couple of results are similar to the first four specifications. Specifically, there continues to be a positive effect of large firm size on the likelihood that a state will recognize the doctrine,

in this case the covenant of good faith exception. The appeal of this result is that to date, this hypothesis has not been empirically tested. We hypothesized that an increased dependence of employees on employers and/or an employer's inclination to favor labor legislation that would ultimately decrease costs to the firm would have a positive effect on the probability of recognizing these doctrines. While we cannot definitively ascertain which one or if possibly both factors apply here, the results in Table A.3.1. provide the evidence that at least one factor is at work. Another common result, shown in column 5 and 6 and therefore across all models, is that there is an increase in the likelihood that a state will recognize an exception, the higher the proportion of the state's work force that are not union members.²¹⁵ However, this result should not be assumed independent without raising the issue of possible causation. In other words, given these results, can we argue that the state's court is influenced by the union's disfavor of protective labor legislation when it is less likely that a state will recognize an exception? Or is it possible that the state is only reacting to changes in the labor force over the past three or more decades when it is more likely that a state will recognize an exception? We know that the union density has fallen on average over the last 50 years. What we cannot infer from these results is whether the decrease in union membership is causing the state to provide the services that have been provided for by the unions or whether the unions are successful in advocating against protective labor legislation.

One result, in contrast to what was observed from the first 4 specifications, is that the effect of the growth in union density has a significantly positive effect on the likelihood that a state will recognize the covenant of good faith exception. While we cannot infer any possible explanation for this result, we will point out that there are only 10 states that recognize the covenant of good faith exception. Referring back to our analysis of the empirical model, any state that has not made a change (in terms of recognition of the exception to the employment-at-will doctrine) over the sample period will not be included in the regression. Therefore, when the CGF variable is our dependent variable, we have only 10 states providing data over 25 years, compared to 35 states for both the PP and IC exception. Additionally, only one of these states is geographically located in the South, typically a region that is relatively less unionized. While we cannot determine that this is the reason for the troubling result, we at least point out the difference across specifications.

3.6.4. Probability Plots

Using the probit models, we have plotted the probability that a state will recognize the three main exceptions to the employment-at-will doctrine under various scenarios. The purpose of these plots is to further illustrate the results of the fixed effects probit model. We have chosen, somewhat arbitrarily, certain states to plot how the probability changes when a significant factor takes on different values. In the appendix, Figures A.3.1 through A.3.35. provide the results under different scenarios. The states that were chosen had to be states that not only recognized the doctrine whose probability

²¹⁵ This result is indicated from the negative coefficient on union density, which implies that the higher the state's fraction of the workforce that is unionized, the less likely the state will recognize the covenant of good faith exception.

is plotted but also had to make the change during the sample period. For example, we could not include California when plotting the probability of recognizing the public policy exception not because California does not recognize this exception but because it was defined as recognizing the exception in 1959. Our sample period covers 1978 to 2002 and therefore for California, the public policy exception takes the value one throughout the sample period. The factors that take different values, which may or may not show significant or apparent changes in the probability of recognizing an exception were chosen in part on their significance. In other words, we did not include variables whose coefficients were not significant. Nor did we use some factors that were significant but in our view, did not provide an interesting scenario. For example, while the proportion of the state's labor force that is female has a significant effect on the likelihood of the state recognizing the public policy exception, we did not use this factor to plot the probability as this factor changes because this is not one of the main contributions of this paper. While one economic factor changes, allowing us to plot the probability that a state will recognize an exception to the employment-at-will doctrine, all other variables will either be held at their mean, minimum, or maximum values. Additionally, we provide two other scenarios that we define as unfavorable and favorable. An unfavorable scenario indicates that we are forcing the state to be in a situation that is less likely that the state will recognize the exception. For example, if the coefficient on union density is negative, for an unfavorable scenario, we place a high value on the union variable when estimating the probability. If the coefficient is positive on female labor force, we place a low value on this variable when estimating the probability. The opposite strategy is employed when demonstrating a favorable scenario.

The reader should be aware that the labels on the y-axis are not the same across plots. A horizontal line indicates that the probability did not change as the economic factor takes on different values. For Figure A.3.1., we have plotted the probability that Arizona will recognize the public policy exception to the employment-at-will doctrine as the union density variable takes on different values. It is plain to see that we do not get any interesting results from this table. The probability remains one at all levels of union density when the other variables are held at their mean and maximum values as well as under favorable conditions. The probability remains zero when the other factors are held at the minimum values and under unfavorable conditions. We have used union density and large firm size as two of the economic factors to plot the probability of the public policy exception. These were the most interesting results from specification 1 and 2 in Table A.3.1. Figures A.3.1. through A.3.10. provide the plots for five states each with both factors. When we observe New Hampshire, in Figure A.3.3. we see some interesting plots. Specifically, under an unfavorable scenario with all other factors, as union density increases the probability of recognizing the public policy exception decreases at an increasing rate followed by a decreasing rate. Alternatively, when all other factors are held at their minimum values for New Hampshire, as union density increases, the likelihood of recognizing the public policy exception decreases at an increasing rate throughout.

The reader is encouraged to observe the remaining plots to gain a more complete understanding of the effects of these economic factors on the likelihood of recognizing

the exceptions to the employment-at-will doctrine. Figures A.3.11 through A.3.25. plot the probability of recognizing the implicit contract exception for various states using the factors union density, large firm size, and the spatial variable. Figures A.3.26. through A.3.35. plot the probability of recognizing the covenant of good faith exception for various states using the factors union density and large firm size.

3.7. Conclusion

The changes that have taken place in the legal environment in the last couple of decades, with respect to employment law, has generated interest by researchers to distinguish between those factors that might possibly affect the likelihood of whether or not a state court rules in favor of the former employee, thereby defining a change in status from an employment-at-will state to a state that recognizes at least one of the three main exceptions to the employment-at-will doctrine. Additionally, by showing evidence of systematic changes, research on the effect of the legal environment on labor market outcomes will be improved through simultaneous modeling. We have not only revisited previously stated hypotheses, but in addition, have empirically addressed other possible factors that have not been tested.

In contrast to previous research in this area, we use a panel data set allowing for fixed effects, as should be the case when analyzing data on the state level in reference to the labor market. Coupled with the ability to now estimate nonlinear fixed effects with a probit model, we are able to generate probabilities under various scenarios. The contribution, given that the once practical issue is no longer a barrier, is that we obtain more robust results, which will ultimately lead to more robust results when simultaneously modeling the factors that affect the likelihood of protective labor legislation and the potential impact on economic outcomes.

Our results show evidence for systematic changes over the sample period, however differences are apparent across exceptions. We show that the likelihood of recognizing the implicit contract exception in a state increases (at a decreasing rate) as the proportion of the state's neighbors that already recognize the exception increases. However, we do not find evidence to support this hypothesis for the public policy or covenant of good faith exception. We mentioned the possibility of countervailing forces when hypothesizing the effect of union membership on the likelihood of recognizing any of the doctrines. Our results show a negative relationship between union density and the likelihood of recognition of a doctrine, implying that unions possibly engage in procedures to decrease the price elasticity of demand for their services. We do find weak evidence that the decline in union growth in a state has a positive effect on the likelihood of the state recognizing the public policy exception, however the opposite is true in regards to the covenant of good faith exception. Finally, we find evidence that either firms are in favor of and successful in lobbying for protective labor legislation or the employee's dependence on the employer has increased and is causing an effect in the states' courts. Given that both of these factors would cause an increase in the likelihood of a state recognizing an exception to the employment-at-will doctrine, it is possible that both factors are at work. However, we would have to assume that either the state court or

the employee has the information on an increase in dependence on the employer. If we assume the employee has this information, we also have to assume that the employee has the “voice” to be heard by the state. If this is true, this may provide some evidence that Hoerr et al.’s (1985) hypothesis is true.²¹⁶ It may be more likely, however, that firms are lobbying for this legislation if it decreases the unpredictability of outcomes and limits the liability of the employer in regards to damages.²¹⁷

The closest comparison of previous research in this area is Dertouzos and Karoly (1992). However, this analysis was performed by pooling the data, thereby not accounting for heterogeneity across states. In addition, we use Walsh and Schwarz (1996) data for our dependent variables which is updated relative to the previous literature. Given that our empirical technique differs, if we want to make comparisons of our results with that of Dertouzos and Karoly, we must hold constant other parts of the analysis. In the future we will apply the same methodology used here, but we will use Dertouzos and Karoly’s data for the dependent variable to compare the results.²¹⁸

²¹⁶ Earlier it was noted that Hoerr et al. (1985) hypothesizes an employee-rights movement that will force revolutionary changes in the workplace and the way firms manage workers.

²¹⁷ Again, earlier it was stated that Krueger (1991) observed that unjust-dismissal legislation is more likely to be proposed in states where the departure from the traditional EAW doctrine by the courts has been most extreme, where departures most extreme would imply more rulings against the employer and higher costs (damage awards) to the firm.

²¹⁸ We performed measures of correlations across the two data sets Walsh and Schwarz (WS) and Dertouzos and Karoly (DK). The correlations are; 0.5479 for WS_PP and DK_PP, 0.6218 for WS_IC and DK_IC, and 0.686 for WS_CGF and DK_CGF, respectively. The Spearman rank correlations are 0.4929 (WS_PP and DK_PP), 0.3996 (WS_IC and DK_IC), and 0.6372 (WS_CGF and DK_CGF). All of the null hypotheses, that the variables are independent, were rejected. The major factor that would account for a lower correlation would be in a situation where in one data set one of states was defined as not recognizing an exception and in the other data set the same state was defined as recognizing the exception. In our correlation measures if a state did not recognize an exception it was coded as a zero compared to be coded with the year. This situation occurred six times when comparing the public policy exceptions, seven times when comparing the implicit contract exception, and five times when comparing the covenant of good faith exception.

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APPENDIX: SUPPLEMENTARY DATA

Table A.1.1. Descriptive Analysis of Trade Union Variables Over Time		
Variable	1966 - 2001	2001
	Mean	Mean
Union density (%)	17.261	11.913
	(7.94)	(5.23)
Female labor force (%)	44.489	47.308
	(4.71)	(1.40)
Non-white labor force (%)	9.068	9.458
	(8.71)	(9.31)
Labor force age 16-24 (%)	19.201	16.504
	(3.74)	(2.13)
Labor force age 55-64 (%)	10.877	10.604
	(2.07)	(0.90)
Goods producing sector (%)	29.835	22.398
	(8.96)	(3.76)
Urbanization rate (%)	68.074	71.408
	(14.78)	(14.91)
Large firm size (%)	0.240	0.252
	(0.09)	(0.07)
Management opposition	9.681	13.824
	(9.71)	(11.16)
Workers' compensation (\$1000)	60.11	97.556
	(232.73)	(398.90)
Unemployment compensation (\$1000)	215.63	239.030
	(617.99)	(599.42)
State unemployment compensation (\$1000)	203.97	233.148
	(594.96)	(589.53)
OSHA inspections	2012.535	2072.396
	(2505.58)	(2199.55)
Standard deviations in parentheses		
For OSHA, OSHA Act passed in 1970; data available for 1973-2001		
* Per capita/ deflated by gdp price deflator		
For Large firm size, year 2002 not yet available		

Table A.2.1. Year of Graduation by Age Group: June 2001												
Basic Educational Preparation is Diploma												
	Age group		20-30		31-40		41-50		51-60		> than 60	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	88	100.0	1	100.0	6	100.0	28	100.0	47	100.0	6	100.0
Year of graduation in basic RN ed												
1995 or later	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1985-1994	6	6.8	1	100.0	1	16.7	3	10.7	1	2.1	0	0.0
1975-1984	20	22.7	0	0.0	5	83.3	12	42.9	2	4.3	1	16.7
1965-1974	44	50.0	0	0.0	0	0.0	13	46.4	30	63.8	1	16.7
Before 1965	18	20.5	0	0.0	0	0.0	0	0.0	14	29.8	4	66.7

Table A.2.2. Year of Graduation by Age Group: June 2001												
Basic Educational Preparation is Associate degree												
	Age group		20-30		31-40		41-50		51-60		> than 60	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	206	100.0	17	100.0	58	100.0	93	100.0	35	100.0	3	100.0
Year of graduation in basic RN ed												
1995 or later	57	27.7	16	94.1	24	41.4	16	17.2	1	2.9	0	0.0
1985-1994	80	38.8	1	5.9	32	55.2	32	34.4	14	40.0	1	33.3
1975-1984	59	28.6	0	0.0	2	3.4	38	40.9	17	48.6	2	66.7
1965-1974	10	4.9	0	0.0	0	0.0	7	7.5	3	8.6	0	0.0
Before 1965	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table A.2.3. Year of Graduation by Age Group: June 2001												
Basic Educational Preparation is Baccalaureate Degree and Higher												
	Age group		20-30		31-40		41-50		51-60		> than 60	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	219	100.0	34	100.0	61	100.0	75	100.0	40	100.0	9	100.0
Year of graduation in basic RN ed												
1995 or later	42	19.2	25	73.5	9	14.8	6	8.0	2	5.0	0	0.0
1985-1994	69	31.5	8	23.5	41	67.2	14	18.7	6	15.0	0	0.0
1975-1984	73	33.3	1	2.9	11	18.0	52	69.3	9	22.5	0	0.0
1965-1974	23	10.5	0	0.0	0	0.0	3	4.0	20	50.0	0	0.0
Before 1965	12	5.5	0	0.0	0	0.0	0	0.0	3	7.5	9	100.0

Table A.2.4. Year of Graduation by Basic Educational Preparation: June 2001											
		Year of Graduation									
Basic Ed Preparation		1995 or later		1985-1994		1975-1984		1965-1974		Before 1965	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total		99	100.00	155	100.00	152	100.00	77	100.00	30	100.00
Diploma		0	0.00	6	3.87	20	13.16	44	57.14	18	60.00
Associate degree		57	57.58	80	51.61	59	38.82	10	12.99	0	0.00
Baccalaureate or higher		42	42.42	69	44.52	73	48.03	23	29.87	12	40.00

Table A.2.5. Louisiana Registered Nurse Population by Marital and Employment Status: June 2001						
Marital Status	Total		Employed in Nursing FT		Employed in Nursing PT	
	#	%	#	%	#	%
Total	494	100.0	432	100.0	62	100.0
Married	347	70.2	299	69.2	48	77.4
with dependent children at home	218	44.1	183	42.4	35	56.5
with no dependent children at home	129	26.1	116	26.9	13	21.0
Divorced, single, or other	147	29.8	133	30.8	14	22.6
with dependent children at home	43	8.7	37	8.6	6	9.7
with no dependent children at home	104	21.1	96	22.2	8	12.9

Table A.2.6. Louisiana Registered Nurse Population by Basic and Highest Nursing-Related Education: June 2001										
Highest Ed Preparation	Basic Educational Preparation									
	Total		Diploma		Associate degree		Baccalaureate		Master's	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	524	100.0	91	100.0	210	100.0	206	100.0	17	100.0
Diploma	69	13.2	69	75.8	0	0.0	0	0.0	0	0.0
Associate degree	184	35.1	2	2.2	182	86.7	0	0.0	0	0.0
Baccalaureate	205	39.1	10	11.0	19	9.0	176	85.4	0	0.0
Master's	63	12.0	9	9.9	9	4.3	28	13.6	17	100.0
Doctorate	3	0.6	1	1.1	0	0.0	2	1.0	0	0.0

Table A.2.7. Current Enrollment of Louisiana Registered Nurses in both Nursing-Related and Nonnursing-Related Academic Degree Educational Programs by Employment and Student Status: June 2001		
Employment and Student Status	Number	Percent
Total	495	100.0
Nursing full-time	431	87.1
Student in nursing	66	13.3
Not student in nursing	365	73.7
Student outside of nursing	18	3.6
Not student outside of nursing	413	83.4
Nursing part-time	64	12.9
Student in nursing	6	1.2
Not student in nursing	58	11.7
Student outside of nursing	1	0.2
Not student outside of nursing	63	12.7

Table A.2.8. Louisiana Registered Nurses Employed in each Employment Setting by Employment Status and Hours Per Shift Worked: June 2001							
Employment Setting		Total		Nursing Full-time		Nursing Part-time	
		Number	Percent	Number	Percent	Number	Percent
	Total	487	100.0	423	100.0	64	100.0
Hospital	Total	334	68.6	288	68.1	46	71.9
	Eight hours	115	23.6	96	22.7	19	29.7
	Twelve hours	127	26.1	116	27.4	11	17.2
	Mixed eight and twelve	56	11.5	41	9.7	15	23.4
	Four hours	1	0.2	1	0.2	0	0.0
	No pattern	10	2.1	10	2.4	0	0.0
	Other	25	5.1	24	5.7	1	1.6
Nursing homes/extended care/assistive facilities	Total	23	4.7	20	4.7	3	4.7
	Eight hours	10	2.1	8	1.9	2	3.1
	Twelve hours	4	0.8	4	0.9	0	0.0
	Mixed eight and twelve	5	1.0	5	1.2	0	0.0
	Four hours	1	0.2	0	0.0	1	1.6
	No pattern	2	0.4	2	0.5	0	0.0
	Other	1	0.2	1	0.2	0	0.0

Table A.2.8. Continued

Table A.2.8. Continued

Nursing education	Total	17	3.5	15	3.5	2	3.1
	Eight hours	12	2.5	12	2.8	0	0.0
	Twelve hours	1	0.2	0	0.0	1	1.6
	Mixed eight and twelve	1	0.2	1	0.2	0	0.0
	Four hours	1	0.2	0	0.0	1	1.6
	No pattern	1	0.2	1	0.2	0	0.0
	Other	1	0.2	1	0.2	0	0.0
Public/community/occupational/school settings	Total	66	13.6	61	14.4	5	7.8
	Eight hours	59	12.1	55	13.0	4	6.3
	Twelve hours	1	0.2	1	0.2	0	0.0
	Mixed eight and twelve	3	0.6	3	0.7	0	0.0
	Four hours	0	0.0	0	0.0	0	0.0
	No pattern	1	0.2	0	0.0	1	1.6
	Other	2	0.4	2	0.5	0	0.0
Outpatient/ambulatory care	Total	47	9.7	39	9.2	8	12.5
	Eight hours	29	6.0	27	6.4	2	3.1
	Twelve hours	2	0.4	2	0.5	0	0.0
	Mixed eight and twelve	0	0.0	0	0.0	0	0.0
	Four hours	1	0.2	0	0.0	1	1.6
	No pattern	4	0.8	2	0.5	2	3.1
	Other	11	2.3	8	1.9	3	4.7

Table A.2.9. Employed Louisiana Registered Nurses by Employment Setting and Age Group: June 2001												
			Age Group									
Employment Setting	Total		20-30		31-40		41-50		51-60		61 and over	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	498	100.0	54	100.0	123	100.0	188	100.0	117	100.0	16	100.0
Hospital	341	68.5	46	85.2	89	72.4	118	62.8	78	66.7	10	62.5
Nursing homes/extended care/assistive facilities	23	4.6	1	1.9	9	7.3	7	3.7	5	4.3	1	6.3
Nursing education	19	3.8	0	0.0	2	1.6	7	3.7	8	6.8	2	12.5
Public/community/occupational/school settings	68	13.7	1	1.9	14	11.4	32	17.0	18	15.4	3	18.8
Outpatient/ambulatory care	47	9.4	6	11.1	9	7.3	24	12.8	8	6.8	0	0.0

Table A.2.10. Employment Setting and Highest Nursing-Related Educational Preparation of Louisiana Registered Nurses Employed in Nursing: June 2001												
Employment Setting	Total		Highest Educational Preparation									
			Diploma		Associate		Baccalaureate		Master's		Doctorate	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	492	100.0	63	100.0	177	100.0	193	100.0	56	100.0	3	100.0
Hospital	337	68.5	35	55.6	127	71.8	144	74.6	31	55.4	0	0.0
Nursing homes/extended care/assistive facilities	22	4.5	0	0.0	13	7.3	7	3.6	2	3.6	0	0.0
Nursing education	19	3.9	1	1.6	2	1.1	2	1.0	11	19.6	3	100.0
Public/community/school/occupational settings	67	13.6	19	30.2	23	13.0	19	9.8	6	10.7	0	0.0
Outpatient/ambulatory care	47	9.6	8	12.7	12	6.8	21	10.9	6	10.7	0	0.0

Table A.2.11. Employment Setting and Primary Nursing Position of Employed Louisiana Registered Nurses: June 2001												
				Primary Position								
Employment Setting	Total		Staff nurse		Mid level manager/charge nurse		Advanced Practice		Administrative officer		School of nursing faculty	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	484	100.0	298	100.0	126	100.0	15	100.0	28	100.0	17	100.0
Hospital	333	68.8	218	73.2	88	69.8	7	46.7	18	64.3	2	11.8
Nursing homes/extended care/assistive facilities	21	4.3	14	4.7	5	4.0	0	0.0	2	7.1	0	0.0
Nursing education	18	3.7	1	0.3	0	0.0	1	6.7	1	3.6	15	88.2
Public/community/occupational/school settings	65	13.4	36	12.1	23	18.3	1	6.7	5	17.9	0	0.0
Outpatient/ambulatory care	47	9.7	29	9.7	10	7.9	6	40.0	2	7.1	0	0.0

Table A.2.12. Type of Position and Highest Nursing-Related Educational Preparation of Louisiana Registered Nurses Employed in Nursing: June 2001												
			Highest Educational Preparation									
Primary Position	Total		Diploma		Associate degree		Baccalaureate		Master's		Doctorate	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	483	100	61	12.6	173	35.8	192	39.8	54	11.2	3	0.6
Staff nurse	297	100	38	12.8	116	39.1	134	45.1	9	3.0	0	0.0
Mid level manager/charge nurse	125	100	20	16.0	45	36.0	48	38.4	12	9.6	0	0.0
Advanced Practice	16	100	0	0.0	1	6.3	2	12.5	13	81.3	0	0.0
Administrative officer	28	100	2	7.1	11	39.3	7	25.0	8	28.6	0	0.0
School of nursing faculty	17	100	1	5.9	0	0.0	1	5.9	12	70.6	3	17.6

Table A.2.13. Earnings of Louisiana Registered Nurses Employed Full Time in their Primary Nursing Position by Employment Setting: June 2001

Setting: June 2001													
				Primary Position									
Employment Setting		Total		Staff nurse		Mid level manager/charge nurse		Advanced Practice		Administrative officer		School of nursing faculty	
		#	%	#	%	#	%	#	%	#	%	#	%
	Total	412	100	242	100	116	100	14	100	25	100	15	100
Hospital	Total	281	68.2	174	71.9	82	70.7	7	50.0	16	64.0	2	13.3
	Less than \$20,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$21,000-\$30,000	8	1.9	7	2.9	1	0.9	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	65	15.8	55	22.7	8	6.9	0	0.0	0	0.0	2	13.3
	\$41,000-\$50,000	100	24.3	69	28.5	26	22.4	1	7.1	4	16.0	0	0.0
	more than \$50,000	108	26.2	43	17.8	47	40.5	6	42.9	12	48.0	0	0.0
Nursing Homes/ Assistive Fac./ Extended Care	Total	18	4.4	13	5.4	4	3.4	0	0.0	1	4.0	0	0.0
	Less than \$20,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$21,000-\$30,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	9	2.2	7	2.9	2	1.7	0	0.0	0	0.0	0	0.0
	\$41,000-\$50,000	6	1.5	4	1.7	1	0.9	0	0.0	1	4.0	0	0.0
	more than \$50,000	3	0.7	2	0.8	1	0.9	0	0.0	0	0.0	0	0.0

(Table A.2.13. continued)

(Table A.2.13. continued)

Nursing education	Total	16	3.9	1	0.4	0	0.0	1	7.1	1	4.0	13	86.7
	Less than \$20,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$21,000-\$30,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	3	0.7	0	0.0	0	0.0	1	7.1	0	0.0	2	13.3
	\$41,000-\$50,000	6	1.5	1	0.4	0	0.0	0	0.0	0	0.0	5	33.3
	more than \$50,000	7	1.7	0	0.0	0	0.0	0	0.0	1	4.0	6	40.0
Public/School/ Community/ Occupational Settings	Total	58	14.1	31	12.8	21	18.1	1	7.1	5	20.0	0	0.0
	Less than \$20,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$21,000-\$30,000	5	1.2	3	1.2	2	1.7	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	20	4.9	17	7.0	3	2.6	0	0.0	0	0.0	0	0.0
	\$41,000-\$50,000	24	5.8	11	4.5	8	6.9	1	7.1	4	16.0	0	0.0
	more than \$50,000	9	2.2	0	0.0	8	6.9	0	0.0	1	4.0	0	0.0
Oupatient/ Ambulatory care	Total	39	9.5	23	9.5	9	7.8	5	35.7	2	8.0	0	0.0
	Less than \$20,000	1	0.2	0	0.0	0	0.0	0	0.0	1	4.0	0	0.0
	\$21,000-\$30,000	1	0.2	1	0.4	0	0.0	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	14	3.4	11	4.5	3	2.6	0	0.0	0	0.0	0	0.0
	\$41,000-\$50,000	13	3.2	7	2.9	4	3.4	1	7.1	1	4.0	0	0.0
	more than \$50,000	10	2.4	4	1.7	2	1.7	4	28.6	0	0.0	0	0.0

Table A.2.14. Earnings of Louisiana Registered Nurses Employed Full Time by Type of Position and Highest Educational Preparation: June 2001

		Highest Educational Preparation											
Primary Position		Total		Diploma		Associate		Baccalaureate		Master's		Doctorate	
		#	%	#	%	#	%	#	%	#	%	#	%
	Total	481	100	61	100	172	100	192	100	53	100	3	100
Staff nurse	Total	297	61.7	38	62.3	116	67.4	134	69.8	9	17.0	0	0.0
	Less than \$20,000	17	3.5	2	3.3	5	2.9	10	5.2	0	0.0	0	0.0
	\$21,000-\$30,000	23	4.8	2	3.3	10	5.8	11	5.7	0	0.0	0	0.0
	\$31,000-\$40,000	107	22.2	9	14.8	53	30.8	44	22.9	1	1.9	0	0.0
	\$41,000-\$50,000	97	20.2	15	24.6	35	20.3	42	21.9	5	9.4	0	0.0
	more than \$50,000	53	11.0	10	16.4	13	7.6	27	14.1	3	5.7	0	0.0
Mid level manager/charge nurse	Total	124	25.8	20	32.8	44	25.6	48	25.0	12	22.6	0	0.0
	Less than \$20,000	1	0.2	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
	\$21,000-\$30,000	6	1.2	1	1.6	2	1.2	2	1.0	1	1.9	0	0.0
	\$31,000-\$40,000	18	3.7	3	4.9	7	4.1	7	3.6	1	1.9	0	0.0
	\$41,000-\$50,000	40	8.3	6	9.8	16	9.3	15	7.8	3	5.7	0	0.0
	more than \$50,000	59	12.3	10	16.4	19	11.0	23	12.0	7	13.2	0	0.0

(Table A.2.14. continued)

(Table A.2.14. continued)

Advanced Practice	Total	16	3.3	0	0.0	1	0.6	2	1.0	13	24.5	0	0.0
	Less than \$20,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$21,000-\$30,000	1	0.2	0	0.0	0	0.0	0	0.0	1	1.9	0	0.0
	\$31,000-\$40,000	1	0.2	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
	\$41,000-\$50,000	3	0.6	0	0.0	0	0.0	0	0.0	3	5.7	0	0.0
	more than \$50,000	11	2.3	0	0.0	1	0.6	1	0.5	9	17.0	0	0.0
Administrative officer	Total	27	5.6	2	3.3	11	6.4	7	3.6	7	13.2	0	0.0
	Less than \$20,000	1	0.2	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
	\$21,000-\$30,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$41,000-\$50,000	11	2.3	1	1.6	8	4.7	1	0.5	1	1.9	0	0.0
	more than \$50,000	15	3.1	1	1.6	3	1.7	5	2.6	6	11.3	0	0.0
School of nursing faculty	Total	17	3.5	1	1.6	0	0.0	1	0.5	12	22.6	3	100.0
	Less than \$20,000	1	0.2	0	0.0	0	0.0	0	0.0	1	1.9	0	0.0
	\$21,000-\$30,000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	\$31,000-\$40,000	4	0.8	0	0.0	0	0.0	1	0.5	3	5.7	0	0.0
	\$41,000-\$50,000	5	1.0	1	1.6	0	0.0	0	0.0	3	5.7	1	33.3
	more than \$50,000	7	1.5	0	0.0	0	0.0	0	0.0	5	9.4	2	66.7

Table A.2.15. Louisiana Registered Nurses Employed in Nursing: Career Satisfaction by Employment Setting: June 2001

	Employment Setting											
Level of Satisfaction in Career Choice	Total		Hospital		Nursing homes/ Extended care Assistive facilities		Nursing Education		Public/School/ Community/ Occupational		Outpatient Ambulatory	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	491	100	336	100	23	100	19	100	66	100	47	100
Well satisfied	156	31.77	100	29.76	6	26.09	9	47.37	25	37.88	16	34.04
Satisfied	259	52.75	173	51.49	13	56.52	8	42.11	36	54.55	29	61.70
Dissatisfied	60	12.22	50	14.88	1	4.35	2	10.53	5	7.58	2	4.26
Very dissatisfied	16	3.26	13	3.87	3	13.04	0	0.00	0	0.00	0	0.00

Table A.2.16. Likelihood of Louisiana Registered Nurses Practicing as a Nurse in the Future by Factors Used in Making Decision: June 2001								
Factors in deciding to stay or leave	Likelihood of practicing as a professional nurse in five years				Likelihood of practicing as a professional nurse in ten years			
	Very likely/likely		Unlikely/very unlikely		Very likely/likely		Unlikely/very unlikely	
	#	%	#	%	#	%	#	%
Total	401	100.0	94	100.0	302	99.7	190	100.0
Wage level	269	67.1	64	68.1	198	65.6	133	70.0
Flexible scheduling	50	12.5	17	18.1	41	13.6	25	13.2
High quality of care provided	21	5.2	2	2.1	18	6.0	4	2.1
Friend/colleague network	18	4.5	2	2.1	10	3.3	10	5.3
Benefit package	13	3.2	4	4.3	8	2.6	9	4.7
Proximity to place of residence	20	5.0	1	1.1	17	5.6	4	2.1
Commitment to profession	10	2.5	4	4.3	9	3.0	5	2.6

Table A.2.17. Supply of Louisiana Registered Nurses in Geographical Region According to Work Status: June 2001

Geographical Region			Work Status			
	Total		Full-time		Part-time	
	#	%	#	%	#	%
Total	494	100.0	432	100.0	62	100.0
Northwest	31	6.3	28	6.5	3	4.8
Northeast	25	5.1	21	4.9	4	6.5
Central	108	21.9	94	21.8	14	22.6
Southeast	251	50.8	218	50.5	33	53.2
Southwest	79	16.0	71	16.4	8	12.9

Table A.2.18. Employed Louisiana Registered Nurses in Geographical Region by Highest Educational Preparation: June 2001

Geographical Region	Total		Highest Educational Preparation							
			Diploma		Associate		Baccalaureate		Master's and Doctorate	
	#	%	#	%	#	%	#	%	#	%
Total	501	100	66	100	176	100	199	100	60	100
Northwest	31	6.2	3	4.5	6	3.4	12	6.0	10	16.7
Northeast	24	4.8	1	1.5	12	6.8	10	5.0	1	1.7
Central	113	22.6	9	13.6	57	32.4	36	18.1	11	18.3
Southeast	254	50.7	41	62.1	82	46.6	106	53.3	25	41.7
Southwest	79	15.8	12	18.2	19	10.8	35	17.6	13	21.7

Table A.2.19. Distribution of Louisiana Registered Nurse Population in Each Geographical Region by Age Group: June 2001

	Geographical Region											
Age Group	Total		Northwest		Northeast		Central		Southeast		Southwest	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	510	100	30	100	25	100	113	100	261	100	81	100
20-30	53	10.4	4	13.3	3	12.0	9	8.0	28	10.7	9	11.1
31-40	124	24.3	11	36.7	6	24.0	33	29.2	62	23.8	12	14.8
41-50	196	38.4	9	30.0	10	40.0	47	41.6	97	37.2	33	40.7
51-60	120	23.5	4	13.3	6	24.0	21	18.6	64	24.5	25	30.9
61 and over	17	3.3	2	6.7	0	0.0	3	2.7	10	3.8	2	2.5

Table A.2.20. Employment Setting of Louisiana Registered Nurses by Geographical Region: June 2001												
	Geographical Region											
Employment Setting	Total		Northwest		Northeast		Central		Southeast		Southwest	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	495	100	28	100	25	100	111	100	254	100	77	100
Hospital	339	68.5	21	75.0	15	60.0	64	57.7	186	73.2	53	68.8
Nursing homes/extended care/assistive facilities	23	4.6	1	3.6	0	0.0	12	10.8	10	3.9	0	0.0
Nursing education	19	3.8	2	7.1	3	12.0	4	3.6	8	3.1	2	2.6
Public/community/occupational/school settings	68	13.7	3	10.7	4	16.0	20	18.0	23	9.1	18	23.4
outpatient/ambulatory care	46	9.3	1	3.6	3	12.0	11	9.9	27	10.6	4	5.2

Table A.2.21. Annual Salaries of Louisiana Registered Nurses Employed Full Time by Geographical Region: June 2001

Geographical Region	Annual Earnings											
	Total		Less than \$20,000		\$21,000-\$30,000		\$31,000-\$40,000		\$41,000-\$50,000		More than \$50,000	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	430	100	1	100	14	100	111	100	155	100	149	100
Northwest	28	6.5	0	0.0	0	0.0	3	2.7	10	6.5	15	10.1
Northeast	20	4.7	0	0.0	0	0.0	8	7.2	9	5.8	3	2.0
Central	93	21.6	0	0.0	8	57.1	33	29.7	28	18.1	24	16.1
Southeast	218	50.7	0	0.0	5	35.7	51	45.9	83	53.5	79	53.0
Southwest	71	16.5	1	100.0	1	7.1	16	14.4	25	16.1	28	18.8

Table A.2.22. Hausman and Small-Hsiao Tests of IIA Assumption

Hausman Test			
Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.			
Unrestricted/restricted	chi2	P>chi2	evidence
ALL_advanced=B_advanced	chi2(5) = 1.50	Prob > chi2 = 0.9127	for Ho
ALL_admin=B_admin	chi2(5) = 6.57	Prob > chi2 = 0.2545	for Ho
ALL_faculty=B_faculty	chi2(5) = 2.35	Prob > chi2 = 0.7992	for Ho
ALL_advanced=C_advanced	chi2(5) = 0.92	Prob > chi2 = 0.9685	for Ho
ALL_faculty=C_faculty	chi2(5) = 2.17	Prob > chi2 = 0.8258	for Ho
ALL_mgr/charge=C_mgr/charge	chi2(5) = 2.94	Prob > chi2 = 0.7087	for Ho
ALL= Unrestricted model B = Excludes Mid-level mgr/charge nurse C = Excludes Admin officer Degrees of freedom = K, in parentheses			

Small-Hsiao Test			
Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.			
Omitted	chi2	P>chi2	evidence
mgr/char	16.776(6)	0.01	against Ho
advanced	18.688(6)	0.005	against Ho
admin	10.389(6)	0.109	for Ho
faculty	17.682(6)	0.007	against Ho
Degrees of freedom = K+1, in parentheses			

Table A.2.23. Tests of the IIA Assumption					
Probit Analysis					
	(1)	(2)	(3)	(4)	(5)
	staff	chargemgr	admin	advanced	faculty
edbasic	-0.218	-0.08	-0.025	1.307	0.458
	(2.56)**	(0.91)	(0.19)	(4.15)***	(2.77)***
potexp	-0.031	0.005	0.011	0.023	0.04
	(4.84)***	(0.71)	(1.15)	(1.57)	(3.28)***
earnings	-0.412	0.37	0.298	0.333	-0.019
	(6.52)***	(5.19)***	(2.58)***	(2.02)**	(0.17)
marstat	0.189	-0.16	0.004	-0.608	-0.328
	(2.24)**	(1.77)*	(0.03)	(2.03)**	(1.45)
rn_bsn_or_more	-0.215	-0.368	0.228	1.565	0.709
	(1.05)	(1.65)*	(0.80)	(2.97)***	(1.87)*
constant	2.604	-1.783	-3.013	-6.639	-3.326
	(7.35)	(4.85)	(4.91)	(5.75)	(4.78)
Observations	488	488	488	488	488
Comparison of Unrestricted to Restricted Models					
	(1)	(2)	(3)	(4)	(5)
	full model	no charge	no aprn	no admin	no faculty
edbasic	0.11	2.829	0.106	0.117	0.108
	(0.67)	(4.33)***	(0.64)	(0.71)	(0.65)
potexp	0.025	0.074	0.025	0.025	0.025
	(2.07)**	(2.21)**	(2.04)**	(2.06)**	(2.05)**
earnings	1.192	4.159	1.193	1.201	1.139
	(3.00)***	(3.52)***	(2.99)***	(3.02)***	(2.89)***
marstat	0.655	1.038	0.662	0.653	0.655
	(5.23)***	(2.47)**	(5.23)***	(5.22)***	(5.16)***
rn_bsn_or_more	-0.421	-1.285	-0.431	-0.402	-0.425
	(2.55)**	(2.08)**	(2.59)***	(2.44)**	(2.58)***
constant	-3.485	-14.97	-3.479	-3.514	-3.462
	(5.13)	(5.27)	(5.11)	(5.17)	(5.06)
Observations	483	349	467	455	467
Absolute value of z-statistics in parentheses					
*, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively					

Table A.2.24. Multinomial Logistic Regression Using Individual-Specific Variables					
N = 493					
Mid-level manager/Charge RN vs. Staff RN			Administrative officer vs. Staff RN		
	b	se		b	se
bdiploma	0.057	0.394	bdiploma	0.001	0.715
badn	0.013	0.261	badn	0.599	0.529
bmasters	0.373	0.934	bmasters	1.9764*	1.056
rn_bsn_or_more	1.035***	0.394	rn_bsn_or_more	1.327**	0.578
income30	-1.298***	0.428	income30	-1.742	1.081
income3150	-1.197***	0.256	income3150	-1.218***	0.439
single	-0.968***	0.366	single	-0.475	0.607
potexp10	0.516	0.355	potexp10	1.300	1.109
potexp20	1.134***	0.365	potexp20	2.686**	1.070
potexp30	0.8553*	0.480	potexp30	2.068*	1.216
potexp40	-0.025	0.681	potexp40	2.333*	1.320
constant	-0.539	0.410	constant	-3.755	1.154
APRN vs. Staff RN			RN Faculty vs. Staff RN		
	b	se		b	se
bdiploma	-35.585	1.430E+07	bdiploma	-2.363**	1.153
badn	-1.481	1.112	badn	-3.671***	1.415
bmasters	4.08***	1.025	bmasters	1.593	1.079
rn_bsn_or_more	3.01**	1.239	rn_bsn_or_more	3.559***	1.206
income30	-1.297	1.154	income30	-1.266	1.157
income3150	-2.334***	0.743	income3150	-0.518	0.601
single	-1.718	1.251	single	-34.884	1.49E+07
potexp10	-0.635	1.575	potexp10	-0.019	1.255
potexp20	2.303*	1.206	potexp20	1.494	1.122
potexp30	1.733	1.421	potexp30	2.254*	1.195
potexp40	-0.497	1.830	potexp40	1.369	1.408
constant	-2.879	1.281	constant	-2.708	1.152
*, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.					
Pseudo R-squared = 0.1782					

Table A.2.25. Marginal Effects of Multinomial Logit Regression

	Basic Education is Diploma				RN is Single		
	b	z	e ^b		b	z	e ^b
Charge RN	0.057	0.144	1.059	Charge RN	-0.968***	-2.642	0.380
APRN	-35.585	0	0.000	APRN	-1.718	-1.373	0.180
Administrative Officer	0.001	0.001	1.001	Administrative Officer	-0.475	-0.782	0.622
RN Faculty	-2.363**	-2.049	0.094	RN Faculty	-34.884	0	0.000
	Basic Education is Associate				Potential Experience is 10 Years		
	b	z	e ^b		b	z	e ^b
Charge RN	0.013	0.049	1.013	Charge RN	0.516	1.456	1.676
APRN	-1.481	-1.332	0.228	APRN	-0.635	-0.403	0.530
Administrative Officer	0.599	1.13	1.820	Administrative Officer	1.300	1.172	3.669
RN Faculty	-3.671***	-2.595	0.026	RN Faculty	-0.019	-0.015	0.981
	Basic Education is Master's				Potential Experience is 20 Years		
	b	z	e ^b		b	z	e ^b
Charge RN	0.373	0.4	1.453	Charge RN	1.134***	3.112	3.109
APRN	4.08***	3.981	59.114	APRN	2.303*	1.909	10.002
Administrative Officer	1.977*	1.872	7.217	Administrative Officer	2.686**	2.51	14.676
RN Faculty	1.593	1.476	4.919	RN Faculty	1.494	1.331	4.453

(Table A.2.25. continued)

(Table A.2.25. continued)

	RN-to-BSN-or-more				Potential Experience is 30 Years		
	b	z	e ^b		b	z	e ^b
Charge RN	1.035***	2.629	2.815	Charge RN	0.855*	1.78	2.352
APRN	3.007**	2.427	20.232	APRN	1.733	1.219	5.659
Administrative Officer	1.327**	2.295	3.768	Administrative Officer	2.068*	1.7	7.908
RN Faculty	3.559***	2.951	35.113	RN Faculty	2.254*	1.886	9.527
	Income ≤ \$30,000				Potential Experience is 40 Years		
	b	z	e ^b		b	z	e ^b
Charge RN	-1.298***	-3.034	0.273	Charge RN	-0.025	-0.036	0.976
APRN	-1.297	-1.123	0.273	APRN	-0.497	-0.271	0.609
Administrative Officer	-1.742	-1.611	0.175	Administrative Officer	2.333*	1.768	10.310
RN Faculty	-1.266	-1.095	0.282	RN Faculty	1.369	0.972	3.930
<p>Marginal effects are interpreted as the percentage by which the probability of holding occupation j relative to a staff nurse is affected by the binary indicator changing from 0 to 1.</p> <p>*, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.</p>	Income between \$31,000 and \$50,000						
					b	z	e ^b
				Charge RN	-1.197***	-4.674	0.302
				APRN	-2.334***	-3.142	0.097
				Administrative Officer	-1.218***	-2.772	0.296
				RN Faculty	-0.518	-0.863	0.596

Table A.2.26. Mixed Model Estimation of the RNs Occupational Choice		
	(1)	(2)
	-	
Income	0.000010	-0.000010
	(0.38)	(0.37)
RN-to-patient-ratio	0.001330	0.008030
	(0.18)	(1.46)
Income interaction with RN-to-BSN-or-more:		
Charge RN		0.00003***
		(3.27)
APRN		0.00004**
		(2.03)
Administrative officer		0.00003***
		(3.22)
RN Faculty		0.00004***
		(2.80)
RN-to-patient ratio interaction with RN-to-BSN-or-more:		
Charge RN		0.000300
		(0.00)
APRN		-0.153820
		(0.72)
Administrative officer		-0.006730
		(0.33)
RN Faculty		-0.007420
		(0.26)
Strata (RNs)	493	493
N (combinations)	2465	2465
Pseudo R-square	0.4582	0.3583
** and *** denote significance at the 0.05 and 0.01 level, respectively.		

Table A.2.27. Predicted Probabilities of Holding Staff RN Position					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN-or-more=0	RN-BSN-or-more=1	RN-BSN-or-more=0	RN-BSN-or-more=1	N/A
3	0.846	0.626	0.812	0.553	0.798
10	0.822	0.574	0.781	0.496	0.763
20	0.781	0.490	0.728	0.410	0.699
30	0.730	0.393	0.662	0.321	0.616
40	0.668	0.290	0.581	0.236	0.512
Case (1) RN earns \$30,000 per year or less and is either married or divorced.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN-or-more=0	RN-BSN-or-more=1	RN-BSN-or-more=0	RN-BSN-or-more=1	N/A
3	0.937	0.829	0.919	0.773	0.917
10	0.925	0.802	0.903	0.732	0.902
20	0.905	0.755	0.872	0.659	0.875
30	0.878	0.697	0.830	0.569	0.838
40	0.842	0.625	0.770	0.465	0.786
Case (2) RN earns \$30,000 per year or less and is single.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN-or-more=0	RN-BSN-or-more=1	RN-BSN-or-more=0	RN-BSN-or-more=1	N/A
3	0.817	0.560	0.776	0.507	0.770
10	0.787	0.499	0.739	0.449	0.729
20	0.737	0.401	0.674	0.361	0.654
30	0.675	0.297	0.595	0.273	0.557
40	0.598	0.198	0.501	0.191	0.442
Case (3) RN earns between \$31,000 and \$50,000 per year and is married or divorced.					

(Table A.2.27. continued)

(Table A.2.27. continued)

	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN-or-more=0	RN-BSN-or-more=1	RN-BSN-or-more=0	RN-BSN-or-more=1	N/A
3	0.922	0.795	0.899	0.732	0.905
10	0.908	0.762	0.877	0.683	0.888
20	0.881	0.704	0.835	0.598	0.855
30	0.845	0.632	0.777	0.496	0.809
40	0.796	0.544	0.695	0.384	0.746
Case (4) RN earns between \$31,000 and \$50,000 per year and is single.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
	RN-BSN-or-more=0	RN-BSN-or-more=1	RN-BSN-or-more=0	RN-BSN-or-more=1	N/A
3	0.558	0.278	0.490	0.214	0.443
10	0.512	0.236	0.439	0.176	0.389
20	0.444	0.180	0.363	0.129	0.308
30	0.373	0.128	0.286	0.089	0.229
40	0.301	0.085	0.214	0.058	0.159
Case (5) RN earns more than \$51,000 per year and is married or divorced.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN-or-more=0	RN-BSN-or-more=1	RN-BSN-or-more=0	RN-BSN-or-more=1	N/A
3	0.770	0.521	0.711	0.421	0.690
10	0.734	0.472	0.663	0.362	0.644
20	0.675	0.398	0.582	0.279	0.569
30	0.604	0.322	0.486	0.201	0.481
40	0.520	0.248	0.381	0.136	0.385
Case (6) RN earns more than \$51,000 per year and is single.					

Table A.2.28. Predicted Probabilities of Holding Staff RN Position					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN=0	RN-BSN=1	RN-BSN=0	RN-BSN=1	N/A
3	0.825	0.623	0.791	0.586	0.798
10	0.797	0.584	0.756	0.544	0.763
20	0.748	0.525	0.695	0.481	0.699
30	0.686	0.465	0.619	0.416	0.616
40	0.609	0.404	0.528	0.351	0.512
Case (1) RN earns \$30,000 per year or less and is either married or divorced.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN=0	RN-BSN=1	RN-BSN=0	RN-BSN=1	N/A
3	0.931	0.822	0.913	0.796	0.917
10	0.919	0.796	0.894	0.765	0.902
20	0.896	0.754	0.860	0.714	0.875
30	0.867	0.704	0.810	0.653	0.838
40	0.826	0.646	0.742	0.580	0.786
Case (2) RN earns \$30,000 per year or less and is single.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN=0	RN-BSN=1	RN-BSN=0	RN-BSN=1	N/A
3	0.795	0.584	0.762	0.542	0.770
10	0.761	0.543	0.722	0.498	0.729
20	0.701	0.482	0.652	0.432	0.654
30	0.626	0.420	0.567	0.365	0.557
40	0.534	0.357	0.467	0.298	0.442
Case (3) RN earns between \$31,000 and \$50,000 per year and is married or divorced.					

(Table A.2.28. continued)

(Table A.2 28. continued)

	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN=0	RN-BSN=1	RN-BSN=0	RN-BSN=1	N/A
3	0.918	0.796	0.895	0.763	0.905
10	0.902	0.766	0.871	0.727	0.888
20	0.873	0.718	0.826	0.667	0.855
30	0.834	0.661	0.762	0.594	0.809
40	0.780	0.594	0.674	0.508	0.746
Case (4) RN earns between \$31,000 and \$50,000 per year and is single.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
	RN-BSN=0	RN-BSN=1	RN-BSN=0	RN-BSN=1	N/A
3	0.514	0.275	0.447	0.242	0.443
10	0.465	0.243	0.393	0.210	0.389
20	0.391	0.200	0.313	0.168	0.308
30	0.315	0.162	0.237	0.131	0.229
40	0.240	0.129	0.169	0.099	0.159
Case (5) RN earns more than \$51,000 per year and is married or divorced.					
	Basic Ed is Diploma		Basic Ed is Associate		Basic Ed is BSN
Pot. Exp.	RN-BSN=0	RN-BSN=1	RN-BSN=0	RN-BSN=1	N/A
3	0.748	0.513	0.682	0.462	0.690
10	0.710	0.469	0.628	0.414	0.644
20	0.644	0.405	0.536	0.344	0.569
30	0.565	0.341	0.432	0.275	0.481
40	0.474	0.277	0.324	0.208	0.385
Case (6) RN earns more than \$51,000 per year and is single.					

Table A.2.29. Comparison of Probabilities					
Basic Ed is Diploma			Basic Ed is Associate		
RN-BSN=1	RN-BSN-or-more=1	Difference	RN-BSN=1	RN-BSN-or-more=1	Difference
0.623	0.626	-0.003	0.586	0.553	0.033
0.584	0.574	0.009	0.544	0.496	0.047
0.525	0.490	0.036	0.481	0.410	0.071
0.465	0.393	0.072	0.416	0.321	0.095
0.404	0.290	0.114	0.351	0.236	0.114
Case (1)			Case (1)		
RN-BSN=1	RN-BSN-or-more=1	Difference	RN-BSN=1	RN-BSN-or-more=1	Difference
0.822	0.829	-0.007	0.796	0.773	0.023
0.796	0.802	-0.006	0.765	0.732	0.034
0.754	0.755	-0.001	0.714	0.659	0.056
0.704	0.697	0.007	0.653	0.569	0.084
0.646	0.625	0.021	0.580	0.465	0.115
Case (2)			Case (2)		
RN-BSN=1	RN-BSN-or-more=1	Difference	RN-BSN=1	RN-BSN-or-more=1	Difference
0.584	0.560	0.024	0.542	0.507	0.035
0.543	0.499	0.044	0.498	0.449	0.049
0.482	0.401	0.081	0.432	0.361	0.071
0.420	0.297	0.123	0.365	0.273	0.092
0.357	0.198	0.159	0.298	0.191	0.106
Case (3)			Case (3)		

(Table A.2.29. continued)

(Table A.2.29. continued)

RN-BSN=1	RN-BSN-or-more=1	Difference	RN-BSN=1	RN-BSN-or-more=1	Difference
0.796	0.795	0.001	0.763	0.732	0.031
0.766	0.762	0.005	0.727	0.683	0.044
0.718	0.704	0.014	0.667	0.598	0.069
0.661	0.632	0.029	0.594	0.496	0.098
0.594	0.544	0.050	0.508	0.384	0.124
Case (4)			Case (4)		
RN-BSN=1	RN-BSN-or-more=1	Difference	RN-BSN=1	RN-BSN-or-more=1	Difference
0.275	0.278	-0.003	0.242	0.214	0.027
0.243	0.236	0.006	0.210	0.176	0.034
0.200	0.180	0.021	0.168	0.129	0.040
0.162	0.128	0.035	0.131	0.089	0.043
0.129	0.085	0.044	0.099	0.058	0.041
Case (5)			Case (5)		
RN-BSN=1	RN-BSN-or-more=1	Difference	RN-BSN=1	RN-BSN-or-more=1	Difference
0.513	0.521	-0.009	0.462	0.421	0.042
0.469	0.472	-0.003	0.414	0.362	0.052
0.405	0.398	0.007	0.344	0.279	0.066
0.341	0.322	0.018	0.275	0.201	0.073
0.277	0.248	0.030	0.208	0.136	0.072
Case (6)			Case (6)		

Table A.3.1. Results of Binary Probit Fixed Effects Model						
(t statistics in parentheses)						
Variable	(1) PP	(2) PP	(3) IC	(4) IC	(5) CGF	(6) CGF
	N = 875	N = 875	N = 875	N = 875	N = 250	N = 250
	35 States	35 States	35 States	35 States	10 States	10 States
Spatial	0.4419		0.3936***		0.0279	
	(0.00)		(4.25)		(0.00)	
Spatial squared	23.943		- 27.109***		76.944	
	(0.00)		(4.38)		(0.00)	
Osha inspections	0.0004	0.0006**	0.0003	0.0002	-0.0001	0.0002
	(1.15)	(2.98)	(1.59)	(1.61)	(0.09)	(0.41)
Female labor force (%)	0.1985**	0.2798***	0.1561***	0.1996***	-0.2667	-0.045
	(2.89)	(6.45)	(3.61)	(6.36)	(1.43)	(0.45)
Labor force age 55-64 (%)	- 0.6564**	- 0.9802***	- 0.3131**	- 0.6145***	-0.1416	-0.0417
	(2.54)	(6.15)	(2.31)	(6.05)	(0.51)	(0.19)
Non white labor force (%)	-0.0382	- 0.2706**	0.0166	-0.0194	0.0261	-0.0179
	(0.24)	(2.80)	(0.22)	(0.32)	(0.22)	(0.16)
Large firm size	3.304*	6.164***	1.611**	0.2989	4.865**	5.681***
	(1.99)	(5.35)	(2.15)	(0.52)	(2.43)	(4.19)
Union density	- 0.5923***	- 0.7577***	- 0.3913***	- 0.4175***	- 0.8167***	- 0.6552***
	(4.88)	(8.45)	(5.11)	(8.17)	(4.54)	(5.62)
Change in union density	-0.1141	- 0.1206*	-0.1058	-0.1221	0.1556***	0.0798***
	(0.69)	(1.72)	(0.96)	(1.59)	(3.65)	(3.38)
legend: * p<0.05; ** p<0.01; *** p<0.001						

Figure A.3.1.

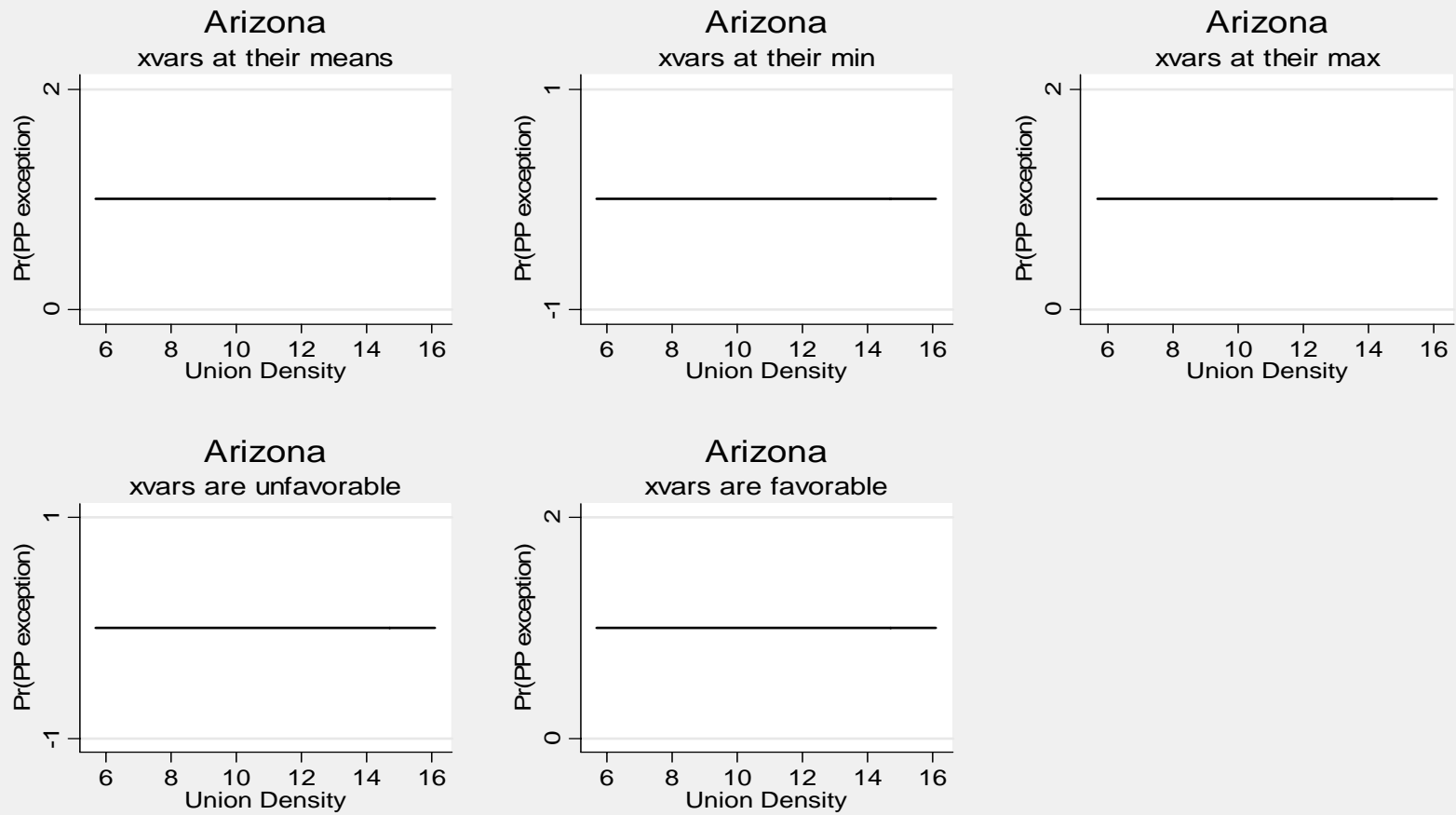


Figure A.3.1.

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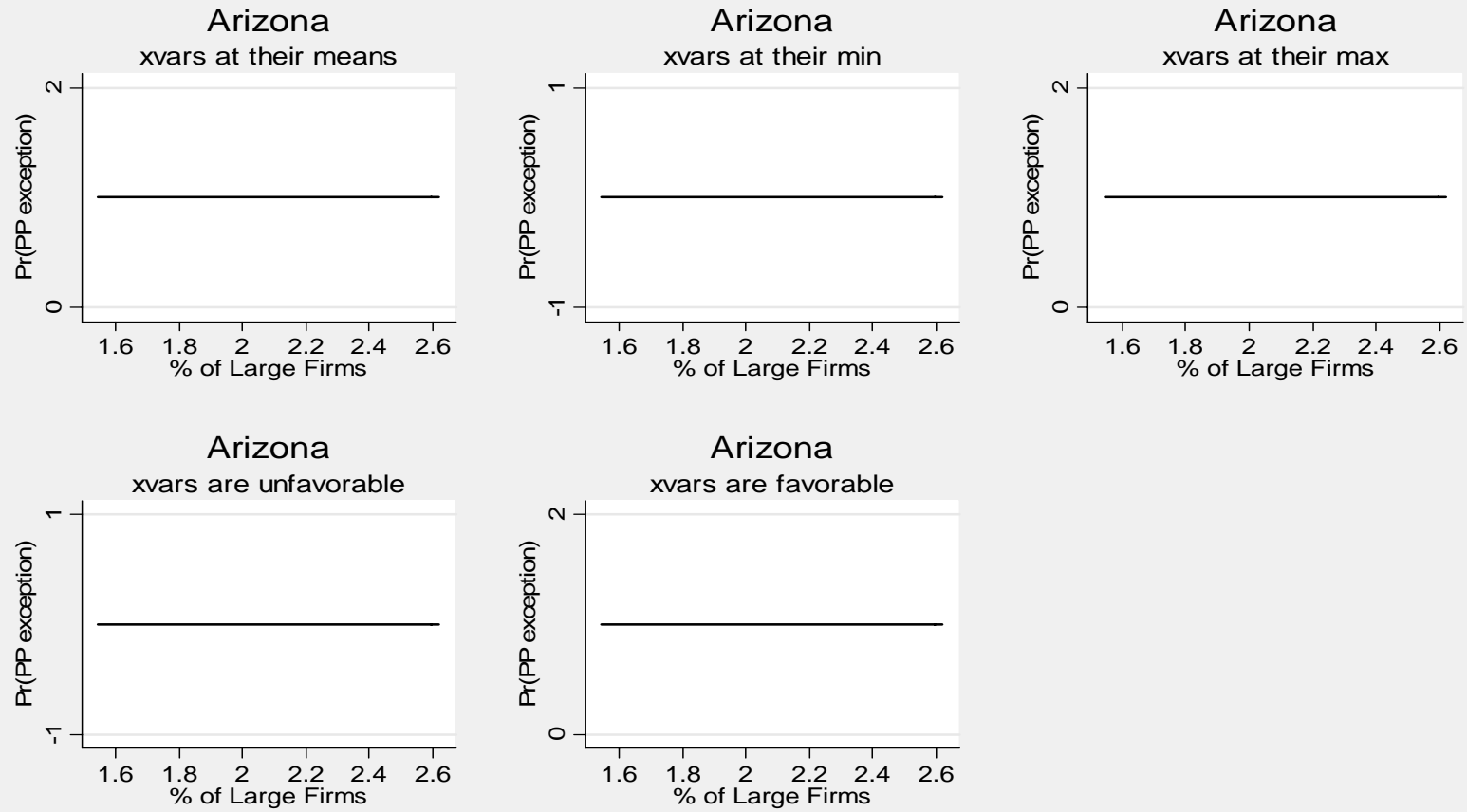


Figure A.3.2.

Figure A.3.3.

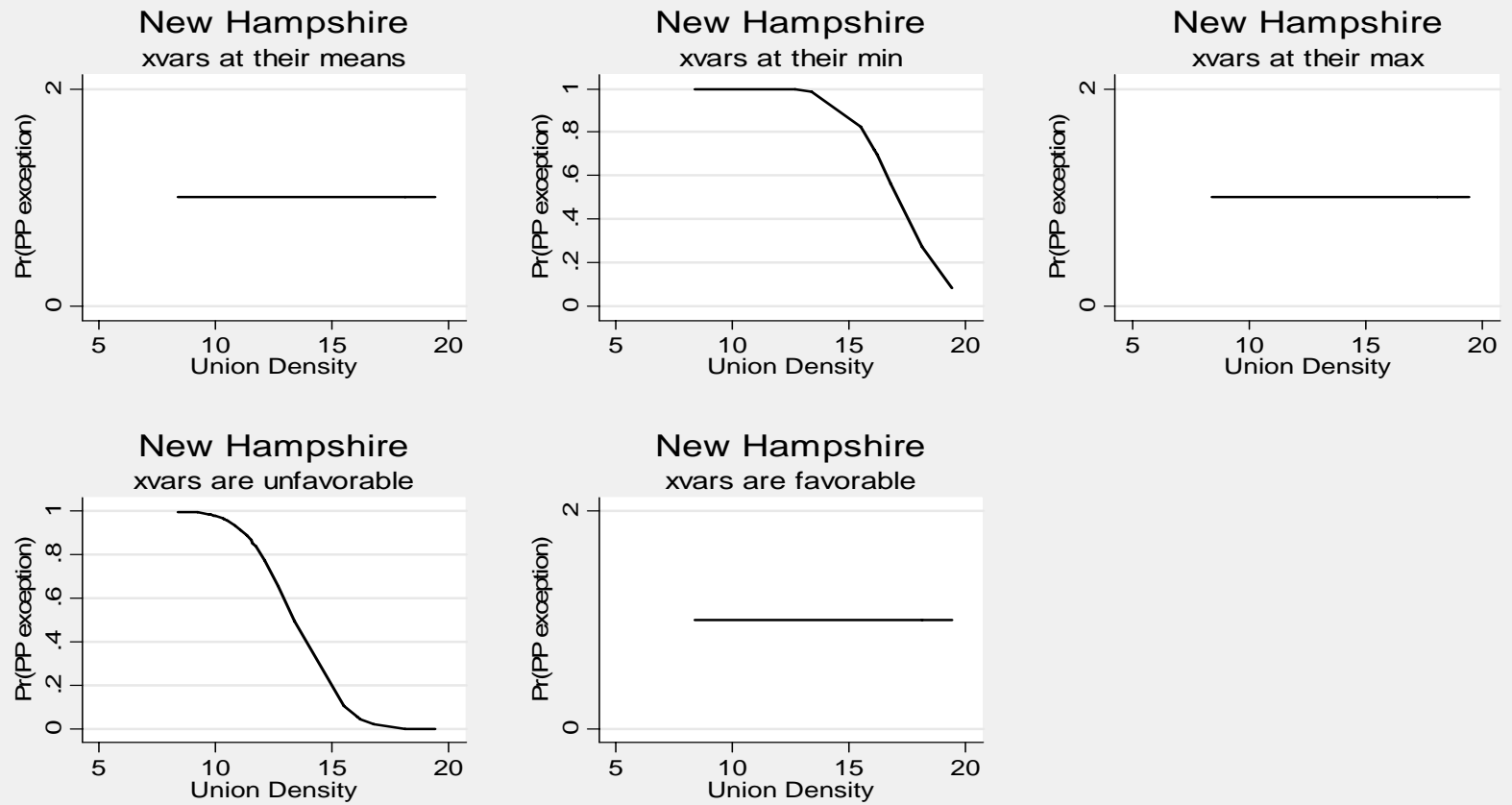


Figure A.3.3.

Figure A.3.4.

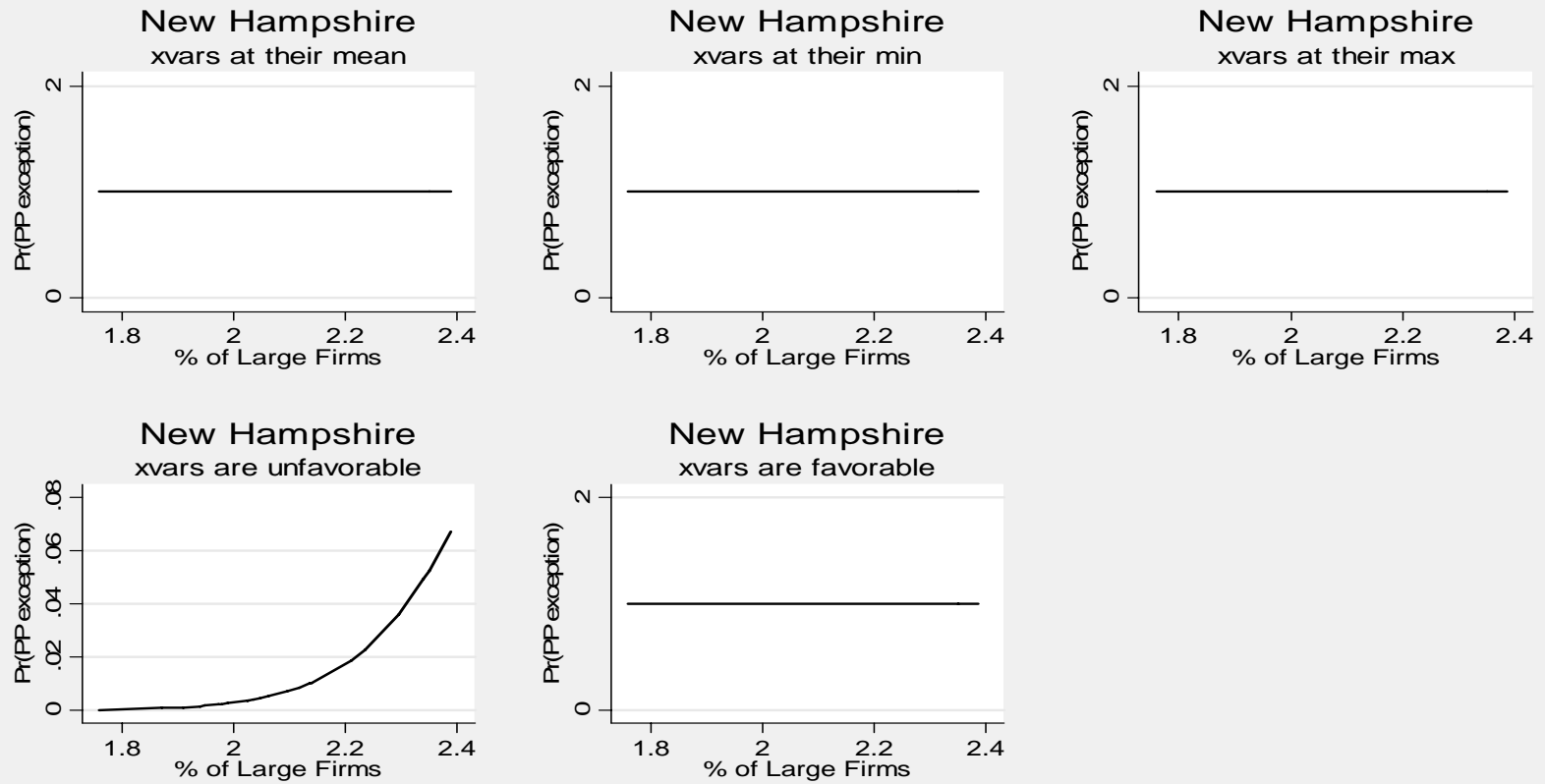


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Figure A.3.5.

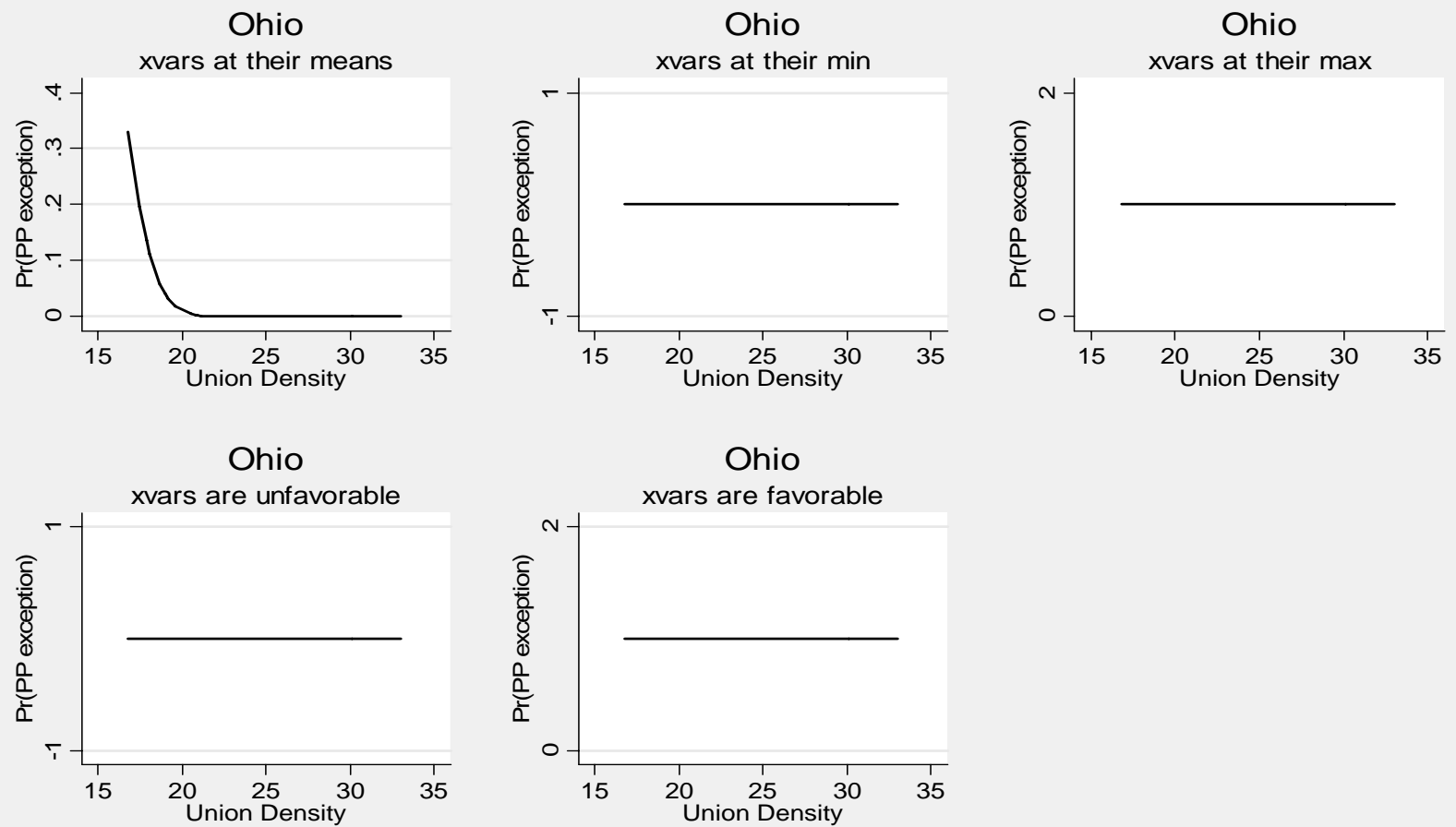


Figure A.3.5.

Figure A.3.6.

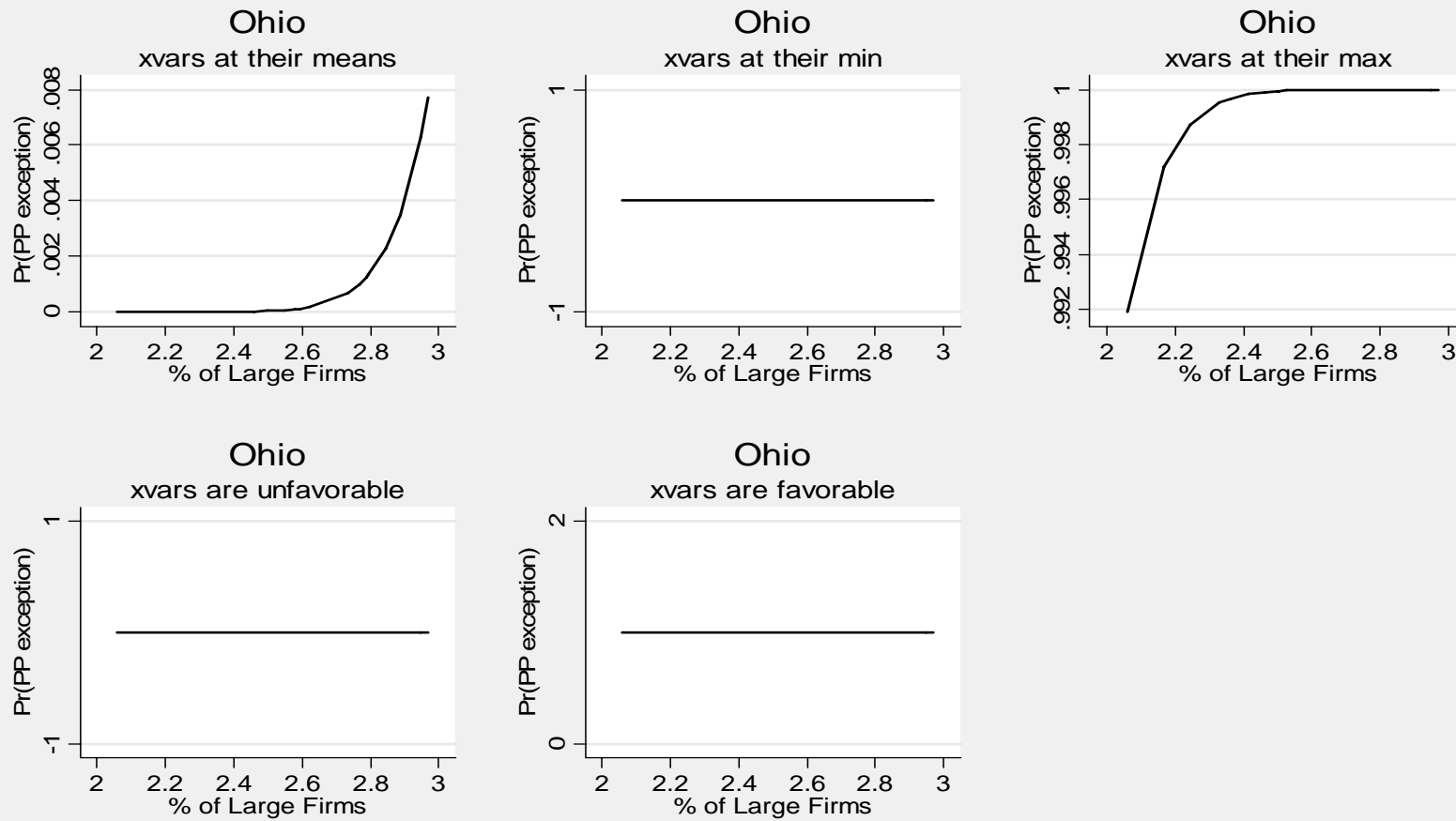


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Figure A.3.7.

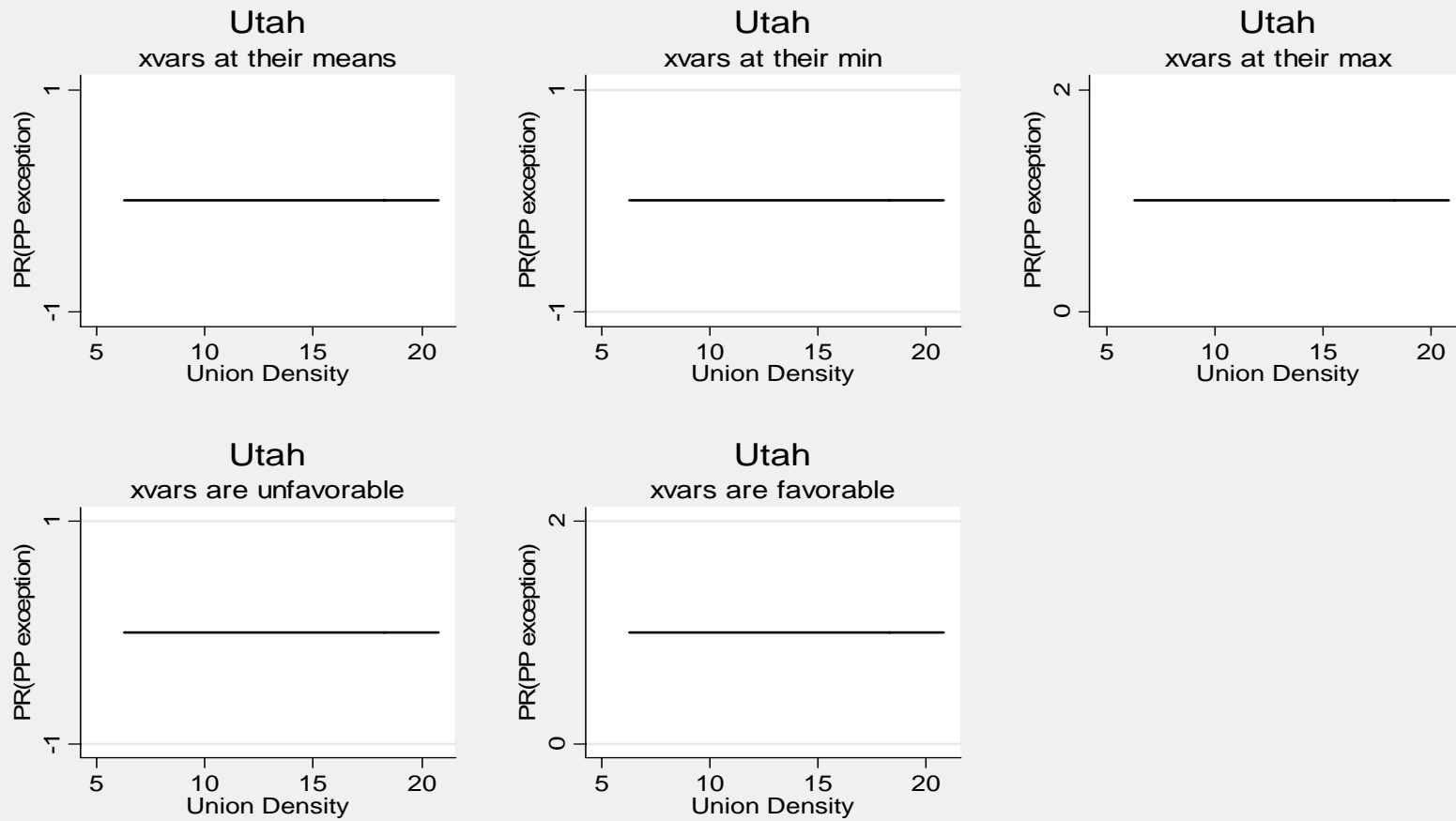


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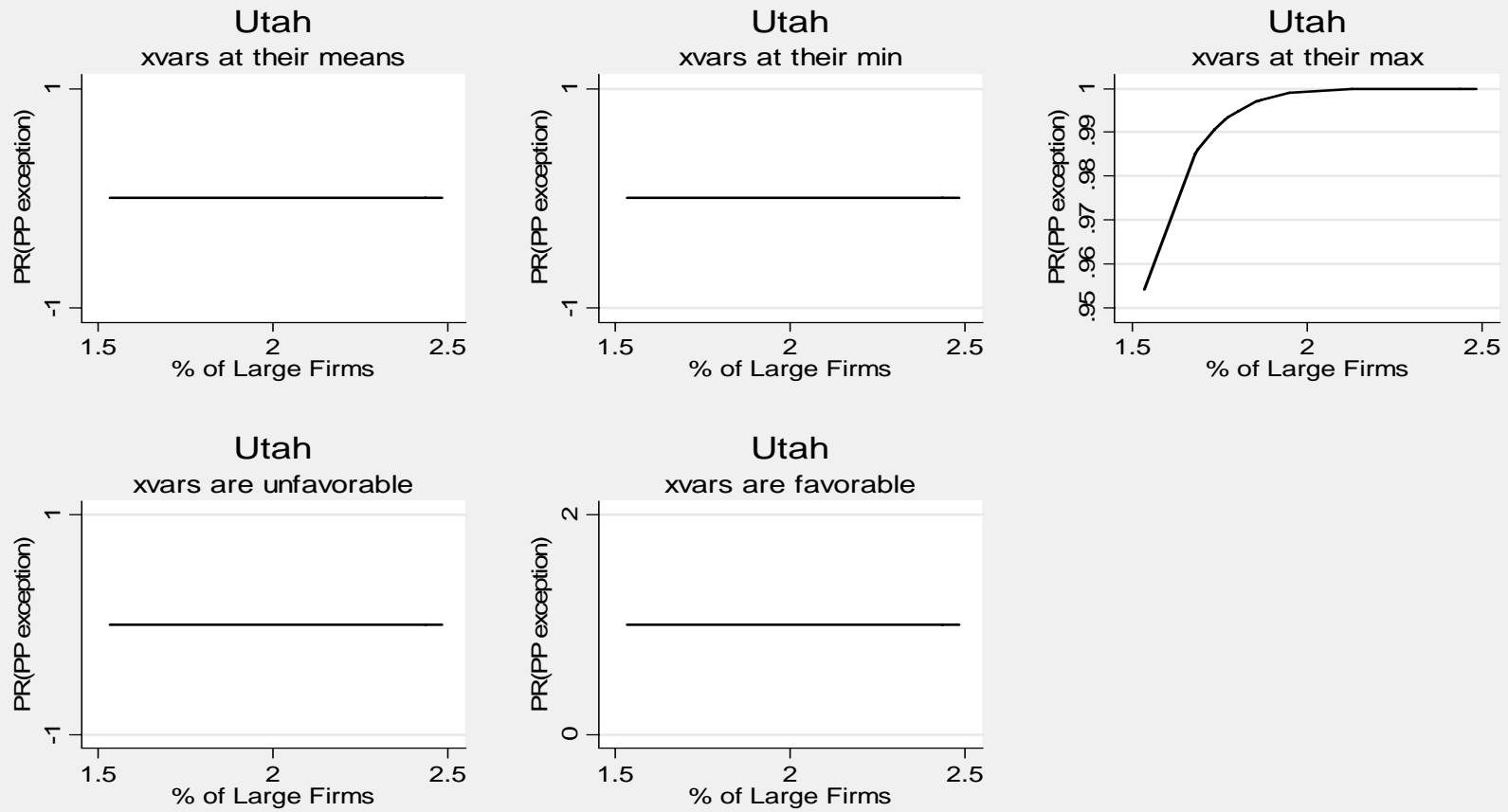


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Figure A.3.9.

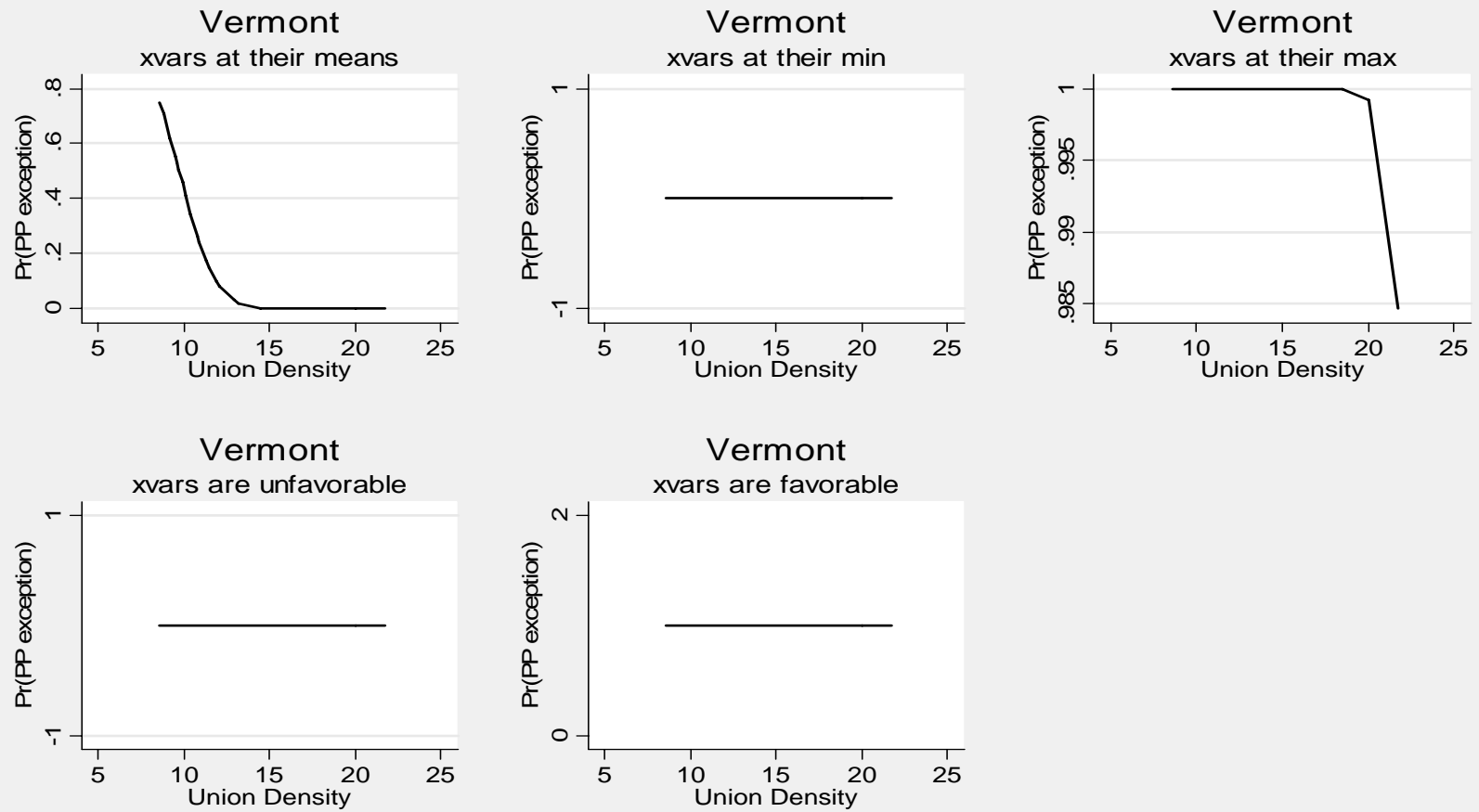


Figure A.3.9.

Figure A.3.10.

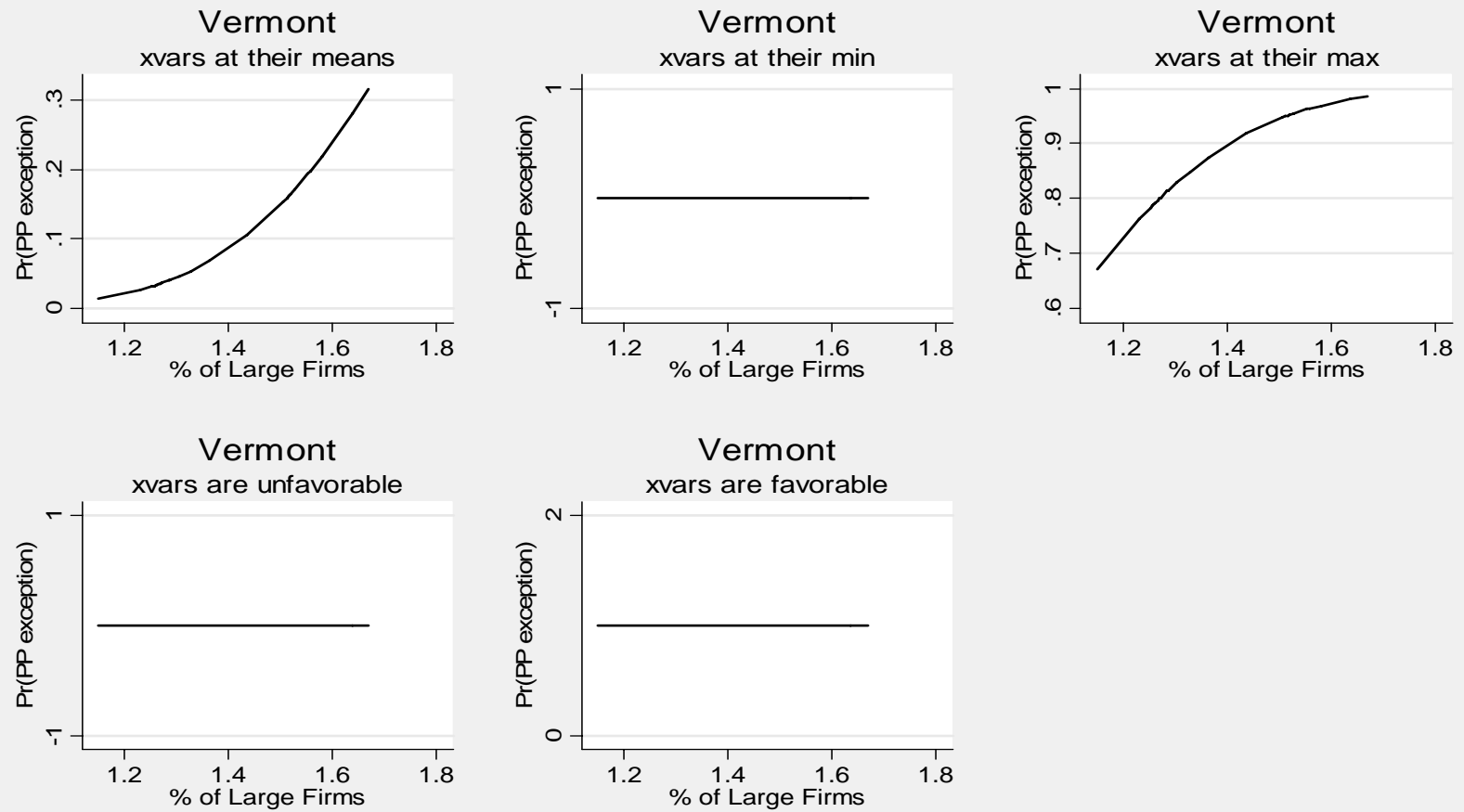


Figure A.3.10.

Figure A.3.11.

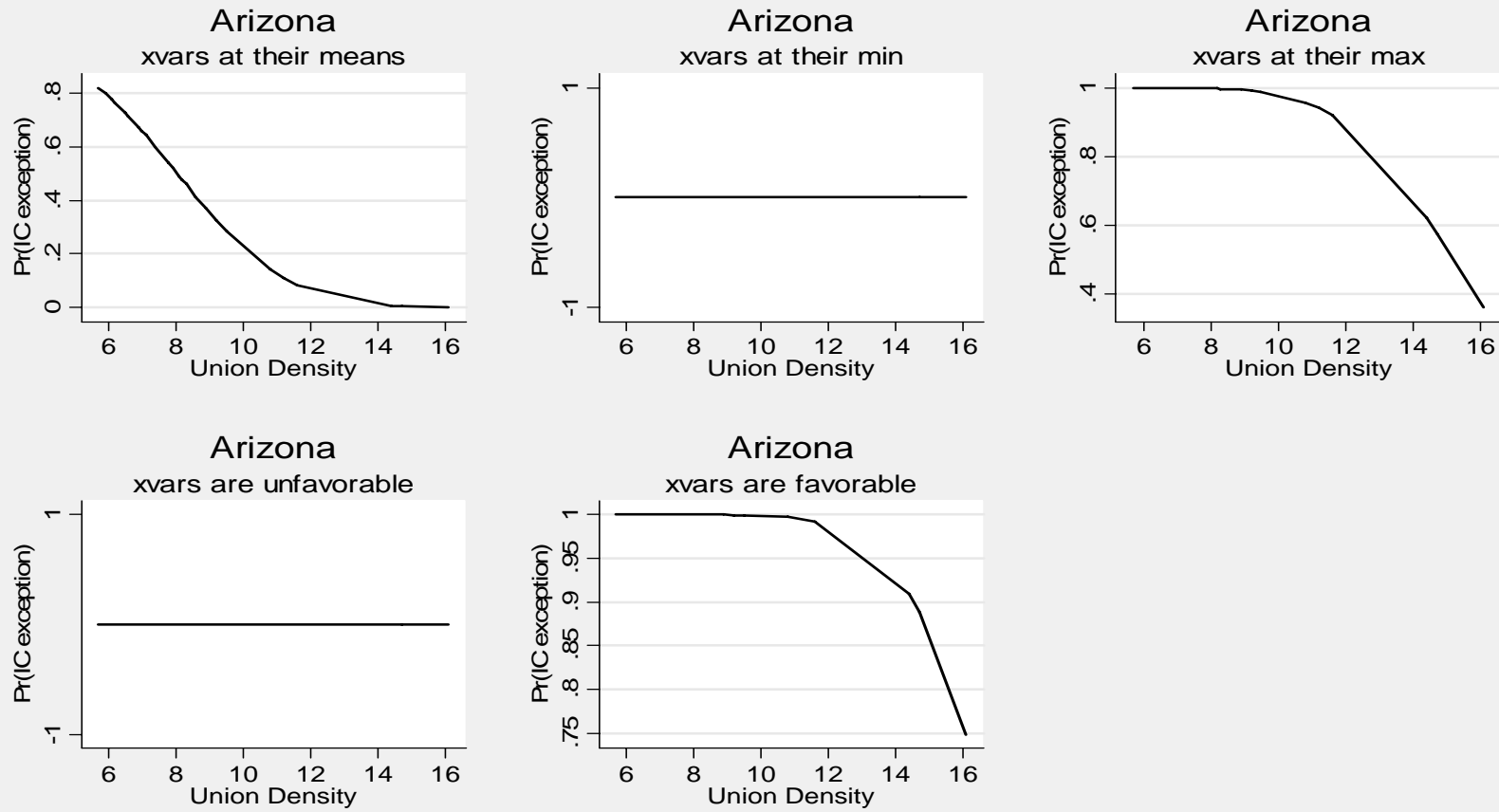


Figure A.3.11.

Figure A.3.12.

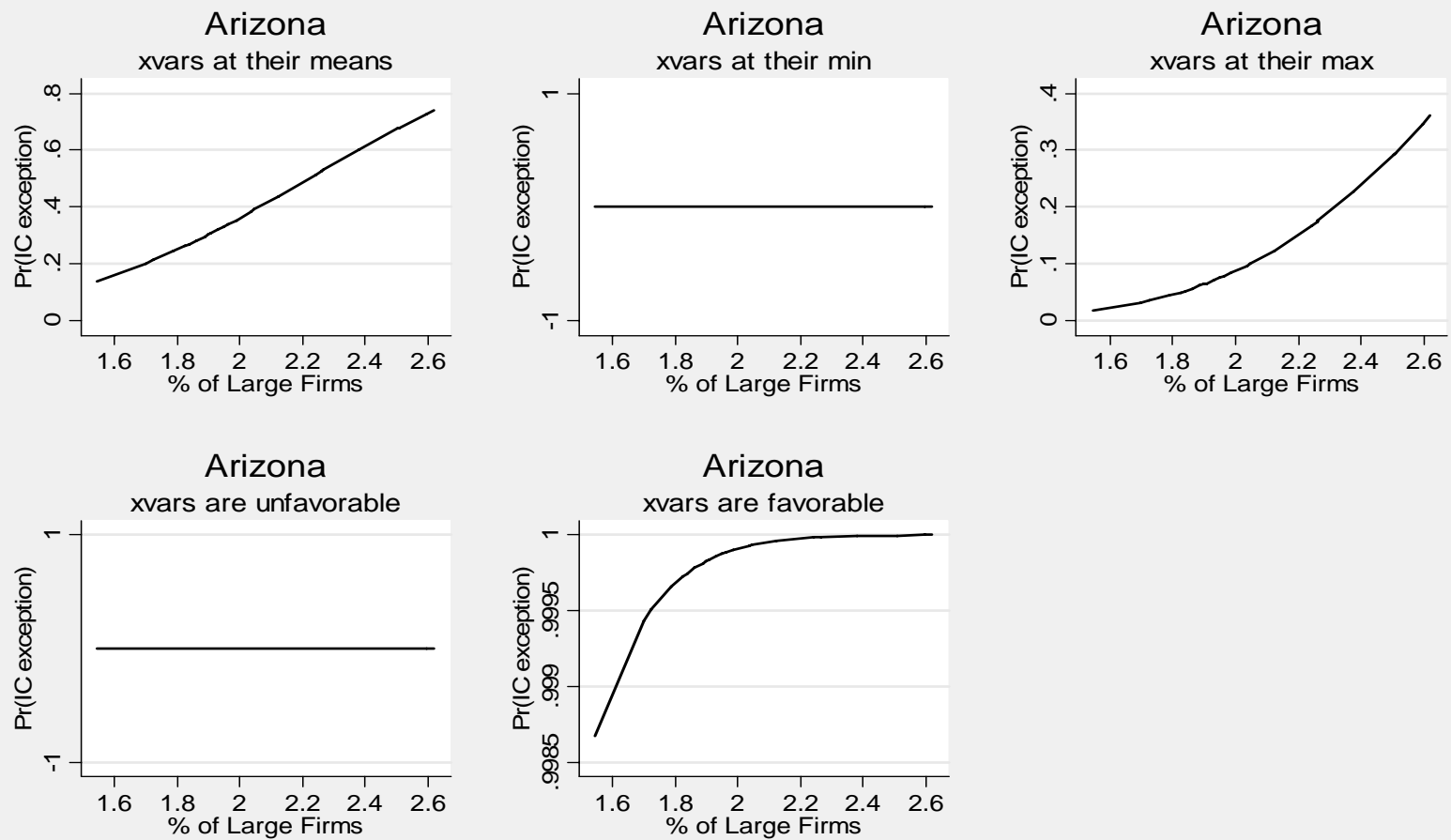


Figure A.3.12.

Figure A.3.13.

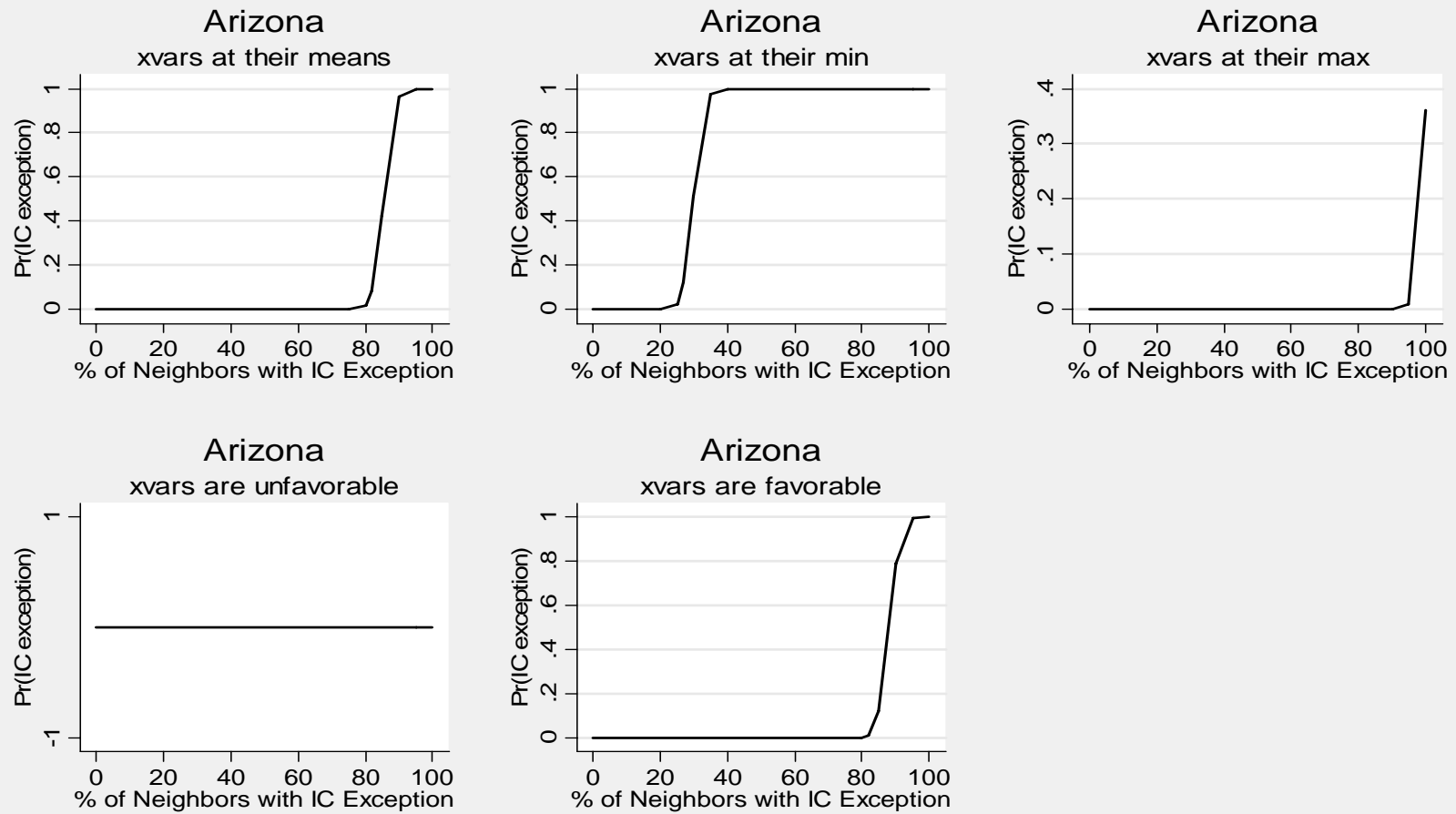


Figure A.3.13.

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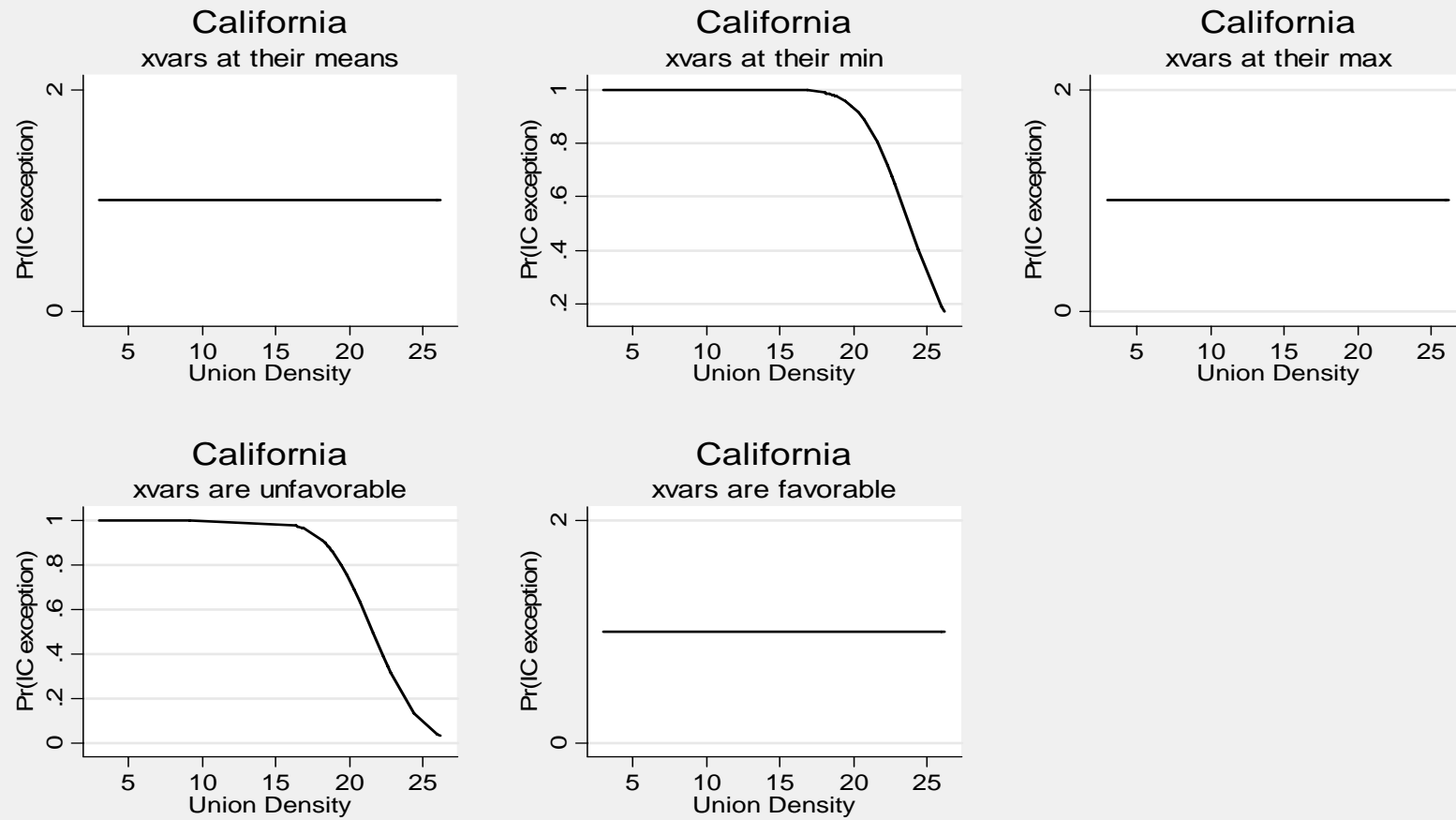


Figure A.3.14.

Figure A.3.15.

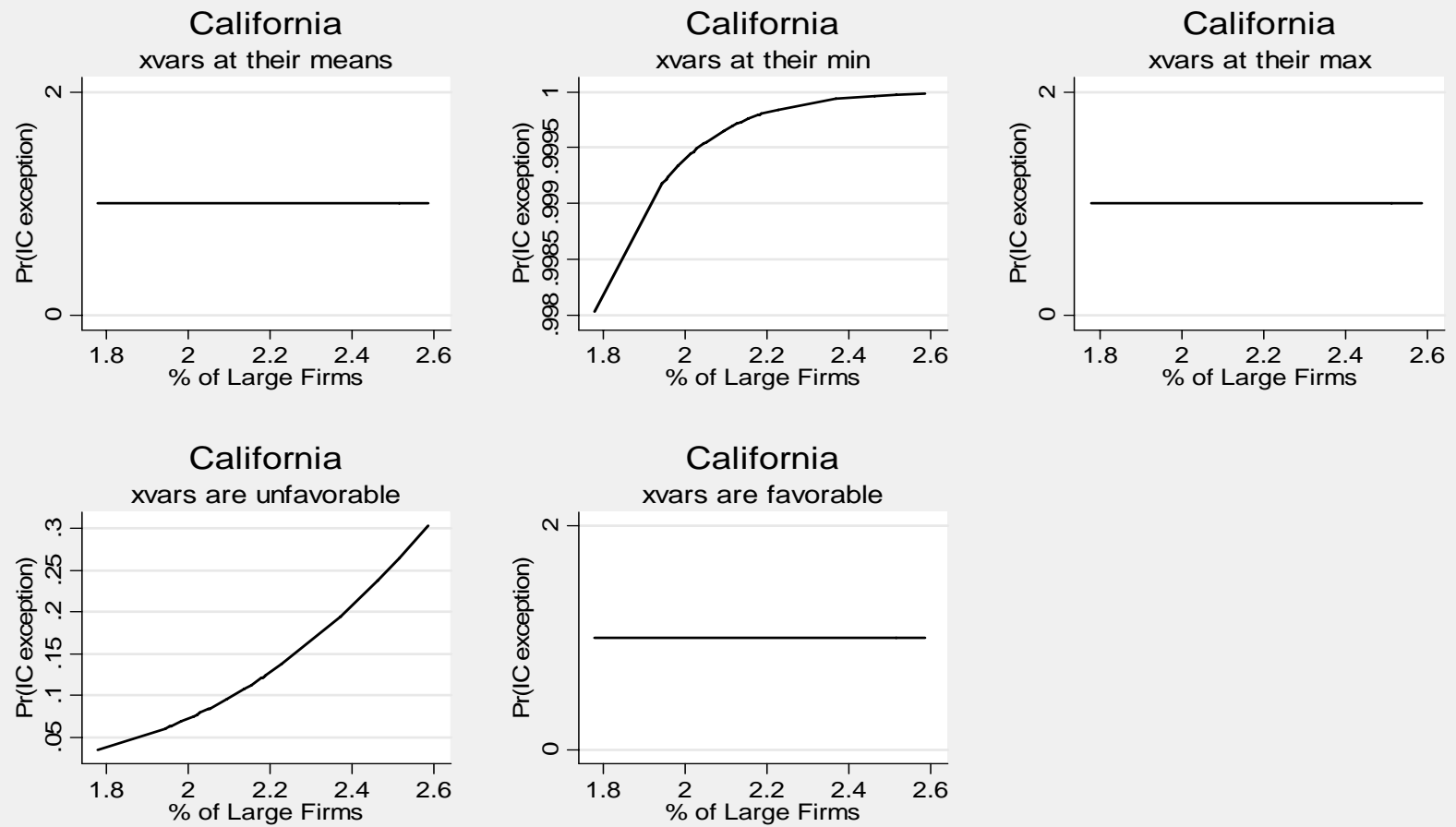


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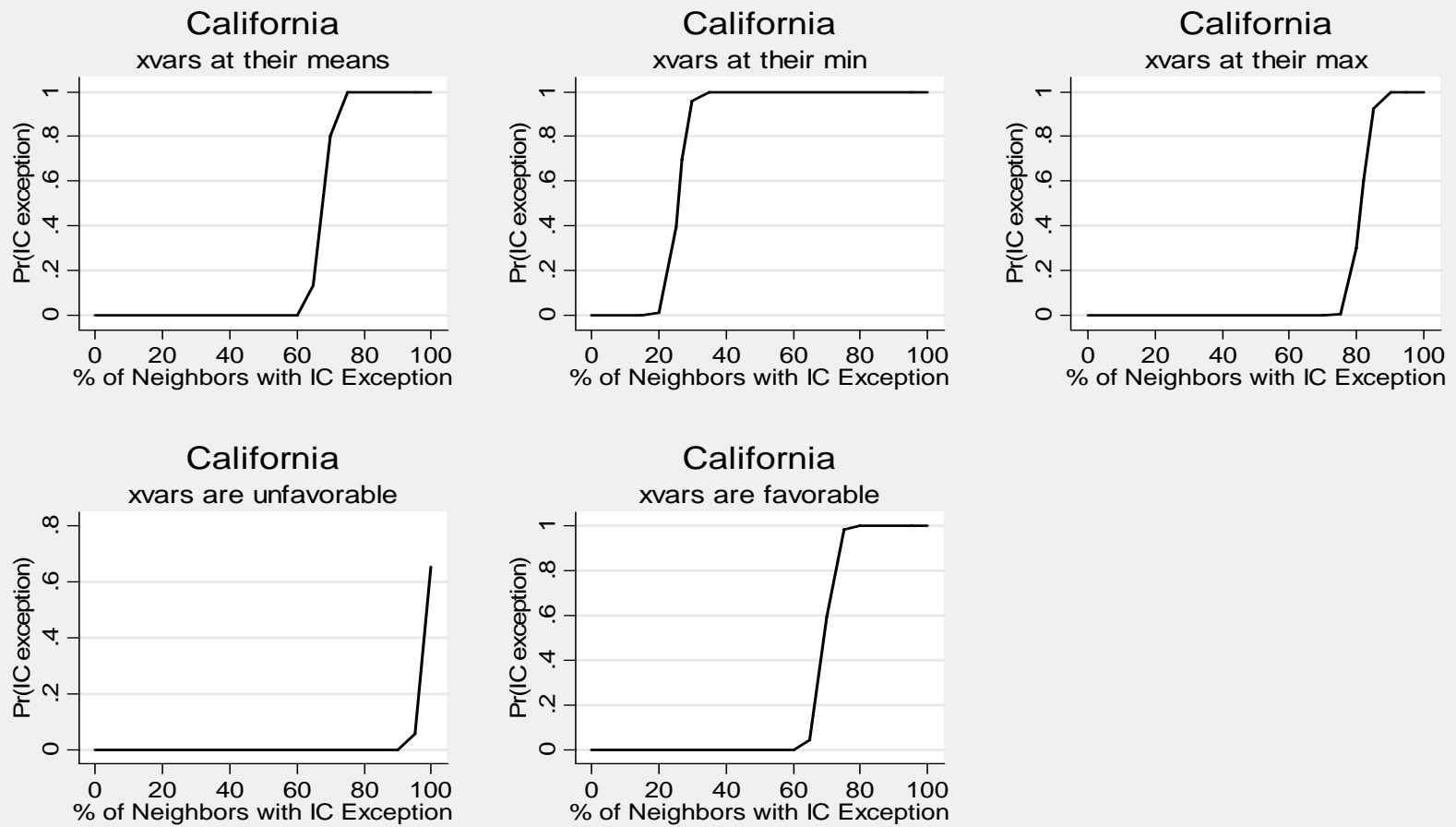


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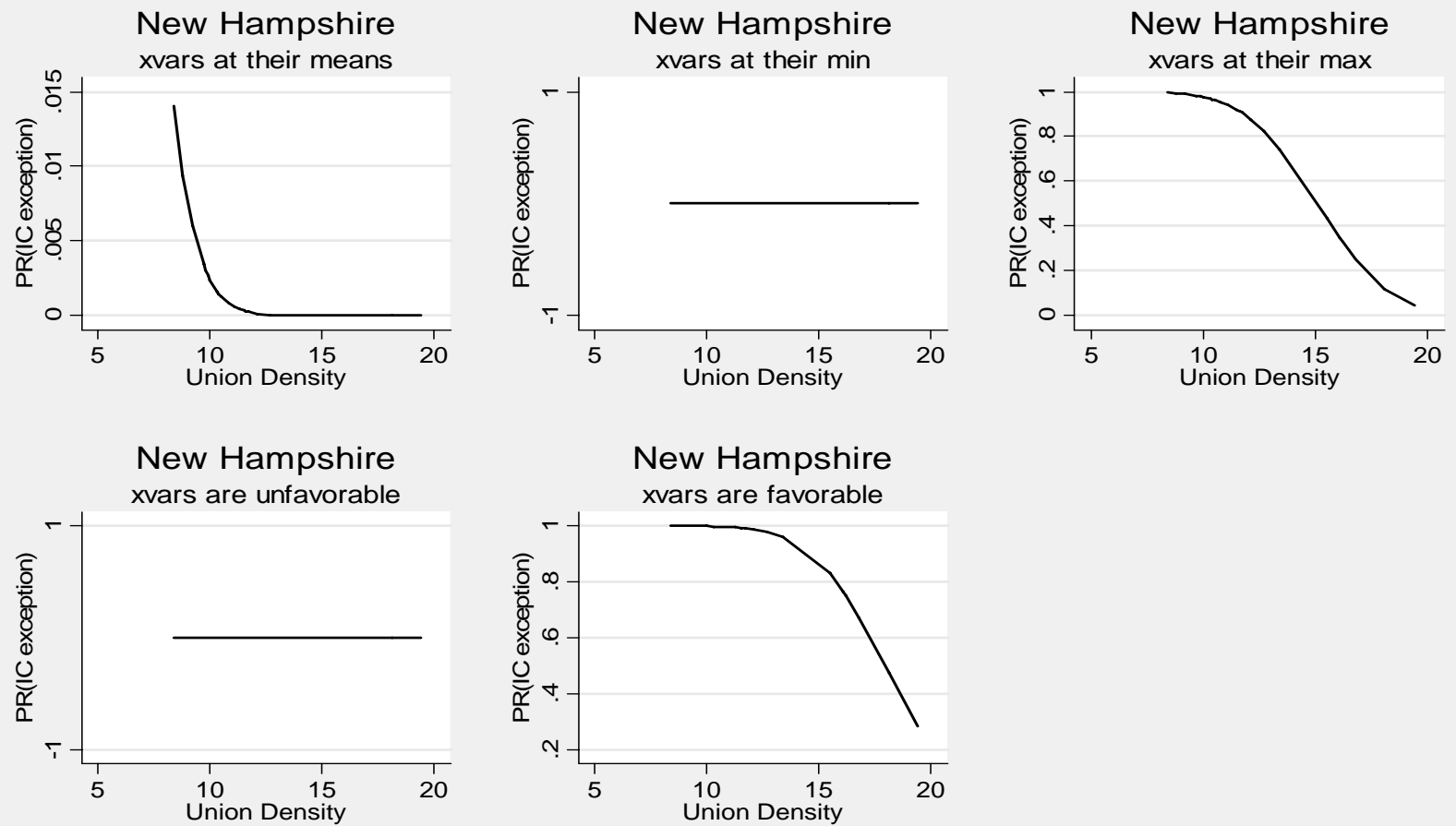


Figure A.3.17.

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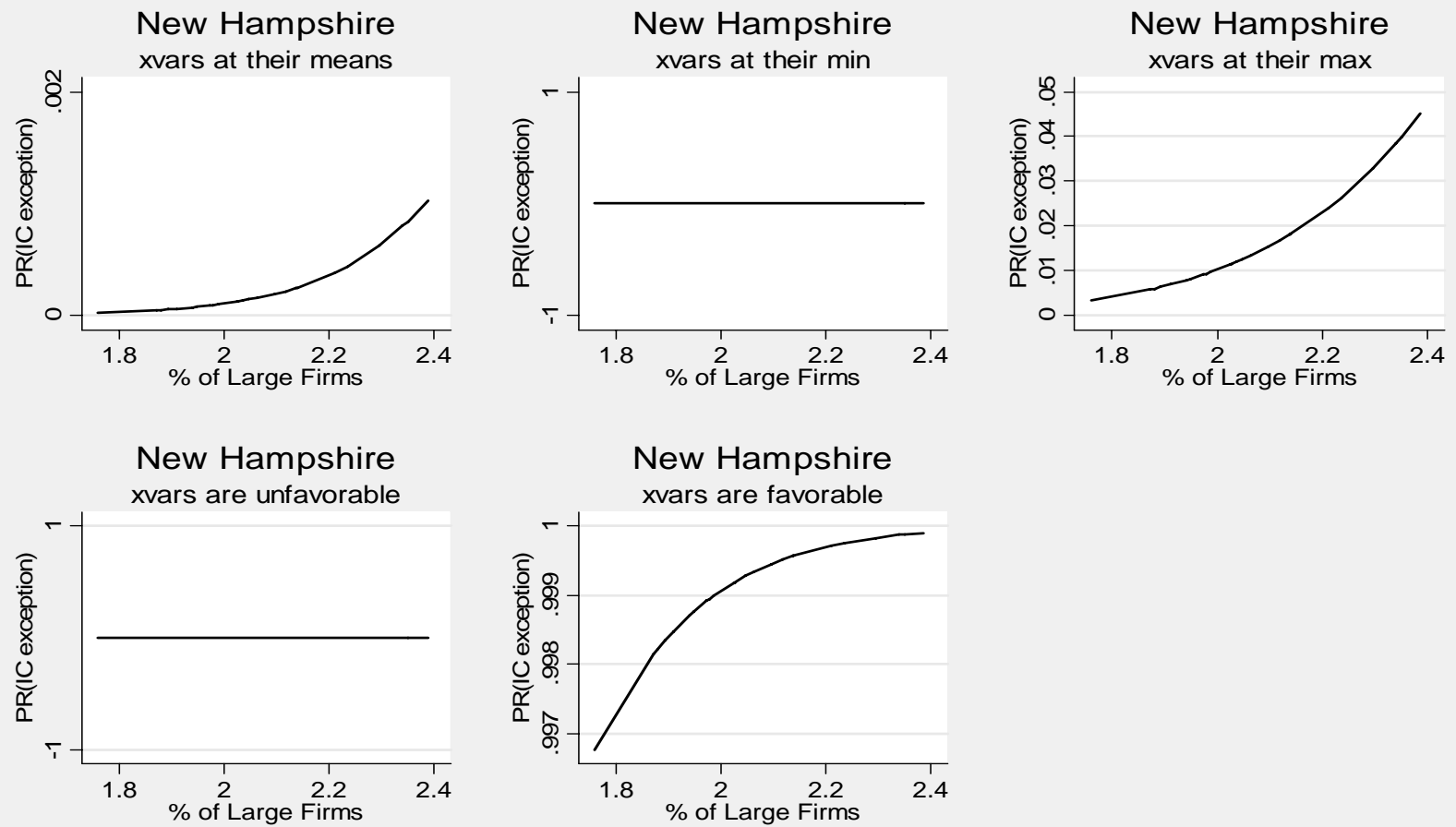


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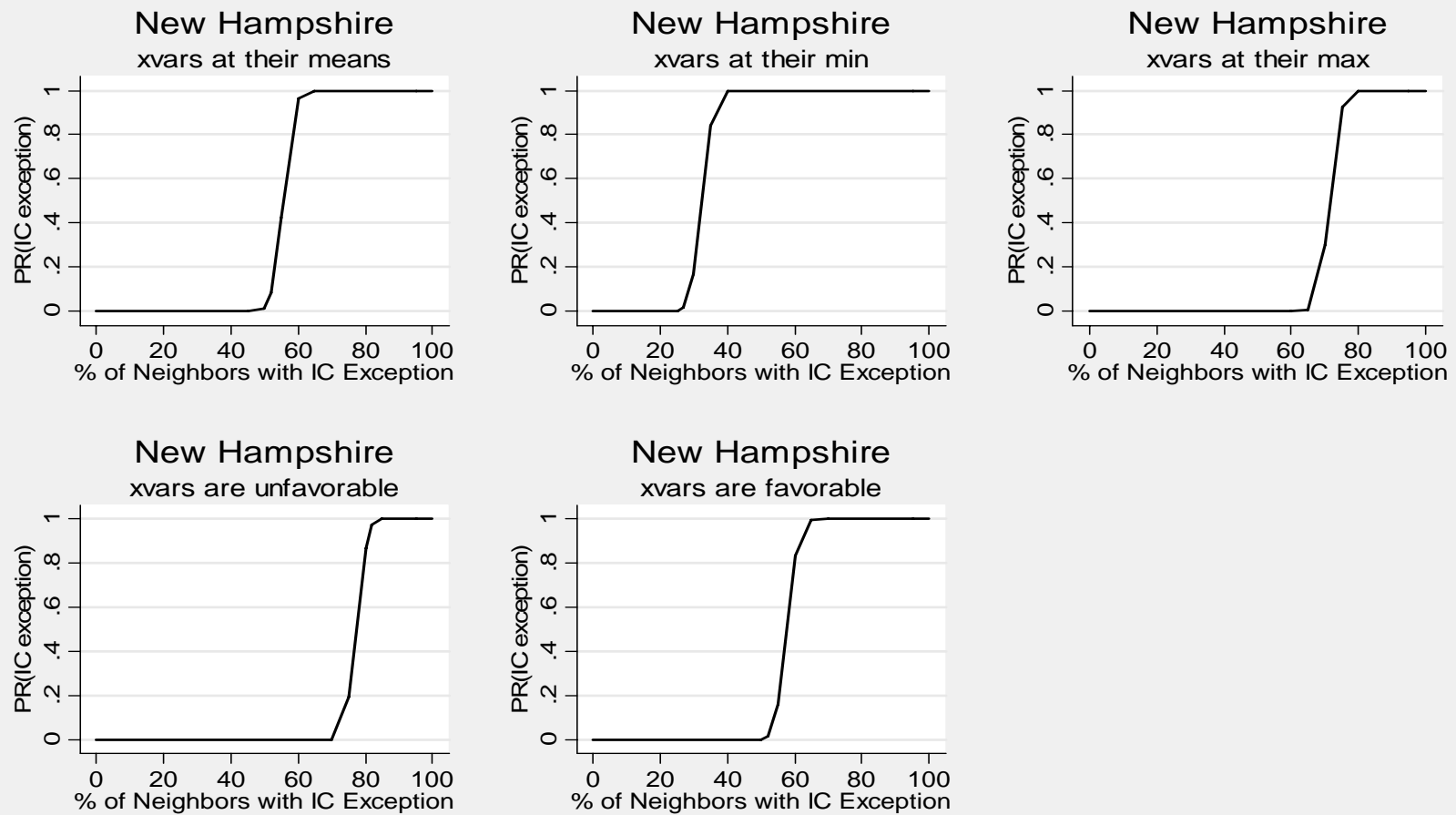


Figure A.3.19.

Figure A.3.20.

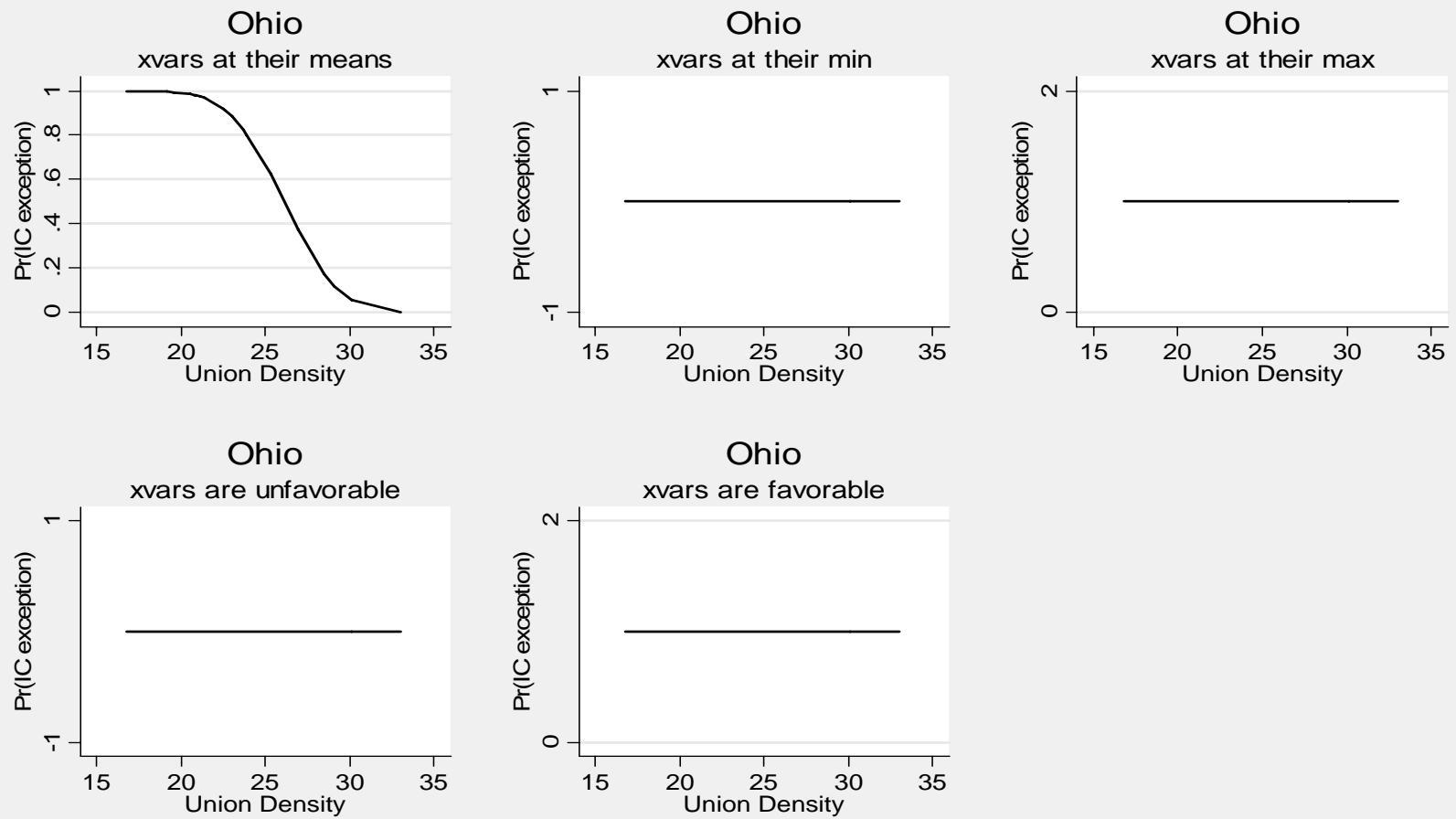


Figure A.3.20.

Figure A.3.21.

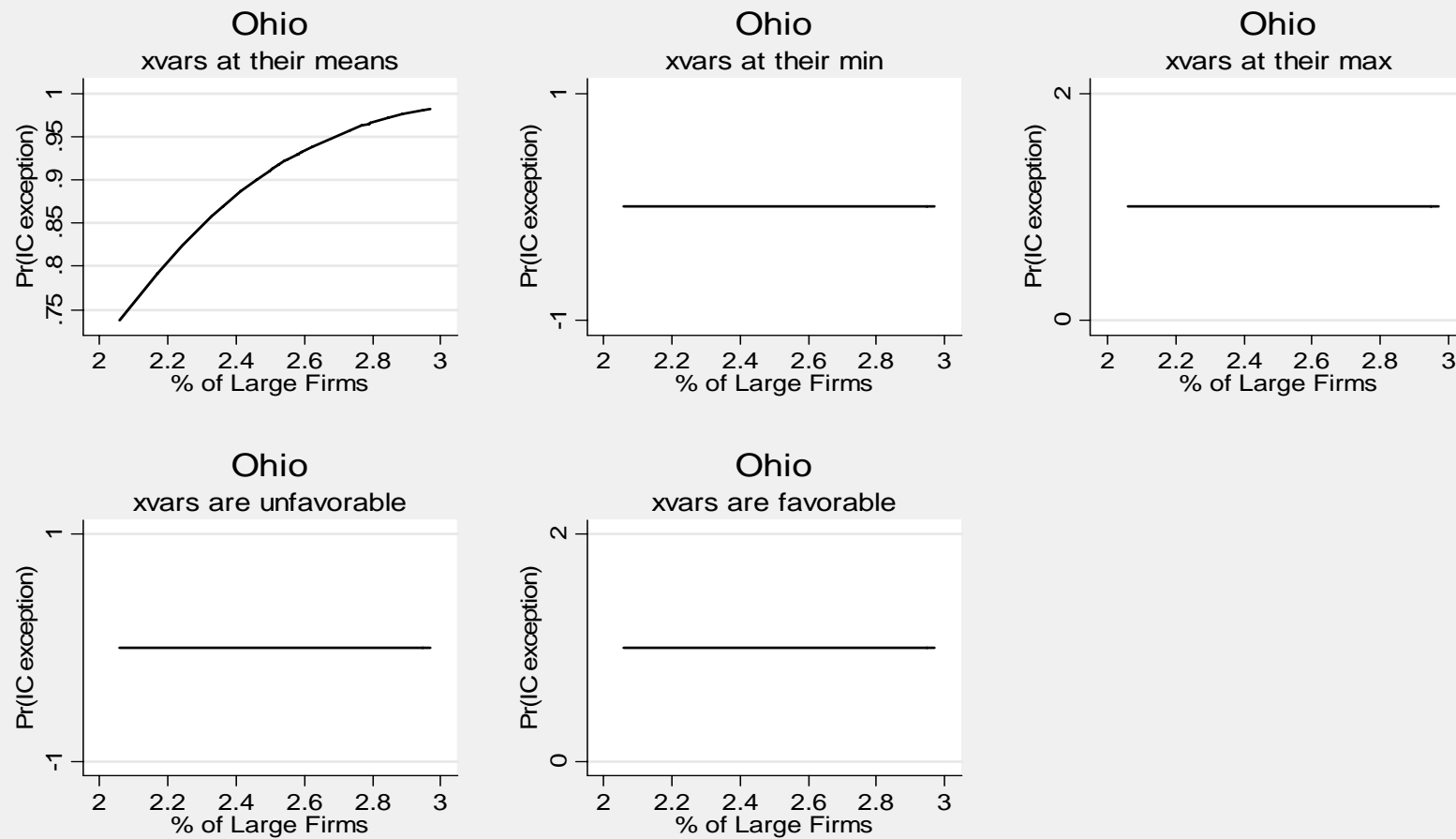


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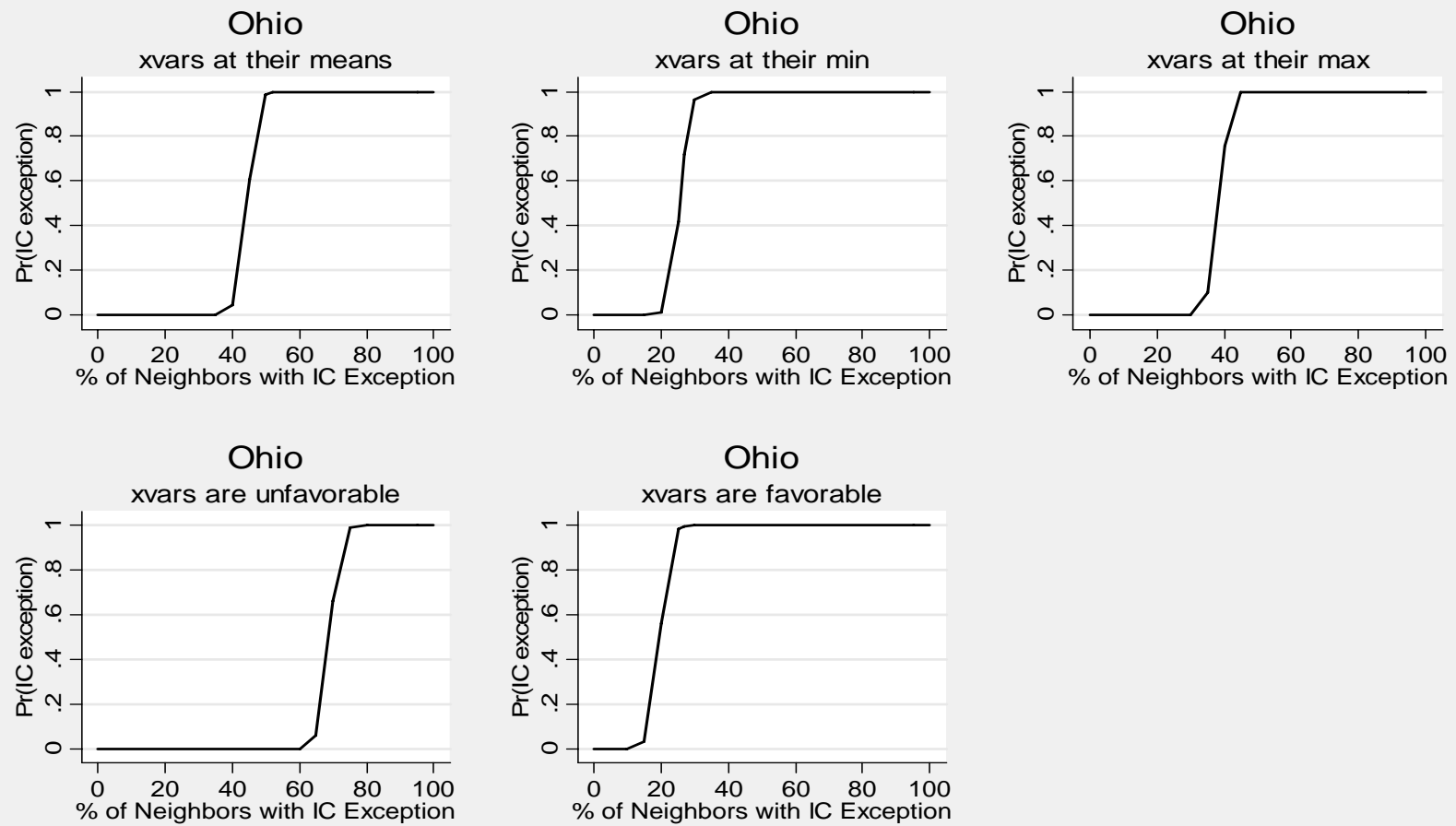


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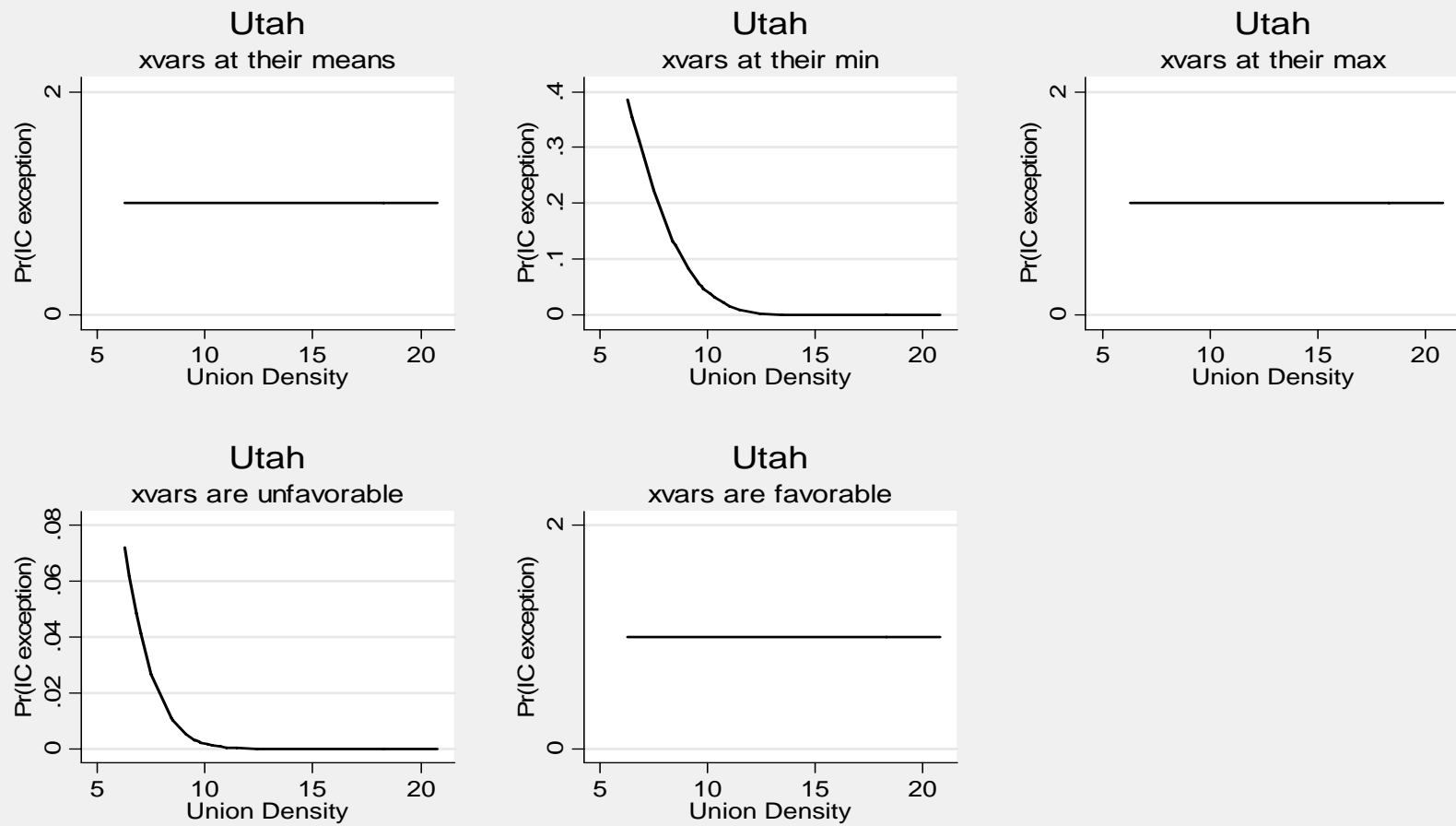


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Figure A.3.24.

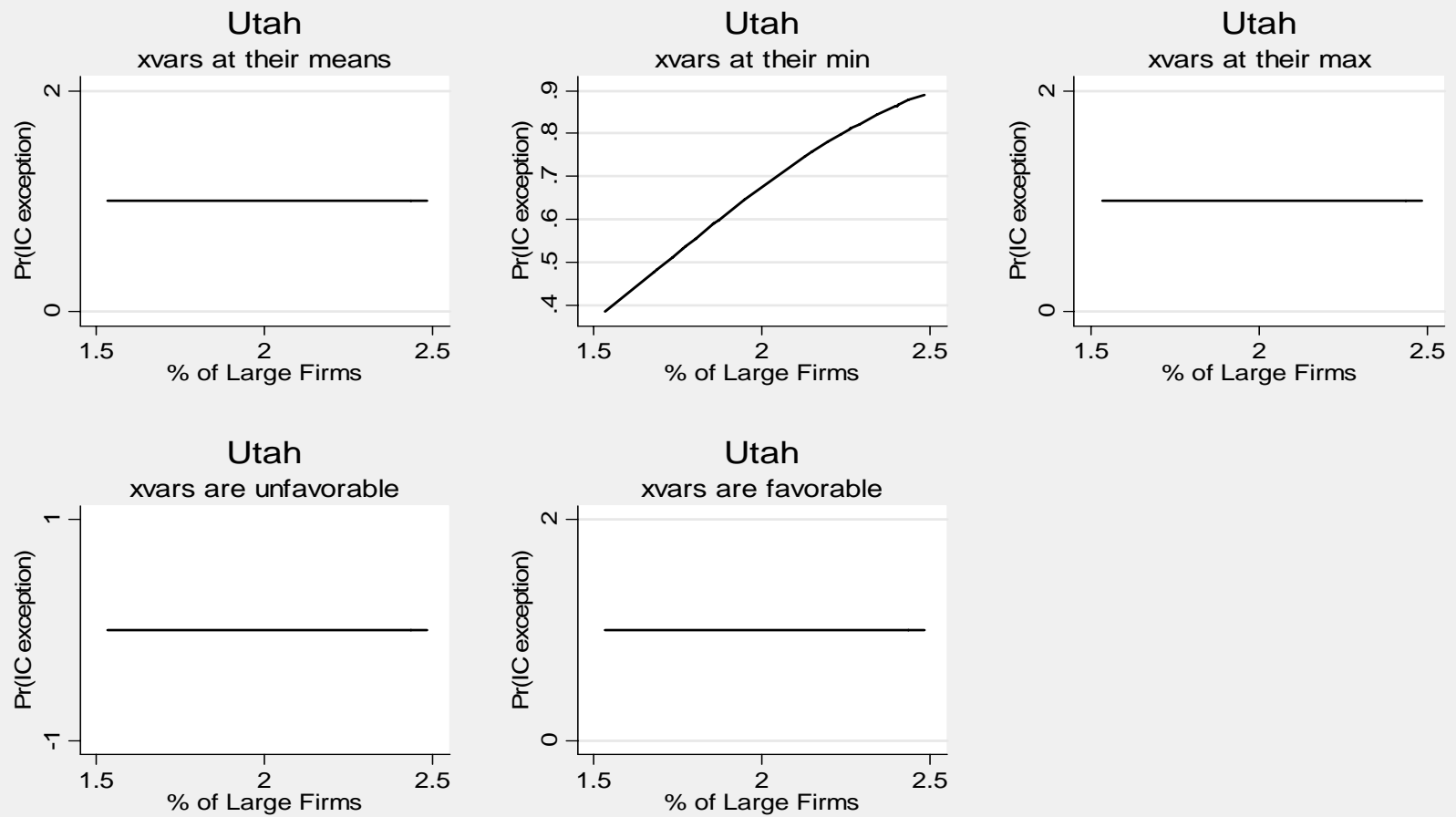


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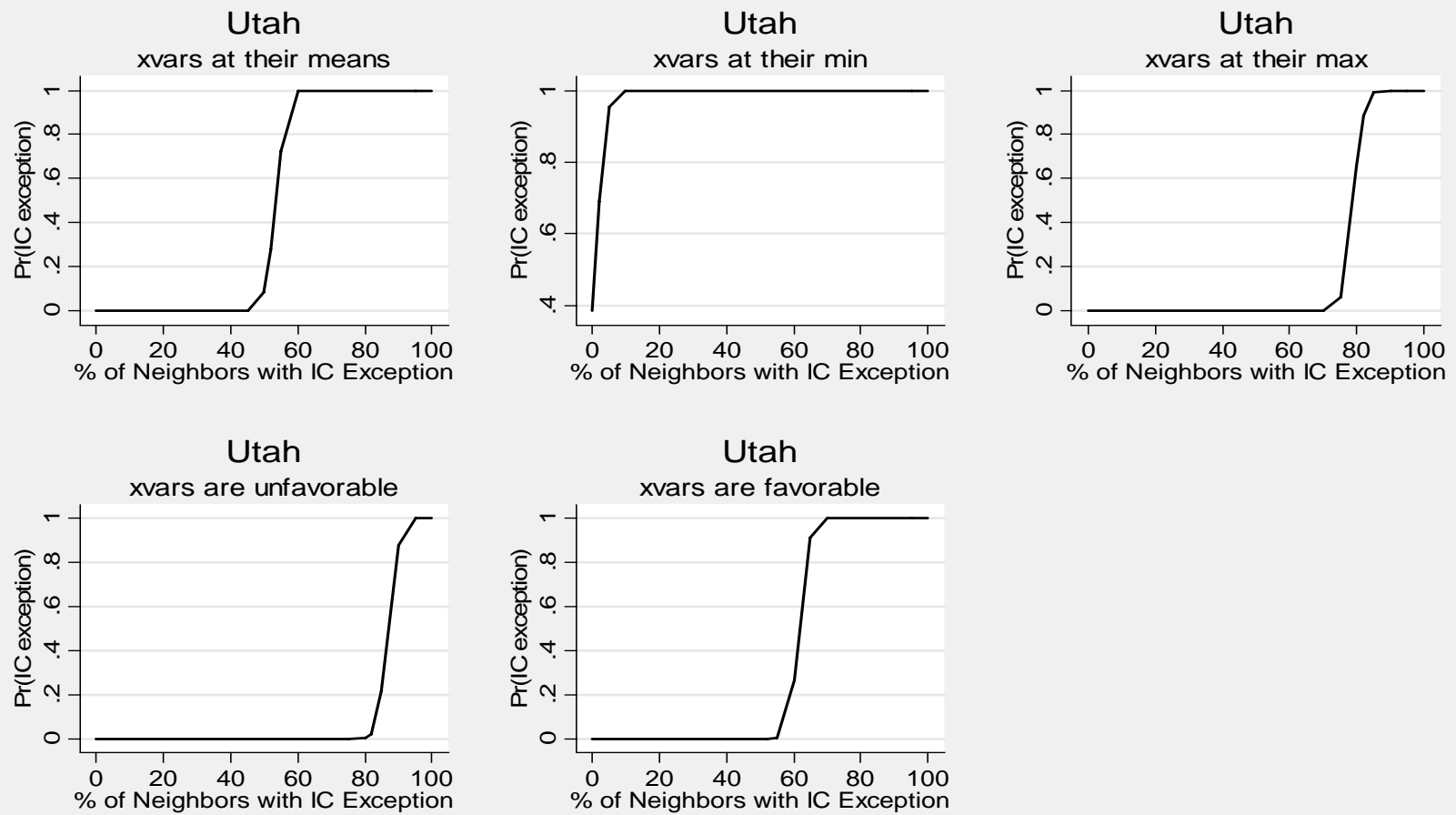


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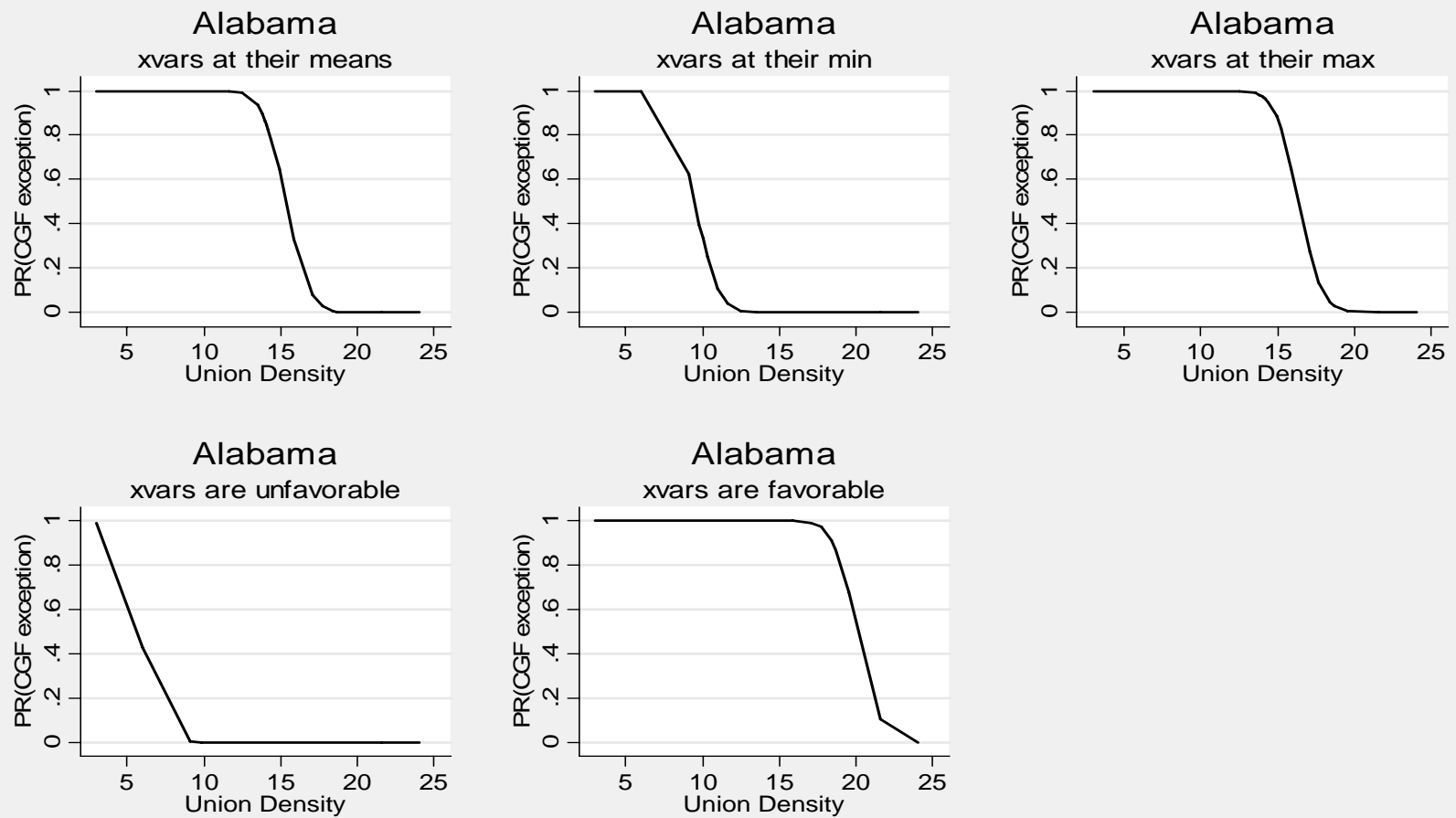


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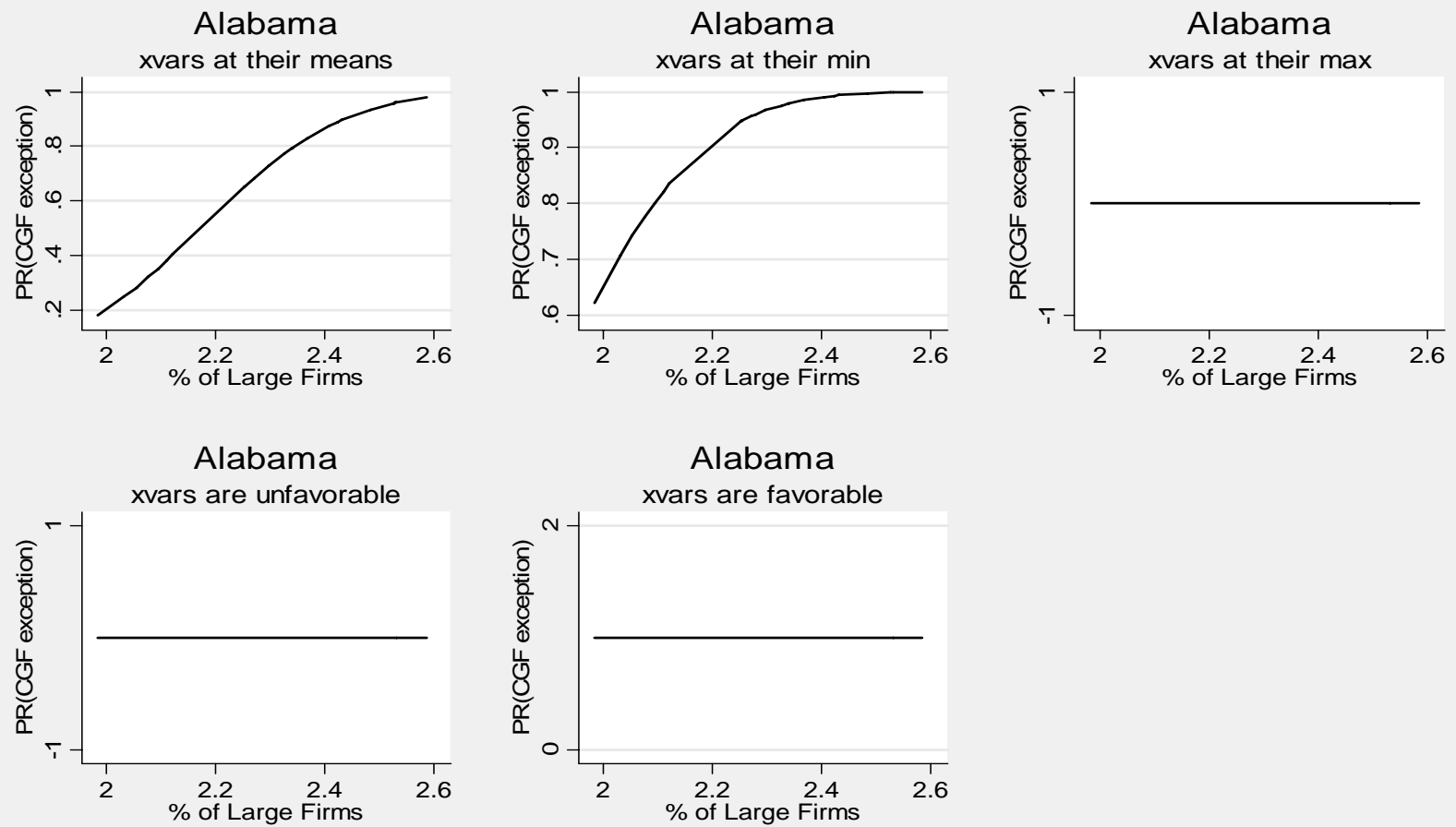


Figure A.3.27.

Figure A.3.28.

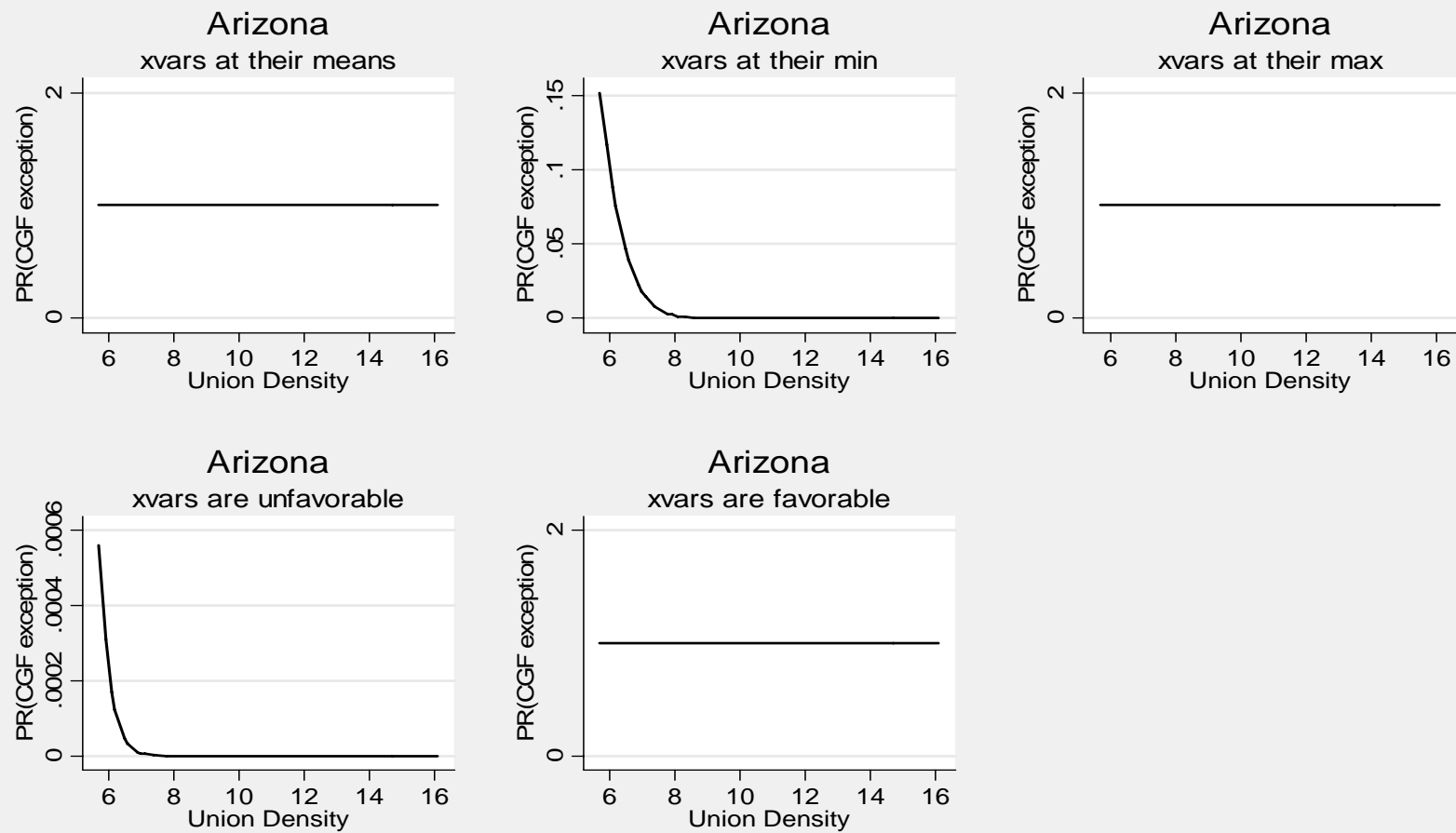


Figure A.3.28.

Figure A.3.29.

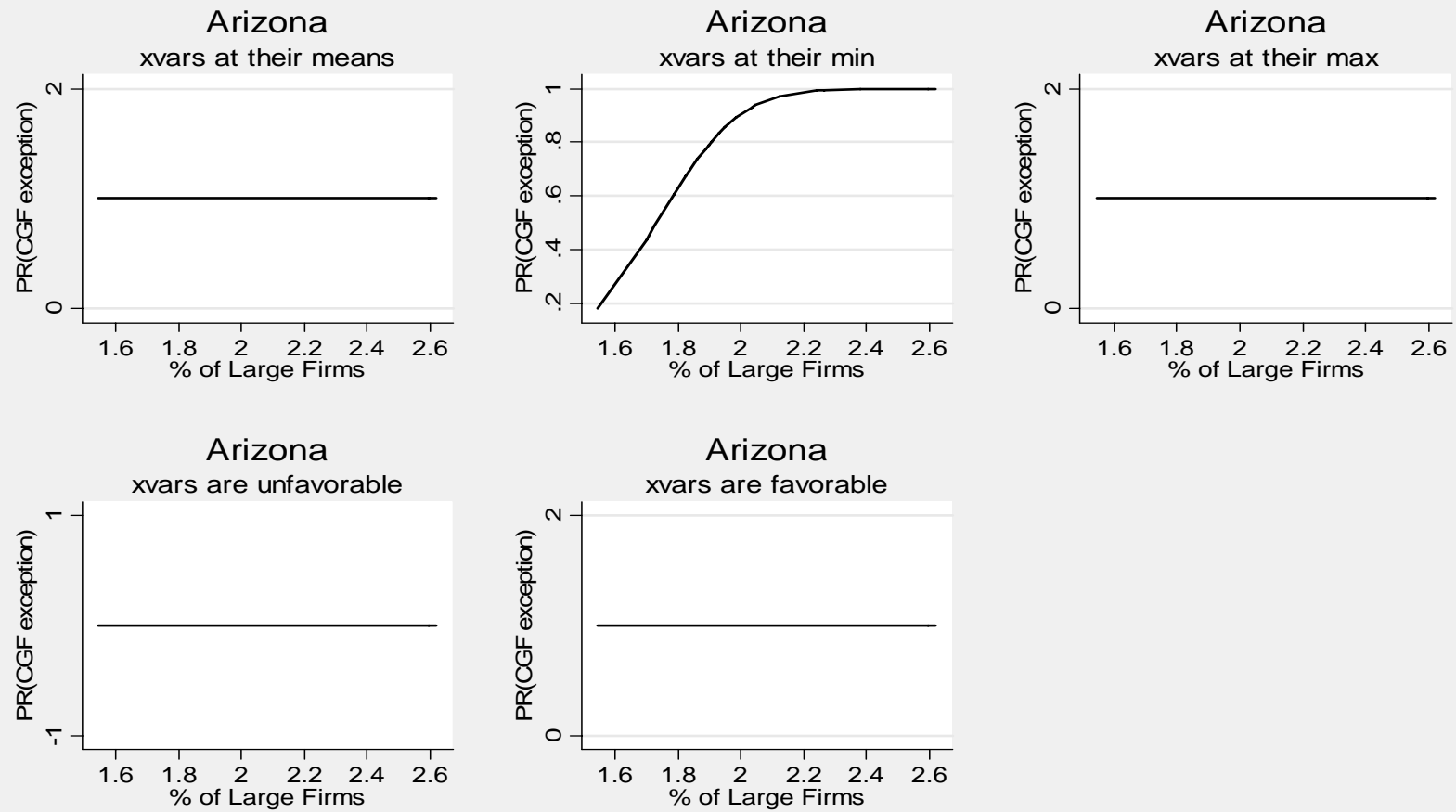


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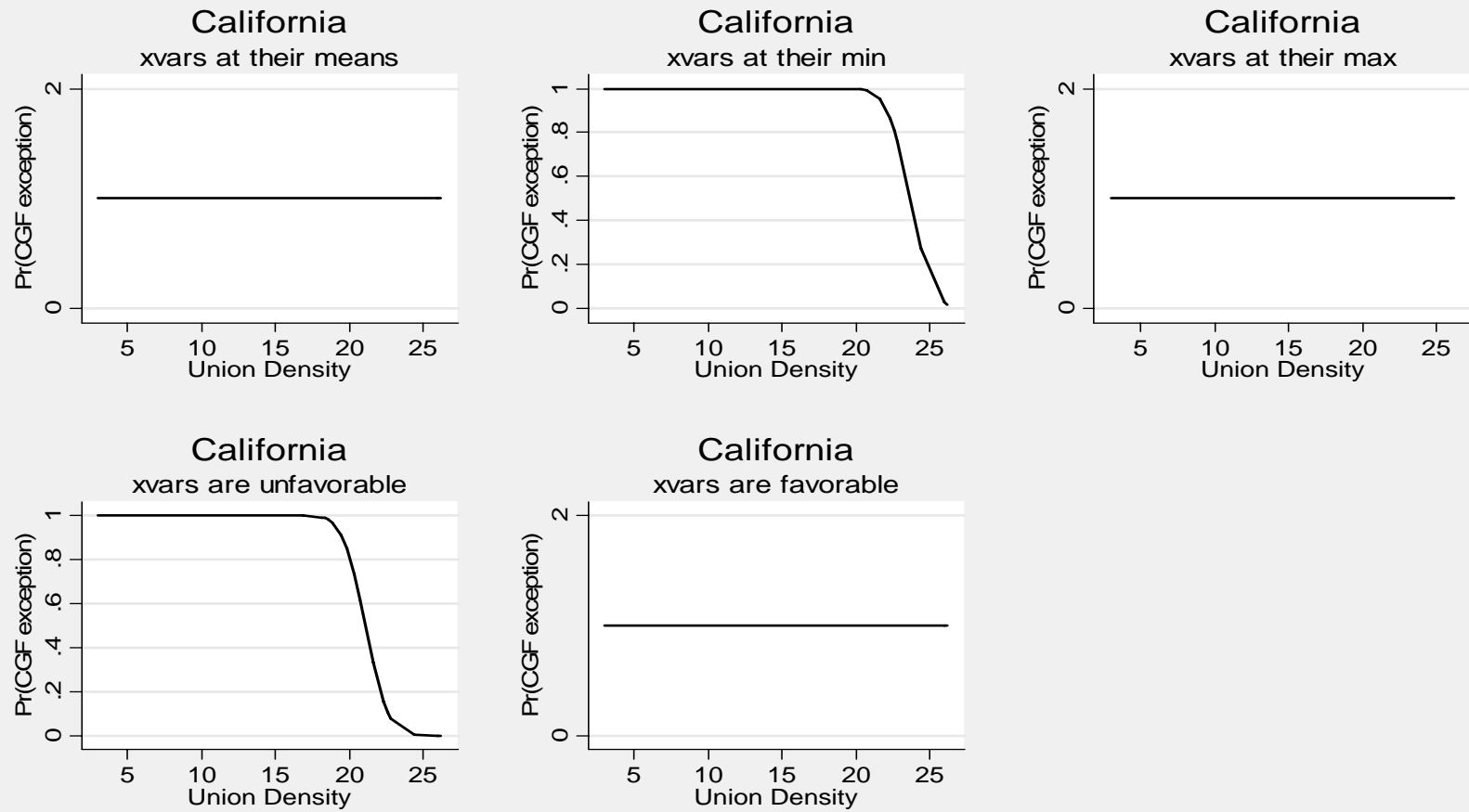


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Figure A.3.31.

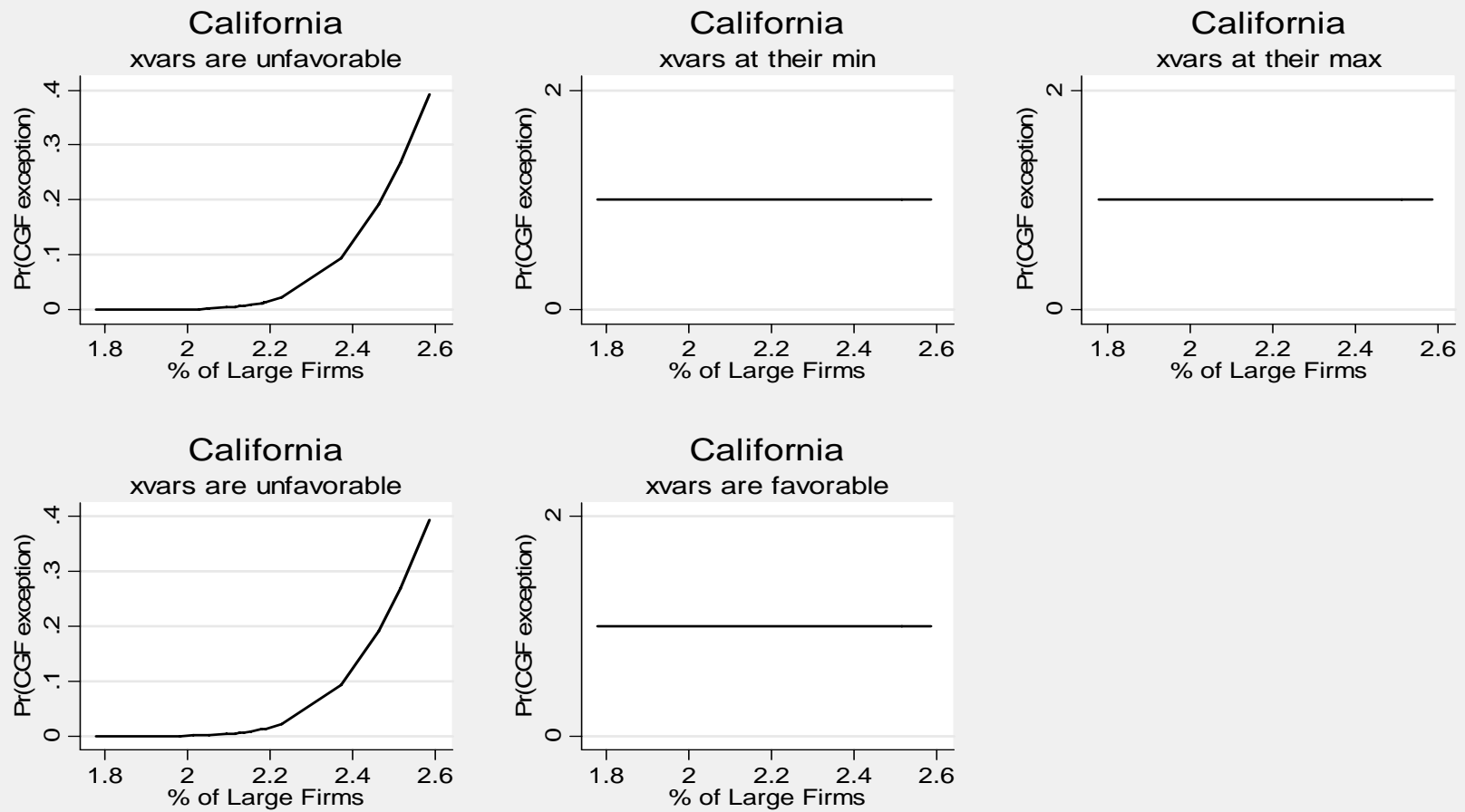


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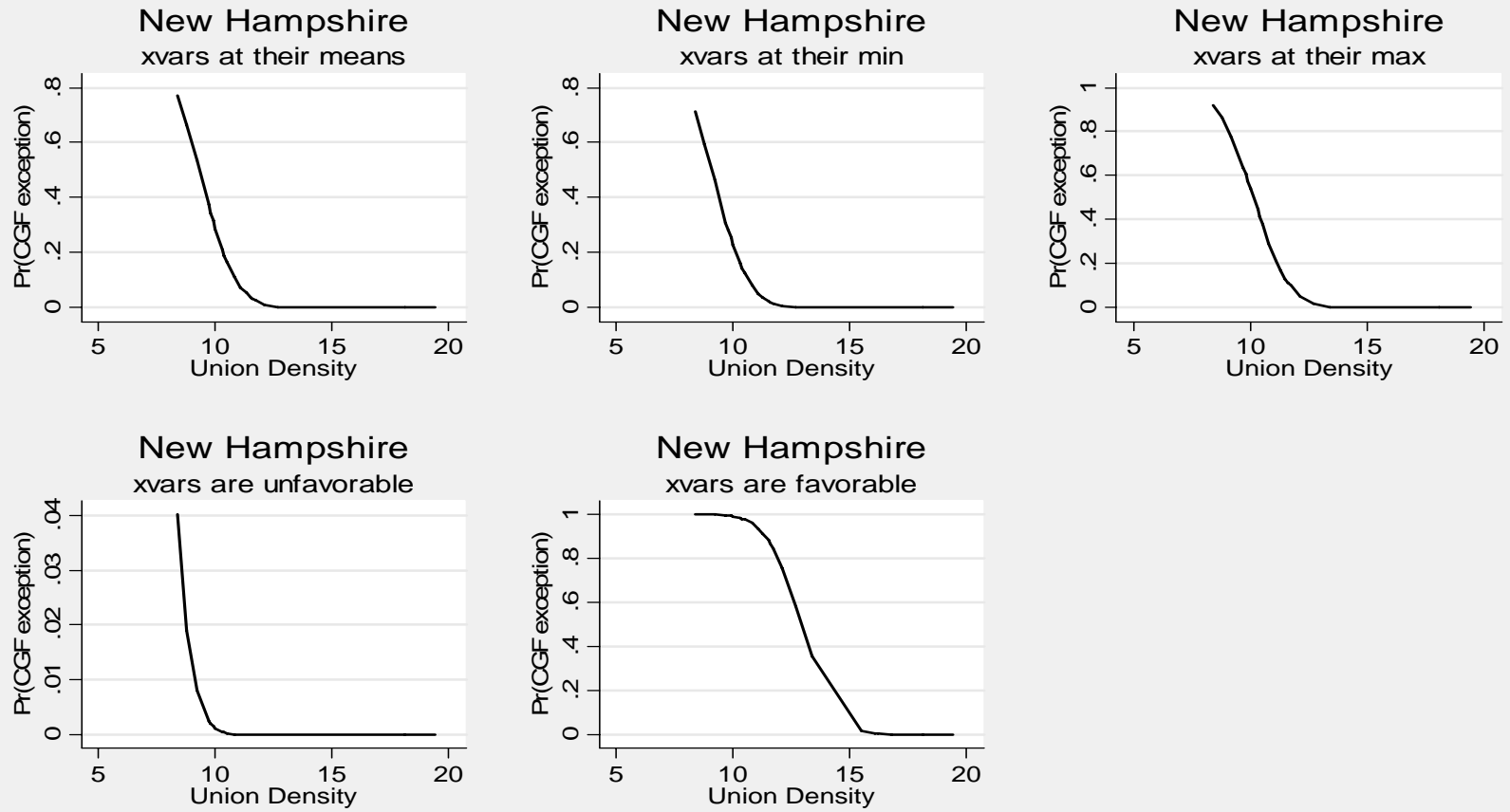


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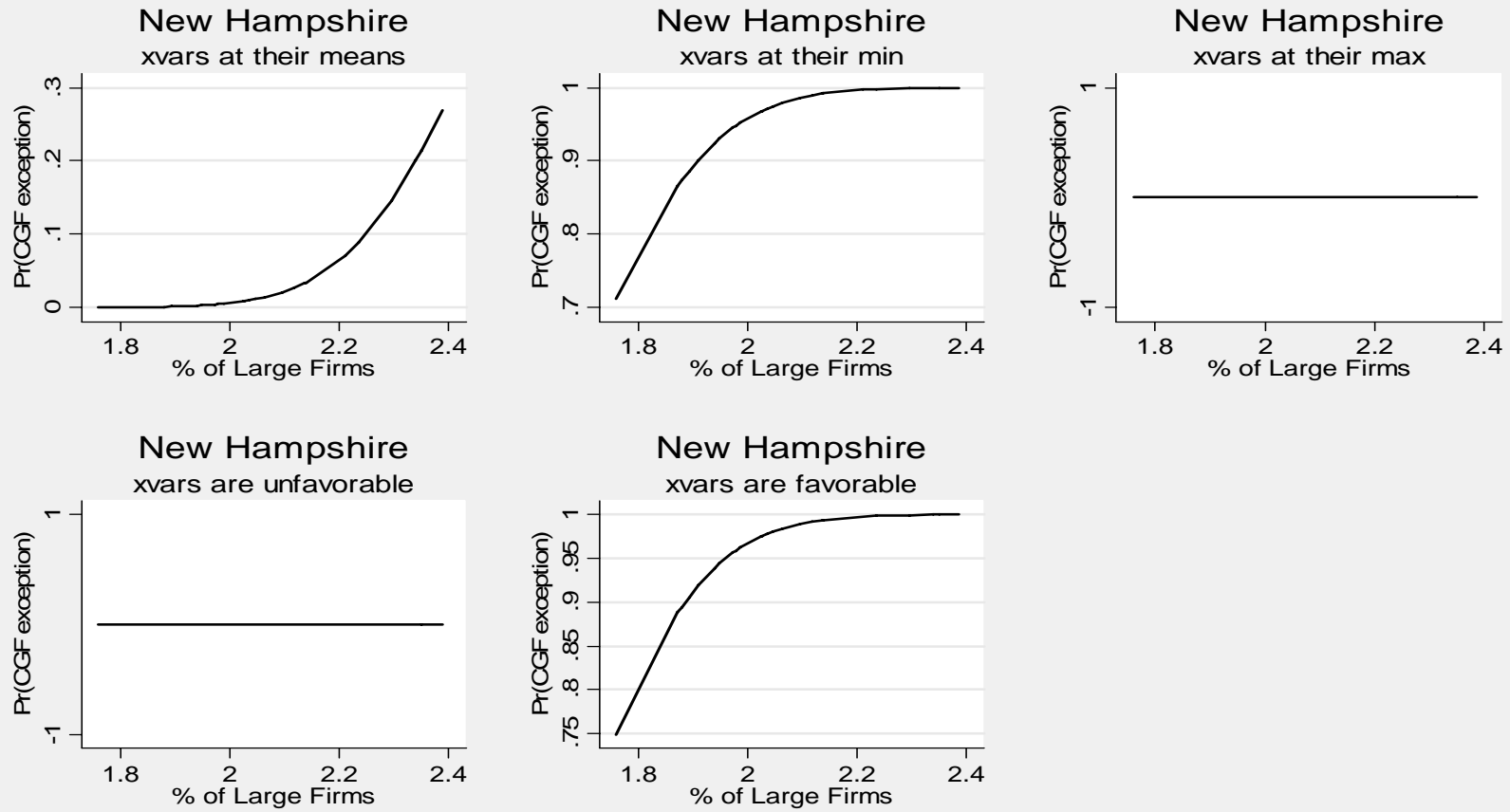


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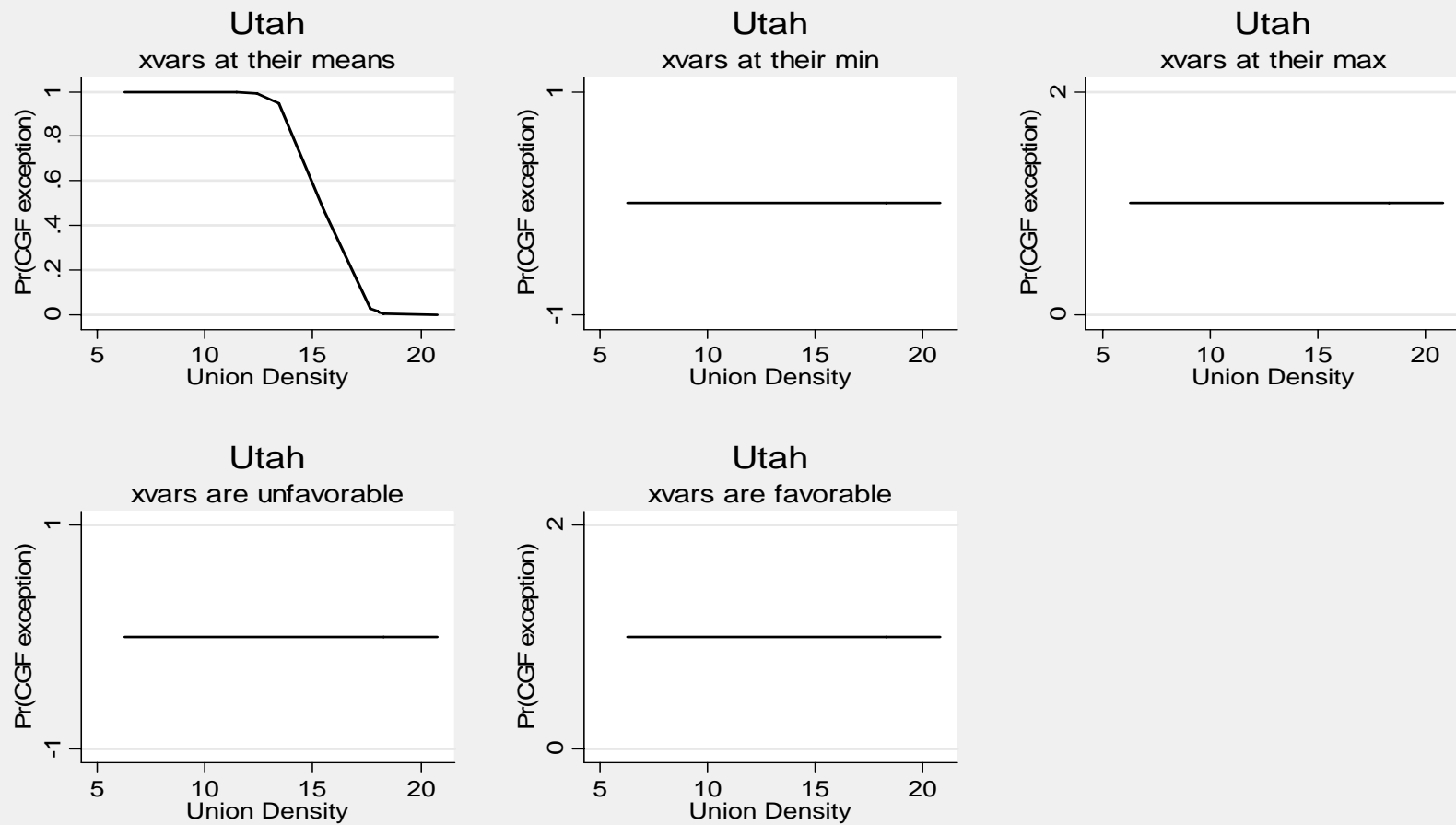


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Figure A.3.35.

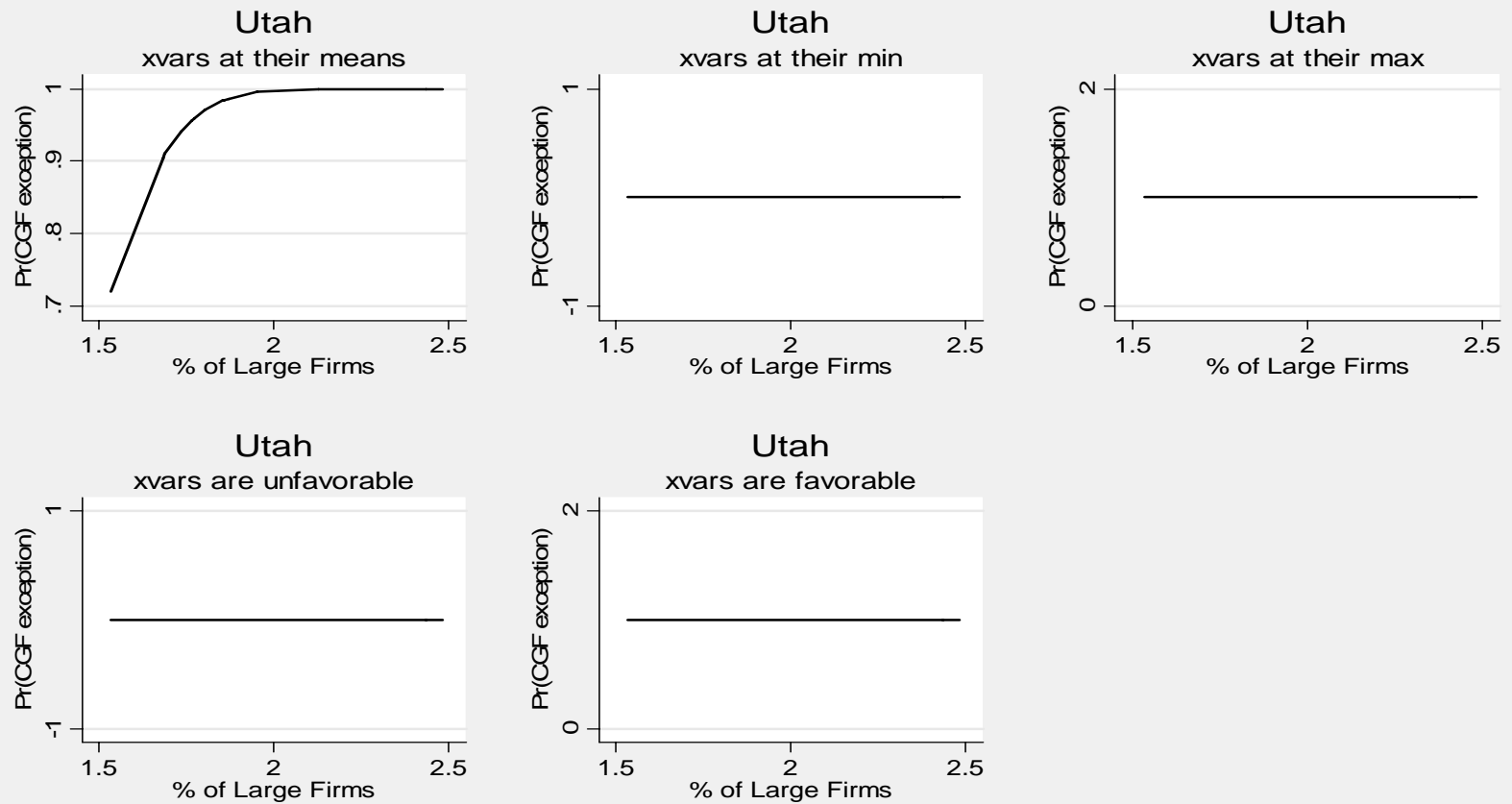


Figure A.3.35.

VITA

Christopher K. Coombs received his following degrees: Bachelor of Arts (1999) in economics from the University of North Florida, Jacksonville, Florida; Master of Science (2001) in economics from Louisiana State University A & M College. At Louisiana State University, he worked as a research assistant for M. Dek Terrell from 2000 to 2002. From 2002 to 2005, he worked as a teaching assistant lecturing in Principles of Microeconomics. Currently he is a candidate for the degree of Doctor of Philosophy at Louisiana State University, which will be awarded at the December, 2005 commencement.