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A renewed nurse market shortage hospital monopsony alive and well

Julia Lane

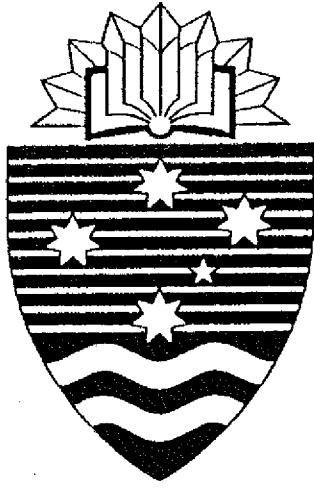
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"A Renewed Nurse Market Shortage Hospital
Monopsony Alive and Well"

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and
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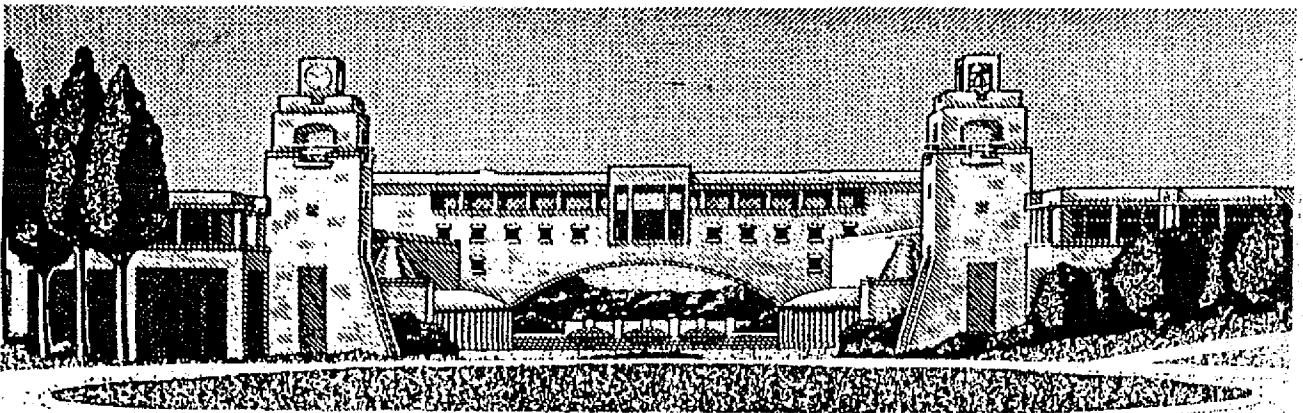
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B O N D U N I V E R S I T Y

A RENEWED NURSE MARKET SHORTAGE
HOSPITAL MONOPSONY ALIVE AND WELL?

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Bond University and
The American University

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Abstract

Participation in the nurse market is analyzed by developing a model which generates the discounted value of RN lifetime earnings. Nurse wages are compared with those for comparable females to develop a wage-based index which is considered a measure of hospital monopsony power. Hospital statistics and Current Population Survey data are used to test the model. Results suggest such a wage profile measure is superior to using current wage in supply equations. The measure of hospital labour market power appears to be a better indicator of monopsony than product market measures.

I. Introduction

The nationwide problem of a registered nurse (RN) shortage has attracted a great deal of political and professional interest in recent years. The extent of the problem in terms of hospital and nursing home vacancies is estimated as a shortfall of 500, 000 nurses by the turn of the century (Secretary's Commission Report 1988). Hospitals, which have been dealing with the problem of providing high quality care under restrained reimbursement, rising costs, and increased competition, now are faced with the issue of nurse staffing. Labour economists, in looking for explanations, have paid more attention to the model of hospital employment of nurses (Booton and Lan 1985; Link 1988).

The story has, however, become increasingly complex. While hospitals many have gained in earlier years from their nurse employment patterns of low entry wage, flat wage growth, and lack of career ladders, the real long term consequences are becoming evident. Although there is some lack of precision in estimating labour supply curves, it is difficult to deny the eventual outcome from the downward trends in nurse enrolment numbers. Nursing school administrators are faced with program closings and an acute concern over enrolments which have declined 28% from 1983 to 1987; it is estimated that in 1990 colleges will award more medical degrees than BSN nursing degrees (Secretary's Commission Report 1988). The more severe crunch in nursing is yet to come with these enrolment effects on supply.

Compounding this issue is the fact that while most other occupations have pushed for increased education and credentialing (on the basis of the need for higher quality), nursing has actually encouraged less education by accepting licensure from two and three year programs as equivalent to baccalaureate degrees. Students considering a career investment perceive a college degree in fields other than nursing will offer a better return. Ultimately, the hospitals' role in assisting in the retention of the three-tiered educational structure may be more damaging to the nursing profession than are the low wages.

There are two aspects to the nurse shortage problem. The first of these is the decision of qualified RNs to remain in the nurse labour market; the second is that of college students making the decision to become RNs. Both will be affected by current relative wages and expected future relative wages. This study analyzes the market power of hospitals over nurse wages and the extent to which wage factors influence the decision to be employed as an RN.

II. Monopsony and the Nurse Labour Market

The question of whether hospitals possess and practice monopsony control over professional nurses — and if so, to what degree — has been classic in labour economics. The analytics are straightforward: the hospital, as the dominant employer of nurses, faces an upward supply curve and uses the related marginal cost curve to determine the hiring level at its intersection with the demand curve. The resulting wage is less than the competitive market equilibrium wage, but the model allows the hospital to show budgeted vacancies and agitate for supply increases through the state hospital association. Wage increases are resisted on the grounds of a short run inelastic supply curve and a reluctance to upset the total labour budget (Eastaugh 1987). In general, the story has stopped there — as long as hospitals exert control over such a large proportion of nurse labour hours, females are able to enter nursing through a variety of programs, and nurses are unreceptive to unionization from offsetting this pattern, nothing much can be added.

The research examining hospitals acting as monopsonists in professional nursing employment has not produced conclusive results. The traditional model of monopsony shows hospitals paying nurses a wage lower than the value of their contribution and hiring fewer than the competitive model would

predict. The absence of a wage premium for nurses with higher levels of education is an additional non-competitive feature of this market. The existence of monopsony capability has been empirically documented. Sloan and Elnicki's (1979) work suggests monopsony and Hurd's (1973) earlier research showing a negative relationship between hospital concentration and nurse wages led him to conclude this power exists.

The complexity of whether the nurse wage pattern indicates hospitals do not support changes in nurse licensure (Mennemeyer and Gaumer 1983) or whether it is a manifestation of monopsony power (Booton and Land 1985) has not been totally resolved by research. Link's (1988) recent results show a clearly decreased return to additional education for nurses employed in a hospital; a finding he notes as consistent with, but not proof of, monopsony power being used in the RN labour market. His results are similar to those of Booton and Land (1985) regarding hospital exertion of monopsony power and lower rates to the four year degree nurse.

Evidence reported from various surveys indicates monopsony-like outcomes for nurses. Results of a University of Texas survey of nurses showed the rate of increase for staff nurse pay had actually declined in spite of reported shortages (American Journal of Nursing 1988). The American Hospital Association's survey of hospital personnel shows there is little incentive given for nurses to earn an additional degree. Only 20 percent of hospitals reported a differential for a baccalaureate nursing degree, and this was only 4 percent, or 28 cents per hour (Young 1988). Aiken and Blendon (1981) document the hospital pattern regarding nurse employment and wages, noting that this behaviour does not spill over to other hospital workers who are less vulnerable to single employer dominance since they have other options.

Although the theory of monopsony clearly indicates that both wages and employment will be below a competitive equilibrium, and the evidence summarized above is indeed couched in such terms, little academic work has explicitly incorporated a measure of hospital labour market power in an analytical framework. Most previous studies have included a measure of product market power as an explanatory variable. This has the obvious failing that while product market power does provide the potential for labour market power, the latter can only exist if labour supply is unresponsive to wage changes. A compelling argument for the presence of nurse shortages, however, is that women are

now finding alternative employment opportunities and, hence, have reduced their participation in the relatively poorly paid nurse labour market.

III Methodology and Data

This study is concerned with the female labour supply response to hospital market structure from 1984 to 1988. This period follows implementation of Diagnostic Related Groups (DRGs) which increased cost efficiency pressure on the hospital sector. The focus of the study is on the decision of women to participate in the labour market as an RN, since the major complaint on the part of hospitals is not that nurses offer insufficient hours, but rather that there are not enough nurses available. Central to this focus is development of a wage-based index of labour market power and analysis of the responsiveness of nurse labour market participation to this index.

The approach is intended to provide a first pass at a potentially rich field of endeavour by using a wage-based measure of monopsony power similar to a Lerner Index, rather than either estimating vacancy rates or using an historical product market measure, such as a concentration ratio. Thus, as estimate of the opportunity cost earnings of an RN, or the earnings potential in competitive markets, is compared to that actually paid. This index is a measure of monopsony exploitation, just as the Lerner Index is a measure of market power.

The use of such a measure has a number of advantages. The index provides a direct estimate of labour market power, rather than a proxy, such as product market power. It obviates the need to estimate the excess of quantity demanded over quantity supplied, for which data may not be available or may be of poor quality. Further more, it directly addresses a probable cause of the nurse shortage in the 1980s - the likelihood that alternative employment opportunities have expanded, increasing the elasticity of supply of labour, and increasing the wage gap between nursing and comparable occupations in the absence of hospital wage flexibility.

In keeping with this, then, we develop a wage index. This approach, while new to the study of nurse labour markets, has been used in the study of occupational choice. Berger (1988), for example, estimates conditional logit models which incorporate alternative predicted future earnings measures

in his analysis of the choice of a college major. Murnane and Olsen (1990) find that teachers with high opportunity costs. The index generated in this study is similar in that it compares the present discounted value of lifetime earnings of an RN with the present discounted value of lifetime earnings in an alternative, competitive position.

Data for testing the model are for the 42 most populous cities, and are available in the American Hospital Association's "Hospital Statistics" and "Guide to the Health Care Field," selected years; Statistical Abstract of the US; and the March supplement of the Current Population Surveys, 1981-1988. All female RNs from the CPS data were included in the study, but due to space and time limitations, only a randomly selected subset of 20% of females who were not RNs was used. Only females who had completed high school were included in the data set.

IV Model Development

The model developed uses a standard, albeit nonlinear, reduced form earnings equation combined simultaneously with the decision to participate in the labour market as an RN. The model endogenously generates the present discounted value of lifetime earnings for the RN and compares that to the opportunity cost lifetime earnings. This ratio is the index (WAGEIND), which is used as an independent variable in the nurse participation equation.

Since the approach used in this study is to analyze nurse labour supply, which is heavily dominated, the model is also developed in the tradition of Hanoch (1980) insofar as it incorporates the inverse Mills ratio to control for sample selection bias. Specifically, the decision to participate is modelled as discussed below, and an inverse Mills ratio (MILLS1) is constructed and used as an independent variable in the subsequent analysis. Since the inverse Mills ratio itself will vary by respondent age, the derivative of the ratio with respect to age is included in the generation of WAGEIND.

The decision to participate in the labour force should be affected by labour demand variables, such as region (NE, NC, SOUTH), education (COLL2 and COLL4), race (WHITE), and age (AGE). Labour supply variables are clearly also important, and include a measure of non-labour income (OTINC),

whether the female is in a household with the husband present (HUSHOME), and the age gap between the oldest and youngest child (KIDGAP). The variables are defined in more detail in the appendix. The model is estimated using logistic regression techniques and the results are reported in Table 1. The results will not be discussed in details, as they are consistent with the literature.

TABLE 1
Labour Force Participation

Variable	Parameter Estimate	T-Statistic
HUSBHOME	-0.30	18.87
OTINC	-0.001	3.19
AGE	-0.002	3.48
COLL2	.33	17.72
COLL 4	.57	31.92
NE	-.04	2.25
NC	.03	1.69
SOUTH	.05	2.55
WHITE	.18	9.52
KIDGAP	-.03	13.80

Number employed: 27, 293

Total sample: 35, 530

The model above enables the inverse Mills ratio to be constructed. It is then included in the earnings and RN participation models developed in the second part of the analysis. The specification of the reduced form earnings equation is relatively standard, incorporating labour demand factors such as WHITE, COLL2, COLLA, NE, NC, SOUTH, AGE and AGESQ (age squared) and the industry in which the worker is employed (MAN, TCPU, WRT, and SER). Labour supply factors such as HUSBHOME, KID3, KIDGAP, OTINC, and MILLS were also included. The effect on earnings of being an RN was incorporated both directly and interactively with the age variables (AGE, AGESQ) and hospital employment (HOSP).

The earnings measure used in the log of annual wage and salary income (LWSY). The reason for choosing an annual, rather than a weekly or hourly measure is that the nurse labour market is relatively flexible in terms of hours worked per week, and the annual measure captures that dimension more readily than the alternatives, as shown by Heckman (1979). The reason for the choice

of a reduced form rather than a structural estimate of opportunity cost earnings is that the former is what is observed by labour market participants. In other words, the foregone earnings of which the nurse is aware are those which are realized in the marketplace by women of similar background and skills.

The decision to participate in the labour market as an RN was modelled as a function of HUSBHOME, OTINC, KIDGAP, COLL2, COLL4, RNLY (whether the individual was employed as an RN last year), NHOSP (number of hospitals in the city), and WAGEIND. The WAGEIND variable was created simultaneously within the model, and is expressed as a ratio of actual to opportunity cost wages. More specifically, the structure of the estimated model may be specified as follows:

$$\log (WSY) = f(Z1, RN*X, RN),$$

$$RN = g(Z2, WAGEIND)$$

$$WAGEIND = \sum (\widehat{WSY}_i / (1+r)^i) / \sum \widehat{WSY}_i / (1+r)^i,$$

$$\widehat{WSY}_i = \exp (f(Z1, RN*X, RN)) \quad i = \text{age} \dots 65$$

$$\widehat{WSY}_i = \exp (f(Z1)) \quad i = \text{age} \dots 65;$$

where Z1 are the variables listed above, X are those variables which are interacted with RN, and the estimates for earnings (WSY) over different ages are generated by allowing the age variables to vary as indicated.

The results, which are presented in Table 2, are consistent with standard economic theory. Of particular interest, however, are these generated as a result of those interactions with the RN variable. Although the effect of age on earnings is positive for the entire data set, when it is interacted with RN it becomes negative. This corroborates earlier evidence that the earnings profile for nurses tends to be flatter than that for other occupations, and supports the use of a lifetime wage index to analyze nurse supply behaviour. There does appear to be a premium on being a hospital nurse, although much of this may be due to wage differential which compensates for less pleasant work, and more overtime and shift work.

TABLE 2
Earnings and Participation Equations

	Variable	Earnings	RN Participation	
MAN	.162	(4.28)*		
TCPU	.379	(7363)*		
WRT	-.204	(-6.15)*		
SER	-.209	(0.93)		
WHITE	.059	(0.89)		
COLL2	.294	(2.47)*	2.582	(5.94)*
COLL4	.647	(3.48)*	2.025	(3.38)*
NE	-0.54	(1.63)*		
NC	-.019	(0.59)		
SOUTH	.037	(1.04)		
AGE	.098	(14.88)*		
AGESQ	-.001	(-13.12)*		
RN	.742	(1.66)		
RN*AGE	-.040	(-1.80)***		
RN* AGESQ	.0006	(2.00)***		
RN*HOSP	.271	(3.94)*		
OTINC	-.0025	(3.59)*	.0050	(1.32)
KID3	.082	(1.54)		
KID6	-.083	(2.25)**		
KIDGAP	-.05	(4.18)*	-.096	(2.52)**
HUSBHOME	-.022	(2.16)**	-.451	(1.60)
MILLS	1.07	(1.55)	2.57	(1.30)
NIHOSP			-0.015	(5.93)*
RNLY			9.43	(25.72)*
WAGEIND			7.35	(3.64)*

The other result of interest is the sensitivity of the decision to participate in the RN labour market to the WAGEIND variable. This tends to verify a rational approach in the human capital framework

The inclusion of the wage index variable also results in an interesting coefficient on the NIHOSP variable: one which is significant and negative. This confirms the initial thesis of the study; namely that possession of product market power is not in itself responsible for reduced nurse labour market participation. Indeed, the reverse is true, which suggests that in the larger metropolitan areas, where there are more hospitals but also more labour market opportunities, nurse relative wages are the driving factor explaining nurse labour market participation.

It should also be noted that the results remained essentially the same as the threshold income level included in the data set was progressively increased from a minimum of 0 in income to \$7,000. The sole coefficient which changed substantially was that on WAGEIND, which became greater in magnitude, indicating greater sensitivity as incomes increased. Furthermore, as the discount rate used increased, the magnitude of the WAGEIND coefficient decreased, which is consistent with prior expectations.

A further question of interest is whether the magnitude of the WAGEIND variable itself has changed over the time. The severity of the nurse shortage has been well documented over the past ten years and firmly put forward by hospitals as evidence for the need for both more training programs and more relaxed immigration laws for health professionals. Therefore, some evidence of an increase in nurse lifetime earnings relative to others should be observed. However, as Table 3 suggests, this has not been the case.

TABLE 3
Means

Pooled Date Set	Wageind*	No. of Observations
All years	1.22 (.157)	18402
1988	1.22 (.175)	5821
1987	1.23 (.180)	4305
1986	1.23 (.182)	4182
1985	1.23 (.176)	2130
1984	1.22 (.179)	1964

* discounted value RN lifetime earnings to opportunity cost lifetime earnings.

In fact, the degree of stability in the wage index over time would appear to be a classic example of the exertion of monopsony power. Furthermore, when the threshold income level for sample inclusion is increased as before, the mean of WAGEIND drops consistently to a level of 1.04 at an income threshold of \$7,000. This is consistent with similar evidence obtained by Lewis (1990) that the union/nonunion wage gap is larger at starting than at maximum wages for both RNs and LPNs. Lewis

further notes that the union/nonunion gap increased with the number of years of unionization of the occupation which is consistent with the monopsony power explanation hypothesized here.

V. Summary and Conclusions

The nursing shortage issue does not appear to be reaching resolution. The potential solutions generally suggested are: increase the supply of nurses through enrolments in nurse education programs, and increase nurse wage rates. The former solution places more of the cost burden on education and training programs and tax payers; the latter hospitals and those paying for their services to bear the brunt of the burden.

Since the analysis performed here has been exploratory in nature, the recommendations are to be taken with a degree of caution. However, these preliminary results do suggest that monopsony power, as measured by the importance of the WAGEIND variable, is a very significant factor. Hence, changing wage rates may be a very effective tool in ameliorating the problem (indeed, this is beginning to happen in large urban areas as the staff situation worsens).

Retention of qualified nurses in the market and the perception that nursing is an occupation yielding a good return on investment both depend on wages. Unionization may represent an effective means for nurses to realize wage gains and offset hospital labour market power. Studies of union activity in the hospital sector through the 1970s show higher wages to unionized RNs, although the union/nonunion wage gap is not as great for RNs as for LPNs and other less skilled hospital (Becker et al. 1982; Lewis 1990). A summary of several studies places the estimate of the union impact on RN wages at around 6 percent (Becker et al. 1982). Nonetheless, nurses have not flocked to unionization, for example, compared to the extent teachers have done so. Further, the 1980s' trend in hospital union activity shows a dramatic decline in organizing activity among hospital workers and increased resistance on the part of their employers (Becker and Rakich 1988). For those nurses who want to remain in hospital nursing, yet develop more control relative to the dominant employer, organization and forceful collective bargaining may be worthy of greater consideration.

One drawback of the methodology suggested in this paper is the need for more appropriate data. It would be ideal to track RNs over time and observe the reasons for their leaving or re-entering the RN labour market. It would also be useful to analyze the choice specialty in the spirit of Berger (1988) using a longitudinal data set. The analysis would be enriched by incorporating annual hospital survey data, used so effectively by Robinson (1988).

Another factor affecting resistance to monopsony power in a female dominated labour market is spouse mobility. Thus, an extension of this research will be to construct an index of the husband's potential mobility, since information on his characteristics is in a related record in the Current Population Survey. This index will be used as an independent variable in the analysis.

The most obvious extension is to look at the characteristics of the earnings profiles of nurses and observe how they have changed over time relative to the potential earnings profiles. The changing of institutional structure, combined with the increasing use of substitutes, such as LPNs, should make such an area of research very interesting.

However, the results strongly suggest that some wage-based measure of monopsony power is more appropriate than measures used to date. It also suggests that wage profiles and the potential for earnings increases are more important labour supply influences on nurses than simply the current wage.

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APPENDIX TABLE
Variable Means and Definitions

Acronym	Description	MEAN	S.D.
NHOSP	number of hospitals in metro area	54.38	34.92
COLL2	1(2<=years of college<4)	0.20	.40
COLL4	1(4+years of college completed	0.29	0.45
KID3	1 if child under 3	0.10	0.32
KID6	1 if child under 6	0.20	0.50
AGE	age in years	36.23	11.54
IUSBHOME	married couple family	0.65	0.48
OTINC	total family income less wage and salary income	21,770	21,800
KIDGAP	age of oldest - less age of youngest child	1.81	3.23
HOSP	1 if employed in hospital	0.16	0.36
MAN	1 if employed in manufacturing	0.13	0.34
TCPU	1 if employed in trans, comm, and public utilities	0.04	0.20
WRT	1 if employed in wholesale/retail trade	0.17	0.38
SER	1 if employed in services	0.19	0.39
RN	1 if occupation is registered nurse	0.16	0.36
WHITE	1 if race is white	0.85	0.35
RNLY	1 if employed as registered nurse last year	0.15	.36
MILLS1	Mills ratio	0.48	0.16
NE	1 if residency in Northeast	.28	.42
NC	1 if residency in South	.27	.45
WSY	wage and salary income	13,463.45	9,364.94