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The Role of Information in Internal Labour Markets

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Chapters 1-4 and 6-8. Appendix A and Bibliography are only in hard copy

CHAPTER 5

THE STRUCTURE OF CAREER PATHS AND EARNINGS FUNCTIONS

In this Chapter, we build a picture of individual career mobility and the extent of mobility between separately identified job ladders at the management level. We conclude by looking at the earnings variance which is the outcome of this internal mobility. The sources of this variance are analysed in Section II of the Chapter.

SECTION I: CAREER PATHS AND EARNINGS VARIANCE

Internal Labour Mobility

If information produced within the internal labour market is being used in reallocation decisions this will cause individuals from each entry cohort to fan out on the career ladder as their years of service with the firm increase. This will be a source of increasing earnings variance within service cohorts.

General management employees usually joined this firm as trainees and were paid according to an age-related pay scale to age 27. The major exception to this is a small and relatively new group of graduate trainees. The latter were required to spend a minimum of two years training in clerical level jobs before they are eligible for consideration for a junior posting. There was also a small group employed as specialists who, by 1987, had transferred to the general management ladder.

The relationship between salary and years of service is one indicator of internal labour sorting. In the extreme case of a strict seniority pay structure, salary would be identical for all employees with a given level of service. For these data, the correlation between salary and years of service is significant at the .01 level but the coefficient of determination of 0.23 indicates that years of service in this organisation, explain less than a quarter of the variance in salary levels.

Another summary measure which illustrates the movement of individuals on the job ladders of the case study firm is provided by comparing 1982 grade with 1987 grade for individual employees. This is shown in Table 5.1 for all employees in the study in 1987.

TABLE 5.1

COMPARISON OF 1982 GRADE and 1987 GRADE: ALL EMPLOYEES IN STUDY

GRADE 1987

GRADE 1982 (or date commenced)		JUNIOR MANAGEMENT			MIDDLE MANAGEMENT				SENIOR MANAGEMENT			SPEC EDP	SPEC OTHER
		1	2	3	1	2	3	4	1	2	3		
CLERICAL	1	6		3				.					
	2	32	4	2									
	3	18	10	23									
	4	6	3	25	2	4						1	
JUNIOR	1	1	1	13	9			1				1	2
MGT	2		2	9	10	2	1	1	1				
	3			15	11	8	5	2					
MIDDLE			.										
MGT	1			1	4	8	10	5	1				
	2					2	8	6	7	1	1		
	3						2	5	16				
	4						1	2	12	1	2		
SENIOR	1							1	7	2	7		
MGT	2									3			
	3									15	1		
SPECIAL 'T EDP							1			2		40	
SPECIAL IT OTHER					1	1		1	4	2		1	24
TOTALS 1987		63	19	91	37	24	29	23	45	28	13	43	26

Kendall's Tau B = 0.84410 Significant at .01 level.

Of the 441 employees for whom records were made available 372 were in general management positions. The remaining 69 were in specialist positions. There was very little movement from general management to specialist positions, although there was some movement out of the specialist grades to general management levels.

Career moves between grades on the general management ladder can be identified. A total of 139 persons moved into general management from the preceding clerical levels during the study period, and 39 general management people retained the same grade throughout the five years.

The Kendall's tau B statistic indicates the expected strong positive diagonal association between 1982 grade and 1987 grade. However, it is clear that employees did not experience uniform rates of promotion. Variation in rates of promotion appears to be greatest amongst those commencing the period on the top clerical grade, in junior management and the first grade in middle management.

These data also provide evidence that in the transition from junior to middle management there appears to be a barrier for some employees. While 31 employees from lower grades attained the top junior management grade and then moved into the next level in the five year study period, 15 of the 41 employees on this top junior management grade in 1982 remained on this grade in 1987.

Movement between management levels on the general management ladder in this organisation resulted in a change in job description and an increase in the level of responsibility. Movement within levels involved assumption of similar duties but usually an increase in the scale of the unit within which these duties were discharged.

Earnings Distribution

Data on earnings distribution provide another measure of the fanning out of labour on the internal job ladder. Table 5.2 gives details of the earnings distribution in the case study firm in 1987 by age, years of tenure, and qualifications.

The standard deviation and the coefficient of variation increase steadily with age as expected. This pattern repeats that identified in the literature for a wide range of cross sectional studies.

The pattern for the measures of earnings variation by qualifications is consistent with that expected. The coefficient of variation is largest for degree, followed by associate diploma/diploma/certificate then professional membership which is in turn higher than that for those with no qualifications. Interestingly, professional membership resulted in the highest mean earnings and slightly negative skewness.

TABLE 5.2

DESCRIPTIVE STATISTICS - EARNINGS DISTRIBUTION 1987
ALL GENERAL MANAGEMENT EMPLOYEES

	Mean $	Std Deviation $	Coeff. of Variation	Kurtosis	Skewness	N=
Age (years)						
< 30 years	23,328.2	287.5	.0123	6.5	2.6	24
30 < 40 yrs	25,622.9	3,845.2	.1501	24.6	.4.3	191
40 < 50 yrs	31,369.3	5,634.1	.1796	1.5	0.9	101
50 < 60 yrs	32,940.3	6,157.6	.1869	0.1	0.5	52
Service/Yrs						
< 5 yrs	27,247.2	6,886.3	.2527	6.6	2.5	10
5 < 10 yrs	27,884.9	6,103.7	.2188	3.5	1.8	36
10 < 15	25,163.9	4,254.7	.1690	22.7	4.5	104
15 < 20	26,451.2	3,562.9	.1347	1.5	1.5	103
20 < 25	31,101.5	5,988.3	.1925	4.2	1.7	48
25 < 30	32,486.2	5,876.2	.1808	1.4	0.9	27
30+	33,582.2	5,235.0	.1559	0.5	0.4	41
Qualification						
Degree	31,942.9	10,053.6	3147	-0.4	0.9	13
Dip/Cert/ Assoc Dip	30,263.7		.2256	0.5	1.0	29
Prof. M' ship	35,871.0	7,840.4	.2185	-0.3	-0.01	11
No qualif.	27,459.6	4,939.1	.1799	4.0	1.7	316

The measures of earnings variation by years of service with the organisation responded to a period of recruitment of a small number of experienced employees to the general management ladder. This is reflected in the measure of kurtosis which suggests a strongly peaked distribution. A relatively high proportion of those on the general management ladder with less than 10 years service were in 1987 employed in the upper middle and senior management ranks. The distribution of earnings however, is positively skewed at the lower

levels of service as expected. The positive skewness declines with years of service after the 10 and less than 15 years service group.

Employee mobility patterns and career paths in the case study firm do provide evidence of workers fanning out on the general management ladder in the five years studied. Calculations of cross sectional earnings variance for 1987 show the expected pattern for employees by age.

SECTION II: CALCULATION OF A HUMAN CAPITAL MODEL

Propositions 2 and 3 relate to the expected outcomes from estimation of the human capital model alone for earnings collected on cross sectional or longitudinal earnings. For these propositions to be accepted it is necessary that a discrete impact on individual earnings profiles result from labour allocation decisions derived from internally produced information. Hence the first step is to consider estimations of the human capital model and to compare the results with the predictions of the propositions.

The propositions are considered in relation to estimation of the human capital model for the following employee categories:

- All employees who were employed with the firm in 1982 and in general management in 1987. The human capital model is estimated for 1982 and 1987 earnings.

- The three levels of general management employees in 1987, junior, middle and senior management. The human capital model is estimated for 1982 and 1987 earnings.

- Two separate general management service cohorts, determined on the basis of 1987 service These were those with service of 10 and less than 15 years, 15 and less than 20 years. Employees within cohorts with equivalent years of service in the environment of this firm may be expected to have equivalent firm specific human capital investments, given the firm's training regime.

Data Base and Estimating Equation

The form of the data enables earnings functions to be estimated in two separate years, five years apart. This contributes a longitudinal aspect to the study. However it is important to note that the group of managerial level employees for whom data are available is a 'surviving cohort'. The information available relates to those employed as at mid 1987 in the general management grades. Comparison with 1982 estimates must be undertaken in the knowledge that those who resigned (57 from general managerial grades) or retired (34) in the intervening period are excluded. Only 10, or less than 3%, of the 372 employees in 1987 joined the organisation in the five year period under consideration. It was possible to exclude these and confine consideration to those employed for the full period of the study.

The estimating equation used to analyse the factors influencing earnings variance amongst general management employees is derived from Mincer (1976). The derivation of this equation was considered in detail on page 39. The equation is of the form:

$$\mathbf{Ln\ Y_t = b_o + b_1 s + b_2 n + b_3 n^2 + V \quad – (3.1)}$$

The earnings function is a reduced form model. Direct estimation of such models can yield coefficients which are subject to bias. However, the focus in this study is not on the provision of accurate individual rate of return estimates, but rather on the total effects of human capital investments and changes over time in the explanatory power of the human capital model. Hence the question of possible bias in coefficients estimated by the reduced form model is not material to the argument and can be side stepped. Nevertheless the relatively uniform occupational grouping of these employees and the single employer gives some credibility to the estimated coefficients when considered within the context of this firm.

It should be noted here that the period covered largely coincides with firstly the Fraser 'pay pause' and then the implementation of the ALP /ACTU Accord. It is possible that this influenced the extent to which the case firm used promotion as an alternative to award rate changes to retain employees, given demand pressures in this industry.
This may have inflated the number of employees who gained earnings changes through promotion. Details of relative promotion rates for an earlier period were not available.
From the Survey of Weekly Earnings (ABS 1983, 1987) it is apparent that the dispersion of earnings for managerial employees in the private sector as a whole increased between 1983 and 1987. This trend in managerial salaries may also have influenced remuneration policies in the firm.

The average growth rate in earnings for employees on this job ladder in the five year period

was 48%. In the same period the rise in the index of male average weekly earnings for Australia as a whole (A.B.S. 1988) was 40% and for adult male award wages 29%. These figures do suggest that, relative to adult male award wages, 'promotions' creep was occurring for employees in the case study firm at an average of almost 4% per annum.

In the estimated earnings functions the dependent variable was the natural log of the gross annual income level at the reporting dates in mid 1982 and 1987. Gross income was adjusted to exclude housing and remote area allowances. Because the estimated equations relate to separately identified years the income data were not corrected for inflation.

The independent human capital variables used in the estimations of the model include an estimate of years of schooling and details of post-school formal education qualifications; in-firm service and prior work experience are the labour force experience variables and were reported in years and months. The usual quadratic form was used for both prior and in-firm experience. Education certificates held were included as dummy variables rather than in the Mincer form of years of education.

In line with other work on earnings functions, dummy variables were included in the estimations to pick up the effect of a range of factors which could be interpreted as likely to influence the incentives for individuals to invest in human capital or to influence returns by signalling desirable or undesirable characteristics. These incentives may operate either by affecting opportunity costs or the expected pay back period. The variables included are gender, marital status and a self response variable collected by the firm to indicate geographical mobility of employees.

The variable 'modules completed, which indicates completion of a program of formal internal training, was used only for estimations of the junior management levels. Those completing the modules in the five year period since 1982 were predominantly in junior management. A formal training system which had comprehensive coverage of employees was in place prior to 1982 but personnel files do not record employee completion of a program prior to that date. It was concluded that the variable was not an accurate estimate of formal in-firm training for employees as a whole.

The available information on employees undertaking current study was not used in any of the estimates reported here. The coefficient was negative and the t value not significant when the variable was included in early estimations. The variable did not add significantly to the

explanatory power of the model and the judgment was made to exclude it from further estimations.

The general specification of the human capital equation estimated was as follows:

$$\ln(\text{annual Income}) = b_o + b_1 \text{ schooling} + b_2 \text{ experience} + b_3 \text{ experience}^2 + b_4 \text{ service} + b_5 \text{ service}^2 + b_6 \text{ qualifications} + b_7 \text{ modules} + b_8 \text{ gender} + b_9 \text{ marital status} + b_{10} \text{ mobility} + V.$$

Appendix A lists the variables used in the series of regressions reported and provides details of the excluded categories for the dummy variables.

In estimating the earnings functions the schooling, experience and service variables were retained in all versions. This allows us to consider the explanatory power of the accepted human capital model in this internal labour market. The remaining variables were deleted where it was apparent that the simpler human capital model had greater explanatory power.
In each case the data were analysed for evidence of a problem of multicolinearity. With the exception of the expected positive correlation of the experience, experience^2 and service, service^2 variables and negative correlation between experience and service there was no evidence of a problem. An estimation of the full model over the total data set was analysed for heteroscedasticity. The Lagrange test [see Beggs 1988] yielded a chi square value of 38.41, df = 20 and, indicated this was not a problem. Comparison of the t values generally confirmed this. Nevertheless in all estimations of the earnings function the t values shown are heteroscedastic consistent estimates.

Earnings Functions 1982 and 1987: General Management Employees

Proposition 2 states:

> *If reallocation of labour is based on information collected internally, for a given cohort or cross-section of employees, it is expected the explanatory power of the human capital model will decline with time or with increasing tenure.*

To test the proposition, the human capital model is estimated for the case study firm at two points five years apart for specified cohorts of general management employees and for separate hierarchical levels in the firm.

Proposition 3 states:

> *It follows from proposition 2 and the existence of internal labour sorting that in estimation of the human capital model the variance of the coefficient on those independent variables which are not used as signals in the labour sorting process will increase over time, or, in a cross sectional study with level in the hierarchy.*

Table 5.3 provides estimated coefficients for the OLS regression of ln (income) level in both 1982 and 1987 on human capital variables for general management employees. Only those general management employees who were employed by the firm for the full five years (361) are considered.

TABLE 5.3

ALL GENERAL MANAGEMENT EMPLOYED 1982 TO 1987:

HUMAN CAPITAL MODEL - 1982 AND 1987

OLS Estimations

.	Dependent Variable	
	ln (income)1982	ln (income)1987
Independent Variables		
Schooling (yrs)	-.0095 (0.86)	-.0129 (0.99)
Experience out-of-firm (yrs)	.0255 (9.78)**	.0164 (5.22)**
Experience^2 out-of-firm (yrs)	-.0004 (3.70)**.	.0002 (1.78)
Service (yrs)	.0309 (10.13**.	.0214 (4.87)**
Service^2 (yrs)	-.0003 (3.63)**	-.0001 (1.47)
Gender (female)	-.0738 (2.65)**	-.1367 (3.44)**
1st Qualification held Degree	.1911 (4.03)**	.1683 (3.19)**
Assoc.Dip/Dip/Cert.	.0205 (0.92)	.0306 (0.98)
Professional Membership	.1586 (4.36)**	.1958 (3.30)**
2nd Qualification held	.0894 (2.10)*	.0929 (1.89)
Marital Status		
Single	-.0489 (3.83)**	-.0264 (1.43)
Divorced/Separated	.0069 (0.22)	-.0113 (0.33)
Mobility		
Immobile	-.0118 (0.73)	-.0102 (0.54)
Restricted Mobility	.0046 (0.38)	-.0084 (0.61)

CONSTANT	9.5184 (68.55)**	9.9915 (58.17)**
$\bar{R}^2$	.7398	.5471
F	74.109	32.061
St error	.1049	.1217
N =	361	361
Durbin Watson	1.9	1.9

( ) t statistics
* significant at .05 level
**significant at .01 level
t values shown are heteroscedastic-consistent estimates

For 1982 the in-firm experience variable 'service' was adjusted to reflect the reduction of 5 years in experience; all other independent variables were held at their 1987 values. Details of 1982 values of the variables which may have changed in the interim [for example marital status] were not available. As a result the individual coefficients for 1982 must be interpreted with caution.

The overall explanatory power of the earnings function applied to the total cohort of management employees declined in the 5 year period. This is in line with the prediction of proposition 2. In 1982 the adjusted R^2 for this estimating equation was .74. By 1987, using the same variables and allowing for longer tenure, this had declined to .55, while the standard error of the equation rose from .10 to .12. In line with the increase in the unexplained residual the F ratio of the equation, in Table 5.3 declined between the two dates but remained significant at the .01 level. Over a similar length period (1962 to 1969) and using similar variables Rosenbaum reported a decline in R^2 from .72 to .50 for white males in a US corporation.

The individual coefficients and the variance are consistent with proposition 3. The coefficients for the labour force experience variables reported in table 5.3 suggest substantial declines in returns to both in-firm and out-firm experience in the five year period 1982 to 1987 for those who were employed over that period. The premium received per additional year of out-firm experience fell from 2.5% to 1.6% and per additional year of in-firm experience from 3% to 2%.

Human capital theory does predict a decline in the rate of growth of returns to human capital in later years in the workforce. This is said to follow because the rate of growth of the human capital stock declines with the decline in the absolute value of new investment with age and depreciation of the total capital stock and is the rationale for the quadratic form of the model.

However after making the customary allowance for this, returns per year of service and per year of previous work experience fell absolutely in each case in the five year period along with declines in the t values. Human capital theory does not predict that the significance level of these variables will decline with time. To explain the increasing variance, human capital theory must invoke the concept of unmeasured quality differences in human capital investments from the jobs held over the period. This begs the question of how the firm identifies such differences in the quality of training received. In the case reported here it also appears contrary to the firms stated training and promotion policies.

From proposition 3 however, we expect this result with time as the variance of the coefficient appears to increase for those variables not pertinent to the organisation's labour reallocation decisions.

The returns to qualifications were relatively stable in the five years. However the 't' statistics indicate a decline in significance of the coefficients. It is known that some employees gained qualifications in study period. Most new qualifications were at the Associate Diploma/Diploma/Certificate level. However, the coefficient for this category of qualification was not significant in either 1982 or 1987.

Gender was a differentiating characteristic in both 1982 and 1987. The income disadvantage of female employees in general management, all else equal, was 7% in 1982 rising to 14% in 1987. The significance level of this variable rose between 1982 and 1987. The result for females appears to involve an element of customary discrimination and may also reflect lack of commitment to careers in the firm on the part of its female employees. Some circularity is probably involved here. Management indicated that females normally leave the firm before they reach a level on the job ladder which renders them eligible for selection for management level positions. However it should be noted that in the past women were required to resign upon marriage. This probably had a residual negative effect on the attitude of some managers to training and promotion opportunities for female staff. Females may develop the view, based on observation, that the firm does not offer them long term career prospects.

It is apparent from this discussion that the performance of the human capital model for general management is consistent with proposition 2 and that in relation to the experience and service variables proposition 3 is supported. In what follows these propositions are considered also in relation to specific segments of this management labour force.

Earnings Functions 1982 and 1987: By Hierarchical Level

The result reported above for the total cohort of management level employees for the period 1982 to 1987 was checked against the results for employees grouped into junior, middle and senior management levels in a further series of regressions. From proposition 2 we would expect that the explanatory power of the human capital model would decline both for the longitudinal comparison 1982 to 1987 and as we move up the hierarchy to the extent that there is some relationship between tenure and hierarchical level. From proposition 3 we expect that the estimated variances on the coefficients for the individual human capital variables will increase for those variables not used directly as quality signals in internal labour reallocation.

The natural log of income level was again used as the dependent variable. The independent variables for the estimates by hierarchical level are similar to those used for all general management employees. However, not all independent variables were relevant at each hierarchical level. At middle and senior management levels gender was not included since there were no females at these levels.

It is useful to consider the three general management levels as a group, tables 5.4 to 5.6, since they give a picture of the hierarchical development of the firms general management ladder. The samples comprise employees in the given level in 1987. The employee histories were used to determine their 1982 level and salary.

These are truncated samples; the dependent variable has upper and lower bounds determined by the grade distribution in the organisation. Hence the results should be interpreted with caution [on truncated samples see for example Tobin (1958) p241). Our
interest, however, is in the change in explanatory power of the identical models across the five year period. As previously noted, the only change to the independent variables was for length of service with the firm.

TABLE 5.4

HUMAN CAPITAL MODEL - JUNIOR MANAGEMENT: 1982 AND 1987
OLS Estimations

	Dependent Variable			
Independent Variables	ln (Income 1982)		ln (Income 1987)	
Schooling (yrs)	.0214	(1.49)	.0031	(0.77)
Experience (out-of-firm) (yrs)	.0212	(7.57)**	.0014	(2.32)*
Experience^2 (out-of-firm,) (yrs)	.0002	(2.18)*	-.000005	(0.25)
Service (yrs)	.0293	(8.82)**	.0051	(3.76)**
Service^2 (yrs)	.0004	(4.28)**	-.00007	(1.65)
Gender				
Female	.0208	(0.75)	.0083	(0.95)
1st Qualification held Degree	.1183	(5.20)**	.0135	(2.01)*
Assoc.Dip/Dip./Certif.	.0362	(1.21)	.0067	(1.03)
Professional Membership	.0467	(1.83)	.0189	(2.81)**
2nd Qualification held	-.00002	(0:01)	.0063	(0.88)
Marital Status				
Divorced/Separated	.0218	(0.92)	.0021	(0.33)
Single	.0175	(2.01)*	.0124	(2.97)**
Mobility				
Immobile	.0180	(1.08)	.0017	(0.40)
Restricted	.0050	(0.52)	.0032	(1.02)
CONSTANT	9.1391	(51.648)**	9.9858	(194.45)**
$\bar{R}^2$	.6889		.2808	
F	25.9453		5.7138	
st. error	.0611		.0193	
N =	170		170	
Durbin Watson	2.1		1.9	

t values shown are heteroscedastic - consistent estimates.

( ) t statistics
* significant at .05 level.
** significant at .01 level.

TABLE 5.5

HUMAN CAPITAL MODEL - MIDDLE MANAGEMENT: 1982 AND 1987
OLS Estimations

	Dependent Variable			
Independent Variables	In (Income) 1982		In (Income) 1987	
Schooling (yrs)	.0025	(0.11)	.0022	(0.14)
Experience (out-of-firm) yrs	.0053	(1.32)	.0017	(0.50)
Experience2 (out-of-firm) yrs	.0003	(0.13)	.0002	(1.14)
Service	.0085	(2.25)*	.0018	(0.37)
Service^2	.00002	(0.02)	.00001	(0.12)
1st Qualification Held				.
Degree	.0871	(2.27)*	.0650	(1.54)
Assoc Diploma/Dip/Cert	.0761	(4.75)**	.0569	(2.61)*
Professional Membership	.0391	(2.22)*	.0864	(3.59)**
2nd Qualification Held	-.0725	(1.89)	.0742	(1.80)
Marital Status #				
Single	-.0239	(0.87)	.0589	(3.18)**
CONSTANT	9.7137	(33.36)**	10.203	(51.50)**
R^2	.3031		.0259	
F	4.3021		1.2008	
st error	.0742		.0627	
N =	85		85	

t values shown are heteroscedastic - consistent estimates

( ) t statistics
* significant at .05 level
** significant at .01 level
# There were no cases in the divorced/separated category in Middle Management.

TABLE 5.6

HUMAN CAPITAL MODEL - SENIOR MANAGEMENT 1982 and 1987
OLS Estimations

	Dependent Variable			
Independent Variables	In (Income) 1982		In (Income) 1987	
Schooling (yrs)	-.0149	(0.89)	-.0141	(0.68]
Experience (out-of-firm) yrs	.0076	(1.09)	.0014	(0.20)
Experience2 (out-of-firm) yrs	-.0001	(0.48)	-.0001	(0.50)
Service	.0058	(0.64)	-.0058	(0.44)
Service^2	.00007	(0.43)	.00001	(0.66)
1st Qualification Held ~				
Degree	.2549	(3.19)**	.2451	(2.61)*
Assoc Diploma/Dip/Cert	.0030	(0.68)	.0685	(1.35)
Professional Membership	.1364	(3.47)**	.1306	(2 36)*
2nd Qualification Held	.0239	(0.59)	.0233	(0 42)
Marital Status '				
Single	.1122	tl.71)	.2248	(2.45)*
Divorced/Separated	.0386	(1.49)	.0257	(0.72)
CONSTANT	10.056	(53.61)**	10.672	(37.85)**
$\bar{R}2$	.3240		.1385	
F	4.3148		2.1128	
st error	.1317		.1281	
N =	84		84	

t values shown are heteroscedastic - consistent estimates

( ) t statistics
* significant at .05 level
** significant at .01 level

The adjusted R^2 value and F statistic declined substantially as predicted by proposition 2 between 1982 and 1987 when the standard human capital model was estimated separately for each level. At the junior management level the adjusted R^2 fell from .69 in 1982 to .28 in 1987.

The adjusted R^2 for the middle management level fell from .30 in 1982 to .03 in 1987 and the F statistic of the 1987 equation was not significant.

At senior management level the adjusted R^2 fell from .32 to .14, a fall in line with that experienced for the other levels. For each management level the change in explanatory power was in accordance with the prediction of proposition 2.

At each hierarchical level, the earnings variance in 1987 is less explicable by human capital variables than in 1982. Changes in earnings between 1982 and 1987 as a result of mobility on the firm's general management ladder were not explained by the explicit human capital variables measured. This is the case even for junior management where the measured human capital variables explained almost 70% of the 1982 earnings variance.

There appear to be two exceptions, single marital status and professional membership, to this impression overall that the individual human capital variables played a lesser role in determining earnings variance in 1987 relative to 1982. Proposition 3 predicts that as labour reallocation takes place there will be increases in the variances estimated on the coefficients for variables which are not used as signals in that reallocation. As a result of the process of labour reallocation average rates of return to some forms of investment may also decline.

From table 5.4 we can see that for junior management employees the coefficients on the variables declined between 1982 and 1987 with only one exception, 2nd qualification. The t values fell for all except gender, single status and two of the qualifications variables. Marital status is expected to affect the incentive to effort. Professional membership relates to the Bankers Institute and could be a signal of commitment to the industry.

There were very substantial declines in returns to out-of-firm experience and in-firm service for junior management over the study period. The premium in 1982 per year of out-firm experience was 2.1% and for in-firm service 2.9%; these returns had declined to 0.14% and 0.5% respectively in 1987, although experience and service did remain significant in 1987.

The returns to formal tertiary education qualifications also declined considerably.

The returns to experience and service for middle and senior management, tables 5.5 and 5.6, were consistent with these estimates. In each case the coefficients remained stable or declined and t values declined or were not significant. Service with the firm did not contribute to the explanatory power of the model for middle managers in 1987 and for senior managers in either 1982 or 1987.

On the basis of Proposition 3 we would expect these results if prior and in-firm work experience were not used by the case study firm as criteria in decisions to reallocate labour at the management level. Interviews with management and the personnel section confirmed that selection at this level was seen to be based on merit and employee potential.

While consistent with the proportions 2 and 3 of this study, aspects of these results do not appear to be consistent with an internal labour market based solely on firm specific human capital investments. Returns to in-firm experience decline very substantially between 1982 and 1987 for junior and middle management employees and by the time middle management is reached, in-firm experience is not a significant factor in explaining earnings variance.

For those arriving at the bottom of the general management ladder, there are returns to in-firm experience. Once on this ladder, however, it does appear that no further returns accrue to additional tenure. The average returns to service dropped away strongly for the 1987 junior management group in the 1982-87 period while average returns for middle and senior management were very low or negative.

It is worth speculating that in this internal labour market there is a level of capital investment which each employee is judged to have acquired before they join the general management ladder. Once on this ladder employees are judged to have approximately equivalent investments. Additions to firm specific capital gained in management level positions appear to play no role in labour reallocation at the general management level. On the other hand the premiums paid to those with formal post-school qualifications were generally maintained over the study period, especially at higher levels in the hierarchy.

Proposition 3 suggests an increase in the variance of the coefficients on educational variables is to be expected if these certificates are used as entry screens, but are not used internally in

the process of labour sorting. This appears generally to have been the case for this management ladder, especially for junior and middle management. The professional membership variable is an exception for junior and middle management. Promotion was said to depend on merit. Qualifications are only one indicator and are given no special weighting in promotion decisions. The perception of staff was that for the general management ladder qualifications are important only in the case where all other factors, including performance, were equal.

The results tend to confirm the staff view that qualifications play a minor role in labour reallocation decisions within levels on the general management ladder.

Earnings Functions 1982 and 1987: By Five Year Service Cohorts

Another way of looking at the effect of internal labour allocation on entry is co consider groups of employees with approximately equivalent service with the firm.

Two service cohorts are analysed here, those with 10 and less than 15 years service and those with 15 and less than twenty years service. These are 'survivor' cohorts, they do not include any new entrants in the period studied. Tables,5.7 and 5.8 report the results. These two cohorts were chosen for analysis because the numbers of cases within ,the five year groupings were adequate to provide robust results.

Proposition 2 suggests that we would expect to find that the explanatory power of the human capital model will be greater in the case of those with ten and less than 15 years service in 1987 compared with those with 15 and less than twenty years service. We would also expect the explanatory power of the model to decline in the case of each of these cohorts between 1982 and 1987. The results in each case were in line with these expectations.

A substantial decline was recorded in each case in the adjusted R and F statistic when the equation was estimated for 1982 and again for 1987. For those with 10 and less than 15 years service in 1987 the change in adjusted R2 was from .75 to .55 while for those with 15 and less than 20 years service the decline was from .59 to .34.

We would also expect from Proposition 3 to find the variance of the coefficients on variables not used in the process of internal labour sorting increase with time. This is consistently confirmed for the schooling and labour force experience variables. The same pattern applies for qualifications for those with 10 and less than 15 years service. For those with 15 and less than 20 years service, the results for qualification are less robust.

TABLE 5.7

HUMAN CAPITAL MODEL – EMPLOYEES – SERVICE 10 AND LESS THAN 15 YEARS
OLS Estimations

	Independent Variables			
Independent Variables	In (income)1982		In (income)1987	
Schooling (yrs)	.0226	(0.98)	-.0072	(0.31)
Experience (out-of-firm) yrs	.0449	(8.72)**	.0215	(3.43)**
Experience^2 (out-of-firm) yrs	-.0013	(4.36)**	-.0005	(1.75)
Service	.0905	(1.94)	.1346	(1.52)
Service^2	_.0040	(4.36)**	-.0048	(1.36)
Gender (female)	-.0611	(1.07)	-.1031	(1.75)
1st Qualification Held				
Degree	.1590	(2.58).	.1743	(2.15).
Assoc Diploma/Dip/Cert	.0613	(1.39)	.0150	(0.31)
Professional Membership	.1723	(5.66)~.	.3756	(3.07)**
2nd Qualification Held	.0737	(0.84)	.0844	(0.94) Marital
Status				
Single	-.0276	(2.35)*	-.0180	(1.26)
Divorced/Separated	-.0368	(2.18)*	.0127	(0.56)
Mobility				
Immobile	-.0585	(3.88)**	.0605	(3.32)**
Restricted	-.0376	(1.63)	-.0095	(0.35)
CONSTANT	8.8897	(26.78)**	9.2640	(16.28)**
R^2	.7458		.5529	
F	31.386		11.571	
st error	.0931		.1082	
N =	146		146	
Durbin Watson Statistic	1.98		1.99	

( ) t statistics
* significant at .05 level
** significant at .01 level
t values shown are heteroscedastic - consistent estimates.

TABLE 5.8

HUMAN CAPITAL MODEL - EMPLOYEES - SERVICE 15 AND LESS THAN 20 YEARS

OLS Estimations

	Dependent Variable			
	In (income)1982		In (income)1987	
Independent Variables				
Schooling (yrs).	.0392	(2.95)**	.0144	(1.08)
Experience (out-of-firm) yrs	.0204	(3.72)~.	.0175	(2.62)**
Experience^2 (out-of-firm).yrs	-.0003	(0.95)	.0004	(1.11)
Service	.0987	(1.16)	.0681	(0.52)
Service^2	-.0030	(0.87)	-.0016	(0.42)
Gender (female)	-.0470	(1.63)	-.0590	(1.90)
1st Qualification Held				
Degree	.1759	(1.22)	-.1640	(1.89)
Assoc Diploma/Dip/Cert	-.0093	(0.25)	.0767	(2.53)*
Professional Membership				
2nd Qualification Held	.2987	(2.31)*	.3268	(11.5)**
Marital Status				
Single	-.0405	(1.91)	-.0175	(0.70)
Divorced/Separated	.0185	(0.85)	.080	(4.88)**
Mobility				
Immobile	-.0180	(1.07)	-.0332	(1.61)
Restricted	-.0102	(0.40)	.0111	(0.41)
CONSTANT	8.5435	(15.91)**	9.3014	(8.29)**
$\bar{R}^2$	.5859		.3405	
F	31.734		5.646	
st error	.0928		.1054	
N =	127		127	
Durbin Watson Statistic	1.89		1.89	

( ) t statistics
* significant at .05 level
** significant at .01 level
t values shown are heteroscedastic - consistent estimates

Overall, however, the results for these two service cohorts are consistent with propositions 2 and 3. Where there is divergence it is generally explained by special factors and does not appear to provide strong contrary signals.

Conclusions

The foregoing analysis shows that for all general management level employees, and for groups of employees classified by hierarchical level or service cohort the explanatory power of the human capital model declined consistently and substantially between 1982 and 1987. This decline was in agreement with the prediction of Proposition 2. It has been proposed that this result will follow from internal sorting of labour on the basis of internally produced information which is independent of the human capital variables. The relevant summary statistics are provided in Table 9.14 for ease of comparison.

TABLE 5.9

SUMMARY STATISTICS - OLS REGRESSIONS: 1982 AND 1987

	1982			1987		
Employee Category	R^2	F	st error	R^2	F	st error
Junior Management	.689	25.945	.061	.281	5.714	.019
Middle Management	.303	4.302	.074	.026	1.208	.063
Senior Management	.324	4.315	.132	.139	2.113	.128
All Current General Management	.740	74.109	.105	.547	32.061	.122
10 less than 15 years service	.746	31.386	.093	.553	11.571	.108
15 and less than 20 years service	.586	31.734	.093	.341	5.646	.105

Summary statistics from Tables 5.3 to 5.8

Analysis of the coefficients on individual variables are generally in line with the outcomes which can be expected if Proposition 3 holds. There were consistent declines in the values of the individual coefficients on the workforce experience (out-of-firm and in-firm) variables. The ‘t’ values related to these coefficients also fell and the coefficients of the workforce experience variables were in most cases not significant in 1987. These workforce experience variables tended to have significant explanatory power in early years of service and/or lower levels as, for example, junior management employees, many of whom were on the clerical level in 1982. It has been argued that these results, coupled with the strong system of in-firm training at clerical levels, suggest that each employee who achieves management level is judged to have acquired the required firm or industry specific knowledge. Thereafter experience of either category is not used as a basis for further employee reassignment. This interpretation gives the internal labour market an important role in developing this stock of capital in the early years of service.

The pattern in relation to formal qualifications is a good deal more confused. It is consistent with qualifications being used to determine initial level but does not suggest a strong relationship between qualifications per se and earnings growth subsequent to the initial level allocation. At the same time the individual coefficients do suggest that there has been a changing mix of, and emphasis on, qualifications within the case firm. Holding a degree appears to have been an important element in earnings differentiation for employees with lower years of service. Professionals Membership appears to have yielded substantial returns to all hierarchical levels; almost invariably gained while employed by the firm such qualifications may be being used within the organisation as a 'signal' of commitment.

There is no firm evidence about the factors determining the effect of female gender; the sorting process in this internal labour market in relation to gender may be a form of statistical discrimination based on expected length of completed service, customer preference, or implicit development of a 'secondary' labour group. There is no evidence available on which to pursue this.

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