

An Analysis of Earnings Differentials in Singapore*

K.P. Kalirajan**
and
G. Shantakumar

Differentials in earnings within a homogeneous group may occur mainly due to market forces. The main point that this paper has examined is whether, on top of differentials created by market forces, there are any additional differentials due to Government intervention in labour market in Singapore. The results of this study do not indicate any such characteristic of the labour market in Singapore.

I. Introduction

The interesting question addressed in this paper is as to whether the Government intervention in the labour market through its various policies has significantly contributed to the earnings differentials of Singapore's managers.

First, in Singapore, the Government is the single largest employer. Public sector employees account for 12% of total labour force in 1980, which dropped to 11% in 1985 due to the 'trimming exercise' carried out by the Government departments to cope up with the recession.¹ Compared to other ANICs and Japan, Singapore appears to have an unusually large public sector (Lim et al., 1988). Further, the public sector used to implement the wage guidelines given by the National Wages

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** Senior Research fellow, Dept. of Economics, Research School of Pacific Studies, Australian National University, and Senior Lecturer, Dept. of Economics & Statistics, National University of Singapore, respectively.

¹ For a comprehensive analysis of the spectacular transformation of Singapore, with different perspectives, see, You and Lim (1984), Lim (1985), and Lim and Lloyd (1986).

Council (NWC) without any downward modifications. As the NWC guidelines are not mandatory, the private sector could reduce the recommendations, if necessary, to suit its production environment.²

Four inferences can be made here. One, the NWC guidelines appear to be not unreasonable and high. Two, firms do take into consideration of their economic performance before implementing the NWC recommendations. Three, one would expect that managerial earnings in the public sector would be either higher than that in the private sector or at least the difference would be insignificant, had the NWC guidelines been high and unrealistic. Four, if the differentiation in respective salaries were significant and also, the private sector managerial earnings were higher, then this would imply that the NWC recommendations do not appear to contribute to the earnings differentials on top of the differences created by market forces. Now, the interesting question is as to whether such wage negotiations have contributed significantly on top of market forces to a rise in the earnings differentials between the public sector and private companies.

Second, the Government has been investing heavily in Singapore's human resources. In the seventies, it focused on increasing educational and training facilities in post-secondary and tertiary institutions and revamped the schooling system mainly to reduce wastage of human resources. In the eighties, it concentrated on increasing the supply of formally trained, technical, managerial and professional personnels (Pang, 1985). Due to these educational policies of the Government, the proportion of new entrants to the work force with post-secondary and tertiary education increased from 18% in 1979 to 30% in 1984 (Ministry of Trade and Industry, 1986). Is there any significant impact on the distribution of earnings due to the increase in supply of personnels? The impact may vary between the public and private sectors and also within the private sector.

Third, the dependence of Singapore on foreign investment, has lead to the development of a kind of dualism in the private sector. Multinational companies (MNCs) and local companies (LCs) compete with each other for managerial personnels. In this process, MNCs tend to offer more attractive earnings structure than LCs. Empirical studies have confirmed this characteristic of MNCs (Lim, 1975; Lall, 1979).

² The national Wages Council (NWC), which was formed in 1972, is concerned with national wage issues and not firm or industry level wage negotiations. NWC was instituted to ensure orderly wage changes in Singapore to protect its export competitiveness.

Thus, within the private sector, there seem to be forces affecting the distribution of earnings, although the motivation for both foreign and local firms is profit maximization.

Based on the above three specific characteristics of Singapore, the following three major hypotheses concerning the managerial earnings are empirically tested in this paper.

1. NWC wage guidelines do not contribute to the managerial earnings differentials between the public and private sectors over and above market forces. If the NWC guidelines were high, but at the same time the private sector were free to reduce the NWC recommendations, then one would expect that the NWC wage increases would influence the height of the earnings curve from the origin. This is equivalent to testing the equality of intercepts of earnings equations among the public sector, foreign firms and local companies.

2. Recent higher educational policies and expansion do not contribute to a rise in managerial educational earnings differentials. This is equivalent to testing the equality of slope coefficients, especially of the 'education' variable of the earnings equations among the public sector, foreign firms and local companies.

3. The presence of many MNCs do not affect the managerial earnings differentials in the private sector. As both types of firms engage in profit maximization, their attitude towards managerial earnings should be similar. This is equivalent to testing the overall homogeneity of the earnings equations between MNCs and LCs.

The following section describes the earnings equation and the variables selected. Data and measurement of variables are discussed in a next section. A comparative analysis of managerial earnings among the public sector, foreign firms and local companies are given in the following section. A final section brings out the overall conclusions of this paper.

II. Managerial Earnings Equation

The earnings equation analysis is well documented in the literature (Hanoch, 1967; Mincer, 1974; Blaug, 1975). Based on these well known earlier studies, the factors influencing managerial earnings considered in this study are management experience in the firm, age, sex and type of firm.

The labour market for the present study has been divided into three

sectors — locals, foreign and public — mainly due to the differences in their recruitment preferences and benefits given to the employees. For example, in the public sector, appointments are made only after completing a severe scrutiny of candidates' abilities. The public sector during the recruitment process usually announces that it needs only the top excellent candidates and in return, it offers a higher starting salary than the private sector (Lim et.al., 1988). Due to the amount of care and cost involved in the selection procedures, intuitively, it may be argued that the public sector offers relatively more job security than the private sector. However, there is no institutional barrier on labour mobility between sectors, except for those serving government scholarship bonds.

Job-hopping from the public sector to the private sector and within the private sector from one firm to another was reported in late seventies as early eighties in Singapore. Later on, it was not significant, as job-hopping has been considered as a bad quality of the employee and those who stay on with the same firm for a long time are considered as desirable and loyal employees. Also, public sector and MNCs have a significant percentage of managerial force at senior level and the local firms have a high proportion of junior managers. Therefore, in order to investigate a number of issues related to organizational earnings differentials, the inclusion of a type of firms variable in the analysis becomes necessary. Thus, the following managerial earnings function has been identified for further analysis in this paper: $EARN = f(\text{Sex}, \text{Edn}, \text{Exp}, \text{Age}, \text{Type of firm})$.

III. Data and Measurement of Variables

The primary source of data for the present study is the Managerial Manpower Survey (MMS) which was conducted by the Singapore Institute of Management (SIM) in 1982.³ Survey questionnaires were sent to 845 firms, of which, 400 were SIM institutional members, 29 statutory boards and Government companies, 119 MNCs and 297 local companies. However, only 688 firms made up the sample, as 157 firms were dropped due to lack of cooperation from them. The total number of managers responded for the survey was 3095, which constituted about 6%-8% of the managerial force in Singapore as per the 1980 census. Against this total sample of 3095, only 1300 managers were selected for the present study.

³ The authors are grateful to Prof. You Poh Seng, Executive Director of SIM for having given access to the data set. The sample characteristics are given in Table 1.

As the definition of managers varies from firm to firm, MMS standardized the concept of managers by the following definition: Managers are those designated as heads or chiefs of enterprises, divisions, functions, departments, sections and units with at least one subordinate accountable to him or her. Survey responses showed that respondents fully understood the MMS definition and only the proper personnels were surveyed.

The dependent variable earnings (EARN) are measured as an all-in-annual salary which includes NWC, bonuses and other monetary allowances but excludes non-monetary benefits. Sex is represented as a dummy variable, implying a zero for female and 1 for male managers. Age is measured in years as at last birthday. Experience is measured in number of years with the firm.⁴ Education and type of firm are used as categorical variables. Education has been coded as follows: non-university = 0, non-university diploma = 1, first degree = 2 and higher degree = 3. Type of firm has been coded as follows: Government and Statutory Boards = 1, foreign companies = 2 and local companies = 3.⁵

IV. Empirical Results and Discussions

As sample managers come from different organizations and these organizations react differently to the Government policy measures, significant differences in slopes as well as in intercepts of the earnings equations might be expected. However, the null hypotheses are that the earnings equations for the public sector and private sectors are homogeneous, and the functions for the foreign firms and local companies are homogeneous. These hypotheses which are equivalent in testing the major hypotheses concerning the effect of policy measures on managerial earnings, are tested using covariance analysis (Johnston, 1972).⁶ Since, all covariance tests are based on comparisons between pairs of three basic regression equations, it becomes necessary

⁴ Executives' experience with previous firms may not be included here in the analysis, as it is generally, taken into consideration while negotiating the salary and fixing the position in the new firms. Therefore, the dependent variable which is the annual salary of the manager is expected to reflect the above characteristic concerning executives' past experience with other firms. Further, it is the experience in the present firm that is important for future increases in earnings which are predicted through the earnings equation given above.

⁵ Foreign companies are defined as those with 51% or above foreign shareholding and local companies are defined as those with 51% and above local shareholding.

⁶ The covariance analysis and the testing procedures have been explained in detail in Johnston (1972, pp. 192-207).

to estimate the following 3 sets of earnings equations. Ordinary least squares (OLS) method was used to estimate these equations. Results from the Ramsey's RESET test available in the computer program MICROFIT indicate that there is no problem with the chosen linear functional form for the present data set. The value of the F-statistic was 1.6378 which was not significant at the 5 percent level.

A. 1st Set

$$\begin{aligned} \text{EARN}_i = & a_{i0} + b_{i1}\text{sex} + b_{i2}\text{Edn1} + b_{i3}\text{Edn2} + b_{i4}\text{Edn3} \\ & + b_{i5}\text{Exp} + b_{i6}\text{Age} + b_{i7}(\text{Age})^2 + u_i \end{aligned}$$

$i = 1$ (Public sector)
 $= 2$ (Foreign firms)
 $= 3$ (Local firms)

where u 's are random disturbance terms with 'normal' properties, $N(0, \sigma_u^2)$.

The above 3 equations form the basic model for further analysis in this paper.

B. 2nd Set

Assuming all the coefficients, a (intercept) and b 's (slope) were the same for public sector, foreign firms and local companies, another set of 3 equations were estimated, combining the observations from first, the public sector and foreign companies, second, public sector and local firms and third, foreign firms and local firms.

C. 3rd Set

Assuming b (slope) coefficients were the same but a (intercept) coefficients were different, another set of 3 equations were estimated, combining the observations as explained above for the 2nd set. In order to differentiate the coefficients in each equation, an additional dummy variable was added to the existing independent variables.

Using F-statistic, a series of statistical tests were conducted to examine the above hypotheses of homogeneity. First, the test of overall homogeneity of earnings equations (intercepts and slopes) between organizations involves contrasting the reduction in the error sum of squares from set 2 to set 1 regressions. Second, the test of equality of a 's (intercepts) concerns reduction in the error sum of squares from set

Table 1
SOME CHARACTERISTICS OF THE SAMPLE

Salary	Average Salary
Below \$15,000	\$10,000
\$15,000 to less than \$25,000	\$20,000
\$25,000 to less than \$40,000	\$32,500
\$40,000 to less than \$60,000	\$50,000
\$60,000 and over	\$60,000

Sex: Dichotomous dummy variable; 0 for male and 1 for female.

Age: Age in years as at last birthday

Less than 30 years	22%
31 years to 40 years	47%
41 years to 50 years	22%
51 years and over	9%

Highest qualification on entry into first management job:

Non-university	0
Non-university diploma	1
First degree	2
Higher degree	3

Management experience in the company (Exp): measured in years.

Type of firm: The categories are code as

Foreign companies (foreign shareholding; 51% and above)	1
Local companies (local shareholding; 51% and above)	2
Government companies and Statutory Boards	3

Note: Salary includes all-in annual salary which includes bonuses, NWC, and other monetary allowances, excluding non-monetary benefits in kind.

3 to set 1 regressions. Third, the test of equality of b's (slopes) comprises comparison of the reduction in the error sum of squares from set 2 to set 3 regressions.

The tests applied (Table 2) show first that the earnings equations are clearly not homogeneous overall among the organizations. This means that the three types of firms cannot be placed together and should be analysed individually. Second, there are very large signifi-

Table 2

F-TESTS FOR HOMOGENEITY, SLOPE AND INTERCEPT COEFFICIENTS,
PUBLIC SECTOR, FOREIGN FIRMS AND LOCAL FIRMS

Test	Calculated F	d.f.	Table F	Result	Level of Significance
Public sector vs Foreign firms					
Homogeneity	18.4678	(7,797)	2.66	H_0^a : reject	0.01
Intercept	150.2780	(1,804)	6.64	H_0^b : reject	0.01
Slope	8.4397	(7,797)	2.66	H_0^c : reject	0.01
Public sector vs Local firms					
Homogeneity	21.8043	(7,909)	2.66	H_0^a : reject	0.01
Intercept	162.1764	(1,916)	6.64	H_0^b : reject	0.01
Slope	12.8106	(7,909)	2.66	H_0^c : reject	0.01
Foreign firms vs Local firms					
Homogeneity	12.5680	(7,873)	2.66	H_0^a : reject	0.01
Intercept	132.1011	(1,880)	6.64	H_0^b : reject	0.01
Slope	5.2016	(7,873)	2.66	H_0^c : reject	0.01

- Notes: 1. H_0^a : Both equations are the same.
 2. H_0^b : Intercepts of the equations are the same.
 3. H_0^c : Slopes of the equations are the same.

cant differences in intercepts and the value for the foreign firms is larger (\$48, 175) than that for the public sector (\$42, 650), (Table 3).

The above result implies that NWC wage guidelines have not significantly contributed to the managerial earnings differentials on top of market forces. Because, until 1985, public sector usually adopted the guidelines without any downward modifications and it used to be the first organization to implement the wage increases either equal to or more than the recommendations. Had the NWC guidelines been very high and unrealistic, naturally, it could be expected that the foreign firms would implement wage increases less than the guidelines. In this context, then the public sector earnings should have been either larger than the foreign firms or the difference should be insignificant. But, the empirical results show the contrary.

Table 3
**MANAGERIAL EARNINGS EQUATIONS FOR THE PUBLIC SECTOR,
 FOREIGN FIRMS AND LOCAL COMPANIES**

Variables	Parameter	OLS Estimates		
		Public sector	Foreign firms	Local firms
Constant	a ₀	42,650.17 (6,218.63)	48,175.43 (6,820.17)	38,696.08 (6,183.11)
Sex	b ₁	2,123.01 (527.33)	1,892.16 (427.34)	1,560.24 (504.12)
Non-university diploma	b ₂	340.82 (79.27)	180.79 (42.16)	160.25 (30.07)
First degree	b ₃	430.76 (110.08)	670.24 (120.19)	520.34 (136.27)
Higher degree	b ₄	680.19 (140.45)	820.17 (160.82)	679.26 (140.82)
Experience	b ₅	55.74 (10.89)	24.48 (6.22)	33.22 (8.13)
Age	b ₆	22.32 (5.91)	18.19 (3.35)	24.26 (5.71)
Age ²	b ₇	-10.16 (3.85)	-6.72 (2.26)	-14.81 (4.89)
R ²		0.6436	0.6812	0.6109

Note: Figures in parentheses are standard errors of estimates. All the coefficients are significant at the 5 percent level.

The intercepts for the foreign companies is also higher than that for local firms (\$38, 696), (Table 3). MNCs with greater access to financial markets and enjoying various Government incentives, appear to be in a position to offer higher pay on average for their managerial force. Thus, the possibility that local firms lose out in the competition in attracting better managerial force may not be ruled out.

Third, there were also significant differences in slopes. This indicates that different organizations react differently to selected independent variables in determining the dependent variable, 'Earnings.'

As per the results, sex appears to be a discriminating factor in determining managerial earnings in Singapore, and an average male manager seems to be earning more than his female counterpart. Although salary scales of female employees are on par with their male counterparts, in practice, there appears to be a differentiation in the respective salaries in the public sector; while it is least effective in the foreign and local companies. Three observations can be made from these results. One, it is puzzling that the Government on the one hand, encourages female labour force participation through various policy measures and on the other hand, discriminates them against their counterparts in terms of structure of earnings. Two, if the same situation of discrimination prevails, at least in the managerial level, public sector may not be able to attract top 'female brains' compared to private sectors. Three, the difference in the respective salaries could be due to various factors. Discontinuity arising from various reasons, such as the maternity leave, may influence the entry scale downwardly for the female employees. However, more detailed studies are needed to examine the female labour market operations, before reaching any firm conclusions from the above results.

Education is positively and significantly related to earnings at all levels, which means that earnings are an increasing function of education. Results from Table 3 show that the increase in earnings due to improvement in educational qualifications varies with both levels of education and types of organizations. A higher degree manager clearly tends to be the top earner in both public and private sectors. This result is in confirmity with the human capital theory and is consistent with earlier empirical works (Blaug, 1975). It is worth noting that a non-university diploma holder can achieve more in the public sector than in the private sector. The difference in earnings between a non-university diploma holder and an university first degree holder is very small in the public sector compared to that in foreign and local companies. If this is so, the question arises of how it is possible to encourage any graduates into the public sector. One explanation could be that the permanent jobs offer greater security and possibly other non-pecuniary benefits (Psacharopoulos and Williams, 1973). Another question is why is that foreign and local firms do not prefer to recruit non-university diploma holders. This may be due to the private companies, 'especially the local firms', attitude towards management training. They seem to be keen in appointing graduates than non-university diploma holders and then training them. Further, the then existing higher education policy due to its rigid rules and the increasing competition to entering into the university discouraged the diploma holders

from appearing for higher degrees.⁷

Though these results point out that educational managerial earnings differentials do exist in Singapore, an important question rises as to whether these earnings differentials encourage one to self-invest in higher degrees. Answer to this question is crucial for future development of Singapore because shifts in the supply of higher degree holders might reduce the educational managerial earnings differentials in favour of managers with relatively lower qualifications, *ceteris paribus*. Recent relaxing of higher education policy has induced an increase in demand for higher degrees (through both national and foreign universities) which is an indication that more and more people are self-investing in higher education. Nevertheless, a more detailed data is needed for a comprehensive analysis of this subject.

The coefficient of the variable, experience in the firm is the largest for the public sector which is followed by the local firms. This tendency in the public sector may be due to its hierarchical structure. In other words, in the public sector the seniority based salary increasing system is followed, while in the private sector this system is not followed strictly.

Age-earnings profile appears to be well behaved, as both the age related coefficients are significant at the 5 percent level. Further, the negative and significant coefficient of (age)² implies that there exists a concave relationship between earnings and age. This result is in conformity with the human capital theory and is also consistent with earlier studies (Mincer, 1974).

As a summary, the foregoing analysis indicates that there exists managerial earnings differentials in Singapore at various sectors. Foreign companies appear to be offering more attractive earnings structure for managers than the public sector and local firms. No doubt, local firms and the public sector have to compete with foreign companies continuously for better brains.

Contrary to common notion, the results prove that NWC guidelines have not contributed to managerial earnings differentials. Educational qualifications and sex appear to be the factors contributing to earnings differentials significantly. However, with the increasing demand for higher degrees, a prediction, based on economic theory, can be made of a possible reduction in educational earnings differentials in future in Singapore.

⁷ For a detailed analysis on Singapore's education and manpower development, see Pang (1982).

V. Conclusions

Differentials in earnings within a homogeneous group may occur mainly due to different interactions of market forces of supply and demand. The main point that we have investigated in this paper is, on top of differentials created by market forces, there are any additional differentials due to the Government intervention in the labour market. The results of this study positively indicates that Government intervention through NWC in the labour market has not contributed to the managerial earnings differentials in Singapore.

Though at present, educational managerial earnings differentials prevail, with the increasing spending on higher education and skill improvement programs by the Government, in future, the possibility of such differentials being reduced considerably cannot be ruled out.

However, regarding the sex induced managerial earnings differentials, in the public sector, the Government has to look for new avenues and policy measures for improvement towards sex-neutral earnings.

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