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MARKET STRUCTURE AND INTER-INDUSTRY WAGE DIFFERENCES IN TAIWAN: TESTING THE DUALISTIC STRUCTURE HYPOTHESIS

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Abstract

Given Taiwan's high degree of openness and labor-intensive mode of production, this paper uses export/sales ratio and K/L ratio to investigate if there exists a dualistic structure (1) between the export-oriented and domestic-oriented industries, (2) between the capital-intensive and labor-intensive industries. It is shown that the dualistic structure existed under such a classification (meaning that these different industry sectors have distinct patterns of structure and performance), and that K/L ratio is a better criterion to illustrate this feature. When analyzing inter-industry wage differences in a small open developing economy, this dualistic structure is an important factor to take into account. Using Taiwan's 1986 manufacturing sector (160 industries, 4-digit level) census data, regression results suggest that three variables are negatively correlated to wage rates: industrial concentration ratio, female ratio, domestic/sales ratio. On the other hand, staff ratio and K/L ratio are positively contributed to wage differences; output/labor ratio and profitability of industries are unrelated to wage differentials. Although there exists such a dualistic phenomenon in different sectors (export vs. domestic, capital-intensive vs. labor-intensive), the determinations of wage differences among these sectors do not show different patterns. (Keywords: market structure, inter-industry wage differences, Taiwan. JEL: L60, J31, O53.)

1. *Introduction*

1. 1 Labor market characteristics

During the 1950s and the first half of the 1960s, Taiwan was a labor surplus developing economy. A distinctive feature of this kind of economy is the predominance of an agricultural sector characterized by widespread disguised unemployment and high rates of population growth, side by side with a small but hopefully growing industrial sector. Wage rates equal to or lower than the subsistence level will *push* the rural surplus labor toward the small but growing industrial sector. The industrial sector, in turn, provides a *pull* by offering employment opportunities and/or higher wages. When the excess labor is exhausted, real wages start to rise significantly. Development economists term this phenomenon as the "turning point" of a developing economy. The year 1968 is usually dated as the turning point for Taiwan because

since then the general real wages have been increasing significantly.

Under this economic structure, two stages of relationships between wages and market structure can be defined. (1) The labor supply curve is almost horizontal before the turning point simply because of the excess of labor supply. At this stage, the employer's market power in the product market is assumed to play no significant role in wage rates. (2) After the turning point the labor supply curve becomes elastic because labor is now a scarce factor. Wages are determined, roughly speaking, by the demand-supply conditions of the market. At this stage one can hypothesize that market structure (or employer's product market power) could play a role in inter-industry wage differences.

The period investigated in this study (1986) belongs to this post 1968 turning point stage, meaning that market structure is supposed to have effect on inter-industry wage differences. It is under this background that one may apply the conventional structure-performance paradigm of industrial organization to investigate the "marker imperfection—inter-industry wage differences" causality in Taiwan.

Another major feature in Taiwan's labor market is that trade unions played no role in wage determination. This is very different from most industrialized countries. As in many developing countries, trade unions are "dummy players" in game theory's terminology. The political and institutional constraints of Taiwan's trade unions are the following. (1) Strikes and sabotage were illegal before 1987, and even though legal since then, they still do not function in a Western sense. (2) Family firms and small enterprises are widely spread, kinship relations and traditional customs mitigate open conflicts between employers and employees: conflicts being rarely solved through public channels before 1990. In short, for the year of our analysis (1986) unions played no role in wage differences.

1. 2 Openness and labor-intensiveness

Generally speaking, one of the characteristics of industries in a developing economy is (on average) having lower K/L ratios comparing to industrialized economies; in other words, most industries in developing economies are more labor-intensive oriented. An open economy is usually judged by its high export-import ratio in GNP. As a small open developing economy, Taiwan has both characteristics: this is well-known judging from national account statistics as well as from the manufacturing sector, see the information reported in Tables 1a-1b: S12 for openness and P2 for K/L ratio. Further evidence will be discussed in Section 2.

1. 3 Significance of this study

Most published studies on the "market structure—inter-industry wage differences" causality were on the industrialized economies. A survey of main results from developed countries can be found in Kwoka, Jr. (1983, Table 1); Dickens and Katz (1987, Table 3.2–3.5) compares a dozen of empirical results and analyze the findings in detail; a case study of West Germany is reported by Feldmann (1981); Krueger and Summers (1987) provides many interesting results, among other things they compared the wage differentials over time (USA, 1923–1984), and compared wage structure between US and Japan (Figure 2.2); an interesting case study of Japan is Kawashima and Tachibanaki (1986). Some overall impressions on industrialized economies' experiences are the following. (1) Industrial concentration has no

uniform effect on wage differences. Roughly speaking, however, the positive relationship between market power and wage rates cannot be rejected. Firm and plant size have the expected positive effect. (2) Labor characteristic variables such as education, sex etc. have expected signs almost in every case. (3) Economic variables such as K/L ratios have positive impact. (4) Trade unions generated mixed effects, one cannot reject that union power is positively related to wage rates.

To my knowledge, few case study on developing economy is reported. This paper intends to investigate the case of Taiwan with a special point of view: (1) testing the "market structure —wage differences" relationship in the whole manufacturing sector; (2) using export ratio to divide industries into two sectors (export-oriented and domestic-oriented sectors), then testing the same relationship; (3) the same procedure is applied to capital-intensive and labor-intensive sectors. May this study adds a new evidence for this topic in developing economies and that this export ratio and K/L ratio division approach be a useful suggestion for industrialized economies.

1. 4 Hypotheses

The following seven conventional points will be examined in Section 3 with regressions, the results are reported in Table 2. (1) In more concentrated industries firms pay higher wages. (2) In higher female ratio industries employees receive lower wages. (3) Industries with higher skilled labor ratio (proxied by higher staff ratio), firms pay higher wages. (4) In domestic market-oriented industries, firms are more generous to their employees (see P4 of columns 3 & 5 in Table 1a). (5) Capital-intensive industries pay better than labor-intensive industries (see P4 of columns 3 & 5 in Table 1b). (6) Higher labor productivity (output/labor ratio) industries pay better. (7) Higher profitability industries are more generous to their employees.

Another question to be examined is this: if there exists a dualistic phenomenon in different sectors (capital-intensive vs. labor-intensive etc.), can we also find different patterns of wage determinations? In other words, variables such as concentration ratio, female ratio etc. have (systematic) different impacts in different sectors? Table 2 shows that there is no solid evidence to support this hypothesis

2. *Dividing Industries into Two Sectors*

2. 1 Using export ratio as criterion

As stated above we use the export ratio to split the manufacturing industries into the export-oriented and domestic-oriented sectors (Table 1a). The partition threshold is 37% (see S12 of column 1, Table 1a), which is the average export ratio of the manufacturing sector (160 industries). This "average ratio" criterion seems somewhat arbitrary but it is a convenient practice as often found in the literature.

There are 22 variables in Table 1a, they are grouped into three categories: industrial concentration ratios, structure variables, and performance indicators. Although most variables and columns in Table 1a are self-explanatory, two require special explanation.

TABLE 1a. STRUCTURE AND PERFORMANCE OF TAIWAN'S MANUFACTURING SECTOR: 1986

[1] Using export/sales ratio (37%) as the criterion of "dualistic structure"

	Overall N=160		Export-oriented Sector Export/Sales>37% N=58		Domestic-oriented Sector Export/Sales<37% N=102		Significance of dualistic structure (standard normal distribution)
	mean (1)	s.d. (2)	mean (3)	s.d. (4)	mean (5)	s.d. (6)	Z-value (7)
1) INDUSTRIAL CONCENTRATION RATIOS							
CR4	0.59	(0.26)	0.46	(0.23)	0.66	(0.25)	5.122***
CR4*	0.73	(0.23)	0.63	(0.23)	0.79	(0.21)	4.364***
CR8	0.68	(0.24)	0.69	(0.21)	0.67	(0.25)	0.540
CR8*	0.81	(0.20)	0.84	(0.17)	0.80	(0.22)	1.282*
2) STRUCTURE							
S1 Number of firms	686	(1062)	796	(886)	624	(1151)	1.056
S2 Sales volume (US$ million)	615	(862)	721	(867)	555	(857)	1.169
S3 Wage payrolls (US$ million)	82	(112)	121	(152)	60	(74)	2.869***
S4 Output (US$ million)	585	(799)	694	(832)	524	(778)	1.272
S5 Value-added (US$ million)	163	(258)	176	(224)	155	(277)	0.522
S6 Capital (US$ million)	520	(878)	459	(598)	555	(1004)	0.758
S7 Labor employed (persons)	16928	(24177)	27212	(33465)	11080	(13889)	3.504***
S8 Staff ratio	24%	(9%)	18%	(5%)	26%	(9%)	7.228***
S9 Worker ratio	68%	(51%)	68%	(12%)	68%	(63%)	0
S10 Female ratio	37%	(19%)	51%	(16%)	29%	(15%)	8.551***
S11 Domestic/sales ratio	62%	(25%)	35%	(15%)	81%	(13%)	18.700***

S12 Export/sales ratio	37%	(25%)	64%	(15%)	18%	(11%)	20.438***
S13 Capacity utilization rate	77.7%	(12.4%)	79.4%	(10.2%)	76.8%	(13.4%)	1.379*
3) PERFORMANCE							
P1 Capital/output ratio (S6/S4)	0.92	(0.42)	0.70	(0.27)	1.05	(0.43)	6.317***
P2 Capital/labor (S6/S7, US$)	30745	(43231)	18898	(10423)	50053	(50255)	6.037***
P3 Output/labor (S4/S7, US$)	40129	(33875)	27251	(12176)	47452	(39666)	4.764***
P4 Average wage (S3/S7, US$)	4970	(1699)	4328	(808)	5335	(1951)	4.568***
P5 Profit rate	6.45%	(3.59%)	6.51%	(3.15%)	6.42%	(3.83%)	0.160

*: Four or eight largest firms' share in the industry, but export volumes are excluded.
***, **, *: significance at the 1%, 5% and 10% level.
Data Sources: (1) Chou (1988): Industrial concentration ratios in an open economy: a case study of Taiwan's manufacturing sector, *Academia Economic Papers*, 16 (1): 113–150 (in Chinese).
(2) *The Report on 1986 Industrial and Commercial Census*, published by the Directorate General of Budget, Accounting and Statistics, Taiwan, volume 3: Taiwan District Manufacturing, Tables 1, 5, 20, 25, 37, 42.

First, the industrial concentration ratios in the literature are usually calculated from overall sales without excluding export volumes. In an open economy like Taiwan this must underestimate the real domestic concentration level and understate the true relationship between market structure and inter-industry wage differences because wage differences are supposed to be affected by domestic market power only, therefore exports should be excluded. With this concept in mind, two sets of concentration ratio were used: (1) overall concentration ratio (without excluding exports, such as CR4 in Table 1a, representing the market share of the largest four firms in the industry); and (2) real domestic concentration ratio (exports are excluded, such as CR4*)[1]; it is expected that this set will generate higher coefficients and higher degree of significance in regression analysis.

Second, the key indicator is column (7), testing the degree of asymmetry between the export-orient and domestic-oriented sectors. Using the mean and standard deviation as shown in columns (3), (4), (5), (6), the conventional standard normal distribution test is used to calculate the z-value. The higher degree of significance in z-value (with more* marks) indicates higher degree of asymmetry of the two sectors. This z-test is in fact the same as the conventional t-test, but since t-test is used in Table 2 for regressions, z-value is used here to

[1] To obtain a "real" domestic concentration ratio, import volumes should also be taken into account. This is not done here because of insufficient import data. The bias is believed to be insignificant because most imports in Taiwan are later re-exported until the mid-1980s.

TABLE 1b. STRUCTURE AND PERFORMANCE OF TAIWAN'S MANUFACTURING SECTOR: 1986
[2] Using capital/labor ratio (US$30,745) as the criterion of "dualistic structure"

	Overall N=160		Capital-intensive Sector K/L>US$30,745 N=57		Labor-intensive Sector K/L<US$30,745 N=103		Significance of dualistic structure (standard normal distribution)
	mean (1)	s.d. (2)	mean (3)	s.d. (4)	mean (5)	s.d. (6)	Z-value (7)
1) INDUSTRIAL CONCENTRATION RATIOS							
CR4	0.59	(0.26)	0.67	(0.24)	0.54	(0.26)	3.184***
CR4*	0.73	(0.23)	0.82	(0.19)	0.69	(0.24)	3.764***
CR8	0.68	(0.24)	0.70	(0.23)	0.67	(0.24)	0.778
CR8*	0.81	(0.20)	0.84	(0.18)	0.80	(0.21)	1.267
2) STRUCTURE							
S1 Number of firms	686	(1062)	240	(253)	933	(1246)	5.445***
S2 Sales volume (US$ million)	615	(862)	812	(1042)	507	(726)	1.962**
S3 Wage payrolls (US$ million)	82	(112)	72	(80)	87	(127)	0.915
S4 Output (US$ million)	585	(799)	760	(938)	489	(698)	1.908**
S5 Value-added (US$ million)	163	(258)	220	(346)	132	(188)	1.780**
S6 Capital (US$ million)	520	(878)	856	(1255)	335	(489)	3.010***
S7 Labor employed (persons)	16928	(24177)	11119	(12645)	20143	(28180)	2.783***
S8 Staff ratio	24%	(9%)	30%	(9%)	20%	(6%)	7.515***
S9 Worker ratio	68%	(51%)	72%	(84%)	65%	(12%)	0.626
S10 Female ratio	37%	(19%)	26%	(15%)	43%	(18%)	6.383***
S11 Domestic/sales ratio	62%	(25%)	78%	(20%)	58%	(24%)	6.195***

S12 Export/sales ratio	37%	(25%)	21%	(20%)	41%	(25%)	5.529***
S13 Capacity utilization rate	77.8%	(12.4%)	76%	(16%)	79%	(9.9%)	1.286*
3) PERFORMANCE							
P1 Capital/output ratio (S6/S4)	0.92	(0.42)	1.17	(0.50)	0.79	(0.29)	5.268***
P2 Capital/labor (S6/S7, US$)	30745	(43231)	76021	(55064)	18138	(6584)	7.905***
P3 Output/labor (S4/S7, US$)	40129	(33875)	69594	(41966)	23824	(8261)	8.147***
P4 Average wage (S3/S7, US$)	4970	(1699)	6411	(1922)	4173	(818)	8.381***
P5 Profit rate	6.45%	(3.59%)	5.61%	(4.47%)	6.92%	(2.92%)	1.990**

*: Four or eight largest firms' share in the industry, but export volumes are excluded.
***, **, *: significance at the 1%, 5% and 10% level.
Data Sources: (1) Chou (1988): Industrial concentration ratios in an open economy: a case study of Taiwan's manufacturing sector, *Academia Economic Papers*, 16 (1): 113–150 (in Chinese).
(2) *The Report on 1986 Industrial and Commercial Census*, published by the Directorate General of Budget, Accounting and Statistics, Taiwan, volume 3: Taiwan District Manufacturing, Tables 1, 5, 20, 25, 37, 42.

avoid possible confusion.[2]

Column (7) shows that among the 22 variables, 14 are statistically significant (14/22, about 2/3), and 12 among 14 variables (12/14) are significant at the 1% level (with***). This suggests that the dualistic structure does existed: in the manufacturing sector of Taiwan (1986), export-oriented and domestic-oriented industries have different patterns as reflected in their concentration ratios, their structures and performance. Some variables are directly related to the relationship between market structure and inter-industry wage differences, for instance: industrial concentration ratios (CR4 and CR4*), female ratio (S10), K/L ratio (P 2), average wage (P4), etc. They are very significant (at the 1% level), suggesting that the patterns of industrial concentration, capital-intensiveness, wage rates, etc. are quite distinct between the two sectors.

2. 2 Using K/L ratio as criterion

Given Taiwan's labor-intensive mode of production (a characteristic of developing economy), one may want to see what would happen when the K/L ratio is used as the dualistic

[2] Given that the number of observations is rather small in this study, the z-value is strictly taken a t-statistics. The Chi-square test is also applicable when we do not know the distribution *a priori*, but since z-test is easy to "read" and t-test is used in Table 2, I choose to use z-value here.

structure criterion (Table 1b). The average K/L of the whole manufacturing sector is US $30,754 (in 1986 US$, see P2 of column 1), which is used to divide the manufacturing sector into capital-intensive and labor-intensive sectors. It is interesting to note that, according to the K/L criterion, there are 57 capital-intensive and 103 labor-intensive industries, this is very close to that using the export ratio criterion (Table 1a): 58 export-oriented and 102 domestic-oriented industries. Unfortunately, we are not able to tell how much overlap is there by using these two dividing methods: we cannot tell how many industries are both export-oriented and capital-intensive, how many are both export-oriented and labor-intensive industries, etc. It is regrettable not able to clarify this essential contrast.

By again focusing on column (7) in Table 1b, 18/22 (nearly 3/4) variables are significant, and 13/18 are significant at the 1% level. This indicates that the K/L ratio criterion illustrates the dualistic structure feature better than the export/sales ratio criterion.

3. *Regression Analysis*

3. 1 Variables

Most empirical studies provide a table to show the definition, mean and standard deviation of the valiables used in the regression. For our study this information is provided in Table 1a & 1b, for instance: in Table 1a one finds female ratio in S10, K/L ratio in P11 etc. From the same sources on can find other variables used for regression in Table 2. In addition to this purpose, the information reported in these two tables virtually summarized the essence of Taiwan's manufacturing sector.

The conventional econometric analysis takes semi-log of wages as dependent variable to be explained by some five sets of independent variables: (1) market structure variables: concentration ratio, firm size, etc.;(2) labor force characteristics variables: wage earner's age, sex, education, profession, race, etc.; (3) economic variables: capital/labor, capital/output, skilled labor, export, import ratios, etc.; (4) institutional variables: bargaining power of trade unions; (5) industry's geographical location. For the case study of Taiwan, no data is available at the industry level for labor characteristic variables such as education and age. Also, industrial location is not a meaningful variable for this small island. Finally, trade unions, as analyzed above, have no effective role in wage determination. These variables are excluded.

3. 2 Regressions

In terms of estimation technique, some studies such as Belman (1988) are able to use simultaneous equations model to measure the elasticity of wages with respect to market concentration and the indirect effect through other variables such as unionization, etc. It seems that single equation relationship between wage rates and independent variables is not sufficient to capture their complex interaction, simultaneous equation systems are more likely to yield reliable results.

The purpose here is rather different. First, this study mainly interested in the impact of market structure (proxied by industrial concentration ratio) on wage differentials. In this case

single equation estimation seems sufficient because one simply needs to observe the *uni-directional* impact of market structure variables on wage differences, the interactions among variables are not concerned in this context. Second, we have five dependent variables to be estimated, and in each equation we estimate the impact of various concentration ratios, simultaneous estimations will make the table too complex to be manageable.

One remark on the estimation techniques used. Several estimation techniques have been tried including basic OLS, two-stage least squares, thinking about the problem of multi-collinearity among explanatory variables and the heteroscedasticity of the error terms etc.; many different regressions were executed, dropping out or putting in some other variables. But all these do not change the basic results of the major concern: the sign and degree of significance between concentration ratios and the five dependent variables. To simplify the presentation without loosing the essentials, only the results obtained by using OLS technique are reported. The results reported in Table 2 are the estimations of a conventional semi-log linear equation. Specifically:

$$\log (W/L) = a1 + a2\ \textit{Concentration ratio} + a3\ \textit{Female ratio} + a4\ \textit{Staff ratio} + a5\ \textit{Domestic sales ratio} + a6\ K/L + a7\ \textit{Output}/L + a8\ \textit{Profit rate} + \mu$$

This single equation is specified in an additive form $\log W = f(aX + bY + cZ)$, implying that X (say, concentration), and Y, Z (other variables) have separate (or independent) effects on wages. It is expected that female ratio will generate negative signs, all other variables are expected to generate positive signs.

A grain of salt is needed when reading Table 2: this is not a precise way to report regression results; rather, it is a summary of general results. For instance, four concentration ratios are used in each regression: CR4 (sales share of the first four largest firms in the industry), CR8, CR4* (export volumes are excluded, to reflect their "real" domestic market power) and CR8*. Each concentration ratio runs a regression together with other independent variables, so in Equation 1 there are four coefficients for the concentration ratios. In other words, each equation in Table 2 is a condensed form of four regressions. The same is true for R^2s: only the most representative ones are reported. This is certainly not a best way but it is an efficient way to present complicated regressions. The main results are interpreted as follows.

3. 3 Results

1. Industrial concentration ratios. Taken together, the concentration ratio sets generate unexpected negative signs (except for Eq.4). This is somewhat surprising but not exceptional: this negative relationship was also found in the case of France [1964, comparing inter-personal wage differences, see Jenny (1978)] and in the case of UK [1968, all manufacturing sector, see Wabe and Leech (1978)].

Let us examine each equation in turn. Considering the overall effect (Eq.1), only CR8 is slightly significant (at the 10% level), with low negative coefficient (-0.0785). It would not be an exaggeration to say that industrial concentration is not a significant factor in determining wage differences in the whole manufacturing sector.

However, in Eq.2 (export-oriented industries), this correlation is more significant (at the 5% level) with a higher coefficient (between -0.10 and -0.16), suggesting another unexpected phenomenon: industries with market power in the export sector pay lower wages. Although

TABLE 2. DETERMINATION OF WAGE DIFFERENCES IN THE MANUFACTURING SECTOR OF TAIWAN: 1986 (160 industries), 4-digit level

Dependent variable	Log (wage payrolls/total employees)				
	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5
	Overall N=160	Export/Sales>37% N=58	Export/Sales<37% N=102	K/L>US$30,745 N=57	K/L<US$30,745 N=103
Constant	8.52*** (87.67)	8.47*** (52.43)	8.60*** (48.47)	8.72*** (37.11)	8.37*** (70.49)
Industrial Concentration Ratios#					
CR4 overall	−0.0728 (−1.10)	−0.1626** (−1.80)	−0.0395 (−0.43)	0.0769 (0.51)	−0.1099* (−1.66)
CR8 overall	−0.0785* (−1.63)	−0.1596* (−1.63)	−0.0500 (−0.55)	0.0447 (0.29)	−0.1221** (−1.88)
CR4* (exports excluded)	−0.0902 (−1.21)	−0.1604** (−1.77)	−0.0558 (−0.51)	0.0588 (0.31)	−0.1321** (−1.91)
CR8* (exports excluded)	−0.0566 (−0.71)	−0.1038 (−0.84)	−0.0478 (−0.46)	0.0170 (0.09)	−0.1177* (−1.60)
Female ratio	−0.5330*** (−5.02)	−0.4015*** (−2.86)	−0.6099*** (−3.99)	−0.7995*** (−3.00)	−0.4073*** (−4.12)
Staff ratio	0.9886*** (4.77)	0.6897* (1.38)	0.9634*** (3.85)	0.1346 (0.36)	1.4176*** (5.24)
Domestic/ sales ratio	−0.3048*** (−3.85)	−0.3664** (−2.23)	−0.3929** (−2.33)	−0.1458 (−0.80)	−0.3398*** (−4.35)
Capital/ labor ratio	0.000003*** (3.91)	0.00001*** (3.18)	0.000002*** (2.68)	0.000003*** (2.83)	0.0000014 (0.38)
Output/ labor ratio	<.000001 (0.34)	−0.000003* (−1.41)	0.000001 (0.80)	0.000002** (1.77)	0.000002 (1.23)
Profit rate	−0.0010 (−0.23)	0.0067 (0.81)	−0.0010 (−0.17)	0.0101 (1.19)	0.0048 (0.89)
R^2	.61	.44	.62	.47	.42
F	34.50	5.69	21.94	5.29	11.79

Remarks: 1. t-value in parentheses.
2. ***, **, *=significant at the 1%, 5% and 10% levels respectively.

Although four industrial concentration ratios are presented simultaneously, but they are estimated in four different regressions. The coefficients of other variables are almost the same when different industrial concentration ratios are used.

unexpected but theoretically speaking this is in accordance with the Hecksher-Ohlin trade theory predictions: the Leontief paradox [see Leamer (1980)]. It is, however, not certain if this paradox is applicable to Taiwan, an interesting topic needs to be investigated. Eq.3 and Eq. 4 are all insignificant. Eq.5 (labor-intensive sector) also shows a significant negative effect: labor-intensive industries are expected to pay lower wages than capital-intensive industries, but not expected to generate negative signs.

The above observations can be summarized as follows. First, in the whole manufacturing sector, concentration ratios play no significant role. Second, unexpectedly, industries that enjoy higher market share (power) in the export-oriented sector (Eq.2) and in labor-intensive sector (Eq.5) pay lower wages. Third, also unexpected, export-excluded ratios (CR4* CR8*) generate almost indifferent results from overall ratios (CR4, CR8).

From another point of view, it is also interesting to note that in the export-oriented industries (Eq.2), concentration ratios are quite significant, while in its counterpart (Eq.3), they are not significant at all. The same phenomenon is also observed in Eqs.4 and 5. No such contrasting pattern is observed in other variables of Table 2.

Concentration ratio is a key variable in this study but the main results obtained are counter-expectation. A possible explanation is that, as one can see from Table 1a and 1b, industrial concentration ratios in Taiwan are quite high ($CR4^* = 0.73$, $CR8^* = 0.81$ in Table 1 a), it is quite possible (but without ready evidence) that these small amount of big firms are "wage setters", they enjoy market power and offering important employment opportunities, hence are in a position to pay lower wages; other small and medium firms will be happy to follow this "wage standard". This "big firms set lower wages" explanation is still hypothetical.

2. Female ratio, staff ratio. As expected, in all the five equations higher female ratio industries pay lower wages. Using staff ratio as a proxy for skilled labor ratio, the results also show that industries with higher skilled labor ratio pay better. Both variables are statistically very significant. Since both variables conform with conventional wisdom, they need no further explanation.

3. Domestic sales ratio. From P4 of Table la one observes that on average high export ratio industries pay lower wage rates (column 3, US$4,328) with lower standard deviation (column 4, US$808). Domestic market-oriented industries pay higher wage rates (column 5, US$5,335) but with higher s.d. (column 6, US$1,951). Based on this "fact", it was hypothesized that higher domestic sales ratio industries pay better. However, regression results provide an opposite answer: a very significantly negative effect (at the 1% level) with a coefficients about -0.33. In other words, this positive effect hypothesis is rejected. A possible cause comes from the high s.d. of domestic-oriented industries: its s.d. is almost 2.5 times higher than that of export industries. This results seems supporting daily life experience: most new school graduates (from middle school to college) prefer to work in firms dealing with export business at least until the 1980s for better pay and better opportunities to contact foreign matters.

4. Capital/labor ratio, output/labor ratio and profit rate. For K/L ratio it is significant at the 1% level except for Eq.5. The coefficients are very low (0.000003 in Eqs.1 & 4). This low coefficient could be attributed to units of measurement of variables. For instance, in Table 1b (P2 column 3) the average value of K/L ratio is 76021 with standard deviation 55064. Hence, twice the standard deviation times the estimated coefficient equals .33, which is not too small a variation for a value of log (wage rate) of log $(6441) = 8.8$. So K/L ratio played an important role in determining wage differences.

The average labor productivity (output/L ratio) variable generates low coefficients with weak degree of significance, suggesting that its effects are slight, this shows that K/L ratio is a much more important factor than labor productivity in determining wage variations.

The profitability of industries (profit rate) had no impact on wage variations, it could be because except for small amount of big firms who possess high degree of concentration ratio, most firms are small-medium size and they are quite competitive, earned low average profit rate (6.45% on average in the whole sector, see P5 in Table 1a and 1b), hence have no significant feedback to employees.

5. Chow test (F-test). This is used here to check if the coefficients between Eqs.2 & 3 and between Eqs. 4 & 5 are statistically different, i.e. testing the regime change hypothesis. For the export/sales ratio group (Eqs. 2 & 3), the Chow test coefficient is calculated as 0.758 (insignificant), meaning the coefficients of Eqs. 2 & 3 are not statistically different (no regime change). In contrast, for the K/L ratio group, Chow test coefficient is 2.97, significant at the 1% level, confirming the regime change hypothesis. This result suggests again that K/L criterion illustrate better the dualistic structure.

4. *Conclusions*

In terms of dualistic structure, the conclusions are two-fold. First, the dualistic structure is shown both in Table 1a and 1b and that capital-intensity is a better criterion to illustrate this structure. Second, if one agrees that there exists such a structure, would the explanatory variables have different types of impact on wage differences? In other words, can we observe the explanatory variables in each equation correlated with the dependent variables in different patterns? As stated earlier, industrial concentration ratios do show a contrast pattern (compare Eqs. 2 & 3 and Eqs. 4 & 5): this variable generate negative and (weakly) significant effects on wages in the export-oriented sector (Eq.2), while for domestic-oriented sector the coefficients are all negative and insignificant (Eq.3). A sharper contrast is observed in the capital-intensive sector (positive but insignificant, Eq.4) and labor-intensive sector (negative and significant, Eq.5). However, all the other six variables in Table 2 do not show such a contrast pattern. This is quite plausible because if one asserts that inter-industry wage differentials are determined in a "dualistically" way (i.e. in different ways of correlation), this would mean that different sectors are subject to (totally) different economic forces (process).

For the determinants of wage differences, the following conclusions are reached. First, generally speaking, industrial concentration ratios have a negative effect on wage differences. Second, high female ratio industries pay systematically lower wages; while industries with higher skilled labor ratio pay better. Third, domestic-oriented industries are stingy with employees. Fourth, capital-intensity is an important factor in wage differentials. Fifth, labor productivity cannot explain wage variations. Finally, profitability is not related to wage rates.

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