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## Taiwan's Changing Employment and Earnings Structure

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## Taiwan's Changing Employment and Earnings Structure

### Abstract

[Excerpt] In its determined pursuit of economic development throughout the latter part of the twentieth century, Taiwan consistently succeeded in achieving growth rates that were amongst the highest in the world; however, in tandem with such growth, a number of significant changes also took place in the island's labour market. This chapter begins by highlighting some of the most important of these aggregate changes, as follows: (i) the achievement, and subsequent maintenance of, essentially full employment; (ii) improvements in the overall mix of jobs, in particular, a steady reduction in the share of agricultural employment to total employment, a very important shift given that agriculture remains one of the lowest-paying sectors in the Taiwanese economy; (iii) a rise in the share of wage employees, and, in consequence, a fall in the share of own-account work and unpaid family work; this represents another important shift, since wage employees in Taiwan enjoy much higher standards of living than own-account workers and unpaid family workers; (iv) an increase in the share of professional positions and other high-level jobs; a further significant and valuable development, because these are quite clearly the best-paying jobs; (v) real improvements in the educational level of the labour force as a whole; and (vi) a rise in real earnings throughout every sector of the economy, with both male and female earnings having risen at the same pace, in both farm and non-farm households.

In addition to all of these changes, real earnings across the entire Taiwanese economy have doubled every ten years, absolute poverty has fallen sharply and the Gini coefficient of individual earnings has remained essentially constant, indicating that income inequality remains strong (further details on all of the above developments are provided in the Appendix, Tables A2.1-A2.7). This chapter sets out to present brief analyses of the changes that have taken place in Taiwan between 1976 and 1993.

### Keywords

Taiwan, employment, earnings, development

### Disciplines

Income Distribution | International and Comparative Labor Relations | Labor Economics | Labor Relations | Regional Economics

### Comments

#### Suggested Citation

Fields, G. S. (2007). Taiwan's changing employment and earnings structure [Electronic version]. In J. S. Lee (Ed.), *The labour market and economic development of Taiwan* (pp. 36-58). Northampton, MA: Edward Elgar Publishing.

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## 2 Taiwan's Changing Employment and Earnings Structure

**Gary S. Fields**

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### INTRODUCTION

In its determined pursuit of economic development throughout the latter part of the twentieth century, Taiwan consistently succeeded in achieving growth rates that were amongst the highest in the world; however, in tandem with such growth, a number of significant changes also took place in the island's labour market. This chapter begins by highlighting some of the most important of these aggregate changes, as follows: (i) the achievement, and subsequent maintenance of, essentially full employment; (ii) improvements in the overall mix of jobs, in particular, a steady reduction in the share of agricultural employment to total employment, a very important shift given that agriculture remains one of the lowest-paying sectors in the Taiwanese economy; (iii) a rise in the share of wage employees, and, in consequence, a fall in the share of own-account work and unpaid family work; this represents another important shift, since wage employees in Taiwan enjoy much higher standards of living than own-account workers and unpaid family workers; (iv) an increase in the share of professional positions and other high-level jobs; a further significant and valuable development, because these are quite clearly the best-paying jobs; (v) real improvements in the educational level of the labour force as a whole; and (vi) a rise in real earnings throughout every sector of the economy, with both male and female earnings having risen at the same pace, in both farm and non-farm households.

In addition to all of these changes, real earnings across the entire Taiwanese economy have doubled every ten years, absolute poverty has fallen sharply and the Gini coefficient of individual earnings has remained essentially constant, indicating that income inequality remains strong (further details on all of the above developments are provided in the Appendix, Tables A2.1-A2.7). This chapter sets out to present brief analyses of the changes that have taken place in Taiwan between 1976 and 1993.

## PSEUDO-COHORT ANALYSIS OF TAIWAN'S CHANGING INDUSTRIAL STRUCTURE

We begin with a brief analysis of the changes that have taken place in Taiwan, to both the industrial structure and the domestic labour market, since 1976; this was a time which heralded the start of the island's spectacular period of economic growth.<sup>1</sup> In terms of the overall share of employment, Taiwan was experiencing a steady and continuous decline in the agricultural sector, alongside continued growth in the commerce and financial services sector. The manufacturing sector as a whole experienced a steady rise, followed by a gradual decline, in its overall level of importance to the Taiwanese economy.<sup>2</sup>

There are two potential alternative adjustment mechanisms to which these changes may be attributable. The first of these was the gradual shift of workers from the declining sectors (for example, agriculture) into the growth sectors (such as manufacturing). If we assume that all workers had exactly the same probability of changing sectors, any increase or decrease in employment within any given sector would have been observed more or less proportionately across all age groups. However, the second potential adjustment mechanism which may have brought about these changes arises from the fact that the process of sectoral reallocation may have been quite age-specific, with older agricultural workers, in particular, not being replaced as they moved into retirement. In such a case, young workers, the new entrants into the labour force, would no doubt have entered directly into the growth sectors, such as manufacturing.

Clearly, when looking into the changes in the sectoral structure of employment over time, an ideal method would be to use panel data which could effectively follow the same individuals, tracing their employment patterns alongside the growth of the economy. Unfortunately, since Taiwan does not possess such panel data, we are limited to other methods; thus, the method proposed for adoption in this chapter is a pseudo-cohort analysis. The Family Income and Expenditure Survey, which measured a variety of labour force characteristics, was carried out in 1976, with the survey subsequently being repeated in 1977 on a new sample of families. In our pseudo-cohort approach, repeated cross-sections are used on a synthetic cohort of workers born during a predetermined time interval to trace these workers as they age. Those people who were born between 1936 and 1940, for example, would have reached the age of 36-40 years by 1976. By looking at those people who were 37-41 years of age in 1977, we can approximate the changing labour market patterns of people born between 1936 and 1940 as they became one year older. Repeating this process, year after year, produces an approximation of the impact that the labour market changes had upon particular groups.

Figures 2.1 to 2.6 present the pseudo-cohort data on separate male and female cohorts for the three sectors within which significant and systematic changes took place, namely, the agriculture, forestry and fisheries sector, the manufacturing sector and the commerce sector. The figures identify workers according to their birth year at five-year intervals. The line labelled 43, for example, which runs through the middle of each of the figures, comprises of workers born between 1941 and 1945. We can see that between 1976 and 1992, there was barely any change in the percentage of men in this cohort working in manufacturing; the same is true of women, although this is not so easily discernible (Figure 2.4). Conversely, the line labelled 63 in the same graphs shows that there was a steady decline within the manufacturing sector in the proportion of both young men and young women (those born between 1961 and 1965). Thus, in net terms, about a quarter of the young men and women who had previously been working in agriculture in 1986 had left for other sectors of the economy within six years, whilst little inter-sectoral mobility was indicated for workers in the older age groups.

Looking at these figures as a whole, we can discern the following. In any given year, the older the worker cohort, the smaller the proportion of the cohort employed in agriculture and the greater the proportion working in the manufacturing sector. This holds for both men and women. Over time, the changes in the proportion of workers employed in agriculture in any given demographic group were quite different for each of the different age-gender groups: (i) there was a rise in the proportion of older men and older women (those born in 1928 or before); and (ii) there was a fall in the proportion of younger men (those born after 1948) and younger women (those born in 1943 or later). The differences in the importance of agricultural employment between the various groups are much greater than the changes over time within the groups. For any given year, the younger the cohort (of both men and women) the greater the proportion of those working in the manufacturing sector. Over time, the proportion of female workers in the manufacturing sector follows an inverted-U pattern for most age groups. The participation of female workers in manufacturing reached its peak around 1986, whereas, with the exception of the very youngest cohorts, the proportion of male workers in the manufacturing sector remained constant for all age groups; however, across different age groups, it became successively higher for the newer cohorts.

Since 1988, women have been moving into the commerce and services sector in large numbers; however, there is no discernible trend in this direction for men. On the whole, the changes over time in the sectoral composition of employment within any of the male age groups were much smaller than the differences across all age groups; however, for those women in the 1943 (or later) cohort, the changes over time within any given age group were substantial, as compared to the differences between groups.

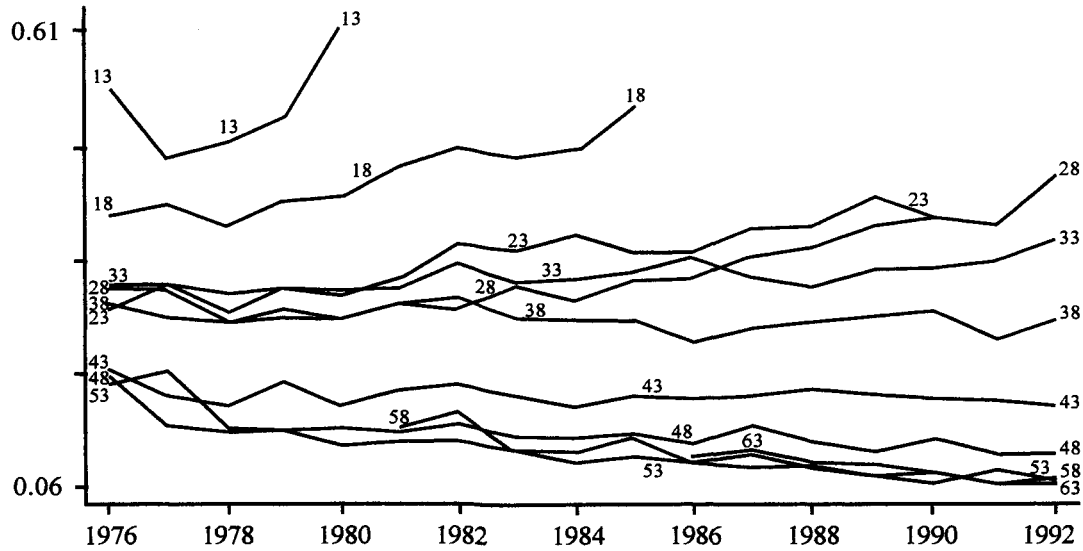


Figure 2.1 The proportion of the economically active male population in agriculture and related industries, by year

Source: Calculations by Dr. Philippe de Vreyer using micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

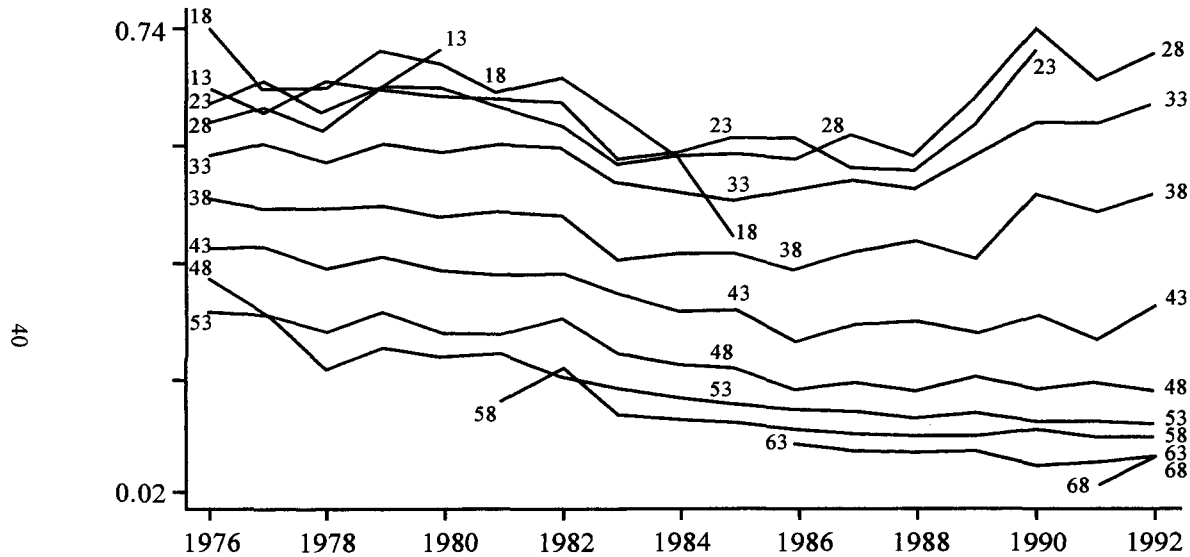


Figure 2.2 The proportion of the economically active female population in agriculture and related industries, by year

Source: Calculations by Dr. Philippe de Vreyer using micro data archives from DGBAS (various years), Manpower Utilization Surveys.

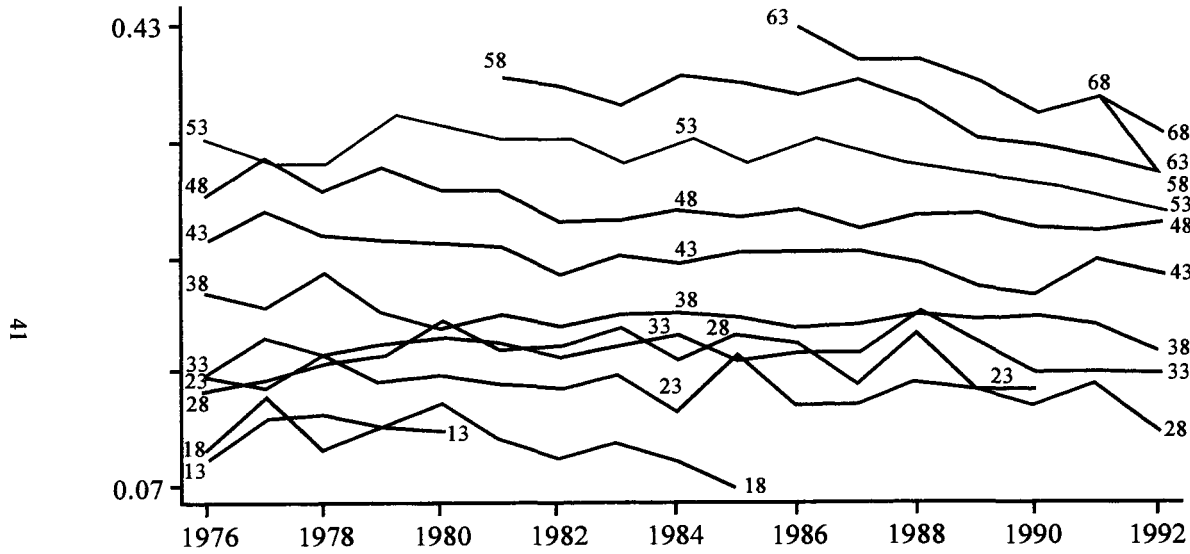


Figure 2.3 The proportion of the economically active male population in the manufacturing industry, by year

Source: Calculations by Dr. Philippe de Vreyer using micro data archives from DGBAS (various years), Manpower Utilization Surveys.



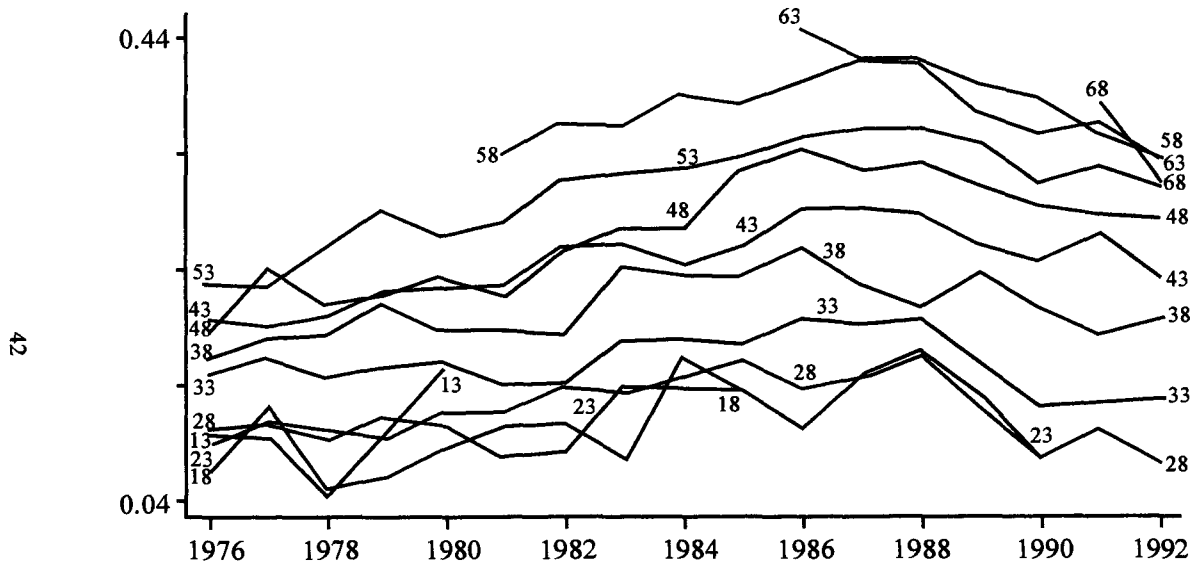


Figure 2.4 The proportion of the economically active female population in the manufacturing industry, by year

Source: Calculations by Dr. Philippe de Vreyer using micro data archives from DGBAS (various years), Manpower Utilization Surveys.

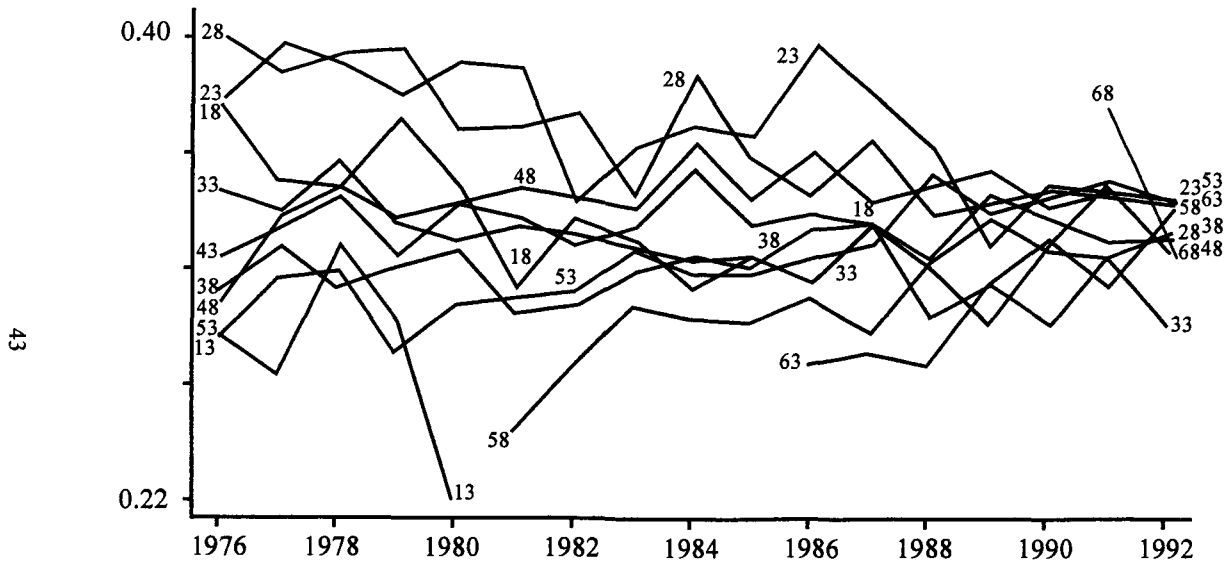


Figure 2.5 The proportion of the economically active male population in the commerce and service industries, by year

Source: Calculations by Dr. Philippe de Vreyer using micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

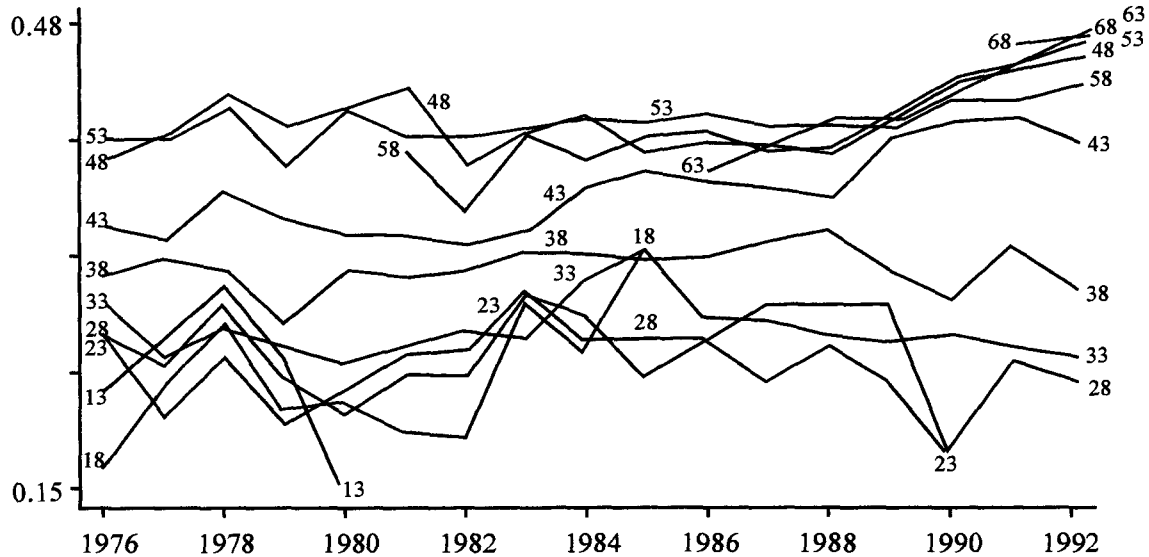


Figure 2.6 The proportion of the economically active female population in the commerce and service industries, by year

Source: Calculations by Dr. Philippe de Vreyer using micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

The data reveals much greater overall stability for men than for women within the various labour market sectors. Agricultural employment shrank in importance for men, not because individuals moved out of the agricultural sector, but largely because, as older agricultural workers retired, younger people who were newly entering the labour market bypassed agriculture entirely, entering other sectors, particularly manufacturing. There were, however, considerable inter-sectoral shifts for women; it is clear that large numbers of women were leaving agriculture and moving into the manufacturing sector up to the late 1980s, after which there was a further shift out of manufacturing and into the commerce and services sector. One of the implications of these findings is that any subsequent discussion on inter-sectoral shifts in Taiwan should focus more on the new younger cohorts moving into different sectors of the economy, rather than an assumption of large numbers of individuals changing sectors as they became older.

## INTER-INDUSTRY EARNINGS DIFFERENTIALS

The data presented above clearly demonstrates a rise in real earnings throughout the Taiwanese economy, with wages doubling about every ten years. Here, we present further details on inter-industry earnings differentials in Taiwan, along with the growth in earnings, essentially establishing the empirical basis for the labour market model that follows in Chapter 4, where it will be argued that the integrated labour market model fits the facts of Taiwan better than any of the other model candidates.

A fundamental aspect of the integrated labour market model is that the changes in earnings for workers in a particular economic sector are not solely dependent upon the demand and supply of labour within that sector alone, but also within the economy as a whole. In an integrated labour market, labour earnings for workers with particular skills levels should be roughly equal across major economic sectors, with earnings increasing at more or less the same rate throughout the economy for similar types of workers. Empirical evidence on these propositions is offered in this section for the case of Taiwan. The data is taken from the micro data archives of the Manpower Utilization Surveys, for the years 1980 to 1993, undertaken by the Directorate-General of Budget, Accounting and Statistics (DGBAS) in Taiwan. All male and female workers in gainful employment within the private or the public sector during the week of the survey, either as waged employees or self-employed, were included in the analysis.

Table 2.1 provides details of the mean incomes for Taiwanese workers, by economic sector, for 1980 and 1993. What stands out immediately is that agricultural workers earned only about half as much as workers in other

industries; however, sizeable differences are also apparent outside of the agricultural sector. Furthermore, those industries that were high-income industries in 1993 were the same ones that had previously been high-income industries in 1980.

*Table 2.1 Mean wage income levels in Taiwan, by one-digit industries, 1980 and 1993*

| One-digit Industries                | Mean Income |        |
|-------------------------------------|-------------|--------|
|                                     | 1980        | 1993   |
| Agriculture                         | 9,133       | 18,487 |
| Mining                              | 11,872      | 30,794 |
| Manufacturing                       | 9,542       | 21,885 |
| Electricity, Gas and Water          | 15,131      | 36,160 |
| Construction                        | 11,830      | 28,239 |
| Commerce                            | 10,791      | 22,408 |
| Transportation                      | 14,351      | 31,103 |
| Finance and Business Services       | 14,034      | 28,108 |
| Public Admin. and Personal Services | 11,456      | 26,776 |
| Std. Dev.                           | 2,107       | 5,449  |
| Coefficient of Variation            | 0.1754      | 0.2010 |

*Source:* Author's calculations based on micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

A breakdown of earnings within the manufacturing sector by two-digit industries (food, beverages and tobacco, textiles, apparel, and so on) is provided in Table 2.2. This breakdown further demonstrates the sizeable differences across sectors along with the persistence of the industry's position in most cases. The question therefore arises as to whether these findings of substantial and persistent earnings differentials invalidate the concept of an integrated labour market in Taiwan. In order to answer this question, a number of tests need to be carried out, with the first of these tests involving an international comparison of inter-industry wage differentials; and, indeed, such data is available for comparison with earnings in the manufacturing sector in the US in 1992, by two-digit industry.

As Table 2.2 shows, the coefficient of variation for earnings was found to be 0.2226 for the two-digit manufacturing industries in Taiwan in 1993, whilst Table 2.3 reveals that the analogous figure for the US was 0.2523. We may conclude from this that the inter-sectoral inequality in Taiwan is approximately 12 per cent less than that of the manufacturing sector in the

US and that the labour market in Taiwan is therefore more integrated than the labour market in the US. This is especially interesting because the US exhibits much more job mobility than most other countries, which is what generally makes the US labour market more integrated.

*Table 2.2 Mean wage income levels in Taiwan, by two-digit industries, 1980 and 1993*

| Two-digit Industries        | Mean Income |        |
|-----------------------------|-------------|--------|
|                             | 1980        | 1993   |
| Food                        | 10,557      | 23,135 |
| Beverages and Tobacco       | 11,733      | 35,829 |
| Textiles                    | 8,848       | 22,150 |
| Apparel                     | 7,704       | 16,075 |
| Leather                     | 8,041       | 19,192 |
| Wood                        | 9,159       | 20,467 |
| Paper                       | 10,017      | 22,584 |
| Chemicals                   | 12,840      | 29,438 |
| Chemical Products           | 11,499      | 23,903 |
| Petroleum                   | 15,668      | 35,462 |
| Rubber Products             | 9,594       | 20,630 |
| Plastic Products            | 9,015       | 19,805 |
| Non-metallic Minerals       | 9,906       | 24,596 |
| Primary Metals              | 12,705      | 27,500 |
| Fabricated Metal Products   | 9,525       | 22,656 |
| Machinery                   | 10,947      | 24,906 |
| Electrical Equipment        | 9,026       | 21,360 |
| Transportation Equipment    | 11,187      | 24,205 |
| Precision Equipment         | 8,993       | 18,329 |
| Miscellaneous Manufacturing | 8,047       | 17,959 |
| Std. Dev.                   | 1,946       | 5,234  |
| Coefficient of Variation    | 0.1903      | 0.2226 |

*Source:* Author's calculations based on micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

Care must be taken when determining the requirements for an integrated labour market model since the model will indicate that workers within different sectors of the economy with similar skill levels should earn roughly the same amount; however, since the figures presented so far are non-standardized, they do not reflect the differences in education or other relevant characteristics of workers within any given sector.

*Table 2.3 US inter-industry wage differences, by two-digit industries, 1992*

| Industry Code            | Industry                           | Average Wage |
|--------------------------|------------------------------------|--------------|
| 311-3                    | Food and Beverages                 | 10.19        |
| 314                      | Tobacco                            | 16.69        |
| 321                      | Textiles                           | 8.60         |
| 322                      | Apparel                            | 6.95         |
| 323-4                    | Leather and Leather Products       | 7.40         |
| 331                      | Wood Products                      | 9.43         |
| 332                      | Furniture                          | 9.00         |
| 341                      | Paper                              | 13.09        |
| 342                      | Paper Products                     | 11.75        |
| 351-2                    | Chemicals and Chemical Products    | 14.45        |
| 353-4                    | Petroleum                          | 17.87        |
| 355-6                    | Rubber and Plastic                 | 10.37        |
| 36                       | Mineral Products                   | 11.64        |
| 37                       | Basic Metals                       | 13.67        |
| 381                      | Metal Fabrication                  | 11.41        |
| 382                      | Machinery, Non-electrical          | 12.43        |
| 383                      | Machinery, Electrical              | 11.01        |
| 384                      | Transport equipment                | 15.16        |
| 385                      | Medical and Photographic Equipment | 11.93        |
| 390                      | Other Manufacturing Industries     | 9.14         |
| Std. Dev.                |                                    | 2.9291       |
| Coefficient of Variation |                                    | 0.2523       |

*Source:* Author's calculations based upon current population survey data.

Of course, it could well be the case that different wage levels are paid by different industries, perhaps because they have workers who possess varying levels of skills and abilities; if this is the case, then after controlling for these differences, it could also be the case that earnings would once again achieve parity, or very close to it.

Therefore, in order to determine whether different industries in Taiwan pay different wage levels, a number of regressions were run to establish whether or not, after controlling for human capital and other worker characteristics, the industry effects were statistically significant. The controls included measures of education, experience, job tenure, hours worked, gender and marital status. The respective 1993 results for the one- and two-digit industries are presented in Tables 2.4 and 2.5.

Table 2.4 *Determinants of logarithm of income for wage employees in Taiwan, with one-digit industry dummies, 1993*

| Variables                 | Coefficient | t-statistics |
|---------------------------|-------------|--------------|
| Experience                | 0.027       | 36.043       |
| Experience squared        | 0.000       | -34.023      |
| Tenure                    | 0.020       | 18.425       |
| Tenure squared            | 0.000       | -9.425       |
| Hours                     | 0.006       | 19.885       |
| Female                    | -0.319      | -63.607      |
| Married                   | 0.047       | 7.916        |
| Changed Job               | -0.085      | -12.897      |
| Years of Education        | 0.055       | 58.376       |
| Mining                    | 0.406       | 10.034       |
| Manufacturing             | 0.168       | 10.212       |
| Electricity               | 0.338       | 11.412       |
| Construction              | 0.400       | 23.469       |
| Commerce                  | 0.221       | 12.658       |
| Transportation            | 0.356       | 18.978       |
| Finance                   | 0.336       | 17.847       |
| Public Services           | 0.257       | 15.120       |
| Constant                  | 8.688       | 347.704      |
| Total No. of Observations |             | 22,133       |
| R <sup>2</sup>            |             | 0.485        |

Source: Author's calculations based on micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

We find from these tables that all of the industry effects are statistically significant at the one-digit level, and indeed that most of them are also significant at the two-digit level; the same was also true for 1980.<sup>3</sup> This provides strong evidence to suggest that the differences in measured worker characteristics are not the sole reason for the differences in wage levels offered by the various industries in Taiwan; thus, given that there are such significant inter-industry differences, the next task is to quantify how much of the inter-industry earnings differential can be explained by worker characteristics. Using the regression results from Tables 2.4 and 2.5, along with their 1980 analogues, we first of all set the other variables at values equal to their mean values, with the predicted log earnings subsequently being obtained for representative workers in each sector. The figures are presented in Table 2.6.



*Table 2.5 Determinants of logarithm of income for wage employees in Taiwanese manufacturing, with two-digit industry dummies, 1993*

| Variables                        | Coefficient | t-statistics |
|----------------------------------|-------------|--------------|
| Experience                       | 0.021       | 18.095       |
| Experience squared               | 0.000       | -19.874      |
| Tenure                           | 0.023       | 11.302       |
| Tenure squared                   | 0.000       | -3.867       |
| Hours                            | 0.007       | 12.157       |
| Female                           | -0.392      | -47.900      |
| Married                          | 0.034       | 3.636        |
| Changed Job                      | -0.071      | -6.587       |
| Years of Education               | 0.043       | 26.925       |
| Food                             | 0.140       | 6.013        |
| Beverages and Tobacco            | 0.344       | 3.735        |
| Textiles                         | 0.141       | 6.283        |
| Apparel                          | 0.025       | 1.117        |
| Leather Goods                    | 0.072       | 2.455        |
| Wood Products                    | 0.059       | 2.457        |
| Paper Products                   | 0.104       | 4.252        |
| Chemicals and Chemical Materials | 0.218       | 7.107        |
| Chemical Products                | 0.141       | 4.695        |
| Petroleum                        | 0.262       | 5.921        |
| Rubber                           | 0.089       | 3.030        |
| Plastic                          | 0.071       | 3.150        |
| Non-metallic Products            | 0.176       | 7.001        |
| Primary Metals                   | 0.224       | 7.630        |
| Fabricated Materials             | 0.113       | 5.363        |
| Machine Products                 | 0.152       | 6.165        |
| Electrical Equipment             | 0.114       | 5.753        |
| Transportation Equipment         | 0.130       | 5.366        |
| Precision Equipment              | 0.041       | 1.126        |
| Constant                         | 8.929       | 226.113      |
| Total No. of Observations        |             | 8,021        |
| R <sup>2</sup>                   |             | 0.509        |

*Source:* Author's calculations based on micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

Table 2.6 *Non-standardized and standardized wage incomes in Taiwan, by one-digit industries, 1980 and 1993*

| Industry                                       | Mean<br>ln(Income)<br>1980 | Mean<br>ln(Income)<br>1993 | Change in<br>Mean<br>ln(Income) | % Change<br>in Mean<br>ln(Income) |
|--|----------------------------|----------------------------|---------------------------------|-----------------------------------|
| <b>Non-standardized</b>                        |                            |                            |                                 |                                   |
| Agriculture                                    | 9.02                       | 9.68                       | 0.654                           | 0.072                             |
| Mining   | 9.27                       | 10.28                      | 1.007                           | 0.109                             |
| Manufacturing                                  | 9.07                       | 9.89                       | 0.822                           | 0.091                             |
| Electricity, Gas and<br>Water                  | 9.56                       | 10.45                      | 0.894                           | 0.094                             |
| Construction                                   | 9.30                       | 10.18                      | 0.882                           | 0.095                             |
| Commerce                                       | 9.19                       | 9.93                       | 0.740                           | 0.081                             |
| Transportation                                 | 9.49                       | 10.28                      | 0.794                           | 0.084                             |
| Finance and Business<br>Services               | 9.41                       | 10.13                      | 0.715                           | 0.076                             |
| Public Administration<br>and Personal Services | 9.22                       | 10.07                      | 0.853                           | 0.093                             |
| Std. Dev.                                      | 0.1805                     | 0.2367                     | 0.1068                          | –                                 |
| Coefficient of Variation                       | 0.0194                     | 0.0234                     | 0.1305                          | –                                 |
| <b>Standardized</b>                            |                            |                            |                                 |                                   |
| Agriculture                                    | 9.02                       | 9.77                       | 0.750                           | 0.083                             |
| Mining   | 9.22                       | 10.17                      | 0.957                           | 0.104                             |
| Manufacturing                                  | 9.16                       | 9.94                       | 0.774                           | 0.084                             |
| Electricity, Gas and<br>Water                  | 9.26                       | 10.11                      | 0.844                           | 0.091                             |
| Construction                                   | 9.27                       | 10.17                      | 0.893                           | 0.096                             |
| Commerce                                       | 9.20                       | 9.99                       | 0.792                           | 0.086                             |
| Transportation                                 | 9.34                       | 10.12                      | 0.786                           | 0.084                             |
| Business and Financial<br>Services             | 9.29                       | 10.10                      | 0.813                           | 0.087                             |
| Public Administration<br>and Personal Services | 9.09                       | 10.02                      | 0.931                           | 0.102                             |
| Std. Dev.                                      | 0.1015                     | 0.1309                     | 0.0736                          | –                                 |
| Coefficient of Variation                       | 0.0110                     | 0.0130                     | 0.0879                          | –                                 |

Source: Author's calculations based on micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

Measuring the inequality of these 'standardized log earnings' by the coefficient of variation, we obtain a figure of 0.0130. Thereafter, in order to

gauge whether these standardized industry effects are large or small, we can compare them with the coefficient of variation for the non-standardized sectoral earnings, which is found to be 0.0234. Thus, the standardized inter-sectoral inequality is  $-0.0130/0.0234$  (55.5 per cent) of the gross inter-sectoral inequality. By this measure, we find that 44.5 per cent of the difference in earnings across one-digit sectors in Taiwan was due to inter-sectoral differences in worker characteristics. A parallel analysis was subsequently carried out at the two-digit industry level within the manufacturing sector (textiles, apparel, and so on), the results of which are presented in Table 2.7.

*Table 2.7 Non-standardized and standardized wage incomes in Taiwan, by two-digit industries, 1980 and 1993*

| Industry                       | Mean<br>ln(Income)<br>1980 | Mean<br>ln(Income)<br>1993 | Change in<br>Mean<br>ln(Income) | % Change<br>in Mean<br>ln(Income) |
|--------------------------------|----------------------------|----------------------------|---------------------------------|-----------------------------------|
| <b>Non-standardized</b>        |                            |                            |                                 |                                   |
| Food                           | 9.15                       | 9.95                       | 0.800                           | 0.088                             |
| Beverages and Tobacco          | 9.31                       | 10.45                      | 1.135                           | 0.122                             |
| Textiles                       | 9.02                       | 9.91                       | 0.893                           | 0.099                             |
| Apparel                        | 8.89                       | 9.59                       | 0.707                           | 0.080                             |
| Leather                        | 8.93                       | 9.79                       | 0.860                           | 0.096                             |
| Wood                           | 9.00                       | 9.84                       | 0.842                           | 0.094                             |
| Paper                          | 9.12                       | 9.92                       | 0.797                           | 0.087                             |
| Chemicals                      | 9.39                       | 10.22                      | 0.833                           | 0.089                             |
| Chemical Products              | 9.26                       | 9.99                       | 0.735                           | 0.079                             |
| Petroleum                      | 9.61                       | 10.44                      | 0.829                           | 0.086                             |
| Rubber Products                | 9.08                       | 9.86                       | 0.780                           | 0.086                             |
| Plastic Products               | 9.04                       | 9.81                       | 0.770                           | 0.085                             |
| Non-metallic Minerals          | 9.14                       | 10.00                      | 0.866                           | 0.095                             |
| Primary Metals                 | 9.37                       | 10.14                      | 0.771                           | 0.082                             |
| Fabricated Metal<br>Products   | 9.08                       | 9.95                       | 0.866                           | 0.095                             |
| Machinery                      | 9.17                       | 10.06                      | 0.892                           | 0.097                             |
| Electrical Equipment           | 9.01                       | 9.86                       | 0.846                           | 0.094                             |
| Transportation<br>Equipment    | 9.24                       | 10.02                      | 0.785                           | 0.085                             |
| Precision Equipment            | 9.00                       | 9.74                       | 0.742                           | 0.082                             |
| Miscellaneous<br>Manufacturing | 8.90                       | 9.66                       | 0.758                           | 0.085                             |
| Std. Dev.                      | 0.18                       | 0.22                       | 0.090                           | —                                 |
| Coefficient of Variation       | 0.02                       | 0.02                       | 0.109                           | —                                 |

Table 2.7 (Contd.)

| Industry                       | Mean<br>ln(Income)<br>1980 | Mean<br>ln(Income)<br>1993 | Change in<br>Mean<br>ln(Income) | % Change<br>in Mean<br>ln(Income) |
|--------------------------------|----------------------------|----------------------------|---------------------------------|-----------------------------------|
| Standardized                   |                            |                            |                                 |                                   |
| Food                           | 9.05                       | 9.92                       | 0.875                           | 0.097                             |
| Beverages and Tobacco          | 9.02                       | 10.13                      | 1.102                           | 0.122                             |
| Textiles                       | 9.11                       | 9.92                       | 0.811                           | 0.089                             |
| Apparel                        | 9.09                       | 9.81                       | 0.716                           | 0.079                             |
| Leather                        | 9.04                       | 9.85                       | 0.813                           | 0.090                             |
| Wood                           | 8.99                       | 9.84                       | 0.849                           | 0.094                             |
| Paper                          | 9.01                       | 9.89                       | 0.876                           | 0.097                             |
| Chemicals                      | 9.13                       | 10.00                      | 0.869                           | 0.095                             |
| Chemical Products              | 9.12                       | 9.92                       | 0.806                           | 0.088                             |
| Petroleum                      | 9.11                       | 10.04                      | 0.934                           | 0.103                             |
| Rubber Products                | 9.09                       | 9.87                       | 0.776                           | 0.085                             |
| Plastic Products               | 9.09                       | 9.85                       | 0.759                           | 0.083                             |
| Non-metallic Minerals          | 9.07                       | 9.96                       | 0.889                           | 0.098                             |
| Primary Metals                 | 9.21                       | 10.01                      | 0.797                           | 0.087                             |
| Fabricated Metal<br>Products   | 9.05                       | 9.89                       | 0.846                           | 0.093                             |
| Machinery                      | 9.07                       | 9.93                       | 0.862                           | 0.095                             |
| Electrical Equipment           | 9.06                       | 9.90                       | 0.835                           | 0.092                             |
| Transportation<br>Equipment    | 9.10                       | 9.91                       | 0.807                           | 0.089                             |
| Precision Equipment            | 9.04                       | 9.82                       | 0.782                           | 0.087                             |
| Miscellaneous<br>Manufacturing | 8.99                       | 9.78                       | 0.794                           | 0.088                             |
| Std. Dev.                      | 0.05                       | 0.08                       | 0.080                           | —                                 |
| Coefficient of Variation       | 0.01                       | 0.01                       | 0.095                           | —                                 |

Source: Author's calculations based on micro data archives from DGBAS (various years), *Manpower Utilization Surveys*.

The coefficient of variation of 'standardized log earnings' was found to be 0.0085, as compared with a coefficient of variation of 'non-standardized log earnings' of 0.0224. Thus, by this measure,  $1 - 0.0085/0.0224$  (62.1 per cent) of the earnings differential across the two-digit manufacturing sectors is accounted for by differences in the personal characteristics of the workers in the different sectors. These findings show that with finer disaggregation of labour market sectors, an even greater share of the inter-sectoral earnings differential is accounted for by differences in worker characteristics.

Finally, it is apparent from Tables 2.6 and 2.7 that earnings increased at very similar rates within different sectors of the Taiwanese economy. This is true both of gross earnings (Table 2.6) and standardized earnings (Table 2.7), and thus provides one additional piece of evidence to support the integrated labour market model.

So, what are we to make of these findings? Clearly, much of the evidence does provide support for the integrated labour market model; and indeed, it is also clear that the gross earnings differentials across different sectors which are apparent from the simple statistical tables substantially overstate the differences in the earnings of comparable workers in different parts of the Taiwanese economy. Furthermore, we have also demonstrated that the inter-sectoral wage differentials in Taiwan are smaller than those of the US, whilst there were also increases at very similar rates in standardized earnings throughout the Taiwanese economy.

Nevertheless, it still cannot be said that Taiwan's labour market is fully integrated in the sense that observationally equivalent workers in different sectors earn the same amount (where the term 'same' refers to no statistically significant differences across sectors). These findings are mostly, but not completely, consistent with the integrated labour market model (which is further formulated in Chapter 4).

## CONCLUSIONS

Throughout the course of Taiwan's exceptional performance in economic growth, there have been steady improvements in the island's labour market conditions. Two aspects of the labour market adjustment taking place in Taiwan have been explored in some detail in this chapter.

Firstly, a pseudo-cohort analysis of the changing employment structure has shown that most of the reallocation of workers across sectors took place as a result of young people entering the labour market in sectors that differed from those of their predecessors. By contrast, there were only minor shifts across sectors by prime-age workers.

Secondly, our analysis of inter-industry earnings differentials has demonstrated that although workers in Taiwan do earn different amounts, largely dependent upon the sector in which they are employed, and that the standardized earnings differentials are considerably smaller than the non-standardized differentials, inter-industry earnings differentials are, nevertheless, generally smaller in Taiwan than in the US. Furthermore, both standardized and non-standardized earnings grew at very similar rates across all sectors of the Taiwanese economy. Taken together, most of this data is consistent with an integrated labour market interpretation.

## NOTES

- <sup>1</sup> Our analysis starts from 1976, essentially because that was the start of the household income and expenditure survey used here.
- <sup>2</sup> This section extends research carried out by Dr. Philippe de Vreyer, which began at doctoral dissertation research level at Delta in Paris. The author is grateful to Dr. de Vreyer for his work in carrying out the calculations reported in this section.
- <sup>3</sup> The omitted category in the one-digit analysis was agriculture, whilst the omitted category in the two-digit analysis was miscellaneous manufacturing.

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**Appendix***Table A2.1 Unemployment rates in Taiwan, 1980-1994*

| Year | %   | Year | %   | Year | %   |
|------|-----|------|-----|------|-----|
| 1980 | 1.2 | 1985 | 2.9 | 1990 | 1.7 |
| 1981 | 1.4 | 1986 | 2.7 | 1991 | 1.5 |
| 1982 | 2.1 | 1987 | 2.0 | 1992 | 1.5 |
| 1983 | 2.7 | 1988 | 1.7 | 1993 | 1.5 |
| 1984 | 2.4 | 1989 | 1.6 | 1994 | 1.6 |

Source: CEPD (1995), Table 27.

*Table A2.2 Share of total employment, by education and employment type*

| Year | Share of Total Employment  |                          |   | Employed<br>Persons with<br>Primary<br>Education or<br>Below |
|------|----------------------------|--------------------------|---|--|
|      | Agricultural<br>Employment | Wage-employed<br>Workers | Professional,<br>Managerial,<br>Technical and<br>Clerical Personnel | Unit: %  |
| 1980 | 19.5                       | 64.4                     | 21.55   | 51.31  |
| 1981 | 18.8                       | 64.3                     | 22.12   | 49.57  |
| 1982 | 18.9                       | 64.1                     | 22.39   | 48.01  |
| 1983 | 18.6                       | 63.8                     | 22.55   | 46.74  |
| 1984 | 17.6                       | 64.4                     | 22.92   | 45.06  |
| 1985 | 17.5                       | 64.1                     | 23.35   | 43.46  |
| 1986 | 17.0                       | 64.7                     | 23.80   | 41.67  |
| 1987 | 15.3                       | 66.7                     | 24.87   | 39.75  |
| 1988 | 13.7                       | 67.1                     | 26.38   | 37.58  |
| 1989 | 12.9                       | 67.4                     | 27.60   | 35.79  |
| 1990 | 12.8                       | 67.6                     | 29.48   | 33.90  |
| 1991 | 13.0                       | 67.1                     | 30.34   | 32.63  |
| 1992 | 12.3                       | 67.8                     | 31.43   | 30.75  |
| 1993 | 11.5                       | 68.7                     | 33.88   | 28.76  |
| 1994 | 11.0                       | 68.9                     | —   | 27.50  |

Source: CEPD (1995), Tables 30-33.

Table A2.3 Real earnings growth, by one-digit industries, 1978-1993

| Industry                      | Real Earnings* |        | Real Growth (%) |
|-------------------------------|----------------|--------|-----------------|
|                               | 1978           | 1993   |                 |
| Mining                        | 7,683          | 16,916 | + 120.2         |
| Manufacturing                 | 5,420          | 14,664 | + 170.6         |
| Electricity, Gas and Water    | 9,426          | 31,661 | + 235.9         |
| Construction                  | 6,228          | 17,113 | + 174.8         |
| Commerce                      | 5,113          | 14,866 | + 190.8         |
| Transport                     | 7,910          | 19,325 | + 144.3         |
| Finance                       | 10,877         | 24,876 | + 128.7         |
| Business Services             | 11,143         | 21,422 | + 92.2          |
| Public and Community Services | 7,269          | 14,777 | + 103.3         |

Note: \* Real earnings are in 1978 New Taiwan dollars.

Source: CEPD (1994), Table 35.

Table A2.4 Nominal farm and non-farm household income, selected years

| Year | Farm (NT\$) | Non-farm (NT\$) | Farm/Non-Farm (%) |
|------|-------------|-----------------|-------------------|
| 1964 | 3,682       | 5,212           | 70.6              |
| 1980 | 35,199      | 52,682          | 66.8              |
| 1991 | 105,097     | 148,535         | 70.8              |

Source: DGBAS (1976-1993), Table 6.

Table A2.5 Average annual rise in earnings of manufacturing employees \*

| Year | %     | Year | %     | Year | %     |
|------|-------|------|-------|------|-------|
| 1980 | 100.0 | 1985 | 130.3 | 1990 | 203.0 |
| 1981 | 102.2 | 1986 | 142.5 | 1991 | 217.4 |
| 1982 | 108.7 | 1987 | 155.7 | 1992 | 229.4 |
| 1983 | 114.0 | 1988 | 170.2 | 1993 | 238.2 |
| 1984 | 124.7 | 1989 | 186.5 |      |       |

Note: \* 1980 = 100 per cent.

Source: CEPD (1995), Tables 35 and 170.



*Table A2.6 Estimated proportion of households with disposable income of less than NT\$200,000 \**

| Year | %    | Year | %    | Year | %    |
|------|------|------|------|------|------|
| 1980 | 47.4 | 1985 | 38.0 | 1990 | 18.1 |
| 1981 | 49.5 | 1986 | 34.2 | 1991 | 14.4 |
| 1982 | 49.4 | 1987 | 29.5 | 1992 | 14.5 |
| 1983 | 44.7 | 1988 | 23.5 | 1993 | 12.5 |
| 1984 | 39.0 | 1989 | 19.9 | 1994 | 11.7 |

*Note:* \* Estimations are at 1980 prices.

*Sources:* DGBAS (1976-1993), Table 7; CEPD (1994), Table 170.

*Table A2.7 Gini coefficient of individual earnings for all waged employees*

| Year | Gini Coefficient | Year | Gini Coefficient |
|------|------------------|------|------------------|
| 1980 | 0.249            | 1987 | 0.259            |
| 1981 | 0.247            | 1988 | 0.251            |
| 1982 | 0.254            | 1989 | 0.247            |
| 1983 | 0.261            | 1990 | 0.248            |
| 1984 | 0.253            | 1991 | 0.244            |
| 1985 | 0.250            | 1992 | 0.240            |
| 1986 | 0.261            | 1993 | 0.246            |

*Source:* Author's calculations based upon DGBAS (1993), *Report on the Survey of Personal Income Distribution*.