

**The Relationship Between the Ending of Martial Law and Earnings Inequality**

William M. Rodgers III  
The College of William and Mary  
Adjunct Associate, Humphrey Institute, University of Minnesota

and

Joseph Zveglich  
Harvard Institute for International Development

July 1998

We thank Paul Helms for outstanding research assistance and Yana Rodgers for helpful comments and suggestions. This paper has been prepared for Session WMA-02: Country Specific and Region-Specific Studies at the 1998 Academy of Business and Administrative Sciences International Conference in Budapest, Hungary, July 15, 1998.

## **Abstract**

We analyze the relationship between the end of martial law in Taiwan and the structure of monthly earnings. Using 20 years of annual household survey data from Taiwan's Manpower Utilization Survey, we apply breakpoint methods on various measures of aggregate earnings inequality to test for structural change. We find that the change in regimes led to a narrowing in both earnings and residual earnings inequality as political and union activity increased. Our results reflect a change in the trend rather than a one-time decline in inequality.

We then examine whether the relationship between real Gross Domestic Product and Taiwan's structure of earnings. Our results for male earnings indicate that GDP and inequality are positively correlated. We find that the end of martial law may have led to a weakening in the relationships. For residual earnings, we find that the regime change led to a distinct narrowing in inequality. For women, we find that GDP and earnings are negatively correlated; however, the relationship weakened after the end of martial law.

## **1. Introduction**

Estimating the economic impact of institutional changes is a key aspect of social science research. For example, labor economists have explored the impact that the passage of Federal Anti-discrimination Policy in 1964 had on the economic status of African Americans. Early studies estimated time-series models that contained a time trend and expenditures on government enforcement with breakpoints in 1964 to determine whether the employment and earnings of African Americans exhibited a significant increase after 1964. The potential pitfalls of this approach are wide known. In particular, these simple time-series models can not identify the independent impacts that the U.S. economy's rapid 1960s expansion and federal had on African American wages and employment outcomes.

Heckman and Paynor (1989) revisit this research problem. They provide a unique approach for estimating the independent impact of government policy. Focusing on South Carolina, Heckman and Paynor first show using basic time-series data that a dramatic shift in black employment and wages occurred in 1965. They argue that the independent effects of rapid economic growth and government policy can be if South Carolina is not a single labor market or that all counties are identical. Rapid economic growth would have differential effects across counties, while uniformly applied government policy would have similar effects. Heckman and Paynor find strong support the hypothesis that government anti-discrimination policy played an important role in improving the relative employment and wages of South Carolina African Americans.

We now turn our attention to Taiwan. On July 15, 1987, a major institutional change occurred. Four decades of martial law came to an end. The end of martial law

was the culmination of a liberalizing trend that began in the 1970s. At least five to ten years of political movement and protest from the electorate and deliberate motions by Chiang Chi-kuo contributed to the order's ending. From 1980 to 1987, the number and types of political protests rose. These protests departed from sole environmental stands (one of the only permitted topics for debate) and instead focused directly on political and economic issues.<sup>1</sup> The end of martial law confirmed workers' ability to express their concerns about the employer-employee contract. Because of anecdotal evidence, many argue that the uniform end of martial law and move to democracy had a real impact on the structure of Taiwan's earnings.<sup>2</sup>

However, others cite Taiwan's strong macroeconomic growth and tight labor market as the real source of changes in the country's earnings structure.<sup>3</sup> Growth in Taiwan's export market generated rapid overall growth and a booming securities market. Unemployment consistently remained near 2 percent, and the economy developed higher skill markets in response to international labor competition. The increasingly tight labor market, the need for higher skill workers and influx of foreign workers may have been the source of escalating number of disputes and a corresponding elevation in wage levels.<sup>4</sup>

The purpose of this paper is to determine whether the end of martial law had a direct impact on Taiwan's earnings structure. Using industry level data by gender, we apply Heckman and Paynor's methodology. We first document that earnings inequality narrowed after the end of martial law and the level of earnings rose. We then describe the rapid economic growth that Taiwan experienced during the 1980s. Using industry cross-section-time series data, we then demonstrate that Taiwan's industries represent

distinct labor markets. Because of this, we then use the industry variation to identify the independent effects that the uniform end of martial law had on Taiwan's structure of earnings.

Preliminary estimates suggest that a narrowing in both earnings and residual earnings inequality occurred at the end of martial law as political and union activity increased. We then examined whether the relationship between real Gross Domestic Product and Taiwan's structure of earnings changed. Our estimates for male earnings indicate that GDP and inequality are positively correlated for the 1978 to 1997 period, and that the end of martial law may have led to a weakening in the relationship. For residual earnings, we find that the regime change may have led to a distinct narrowing in inequality. For women, we find that GDP and earnings are negatively correlated over the 1978 to 1997 period; however, the relationship weakened after the end of martial law.

## 2. Methodology

To identify whether inequality changed after the end of martial law, we estimate wage equations by gender using industry level. We estimate pooled time-series-cross-section models for the years 1978 to 1997. The model for the  $j$ th demographic group can be written as

$$Y_{it} = \alpha_i + \alpha_1 t + \alpha_2 POST_{it} + \alpha_3 t * POST_{it} + \varepsilon_{it},$$

where  $i$  refers to industry and  $t$  refers to the year. The variable  $Y_{it}$  denote the industry  $i$ 's measure of inequality in year  $t$ . The fixed-effect  $\alpha_i$  is an industry specific intercept. The fixed effect controls for time-invariant omitted variables that are likely to impact demographic inequality. The variable  $POST_{it}$  is a dummy variable that equals 1 if industry  $i$ 's observation occurs after 1986, and 0 if the observation is 1986 or before. Its

coefficient ( $\alpha_2$ ) measures the average difference in inequality before and after the ending of martial law. The variable  $t$  denotes a time trend. It captures the before the end of martial law the average rate of change in  $Y_{it}$ , the measure of inequality, and the interaction of the time trend and the martial law dummy variable,  $t * POST_{it}$  measures inequality's average rate of change after martial law.

To estimate the independent effects of the end of martial law and macroeconomic growth on Taiwan's earnings inequality, we write the model for the  $j$ th demographic group as inequality. The models for each demographic group can be written as

$$Y_{it} = \alpha_i + \alpha_t + \alpha_1 POST_{it} + \alpha_3 RGDP_{it} + \alpha_5 RGDP_{it} * POST_{it} + \varepsilon_{it},$$

where  $RGDP_{it}$  denotes the logarithm of real gross domestic product for industry  $i$  in year  $t$ . We now add year-specific intercepts ( $\alpha_t$ ) to control for any time-varying uniform (across industries) country wide effects that may impact demographic inequality. The coefficient for  $RGDP_{it}$  measures the relationship between GDP and earnings inequality ( $Y_{it}$ ) prior to the end of martial law, and the interaction of the time trend and  $RGDP_{it}$ ,  $t * RGDP_{it}$  measures the relationship after the end of martial law. The models are estimated using weighted least squares where the weights are the square root of number of respondents in each industry.

The inequality measures are constructed from household data from Taiwan's *Manpower Utilization Survey*, conducted annually since 1978.<sup>5</sup> An average of 55,000 individuals were surveyed in each year. The earnings sample used to conduct the inequality measures consist of civilian non-farm employees aged 15 to 65 with positive reported earnings and hours worked, from 1978 to 1997. The sample contains an average 18,500 observations for each year.

For each year, we construct three aggregate measures of earnings inequality by gender for broad industry categories. The categories are: (1) mining, (2) manufacturing, (3) electricity, gas and water, construction, (4) Transportation, Storage and Communications, (5) Business Services, and (6) Social Services. More specifically, the measures are the difference between the 90<sup>th</sup> and 10<sup>th</sup> percentile logarithm of monthly earnings, the difference between the 90<sup>th</sup> and 50<sup>th</sup> percentile logarithm of monthly earnings and the difference between the 50<sup>th</sup> and 10<sup>th</sup> percentile logarithm of monthly earnings.

Real Gross Domestic Product by industry comes from the *National Income in Taiwan Area of the Republic of China: National Income Accounts for 1951-1996*. The values are in 1991 constant prices and in million NT\$. Figures 1 and 2 show the pattern of macroeconomic growth for the 1978 to 1997 period. We have placed a vertical line in the graph to identify the end of martial law. Real GDP's time series mildly suggest a change in its trend at the time of martial law's end. A change in trend is more apparent in the per capita GNP series.

The next figures plot our average logarithm monthly earnings and inequality series for each industry. The detailed values are presented in Appendix Tables A1 and A2. In general, the graphs support our claim that the end of martial law had an impact on the structure of earnings. The trends of average log monthly earnings of workers in mining, manufacturing, electricity, gas and water, construction, and commerce increase at approximately the same time that martial law ended. Our inequality measures, the 90-10 spreads start to narrow in five of the six industries after martial law ended.

## **5. Results**

Table 1 presents estimates of Equation (1). They provide a formal comparison of the trend in average log earnings and inequality before and after the end of martial law. Panel A reports the estimates for the logarithm of earnings and Panel B reports the estimates for the logarithm of residual earnings.<sup>6</sup> For men, earnings inequality as measured by the 90-10 spread narrowed at one-half of a percent year from 1978 to 1997, with the biggest reductions occurring since 1987, the end of martial law. The 90-50 and 50-10 spreads indicate that the post martial law narrowing was concentrated at the lower part of the earnings distribution. For women over the 1978 to 1997, earnings inequality did not change. However, when we break the period into pre and post martial law, we find that since 1987, the gap between the 90<sup>th</sup> and 10<sup>th</sup> percentile women has fallen on average by eight-tenths of one percent per year. Disaggregating the spread into the 90-50 and 50-10 also reveals that the narrowing was concentrated at the lower part of the earnings distribution.

The residual earnings estimates provide even stronger confirmation that the end of martial law may have had a significant impact on earnings inequality. Residual earnings inequality fell in the period before the end of martial law, but the rate of its decline is lower than during the period after the end of martial law. The larger post martial law reductions were uniform throughout the residual earnings distribution.

Before estimating our primary model, we first demonstrate that the industries represent distinct labor markets. This result is key in order to argue that general macroeconomic growth will have differential impacts across markets and thus allow us to identify the uniform effect of the end of martial law. Tables 2 and 3 present detailed summary statistics by gender for 1978, 1987 and 1997. The municipal and urban statistics

measure for a given industry the fraction of a demographic group whose jobs are in a municipality or urban area. In general, they show a tremendous time-series variation. For example, in manufacturing, 25 and 20 percent of men and women worked in municipalities in 1978. The figures had fallen to 15 and 12 percent in 1997. Employment in Commerce jobs located in municipal areas start at 60 and 66 percent in 1978 and fall to 39 and 44 percent in 1997. The average age and potential experience of respondents within industry categories changes slightly, with the biggest changes occurring in manufacturing. The educational attainment with industry categories also shows significant time series and cross section variation. A general increase in primary and secondary attainment occurs in all sectors from 1978 to 1997. Vocational and college degree shifts also occur throughout the period. Tremendous variation by gender occurs. Men made gains in technical programs, while women completed more commerce programs.

Table 4 presents estimates of Equation (2). Panel A shows the results for the logarithm of earnings and Panel B presents the results for residual logarithm of earnings. For men from 1978 to 1996, a one percent increase in real GDP is associated with a 15 percent increase in earnings inequality, and the relationship is distributed equally throughout the distribution. The models for each period suggest that there might have been a modest decline in this relationship, but the reduction is not statistically significant. Estimating the models using the half-spreads reveals that the bulk of the action occurs at the lower segment of the earnings distribution. For women from 1978 to 1996, a one percent increase in GDP is associated with a 28 percent reduction in inequality. The breakpoint analysis suggests that the impact is not greater in the post martial law period.

The half-spread models reveal a more complicated story. In the martial law period, an increase in GDP led to lower inequality at the upper segment of the earnings distribution. Since 1987, this relationship has dissipated. At the lower segment of the earnings distribution, GDP had no impact on inequality during martial law, but has a big effect after the end of martial law.

The estimates from the residual log earnings models indicate that an increase GDP lowers inequality in the post martial law period. For men, the estimates suggest that this is a new trend. During martial law, an increase in GDP raised inequality. Note the estimates of this relationship are quite noisy. Since 1987, a one percent increase in GDP lessens residual earnings inequality between the 90<sup>th</sup> and 10<sup>th</sup> percentile men by 13 percent, with 5 percent of the narrowing occurring at the lower segment and 7 percent occurring at the upper segment of the residual earnings distribution.

For women, an increase in GDP narrows residual inequality throughout the 1978 to 1996 period, before and after the end of martial law. The reduction is largest during the 1978 to 1987 period. A one percent increase in GDP is associated with a 30 percent narrowing in the distance between the 90<sup>th</sup> and 10<sup>th</sup> percentile women, with the reductions favoring the lower tail of the distribution. For the 1987 to 1996 period, a one point increase in GDP is associated with a 14 percent narrowing in inequality. The reduction slightly favors the upper segment of the residual earnings distribution.

## **5. Conclusions and Discussion**

A major research concern of social scientists is the estimation of the independent effects that government led institutional changes have on economic and social outcomes. In the past, the typical approach to identifying the impact has been to estimate time-series

models that contain a time trend and expenditures on government enforcement with a breakpoint at the time of enforcement. A prime example of this approach were studies that tried to identify the impact that Federal Anti-discrimination laws had on the relative wage and employment outcomes of African Americans. These simple time-series models can not identify the independent impacts that the U.S. economy's rapid 1960s expansion and federal had on African American wages and employment outcomes. It is not possible to disentangle the institutional and labor market effects.

Heckman and Paynor (1989) revisit this research problem. They provide a unique approach for estimating the independent impact of government policy. Focusing on South Carolina, they argue that the independent effects of rapid economic growth and government policy can be isolated as long as South Carolina is not a single labor market or that all counties are identical. As long as this assumption is true, rapid economic growth would have differential effects across counties, while uniformly applied government policy would have similar effects. Heckman and Paynor find strong support the hypothesis that government anti-discrimination policy played an important role in improving the relative employment and wages of South Carolina African Americans.

We apply the Heckman and Paynor approach to Taiwan in an effort to evaluate the impact that the end of martial has had on earnings inequality. We face the same problem because Taiwan was experiencing rapid economic growth when martial law ended. Using industry aggregates by gender, we show that the industries are distinct labor markets and thus macroeconomic growth would have had differential impacts across industries. We will be able to identify the end of martial law's effect as long as its repeal was uniform across Taiwan. Anecdotal evidence suggests that this is a reasonable

assumption.

Our results can be summarized as follows. In general we find support for the hypothesis that martial law's end had real effects on Taiwan's earnings inequality, especially residual inequality as political and union activity increased. Our results reflect a change in the trend rather than a one-time decline in inequality. Male earnings inequality and GDP are positively correlated for the 1978 to 1996 period. However, we find that the end of martial law led to a weakening in the relationship. For residual earnings, we find that the regime change led to a distinct narrowing in earnings inequality. For women, we find that GDP and earnings are negatively correlated; however, the relationship weakened after the end of martial law. Our analysis finds new evidence that even though some institutional changes may appear to be largely symbolic they still can have very real effects.

## References

- DGBAS. *Labor Force* (Published on world wide web:  
[Http://www.dgbasey.gov.tw/dgbas03/english/stat/labor.htm](http://www.dgbasey.gov.tw/dgbas03/english/stat/labor.htm)). Referenced June 1998.
- Frenkel, Stephen et al. (1993) "The Resurgence and Fragility of Trade Unions in Taiwan," in Stephen Frenkel, ed., *Organized Labor in the Asia-Pacific Region*. Ithaca, NY: ILR Press, pp. 162-186.
- Goldstein, Carl (1987). "Tiptoeing Toward Democracy?" *World Press Review*, 34 (11), pp. 19-20.
- Heckman, James J. and Brook S. Payner (1989). "Determining the Impact of Federal Antidiscrimination Policy on the Economic Status of Blacks: A Study of South Carolina," *The American Economic Review*, 79 (1), pp. 138-177.
- Liu, Philip (1988). "On Management-Labor Relations," *Free China Review*, 38 (5), pp. 14-16.
- Tseng, Osman (1988). "Labor Protests Unfair Treatment," *Free China Review*, 38 (5), pp. 17-19.
- Tzong-Shian, Yu (1988). "Complexities Compounded," *Free China Review*, 38 (10), pp. 26-29.
- Wade, Robert (1990). *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton: Princeton University Press.
- Wen-Tsung, Chen (1988). "Labor Flexes its Muscles," *Free China Review*, 38 (5), pp. 4-9.
- Wu, Jaushieh Joseph (1995). *Taiwan's Democratization: Forces Behind the New Momentum*. Hong Kong: Oxford University Press.
- Yeung, Irene (1990). "Labor Gets Organized," *Free China Review*, 40 (10), pp. 28-34.

**Table 1: The Impact of Ending Martial Law on the Structure of Taiwan's Earnings Structure  
(Standard Errors in Parentheses)**

Panel A: Logarithm of Monthly Earnings								
Period	Men				Women			
	90-10	90-50	50-10	lnW	90-10	90-50	50-10	lnW
1978-1997	-0.0051 (0.0010)	-0.0013 (0.0006)	-0.0038 (0.0007)	0.0595 (0.0009)	-0.0005 (0.0011)	0.0027 (0.0007)	-0.0032 (0.0008)	0.0574 (0.0007)
1978-1987	0.0014 (0.0025)	0.0020 (0.0018)	-0.0006 (0.0022)	0.0538 (0.0012)	-0.0020 (0.0028)	0.0023 (0.0020)	-0.0043 (0.0025)	0.0506 (0.0015)
1988-1997	-0.0049 (0.0025)	0.0009 (0.0015)	-0.0058 (0.0020)	0.0510 (0.0024)	-0.0086 (0.0021)	-0.0007 (0.0014)	-0.0079 (0.0019)	0.0544 (0.0018)

Panel B: Residual Logarithm of Monthly Earnings						
Period	Men			Women		
	90-10	90-50	50-10	90-10	90-50	50-10
1978-1997	-0.0052 (0.0005)	-0.0022 (0.0003)	-0.0030 (0.0003)	0.0004 (0.0007)	0.0003 (0.0004)	0.0002 (0.0004)
1978-1987	-0.0034 (0.0014)	-0.0016 (0.0008)	-0.0018 (0.0011)	-0.0003 (0.0017)	0.0007 (0.0009)	-0.0010 (0.0011)
1988-1997	-0.0048 (0.0011)	-0.0020 (0.0007)	-0.0027 (0.0007)	-0.0063 (0.0011)	-0.0037 (0.0007)	-0.0026 (0.0009)

Source: Authors' calculations from Taiwan's Manpower Utilization Survey: 1978-1997. Each entry represents the average annual change in the dependent variable for a given time period.

90-10: 90<sup>th</sup> – 10<sup>th</sup> Percentile logarithm of earnings.

90-50: 90<sup>th</sup> – 50<sup>th</sup> Percentile logarithm of earnings.

50-10: 50<sup>th</sup> – 10<sup>th</sup> Percentile logarithm of earnings.

lnW: Average logarithm of earnings.

**Table 2: Summary Statistics by Industry and Gender, Selected Years**

Year	Municipal		Urban		Age		Potential Experience	
	Men	Women	Men	Women	Men	Women	Men	Women
<b>Mining</b>								
1978	0.28	0.48	0.34	0.48	42.7	42.3	30.8	32.6
1987	0.05	0.07	0.09	0.14	46.4	42.7	34.1	30.2
1997	0.00	0.00	0.02	0.07	39.6	42.4	23.2	26.9
<b>Manufacturing</b>								
1978	0.25	0.20	0.41	0.33	29.7	24.2	14.9	10.6
1987	0.23	0.18	0.37	0.31	32.4	29.4	16.2	14.5
1997	0.15	0.12	0.30	0.29	35.8	35.1	18.3	18.9
<b>Electricity, Gas and Water, Construction</b>								
1978	0.29	0.35	0.43	0.49	33.3	31.1	20.2	17.5
1987	0.28	0.36	0.40	0.50	35.6	36.9	21.1	23.6
1997	0.20	0.24	0.37	0.45	36.8	38.0	20.9	22.8
<b>Commerce</b>								
1978	0.60	0.66	0.77	0.80	31.5	25.3	15.5	9.3
1987	0.57	0.63	0.72	0.77	31.7	27.0	14.3	9.3
1997	0.39	0.44	0.62	0.65	32.6	30.4	14.3	12.3
<b>Transportation, Storage and Communications</b>								
1978	0.42	0.44	0.66	0.63	36.2	26.1	21.2	8.9
1987	0.45	0.56	0.63	0.76	38.0	30.1	21.8	11.4
1997	0.37	0.55	0.56	0.74	39.0	34.4	21.2	15.0
<b>Business Services</b>								
1978	0.47	0.47	0.61	0.66	34.7	25.7	15.4	6.7
1987	0.60	0.57	0.73	0.70	36.8	28.2	17.2	8.8
1997	0.46	0.43	0.68	0.64	35.8	32.2	15.7	12.4
<b>Social Services</b>								
1978	0.38	0.35	0.53	0.53	39.9	29.0	22.8	12.0
1987	0.37	0.38	0.51	0.56	39.1	31.0	21.0	12.9
1997	0.29	0.29	0.45	0.48	37.8	33.5	18.7	14.3

Notes: Authors' calculations from the Manpower Utilization Survey: 1978, 1987, and 1997.

**Table 3: Educational Attainment Summary Statistics by Industry and Gender**

---

Panel A: Primary, Secondary and High School				
Year	Primary and Secondary		High School	
	Men	Women	Men	Women
Manufacturing				
1978	0.28	0.19	0.07	0.04
1987	0.44	0.34	0.07	0.06
1997	0.59	0.48	0.09	0.08
Electricity, Gas and Water, Construction				
1978	0.12	0.32	0.03	0.06
1987	0.24	0.28	0.05	0.04
1997	0.37	0.41	0.06	0.05
Commerce				
1978	0.45	0.47	0.15	0.10
1987	0.61	0.70	0.17	0.11
1997	0.73	0.75	0.14	0.12
Transportation, Storage and Construction				
1978	0.34	0.58	0.10	0.14
1987	0.47	0.82	0.13	0.11
1997	0.64	0.88	0.12	0.15
Business Services				
1978	0.82	0.85	0.12	0.12
1987	0.85	0.91	0.12	0.13
1997	0.91	0.92	0.12	0.12
Social Services				
1978	0.57	0.58	0.12	0.08
1987	0.65	0.70	0.09	0.10
1997	0.77	0.82	0.09	0.08

---

Notes: Authors' calculations from the Manpower Utilization Survey: 1978, 1987, and 1997.

---



**Table 3 cont.: Educational Attainment Summary Statistics by Industry and Gender**

Panel B: Vocational and Junior College												
Year	Vocational						Junior College					
	Technical		Commerce		Other		Technical		Commerce		Other	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Manufacturing	0.10	0.01	0.03	0.11	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.00
1978	0.10	0.01	0.03	0.11	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.00
1987	0.20	0.03	0.03	0.19	0.01	0.01	0.07	0.01	0.01	0.02	0.01	0.00
1997	0.25	0.05	0.03	0.20	0.00	0.02	0.13	0.03	0.01	0.06	0.00	0.01
Electricity, Gas and Water, Construction												
1978	0.04	0.00	0.01	0.13	0.00	0.01	0.01	0.00	0.00	0.06	0.00	0.01
1987	0.10	0.01	0.01	0.11	0.00	0.00	0.04	0.01	0.00	0.04	0.01	0.00
1997	0.18	0.02	0.02	0.16	0.00	0.01	0.06	0.06	0.01	0.08	0.01	0.00
Commerce												
1978	0.07	0.00	0.09	0.23	0.01	0.00	0.04	0.00	0.02	0.06	0.01	0.01
1987	0.18	0.02	0.06	0.34	0.01	0.02	0.07	0.01	0.03	0.11	0.01	0.01
1997	0.25	0.04	0.05	0.31	0.01	0.04	0.14	0.03	0.03	0.14	0.01	0.01
Transportation, Storage and Construction												
1978	0.10	0.04	0.04	0.26	0.01	0.01	0.02	0.00	0.01	0.06	0.02	0.01
1987	0.15	0.01	0.03	0.40	0.01	0.01	0.05	0.03	0.01	0.12	0.02	0.03
1997	0.25	0.03	0.04	0.29	0.00	0.03	0.09	0.02	0.02	0.15	0.02	0.04
Business Services												
1978	0.09	0.01	0.25	0.48	0.01	0.01	0.04	0.01	0.05	0.09	0.01	0.03
1987	0.12	0.04	0.15	0.41	0.02	0.02	0.09	0.02	0.06	0.15	0.04	0.02
1997	0.16	0.03	0.08	0.31	0.01	0.02	0.15	0.05	0.11	0.20	0.01	0.01
Social Services												
1978	0.07	0.04	0.03	0.14	0.03	0.02	0.03	0.03	0.01	0.03	0.09	0.11
1987	0.12	0.05	0.03	0.15	0.03	0.02	0.06	0.06	0.01	0.05	0.11	0.11
1997	0.18	0.05	0.03	0.18	0.02	0.05	0.09	0.09	0.02	0.06	0.11	0.07

Notes: Authors' calculations from the Manpower Utilization Survey: 1978, 1987, and 1997.

**Table 3 cont.: Educational Attainment Summary Statistics by Industry and Gender**

Panel C: College						
	Technical		Commerce		Other	
	Men	Women	Men	Women	Men	Women
Manufacturing						
1978	0.02	0.00	0.01	0.00	0.01	0.00
1987	0.03	0.00	0.01	0.01	0.01	0.01
1997	0.05	0.01	0.02	0.02	0.00	0.01
Electricity, Gas and Water, Construction						
1978	0.01	0.01	0.00	0.04	0.00	0.01
1987	0.02	0.00	0.00	0.04	0.00	0.01
1997	0.02	0.00	0.00	0.02	0.00	0.01
Commerce						
1978	0.01	0.00	0.03	0.02	0.03	0.03
1987	0.04	0.00	0.03	0.04	0.02	0.03
1997	0.05	0.00	0.04	0.04	0.02	0.02
Transportation, Services and Construction						
1978	0.02	0.01	0.01	0.02	0.01	0.04
1987	0.02	0.00	0.01	0.04	0.03	0.05
1997	0.05	0.02	0.03	0.08	0.01	0.06
Business Services						
1978	0.05	0.00	0.13	0.07	0.06	0.02
1987	0.10	0.01	0.13	0.08	0.05	0.04
1997	0.09	0.01	0.14	0.14	0.04	0.04
Social Services						
1978	0.05	0.02	0.02	0.02	0.12	0.09
1987	0.08	0.03	0.02	0.03	0.11	0.10
1997	0.11	0.04	0.03	0.05	0.11	0.15

Notes: Authors' calculations from the Manpower Utilization Survey: 1978, 1987, and 1997.

**Table 4: The Impact of Ending Martial Law on the Relationship Between GDP and Taiwan's Earnings Structure**

Panel A: Logarithm of Monthly Earnings								
Period	Men				Women			
	90-10	90-50	50-10	InW	90-10	90-50	50-10	InW
1978-1997	0.1529 (0.0438)	0.0644 (0.0271)	0.0885 (0.0363)	-0.0657 (0.0254)	-0.2844 (0.0446)	-0.1325 (0.0355)	-0.1519 (0.0372)	0.0304 (0.0221)
1978-1987	0.1935 (0.1062)	0.0361 (0.0750)	0.1574 (0.0908)	0.0842 (0.0450)	-0.1988 (0.1838)	-0.2291 (0.1488)	0.0303 (0.1826)	0.2025 (0.1069)
1988-1997	0.1482 (0.0857)	0.0149 (0.0436)	0.1333 (0.0732)	-0.0353 (0.0382)	-0.1664 (0.0710)	-0.0199 (0.0519)	-0.1465 (0.0548)	-0.0212 (0.0277)

**Panel B: Residual Logarithm of Monthly Earnings**

Period	Men			Women		
	90-10	90-50	50-10	90-10	90-50	50-10
1978-1997	0.0245 (0.0261)	0.0235 (0.0162)	0.0010 (0.0166)	-0.1579 (0.0254)	-0.1004 (0.0170)	-0.0574 (0.0154)
1978-1987	0.0461 (0.0648)	0.0565 (0.0375)	-0.0104 (0.0477)	-0.3053 (0.1180)	-0.1213 (0.0719)	-0.1840 (0.0732)
1988-1997	-0.1258 (0.0435)	-0.0516 (0.0300)	-0.0743 (0.0265)	-0.1382 (0.0291)	-0.0897 (0.0234)	-0.0485 (0.0217)

Source: Authors' calculations from Taiwan's Manpower Utilization Survey: 1978-1997. Each entry represents the percent change in the dependent variable due to a one percent increase in real GDP for a given time period.

90-10: 90<sup>th</sup> – 10<sup>th</sup> Percentile logarithm of earnings.

90-50: 90<sup>th</sup> – 50<sup>th</sup> Percentile logarithm of earnings.

50-10: 50<sup>th</sup> – 10<sup>th</sup> Percentile logarithm of earnings.

InW: Average logarithm of earnings.

**Table A1: Average Log Monthly Earnings by Gender and Industry**

Year	Mining		Manufacturing		Electricity, Gas & Water, Construction		Commerce		Transportation, Storage, and Communications		Business Services		Social Services	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1978	9.29	8.67	9.10	8.68	9.22	8.91	9.16	8.89	9.45	9.05	9.54	9.05	9.25	8.90
1979	9.41	8.90	9.21	8.78	9.29	9.00	9.31	8.98	9.55	9.13	9.65	9.15	9.36	9.00
1980	9.41	8.60	9.23	8.79	9.35	9.02	9.31	9.00	9.55	9.17	9.64	9.09	9.35	9.04
1981	9.61	8.83	9.29	8.86	9.40	9.06	9.36	9.03	9.59	9.16	9.67	9.20	9.41	9.10
1982	9.70	8.96	9.37	8.90	9.43	9.13	9.44	9.09	9.70	9.27	9.74	9.31	9.50	9.17
1983	9.49	8.63	9.42	8.93	9.47	9.19	9.47	9.13	9.72	9.37	9.81	9.39	9.58	9.24
1984	9.67	9.21	9.47	8.99	9.54	9.19	9.56	9.21	9.74	9.44	9.83	9.42	9.57	9.29
1985	9.75	9.16	9.52	9.05	9.58	9.27	9.57	9.24	9.82	9.45	9.88	9.50	9.65	9.34
1986	9.81	9.18	9.57	9.06	9.62	9.24	9.60	9.26	9.88	9.60	9.92	9.52	9.73	9.42
1987	9.92	9.12	9.64	9.12	9.71	9.33	9.69	9.32	9.90	9.62	9.99	9.57	9.76	9.45
1988	9.91	9.29	9.73	9.21	9.81	9.46	9.77	9.42	9.95	9.66	10.05	9.64	9.86	9.54
1989	10.05	9.22	9.84	9.30	9.96	9.61	9.91	9.53	10.08	9.76	10.12	9.69	9.95	9.61
1990	10.08	9.37	9.92	9.39	10.05	9.68	9.95	9.58	10.12	9.80	10.19	9.82	10.01	9.68
1991	10.15	9.61	9.99	9.46	10.14	9.72	10.04	9.68	10.21	9.90	10.23	9.89	10.12	9.77
1992	10.06	9.67	10.04	9.52	10.19	9.83	10.08	9.72	10.28	9.99	10.26	9.92	10.18	9.85
1993	10.35	9.84	10.11	9.56	10.24	9.90	10.08	9.75	10.34	10.04	10.33	9.94	10.25	9.90
1994	10.31	9.72	10.14	9.60	10.27	9.96	10.12	9.78	10.37	10.08	10.35	10.00	10.28	9.93
1995	10.31	9.79	10.16	9.63	10.26	9.96	10.14	9.79	10.38	10.07	10.35	10.03	10.28	9.96
1996	10.33	9.65	10.17	9.66	10.21	9.91	10.11	9.77	10.37	10.10	10.36	10.05	10.28	9.98
1997	10.38	9.67	10.18	9.70	10.21	9.95	10.15	9.79	10.36	10.12	10.37	10.11	10.29	10.01

Source: Authors' calculations from Taiwan's Manpower Utilization Survey: 1978-1997.

**Table A2: Difference Between the 90th and 10th Percentile Log Monthly Earnings by Gender and Industry**

Year	Mining		Manufacturing		Electricity, Gas & Water, Construction		Commerce		Transportation, Storage, and Communication		Business Services		Social Services	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1978	0.75	1.12	0.98	0.83	0.88	0.88	1.10	0.96	0.73	1.04	1.27	1.13	0.94	1.25
1979	0.79	0.99	0.98	0.80	0.92	0.92	1.10	0.85	0.77	0.97	1.28	1.00	1.01	1.32
1980	0.92	1.03	0.98	0.85	0.96	0.74	1.03	0.81	0.82	0.98	1.12	0.92	0.96	1.30
1981	0.81	1.01	0.95	0.72	0.97	0.69	0.98	0.89	0.81	0.96	1.20	1.10	1.01	1.25
1982	0.69	0.98	0.98	0.69	1.01	0.88	1.10	0.88	0.85	0.92	1.08	0.98	1.07	1.32
1983	0.86	1.50	1.02	0.73	0.94	0.84	1.05	0.80	0.89	0.96	1.22	1.20	1.05	1.16
1984	0.80	0.83	0.94	0.80	0.81	0.96	1.10	0.92	0.89	1.01	1.08	1.20	1.08	1.22
1985	0.79	1.10	0.98	0.79	0.92	0.77	0.98	0.92	0.88	1.05	1.10	1.10	1.08	1.28
1986	0.79	1.10	0.92	0.79	0.92	0.92	1.12	0.92	0.73	0.97	1.14	1.15	1.14	1.24
1987	0.50	0.83	1.01	0.88	0.74	0.92	1.14	0.76	0.73	0.97	1.16	1.20	1.18	1.25
1988	0.61	0.76	1.02	0.85	0.92	0.84	1.06	0.82	0.85	1.08	1.07	1.06	1.06	1.26
1989	0.73	0.85	0.93	0.92	0.84	0.89	0.92	0.92	0.73	1.03	1.17	1.06	1.07	1.14
1990	0.85	0.39	0.88	0.81	0.82	0.92	0.98	0.89	0.78	1.13	1.10	1.13	1.10	1.29
1991	0.85	1.10	0.82	0.92	0.75	0.96	0.88	0.92	0.80	1.03	0.92	0.99	0.98	1.27
1992	1.03	1.48	0.88	0.87	0.69	0.92	0.98	0.85	0.75	1.05	1.02	1.07	1.03	1.31
1993	0.66	0.85	0.80	0.85	0.81	0.85	0.92	0.92	0.74	0.98	1.03	1.07	1.02	1.20
1994	0.65	0.57	0.89	0.82	0.88	0.88	0.92	0.78	0.69	1.03	1.10	0.98	1.03	1.12
1995	0.66	0.69	0.83	0.85	0.92	0.81	0.94	0.69	0.75	0.94	1.05	1.03	1.03	1.08
1996	0.51	0.51	0.92	0.92	0.92	0.88	1.02	0.76	0.81	1.02	0.92	1.02	1.08	1.14
1997	0.51	1.10	0.92	0.76	0.92	0.75	0.92	0.76	0.75	0.97	1.11	1.02	1.10	1.20

Source: Authors' calculations from Taiwan's Manpower Utilization Survey: 1978-1997.

## Endnotes

---

<sup>1</sup> For more detailed discussion of the background, see, for example, Liu (1988), Tseng (1988), Frenkel (1993), Wen-Tsung (1988), and Yeung (1990).

<sup>2</sup>In an article examining the aftermath of July's action, Goldstein (1987) noted that

[a] formerly quiescent public's increasing willingness to take direct action to redress grievances is reflected almost every day in local newspapers, which once obediently followed the party's [KMT's] directives to suppress or exaggerate stories. Recent headlines have been about villagers forcibly shutting down a polluting factory, or laid-off workers from a state-owned enterprise camping out on a government ministry's doorstep. In another case, thousands of retired servicemen laid siege to party headquarters in Taipei to press their demands for better welfare benefits.

<sup>3</sup> Taiwan's strong economy has its origins to when it was a Japanese colony. Japan, competing with western powers, sought to develop Taiwan. As a result, Taiwan began with a stronger, more stable base than the typical developing country at similar stages of development. In 1949, when the mainlanders moved to Taiwan, a successful land reform granted the KMT legitimacy and guaranteed its strong oversight of the economy. Under martial law, Taiwan shifted from agricultural to industrial production. The 1980's witnessed another transformation as competition from South Korea, the Philippines and the PRC encouraged the growth of a service industry, as well as higher skill-oriented production. Since the 1970's, Taiwan's record for low inflation, stable investment climate, U.S. aid and the removal of several trade barriers (with 1987 legislation) has encouraged investment activity, both foreign and domestic. The second half of the 1980's continued the trends mentioned above. Liberalizing legislation in 1986 and 1987 spurred trade with the mainland. Moves to high technology and increasing education levels and quality improved labor productivity. A key feature of the economic development and growth was that has been generally evenly distributed.

<sup>4</sup> Tzong-Shian (1988) argues that the sustained growth has been dependent on government influence and the performance of a strong export market.

<sup>5</sup> Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, and the Council for Economic Planning and Development, Taiwan, Republic of China. The Chung-Hua Institution for Economic Research provided the data.

<sup>6</sup> The residual earnings distributions for men and women by industry were constructed by creating the residual from a regression of the logarithm of monthly earnings on hours worked, part-time work status, educational attainment, potential experience, tenure, region of employment, municipal location of employment, and urban location of employment. Regressions are estimated for by gender and industry, providing fourteen residual distributions.