

Economic Change and the Structure of Opportunity for Low-educated Workers in Taiwan

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Abstract

How economic change affects job availability for less-skilled workers in Taiwan? Employment and earnings are the primary sources of support for most non-elderly adults. Thus, a key to understanding changes in the well-being of low-income populations is to understand the jobs and wages available to less-skilled workers. The macro-economy influences unemployment rates, wage shifts, and overall economic growth, all of which are important factors that determine the economic well-being of low-income families. This study is going to focus on the trends in labor market and macroeconomic circumstances that particularly affect less-educated and low-wage workers. We look at changes in work behavior among individuals by skill level and, then, examine unemployment and job availability. Secondly, the focus of this study is put on trends in earnings. We discuss the reasons behind substantial earnings shifts among lower-paid workers and higher-paid workers by gender since 1994. Moreover, we investigate the relationship between macroeconomic and labor market factors and poverty rates by using the vector autoregression (VAR) technique to analyze multivariate time-series data collected from 1978 to 2015. Finally, this study will discuss policy implications based on empirical results. Based on empirical evidence, we suggest that maintaining a high-employment economy and increasing skill levels for low-educated workers are important long-term solutions to the reduction of poverty in Taiwan.

Keywords: Economic Change, Job Availability, Unemployment, Less-skilled Workers, Poverty.

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Introduction

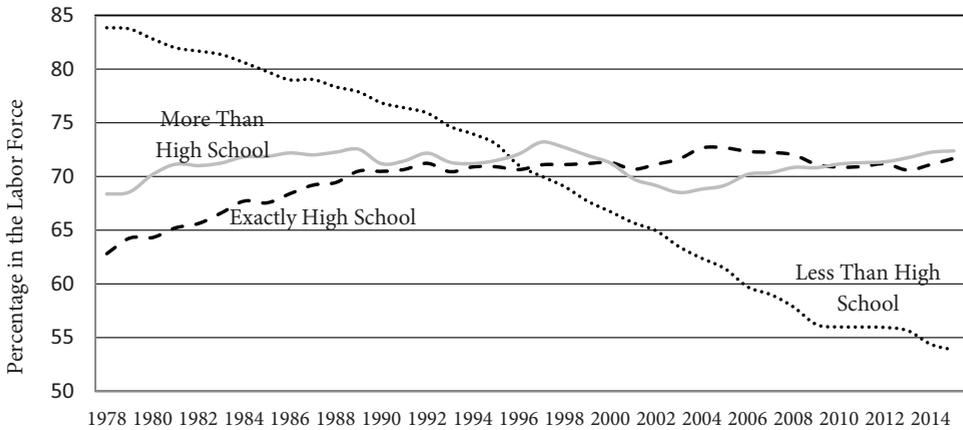
Employment and earnings are the primary sources of support for most non-elderly adults. Thus, understanding the jobs and wages available to less-educated workers is a key to understanding changes in the well-being of low-income populations. Expansions and contractions in the macro-economy influence unemployment rates, wages, and overall economic growth, all of which are important determinants of the economic circumstances facing low-income families.

This study is going to focus on the trends in labor market and macroeconomic circumstances that particularly affect less-educated and low-wage workers. First of all, this paper will look at changes in work behavior among individuals by skill level and, then, at unemployment and job availability. The second issue that this study is going to talk about is to investigate trends in earnings and discusses the reasons behind substantial earnings shifts among lower-paid workers and higher-paid workers by gender since 1994. The third part of the study will investigate the relationship between macroeconomic and labor market factors and poverty rates. Finally, this study will discuss policy implications based on empirical results.

Changes in Work among Less-Educated People

The economy is always a primary determinant of affecting people who are working or actively looking for a job. In Taiwan, trends in labor force participation for less-educated workers are markedly declining since the 1980s and they have differed between less-skilled men and women¹. Thus, we discuss the factors influencing work behavior among men first. Labor force participation declined dramatically among less-educated men between 1978 and 2015. Figure 1 shows the trends over this time period in the share of men above the age of fifteen who reported themselves as either working or looking for a job. The dotted line indicates labor force participation among men who did not hold a high school diploma. The dashed line represents men who held only a high school diploma, while the solid line shows labor force participation among men who had at least some schooling beyond high school.

¹ Labor force participation rate is the ratio between labor force and overall non-institutionalized civilian adults aging above fifteen.

Figure 1. Male Labor Force Participation by Skill Level, 1978 to 2015

Note: Based on all adults whose ages are over fifteen years old and who are capable of working and willing to participate in economic activities, but not including armed forces and inmates.

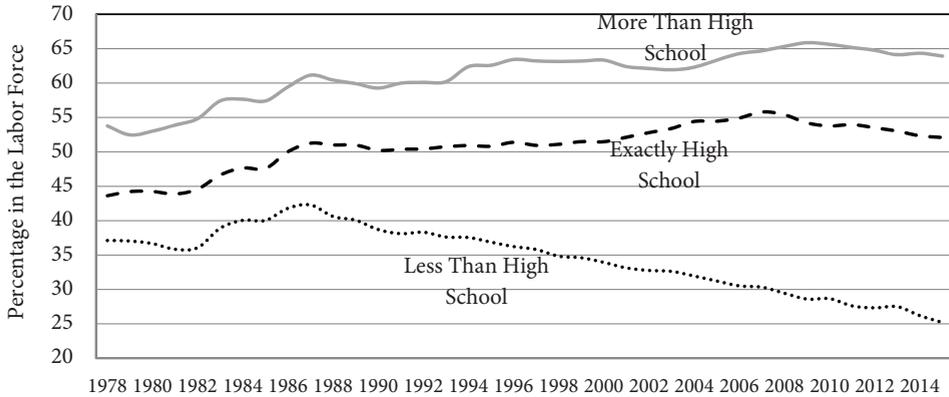
Source: Author's compilation based on Human Resources Survey data [Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)].

Before 1995, men with less than a high school diploma have always been highly likely to work than those with only a high school diploma or more, about an 83.86 to 73.03 percent labor force participation rate, but their labor force participation rate declined remarkably since then. The dramatic decline is due to growing years of school and earlier years of retirement within this group. In contrast, male workers with only a high school diploma or more have seen quite stability in labor market involvement. The participation rate among men with only a high school diploma increased from 62.83 percent to 71.69 percent between 1978 and 2015; among those with more than a high school diploma it increased from 68.37 percent to 72.39 percent although it slightly declined between 1998 and 2004. It is worth noting that these data underestimate the declining labor market involvement of less-skilled men because they exclude men in the armed forces and in prisons and jail.

Why did labor force participation among less-skilled men decline dramatically during this time period? F.M. Huang, Chen, and Huang (2006) examine trends in labor force participation in Taiwan's society between 1980 and 2002 and indicate that virtually the decline in less-skilled men's labor force participation since 1994 can be explained by a factor of which labor market did not provide enough job opportunities to less-skilled male workers. Many researchers have found that declines in market opportunities has also play an important role in explaining decreasing trends in labor

force participation for less-skilled men in the United States (Haveman, Wolfe 1984; Juhn 1992; Parsons 1980).

Figure 2. Female Labor Force Participation by Skill Level, 1978 to 2015



Note: Based on all adults whose ages are over fifteen years old and who are capable of working and willing to participate in economic activities.

Source: Author's compilation based on Human Resources Survey data [Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)].

Figure 2 reports labor force participation among women between 1978 and 2015 and shows a distinct pattern between the same three education groups as in Figure 1. The trends in work behavior in the formal labor market are quite different for women and men. In general, women with only a high school diploma or more have increased their labor force involvement since 1978, while labor force participation among women with less than high school diploma falls remarkably since 1988. Women with post-high school training (the solid line in Figure 2) show steady increases in work, from 53.79 percent in 1978 to 65.89 percent in 2009, after which the rate falls slightly, to 63.94 percent, in 2015. High school graduates (the dashed line) show a similar pattern, starting at 43.64 percent in 1978, peaking at 55.82 percent at 2007, and falling to 52.1 percent at 2015.

In contrast, women without a high school diploma had labor force participation rates just over 35 percent from 1978 to 1982. Their rate increased to over 42 percent by 1987, then declined exceptionally to 25.22 percent by 2015. The decrease in work among the less-educated women since 1987 was related to changes in real wage rate (Huang, Weng, Huang 2009). As real wage rate decreased, less-educated women were not willing to involve in labor market instead of staying at home to take care of their family. Since the 1980s, Taiwan's economic structure has gradually transformed

from labor-intensive industries to technology-intensive high-tech manufacturing so that both labor demand and real wage rate for less-skilled women decrease steadily at that time.

Increases in incarceration have had little net effect on women's overall labor force statistics. Although the share of incarcerated women has grown substantially, the total number remains quite low.

In sum, as international trade is growing rapidly and the tide of economic globalization rises quickly, a lot of traditional labor-intensive industries move out of Taiwan and relocate their factories in developing countries for cheap labor supply and more profits. Labor market involvement among both less-skilled men and women has fallen since the 1980s, while labor force participation among other education groups has risen. A primary reason for this is different real wage rate and job availability among different skilled workers. We will discuss job availability first and then turn to the issue of wage rate.

Chang in Unemployment

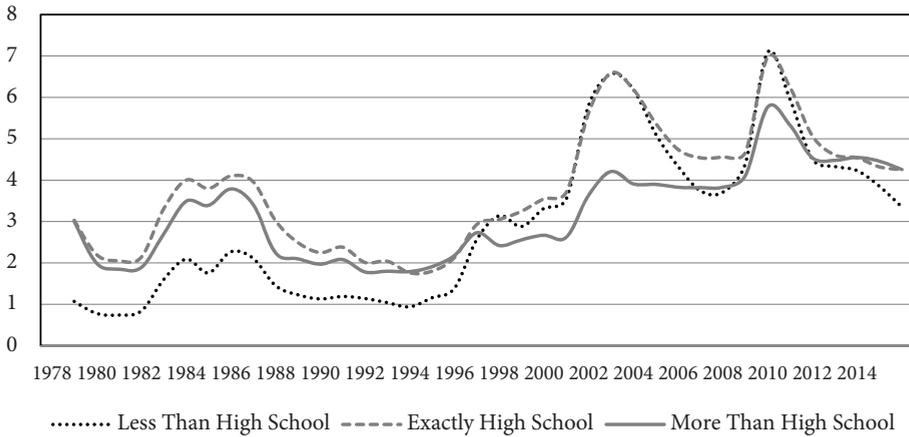
Labor force participation measures the share of the population that is working or looking for a job. If a high share of those in the labor force is without a job but searching, this indicates lower well-being than when employment is high. Hence, the overall unemployment rate is an important indicator of economic well-being, particularly for lower-wage workers, who generally face higher unemployment rates than more-skilled workers.

In Taiwan, men's unemployment rates were usually lower than women's, but since 1996 male unemployment rates exceeded female unemployment rates for the first time (Data are not shown here). Generally speaking, men consider work as their top priority when scheduling their work hours, while women usually put family in their first place (Scandura, Lankau, 1997; Su, Liu, Shih 2011; Taniguchi & Fujimoto 2006). The unemployment gap between men and women reached the highest point in 2002 by 1.81 percent, and since then the gap shrank gradually.

Figure 3 and 4 present male and female unemployment rates among three education levels, respectively. As the results shown in Figure 3, men's unemployment rates among three groups move together very closely. In general, unemployment rates were relatively high from the late-1990s to the mid-2015, certainly in comparison to the 1980s and the early 1990s, when unemployment rates steadily remained low.

Among those with less than a high school diploma (the dotted line in Figure 3), unemployment was slightly lower than other groups before 1996, roughly under 2 percent during this period, but since then unemployment rose steeply, almost as three times as higher than that of the 1980s and the early 1990s.

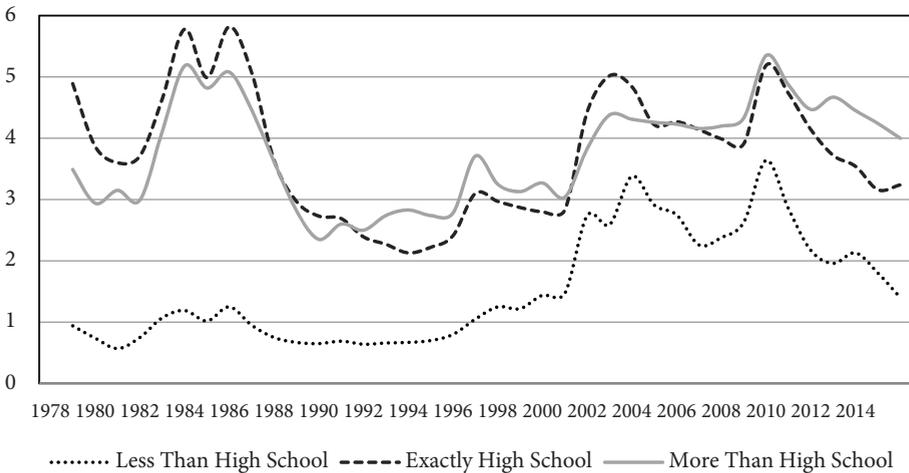
Figure 3. Male Unemployment Rates by Skill Level, 1978 to 2015



Note: Based on all non-institutionalized civilian adults age above fifteen.

Source: Author’s compilation based on Human Resources Survey data (Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)).

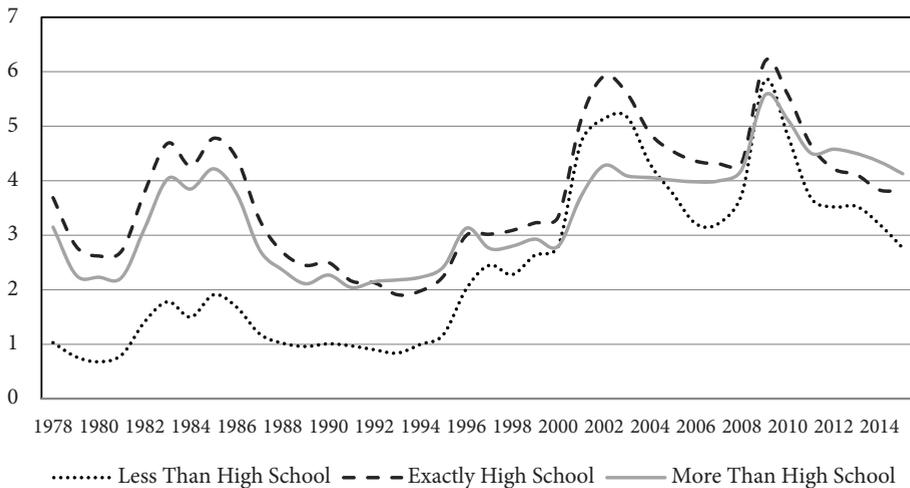
Figure 4. Female Unemployment Rates by Skill Level, 1978 to 2015



Source: Author’s compilation based on Human Resources Survey data [Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)].

In contrast, female unemployment rates among skill levels reported in Figure 4 show a different pattern from those presented in Figure 3. Women with less than a high school diploma always had the lowest unemployment rates in every year between 1978 and 2015, even during the recession years of the 2000s. The unemployment among the less skilled women was 0.57 percent in 1981 which was the lowest rate in our data, and it remained under 1 percent during the 1990s. The less skilled women had an unemployment rate of 3.64 percent in 2010, well below the 5.35 percent for both high school graduates and those with post-high school training. Less skilled women had the lowest unemployment rates because the real wage rate for their skills was quite low so that they decide to leave labor market (Huang et al. 2009). Other researchers have argued that women with less than a high school diploma usually get married early so that they are forced to leave labor force (Li, Yang 2004). The calculation of unemployment rates does not include people who are not in labor force. Therefore, these might be reasons explaining low unemployment among less skilled women in Taiwan.

Figure 5. Unemployment Rates by Skill Level, 1978 to 2015



Note: Based on all non-institutionalized civilian adults age above fifteen.

Source: Author's compilation based on Human Resources Survey data (Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)).

Figure 5 plots unemployment rates by education level between 1978 and 2015 for the three groups. The results presented in Figure 5 indicate two interesting points. First of all, unemployment rates steadily move upward between 1978 and 2015,

no matter what groups we are looking at. Secondly, Figure 5 shows that Taiwan's economy moved into three significant recessions occurring from 1983 to 1985, in 2002, and in 2009. It is worth noting that unemployment among the less skilled is rising much more rapidly than unemployment among more highly skilled workers.

Changes in Jobs and Job Availability

The labor market has experienced relatively low and stable unemployment rates between the mid-1980s and the mid-1990s. Even with remarkable decline in labor force participation among less-educated workers, the Taiwanese economy still performed quite well over past two decades. This reflects good overall Taiwan's economic growth during these decades, which created a growing number of jobs.

Figure 6. Workers in Manufacturing Jobs by Gender and Skill, 1993 to 2015



Note: Workers counts include all current employment in durable and nondurable manufacturing.

Source: Author's compilation based on Manpower Survey data (Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan))

There has been much concern about the declining number of good jobs that pay with wages and provide fringe benefits for less-educated workers. Figure 6 plots changes in manufacturing jobs from 1993 to 2015 among men and women². The

² Figure 6 and 7 are calculated with Manpower Survey data. The industry definitions change every four years since 1993, so constructing a consistent series is not straightforward. The data start in 1993 because the large scale manpower survey data are available since that year. Figure 6 includes workers in

black bars show the share of less-skilled workers (those with high school diploma or less) working in manufacturing. The gray bars show the percentage of all workers employed in manufacturing. The manufacturing jobs have remained steadily among all male and female workers during this time period. But among less-skilled male and female workers, their manufacturing employment have declined dramatically, the share employed in manufacturing fell from 49.1 percent in 1993 to 33.4 percent in 2015 for male workers and 37.4 percent in 1993 to 20.2 percent in 2015 for female workers.

Although the decline in manufacturing jobs has meant that fewer jobs are available for less-skilled worker, we are wondering whether different jobs are created and available for them. Figure 7 shows the share of workers in retail trade and selected service jobs, including hotels, restaurants, and entertainment and tourism. The share of less-educated men in these jobs declined from 44.7 percent to 28.5 percent between 1993 and 2015, and the share of less-educated women from 39.0 percent to 29.3 percent. These results are disappointing and a selected set of jobs are not created for less-educated workers.

Figure 7. Workers in Retail Trade and Selected Service Jobs by Gender and Skill, 1993 to 2015



Note: Workers counts include all current employment in retail trade, arts and entertainment, recreation, accommodation, and food and drinking places.

Source: Author's compilation based on Manpower Survey data (Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan))

The results presented in Figure 6 and Figure 7 show manufacturing and selected service jobs have slightly increased or steadily remained among all workers during

durable and nondurable manufacturing. Figure 7 includes workers in retail trade, arts entertainment and recreation, accommodation, and food and drinking places.

this time period, but employment in manufacturing and selected services have remarkably declined among less-educated workers. Such industry shifts, reducing manufacturing jobs and other jobs opportunities, can cause severe disruption for less-educated workers who find themselves seeking work in very different sectors of the economy. The jobs less-educated workers used to hold have become much less available. Less-educated workers are more affected by cyclical movements in economic growth than are more-educated workers. When economic downturns occur, less-educated workers are more likely to lose their jobs, to move into part-time work, or to leave the labor force entirely. A glance at unemployment trends among more- and less-educated workers in Figure 5 indicates that unemployment among less-educated workers has increased rapidly more than among more-educated counterparts.

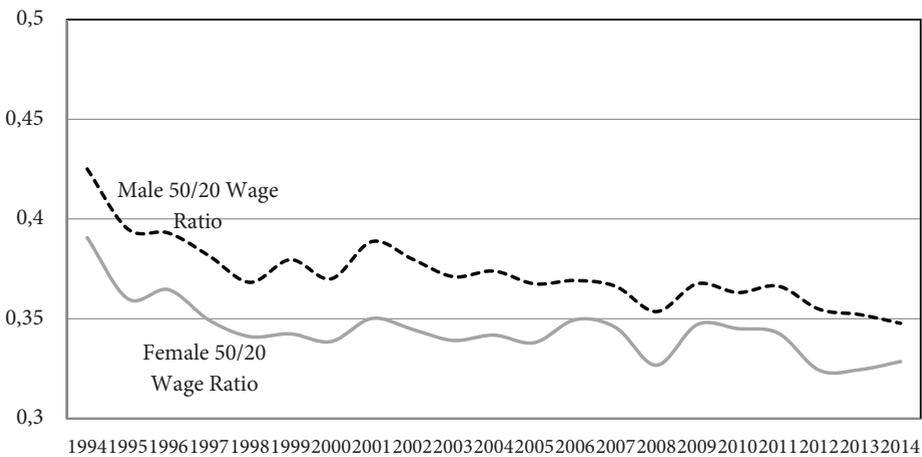
An interesting question is whether the economic situation of less-educated workers has become more or less sensitive to changes in unemployment over time. Generally speaking, low-income, single-mother families have become more vulnerable to economic fluctuations. Female labor force participation in Taiwan has always been relatively low before the 1980s because married women at that era were usually required to leave labor market and to take good care of their family. As this traditional value has changed and women are more and more likely to involve in labor force due to increase in their education level, women's reliance on the labor market has risen, and hence their exposure to unemployment and economic cycles has grown. This situation will become even tough especially for single mothers with children.

Wage Trends and Wage Shifts

The Taiwanese economy has long been praised for its rapid growth and equal distribution of income in comparison to East Asian newly industrialized countries (NICs) in past fifty years. As Taiwan experienced several stages in social, economic, and political development, such as transformation of population structure, the expansion of higher education, political openness, economic liberalization, and the development of technology-intensive industry, since the 1970s, per capital national income increased from \$371 in 1970 to \$19,540 in 2015. Although real wages among all workers in Taiwan rose dramatically before 1993, this upward trend has changed since 1994. Carefully scrutinizing the data between 1978 and 2008, F.M. Huang (2011) indicates that among less-educated workers (people with a high school diploma or

less) their real wages significantly drop after 1994 rather than continuously increased, while real wages among more-educated workers remained steadily during the time period between 1994 and 2008. There is general agreement that the rise in real wages in the bottom half of the wage distribution occurred primarily in the 1980s. There was big change in relative wages in the bottom part of the distribution after that decade. In contrast, inequality in the top half of the wage distribution has remained steadily throughout this time period as wages among the highest-skilled workers have not risen.

Figure 8. Log 50/20 Wage Ratio by Gender, 1994 to 2014



Note: Calculation based on annual earnings.

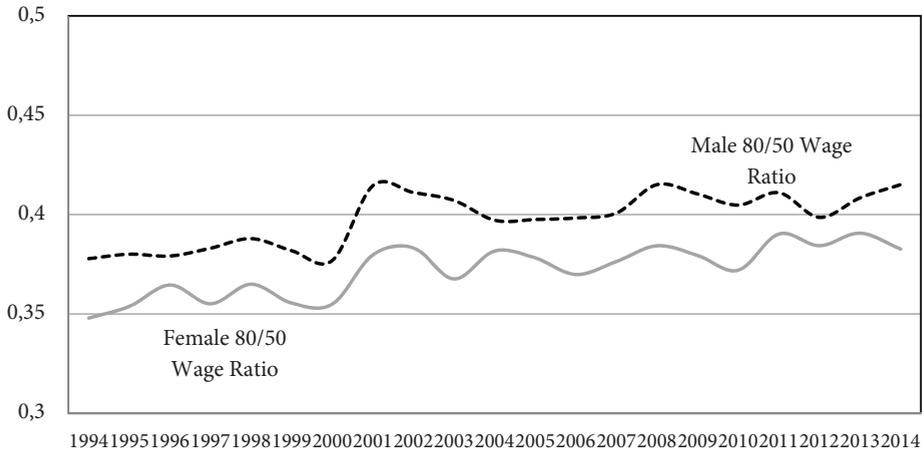
Source: Author's compilation based on the Survey of Family Income & Expenditure [Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)].

Figure 8 and 9 document these trends using the survey data of family and expenditure. Figure 8 shows the log (50/20) wage ratio³ from 1994 through 2014. The dashed line shows the log (50/20) wage ratio among men, while the solid line presents the ratio among women. The remarkable decline in male wage inequality until 1998 is clearly visible, with slight decrease after 2000. The log (50/20) wage ratio for women dropped rapidly until 1998 and has also move downward gradually since then. The rapid drop in log (50/20) wage ratio among all workers between 1994 and 2001 indicates that decline in the labor supply of less-educated workers drives real wages up in the bottom half of the wage distribution (Chen, Hsu 2001; Huang 2011).

³ It is the log of wages at the median of the distribution divided by wages at the twentieth percentile of the distribution.

However, there are not many jobs available for less-educated workers since 2001 so as to be unable to keep driving real wages up (F.M. Huang 2011).

Figure 9. Log 80/50 Wage Ratio by Gender, 1994 to 2014



Note: Calculation based on annual earnings.

Source: Author's compilation based on the Survey of Family Income & Expenditure [Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)].

In contrast, Figure 9 graphs the log (80/50) wage ratio for men and women, showing wage changes among higher-paid workers at the eightieth percentile of the distribution relative to those at the median. For both women and men, these wage ratios grew steadily from 1994 through 2001, with little change since 2002. Wages at the median and the eightieth percentile of the male wage distribution have moved together since that time. F.M. Huang (2011) notes that significant growth in high-end wages before 1994 occurred among workers with a college degree or more, but since then the growth rate in real wages among higher-educated workers became negative or stagnant.

The wage losses not only among the less-skilled, but also among higher-educated workers in the 2000s appear to have been due to numerous forces. For less-skilled workers, a primary factor is skill-biased technological change, which occurs when changes in technology increase labor demand for workers at higher skill levels (Acemoglu, 2002). Skill-biased technological change in the 1990s led to increase computer use in a growing number of applications, from robotics to just-in-time inventory systems. This increased demand for more-skilled workers exceeded supply increases, driving wages up, while demand for less-skilled workers fell. F.M. Huang

(2011) and D.S. Huang (2015) indicate that technological change has continued to affect the labor market in the 1990s and 2000s but is primarily force widening wages in the top half of the wage distribution as information technology continues to increase demand for the most skilled workers, while displacing moderately skilled workers who perform more routine tasks.

Economists have emphasized that growing trade and the globalization of the economy are significant forces causing the wage stagnation of Taiwan (D.S. Huang, 2015). Less-skilled workers in less-developed countries typically earn much lower wages than less-skilled workers in Taiwan. Outsourcing production components that require only limited skill inputs can save company's money and reduce their demand for less-skilled labor in Taiwan. However, Berman, Bound, and Griliches (1994) do not agree that international trade raises wage inequality and falls wages among less-skilled workers, and they have suggested that declining wages would have occurred even without the growth in global markets. Recent works do suggest that trade shifts since the mid-1990s, particularly the rise of China, might make trade a more important factor for the evolution of less-skilled wages in the United States (Krugman 2008) and for the wage stagnation of more-skilled workers in Taiwan (D.S. Huang 2015; F.M. Huang 2011).

D.S. Huang (2015) suggests that multiple factors, such as technological changes, the internationalization of the economy, and an expansion in higher education, resulted in the wage stagnation among more-skilled workers since 2001, as the results presented in Figure 9. These forces appear to have been more quiescent in the past thirty years. Labor demand and wage changes have benefited all workers throughout the 1980s due to an expansion in manufacturing but highly skilled workers have seen extreme wage gains during this period. Since 1994, the stagnation across the wage distribution occurred because the Taiwanese labor market was hit by economic globalization and trade over-reliance on China which in turn causes what the theorem of factor price equalization anticipates the lock-in effect. Of course, wage changes have to be compared to price changes. If prices are falling, then lower wages may not leave families worse off. This paper, however, does not look at the total market basket of goods.

Although wages among all workers remain steadily since the 2000s, the long-term wage outlook for less-skilled workers is not optimistic. All predictions for the future suggest that global demand for more-skilled workers will increase; it is hard to tell a story in which the demand for less-skilled workers will increase very much within Taiwan. The labor market for the less-skilled has been relatively weak for the

past twenty years, with high unemployment and slowly decreasing wages. Difficulties in the low-wage labor market might be expected to translate into declining family incomes and rising poverty. Poverty is based on family incomes, which depend upon the composition of families, the number of earners, and the amount worked by each earner. For example, the increase in single-parent families has lowered family income, held all else constant.

Family incomes among lower-income families did not rise in the 2000s, but neither did they fall as men's wages declined. This was the case among married couples because wives' labor force involvement expanded and wives' earnings offset the fall in male earnings (F.M. Huang et al. 2009). Women needed to work more in order to maintain as the same level as previous family incomes. Although the economic situation of low income families has not deteriorated, what parents work for extra hours has meant fewer hours spent at home in child care or home production. This has changed the composition of spending within household because families have to buy more of what used to be produced at home, such as child care, food preparation, and other services. If adults in a family at the same income level need to work more hours in the market and to buy more child care to support their work, they may have less disposable income and be worse off (Meyer, Wallace 2009). If family incomes also depend upon nonwage sources of income, lower-income families are often affected by changes in public transfer policies (Scholz, Moffitt, Cowan 2009).

Poverty and the Macro-economy

A four-person family with an income below \$20,000 was considered poor in 2014 in Taiwan. An ongoing literature has looked at the responsiveness of poverty to changing economic variables and found that the effects of unemployment on poverty appear to have shifted over time (Gundersen, Ziliak 2004; R. Haveman, Schwabish, 2000; Leu 2010; Wang 2004, 2005). Analysis of data through the 1990s reveals that unemployment had no significant effect on rising poverty; however, this relationship became more connected and the unemployment-poverty link strengthened since 2000.

In order to examine how macroeconomic performance affects poverty, I analyze data from 1978 to 2015 and also specify a model explaining changes in poverty:

$$P_t = \alpha + \rho P_{t-1} + \beta UR_t + \delta WR_t + \gamma X_t + \varepsilon_t \quad (1)$$

The dependent variable, P , is the percentage of all persons in relative poverty. Explanatory variables include the annual unemployment rate, UR , the log 50/10 wage ratio, WR , and the vector X . The log 50/10 wage ratio controls for shifts in wages among the lowest-paid workers, relative to median workers. The vector X consists of the consumer price index (CPI) to measure inflation and a measure of government antipoverty spending, defined as government expenditures on social welfare programs in each year as a share of GDP. This measure includes social insurance, social assistance, welfare services, health care, and job training programs. This model also includes a lagged dependent variable.

Because previous studies have noted that the unemployment rate had different effects after 2000, I create three dummy variables interacting with unemployment, presented in equation 2.

$$P_t = \alpha_1 + \alpha_2 D_{90} + \alpha_3 D_{00} + \alpha_4 D_{10} + \rho P_{t-1} + \beta_1 UR_t + \beta_2 UR_t \times D_{90} + \beta_3 UR_t \times D_{00} + \beta_4 UR_t \times D_{10} + \delta WR_t + \gamma X_t + \varepsilon_t \quad (2)$$

D_{90} indicates the decade of the 1990s if it equals one in each year; D_{00} equals one in every year during the decade of the 2000s; and D_{10} is a dummy variable for the years 2010 to 2015. The coefficients of the interaction terms will tell us whether there are different unemployment effects in the three most recent decades. Three dummy variables by themselves are also added into equation 2. By so doing, this specification allows the intercept of the model to shift in each decade and shows us the changing impact of unemployment on poverty over time.

In the United States, the poverty line has been adjusted only by inflation since the early 1960s when it was defined. According to Blank's study, the poverty line moved from 49 percent of median income in 1959 to 28 percent in 2005 when real economic growth and distributional changes led to changes in the location and shape of the income distribution (Blank 2008). The shift in the location of the poverty line should systematically cause a change in poverty counts. In other words, if the line locates at a lower level in the income distribution, it means that fewer people will be poor. This study includes the ratio of the poverty line to median income to specify the effect of shift in the poverty line in the overall income distribution.

We utilize the vector autoregression (VAR) technique to analyze multivariate time-series data and the results are presented in Table 1. Model 1 corresponds to equation 1 in which no dummy variables are included. According to the results shown in Model 1, the lagged poverty rate has positively strong effect on the current poverty rate, as expected. There is also a strong positive relationship between unemployment and poverty. One point rise in the unemployment rate increases the poverty rate by 0.72 point over time⁴, holding other variables constant. Rises in the consumer price index also led to rising poverty over this time period. The coefficient on the consumer price index suggests that one point increase in the consumer price index would have raised poverty by 0.07 points in the long term, all else being equal. The effect of the CPI on poverty was significantly positive and stronger since 2000 (the result has not shown). When disposable income remained constant throughout the 2000s but the price of consumer goods and services kept increasing during this time period, the gap between income and the price of commodities and services made people worse off and drove the poverty rate up.

Changes in the 50/10 wage ratio have little effect on poverty. Although the share of government expenditures has an unexpected positive effect on poverty, the coefficient is insignificant and this effect turns to negative when we take time effects into account, the result shown in Model 2 and 3. The location of the poverty line in the income distribution is negatively related to poverty. Even though this result contradicts to our expectation, the coefficient is statistically insignificant.

Table 1. Determinants of Poverty, 1978 to 2015

Variable	Dependent Variable: Poverty Rate Among All Persons		
	(1)	(2)	(3)
Lagged Poverty Rate (t-1)	0.46***	-0.06	-0.29*
Unemployment Rate	0.39**	0.57***	-0.14
Consumer Price Index	0.04**	0.01	0.00
Poverty line/Median Income	-4.62	-10.39**	-0.40
Welfare Expenditure/GDP	5.54	-17.00	-4.13
Wage Ratio (50/10)	7.33	7.43*	1.61
D90		1.04**	1.95***
D00		2.28***	-1.98*
D10		3.18***	0.08

⁴ The coefficient on unemployment is 0.39 which tells us the expected effect in the next year. When we take the lagged poverty rate into account, the long-term effect on poverty is larger at 0.72 which is .

Unemployment \times D90			-0.39
Unemployment \times D00			1.04***
Unemployment \times D10			0.79*
Constant	-2.58	3.18	6.38***
N	37	37	37

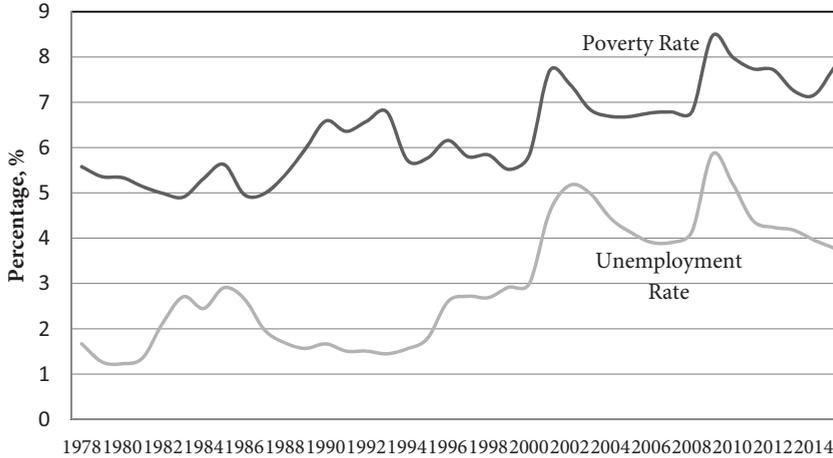
The second column in Table 1 adds dummy variables for the decades of the 1990s, 2000s, as well as 2010s. According to the results in Model 2, time effects on poverty are positive and statistically significant. The coefficient on the dummy variable for the 2010s is stronger than that on the 2000s, which is also stronger than that the 1990s. These results indicate that the poverty rate among the lowest-paid workers was getting worse over past thirty years. The third column adds the interaction terms between dummy variables and the unemployment rate, as described in equation 2. The coefficient for the unemployment rate interacted with the D00 dummy variable on poverty is almost the strongest and positive to overall coefficient on unemployment. The positive effect of unemployment on poverty almost is the strongest over the 2000s, followed by the effect of unemployment on poverty over the 2010s. Before the 2000s, poverty and unemployment have a strong positive relationship and the interaction effect goes to zero. With the inclusion of these dummy variables, however, the coefficient on the unemployment rate also goes to zero and loses significance because the interaction terms between unemployment and decadal dummy variables absorb all the influence of unemployment per se.

Changes in the consumer price index and the unemployment rate are highly correlated to the decadal dummy variables. By including these dummy variables, the flexible decadal coefficients in Model 2 are essentially a more mechanical way of controlling for the same variation that the shifting consumer price index picks up in Model 1. In other words, the inclusion of the consumer price index in Model 1 has essentially the same effect as including the dummy variables and their interactions for recent decades in Model 2 and 3.

The results in Model 1 through 3 emphasize the important impact of the economy on poverty among all persons. Unemployment rates and inflation, as measured by consumer prices, have significant effects on all persons. Government expenditures have little effect on poverty, although the coefficients are large. Overall, these regressions demonstrate that poverty remains responsive to the economy cycle and inflation. Figure 10 graphs trends of poverty and unemployment. Although falling unemployment in late 1980s to late 1990s had little effect on poverty because of offsetting decline in real wage due to skill-biased technological change occurred in

this time period, lower unemployment during 2003–2008 and 2011–2015 significantly reduced poverty for all persons.

Figure 10. Trends of Poverty and Unemployment, 1994 to 2014



Source: Author's compilation based on the Survey of Family Income & Expenditure [Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, R.O.C. (Taiwan)].

Finally, it is worth noting that economic growth alone will not eliminate poverty. Closely examining trends of poverty and unemployment in the time periods from 2001 to 2015, we find that the economic recovery does not necessarily push poverty down substantially, but rises in unemployment will increase poverty. Hence, declines in poverty are likely to require targeted efforts to expand resources for people who cannot work and to expand earning opportunity for less-skilled workers.

Conclusion

This study examines the effects of the economy on the earnings opportunities of less-skilled workers and suggests that low unemployment rates continue to benefit low-income persons. Poverty in Taiwan appears to have been highly responsive to higher unemployment in the 2000s and 2010s. Unemployment has been relatively high over past fifteen years. Although manufacturing jobs for less-skilled workers were decreasing, we expect that service jobs for less-skilled workers would be

increasing instead. Our expectation, however, does not come true. Decreases in both manufacturing and service jobs for less-skilled workers substantially drove unemployment and poverty up since 2000. Therefore, overall wage growth among all less-skilled workers has been limited.

In contrast, the economy has been in a period of sustained growth and we expect that economy growth would benefit higher-skilled workers much more than less-skilled workers. However, this expectation is not supported by empirical evidence. Wages among higher-skilled workers stopped rising and remained relatively constant throughout the time span of 2000 to 2015.

These results have several important policy implications. First of all, maintaining a strong economy and low unemployment is most important for the long-term economic well-being of low-wage workers (Blank, 2000). However, when we take increasing demand for higher-skilled workers result from skill-biased technological change into account, economic growth per se may not be enough to reduce poverty or substantially improve the economic well-being of low-income workers. Hence, it is important for the government to maintain a reasonable level of the minimum wage.

Secondly, we must maintain the level of transfer payments as a subsidy to low-income workers in low-income families. Taiwanese government expenditures in transfer payments dramatically increase since 1991, in which Taiwan started to launch the process of democratization. Democracy produces more public goods and more income redistribution than autocracy because extensions of the franchise increase the number of voters with relative low income, which in turn forces democratic governments to spend more public revenues on government services (Lake, Baum 2001; McGuire, Olson 1996) and to increase these revenues via higher tax rates (Meltzer, Richard 1981; Niskanen 1997). The transfer system expansion might help reduce poverty among less-skilled workers, as shown in Figure 8. Therefore, in policy, we need to expand the transfer system to more disadvantaged people; and, in politics, we need to keep deepening our democratic consolidation.

Finally, increasing skill levels is an important long-term solution to the reduction of poverty. Especially, when the immigrant population is rapidly growing in Taiwan in the past two decades, the educational achievements of the children of these immigrants will be quite important for the future of the economy. Intergenerational mobility will increase if these children are able to reach higher educational levels than their parents, and these families will be in a better position to escape poverty over time.

The Taiwanese economy is moving toward the way of globalization and heavily depends on broader trends in technology, which in turn could shrink the number of jobs for low-wage workers. Or the wages for less-skilled jobs could fall. In the foreseeable future, there will be no substantial gains in low-skill jobs and most of low-skill jobs will be taken by migrant workers. All these factors will keep wages down.

References

- Acemoglu, D. (2002), 'Technical Change, Inequality, and the Labor Market', *Journal of Economic Literature* 40(1): 7–72
- Berman, E., Bound, J., Griliches, Z. (1994), 'Changes in the Demand for Skilled Labor within US Manufacturing: Evidence from the Annual Survey of Manufacturers', *The Quarterly Journal of Economics* 109(2): 367–397
- Blank, R.M. (2000), 'Distinguished Lecture on Economics in Government: Fighting Poverty: Lessons from Recent US History', *The Journal of Economic Perspectives* 14(2): 3–19
- Blank, R.M. (2008), 'How to Improve Poverty Measurement in the United States', *Journal of Policy Analysis and Management* 27(2)
- Chen, B.L., Hsu, M. (2001), 'Time-Series Wage Differential in Taiwan: The Role of International Trade', *Review of Development Economics* 5(2): 336–354
- Gundersen, C., Ziliak, J.P. (2004), 'Poverty and Macroeconomic Performance Across Space, Race, and Family Structure', *Demography* 41(1): 61–86
- Haveman, R., Schwabish, J. (2000), 'Has Macroeconomic Performance Regained Its Antipoverty Bite?', *Contemporary Economic Policy* 18(4): p. 415
- Haveman, R.H., Wolfe, B.L. (1984), 'The Decline in Male Labor Force Participation: Comment', *Journal of Political Economy* 92(3): 532–541
- Huang, D.S. (2015), 'On the Wage Stagnation of Taiwan: Trade and FDI Partners under Globalization', *Review of Social Sciences* 9(1): 33–58
- Huang, F.M. (2011), 'Human Capital and Wage Dynamics: Evidence From Taiwan', *Taiwan Economic Forecast and Policy* 42(1): 1–37
- Huang, F.M., Chen, W.J., Huang, F.Y. (2006), 'The Decline in Males' Labor Market Participation in Taiwan: Population, Market Opportunity, and Participation Behaviors', *Taiwan Economic Forecast and Policy* 37(1): 1–48
- Huang, F.M., Weng, J.C., Huang, F.Y. (2009), 'The Analysis of Females' Labor Force Participation in Taiwan: 1980-2005', *Taiwan Economic Forecast and Policy* 39(2): 1–50

- Juhn, C. (1992), 'Decline of Male Labor Market Participation: The Role of Declining Market Opportunities', *The Quarterly Journal of Economics* 107(1): 79–121
- Krugman, P.R. (2008), 'Trade and Wages, Reconsidered', *Brookings Papers on Economic Activity* 1: 103–154
- Lake, D.A., Baum, M.A. (2001), 'The Invisible Hand of Democracy Political Control and the Provision of Public Services', *Comparative political studies* 34(6): 587–621
- Leu, C.H. (2010), 'The Proximate Determinants of Poverty in Taiwan: Growth, Redistribution, and the Population Effects', *NTU Social Work Review*(22): 109–151, doi:10.6171/ntuswr2010.22.03
- Li, T.C., Yang, C.L. (2004), 'Transitional Patterns of Female Labor Force Participation in Taiwan', *Journal of Population Studies* 28, 109–134
- McGuire, M.C., Olson, M. (1996), 'The Economics of Autocracy and Majority Rule: the Invisible Hand and the Use of Force', *Journal of economic literature* 34(1): 72–96
- Meltzer, A.H., Richard, S.F. (1981), 'A Rational Theory of the Size of Government', *The Journal of Political Economy* 89(5): 914–927
- Meyer, D.R., Wallace, G.L. (2009), 'Poverty Levels and Trends in Comparative Perspective', in: M. Cancian, S. Danziger (eds.), *Changing poverty, changing policies*, New York: Russell Sage: 35–62
- Niskanen, W.A. (1997), 'Autocratic, Democratic, and Optimal Government', *Economic Inquiry* 35(3): 464–479
- Parsons, D.O. (1980), 'The Decline in Male Labor Force Participation', *The Journal of Political Economy* 88(1): 117–134
- Scandura, T.A., Lankau, M.J. (1997), 'Relationships of Gender, Family Responsibility and Flexible Work Hours to Organizational Commitment and Job Satisfaction', *Journal of organizational Behavior* 18(4): 377–391
- Scholz, J.K., Moffitt, R., Cowan, B. (2009), 'Trends in Income Support', in: M. Cancian, S. Danziger (eds.), *Changing poverty, changing policies*, New York: Russell Sage: 203–241
- Su, S.C., Liu, Y.H., Shih, W. (2011), 'The Study of Labor Participation Behavior Affected by Micro-Factors', *Journal of Statistic and Computing* 13: 51–67
- Taniguchi, M., Fujimoto, T. (2006), 'Preferences for Working Hours over Life Course among Japanese Manufacturing Workers', *Career Development International* 11(3): 204–215
- Wang, Y.T. (2004), 'The Economic Status of Unemployed Households: A Comparison between the Periods of 1982–1986 and 1996–2002', *Social Policy & Social Work* 8(2): 159–192
- Wang, Y. T. (2005), 'The Phenomenon of Poverty in Taiwan: A Review of Research', *NTU Social Work Review* (10): 1–54, doi:10.6171/ntuswr2005.10.01