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FAST DEVELOPMENT WITH A STABLE INCOME DISTRIBUTION: TAIWAN, 1979–94

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This paper studies the mechanisms underlying the apparent stability of the income distribution in Taiwan. An original decomposition method based on micro-simulation techniques is proposed. Applied to the distribution of income in Taiwan since 1979, it permits isolating the respective impact of changes in: (a) the earning structure; (b) labor-force participation behavior; and (c) the socio-demographic structure of the population. The stability of the distribution in Taiwan appears as the result of various structural forces which happened to offset each other. The small drop observed in the inequality of individual earnings resulted from the combination of unequalizing changes in the wage structure and the effects of changes in female labor-force participation as well as in the educational structure of the population. However, the same offsetting forces, together with changes in the composition of households, resulted in a small increase in the inequality of the distribution of equivalized household income.

INTRODUCTION

A striking feature of Taiwan's rapid development during the past twenty-five years is that it occurred with very limited changes in the distribution of income. After a large drop in the 50s and 60s, initiated by a successful land reform and reinforced by a vigorous industrialization process,[1] the Gini coefficient for individual earnings stabilized around 0.30.[2] Yet structural changes in the economy and the society kept at a rapid pace. Among other things, the agricultural share of the labor force went down from slightly less than 30 percent in 1979 to 10 percent in 1995; the service sector largely overcame the industrial sector and now employs almost half the labor force; labor force participation increased significantly, family size fell, and the schooling level of the population went up in a dramatic proportion. How such an evolution could occur without drastic changes in the distribution of income is the question we address in this paper.

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[1]This is the process so eloquently described and analyzed by Ranis (1974), Fei, Ranis, and Kuo (1979), and Kuo, Ranis, and Fei (1981).

[2]This stabilization is observed for most inequality indices.

Possibly because the experience of Taiwan during the 50s and 60s has often been cited as one of the clearest cases of development with employment expansion and income equalization, a sizable literature has developed on income distribution in Taiwan. As pointed out by Chu (1997), however, a detailed study of the evolution of the distribution of income in Taiwan is still much needed for two reasons. First, the existing literature is at too much an aggregate level to permit understanding the mechanisms through which income distribution may be affected by exogenous structural changes in the economy or in the socio-demographic structure of the population. Second, it also tends to focus on a single aspect of the problem—e.g. trade, strength of competition, education—while ignoring other aspects and the way they interact to produce the observed change in the distribution of income.

Several authors have recently tried to overcome these difficulties, mostly through some kind of decomposition of income inequality, either by income source or by income groups at various points of time. Chu (1997) distinguishes two periods in the recent history of Taiwan. By a decomposition analysis based on standard wage regression he shows that the fall in wage inequality between 1966 and 1977 is due for approximately one half to changes in both the educational structure of the population and in the rate of return to schooling. Between 1981 and 1992, he finds with the same type of decomposition that the distribution of household wage income remained relatively stable but the inequality of household income rose because of changes in participation behavior and in family composition. Using another method based on Shorrocks' (1982) decomposition of inequality by income sources, Fields and O'Hara (1996) found that various forces played a significant role in the observed evolution of earnings inequality. In particular, they show that a rise in the male–female wage differential and in returns to education played an unequalizing role, whereas the drop in the inequality of the distribution of human capital had an equalizing effect.

These results are in agreement with our conjecture that below the surface and behind the apparent stability of the distribution of income, powerful forces have been at work in Taiwan which, taken in isolation, might have produced significant changes in the distribution of income but tended to offset each other. The objective of the present study is to shed light on these various forces by a systematic study of the changes in the micro-economic determinants of incomes and their effects on the distribution of income within the population. This is done through an original decomposition method based on an in-depth analysis of the evolution of not only the structure of individual earnings but also that of household self-employment (farm and non-farm) incomes and of individual occupational choices within the household. A side product of this method is a measure of the distributional effects of changes in the socio-demographic structure of the population.

The paper is organized as follows. Section 1 presents some basic quantitative facts on the evolution of Taiwan's economy over the past two decades, with some emphasis on income distribution. The methodological framework is presented in section 2. The results obtained from applying this method to household surveys over the period 1979–94 are analyzed in two separate sections. Section 3 discusses observed changes in several types of micro-economic behavior likely to have had

substantial distribution effects.[3] Section 4 presents the decomposition of the change in the distribution of individual earnings and household income into the various effects mentioned above. Section 5 summarizes and concludes.

1. Basic Facts About Economic Development and Income Distribution in Taiwan Since 1979

Several features with potentially strong implications for the distribution of income are readily apparent in the evolution of the socio-demographic structure of Taiwan's population over the past 20 years or so (see Table 1). The population is becoming older, better educated, and more urbanized. At the same time, labor-force participation of women is increasing, whereas household composition is changing.

TABLE 1

Evolution of the Structure of the Population at Working Age

	1979	1983	1986	1989	1992	1994
Population (10^6)	11.0	12.1	12.8	13.4	14.0	14.4
Age structure (%)						
Less than 30	44.9	42.5	40.4	37.1	34.9	34.7
30 to 50	38.2	39.0	40.1	43.0	44.9	45.3
50 to 65	16.9	18.5	19.5	19.9	20.2	20
Education structure (%)						
Illiterate	12.9	10.9	9.7	8.4	7.2	6.2
Primary	37.6	33.6	31.4	29.4	26.1	24.3
Secondary	40.1	44.2	46.9	49.4	51.1	52.5
University	9.4	11.2	11.9	12.9	15.5	17
Average education by age groups (*years*)						
15–30	9.6	10.2	10.6	11.0	11.3	11.5
30–50	6.9	7.6	8.1	8.8	9.6	9.9
50–65	5.1	5.4	5.4	5.4	5.6	6
Individuals in agricultural households (%)	30.4	27.3	23.3	21.2	19.4	16.2
Average participation rate						
All individuals	63.9	62.8	63.0	64.0	64.0	63.3
Women	46.1	45.4	47.5	48.8	49.5	50.2
Men	81.5	80.3	78.4	78.9	78.4	76.3
Agricultural households	57.1	58.2	59.2	59.9	60.3	60.7
Non-agricultural households	79.6	75.0	75.7	79.3	79.3	76.5
Average total size of households						
Agricultural households	5.7	5.4	5.1	4.6	4.5	4.4
Non-agricultural households	4.6	4.5	4.4	4.2	4.0	3.9

Source: Household surveys, DGBAS, authors' calculation. First row from *Statistical Yearbook*, DGBAS.

Most of this evolution is taking take place at a striking pace. Forty-five percent of the population at working age was below 30 in 1979. This figure is now less than a third. Close to 20 percent of individuals at working age have now

[3]A more complete analysis of that evolution is provided in a companion paper (Bourguignon, Fournier, and Gurgand, 1998a).

gone beyond secondary school, a figure that nearly doubled between 1979 and 1994. Conversely, the share of the population with no education or no more than primary education went down from 50 percent to 30 percent.

Equally impressive is the fast evolution of the urban/rural structure of the population. Over the period studied, the number of individuals at working age living in households dedicated to some agricultural activity has approximately halved. This process corresponded partly to a drop in the number of agricultural households—which presumably means a change in the distribution of cultivated land—and partly to a change in the composition of rural households, the size of which diminished quite substantially—from 5.7 to 4.4 persons on average—over the period under analysis.

This relative loss in the importance of agriculture is among the driving forces behind the evolution of other dimensions of the socio-demographic structure of the population. It partly explains the drop in the average household size, although it may be seen in Table 1 that family size fell significantly and continuously on both the rural and the urban sides. It should also have had a positive impact on the overall participation rate since participation is traditionally lower in agricultural households. It turns out, however, that, on top of this, the participation rate of married women increased, both in agricultural and non-agricultural households.

The evolution of the structure of GDP paralleled that of the population. The extremely high growth of GDP recorded over the period under analysis—7.8 percent per annum on average—was accompanied by a dramatic change in its structure, which corresponds itself to the superposition of two phenomena. First, the agricultural sector kept losing relative importance. Until 1984, the corresponding share of GDP went to the manufacturing sector, a continuation of the process observed since the take off of economic growth in the 60s. In the late 80s, however, the industrialization process itself came to an end and the "tertiarization" of the economy began. Between 1988 and 1995, the manufacturing sector lost ground in the evolution of the sector structure of GDP in favor of services to the business sector, and, to a lesser extent, commerce and personal services. Second, within the manufacturing sector itself, "traditional" activities like food, textile, wood and paper products lost relative importance in favor of more advanced sectors like chemical industry, metal industry, or electrical/electronic machinery. Overall, there is thus little doubt that, as with the evolution of the population, the period under study is one of intense structural changes in the economy and therefore on the demand side of the labor market, clearly a constant feature of Taiwan over the past 50 years or so.

Given the sizable changes that took place in the social and economic structure of Taiwan in the past decade and the speed at which they occurred, one would expect the distribution of income to have also undergone substantial alterations. Three different features are observed, depending on the definition that is adopted of income and income units—see Figure 1. First, the inequality of the distribution of *equivalized* disposable household income—that is, the distribution of individual income with every individual being given the disposable income, deflated by the number of adult equivalents,[4] of the household he/she belongs

[4]The equivalence scale used here is such that the number of adult equivalents in a household is equal to the square root of the number of household members.

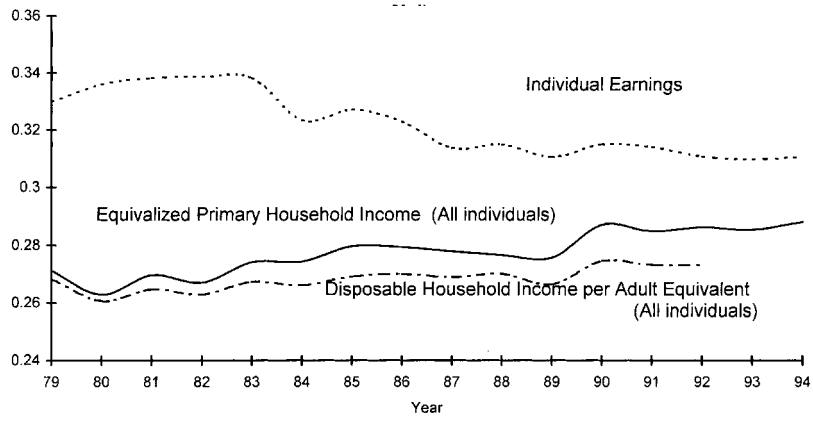

Figure 1. Evolution of Income Inequality: 1979–94 (Gini)

to—is approximately constant over time. Second, the Gini coefficient of the distribution of equivalized *primary* or *market* household income, that is, income before taxes and transfers, shows a slight ascending trend which tends to accelerate in the early 90s. Finally, the inequality of individual earnings—non-wage workers excluded—has been decreasing quite substantially since 1983.[5]

It seems to have become a stylized fact about the distribution of income in Taiwan that household income inequality made a "U-turn" around the beginning of the 80s—see in particular, Hung (1996) and also Chu (1997). Figure 1 does not really support such a view. Individual earnings inequality has substantially declined, whereas the increase in the inequality of equivalized "primary" household income is too moderate for referring to it as a U-turn, especially in view of the stability of the inequality of disposable household income. As noted by Fields and Leary (1997) and by Schultz (1997), the U-turn is in fact more apparent when considering the distribution of total household income with the household as the income unit. This suggests that the demographic composition of households has changed during the period under analysis in a way that is non-neutral with respect to the distribution.

That inequality slightly increased or decreased depending on the definition of income and of the income unit that is used, seems consistent with the idea of several powerful forces affecting the distribution but offsetting each other. It is indeed natural that this offsetting process leads to different pictures of the evolution of the distribution when different perspectives are adopted. The rest of this paper focuses on the identification of these forces and their compensating effects.

2. Explaining the Evolution of the Distribution of Household Income: A Micro-simulation Decomposition Method

Generally speaking, changes in the distribution of individual earnings and equivalized household income over time may come from three sources. (a) People

[5]A similar evolution is shown for other inequality indices.

with given characteristics and the same occupation get a different income because prices on the labor and possibly output markets have been modified. We shall refer to this as the "price effect." (b) People with given characteristics do not make the same occupational choices so that the population of earners is modified. This is the "participation" or "occupation effect." (c) Finally the socio-demographic characteristics of the population of households and individuals—e.g. education, age, household size—changes over time. We shall refer to this as the "population effect." The objective of the following decomposition method is to identify these various effects and then to try to relate them to the general evolution of the economy.

2.1. *Decomposition Principle*

The income y_{it} of household i observed at time t may be assumed to depend on four sets of arguments: its observable socio-demographic characteristics or those of its members (x), unobservable characteristics summarized by ε, the set of prices and labor remuneration rates it faces (β), and a set of parameters describing the labor force participation and occupational choice behavior of its members (λ):

$$y_{it} = Y(x_{it}, \varepsilon_{it}; \beta_t; \lambda_t). \tag{1}$$

The overall distribution of household income at time t, may be expressed as a vector D_t of household incomes. Through (1) this vector is itself a function of the distribution of observable and unobservable household characteristics at date t, the price vector, β_t, and the vector of behavioral parameters, λ_t. Let $H(\ )$ be that function:

$$D_t = H(\{x_{it}, \varepsilon_{it}\}, \beta_t, \lambda_t). \tag{2}$$

where $\{\ \}$ refers to the distribution of the corresponding variable in the population.

With such a definition, the various effects mentioned above to describe and explain the evolution of the distribution between two dates t and t' can be simply computed as follows:

(3) Price effect (a): $$B_{tt'} = H(\{x_{it}, \varepsilon_{it}\}, \beta_{t'}, \lambda_t) - H(\{x_{it}, \varepsilon_{it}\}, \beta_t, \lambda_t).$$

(4) Participation effect (b): $$L_{tt'} = H(\{x_{it}, \varepsilon_{it}\}, \beta_t, \lambda_{t'}) - H(\{x_{it}, \varepsilon_{it}\}, \beta_t, \lambda_t)$$

(5) Population effect (c): $$P_{tt'} = H(\{x_{it'}, \varepsilon_{it'}\}, \beta_t, \lambda_t) - H(\{x_{it}, \varepsilon_{it}\}, \beta_t, \lambda_t)$$

In other words, the population effect, P, is obtained by comparing the distribution at date t and the hypothetical distribution obtained by simulating on the population observed at date t' the remuneration structure and the behavioral parameters of period t. Likewise, the effect of the change in prices is obtained by comparing the initial distribution and the hypothetical distribution obtained by simulating on the population observed at date t the remuneration structure observed at date t', etc.

The preceding formulae may be seen as an extension of the well-known Blinder–Oaxaca decomposition method. This method explains the mean income

difference between two groups of individuals on the one hand by different mean characteristics of individuals in the two groups—i.e. our population effect—and, on the other hand, a different remuneration of these characteristics within each group—i.e. our "price" effect. The difference with that method is first that the decomposition is made here on the full distribution rather than on means and, second, that the income generating model—i.e. the function $Y(\,)$ in (1) may be more complicated than the linear regression model originally used by Blinder (1973) and Oaxaca (1973).[6]

A common problem with the Blinder–Oaxaca method is path dependence. For instance, the price effect and the participation effect are likely to depend on the reference population that is used to evaluate them, unless population, price structure, and behavioral parameters are close to each other, which is unlikely to be the case over the medium or long run in an economy subject to strong structural changes. In the application that follows, this ambiguity will be taken into account by considering simultaneously alternative definitions of the various effects.

It is also possible to decompose the population effect itself into what may be due to unobservables and observables. This is easy once a model allowing for the identification of the unobservable terms, ε_{it}, is available. For instance, let us assume that y_{it} refers to individual earnings. These are assumed to depend on observables, x_{it}, and unobservables, ε_{it}, according to:

$$\ln(y_{it}) = x_{it}\beta_t + \varepsilon_{it}. \tag{6}$$

The econometric estimation of this earning function permits identifying the "price" coefficients, β_t, and the distribution of unobservables, $\{\varepsilon_{it}\}$. Changing the latter so as to make it identical to the distribution observed in year t' can be done using rank-preserving transformations:

$$\hat{\varepsilon}_{it} = F_{t'}^{-1} \circ F_t(\varepsilon_{it}), \tag{7}$$

where $F_t(\,)$ is the function giving the relative rank of its argument in year t's distribution. In a continuous framework $F_t(\,)$ would simply be the cumulative distribution function of the unobservable term, ε_{it}. We approximate here $F_t(\,)$ by a zero-mean normal distribution, so that the preceding transformation becomes:

$$\hat{\varepsilon}_{it} = \frac{\sigma_{t'}}{\sigma_t}\varepsilon_{it}, \tag{8}$$

where σ_t is the standard deviation of the residual term ε_{it} in year t.[7]

[6]A decomposition similar to the present one with a linear income generating function has been proposed by Juhn, Murphy, and Pierce (1993).

[7]Note that the normality assumption is made here for simulation purposes, not for estimation. Note also that it is possible to assume some heteroscedasticity whereby the standard deviation of the effect of unobservables may depend on observables. This makes the decomposition structure substantially more complicated. However, we could check that this would not modify the general conclusions obtained under the assumption of heteroscedasticity. In particular, we checked that the change in the variance of the residuals of the earning functions could not be imputed to changes in the observable characteristics of the population of wage earners.

2.2. *Modeling Household Incomes*

The main difficulty of modeling household incomes in most developing countries arises from the fact that income may be obtained from different activities: wage income for members employed outside the household, farm or self-employment income obtained jointly by all members working, possibly part time within the household. We provide in what follows a simple representation of this complex time allocation problem.

Let X_{mi} be the characteristics of person i in household m which determine his/her wage rate in the labor market and u_{mi} a term summarizing the effect of unobserved determinants of earnings. Let also Z_{mi} be the characteristics of person i and those of his/her household—that is of the other members of the household—which may affect the allocation of his/her time among leisure and various income generating activities. We shall consider two such activities: wage work outside the household and work in the family farm or family business. The corresponding labor supply will be denoted respectively L^t_{mi} and L^{At}_{mi}. Finally, let $\Pi(\,)$ be the profit function associated with family business and Π_{Lm} the corresponding marginal revenue product of labor.

With these notations, the basic structure of the income-generating model for a household, m, observed at period t is given by:

$$
\begin{aligned}
(9)\qquad & \log w^t_{mi} = X^t_{mi}\,\beta^t + u^t_{mi}, \\
& L^t_{mi} = \sup\,[0,\, X^t_{mi}\,\lambda^t_X + Z^t_{mi}\,\lambda^t_Z + v^t_{mi}] \qquad i = 1, 2, \ldots, n_m, \\
& L^{At}_{mi} = \sup\,[0,\, X^t_{mi}\,\lambda^{At}_X + Z^t_{mi}\,\lambda^{At}_Z + v^{At}_{mi}], \\
& y^t_m = \sum_{i=1}^{n_m} L^t_{mi}\, w^t_{mi} + \Pi\left[\beta^t_A, Z^{Tt}_m, \sum_{i=1}^{n_m} L^{At}_{mi}, \bar{X}^t_m(L^{At}_{mi} > 0), s^t_m\right] + y^t_{0m}.
\end{aligned}
$$

The first equation is a standard wage equation for each of the n_m household members. The second and third equations make labor supply dependent on the characteristics of individual members and those of the household. As in the wage function, residual terms stand for unobserved determinants of labor supply and its allocation. The last equation adds up the earnings of all household members, households' self-employment income, and some exogenous income (y_{0m}) to obtain total household income, y_m. Profit or household self-employment income in this equation is assumed to depend on household characteristics (Z^{Tt}_m), which include available productive assets, i.e. cultivable land or non-farm business capital, the total family labor input ($\sum_{i=1}^{n_m} L^{At}_{mi}$), the mean personal characteristics of those members who work in the family business $\bar{X}^t_m(L^{At}_m > 0)$) and some unobservable determinants (s^t_m). β_A stands for the set of coefficients defining that function.

All the coefficients of this model, β, β_A, λ, λ^A, and the standard deviations of the residual terms u_{mi}, v_{mi}, v^A_{mi} and s_m may be estimated by standard econometric techniques on cross-sectional household data available in each period t. However, some precaution must be taken because of the simultaneity between the wage and the labor-supply equations, the non-linearity of the labor-supply functions and the fact that wages are observed only for those persons who actually work.

Once parameters have been estimated at various points of time, the preceding model is used to answer the following questions. What would have been the income of household m had it adopted at period t the labor supply behavior observed at period t', or had earners been paid according to the wage equation observed at period t'? To answer this question, it is sufficient to simulate in the preceding model the effect on household income y_m of replacing the set of coefficients (β^t, β^t_A, λ^t, λ^t_A) by the values estimated in period t' while keeping all the observed characteristics X^t_m and Z^t_m constant. Concerning the residual terms, or the unobserved household or individual characteristics behind them, it may be assumed that adopting the behavior of period t' would not have modified their absolute value or that it would have maintained their relative values as in (8) above. The only difficulty in the preceding micro-simulation method is for persons who were inactive in period t. For them no value of the residual terms v^t_{mi} and v^{At}_{mi}, nor of term u^t_{mi} is observed. The solution consists of drawing randomly the values of these three terms in a way consistent with the original model, that is conditionally on their labor-force status or labor supply in period t.[8] Once these three terms are known, it is a simple matter to see whether the change in the wage equation—i.e. from β to β^t—modifies the labor status of an inactive person or not, and, if it does, how the income of the household is itself altered. The opposite case of an active person becoming inactive is easier to handle because it is not necessary to reconstitute the unobserved residual terms. The same technique is used for the residual term s_m of the profit function.

The total income of a household appears, as initially postulated in (1), as a known function of its characteristics, observable and non-observable, a set of behavioral parameters and a set of "prices." What is interpreted as "prices" in the present framework is the complete vector β as well as the coefficients β_A appearing in the profit function, $\Pi(\ )$. Changes in this vector over time show how market remuneration of individual and family attributes may have changed, thus affecting potential personal wage and family self-employment income and possibly participation or occupational decisions within the family.

The structure of the model is now complete. The full model (9) is what plays the role of the income generating function (1) used above in the description of the decomposition principles with the following set of equivalence between notations. Observable characteristics x_{it} now correspond to the set of general characteristics of a household and its members observed at period t, respectively Z^t_m and X^t_{mi}. Unobservables, ε_{it}, are summarized by the set of residual terms (u^t_{mi}, v^t_{mi}, v^{At}_{mi}, s^t_m) which enter the individual earnings functions, individual labor supply equations and the household profit function in case it engages in farm or independent business activities. The price system includes the coefficients of the earnings and profit equations, β^t and β^t_A. Finally, the set of behavioral parameters λ^t is the whole set of coefficients which enter the labor supply functions, that is (λ^t, λ^{At}).

2.3. *Econometric Specification*

Estimating the complete income generation model (9) in its general form above is practically impossible, or would be a formidable undertaking. There are

[8]For instance the value of v^t_{mi} in the wage labor supply function of (9) is bounded from above by $-X^t_{mi}\lambda^t_X - Z^t_{mi}\lambda^t_Z$ for somebody not working as a wage worker.

several reasons for this. First, all the equations of the model must clearly be estimated simultaneously with non-linear estimation techniques due to the non-negativity constraint on labor supply and the very likely correlation between unobservables or the residual terms in the various equations. Although intricate, things might be manageable—under some simplifying assumptions—if there were a single individual in every household. But the obvious correlation between the earnings equations and labor supply equations of the various members of a household at working age, whose number varies across households, makes things hopelessly complicated. An additional risk would also be that the results of such a complex model might not be very robust and show artificial time variability, thus jeopardizing the decomposition method shown above. The micro-economic estimation work undertaken for Taiwan relies on a simplified but at the same time more robust specification based on the following principles.

- Individual earnings functions and household profit functions—if applicable—are estimated separately and consistently through the instrumentation of endogenous right-hand side variables and the correction of selection biases. Residual terms of these functions are assumed to be independent across household members.
- Because of a lack of information on hours of work, labor-supply behavior is estimated in a discrete way. Household members are assumed to have the choice between the following activities: (i) inactivity, (ii) wage work, (iii) work on family farm, (iv) work in family non-farm business, and (v) combinations of (ii) and (iii).[9] This choice is specified as a multinomial logit model.
- The simultaneity between household members' labor-supply decisions is taken into account solely by considering sequentially the various members of the household. This is in agreement with standard practice in the labor-supply literature. The labor-supply decision of the household head is estimated *first* with the preceding multinomial logit model and using both the general exogenous characteristics of the household and those of all household members as explanatory variables. *Second*, the labor-supply and occupation decision of all other members is estimated conditionally on the decision taken by the head, and possibly his/her income in case he/she is engaged in wage work. In addition, different models were estimated depending on the position of a person in a family. Indeed, it seems natural that, other things being equal, the spouse of the head does not behave in the same way with respect to labor-supply as his/her son/daughter. The categories for which distinct labor-supply models have been estimated are spouses, sons and daughters less than 25 years old, and "other" household members.
- It would have been possible to use the results of the multinomial logit occupational choice model to control for selection in the earnings and

[9]All sorts of combinations of these basic activities are encountered in the data. However, some of them are so infrequent that their incidence cannot be estimated econometrically. Individuals observed with ruled-out combinations of activities were assigned to the activity in (i)–(v) yielding the highest income.

profit functions. This was not done in order to keep the estimation procedure simple. Instead, the usual Heckman two-step procedure was implemented with an intermediate Probit estimation of the probability that an individual be a wage worker, whether full-time or in combination with self-employment, or that a household be engaged in self-employment activity.

- The lack of robustness of the estimates of some coefficients in the various behavioral equations of the model and their possibly non-significant variability over time would clearly introduce some noise in the decomposition technique described above. To avoid this, all the original estimates obtained in the various cross-sections have been submitted to the following "*time smoothing*" treatment. For each series of estimates of a coefficient of the model, a simple regression was run on a time polynomial of order 2. Only significant terms in this regression were kept and original estimates were replaced by the corresponding predicted values. All behavioral equations in the model were then rerun to adjust the intercept accordingly. A possible consequence of this is to reduce the amplitude of price effects in the decomposition method by taking away what is interpreted as temporary changes in behavioral coefficients.
- In order to implement the micro-simulation procedure described above, three types of residuals have to be drawn. First, participation functions residuals are needed at the individual level. Once these are obtained in a way consistent with observed occupational choices and the multinomial logit model, the effect on activity of a change in estimated coefficients can easily be simulated through the multinomial logit specification.[10] Second, wage functions, residuals must be drawn for individuals observed out of wage work in year t but predicted to be wage workers in the simulation. Third, profit function residuals are also needed at the household level for families for which no independent activity is observed in the base year of the simulation.

3. Changes in Income Functions and Occupational Choice Behavior During the 1976–94 Period

The preceding method is now applied to a series of household surveys taken yearly from 1979 to 1994 by the Government of Taiwan (Directorate-General of Budget Accounting and Statistics, DGBAS). Each sample comprises approximately 16,000 households. Variables used in the present study are fully comparable across all samples.

Discussing in detail the estimation results of the preceding model would have taken too much space. We sketch here only those results that are important for

[10]The multilogit model relies on the following structural specification of choice among various alternatives. Let p_j be the probability that alternative j is chosen and let X be the explanatory variables of the choice: $p_j = \text{Prob}(Xb_j + v_j > Xb_k + v_k \text{ for all } k \neq j)$, where the b_i's are vectors of coefficients. The multilogit relies on the assumption that the effects of unobservables, v_i, are distributed as independent random variables with double exponential distributions. Simulation of occupational choices in the present method requires the drawing of these v_i terms conditionally on observed occupational choices. For the detail see Bourguignon, Fournier, and Gurgand (1998a).

the understanding of the decomposition analyzed in the next section. More detail on the estimation results is given in a companion paper (see Bourguignon, Fournier, and Gurgand, 1998a).

Three changes in the structure of labor income and occupational choice behavior are important for the understanding of the evolution of Taiwan's income distribution since 1979. These are: (a) an increase in the rate of return to schooling among wage workers, (b) a drop in the variance of the residual term of the earnings equations, and (c) an increased autonomy of spouses' labor supply and occupational choice, that is, lesser dependence on household heads' income and greater dependence on own education. We analyze briefly each issue in turn.

Table 2 reports the estimates of a standard Mincerian earning function estimated for various years during the period under analysis. The striking result in that table is the increasing trend in the coefficient measuring the return to education for both men and women over the whole period under analysis.[11] Roughly speaking the rate of return for an additional year of schooling increased from a little more than 3 to 6 percent for men, and from 6 to 8 percent for women during the fifteen year period under analysis. Over time, the wage structure in Taiwan's labor market thus tended to change in favor of better educated workers. Other things being equal, the earning differential between somebody with six years of schooling (i.e. primary school) and somebody with twelve years (i.e. completed secondary) increased by approximately 10 percent for both men and women between the end of the 70s and the mid 90s.

Previous studies of the evolution of the wage structure in Taiwan are not in contradiction with this finding, although they point to a somewhat milder unequalizing trend. Using the Labor Force Survey of the Taiwan Area for 1978–91, Gindling, Goldfarb, and Chang (1995) found a slowly increasing trend in the earnings differential between upper and primary education until approximately 1988 for men with a small drop afterwards, and a continuously increasing trend until 1991 for women. Using the same data source as Gindling *et al.* (1995), Fields and O'Hara (1996) also found that the coefficient of the number of years of schooling in the typical log wage regression increased significantly from 0.050 to 0.057 between 1980 and 1993 in a sample including both men and women.[12]

The evidence obtained from Household Surveys on the increase of the return to education is thus more pronounced than with Labor Force Surveys. A possible explanation of this difference is the fact that the number of hours of work is not observed in the household survey, whereas it is explicitly taken into account in the studies just mentioned.[13] These studies also make use of other variables not available in the household survey, like tenure in the current main job, job mobility

[11]All our results are robust to the introduction of education either as a quadratic form or through a set of dummy variables representing educational levels.

[12]Jiang (1992) found a "wage compression effect" across educational levels between 1978 and 1986, although he also uses the Labor Force Surveys. However, it is possible that his conclusion is due to the fact that he simultaneously controls for the sector of activity of wage earners and their occupations, both variables likely to be correlated with formal education.

[13]The part-time dummy variable appearing in the regressions shown in Table 2 actually corresponds to the case of workers reporting being involved in both wage work outside the household and self-employment.

TABLE 2

WAGE FUNCTIONS CORRECTED FOR SELECTION BIAS (SELECTED YEARS)

Year	1979	1983	1987	1991	1994
Men					
Schooling	0.0325	0.0502	0.0562	0.0620	0.0582
	0.0015	*0.0016*	*0.0016*	*0.0017*	*0.0018*
Experience	0.0674	0.0715	0.0705	0.0592	0.0586
	0.0023	*0.0021*	*0.0019*	*0.0018*	*0.0018*
Squared experience	–0.0013	–0.0013	–0.0013	–0.0011	–0.0011
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
Part time dummy (instrumented)	–0.1147	–0.1038	–0.0843	–0.0563	–0.0601
	0.0034	*0.0033*	*0.0034*	*0.0034*	*0.0036*
Correction for selection (Mills ratio)	0.1488	0.3295	0.3635	0.2255	0.2977
	0.0383	*0.0412*	*0.0425*	*0.0445*	*0.0505*
Constant	10.6350	10.4214	10.5639	11.0537	11.1232
	0.0430	*0.0442*	*0.0449*	*0.0487*	*0.0533*
Residual variance	0.2180	0.2244	0.1850	0.1732	0.1801
R^2	0.51	0.52	0.48	0.47	0.47
No. of observations	12711	14217	13428	13034	12990
Women					
Schooling	0.0571	0.0679	0.0663	0.0794	0.0822
	0.0024	*0.0025*	*0.0023*	*0.0025*	*0.0024*
Experience	0.0396	0.0435	0.0379	0.0384	0.0388
	0.0032	*0.0028*	*0.0026*	*0.0026*	*0.0024*
Squared experience	–0.0008	–0.0008	–0.0007	–0.0006	–0.0007
	0.0001	*0.0001*	*0.0001*	*0.0001*	*0.0001*
Part time dummy (instrumented)	–0.0605	–0.0548	–0.0371	–0.0282	–0.0229
	0.0038	*0.0035*	*0.0034*	*0.0034*	*0.0034*
Mills ratio	0.0486	0.0283	0.0164	0.0785	0.0469
	0.0391	*0.0397*	*0.0368*	*0.0373*	*0.0355*
Constant	10.4945	10.4774	10.8146	10.9684	11.0513
	0.0475	*0.0452*	*0.0473*	*0.0510*	*0.0541*
Residual variance	0.2391	0.2348	0.1647	0.1666	0.1384
R^2	0.45	0.42	0.36	0.39	0.41
No. of observations	5780	7403	7448	7729	7765

Note: Other included variables are dummies for area of residence and household position. White robust standard errors in italics.

over the previous five years, and whether the person has a second job or not. A possible explanation of the stronger increase in the coefficient of education found in the present study would be that the correlation between all these variables and education may have changed in some systematic way over time. Our specification would thus appear as some kind of reduced form of a more complete earning model.

From a macroeconomic point of view, the increase in the return to education in Taiwan may seem somewhat surprising. In a competitive framework, this would suggest that the demand for educated workers over the period under

analysis increased faster than the supply, which we have seen grew at an accelerated rate over the period. The growth of demand has obviously to do with the overall growth rate but doubtlessly also with the change in the structure of the economy, which we have seen in section 1 has been quite dramatic.[14]

The second striking feature in Table 2 is the fall in the standard error of the disturbance term of the earnings equation. Since the analysis of Juhn, Murphy, and Pierce (1993) for the USA it has become customary to interpret this term as representing the dispersion of the remuneration of unobserved productive talents. In the case of Taiwan, the evidence would thus suggest that unobserved talents were remunerated in a more homogeneous way in the 90s than in the late 70s. It is not clear, however, that this would be the right interpretation. It must be kept in mind that we control very badly for hours of work in the earnings equations. We essentially do so through a dummy variable indicating that wage earners have other self-employment activities and implicitly through the selection bias correction factor, which in some sense may be interpreted as linked to labor supply. Under these conditions, it is quite possible that the drop in the mean squared residual term of the earnings equations corresponds to more homogeneity in working hours among wage earners. To check whether this is actually the case would require re-estimating earnings equations with another database that would include hours of work.

The last major change in the household income generation behavior is concerned with the occupational choices of married women. As mentioned above, this choice is modeled through a multinomial logit model. Reviewing all the estimated coefficients of this model would be cumbersome and of limited interest. The few significant changes in these coefficients are concerned with the income and price effect of married women's occupational choice. Figure 2 shows the evolution of the estimated mean (quasi) elasticity of the probability that a married woman takes up various occupations with respect to her husband's earnings[15]—in case he is a wage worker—and with respect to her own education. It can be seen that inactivity and wage work are less and less dependent on husbands' income and more and more on education. It thus seems the case that the correlation between husbands' and wives' income tended to increase over time. Because of this husband income effect and the positive correlation between husbands' and wives' education, it turns out that wives' labor income increased over time relatively more in households where heads were relatively well-off.

There are other noticeable features in the evolution of the coefficients of earning equations, family farm and non-farm income functions, and occupational choice models over the period under analysis. They are quantitatively of lesser importance than the points stressed above, however, and we prefer to leave them aside for the clarity of the argument.[16]

[14]It is interesting that the opposite evolution seems to have taken place in Korea in similar circumstances. Kim and Topel (1995) insist on the fact that returns to education declined there because of the big increase in the average education of the labor force. Their paper refers to the 1970–90 period, though. Things might be less clear cut for the more recent period.

[15]The quasi elasticity indicates by how many percentage points the probability of being inactive or a wage worker changes when husbands' earnings change by 1 percent.

[16]Some of them are handled in some detail in Bourguignon, Fournier, and Gurgand (1998a).

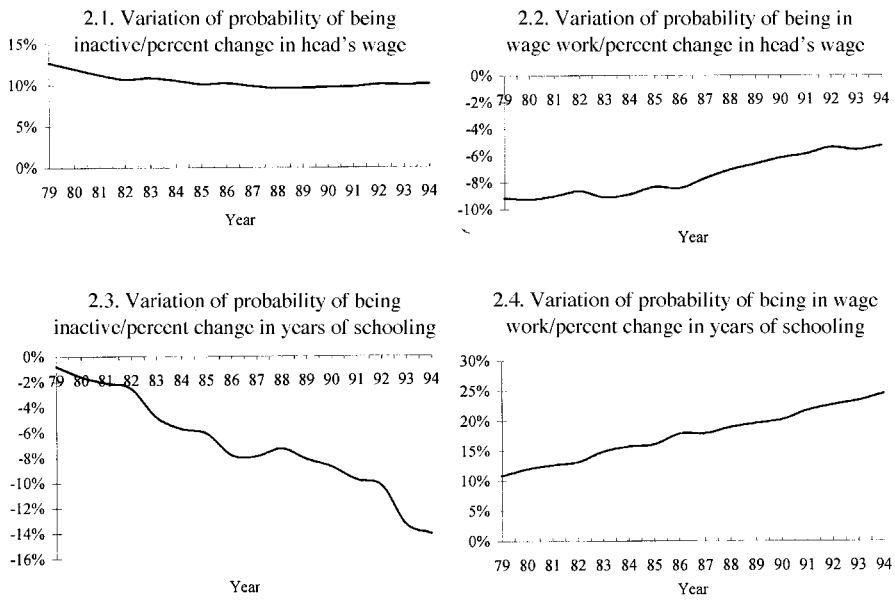

Figure 2. Quasi-Elasticity of Spouse Labor Supply With Respect to Head's Wage and Education

4. Decomposition of the Change in the Distribution of Income Over 1979–94

We are now in the position of applying the decomposition method presented above for identifying the distributional effects of changes in the structure of wages and self-employment incomes, in occupational preferences, and in the structure of the population. To make the analysis clearer, we consider only the initial and terminal years of the period under analysis. However, as we have seen that the decomposition method might be sensitive to the sample chosen as a reference for computing the price and participation effects, we also used the second and penultimate years. Actually, we consider in what follows results obtained with all combinations of the two adjacent initial years, 1979–80, and the two terminal years 1993–94, using alternatively the initial and the terminal year as the reference sample to compute price and participation effects. In view of the path dependence property noted above, this leads to eight possible evaluations of price, participation and population effects.[17] In a very rough way, this permits identifying a sort of "confidence interval" for these various effects or, alternatively, measuring the extent to which they are sensitive to the population that is chosen as a reference.

4.1. *Decomposition of the Change in the Distribution of Individual Earnings*

We start with the distribution of individual wage earnings. The results of our decomposition method are summarized in Table 3(A) for changes in mean

[17]That is four different combinations of initial and terminal years, and for each combination two decompositions depending on whether the initial or terminal population sample is used as a reference.

TABLE 3

DECOMPOSITION OF THE EVOLUTION OF INDIVIDUAL EARNINGS (79–80/93–94)

	Mean Change (a)	Maximum Change (a)	Minimum Change (a)
A: *Evolution of the mean earnings* (*percent change*)			
Observed variation	129.8	137.7	122.0
Price and participation effect	118.2	131.5	108.3
Price effect	118.4	128.9	110.8
Participation effect	–0.1	2.7	–2.6
Population effect	11.6	24.0	2.1
B: *Evolution of earnings inequality* (*change in Gini coefficient*)			
Observed variation	–0.024	–0.027	–0.021
Price and participation effect	0.022	0.008	0.036
Price effect	0.028	0.016	0.040
Participation effect	–0.006	–0.010	–0.003
Change in earning equation's residual variance	–0.027	–0.036	–0.020
Population effect	–0.018	–0.034	–0.001

Note: (a) Minimum and maximum values among all combinations of initial and terminal years and/or initial or terminal population samples for decomposition methodology. Mean change computed on all combinations.

income, in Table 3(B) for Gini coefficients, and in Figure 3 for the full distribution of individual earnings as approximated by conventional Kernel techniques.[18] For the various effects of interest, this figure depicts the change in the density of the distribution after normalizing the mean income of the population.[19]

Price Effect and the Unequalizing Influence of the Increase in Educational Returns

The first step in the decomposition consists of modifying the structure of earnings while keeping the population of wage earners constant. This causes an increase in the mean real earning of wage workers equal to 118 percent, of which approximately half is due to the change in the intercept of the wage functions in Table 2 and half is due to productivity gains associated with education or experience. This impressive productivity gain represents 90 percent of the overall increase in the mean earning of wage workers during the period under analysis. Interestingly enough, this implies that the change in the composition of the wage labor force explained only a tiny fraction of the extremely fast expansion of earnings.

Concerning the distribution of earnings, the dominant effect in the evolution is of course the observed increase in the return to education. This produces an unambiguous increase in the inequality of the distribution. Indeed, in this simulation,

[18]We use a Gaussian kernel with bandwidth $h = 0.9m/n^{1/5}$ where m is the minimum of the standard error of the income distribution and the interquartile range divided by 1.349 and n is the number of observations.

[19]A similar technique is used in a different framework by diNardo, Fortin, and Lemieux (1996). Note that, unlike Table 3(B), Figure 3 refers to a single pair of initial and terminal years. These are 1979 and 1994. This may explain some discrepancy between the results appearing in Table 3(B) in terms of mean changes in the Gini coefficient and Figure 3.

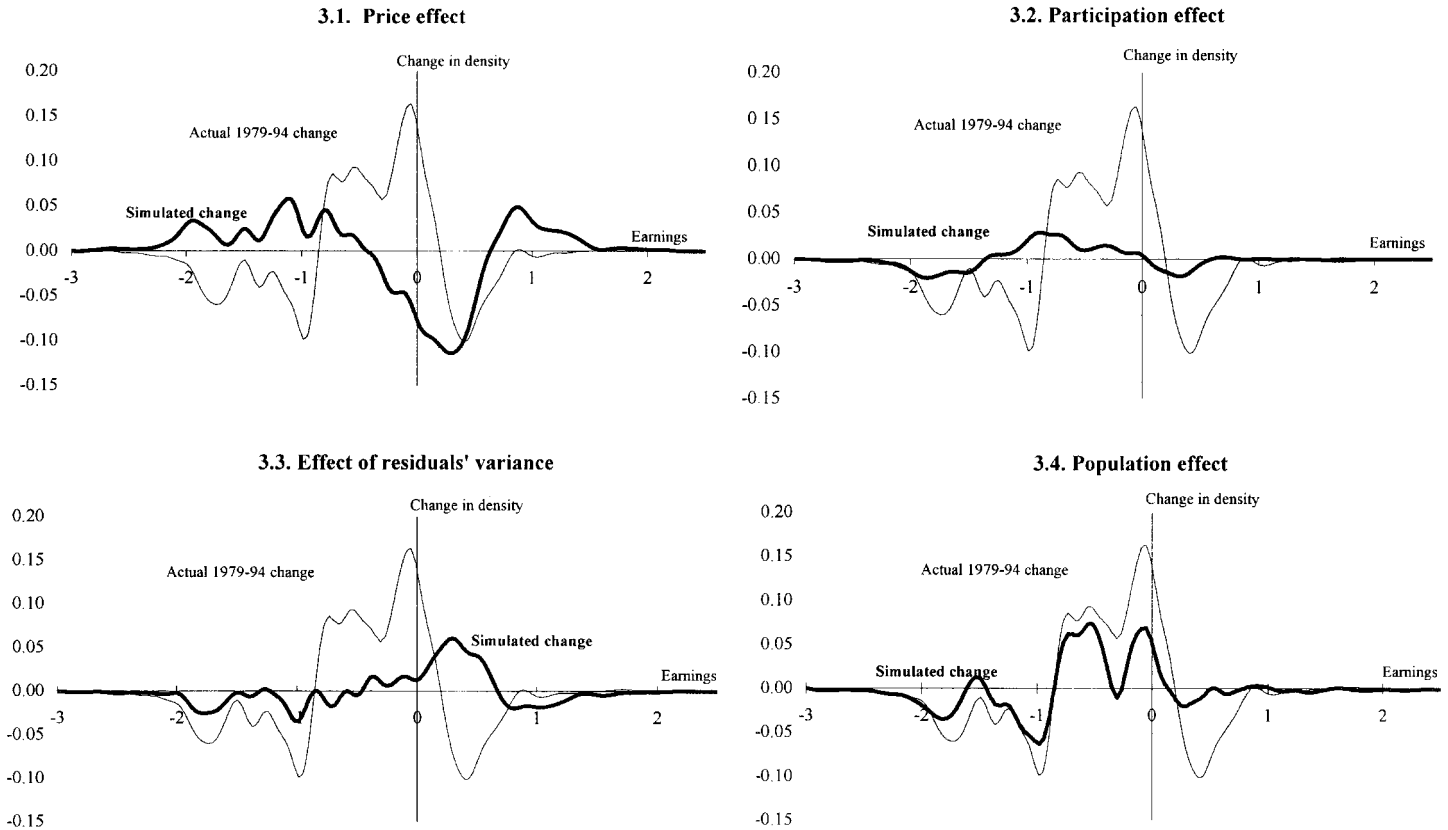

Figure 3. Decomposition of the 1979–94 Change in the Distribution of Individual Earnings (Change in Kernel estimates of density after normalizing earnings by the mean and taking logs)

earners in the bottom 10 centiles would have gained slightly less than 100 percent over the whole period, whereas people in the top 10 centiles would have gained more than 130 percent. Figure 3.1 shows that, after normalizing by the mean income, the distribution resulting from the price effect corresponds to a mean-preserving spread of the initial distribution. The density of the distribution diminishes in an interval slightly above the mean of the distribution and increases on both sides of that interval. Depending on the population that is used to evaluate this effect, it may be seen in Table 3(B) that the change in the Gini coefficient ranges from 0.016 to 0.040 with a mean change equal to 0.028. There is nothing really surprising in the magnitude of this range. It is indeed to be expected that the effect of a change in the return to education on the distribution of earnings depends on the distribution of schooling in the population, which we have seen has drastically changed over the period studied in Taiwan.

The Equalizing Effect of Changes in Participation and Occupational Choice

The effects of changes in participation and occupational choice behavior are more subtle to analyze than the pure price effects above because they correspond to a modification in the population of individual earners. Figure 4 represents these modifications by showing the simulated entries and exits from the 1979 wage labor force which would have occurred had people adopted the participation and

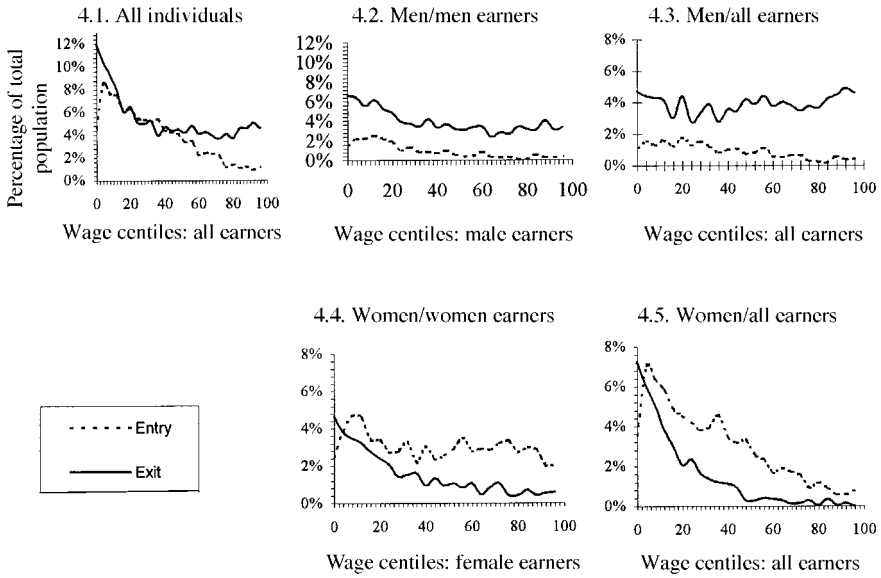

Figure 4. Overall Participation Effect: Simulated Entries and Exits from the Wage Labor Force

occupational choice behavior observed in 1994. For all wage earners, Figure 4.1 shows that there has been an equalizing effect resulting from net exits at the two extremes of the distribution, thus leading to no significant change in mean earnings, as shown in Table 3(A). However, this general evolution results itself from various phenomena and in particular from opposite tendencies among men and

women. The participation of men to the wage labor force fell over the period under analysis at approximately the same rate along the (men) wage scale, but a little more at the bottom (Figure 4.2). For women, there were more entries than exits, except in the bottom centiles of the (women) wage scale (Figure 4.4). Because there are more men than women at the top of the distribution of wage earners, the dominant effect there is the exit of workers, as may be seen in Figures 4.1 and 4.3. Conversely, as women are located in the bottom and middle part of the overall distribution of wages, they contributed to a net entry of workers in the middle part of the distribution, compensating there the net exit of men (see Figures 4.5 and 4.1). Overall, the change in participation behavior, which essentially consisted of a drop in the wage labor force participation of men and an increase in that of women, had an unambiguously equalizing effect on the overall distribution of individual earnings. However, it may be seen in Figure 3.2 that this effect was very moderate. The change in participation behavior produced a mean preserving "squeeze" of the distribution that is almost negligible in comparison with the change actually observed between 1979 and 1994.

The Equalizing Effect of the Drop in Residual Earning Variance

Of course this change has by definition no effect on mean earnings. On the distribution side, it also corresponds to a somewhat tautological step in the decomposition method. We have seen that earnings heterogeneity as described by the residual terms of earning equations fell substantially over time. This evolution may reflect an increase in the homogeneity of either the productivity of workers with identical observed characteristics or of working hours. Table 3(B) shows that this effect is responsible for a drop of 0.020 to 0.036 in the Gini coefficient of individual earnings. It may be seen in Figure 3.3 that this effect is responsible for a mean preserving squeeze of limited amplitude in terms of density. However this squeeze is taking place on a rather wide interval involving individuals at the two extremes of the distribution, which explains the relatively big change in the Gini coefficient.

Population Effect

Taking the sum of the preceding effects out of the actual change in the distribution of individual earnings yields the population effect as a residual. As shown in Table 3(A), this evolution explains around 9 percent of the rise in the mean individual earning, which is mostly due to the rise in the average education attainment within the working population. The resulting change in the distribution shown in Figure 3.4 as well as the change in the Gini coefficient shown in Table 3(B) suggest that the change in the socio-demographic structure of the population was strongly equalizing. However, the estimation range appearing in Table 3(B) is rather wide, which means that this effect may be more path dependent than the preceding effects taken individually.

There is little doubt that the equalizing of the distribution of schooling within the wage labor force contributed to an equalizing of the distribution of earnings—see Fields and O'Hara (1996) as well as our own work (Bourguignon, Fournier, and Gurgand, 1998b). This is the phenomenon behind the mean preserving

squeeze shown in Figure 3.4. But the range estimated for the change in the Gini coefficient in Table 3(B) shows that other forces have probably been at work. The effect of the change in the structure of schooling in the population is naturally more pronounced when evaluated with 1993/1994 prices because the rate of return to education was higher at that time. Schooling thus dominates other changes in the structure of the population which might have had an unequalizing influence. This is what is depicted by Figure 3.4 and the upper limit of the range of the Gini coefficient in Table 3(B). Using 1979/1980 prices to evaluate the population effect yields less pronounced changes.

Overall, it thus appears that the fall in the inequality of individual earnings in Taiwan over the period 1979–94 results from several strong forces which have not all pushed in the same direction. On the unequalizing side, a change occurred in the wage structure. More specifically a rise in the returns to education increased earnings disparities. On the equalizing side, three phenomena of unequal importance permitted overcompensating the preceding evolution. They are: (a) the fall in the variance of the unobserved determinants of earnings; (b) changes in the socio-demographic structure of the population of wage earners, most notably changes linked to the structure of schooling; and finally (c) the change in participation and occupational choice behavior which brought more women in the wage labor force.

4.2. *Decomposition of the Evolution of the Distribution of Household Income*

We may contrast the above results with the analysis of the distribution of equivalized primary household income. We already know that this distribution tended to become more unequal during the period under analysis, whereas that of individual earnings became more equal. This means that the forces that were just identified for distributional changes in the case of individual earnings must have had different intensities or must have been complemented by other ones. In what follows we review the same issues as for individual earnings and try to identify where the difference may lie. Results are summarized in Table 4 and Figures 5 and 6.

Price Effects

Over the period, the mean household income per adult equivalent rose from NT$139,000 to 338,000. Table 4(A) shows that, as for individual income but to a lesser extent, most of that evolution is explained by pure productivity gains in earnings and self-employment incomes.

The unequalizing effect due to the evolution of the individual earning structure should normally be transmitted to household incomes. It may be expected to be smaller, however. Even though there is some correlation between the characteristics (e.g. education) of various household members this correlation is not perfect, which is an equalizing factor. Therefore, it comes as no surprise to see in Table 4(B) that the change in the Gini coefficient attributable to the pure price effect is smaller than the corresponding figure in Table 3(B). Although the mean value is still substantial (i.e. 0.021), the lower bound of the confidence interval is in fact rather low. In terms of the decomposition of the overall change in the

TABLE 4

DECOMPOSITION OF THE EVOLUTION OF EQUIVALIZED HOUSEHOLD INCOME (79–80/93–94)

	Mean Change (a)	Maximum Change (a)	Minimum Change (a)
A: *Evolution of the mean earnings* (*percent change*)			
Observed variation	134.5	142.4	126.6
Price and participation effect	109.2	126.4	95.4
Price effect	104.5	120.1	91.7
Participation effect	4.7	6.3	3.6
Population effect	25.3	41.2	12.4
B: *Evolution of earnings inequality* (*change in Gini coefficient*)			
Observed variation	0.021	0.015	0.027
Price and participation effect	0.031	0.000	0.061
Price effect	0.021	0.003	0.036
Participation effect	0.011	–0.003	0.025
Change in earning equation's residual variance	–0.017	–0.023	–0.010
Population effect	0.005	–0.028	0.037

Note: (a) Minimum and maximum values among all combinations of initial and terminal years and/or initial or terminal population samples for decomposition methodology. Mean change computed on all combinations.

distribution of household income, it may be seen in Figure 5 that, interestingly enough, the price effect almost coincides with the actual mean preserving spread actually observed between 1979 and 1994.

Participation Effects

The difference with individual earnings here is still more pronounced. First, as shown in Table 4(A), changes in participation behavior and occupational choice led to a rise in average household income. This effect was necessarily very limited for individual earners since the mean income was evaluated, by definition, on the population of active individuals being employed as wage workers. Second, whereas this evolution was unambiguously equalizing in the case of individual earnings, it is not so any more. On average, it even is unequalizing when one considers the change in the Gini coefficient (see Table 4(B)). In Figure 5 it clearly contributes to a mean preserving spread at the middle of the distribution.

Two phenomena explain this difference. The first has been alluded to in the preceding section and has been analyzed in some detail in Fournier (1997). It is the drop in the (negative) effect of husbands' income on married women labor force participation. Because of this evolution, we expect that applying to the sample of 1979 households the participation and occupational choice behavior of 1994 will lead to relatively more women entering—in net terms—the labor force at the top of the distribution of household income. It may be seen that this is exactly what is observed in Figure 6.1. But there is another, more powerful explanation. It was seen above—Figure 4.4—that women who entered the (wage) labor force between 1979 and 1994 were on average better educated than women who were already active. This had an equalizing effect on the overall distribution of individual earnings because these women entered the middle of the distribution of wages. Things are different for household income, however, because better

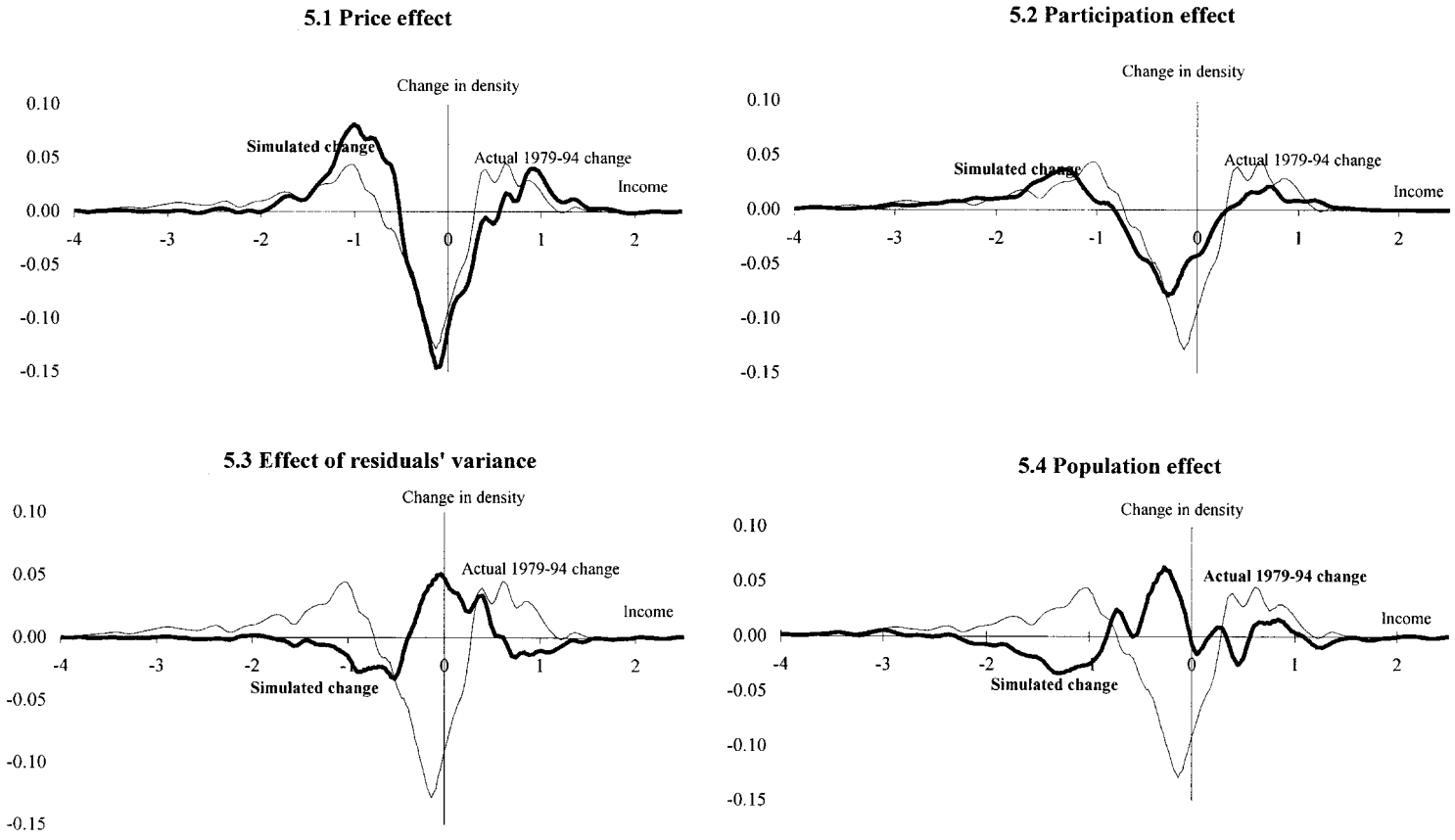

Figure 5. Decomposition of the 1979–94 Change in the Distribution of Equivalized Household Market Income
(Change in Kernel estimates of density after normalizing incomes by the mean and taking logs)

educated women tend to be in relatively richer households. Nothing of this type was observed for men. It was seen above that they tended to exit the labor force in a more or less neutral way with respect to the distribution of male individual earnings. Figure 6.2 suggests that neutrality also holds with respect to household income. It is therefore mostly the change in women labor force participation and its increased elasticity with respect to education that explains the unequalizing effect of participation behavior on household income.

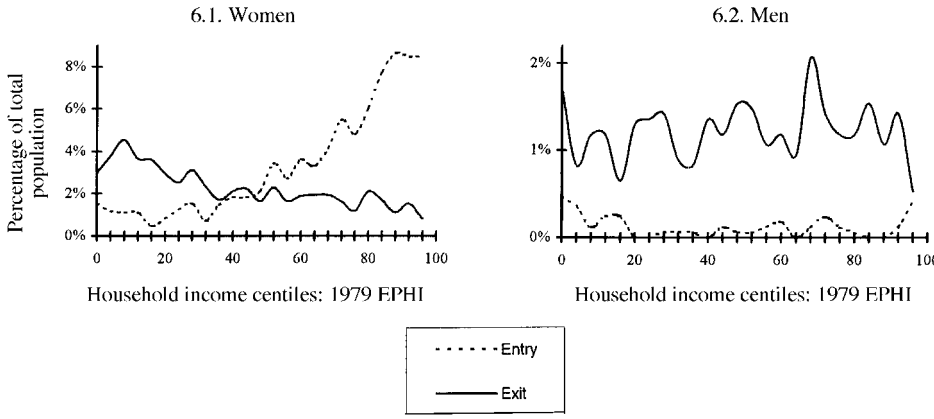

Figure 6. Overall Participation Effect on the Distribution of Household Income: Percentage of Individuals Entering or Exiting the Labor Force by Household Centiles

The Effect of Earnings' Residual Variance

As for the price effects above, the fact that there are various wage earners in a household should reduce the distributional impact of the drop in the variance of the unobserved determinants of individual earnings. This is what is observed in Table 4(B) and Figure 5. The drop in the Gini coefficient of equivalized household income is only 0.017, whereas it was 0.028 for individual earnings.[20]

Population Effect

As for individuals, Table 4(A) shows that changes in the population structure led to an increase in average equivalized household income. The effect is greater, though, because the drop in household size comes on top of the rise in average education. On the distribution side, an important difference with the decomposition of the change in the structure of individual earnings is that the population effect is now in the direction of more inequality. However, the confidence interval appearing in Table 4(B) suggests this effect is ambiguous in the case of household income, whereas it was unambiguously equalizing in the case of individual earnings. The density difference shown in Figure 5.4 also suggests rather complex distributional changes.

[20]Note, however, that no attempt has been made at simulating the effect of observed changes in the variance of the residuals of farm and non-farm profit functions.

Because they are mostly determined as a residual effect, these changes are impossible to identify directly. Since the population effect was strongly equalizing at the individual level, it is possible to say that unequalizing changes necessarily took place in the *matching of individuals within households*. For instance the correlation of potential earnings and schooling levels among household members might have increased. Likewise, changes in the composition of households, in particular the drop in household size, may have been correlated with potential income. This is in agreement with the analysis of Fields and Leary (1997), who found that changes in the demographic structure of households and an increase in the correlation of spouses' education had unequalizing effects on the level of inequality. The consequences of a change in this matching are also analyzed in Fournier (1999).[21]

5. Conclusion

Applying an original decomposition analysis of the change in income distribution to Taiwan during the 1979–94 period, this paper identified some explanatory factors of the observed equalization of the distribution of individual earners and of the unequalizing distribution of household income. These factors are closely linked to the drastic transformation in the economy and in the socio-demographic structure of the population during that period.

Four phenomena were shown to be important in the evolution of the distribution of individual earnings. (a) Changes in the wage structure contributed to an increase in inequality. These can be imputed in a large part to an increase in the return to schooling that took place despite a dramatic growth in the supply of educated workers. However, this effect was more than offset by three other tendencies. (b) A drop in the variance of the effect of unobserved earnings determinants, the nature of which is still to be identified. (c) A change in participation and occupational choice behavior which contributed to an increase in the relative weight of the middle earners. (d) Changes in the socio-demographic structure of the population. Altogether these four tendencies produced a significant drop in the inequality of individual earnings.

The same phenomena affected the evolution of the distribution of equivalized primary household income but their overall effect was somewhat different. Other forces were present too, so that the evolution went in the opposite direction and inequality unambiguously increased between 1979 and 1994. In comparison with the evolution of the distribution of individual earnings, this was shown to be the result of the participation effect which proved to be unequalizing at the household level—the net entrants in the labor force belonging to the upper part of the distribution—and changes in the socio-demographic structure of the household population, and more precisely in household composition.

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