

# A welfare economic analysis of labor market policies in the Harris–Todaro model

Gary S. Fields\*

*Cornell University, 250 Ives Hall, Ithaca, NY 14853-3901, USA*

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## Abstract

This paper presents a welfare economic analysis of the benefits of various labor market policies in the Harris–Todaro labor market model. The policies considered are a policy of modern sector job creation, which I call modern sector enlargement (MSENL); a policy of rural development, which I call traditional sector enrichment (TSENR); and a policy of wage limitation in the urban economy, which I call modern sector wage restraint (MSWR). First, I analyze the inequality effects of these policies. I then perform two welfare economic analyses, the first based on summary measures of labor market conditions (total labor earnings, unemployment, inequality of labor incomes, and poverty rates) and the second based on dominance analysis in the labor market, in both cases assuming that the costs are borne elsewhere. The results of the welfare analyses are compared, and it is shown that TSENR unambiguously increases welfare in the labor market using both approaches, the other policies yield ambiguous results, and no policy is unambiguously welfare-decreasing.

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## 1. Introduction

Since its introduction in 1970, the Harris–Todaro (HT) model has become the workhorse for analyzing labor market policies in dualistic labor markets. In the intervening

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\* Tel.: +1 607 255 4561; fax: +1 607 255 4496.

*E-mail address:* gsf2@cornell.edu.

years, many aspects of the model have been studied including unemployment, development policies, tax and transfer policies, and many others; see [Todaro and Smith \(2003\)](#) for a review. However, one aspect of the model has not yet received thorough attention, and that is the welfare economics of labor market policies in an HT economy. The purpose of this study is to help fill that gap.

The paper proceeds as follows. In Section 2, I present the original Harris–Todaro model and review prior analyses of the effects of various labor market policies in that model. Three labor market policies were considered by Harris and Todaro themselves. The first was a policy of modern sector job creation, which I call modern sector enlargement (MSENL). MSENL could come about by a tripartite agreement, as in Harris and Todaro; by a government-sponsored employment creation scheme, as many countries have done; or by technical change and/or capital accumulation in the modern sector, which can (but need not) shift the demand curve for modern sector labor outward. The second policy considered by Harris and Todaro was rural development; focusing on the labor market effects of such a policy, I label it traditional sector enrichment (TSENR). A third policy considered by Harris and Todaro was a policy of wage limitation in the urban economy; I call this modern sector wage restraint (MSWR).<sup>1</sup> The review of past literature in Section 2 demonstrates that prior work has provided valuable lessons but is not yet complete in analyzing the benefits of the various policies.

The rest of the paper develops new results. Section 3 completes the inequality analysis. Section 4 then performs a welfare economic analysis of labor market conditions based on an “abbreviated social welfare function” (“abbreviated,” because they are functions of variables which themselves are summary statistics of different aspects of the labor market).<sup>2</sup> The labor market indicators used in the abbreviated social welfare function here are total labor earnings, unemployment, inequality of labor incomes, and poverty rates. Section 5 turns to dominance analysis in the labor market ([Hadar and Russell, 1969](#); [Saposnik, 1981](#); [Foster and Sen, 1997](#)). Section 6 compares the welfare economic results for labor market changes using the different approaches. The main conclusions are highlighted in Section 7.

Before proceeding, let me add a word about what the results of this paper imply and do not imply about policy. If a government is choosing between MSENL, TSENR, and MSWR policies, it needs to consider not only the consequences of putting the policy into effect, which is what is analyzed here, but also the costs of putting the policy into effect. MSENL and TSENR both require expenditures of resources to create more modern sector jobs or to achieve rural development, respectively (unless, that is, an outside donor provides the money as an outright grant to the country). On the other hand, MSWR is costless (economically if not politically); actually, it saves the government money if the government is itself a modern sector employer. The social costs of these policies need to be taken account of along with the social benefits before a policy recommendation can be offered.

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<sup>1</sup> Harris and Todaro also considered a “limited” wage subsidy, which they analyzed at length, and migration restriction, which they rejected on ethical grounds.

<sup>2</sup> The terminology is due to [Lambert \(1993\)](#).

## 2. Analysis of labor market policies in the simplified HT model

### 2.1. The model

The Harris–Todaro model was formulated to represent a labor market in a dualistic economy. The two sectors of the economy are a modern sector, denoted here by M, and an agricultural sector (A). The two sectors are geographically distinct, with the modern sector being located in the urban area and the agricultural sector in the rural area. For institutional reasons such as trade unions, sector-specific minimum wages, and the like, the real wage in the modern sector  $W_M$  in the HT model is set rigidly above the real wage in agriculture  $W_A$ .<sup>3</sup>

In the model,  $L$  workers (all assumed identical and fixed in number) allocate themselves between job search strategies in order to maximize expected earnings. In the original Harris–Todaro model, the two search strategies are an urban search strategy and a rural search strategy. Once workers have chosen their strategies, employers hire workers randomly from among the available pool. Those workers employed receive wages  $W_M$  and  $W_A$  in the modern and in the agricultural sector, respectively, and the unemployed receive nothing. At this point, the game ends.

The urban search strategy produces a modern sector job paying  $W_M$  with probability  $p$ . With complementary probability  $1-p$ , an urban job searcher is unemployed; in the absence of unemployment insurance, unemployment results in an income of zero. The expected wage for a prospective worker who adopts an urban search strategy is therefore:

$$E(W_U) = W_M p. \quad (1)$$

Employment in the modern sector  $E_M$  depends negatively on the modern sector wage through an ordinary downward-sloping labor demand curve:

$$E_M = e(W_M), \quad e' < 0. \quad (2)$$

In the original HT model, the available jobs were assumed to be filled in a random way with each of the  $L_M$  members of the urban labor force having the same chance of being hired for a given job as any other:

$$p = E_M / L_M. \quad (3)$$

$L_M$  is determined endogenously from the HT equilibrium condition, defined below.

Rather than pursuing an urban job, a prospective worker might adopt a rural job search strategy. Harris and Todaro assumed that doing this precluded the possibility of obtaining an urban job. On the other hand, the agricultural labor market was assumed to clear so that a job at wage  $W_A$  is available to anyone who wants one. A rural job-seeker would therefore earn  $W_A$  with probability one:

$$E(W_R) = W_A. \quad (4)$$

The Harris–Todaro model is both a disequilibrium model and an equilibrium one. The model explained why workers would continue to migrate into urban areas despite the

<sup>3</sup> Stiglitz (1974, 1976) considered instead the possibility of these wages being set above the market-clearing level for efficiency wage reasons, but that variant is not pursued here.

existence of urban unemployment: this would happen as long as  $E(W_U)$  was still above  $E(W_R)$ . The model also explained why unemployment would exist in equilibrium. In a Harris–Todaro equilibrium, the expected wage from an urban search strategy  $E(W_U)$  and that from a rural search strategy  $E(W_R)$  would equal one another:

$$E(W_U) = E(W_R). \quad (5)$$

This arises, because  $W_M > W_A$  implies  $p < 1$ : that is, unemployment exists in equilibrium. Combining Eqs. (1)–(5), we have that in an (interior) HT equilibrium,

$$W_M \frac{E_M}{L_M} = W_A. \quad (6)$$

In the original HT formulation, the wage in the agricultural sector,  $W_A$ , depended inversely on the agricultural sector labor force  $L_A$ . However, many authors (Fields, 1975; Anand and Vijay, 1979; Heady, 1981; Stiglitz, 1982; Sah and Stiglitz, 1985; Bell, 1991) have found it convenient to work with a simplified Harris–Todaro model in which the agricultural wage remains constant over the relevant range. In the simplified model, the causal structure is then:  $W_M$  and  $L$  are exogenous.  $W_A$  is invariant.  $W_M$  determines  $E_M$ .  $W_M$ ,  $W_A$ , and  $E_M$  together determine  $L_M$ .  $L$  and  $L_M$  determine  $L_A$ . That simplified model is used here as well. The limitation is deliberate: as I shall show below, many ambiguous results are found. If ambiguities arise in the original model, they also arise in the general model that nests the original model as a special case.

The HT model has been generalized to allow for an urban informal sector, on-the-job search from agriculture, duality within the rural sector, educational differences among workers, job fixity, mobile capital, endogenous urban wage setting, risk-aversion, a system of demand for goods, and many other factors (Fields, 1975; Corden and Findlay, 1975; Calvo, 1978; Moene, 1988, 1992; Khan, 1989; Chakravarty and Dutta, 1990; Bourguignon, 1990; Basu, 1997). My reason for working with the original model is to show that many policy ambiguities are found even there.

## 2.2. Effects of labor market policies on labor market conditions in prior work using the HT model

In the original HT model and in other papers that followed, labor market policies were evaluated in terms of their effect on unemployment. The focus on unemployment was justified by the atemporal nature of the model. In an HT equilibrium, the amount of unemployment (all urban) is given by:

$$\text{UNEM} = L_M - E_M = \frac{W_M}{W_A} E_M - E_M = \left( \frac{W_M}{W_A} - 1 \right) E_M. \quad (7)$$

From Eq. (7), the two famed policy conclusions of the HT analysis can be seen immediately: that as long as  $W_M$  and  $W_A$  remain constant, any attempt to eliminate urban unemployment through urban job creation (raising  $E_M$ ) would raise unemployment, not lower it; and that the solution to urban unemployment is rural development (raise  $W_A$ ).

The original HT paper considered a third policy: that of urban wage restraint. The authors stated that for plausible parameter values, lower urban wages would be expected to

raise employment in both the modern and the traditional sectors of the economy. Subsequently, Fields (1997) determined that a policy of urban wage restraint would lower unemployment if the demand for labor in the modern sector is sufficiently inelastic (specifically, if  $\eta > -(1/2)\gamma$ , where  $\gamma = (\frac{W_M}{W_A} - 1)$  and  $\eta$  is the arc wage elasticity of demand for labor in the modern sector evaluated between  $W_A$  and  $W_M$ ) and raise unemployment if the demand for labor is sufficiently elastic ( $\eta < -(1/2)\gamma$ ).

Work by Gupta (1988), Rauch (1993), and Temple (1999, 2003) shifted the HT policy analysis from unemployment to labor market inequality. Gupta showed that MSENL could increase or decrease the Gini coefficient. Working with a multiple period version of the HT model, Rauch deduced that as formal sector employment expands with economic growth, the inequality of lifetime income measured by the log-variance follows an inverted-U path. Temple presented three sufficient conditions for inequality to rise and three similar sufficient conditions for inequality to fall. Unfortunately, these were in terms of endogenous variables (the unemployment ratio, the number of unemployed, and the number employed in each of the two sectors), so the comparative static analysis is not yet complete.

### 2.3. Contributions of this paper

As compared with earlier policy analyses in the basic HT model, this paper makes the following contributions. First, I complete the analysis of inequality changes for Harris and Todaro's three main policy options: MSENL, TSENR, and MSWR.<sup>4</sup> Inequality is gauged here in terms of Lorenz curves, which Bourguignon and Temple also used, as well as by intersectoral wage differentials.<sup>5</sup> Second, I present a full labor market analysis using an abbreviated social welfare function in which the goodness of labor market conditions depends positively on total labor earnings and negatively on unemployment, inequality, and poverty, all in the current period. In previous work, only unemployment and inequality were analyzed, and never together in the same social welfare function.<sup>6</sup> Third, I conduct an alternative labor market analysis using more recent methods of welfare dominance, which have not been applied before in the HT literature.

Before proceeding, I would note that the analysis that follows is concerned with evaluating only the *labor market conditions* that result from various labor market policies in the HT model. This paper does not attempt to consider broader welfare judgments in terms of the economy's utility possibility frontier, as analyzed by Harris and Todaro (1970) and followers.<sup>7</sup>

<sup>4</sup> The inequality effects of MSENL in the HT model were first studied by Gupta (1988). Temple (1999) considered technical progress in agriculture, which effectively corresponds to TSENR, and in manufacturing, which is essentially MSENLR. Temple also analyzed urban wage restraint and a small uniform wage subsidy (which had been introduced into the HT literature by Bhagwati (1974)). The analysis here builds upon and extends these earlier inequality analyses.

<sup>5</sup> Gupta measured inequality using the Gini coefficient and Rauch used the log-variance. For a critique of the log-variance, see Foster and Ok (1999).

<sup>6</sup> For example, Chakravarty and Dutta (1990) formulated social welfare functions depending on mean income and inequality but not unemployment. Papers are still being written analyzing welfare in the HT model using just mean income; a current example is Marjit and Hamid (2003).

<sup>7</sup> Basu (1997) provides a review.

### 3. Inequality analysis

#### 3.1. Inequality analysis in terms of Lorenz curve comparisons

A robust way of judging which of two income distributions is more or less equal than the other is to compare their Lorenz curves; see Figs. 1–4. Income recipients are ordered from lowest income to highest, and the cumulative shares of income received by each cumulative share of population are plotted. In the case of a perfectly equal distribution of income, the Lorenz curve lies along the 45° line, while in the case of a perfectly unequal distribution of income, it lies along the bottom and right axes. When comparing the inequalities of two distributions, if the Lorenz curve of distribution A lies strictly closer to the 45° line at some point than the curve for distribution B and never further away, then we can conclude that A is more equally distributed than B, and all Lorenz-consistent inequality measures would judge A to be more equal than B.<sup>8</sup>

Constructing Lorenz curves in the Harris–Todaro model is aided by the following observations (Bourguignon, 1990; Temple, 1999). In the model, there are just three incomes— $W_M$  for those employed in the modern sector,  $W_A$  for those employed in agriculture, and 0 for the unemployed. Any Lorenz curve will therefore consist of three piecewise linear segments and will bend twice, at “kink points” labeled  $K_1$  and  $K_2$ . Because the lowest income is zero, the first segment  $OK_1$  is entirely flat. The middle segment  $K_1K_2$  has slope  $W_A$ , which also is the average income in the population, and therefore  $K_1K_2$  also has a slope of 45°.<sup>9</sup> The third segment of the Lorenz curve  $K_2P$  is constructed simply by connecting the end of the second segment with the upper corner.

We are now ready to construct Lorenz curves for each labor market policy in the HT model and see how inequality changes. In each case, the original Lorenz curve is depicted by dashed lines and the new Lorenz curve by solid lines.

The first policy, MSEN, is drawn in Fig. 1. This policy increases both the amount of employment at wage  $W_M$  and the amount of unemployment at wage zero. The increase in  $E_M$  moves  $K_2$  leftward while the increase in UNEM moves  $K_1$  rightward. (Superscripts O and MSEN respectively denote the original point and the new one under MSEN.) Because  $W_A$  remains the same and average income equals  $W_A$ , the total income in the economy remains the same ( $W_AL$ ). Therefore, the third segment  $K_2P$  has the same slope  $W_M/W_AL$  after MSEN has taken place as it did before. The resultant Lorenz curve following MSEN is therefore  $OK_1^{MSEN}K_2^{MSEN}P$  which lies partly below the original Lorenz curve  $OK_1^OK_2^OP$  and never above it. Hence, we have a Lorenz-worsening. We may thus conclude that *a policy of modern sector enlargement increases income inequality*.

<sup>8</sup> However, if the two Lorenz curves cross, then neither can be said to be unambiguously more equal or unequal than the other. In this case, two Lorenz-consistent measures can always be found, one of which shows A to be more equally distributed than B and the other showing A less equally distributed than B.

<sup>9</sup> In the generalized HT class of models,  $W_A$  is the average income in the population if and only if there is no on-the-job search from agriculture (Fields, 1989).

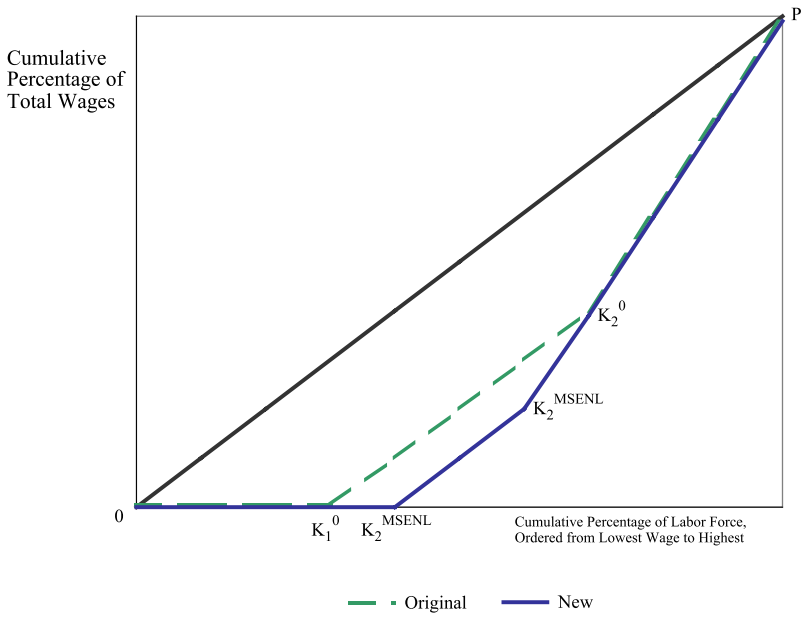


Fig. 1. Lorenz-worsening for MSENL.

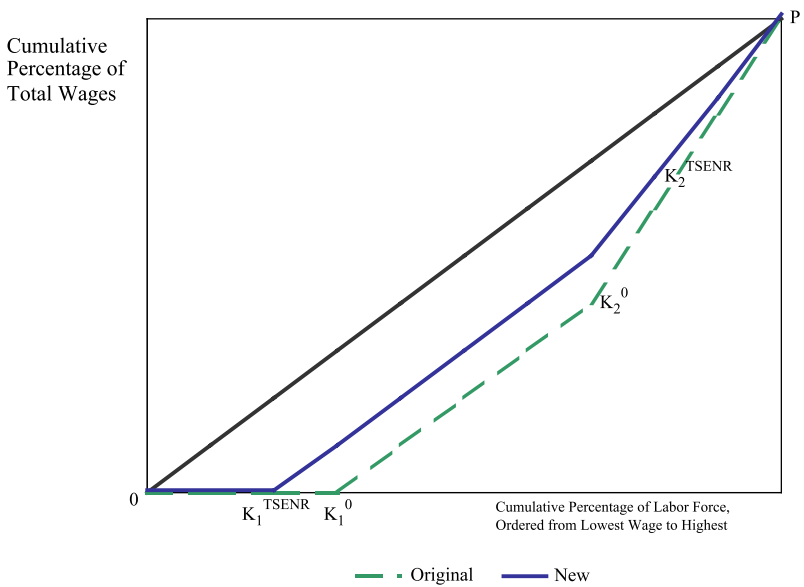


Fig. 2. Lorenz-improvement for TSENR.

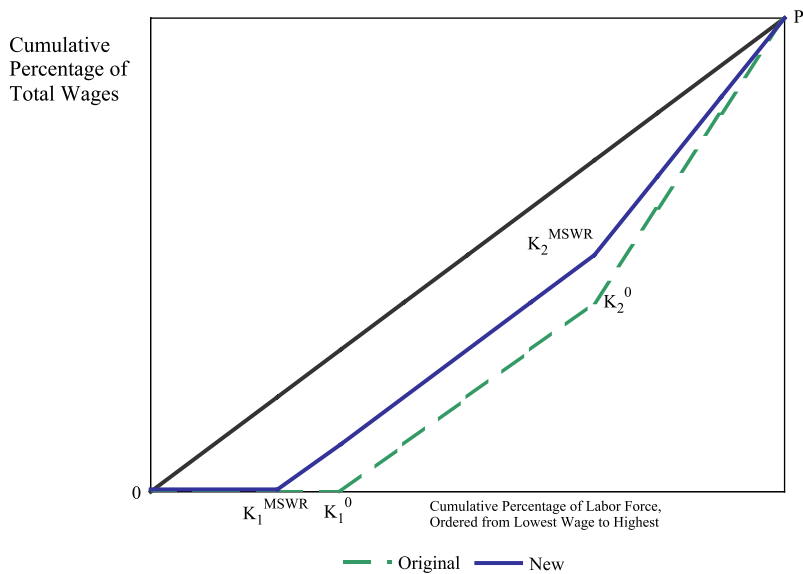


Fig. 3. Lorenz-improvement for MSWR, Case i.

The second policy is TSENR, analyzed in Fig. 2. Because  $W_A$  rises,  $L_U$  falls, so the first kink point moves leftward.  $W_M$  and  $E_M$  are unchanged. The constancy of  $E_M$  implies that  $K_2^{TSENR}$  and  $K_2^O$  have the same horizontal coordinate. As for the vertical coordinate, the

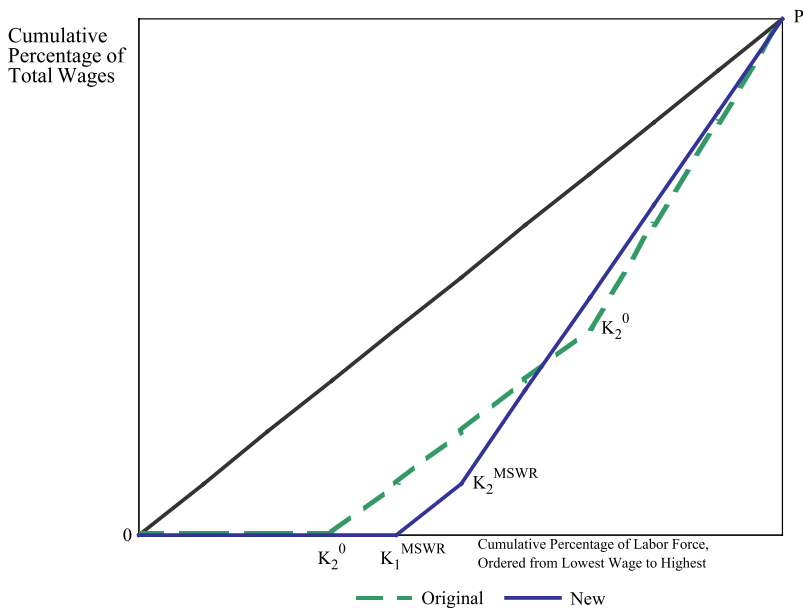


Fig. 4. Lorenz-crossing for MSWR, Case ii.

increase in  $W_A$  because of TSENr means that the slope of the third segment,  $W_M/W_A L$ , has decreased, and therefore  $K_2^{\text{TSENr}}$  must lie above  $K_2^O$ . The slope of the middle segment  $K_1 K_2$  remains equal to one. We therefore have a new Lorenz curve  $OK_1^{\text{TSENr}} K_2^{\text{TSENr}} P$  that lies partly above the original Lorenz curve and never below it. Thus, *traditional sector enrichment reduces income inequality*.

The third policy is MSWR, which lowers  $W_M$ , inducing a rise in  $E_M$ . Whether this combination of forces (lower  $W_M$ , higher  $E_M$ ) induces an increase or a decrease in the number of workers adopting an urban search strategy ( $L_U$ ) depends on the wage elasticity of demand for labor in the modern sector. As analyzed in Fields (1997), there are two cases.

Case i is when  $W_M$  falls and  $E_M$  rises a little, causing  $W_M E_M$  to fall. If  $W_M E_M$  falls,  $L_U$  falls. This happens if  $\eta > -(1/2)\gamma$ . The decrease in  $L_U$  causes the first kink point  $K_1$  of the Lorenz curve to move to the left. The original  $E_M^O$  people now have lower wages, therefore a smaller wage share than before (this, because with  $W_A$  unchanged, total wages are unchanged also). Thus, the new Lorenz curve lies above the original one at  $K_2^O$ . The new Lorenz curve  $OK_1^{\text{MSWR}} K_2^{\text{MSWR}} P$  therefore lies above the original Lorenz curve  $OK_1^O K_2^O P$ . Thus, *when the demand for labor in the modern sector is sufficiently inelastic, modern sector wage restraint reduces income inequality*.

Case ii is when the fall in  $W_M$  induces a sufficiently large rise in  $E_M$  so that  $W_M E_M$  rises and so too does  $L_U$ . This happens if  $\eta < -(1/2)\gamma$ . A higher  $L_U$  moves  $K_1$  to the right, so the new Lorenz curve is below the original one at  $K_1^O$ . For the same reason as in the preceding paragraph, the new Lorenz curve is above the original one at  $K_2^O$ . By continuity, the two must cross in between. When Lorenz curves cross, some Lorenz-consistent indices (for example, in this case, the income share of the poorest) show an increase in income inequality while others (e.g., the income share of the richest) show a decrease. Thus, *when the demand for labor in the modern sector is sufficiently elastic, modern sector wage restraint produces an ambiguous effect on income inequality*.

### 3.2. Inequality analysis in terms of changes in $W_M/W_A$

There is another way of judging wage inequality, which is simply to look at the ratio of wages among workers in the different sectors. Gauging inequality in this way, we find:

- For MSENr, inequality is unchanged.
- For TSENr, inequality falls.
- For MSWR, inequality falls, regardless of the elasticity of demand for labor in the modern sector.

### 3.3. Summary of the inequality analysis

The results on inequality are summed up in Table 1.

In two cases, the inequality judgments based on wage ratios conflict with the inequality judgments based on Lorenz comparisons.

Table 1  
Inequality changes resulting from various labor market policies in the Harris–Todaro model

Labor market policy	Inequality change using Lorenz comparisons	Inequality change using wage ratios
MSENL	+	unchanged
TSENR	–	–
MSWR, sufficiently inelastic demand for labor	–	+
MSWR, sufficiently elastic demand for labor	ambiguous	+

MSENL=modern sector enlargement; TSENR=traditional sector enrichment; MSWR=modern sector wage restraint.

Let us now use these inequality changes in a welfare analysis of changes in the labor market.

#### 4. Welfare economic analysis of labor market conditions using an abbreviated social welfare function

##### 4.1. The abbreviated social welfare function approach

To perform comparative static analysis comparing labor market outcomes under different policies, I work with a class of social welfare functions in which an increase in labor earnings is regarded as good and an increase in unemployment, inequality, or poverty is regarded as bad.<sup>10</sup> These social welfare judgments are represented by a class of abbreviated social welfare functions of the form

$$SW = f(\text{Total labor earnings, unemployment, inequality, poverty}),$$

$$f_1 > 0, f_2 < 0, f_3 < 0, f_4 < 0.$$

Previous policy analyses in the Harris–Todaro framework have considered unemployment and inequality (partially). It remains to complete the analysis of inequality using the results of Section 3 and to bring in total labor earnings and poverty.<sup>11</sup>

##### 4.2. Results for total labor earnings

In the simplified HT model with a fixed  $W_A$ , total labor earnings equals  $W_A$  times the number of workers. Thus, for a fixed number of workers, as long as  $W_A$  is constant, which

<sup>10</sup> I do not use expected wages, because to do so would treat a situation in which all workers receive  $W_A$  as equivalent to one in which some are employed and receive  $W_M (>W_A)$  while others are unemployed and receive nothing.

<sup>11</sup> The social welfare function  $f(\cdot)$  should be thought of as including the four labor market components (total labor earnings, unemployment, inequality, and poverty) but not be limited to them.

is the case in MSENL and MSWR, total earnings are unchanged. But in the case of TSENR,  $W_A$  rises, and average earnings rise accordingly.

#### 4.3. Results for poverty

A reasonable place to set a poverty line in an HT economy is in the range  $W_A < z < W_M$ . Setting the poverty line in this range allows some but not all of the working people to be classified as “working poor.” The precise location of  $z$  is deliberately left imprecise, as is the precise measure of poverty given  $z$ .

One criterion for assessing poverty is the poverty headcount ratio, viz., the fraction of people with incomes below  $z$ . For all  $z$  in the range  $W_A < z < W_M$ , the poverty headcount ratio is  $\frac{L-E_M}{L}$ . By this criterion, MSENL and MSWR raise  $E_M$  and therefore lower the poverty headcount ratio, while TSENR keeps  $E_M$  constant and therefore leaves the poverty headcount ratio *unchanged*.

Below, I shall show that when combined with the results for unemployment, inequality, and total labor earnings, we now have enough information to know whether each of these policies (MSENL, TSENR, or MSWR) is welfare-improving, welfare-reducing, or welfare-ambiguous.<sup>12</sup> It would therefore be superfluous to get into poverty dominance methods in this context.<sup>13</sup>

#### 4.4. Abbreviated social welfare function results when inequality is gauged using Lorenz curves

The results for each of the components of the abbreviated social welfare function are brought together in the four middle columns of Table 2.

The welfare evaluation using the abbreviated social welfare function

$$SW = f(\text{Total labor earnings, unem, ineq, pov}), f_1 > 0, f_2 < 0, f_3 < 0, f_4 < 0 \quad (8)$$

is given in the final column. We see:

- MSENL: Although unemployment and inequality rise, which decreases welfare, the poverty headcount ratio also falls, rendering the social welfare consequences *ambiguous*.

<sup>12</sup> A policy is welfare-ambiguous if it can be shown that for some measures or parameter values, the policy raises welfare, while for others, it lowers welfare.

<sup>13</sup> The limitations of the poverty headcount ratio for gauging poverty are well known. One is that the headcount ratio considers only the number of poor but not the average severity of their poverty nor the inequality of incomes among them. The other limitation is that the headcount ratio is sensitive to the precise place where the poverty line  $z$  is drawn. One solution to these problems is to create poverty measures which are sensitive to the severity of poverty and the inequality of incomes among the poor and to calculate these measures for a variety of poverty lines. This is what Sen (1976) and Foster et al. (1984) did. Another solution is to apply poverty dominance methods (Atkinson, 1987; Foster and Shorrocks, 1988; Ravallion, 1994; Foster and Sen, 1997). This involves choosing minimum and maximum poverty lines and a broad class of poverty measures. The poverty dominance results follow from the welfare dominance results to be presented in Section 5 and will be remarked upon there.

Table 2

Changes in labor market welfare resulting from various labor market policies in the Harris–Todaro model when inequality change is measured using Lorenz comparisons

Labor market policy	Change in total labor earnings	Change in unemployment	Change in inequality using Lorenz comparisons	Change in poverty using poverty headcount ratio	Change in labor market welfare using social welfare function (Eq. (8))
MSENL	0	+	+	–	ambiguous
TSENR	+	–	–	0	+
MSWR, sufficiently inelastic demand for labor	0	–	–	–	+
MSWR, sufficiently elastic demand for labor	0	+	ambiguous	–	ambiguous

MSENL=modern sector enlargement; TSENR=traditional sector enrichment; MSWR=modern sector wage restraint.

- TSENR: The one desirable element (total labor earnings) rises and the three undesirable elements (unemployment, inequality, and poverty) all fall. TSENR is therefore *welfare-improving*.
- MSWR: MSWR will leave total labor earnings unchanged and will reduce poverty regardless of the elasticity of demand for labor in the modern sector. However, the effects of MSWR on unemployment and inequality depend on the labor demand elasticity. If labor demand is sufficiently inelastic, unemployment and inequality will fall. On the other hand, if labor demand is sufficiently elastic, unemployment will increase and the inequality effect is ambiguous. Taking these results together, in the case of a sufficiently inelastic demand for labor, MSWR is *welfare-increasing*. On the other hand, in the case of a sufficiently elastic demand for labor, the effect of MSWR on welfare is *ambiguous*.

#### 4.5. Some final comments on policy evaluation using abbreviated social welfare functions

Three final remarks are in order.

First, up to now in the welfare analysis, inequality has been measured using Lorenz curves. An alternative way of bringing inequality into the analysis is to use the wage ratio among the employed,  $W_M/W_A$ . It is immediately apparent that MSENL leaves this ratio unchanged, while TSENR and MSWR both lower it. Measuring inequality in this way and otherwise using the abbreviated social welfare function (Eq. (8)), we have the welfare results shown in Table 3.

These results are not very interesting because the overall evaluation (final column) is the same here as it was when inequality was gauged using Lorenz curve comparisons (Table 2).

Second, it is worth pointing out that in no way can we say from the preceding analysis that any labor market policy is or is not *Pareto-improving*. This is for two reasons. The first, and obvious one, is that the Pareto criterion requires that we look at welfare changes

Table 3

Changes in labor market welfare resulting from various labor market policies in the Harris–Todaro model when inequality change is measured using wage ratios

Labor market policy	Change in total labor earnings	Change in unemployment	Change in inequality $W_M/W_A$	Change in poverty using poverty headcount ratio	Change in labor market welfare using social welfare function (Eq. (8))
MSENL	0	+	0	–	ambiguous
TSENR	+	–	–	0	+
MSWR, sufficiently inelastic demand for labor	0	–	–	–	+
MSWR, sufficiently elastic demand for labor	0	+	–	–	ambiguous

MSENL=modern sector enlargement; TSENR=traditional sector enrichment; MSWR=modern sector wage restraint.

for *each identified person in the economy* and the HT model has no way of identifying which people are which. But even if we were to look at income changes of *anonymous* people, we should be careful not to infer from the + entries in Tables 2 and 3 that all *classes* of people would be at least as well off as before. Most notably, modern sector wage restraint reduces the economic well-being of all workers employed in the modern sector.

Third, to repeat a point made earlier, the analysis here has considered only the benefits but not the costs of the respective policies. A fuller analysis would have to factor in the costs as well.

## 5. Welfare economic analysis of labor market conditions using first order dominance

In certain situations, the welfare of one income distribution may be ranked relative to another for a broad range of social welfare functions. We have a theorem due to Sapoznik (1981), building on earlier work of Hadar and Russell (1969) and others, which says that one distribution X first-order-dominates another distribution Y for the class of anonymous, increasing social welfare functions if and only if the income of the person in each rank in X is at least as great as the income of the person with the corresponding rank in Y and strictly greater someplace.<sup>14</sup> In other words, (weakly) fewer persons are below any income amount in X than in Y with a strict inequality someplace.

Dominance methods may be used to make welfare comparisons between an initial HT equilibrium and the new equilibrium that would result following a policy change. What is involved is to figure how many people receive each income amount, look for differences between the two sets of numbers, and then see whether these differences are all in the same

<sup>14</sup> “Anonymous” means that all workers are treated identically regardless of which particular ones earn how much income. “Increasing” means that social welfare increases whenever one worker’s earnings increase, holding other workers’ earnings the same.

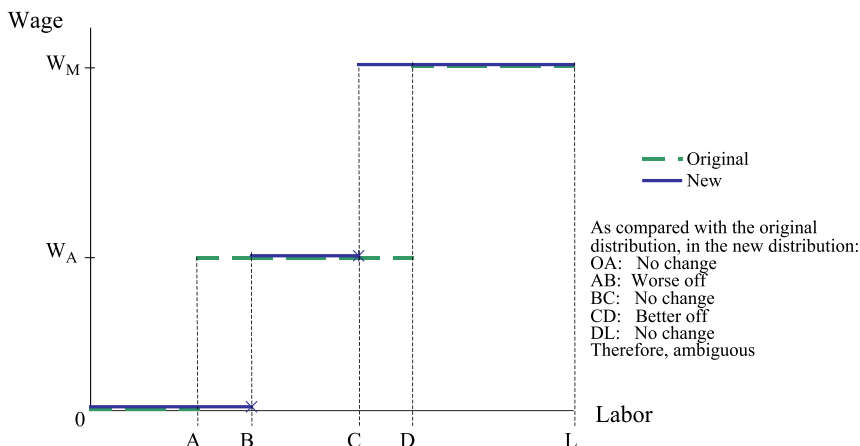


Fig. 5. No welfare dominance for MSENL.

direction (i.e., all higher or all lower). Figs. 5–8 present the results for each labor market policy in the HT model.

Fig. 5 displays the results for the policy of MSENL. The dashed step function OADL denotes the income distribution corresponding to the original HT equilibrium. OA is the number of people unemployed in the original equilibrium and earning zero, AD is the number employed in agriculture and earning  $W_A$ , and DL is the number employed in the modern sector and earning  $W_M$ . After MSENL has taken place, more workers are employed in the modern sector, more are unemployed, and fewer are employed in agriculture, producing the new step function marked by solid lines, OBCL. Comparing the two distributions, they coincide in ranges OA, BC, and DL and differ in ranges AB and CD. The post-MSENL distribution is worse than the original distribution in range AB (this

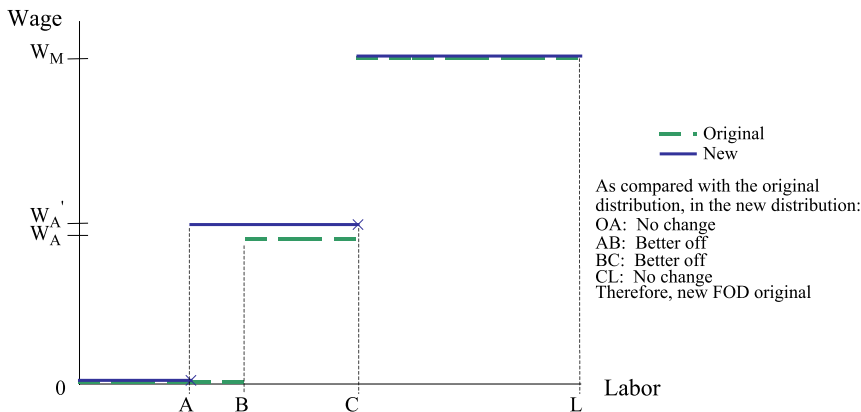


Fig. 6. The new situation dominates the original for TSENLR.

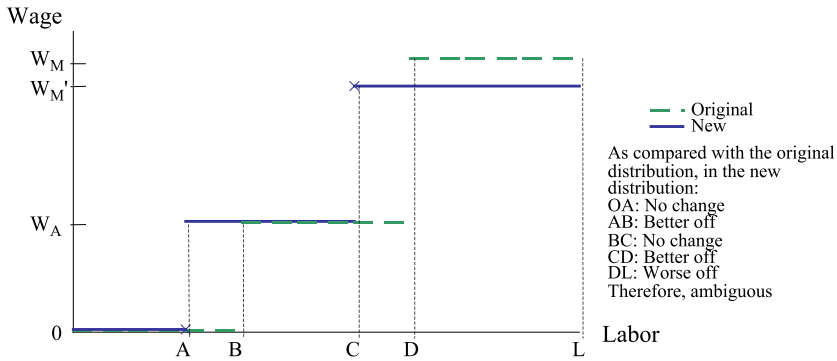


Fig. 7. No welfare dominance for MSWR, case of a sufficiently inelastic demand for labor.

is the number of workers who had been earning  $W_A$  before but now are earning zero) and better than the original distribution in range CD (this is the number of workers who had been earning  $W_A$  before and are now earning  $W_M > W_A$ ). In this way, we may conclude that the post-MSENL distribution neither welfare-dominates the original distribution nor is welfare-dominated by it. In other words, the class of anonymous and increasing social welfare functions is *ambiguous* for MSENL.

In similar fashion, we may gauge the welfare effects of the other policies. Fig. 6 shows the results for TSENR. This policy raises the wage of those working in agriculture and increases their number. Consequently, the number of unemployed is reduced. The size of the modern sector and the earnings level of those employed in the modern sector are unchanged. As a result, the new distribution first-order-dominates the original one. We

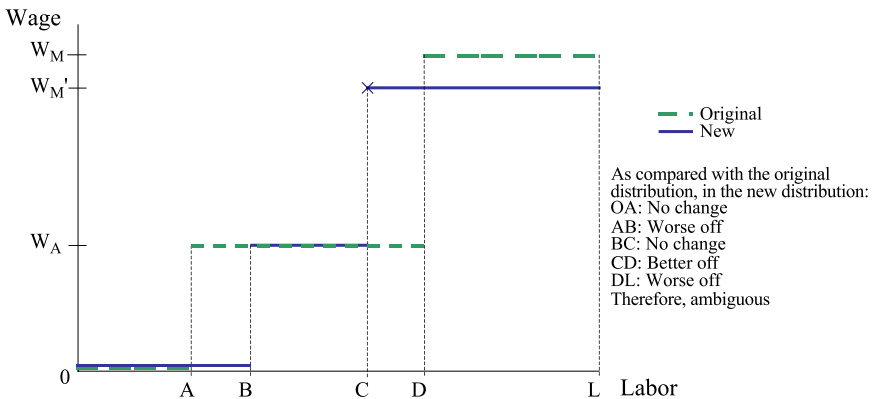


Fig. 8. No welfare dominance for MSWR, case of a sufficiently elastic demand for labor.

Table 4

Changes in welfare in the labor market resulting from various labor market policies in the Harris–Todaro model using first order dominance methods

Labor market policy	Unemployed (wage=0)	Agricultural workers (wage= $W_A$ )	Modern sector workers (wage= $W_M$ )	Change in labor market welfare using first-order-dominance
MSENL (Fig. 5)	More of them	Fewer of them, unchanged wage	More of them	No dominance, therefore ambiguous
TSENR (Fig. 6)	Fewer of them	More of them, higher wages	Same number of them and same wage for each	Dominance, therefore welfare improvement
MSWR, sufficiently inelastic demand for labor (Fig. 7)	Fewer of them	More of them, unchanged wage	More of them, but each is now poorer	No dominance, therefore ambiguous
MSWR, sufficiently elastic demand for labor (Fig. 8)	More of them	Fewer of them, unchanged wage	More of them, but each is now poorer	No dominance, therefore ambiguous

MSENL=modern sector enlargement; TSENR=traditional sector enrichment; MSWR=modern sector wage restraint.

may thus conclude that TSENR is *welfare-improving* using the class of anonymous and increasing social welfare functions.

Figs. 7 and 8 analyze MSWR for the two elasticity ranges. As long as the elasticity of demand for labor in the modern sector is non-zero, more people are employed in the modern sector but at a lower wage than before. Those who gain modern sector jobs are better off than they had been before, but those who were employed in the modern sector and who remain so are worse off than before. This is enough to show that MSWR has an *ambiguous* effect on welfare for the class of anonymous and increasing social welfare functions.

Table 4 sums up the welfare analysis using dominance methods.

Before concluding this section, it bears mention that similar lines of reasoning may be used to conduct a poverty-dominance analysis. “Poverty-dominance” means that one distribution has unambiguously less poverty than another for a broad class of poverty lines and poverty measures. See Appendix A for details.

## 6. Comparing the approaches and understanding the welfare judgments they make

The welfare economic results from Sections 4 and 5 for the abbreviated social welfare function approach and the first-order-dominance approach are summed up in columns 2 and 3, respectively, of Table 5.

It is interesting to understand why the welfare evaluations are similar in some cases and different in others.

First of all, for TSENR, we see that the two approaches agree that TSENR improves labor market conditions. Why? Because fewer people are unemployed and all in agriculture are earning higher wages than before. (In the modern sector, the same number is employed and they all earn the same amount as before.)

Table 5

Comparing the changes in labor market welfare resulting from various labor market policies in the Harris–Todaro model

Labor market policy	Change in labor market welfare using social welfare function (Eq. (8))	Change in labor market welfare using first-order-dominance
MSENL	ambiguous	ambiguous
TSENR	+	+
MSWR, sufficiently inelastic demand for labor	+	ambiguous
MSWR, sufficiently elastic demand for labor	ambiguous	ambiguous

MSENL=modern sector enlargement; TSENR=traditional sector enrichment; MSWR=modern sector wage restraint.

Second, the two approaches disagree about whether MSWR is a good thing when modern sector labor demand is sufficiently inelastic. In this case, under MSWR, total labor earnings are unchanged, unemployment falls, inequality falls, and poverty falls—these are the arguments that enter into the abbreviated social welfare function approach, which is why it renders an unambiguous ranking. But the welfare dominance approach gives negative weight to the fall in  $W_M$ , which is why this approach evaluates MSWR ambiguously. Should policy evaluators be worried about the reduction in these rents? This is an ethical question on which reasonable people can and do disagree.

Third, both methods give ambiguous evaluations about MSWR when modern sector labor demand is sufficiently elastic. However, the reasons for the ambiguity are not the same in the two cases. In the abbreviated social welfare function approach, the higher unemployment that the policy generates is valued negatively but the reduction in the number of people below the poverty line is valued positively. However, using the dominance approach, the ambiguity at the top end of the income distribution: more people than before are earning  $W_M$  but  $W_M$  is lower than it was previously.

Finally, both approaches give ambiguous answers for MSENL. For the abbreviated social welfare function approach, the reason is that MSENL raises unemployment, which counts negatively, but it lowers the poverty headcount ratio, which counts positively. For the welfare dominance approach, although more people now get zero wages, which is bad, more people now get  $W_M$ , which is good.

## 7. Concluding remarks

This paper has analyzed the welfare economics of labor market policies in the Harris–Todaro model. Three policies considered by Harris and Todaro have been evaluated: MSENL, TSENR, and MSWR.

The novelty of this paper has been to widen the terms of the analysis. Harris and Todaro themselves, and many others who followed them (myself included), analyzed policies in terms of their unemployment effects. More recent analysis been conducted in terms of inequality effects, and this paper has added to that strand of work. In addition, I have gone beyond these variables to also include poverty and total labor earnings within the

abbreviated social welfare function framework. I have also evaluated the various labor market policies using welfare dominance methods applied to the labor market.

When the labor market analysis is broadened beyond unemployment alone, Harris and Todaro's justifiably famous policy recommendations—avoid modern sector employment creation and instead seek rural development—are partially but not fully supported. Rural development would indeed produce better labor market outcomes on *all* of the dimensions considered (if, as in HT, the costs of rural development can be ignored). Modern sector employment creation is not unambiguously a bad thing, though. The increase in unemployment and inequality of labor earnings (putative “bads”) should be balanced against the increased number of high wage jobs and the consequent reduction in the poverty headcount ratio (putative “goods”). Modern sector wage restraint was also favored by Harris and Todaro. However, the results here show that such a policy does not unambiguously improve labor market outcomes. This is because the lowering of wages itself receives negative welfare weight and because inequality can rise if the demand for labor is sufficiently elastic.

I have shown in this paper that even when the underlying labor market model is quite straightforward (which is my reason for working with the simplified version of the original HT model), the welfare evaluation of various policy alternatives depends critically on *which* welfare economic approach is adopted. Qualitatively different policy judgments are obtained depending on whether the welfare judgment is a function of unemployment alone, inequality alone, an abbreviated social welfare function, or first order welfare dominance. These different welfare economic approaches have produced qualitatively different results. Thus, in the HT model, it is not enough just to be concerned about distribution. *How* distributional concerns are brought into the policy analysis can and does make an important difference.

## Appendix A. Poverty dominance analysis

Let  $y_i$  denote the income of the  $i$ th individual,  $z$  denote a poverty line, and  $p(y_i, z)$  be a function indicating how much is contributed to economy-wide poverty by an individual whose income is  $y_i$  when the poverty line is  $z$ . Most of the poverty measures in common use, including the headcount ratio and the  $P_\alpha$  measure, are members of the general additive class

$$P = \sum_{i=1}^n p(y_i, z) / n \quad \text{such that} \quad (\text{A.1})$$

$$(\text{i}) p(y_i, z) = 0 \text{ if } y_i \geq z, \text{ and}$$

$$(\text{ii}) p(y_i, z) > 0 \text{ if } y_i \leq z.$$

The fact that many poverty measures belong to this general class (but not all do – in particular, the poverty index created by Sen (1976) does not) leads us to consider whether there are dominance criteria for the class of measures given by Eq. (A.1). That is, are there circumstances under which *all* poverty measures belonging to class (A.1) would rank one

income distribution as having more poverty than another for a *range* of poverty lines  $z < z < \bar{z}$ ?

The answer is affirmative, provided that first order poverty dominance can be shown to hold. First-order poverty dominance is defined as follows: If the cumulative distribution function for distribution X ( $F_X$ ) is everywhere at least as high as that for distribution Y ( $F_Y$ ) for all  $z$  between  $\underline{z}$  and  $\bar{z}$ , X first-order-poverty-dominates Y. Atkinson (1987) and Foster and Shorrocks (1988) proved that X first-order poverty dominates Y if and only if  $\text{pov}_X > \text{pov}_Y$  for *all* poverty measures belonging to class (A.1), or for any monotonic transformation thereof, and for *all* poverty lines between  $\underline{z}$  and  $\bar{z}$ .

In the text, poverty lines were considered in the range  $W_A < z < W_M$ . We see in the relevant ranges of Figs. 1–4 (up to but not including the people earning  $W_M$  in each case) that the new distribution poverty-dominates the original one for TSENR and for MSWR—case i, but neither distribution poverty-dominates the other for MSENL or for MSWR—case ii. The reasons for these differences are as follows:

- For TSENR, the number of poor is the same, but more of the poor are earning the agricultural sector wage, which is higher than before.
- For MSWR—case i, fewer people are poor and fewer people are unemployed earning zero. The remaining poor are earning the same agricultural wage as before, so their economic position is unchanged.
- For MSENL, there are fewer poor but more of the poor are unemployed, earning nothing.
- For MSWR—case ii, fewer people are poor, but some people who had been earning the agricultural wage are now unemployed and earning nothing.

To reiterate, these poverty dominance results hold for *all* poverty functions of class (A.1).

One subclass of particular interest is the set of  $P_\alpha$  measures, defined as  $P_\alpha = \frac{1}{n} \sum_{\text{poor}} \frac{z - y_i}{z}$ . For the  $P_\alpha$  class, the preceding theorem tells us that if X first-order poverty dominates Y, then  $\text{pov}_X > \text{pov}_Y$  for all  $P_\alpha, \alpha > 0$  and for all poverty lines between  $W_A$  and  $W_M$ .

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