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THE GENERALIZED THEORY OF DISTORTIONS AND WELFARE

by

Jagdish N. Bhagwati

Number 39

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The views expressed in this paper are the author's sole responsibility, and do not reflect those of the Department of Economics, nor of the Massachusetts Institute of Technology.

The Generalized Theory of Distortions and Welfare¹

The theory of trade and welfare has recently developed independently in seven areas which have apparently little analytical relationship among themselves:

(a) Sub-Optimality of Laissez-faire Under Market Imperfections: It has been shown that, when market imperfections exist, laissez-faire (otherwise described as "a policy of unified exchange rates" [5]) will not be the optimal policy. Among the market imperfections for which the sub-optimality of laissez-faire has been demonstrated are four key types: (i) factor market imperfection: a wage differential between sectors;² (ii) product market imperfection: a production externality;³ (iii) consumption imperfection:

¹This paper is the result of thinking and research over a period of many years, originating in my 1958 paper on immiserizing growth [1] and developing considerably since my joint paper with Ramaswami in 1963 [2] on domestic distortions. Since 1965, T. N. Srinivasan and I have collaborated on research in related matters, pertaining to the theory of optimal policy intervention when non-economic objectives are present [7]: a subject pioneered by Max Corden's brilliant work [12]. In many ways, therefore, this paper has grown out of the ferment of ideas in Delhi during 1963-1968, when Srinivasan, Ramaswami and I happened to work together and independently on the diverse subjects which are brought together in this paper. The work of others, particularly Murray Kemp [23] [24] and Harry Johnson [18], has also contributed to the development of my thinking.

²I assume here that the wage differential is "distortionary" and cannot be attributed to legitimate economic grounds, such as disutility in occupations where the higher wage is charged. For a detailed discussion, see Fishlow and David [13] and Bhagwati and Ramaswami [2].

³See Kemp [21, Ch. 11] for a fuller discussion of alternative types of production externalities. I have in mind here the case of a "pure" production externality of the Meade-variety, as set out in footnote 10 below.

a consumption externality;⁴ and (iv) trade imperfection: monopoly power in trade.⁵

(b) Immiserizing Growth: Examples have been produced where a country, after growth (in factor supplies and/or technological know-how), becomes worse off: phenomena described as "immiserizing growth." I produced an example of such a phenomenon in 1958 [1], as also Harry Johnson independently at the time, where growth led to such a deterioration in the country's terms of trade that the loss from the worsened terms of trade outweighed the primary gain from growth. Subsequently, Johnson [19] has produced another example of immiseration, where the country has no ability to influence her terms of trade but there is a tariff (which is necessarily welfare-reducing in view of the assumed absence of monopoly power in trade) in both the pre-growth and the post-growth situations, and growth impoverishes the country in certain cases. I have later produced yet other examples of immiserizing growth [6]: one where there is a wage differential in the factor market, and another where the country has monopoly power in trade (as in my original 1958 example) but the country has an optimum tariff (before growth) which becomes sub-optimal after growth.

(c) Ranking of Alternative Policies under Market Imperfections: For the four major imperfections described under (1), the optimal policy intervention has been analysed by several economists. Hagen [16] has argued that

⁴ Instead of a consumption externality, one could assume a situation where sellers charge a uniform premium on a commodity's import and production price.

⁵ The precise sense in which monopoly power in trade represents a market imperfection, in the trade sector, is that foreign prices will not equal the marginal, foreign rate of transformation (as discussed later in the text).

the optimal policy for the case of the wage differential would be a factor tax-cum-subsidy. For the production externality, Bhagwati and Ramaswami [2] have shown that the optimal policy intervention is a production tax-cum-subsidy. For the consumption externality case, it follows from the general arguments in Bhagwati and Ramaswami [2] that a consumption tax-cum-subsidy ought to be used. Finally, for the case of monopoly power in trade, it has been known since the time of Mill, and has been demonstrated rigorously by (among others) Graaff [14] and Johnson [17], that a tariff is the optimal policy. Extremely recent work of Bhagwati, Ramaswami and Srinivasan [8] has then extended the analysis, for each market imperfection, to the ranking of all alternative policies: the tariff (trade subsidy) policy, the production tax-cum-subsidy policy, the consumption tax-cum-subsidy policy, and the factor tax-cum-subsidy policy.⁶

(d) Ranking of Tariffs: Yet another area of research in trade and welfare has raised the question of ranking policies which themselves constitute impediments to the attainment of optimality. Thus, for example, Kemp [22] has analysed, for a country without monopoly power in trade (and no other imperfections), the question as to whether a higher tariff is worse than a lower tariff. Similarly, Bhagwati and Kemp [10] have analysed the problem for tariffs around the optimal tariff for a country with monopoly power in trade.

(e) Ranking of Free Trade and Autarky: A number of trade theorists have compared free trade with autarky, when there were market imperfections

⁶Since the production tax-cum-subsidy policy is equivalent to a tax-cum-subsidy given to all factors (used in production) of an equivalent and uniform magnitude, the factor tax-cum-subsidy policy referred to in this paper relates to a tax-cum-subsidy policy which applies in a discriminatory fashion between or among factors.

such as wage differentials (Hagen [16]) and production externality (Haberler [15]), to deduce that free trade was no longer necessarily superior to self-sufficiency. Melvin [26] has recently considered the comparison between free trade and autarky when there are commodity taxes; so has Kemp [23].

(f) Ranking of Restricted Trade and Autarky: Aside from the case where trade is tariff-restricted, in which case the comparison between restricted trade and autarky becomes the comparison of tariffs discussed in (d) above, Bhagwati [4] has considered the ranking of other policies (e.g. production tax-cum-subsidies), which restrict trade, and autarky.

(g) Non-Economic Objectives and Ranking of Policies: Finally, a number of economists have addressed themselves to the question of optimal policy intervention when the values of different variables are constrained, as non-economic objectives, so that full optimality is unattainable. Four key types of non-economic objectives have been analysed. Corden [12] has shown that a production tax-cum-subsidy is optimal where the constrained variable is production (for reasons such as defense production). Johnson [18] has shown a tariff to be optimal when imports are constrained instead (in the interest of "self-sufficiency"). Bhagwati and Srinivasan [7] have demonstrated that a factor tax-cum-subsidy is optimal when the constrained variable is employment of a factor in an activity (in the interest of "national character," for example) and a consumption tax-cum-subsidy when the constrained variable is domestic availability of consumption (to restrict "luxury consumption" for example). Bhagwati and Srinivasan have also extended the analysis to the ranking of all policy instruments for a number of these non-economic objectives.

This paper is aimed at putting these diverse analyses into a common

analytical framework. This results in the logical unification of a number of interesting and important results leading in turn to fresh insights while also enabling us to derive remarkable "duality" relationships between the analysis of policy rankings under market imperfections and policy rankings to achieve non-economic objectives.

I: Alternative Types of Distortions

It can be readily shown, in fact, that the diverse results reviewed so far belong to what might aptly be described as the theory of distortions and welfare.

The theory of distortions is built around the central theorem of trade and welfare: that laissez-faire is Pareto-optimal for a perfectly competitive system with no monopoly power in trade.⁷ Ruling out the phenomenon of diminishing cost of transformation between any pair of commodities (i.e. the concavity of the production possibility set in the familiar, two-commodity system),⁸ the Pareto-optimality of the laissez-faire policy follows quite simply from the fact that the economic system will operate with technical efficiency (i.e. on the "best" production possibility curve, if we think

⁷The classic proof of this proposition is in Samuelson [28]. For later treatments, see Samuelson [29], Kemp [22] and Bhagwati [4] [5].

⁸The phenomenon of diminishing marginal cost of transformation can arise either due to increasing returns [21, Ch. 8] (which is a purely technological phenomenon) or because of factor market imperfection in the shape of a wage differential [2] [13] [20]. The phenomenon has to be ruled out so as to eliminate certain well-known difficulties which it raises (requiring in particular the distinction between global and local maxima [30] and attention to second-order conditions and possibilities of inefficient specialization [27]).

again of two commodities for simplicity) and will satisfy further the (first-order) conditions for an economic maximum: $DRT = FRT = DRS$ (where DRT represents the marginal rate of transformation in domestic production, FRT the marginal foreign rate of transformation and DRS the marginal rate of substitution in consumption).⁹

The theory of distortions is then concerned with the following four pathologies which may characterise, singly or in combination, the economic system:

Distortion (1): $FRT \neq DRT = DRS$

Distortion (2): $DRT \neq DRS = FRT$

Distortion (3): $DRS \neq DRT = FRT$

Distortion (4): Non-operation on the efficient production possibility curve.

"Endogenous" Distortions:

These distortions (implying departures from full optimality) may obtain when the economy is characterised by market imperfections under a policy of laissez-faire. Thus, the presence of national monopoly power in trade will lead to Distortion (1) as foreign prices will not equal FRT. The case

⁹Equalities have been used in stating the first-order conditions, for each pair of commodities, so as to preserve simplicity; they imply, of course, incomplete specialization in production and consumption. Inequalities can be introduced easily but nothing essential would be gained by way of additional insights. The simplifying assumption of a two-commodity system will also be used through the rest of the paper: this does not critically affect the analysis, although problems associated with devising optimum policy structures (e.g. the optimal tariff structure [14] in the case of monopoly power in trade) are naturally not raised in consequence.

of the Meade-type of production externality¹⁰ leads to Distortion (2). Distortion (3) will follow when sellers of the importable commodity, for example, charge a uniform premium on imported as well as home-produced supplies. Distortion (4) follows when there is a factor market imperfection resulting from a wage differential, for a factor, between the different activities.¹¹ In these cases, therefore, the resulting distortions (arising from the market imperfections) are appropriately described as "endogenous" distortions.

"Policy-Imposed" Distortions:

On the other hand, the four varieties of distortions listed above may be the result of economic policies, as distinct from endogenous phenomena such as market imperfections. Thus, Distortion (1) will arise, for a country with no monopoly power in trade, if the country has a tariff; it will also arise, for a country with monopoly power in trade, if the tariff is less or greater than the optimal tariff. Distortion (2) will follow if the government imposes a production tax-cum-subsidy. Distortion (3) will be the consequence similarly of a consumption tax-cum-subsidy policy. Finally, the adoption of a factor tax-cum-subsidy policy will result in Distortion

¹⁰This externality can be formally stated as follows [21, p. 128]. For linear and homogeneous production functions

$$x = x(K_x, L_x)$$

$$y = y(K_y, L_y, x)$$

it can be shown that, with y-entrepreneurs not having to pay for their "input" of x, the economy will be characterised by Distortion (2).

¹¹A constant wage differential will also lead to Distortion (2), so that in this instance we have a case of two distortions occurring at the same time. In fact, the wage differential case leads also to the possibility of a concave production possibility set, as we have already noted; furthermore, as Bhagwati and Srinivasan [11] have shown, the response of production to relative commodity price change also becomes unpredictable: a question, however, of no welfare significance in the context of this paper.

(4).¹² These are instances therefore of "policy-imposed" distortions.

But as soon as we probe the reasons for the existence of such policy-imposed distortions, two alternative interpretations are possible. Either we can consider these policies as "autonomous": a tariff, which leads to Distortion (1), may for example be a historic accident. Or we may consider these policies as "instrumental": a tariff, leading to Distortion (1), may be the policy instrument used in order to reduce imports, (as in the case of the theory of non-economic objectives when Distortion (1) is created through the deployment of a tariff when the objective is to reduce imports in the interest of "self-sufficiency").

We thus have altogether three sets of "causes" for the four varieties of distortions that can be distinguished: endogenous; autonomous, policy-imposed; and instrumental, policy-imposed. The entire literature which I have reviewed earlier can then be given its logical coherence and unity around these alternative classes and causes of distortions.

Before formulating the general theory of distortions, and generalizing the theorems in the Introduction into other areas, it would be useful to underline the precise manner in which these theorems relate to the different varieties of distortions that we have distinguished so far.

(a) The theorems on the sub-optimality of different market imperfections clearly relate to the theory of endogenous distortions. Within a static welfare context, they demonstrate that these market imperfections result in

¹²A constant rate of factor tax-cum-subsidy will also produce Distortion (2), as in the case of a constant wage differential. However, as we shall see later, a variable factor tax-cum-subsidy policy can be devised which produces only Distortion (4).

the different types of Distortions (1)-(4), thus resulting in the breakdown of the Pareto-optimality of laissez-faire in these cases.

(b) The theorems on immiserizing growth, on the other hand, relate to the comparative statics of welfare when distortions are present. The theorems developed in this literature involve cases where growth takes place under given distortions, either endogenous or policy-imposed, and the primary improvement in welfare (which would have accrued if fully optimal policies were followed both before and after growth) is outweighed by the accentuation of the loss from the distortion in the post-growth situation [6].

Thus, in the original Bhagwati example of immiserizing growth, the assumed free trade and hence failure to impose an optimum tariff (to exploit the monopoly power in trade) in both the pre-growth and the post-growth situations involves welfare-reducing "distortionary" policies in both situations. Immiseration occurs therefore because the gain, which would necessarily accrue from growth if the optimal tariff were imposed in both situations, is smaller than the incremental loss arising from the accentuation (if any) in the post-growth situation of the welfare loss resulting from the "distortionary" free-trade policy (implying an endogenous Distortion (1) in this instance) in both situations.

Harry Johnson's example of immiseration where the country has no monopoly power in trade but a tariff (which thus constitutes an autonomous policy-imposed distortion (1)) in both the pre-growth and the post-growth situations, is to be explained in terms of the same logic. In the absence of monopoly power in trade, the tariff is necessarily "distortionary" and, compared with the fully-optimal free-trade policy, causes a loss of welfare in each situation. If the growth were to occur with free trade, there would necessarily be an increment in welfare. However, since growth occurs under

a tariff, there arises the possibility that the loss from the tariff may be accentuated after growth, and that this incremental loss may outweigh the gain (that would occur under the optimal, free-trade policy), thus resulting in immiseration. Thus, the policy-imposed distortion (i.e. the tariff) generates the possibility of immiserizing growth.

(c) The theorems which rank alternative policies under market imperfections are addressed to a different range of questions. They relate to endogenous distortions, of each of the four varieties we have distinguished. and then seek to rank the different, available policy instruments (extending to the full complement: production, consumption, trade and factor tax-cum-subsidies) in relation to one another and vis-a-vis laissez-faire itself. The problem has been posed in this fashion by Bhagwati, Ramaswami and Srinivasan [8] in their recent work.

(d) The theorems of Kemp [22] and Bhagwati and Kemp [10], which rank tariffs in relation to one another, however, belong to a yet different genre. They relate to policy-imposed distortions, autonomous in the sense defined in this paper, and aim at ranking different levels at which policy may impose the specified distortion (e.g. Distortion (1) in the cases where tariffs are ranked).

(e) The ranking of free trade and autarky under situations involving market imperfections or taxes involves, on the other hand, a comparison of essentially two levels (the zero tariff level and the prohibitive tariff level) at which a policy-imposed distortion (the tariff) is used, in a situation which is itself characterized by another distortion (either endogenous, like the wage differential in Hagen [16] or policy-imposed, like a tax on consumption of a commodity).

(f) The ranking of a situation with trade restricted by a non-tariff policy with a situation of autarky (with therefore an implicit, prohibitive tariff) involves an altogether different type of comparison: of one distortion with another, both autonomous policy-imposed in Bhagwati's analysis [4].

(g) The theory of non-economic objectives [7], on the other hand, relates to the optimal nature of intervention, and the ranking of alternative policies, when certain variables are precluded from specified ranges of values in the interest of "non-economic" objectives. It is therefore, from an analytical point of view, a theory of how optimally (i.e. at minimum-cost) to introduce distortions in the economic system, when the attainment of the full optimum is precluded by the non-economic-objective constraints; and also what the relative costs of alternative policies or methods of introducing such distortions, in pursuit of the non-economic objectives, are. It is thus a theory pertaining to the ranking of instrumental, policy-imposed distortions: with each distortion being defined under a common set of economic and non-economic constraints.

It is clear, therefore, that these diverse theorems relate to different types of distortions and raise a number of diverse questions relating thereto. But as soon as we grasp this central fact, it is possible to unify and extend the entire body of this literature and thus to develop a general theory of distortions and welfare.

II: Distortions and Welfare: General Theory

This generalized theory of distortions and welfare can be developed in terms of seven central propositions.



Proposition (1):

There are four principal types of distortions:

- (1) $FRT \neq DRT = DRS$;
- (2) $DRT \neq DRS = FRT$;
- (3) $DRS \neq DRT = FRT$; and
- (4) Non-operation on the efficient production possibility curve

which, in turn, can be caused by factors which are:

- (1) Endogenous;
- (2) Autonomous, Policy-Imposed; and
- (3) Instrumental, Policy-Imposed.

This proposition is merely a recapitulation of the concepts and analysis developed in the preceding section and requires no further comment. Note merely, by way of re-emphasis, that in each of the $(4 \times 3 = 12)$ distortionary situations, the economic system departs from full Pareto-optimality.

Proposition (2):

(i) Optimal policy intervention, in the presence of distortions, involves a tax-cum-subsidy policy addressed directly to offsetting the source of the distortions, when the causes are endogenous or autonomous, policy-imposed. Dual to (i) is the theorem that:

(ii) When distortions have to be introduced into the economy, because the values of certain variables (e.g. production or employment of a factor in an activity) have to be constrained, the optimal (or least-cost) method of doing this is to choose that policy-intervention which creates the distortion affecting directly the constrained variable.

These two propositions, which constitute a remarkable duality of theorems, extend between themselves to all the classes of distortions (1)-(4) and their three possible causes: endogenous, autonomous policy-imposed, and instrumental policy-imposed. Furthermore, each proposition is readily derived from the theorems on market imperfections and on non-economic objectives.

Proposition 2(i) was formulated, in essentially similar form, by Bhagwati and Ramaswami [2] and later by Johnson [18], for the case of endogenous distortions. For Distortion (1), resulting from monopoly power in trade under laissez-faire, it is well known that the optimal policy intervention is a tariff. For Distortion (2), Bhagwati and Ramaswami showed that the optimal policy was a production tax-cum-subsidy. For Distortion (3), correspondingly the optimal policy is a consumption tax-cum-subsidy. Finally, when a wage differential causes Distortion (4), Hagen [16] showed that the optimal intervention was through a factor tax-cum-subsidy. In each instance, therefore, the policy required is one which directly attacks the source of the distortion.

It follows equally, and trivially, that if these distortions are autonomous policy-imposed, the optimal intervention is to eliminate the policy itself: hence again the optimal policy intervention is addressed to the source of the distortion itself. Thus, with a sub-optimal tariff leading to Distortion (1), the optimal policy is to change the tariff to an optimal level (equal to zero, if there is no monopoly power in trade). Similarly, if a consumption tax-cum-subsidy causes Distortion (3), the optimal policy is to offset it with an equivalent consumption tax-cum-subsidy (which leaves zero net consumption tax-cum-subsidy and thus restores full-optimality).

But the extension of these results, via the "dual" Proposition 2(ii), to the class of instrumental, policy-imposed distortions, is far from trivial. And the duality is remarkable. Corden [12] has shown that the optimal policy, if the binding non-economic constraint relates to production, is a production tax-cum-subsidy. Johnson [18] has demonstrated that the optimal policy, if the binding non-economic constraint relates to import (export) level, is a tariff or trade subsidy. Bhagwati and Srinivasan [7] have extended the analysis to show that, if the binding non-economic constraint relates to the level of employment of a factor of production in a sector, the optimal policy is to use a factor tax-cum-subsidy which directly taxes (subsidises) the employment of the factor in the sector where its employment level must be lowered (raised) to the constrained level.¹³ They have also demonstrated that the optimal policy for raising (lowering) consumption to a constrained level is a consumption tax-cum-subsidy policy.

To put it somewhat differently, a trade-level non-economic objective is achieved at least-cost by introducing a policy-imposed Distortion (1) via a trade tariff or subsidy; a production non-economic objective by introducing a policy-imposed Distortion (2) via a production tax-cum-subsidy; a consumption non-economic objective by introducing a policy-imposed Distortion (3) via a consumption tax-cum-subsidy; and a factor-employment (in-a-sector) non-economic objective by introducing a policy-imposed Distortion (4) via a factor tax-cum-subsidy.

¹³Unlike in the case of a constant wage differential, which also leads to Distortion (2) in addition to Distortion (4), we can devise [7] a variable tax-cum-subsidy which satisfies the constraint on factor employment while creating only Distortion (4).

Proposition (3):

(i) For each distortion, whether endogenous or autonomous, policy-imposed in origin, it is possible to analyse the welfare-ranking of all alternative policies: from the (first-best) optimal to the second-best and so on.

(ii) (a) When distortions have to be introduced into the economy, because the values of certain variables have to be constrained (e.g. production or employment of a factor in an activity), the policy interventions which do this may similarly be welfare-ranked. (b) The ranking of these policies is further completely symmetrical with that under the "corresponding" class of endogenous or autonomous policy-imposed distortions (e.g. the ranking of policies for production externality, an endogenous Distortion (2), is identical with the ranking of policies when production is constrained as a non-economic objective).

Since there are four different types of policies (factor, production, consumption and trade tax-cum-subsidies), the propositions listed above are aimed at ranking all of them for each of the (twelve) varieties of distortions and establishing "duality" relations of the kind we discovered for optimal policies alone in Proposition 2(ii).

Bhagwati, Ramaswami and Srinivasan [8] have recently analysed the welfare-ranking of all policies for endogenous distortions and established the following rankings:¹⁴

¹⁴ Their argument is summarised as follows. They use the notation [8]: C_i, X_i denote the consumption and domestic output respectively of commodity $i, i = 1, 2$.

p_c denotes the ratio of the price of the first to that of the second commodity confronting consumers (DRS).

Distortion (1): $FRT \neq DRT = DRS$

This is the case of monopoly power in trade. The ranking of policies then is:

(i) First-best: tariff

(ii) Second-best: either production tax-cum-subsidy or factor tax-cum-subsidy or consumption tax-cum-subsidy (all policies are superior to laissez-faire but cannot be ranked uniquely vis-a-vis one another)¹⁵

Distortion (2): $DRT \neq DRS = FRT$

This is the case of a pure production externality. The ranking of policies then is:

14 (cont.)

p_t denotes $DRT = -dX_2/dX_1$.

p_f denotes the ratio of the world price of the first commodity to that of the second commodity, i.e., the average terms of trade. The marginal terms of trade $FRT = p_f$ only in the special case in which national monopoly power does not exist.

The welfare function $U(C_1, C_2)$ and the production functions are assumed to be differentiable as required. U_i denotes the marginal utility of commodity i ($i = 1, 2$). It is assumed throughout the analysis that under laissez-faire there is non-specialisation in consumption and production, and that some trade takes place. Then, the following expression, for the change in welfare when there is an infinitesimal movement away from laissez-faire equilibrium, is derived:

$$dU = U_2 [dX_1 (p_f - p_t) + (X_1 - C_1) dp_f + (p_c - p_f) dC_1]$$

Using this expression, the different distortions are easily analysed for alternate policy rankings. Thus, in the case where $DRT \neq FTR = DRS$, which is our present Distortion (2), the expression reduces to $dU = U_2 [dX_1 (p_f - p_t)]$

- (i) First-best: production tax-cum-subsidy
- (ii) Second-best: either tariff (trade subsidy) or factor tax-cum-subsidy (both policies are superior to laissez-faire but cannot be ranked uniquely vis-a-vis each other)
- (iii) Consumption tax-cum-subsidy will not help.¹⁶

Distortion (3): $DRS \neq DRT = FRT$

This is the case where, for example, the sellers of a commodity charge a uniform premium to buyers over the cost of supplies, whether imported or domestically produced. The ranking of policies then is:

- (i) First-best: consumption tax-cum-subsidy
- (ii) Second-best: tariff
- (iii) Production or factor tax-cum-subsidy will not help.¹⁷

14 (cont.)

because $p_c = p_f$, $dp_f = 0$ and $p_f \neq p_t$; and it follows that either a tariff (trade subsidy) or a factor tax-cum-subsidy which increases (reduces) X_1 , if $p_f > p_t$ ($p_f < p_t$), will increase welfare.

¹⁵For finite tax-cum-subsidies, however, the production tax-cum-subsidy will be superior to the factor tax-cum-subsidy.

¹⁶This conclusion holds for infinitesimal tax-cum-subsidy. A finite consumption tax-cum-subsidy will actually be worse than laissez-faire in this instance, as it will impose a "consumption loss" on the economy, over and above the loss it is already suffering from the endogenous Distortion (2).

¹⁷This conclusion again holds only for infinitesimal tax-cum-subsidies on production or factor-use. For finite tax-cum-subsidies, these policies will necessarily be worse than laissez-faire (unless inferior goods are present).

Distortion (4): Non-operation on the efficient Production Possibility Curve

This is the case where there is a wage-differential: a factor market imperfection. In this case, the ranking of policies is:

- (i) First-best: factor tax-cum-subsidy
- (ii) Second-best: production tax-cum-subsidy
- (iii) Third-best: tariff (trade subsidy)
- (iv) Consumption tax-cum-subsidy will not help.¹⁸

It is clear that the extension of these rankings to the corresponding cases where the distortions are autonomous policy-imposed (e.g. Distortion (2) resulting from the autonomous levy of a governmental tax, or Distortion (4) from the grant of a governmental subsidy on employment of a factor in one activity) is total and trivial. It is interesting and remarkable, however, that these rankings carry over also to the class of instrumental, policy-imposed distortions.

Thus, for the case of non-economic objectives, Bhagwati and Srinivasan [7] have provided the basis for analysing the rankings of different policies, which I now proceed to develop fully:

Trade-level as Constraint: The ranking of policies in this case is:

- (i) First-best: tariff
- (ii) Second-best: either production tax-cum-subsidy or factor tax-cum-subsidy or consumption tax-cum-subsidy (these policies cannot be ranked vis-a-vis one another).¹⁹

¹⁸ Again, this conclusion concerning the consumption tax-cum-subsidy must be read in the same sense as in fn. 16 above.

¹⁹ For finite tax-cum-subsidies, however, the factor tax-cum-subsidy policy will be inferior to the production tax-cum-subsidy policy, as Bhagwati and Srinivasan [7] have demonstrated.

Note the complete symmetry with the rankings under Distortion (1) above.

Production-level as a Constraint: The ranking of policies in this case is:

- (i) First-best: production tax-cum-subsidy
- (ii) Second-best: either tariff (trade subsidy) or factor tax-cum-subsidy (these policies cannot be ranked vis-a-vis each other)
- (iii) Consumption tax-cum-subsidy will not help.²⁰

Note again the complete symmetry with the rankings under Distortion (2) above.

Consumption-level as a Constraint: The ranking of policies in this case is:

- (i) First-best: consumption tax-cum-subsidy
- (ii) Second-best: tariff
- (iii) Production or Factor tax-cum-subsidy will not help.²¹

Again, the symmetry with the ranking under Distortion (3) is total.

Factor Employment (in a Sector) as a Constraint: The ranking of policies in this case is:

- (i) First-best: factor tax-cum-subsidy
- (ii) Second-best: production tax-cum-subsidy
- (iii) Third-best: tariff (trade subsidy)
- (iv) Consumption tax-cum-subsidy will not help.²²

In this final case as well, the symmetry with the corresponding, Distortion

²⁰This statement must again be read in the same sense as in fn. 16 and fn. 18 above.

²¹This statement must be construed in the same sense as in fn. 17 above.

²²This statement must be interpreted again in the same sense as in fn. 16, fn. 18 and fn. 20 above.

(4) is complete.

Thus, the duality of the policy rankings, for endogenous and autonomous policy-imposed distortions on the one hand and instrumental policy-imposed distortions on the other hand, is altogether complete and remarkable.

Proposition (4):

For each kind of distortion, growth may be immiserizing.

For endogenous and autonomous policy-imposed distortions, belonging to each of the varieties (1)-(4) we have distinguished, this proposition has already been demonstrated by Bhagwati [6].

Thus, for example, where Distortion (1) obtains endogenously under laissez-faire owing to monopoly power in trade, Bhagwati's 1958 analysis [1] demonstrates the possibility of immiseration. Where Distortions (2) and (4) obtain simultaneously as a result of an endogenous wage-differential, the same possibility has again been demonstrated by Bhagwati [6]. Johnson's [19] demonstration of immiseration, when a country has no monopoly power in trade but a tariff, illustrates Proposition (2) for the case of an autonomous policy-imposed Distortion (1).

Note again that the underlying reason for immiserizing growth is that the growth takes place in the presence of a distortion. This distortion produces a loss of welfare from the fully-optimal welfare-level. Thus, if there is an accentuation in this loss of welfare, when growth has occurred and the distortion has continued, this incremental loss could outweigh the gain that would have accrued if fully optimal policies had been followed in the pre-growth and post-growth situations [6]. It also follows that such immiserizing growth would be impossible if fully optimal policies were followed in each situation: i.e. if the distortions resulting from the

endogenous and policy-imposed causes were offset by optimal policy intervention (as discussed under Proposition 2(i) earlier).²³

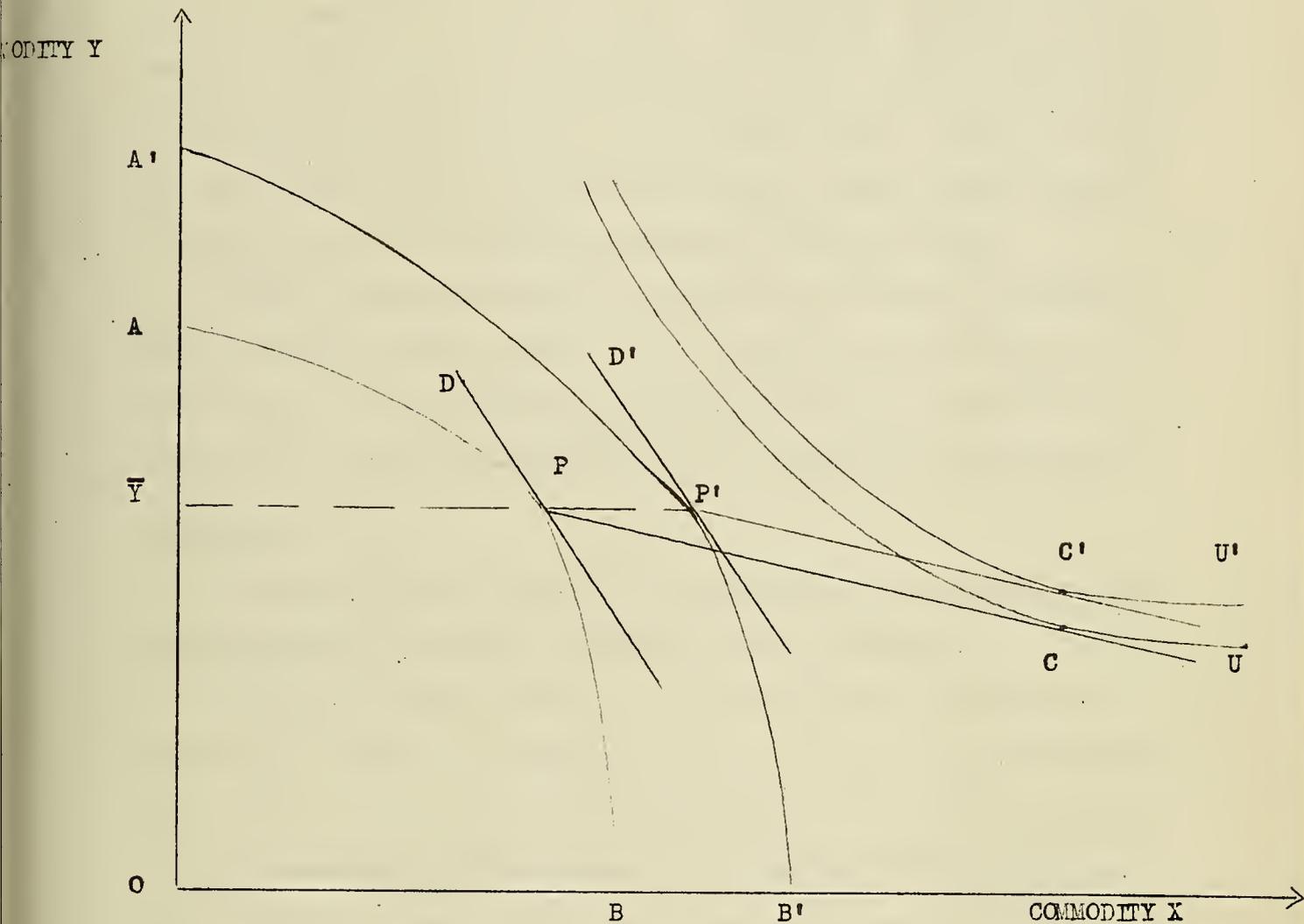
But so far we have discussed only distortions resulting from endogenous and policy-imposed, autonomous factors. However, Proposition (4) applies equally, and can be generalized to, instrumental policy-imposed distortions as well.

In complete symmetry with the endogenous and autonomous policy-imposed distortions, the phenomenon of immiserizing growth will be precluded when the constrained variable (e.g. production in the case of a production objective) is attained (in the pre-growth and the post-growth situations) by optimal policy. On the other hand, immiseration becomes possible as soon as any of the second-best (or third-best) policies is adopted to constrain the variable (to a pre-assigned value in both the pre-growth and post-growth situations).

This generalization of the theory of immiserizing growth is readily illustrated with reference to production as the constrained variable. Remember that a production tax-cum-subsidy is the optimal policy in this case and a tariff a second-best policy. Figure 1(a) then illustrates how it is impossible, after growth, to become worse off if the production level of a commodity is constrained to the required level by a suitable production tax-cum-subsidy policy. y -production is constrained to level \bar{y} ; the production possibility curve shifts out from AB to A'B'. With a suitable production tax-cum-subsidy used in both the pre-growth and the post-growth

²³For phenomena of immiserizing growth arising from reasons other than distortions, see Melvin [25] and Bhagwati [9].

Figure 1(a)



AB is the pre-growth production possibility curve; A'B' the post-growth production possibility curve. The international price-ratio is given at $PC = P'C'$. Production of y is constrained to level \bar{y} . A suitable production tax-cum-subsidy takes production, before growth, to P at domestic, producer price-ratio DP. After growth, a suitable production tax-cum-subsidy takes producer price-ratio to D'P' and production to P'. Welfare level has increased, after growth, to U' ($>U$).

situations, to constrain y -production to \bar{y} , it is clear that it is impossible to worsen welfare after growth. Figure 1(b) illustrates, however, the possibility of immiserizing growth when the sub-optimal, tariff policy is followed instead in each case to constrain y -output to level \bar{y} . Note that this demonstration, where the welfare level reduces after growth to U' from U , does not require the assumption of inferior goods.

Similar illustrations could be provided for the other three cases: where consumption, factor employment in a sector, and trade-level are constrained. In each case, only the pursuit of a sub-optimal policy to achieve the specified non-economic objective could lead to immiseration.

Proposition (5):

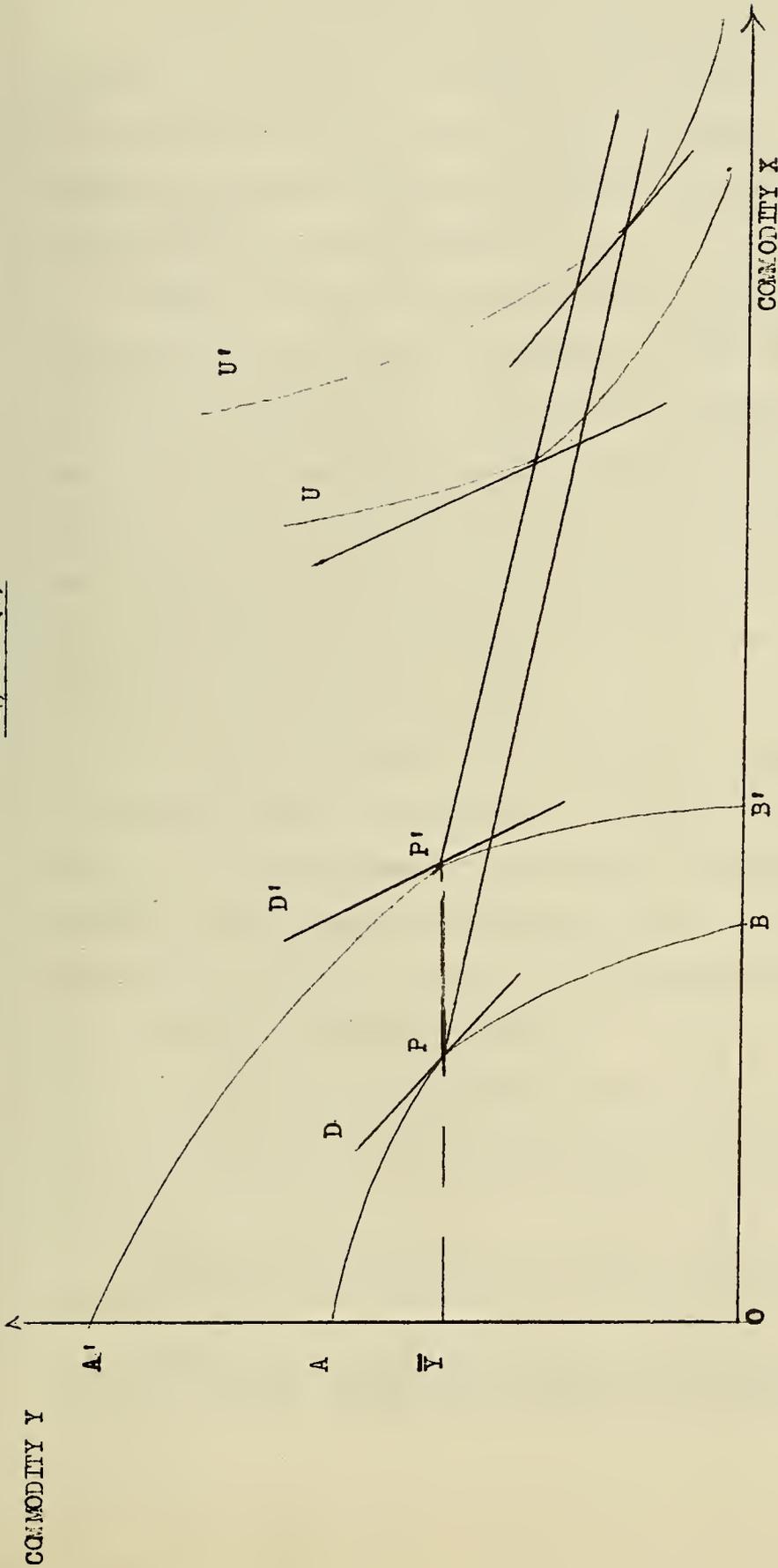
Reductions in the "degree" of (an only) distortion are successively welfare-increasing until the distortion is fully eliminated.

This theorem holds, whether we take endogenous or policy-imposed distortions. However, it needs to be qualified, so as to exclude inferior goods for all cases except where a consumption tax-cum-subsidy is relevant.

For autonomous, policy-imposed Distortion (1), the Kemp [22] and Bhagwati-Kemp [10] theorems are special cases of Proposition (5): each further requires the exclusion of inferior goods and attendant multiple equilibria if the possibility of the competitive system "choosing" an inferior-welfare equilibrium under the lower degree of distortion is to be ruled out.²⁴ In point of fact, identical propositions could be derived for alternative forms of autonomous policy-imposed distortions: factor

²⁴On this, see Bhagwati [4], Kemp [23] and Bhagwati-Kemp [10].

Figure 1(b)



The production possibility curve shifts, after growth, from AB to A'B'. In each case, the production of y is constrained to \bar{y} by a tariff. In the pre-growth case, this tariff leads to production at P (with domestic price-ratio DP), consumption at C and welfare at U. After growth, production is at P', consumption at C' and welfare has reduced to U' (<U), implying immiserizing growth.

tax-cum-subsidy, production tax-cum-subsidy and consumption tax-cum-subsidy.²⁵

Similarly, we can argue that reduction in the degree of each market imperfection will cause a reduction in the degree of its consequent Distortion and thus raise welfare. Thus, for example, a reduction in the degree of production extemality will reduce the degree of Distortion (2) and increase the level of welfare.²⁶

Finally, identical conclusions apply if we reduce the degree of "required" distortion, of the instrumental policy-imposed type, by relaxing the binding constraint on the "non-economic"-objective variable. Thus, marginally relaxing the constraint on production will suffice to improve welfare. As is clear from Figure 2(a), the relaxation of the constraint on y-production, from \bar{y} to \bar{y}_n , will necessarily improve welfare by shifting the "availability line" outwards--if, in each case, the policy adopted is a production tax-cum-subsidy policy.

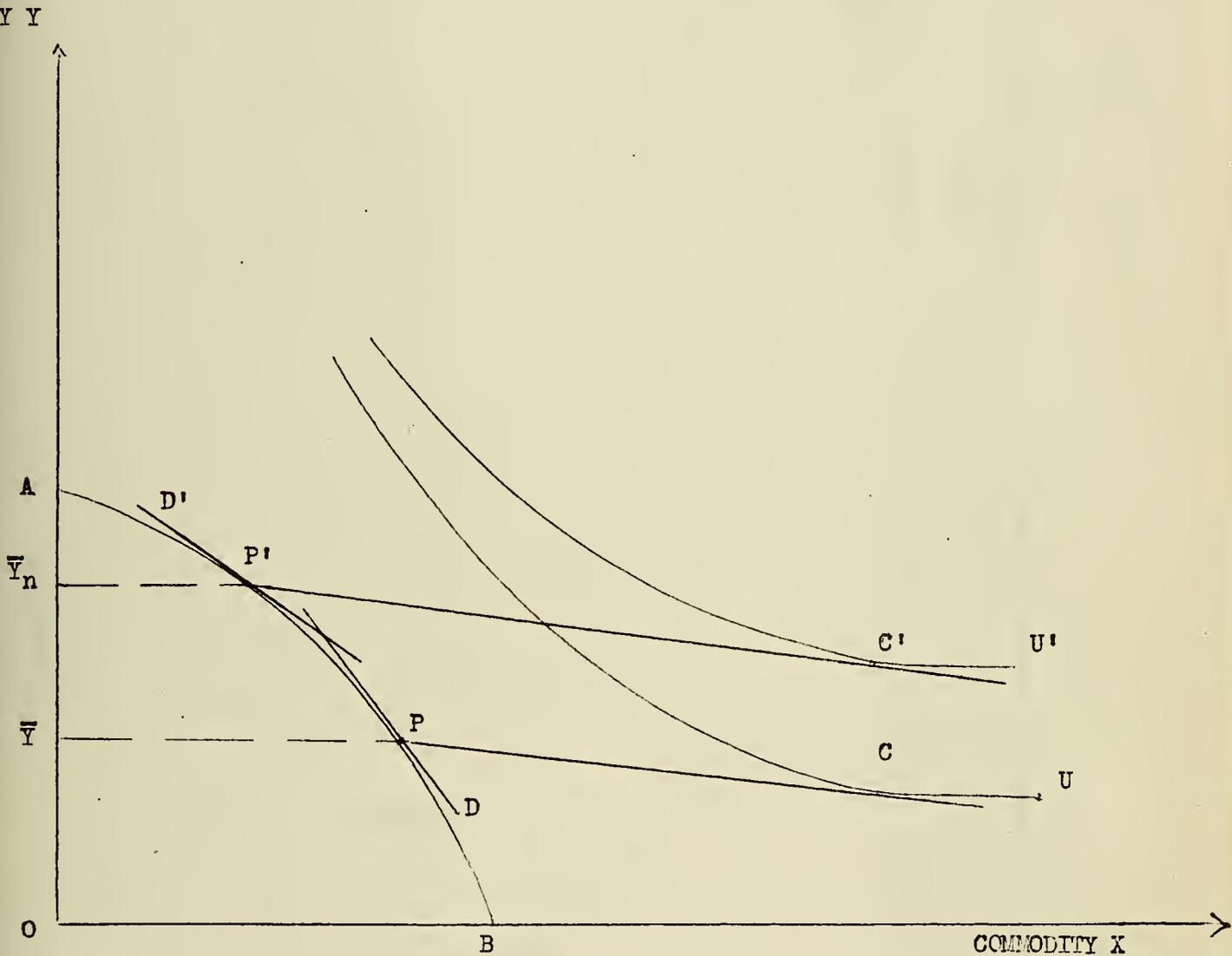
If, however, as Figure 2(b) illustrates, a (sub-optimal) tariff policy is followed instead, to constrain y-production to the required level, the result of a relaxation in the constraint is identical: the only qualification relating to that arising from inferior goods. Further, an identical conclusion holds, as in the case of a production tax-cum-subsidy, for the case of a factor tax-cum-subsidy instead.

Thus, Proposition (5) applies in the case of instrumental policy-imposed distortions, no matter which policy is considered (in other words, no matter

²⁵For the consumption tax-cum-subsidy, the complication arising from inferior goods is not relevant.

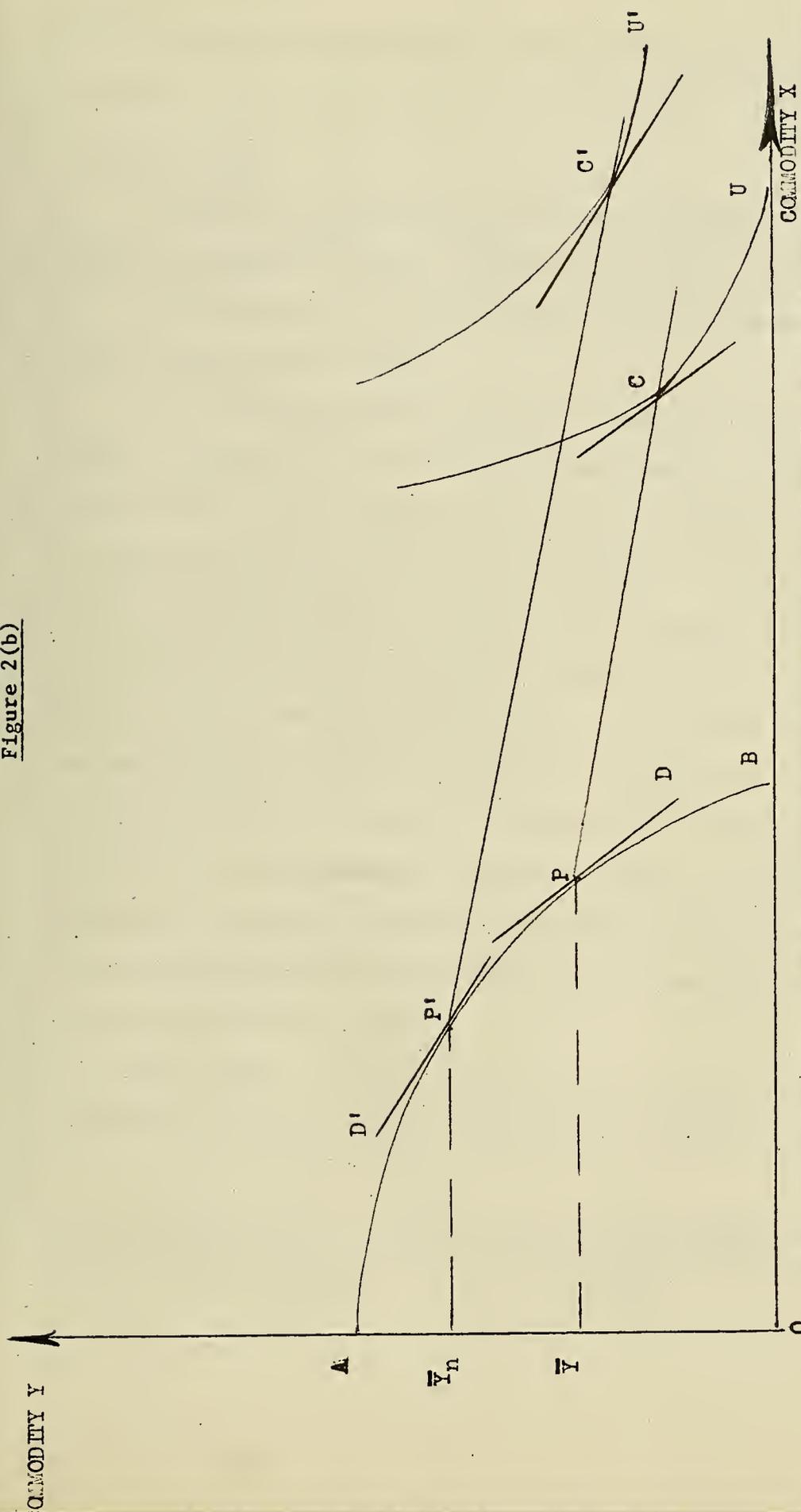
²⁶Note again the caveat regarding inferior goods. This will not apply, however, where the consumption distortion is reduced.

Figure 2(a)



With AB as the production possibility curve, \bar{y} and \bar{y}_n are the successive non-economic constraints on y-production, which are met by use of a suitable production subsidy policy in each case. For \bar{y} , production then is at P, consumption at C and welfare-level at U. For \bar{y}_n , a relaxation in the constraint, production shifts to P' (with producer price-ratio at D'P' now), consumption to C' and welfare has increased to U' (>U).

Figure 2(b)



With production of y-commodity constrained successively at \bar{y} and \bar{y}_n , a tariff used for that purpose, and production possibility curve AB, the production for \bar{y} constraint is at P, consumption at C and welfare at U. Relaxation in the constraint to \bar{y}_n leads to production at P' and consumption at C' (at price D'P') and welfare increases to U' (>U).

which distortion is introduced in pursuit of the specific non-economic objective).

Proposition (6):

Reductions in the "degree" of a distortion will not necessarily be welfare-increasing if there is another distortion in the system.

This proposition is readily established for endogenous or autonomous policy-imposed distortions.

Let us first consider a case where reductions in one distortion do lead to improvement in welfare despite the presence of another distortion in the system. Thus, consider the case where a production externality, an endogenous Distortion (2) where $DRT \neq DRS = FRT$, is combined with a consumption tax-cum-subsidy, an autonomous policy-imposed Distortion (3) where $DRS \neq FRT = DRS$, but there is no monopoly power in trade. Assume further that the two distortions combine so as to yield altogether the initial situation where $DRT \neq DRS \neq FRT$ (so that they are not mutually offsetting as far as one inequality is concerned). In this case, successive reductions in the consumption tax-cum-subsidy will necessarily be welfare-increasing, given the production externality; and successive reductions in the production externality will improve welfare (except for the complication introduced by inferior goods).²⁷

Next, however, consider the case where there is a production externality (endogenous, $DRT \neq DRS = FRT$) combined with a tariff without monopoly power

²⁷These conclusions can also be derived by reference to the Bhagwati-Ramaswami-Srinivasan [8] formula, in fn. 14 above, which reduces for this case to:

$$dU = U_2[dX_1(p_f - p_t) + (p_c - p_f)dC_1].$$

in trade (autonomous policy-imposed $FRT \neq DRS = DRT$) and assume that the resulting initial situation is characterised by $FRT \neq DRT \neq DRS$. In this case, successive reductions in the tariff will not necessarily improve welfare steadily, if at all, and the gains may turn into losses.²⁸ The theorems on the possible inferiority of free trade (i.e. zero tariff) to no trade (i.e. prohibitive tariff) when there is a production externality [15] or a wage differential [2] [16] are only special cases of this general theorem which illustrates Proposition (6).

It is interesting to note further that this theorem can equally insightfully be analysed in terms of Proposition (4) if we recognize that, if optimal policies are followed in both the autarkic and the trading "situations," the trade situation must necessarily enable the economy to be better off-- as is obvious to trade theorists familiar with the Baldwin-envelope technique. If then there is a distortion common to both situations, as with an endogenous wage differential or production externality or with an autonomous policy-imposed production tax-cum-subsidy, the transition to the (free) trading situation may well be immiserizing (i.e. therefore, free trade inferior to autarky) if the loss from this distortion is accentuated and outweighs the primary gain from the shift to (free) trade itself.

²⁸This is seen again by examining the Bhagwati-Ramaswami-Srinivasan formula which reduces, in this instance, to:

$$dU = U_2 [dX_1 (p_f - p_t) + (p_c - p_f) dC_1]$$

It is clear then that a reduction in the tariff, by affecting both X_1 and C_1 may worsen rather than improve welfare; and that the welfare-effect of successive tariff changes need not be uni-directional.

Proposition (7):

Distortions cannot be ranked (uniquely) vis-a-vis one another.

This is a readily apparent proposition and applies clearly to all the classes of distortions we have discussed.

Bhagwati's [4] demonstration that Kemp's [22] theorem of the superiority of tariff-restricted trade over no trade will not extend to cases where the trade is restricted instead by policies such as consumption and production tax-cum-subsidies becomes intuitively obvious as soon as it is seen that it falls into the class of theorems belonging to Proposition (7). For, in this instance, two distortions are being compared: (i) a consumption tax-cum-subsidy leading to Distortion (3): $DRS \neq DRT = FRT$, with a situation of autarky and hence implicit prohibitive tariff, thus involving Distortion (1): $FRT \neq DRT = DRS$; and (ii) a production tax-cum-subsidy leading to Distortion (2): $DRT \neq DRS = FRT$, with autarky involving Distortion (1): $FRT \neq DRT = DRS$. In principle, of course, the demonstration of impossibility of unique ranking between autarky and restricted trade could be carried equally into the case where trade-restriction occurs via use of a factor tax-cum-subsidy involving Distortion (4) along with (2).

III: Concluding Remarks

We have thus succeeded in unifying a considerable body of literature on the welfare economics of trade into a series of major proposition which constitute a generalized theory of distortions and welfare. Aside from the intrinsic elegance of such unification, this has resulted in a number of insights into, and extensions of, the theorems to date in this significant area of economic policy.

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