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Policy Implications of the Trade and Wages Debate

Alan V. Deardorff
University of Michigan

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The University of Michigan

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ABSTRACT

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This paper examines the choice of policies to redistribute income in response to an increase in inequality caused by a rise in the differential wage paid to skilled labor compared to unskilled labor. The main issue is whether the appropriate policy response depends on the cause of the increased differential. In particular, should policies respond any differently if the rising differential is due to "trade" – shorthand for greater openness in global markets and/or greater participation in those markets by developing countries abundantly endowed with unskilled labor – or due to technological changes that have favored skilled labor over unskilled labor. The analysis is conducted within the context of a two-sector Heckscher-Ohlin trade model augmented to allow endogenous determination of the level of skill. Utility possibility frontiers are constructed for various policies, then shifted as a result of changes in trade and technology. The conclusion is that the usual trade economists' argument against the use of trade policies applies in this context as well, regardless of the source of the worsening income distribution. If trade is the best available tool for dealing with a trade-induced increase in inequality, then trade policy will also be best for dealing with inequality induced by technology. But more likely, the preferred policy will be a tax/subsidy focused more directly on factors employed, and this preference too will hold regardless of the relative contributions of trade and technology to causing the problem being addressed.

Alan V. Deardorff

The University of Michigan

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Correspondence:

Alan V. Deardorff
Department of Economics
University of Michigan
Ann Arbor, MI 48109-1220

Tel. 313-764-6817
Fax. 313-763-9181
E-mail: alandear@umich.ed
http://www.econ.lsa.umich.edu/~alandear/

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Policy Implications of the Trade and Wages Debate [*]

Alan V. Deardorff
The University of Michigan

I. Introduction

For the last ten years or so there has been a lively debate among trade and labor economists in America regarding "trade and wages." The issue is the extent to which "trade" has been the cause of the increasing skill differential in the U.S. economy. A parallel issue has occupied European economists, where, on the continent at least, the symptom to be explained has been changes not so much in relative wages but in unemployment. In both cases, "trade" is shorthand for increasing competition with low-skilled labor in global markets, due to a combination of global trade liberalization and growth of the labor-abundant countries, especially in Asia.

Among several alternatives to trade as causes for these changes in labor markets, the most prominent is "technology," that is, technological progress that has been biased in favor of skilled labor, either within industries or across industries. The outcome of that debate, it seems, is a near consensus that trade has indeed been a significant cause of these labor market changes, but also that it has been less important quantitatively than other causes, and most likely less important than technology. In spite of that consensus,

[*] I have benefited from conversations on the topic of this paper with numerous colleagues here at Michigan, including Gordon Hanson, Jim Levinsohn, Bob Stern, and David Weinstein. I have also benefited from the comments of David Autor, John Jackson, Ed Leamer and participants at both the Nottingham conference and a seminar at Michigan.

the debate continues over the appropriate methodology to use for drawing these conclusions.[1] In this paper, however, I want to ask a different question: Does it really matter for policy whether trade or technology (or something else) is the cause?

This is a question that I have already touched on elsewhere, in Deardorff (1998). There I primarily merely stated the usual trade economist's argument against restricting trade as a first-best policy, and then noted that this argument holds regardless of whether labor markets have been impacted by changes in trade or by changes in technology. My argument here will be the same, but somewhat more formal. I will lay out a simple explicit model of trade and income distribution in which it is possible to examine the effects on income distribution of both trade and technology, as well as of certain policies to redistribute income. The point will be to show that while the socially optimal level of policy for redistributing income certainly changes when trade or technology worsens the income distribution, neither the choice of which policy is best to use, nor the decision of whether to use it at all, really depends upon the cause. Thus if it is true that trade has caused a certain worsening of the income distribution, the optimal policy response will be the same as if technology has caused the same worsening.

In particular, like most trade economists I will argue against the use of trade policies to solve the problem, on the grounds that better policies exist. Thus in normal circumstances, even if trade were the cause of a need for greater efforts at redistribution, these efforts should not take the form of restricting trade, even though this might be a workable second-best policy. And if for some reason trade restrictions are the best available policy for redistribution, the case for using them would be just as strong if

[1] See Leamer (2000) and the responses by Deardorff (2000) and Krugman (2000).

technology were the source of increased inequality. In short, the cause does not matter for the cure.

In what follows I will first, in section II, lay out the model that I will use to address these issues. This is just a minor extension of the usual 2-sector, 2-factor Heckscher-Ohlin (H-O) trade model, extended to allow heterogeneous workers to choose whether or not to become skilled. As I have shown in Deardorff (1997), this model incorporates an interaction between trade and income distribution that causes some redistribution policies to affect trade. Here I will use the model to identify optimal redistribution policies, in section III, and how these are altered by changes in trade and technology in section IV. Section V concludes.

II. The Model[2]

The model builds upon the standard 2-factor, 2-good H-O structure with perfect competition. The two factors are skilled and unskilled labor, which are assumed to be imperfect substitutes in the production of both goods. One of the goods, X, uses skilled labor relatively intensively compared to good Y. Given the endowments of the two factors (to be determined endogenously below), the model can be analyzed with the familiar Lerner-Pearce diagram as in almost any modern textbook on international trade.

The number of workers in a country is fixed at a number, L, that is large enough so that I can treat it as continuous. Each of these workers can be thought of as innately unskilled, but capable of acquiring skill by giving up some fixed amount of their own time. Workers are heterogeneous, some able to acquire a great deal of skill through this

[2] This section draws heavily on Deardorff (1997).

process, others not, with the amount of skill that they can acquire distributed continuously over the population, representing their diverse abilities. The model is static, but one can think of each worker as living a fixed lifetime, then being replaced when they die with another worker with the same ability and who must make anew the choice of whether to acquire skill or not. The distribution of births/deaths is constant over time, so that at any moment there is a constant flow of new workers coming on the scene. The distribution of ability across new workers also remains constant over time.

If a new worker chooses to remain unskilled, then she[3] will supply one unit of unskilled labor over her lifetime and earn the unskilled wage w_u. For worker i to become skilled, the only resource she requires is her own time, and the result is that she acquires an amount of skill S_i that is available to her over the remainder of her life.[4] It is this number, S_i, that is taken as given by worker i, and that is distributed unequally across the population. The market will determine a wage per unit of skill, w_s, which I will call the skilled wage, even though it is not paid per person and therefore should not be compared to w_u. It follows that worker i will earn an income of $w_s S_i$ over her lifetime if she chooses to become skilled.

The decision to acquire skill depends, then, simply on the comparison of $w_s S_i$ with w_u. It may seem that a unit of skilled labor should be paid more than unskilled labor, and this is true (that is, presumably $w_s > w_u$), but because of the time spent in skill acquisition the fraction of their lives that skilled workers are paid this higher wage is smaller than

[3] It seems customary these days to let the economic actors in our models be female. I am not entirely comfortable with that custom, especially, as here, in models where the workers are actually sexless and far less interesting than the female pronoun in real life would connote. But I made these workers male in Deardorff (1997), so in fairness, I hope, I make them female here.

one. Since S_i is that fraction multiplied by the level of skill acquired, it too will be less than one for some workers who are not able to acquire very much skill. Such workers will opt to remain unskilled.

Given a pair of market-determined wages, w_s and w_u, then, workers with low ability will remain unskilled, while workers of high ability will become skilled, the dividing line being at

$$S_{\hat{i}} = \frac{w_u}{w_s} \tag{1}$$

That is, the marginal worker, $\hat{i}$, will earn a lifetime income just equal to what they could have earned remaining unskilled. Clearly I am ignoring discounting here, which would complicate matters only slightly.

The distribution of income that emerges from this simple model has all workers of low ability earning the same low lifetime wage, w_u, while workers of high ability, because their skill levels differ, earn different lifetime incomes all of which are higher than w_u. In the model, ability matters only for the return on skill acquisition, not for the unskilled worker's productivity on the job, and that is why they all earn the same. This is not enough diversity for realism, but it suffices to incorporate the incentive effects that will distinguish at least some policies for redistribution. That is, policies that change the relative wages of skilled and unskilled workers in (1) will change some workers' choice of whether to become skilled or not, and will therefore alter the economy's "endowment" of factors, its production and trade, and its total income.

[4] It does not matter how long this process of skill acquisition takes, since a longer time would merely mean that S_i is concentrated over a shorter period.

Once trained, all workers work the same amounts, and there is no alternative for leisure. This means that another margin for choice that might respond to income redistribution policies is omitted, so that the range of redistribution policies that will be considered below is correspondingly limited. In particular, a simple proportional income tax, because it does not change relative wages, will not here introduce any distortion into worker choice, as it would if they could substitute leisure for work.

Figure 1 shows the tradeoff that these assumptions imply between skilled and unskilled labor for the economy as a whole, and the corresponding wages. In the top panel, curve *MEL* shows the "endowment possibilities" for skilled and unskilled labor. Since each unit of labor can provide a unit of unskilled labor if it does not acquire skill, the maximum amount of unskilled labor is L. If some workers do choose to acquire skill, it will be those with the greatest ability, and (minus) the slope of the curve as it rises to the left from L is therefore the skill per worker acquired by the most able individual. As we move to the left along the curve, less and less able individuals opt for skill, and the curve therefore flattens out. At the vertical intercept, all workers acquire skill and the slope there reflects the ability of the least able. Various points along the horizontal axis from O to L therefore represent the individuals in the economy, ordered least able to most able from left to right.

Now introduce wages of skilled and unskilled labor determined by the market. In the lower panel, the horizontal line *CED* at $y_u=w_u$ represents the lifetime income that a worker can get by remaining unskilled, and this is the same for all individuals. Curve *AEB*, in contrast, shows the income that these same individuals can earn if they become skilled, starting low for the least able and rising to the right. This income is just w_sS_i, and

it is therefore equal to the given wage w_s multiplied by (minus) the slope of the curve *MEL* above it. Workers choose the highest of these two incomes, and therefore all workers above $\hat{U}$ become skilled. This corresponds to point *E* in the upper panel, which is the tangency between the endowment possibility curve and a downward-sloping factor price line with slope w_u/w_s, as shown. Note that the choice by individuals maximizes the value, at these factor prices, of the endowment point selected for the country.

The bottom panel shows the complete income distribution in the economy. Unskilled workers, on the left, all earn the same income, y_u. Skilled workers earn more, as shown by the rising curve. Thus the income distribution is unequal. Furthermore, those with the highest incomes are not working harder, as they would for example in Leamer's (1996) model of effort. They are simply lucky, having arrived in the world with higher levels of ability. The market rewards them for this, in part as a mechanism to induce them to use that ability to acquire high levels of productive skill. But a side effect of that mechanism is that incomes are unequal, solely as an accident of birth.

The extent of this inequality depends directly on the two wages. Assuming that all individuals share the same tastes in their roles as consumers and that they face the same prices,[5] a rise in the skilled wage relative to the unskilled wage, w_s/w_u, will increase inequality by raising the incomes of all those who would already have opted to become skilled. Further, it will induce those unskilled workers nearest the margin $\hat{i}$ to become skilled after all, and to raise their incomes too above y_u. Meanwhile the less able

[5] Not a realistic assumption, of course, but probably of second order importance compared to the wages themselves.

unskilled workers fall relatively further behind their skilled (and now more numerous) colleagues. By any measure, the income distribution has become more unequal.

Figure 1 does not determine these wages, but the rest of the model – the H-O part – does. Let the country be small and open, so that prices of goods are determined exogenously in world markets. Then as long as factor endowments, now endogenous, are within the H-O diversification cone, goods prices will determine factor prices *a la* factor price equalization (FPE).

Figure 2 incorporates the familiar Lerner-Pearce diagram of H-O trade theory into the top panel of Figure 1. Solid curves $X=1/p_x$ and $Y=1/p_y$ are unit value isoquants for the two goods, incorporating both their technologies and the prices of the goods taken from world markets. Absent factor-intensity reversals, their common tangent, CD, defines the unique factor prices and factor ratios that are consistent with producing both goods at these prices. The factor ratios, s_x and s_y, define the diversification cone.

In the same figure, the solid curve *MEL* is the endowment possibility curve from Figure 1, and a line parallel to the common tangent, CD, now determines which factor endowment will be chosen in equilibrium by individuals deciding on skill acquisition. Point *E* is that endowment, and it can now be used together with the factor ratios to determine allocations of the factors to the two industries, at points *A* and *B*. Point *E* determines, together with the origin of the diagram, the corners of a standard Edgeworth production box leading to these allocations, although I omit the sides of the box to avoid additional clutter.

Figure 2, expanded to include also the lower panel of Figure 1, can and will be used below to work out the effects of various exogenous changes in the model on income

distribution, as well as on the more familiar variables of the H-O model. As a simple example, I note in passing that mere enlargement of a country will not change the proportions of anything, unless the economy is or becomes large enough to matter for world prices. That is, suppose that a country's population become larger, the distribution of abilities across that population remaining the same. This will expand the endowment possibility curve outward also in proportion and leave the tangency with the factor price line on the same (undrawn) ray from the origin as point *E*. The result will be exactly the same distribution of income as before, but with proportionally more people at each income.

However, if such a country is large enough to affect world prices, then this expansion will matter after all. At unchanged prices the country's supplies, demands, and quantities traded all increase in the same proportion. This increases the supply of its export good on world markets, as well as the demand for its import good, and prices will move against it. We cannot tell from Figure 2 which good is exported, but the resulting price change will change factor prices against the factor used intensively in its production. Suppose, for example, that this was a country with an abundance of ability and therefore an (endogenous) abundance of skilled labor. Then it will have exported the skill-intensive good *X* prior to the expansion. The price of good *X* will therefore fall on world markets, as will the relative (and real) wage of skilled labor. Working through the rest of the model, income distribution will become more equal.

More relevant to the current discussion is the opposite case, however, of expansion by a low-ability, low-skill country. This will cause the price of the unskill-

intensive good to fall, lower the corresponding relative wage of unskilled labor, and make the income distribution more unequal both at home and abroad.

III. Redistribution

I will consider four policies for income redistribution in the context of this model. The first is non-distorting lump-sum redistribution that simply taxes some individuals and subsidizes others in ways that do not change their behavior. In the real world, this would be almost impossible to do, but within the model it is feasible since a proportional income tax does not distort behavior in the absence of a labor/leisure choice. Nonetheless, while I will examine this policy, I will normally assume that it is not available, and I discuss it only as a benchmark.

The second policy is a tax on skilled labor together with a subsidy to unskilled labor. This is feasible, both in the model and in the real world via a progressive income tax, but it does distort behavior – the choice for some workers of whether or not to become skilled.

The third policy is a tax/subsidy on outputs. By taxing the output of the sector that uses skilled labor intensively and simultaneously subsidizing output in the other sector, policy-makers can again tilt the ratio of the two factors' wages, although here it is the wages paid, not just the wages received, that are changed. This too distorts workers' choices regarding skill acquisition, and in addition distorts producer choices of what to produce.

Finally, the fourth policy is a tax on imports of unskilled-labor-intensive goods. This too alters wages paid, not just wages received, and indeed it has all of the effects of a

tax/subsidy on production. Thus it too will have redistributive effects. But it also causes the extra distortion of quantity demanded that is familiar from trade theory.

In each case, while the model can display, as in the bottom panel of Figure 1, the complete distribution of income, this does not summarize it in a way that facilitates discussion of social preferences. And this is difficult, since the model includes a continuum of individuals with different incomes. Therefore, I will focus – and suppose that society also focuses – on only two of them: those at percentiles l and h from the bottom of the income distribution. For example, we might compare the real incomes of individuals whose incomes are above l=25% of the population (the l^{th} percentile) with those whose incomes are above h=75% of the population (the h^{th} percentile), in order to capture the essential inequality. Since, in the model, all unskilled workers earn the same wage, I will require only that l be small enough to lie within that group and h be large enough to lie outside it, at least prior to any policies to redistribute income.

With this assumption, we can think of social preferences as being represented by a social welfare function defined over the real incomes, or utilities, of only these two percentiles, and we can represent these preferences with social indifference curves defined on these two utilities. Obviously, if policies could be constructed without constraint, maximization of social preferences defined in this peculiar way would yield crazy results, concentrating subsidies on just the chosen percentiles. But with only the above-mentioned policies to choose from, I don't think that this simplification will particularly distort the results.

The first step in using this approach is to determine what real income or utility combinations are possible for the chosen percentiles, using each of the eligible mechanisms for redistribution. I will consider them in turn, looking in each case only at the simplest case of a diversified small open economy with free trade. The country therefore takes as given both the prices of the two goods on world markets and the associated (by FPE) wages of the two kinds of labor. In the absence of any redistribution policy, the latter determine the real incomes both of the unskilled l^{th} percentile and of the skilled h^{th} percentile. These are graphed in Figure 3 at the point *E*, where utilities of the two percentiles are u_l^0 and u_h^0 respectively.[6]

Non-Distorting Redistribution

Non-distorting lump-sum redistribution simply transfers real income from one group to another, and it therefore might seem to reallocate simply along the downward sloping 45º line that is drawn in Figure 3 through point *E*. That would be the case if the redistribution took only from percentile *h* or *l* and gave only to the other, but that is not very interesting. For comparability with the policies to be addressed below, we should think instead of a policy that redistributes among the entire population, even though we focus only on these two percentiles.

Suppose then that the non-distorting policy is a simple proportional income tax, the proceeds of which are given back equally to all individuals. The tax does not distort because there is no leisure option and because the skill choice is dependent on the ratio of

[6] I am really thinking here simply of real incomes – nominal wages net of any taxes or subsidies, deflated by a price index that is common to all individuals due to the assumption of identical tastes. I call them utilities

wages, which are taxed equally. This will raise incomes of those whose incomes before the policy were below average, and vice versa. However, for arbitrary percentiles *l* and *h*, these changes will not usually be equal. In general, therefore, the frontier representing real income combinations that are attainable with non-distorting redistribution will not be a 45º line, or even straight. But it is harmless, and most easily recognized, if I draw it that way.

Factor Taxes

In this small open economy with the factor prices that are paid by industries determined via FPE on world markets, a tax on a factor (supply or demand) will be borne entirely by the factor. Therefore an easy way to redistribute from skilled to unskilled workers is to tax the former and subsidize the latter. Wages received by skilled workers will fall by the amount of the tax, and wages received by unskilled workers will rise by the amount of the subsidy. Of course, those skilled workers closest to the margin will now opt not to become skilled in the first place, and the economy's endowment of skilled labor will decline. Figure 4 illustrates the policy, which leaves the Lerner-Pearce part of the picture unchanged. But it raises the relative take-home wage of unskilled labor, to the steeper tangent to the endowment possibility curve at *E'*. In the lower panel, the income distribution changes from *CEB* to *C'E'B'*. Just how far the unskilled take-home wage rises and the skilled one falls depends on the numbers and incomes of both groups, since the payments to the unskilled should just exhaust the proceeds from the tax.

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only because a utility possibility frontier, UPF, is more familiar and comfortable terminology than real-income possibility frontier.

Looking at the incomes of our focus groups, the *l* and *h* percentiles, it would seem that we only know that one gains and the other loses, without knowing how much they gain and lose. But in fact, we can say more. For the distortion of the choice to acquire skill has led to an endowment of the two factors that is worth less, at world prices, than the previous endowment choice was worth. This is seen in the top panel of Figure 4 from the fact that *E'* lies below the tangent to *E*. Therefore real national income must be lower with this policy than without, suggesting that the utility possibilities for this distorting factor tax must lie below those of the non-distorting tax above. Such a curve is labeled *FEF* in Figure 3, lying inside *NEN* except at *E*. Curve FEF is the utility possibility curve, or UPF, attainable using a factor tax/subsidy for redistribution.

If we now introduce a social welfare function defined on the utilities of our two focus percentiles, we can use the indifference curves from that function to identify optimal policy. Of course, such a social welfare function could have many forms (or none at all, if Arrow was correct) but I will draw the social indifference curves as looking much like we see in other contexts. In Figure 3, these identify social optima at W_N with the non-distorting policy and at W_F with the factor tax. This proves nothing, but it does suggest the plausibility of the result that it is the poor who are likely to bear the costs of distortions in income redistribution. That is, as drawn, the curvature of *FEF* has caused the high-income percentile to be left with almost as much income as it would have enjoyed if non-distorting redistribution had been possible.

There is one more point worth noting before moving on. In the present model, utility is real income. This depends on net nominal income, which varies across groups, and on prices, which do not. Thus the ratio of utilities captures the ratio of net nominal

incomes – gross wages, when there are no taxes, and net wages otherwise. In Figure 3, therefore, we can use rays from the origin to index relative net wages, as well as the changes worked upon them by policy. The fact that W_F is drawn on a higher ray than W_N therefore says that the non-distorting policy would be used to lower the relative net wage of skilled workers by more than would be optimal if only factor taxes were available. This too is not inevitable, of course, but it seems to follow if the social welfare function is homothetic.

Production Taxes

A production tax drives a wedge between world prices and those faced by domestic producers, with the latter being those that determine domestic factor prices. A tax on the skill-intensive sector (combined with a subsidy on the other sector to keep the budget balanced) will be borne entirely by domestic producers, whose price will fall by the amount of the tax. As is familiar from the Stolper-Samuelson Theorem, this will cause a magnified drop in the relative wage of skilled labor compared to unskilled labor, and once again, it will redistribute real income, or utility, from the high to the low percentiles.

Compared to a factor tax that would have the same effect on relative net wages, this policy will cause exactly the same distortion of factor endowments and therefore the same drop in the value of the country's endowments at world prices. However, in this case there is an additional distortion, as the country also fails to produce the most valuable bundle of goods along its production possibility frontier. I will skip drawing that, since the story is so familiar. But the lesson is that the UPF for nonzero production

taxes will lie even further inside that of the non-distorting policy, being itself everywhere inferior to the factor tax.

Trade Taxes

Finally, consider a tax on trade. If the country in question is an importer of the unskilled-labor-intensive good, as I will assume[7], then a tax on trade will raise the domestic relative price of the imported good, having the same effect on producer prices and factor prices as the production tax. In addition, however, it will also distort consumption and again produce an inferior combination of utility possibilities, even compared to the already inferior production tax. Again the story here is too well known to require much explication.

To sum up, then, Figure 5 shows the UPFs together for the four different redistribution policies:

- *NEN*: Non-distorting policy
- *FEF*: Factor tax
- *PEP*: Production tax
- *TET*: Trade tax

The four curves coincide at point *E* where the policies are all zero. Everywhere else, they possess a clear rank ordering, with utility possibilities falling as we move down the list.

[7] If not, then a subsidy to trade will be needed here.

III. Response to Change

I now consider how redistribution policy should respond to a worsening of the income distribution, first if it arises from trade, and second if it arises from technology.

A Trade Shock

Suppose simply that the world relative price of the unskilled-labor-intensive good now falls. Figure 6 shows in three panels what happens to the economy and its choices. In the top panel with good *Y* as numeraire, the fall in the price of good *Y* means an increase in the price of good *X*, which shifts its unit value isoquant inward from *X* to *X'*. This flattens the common tangent and lowers the relative wage of unskilled labor. That in turn moves the tangency with the endowment possibility curve up and to the left, from *E* to *E'*, leaving a smaller fraction of the population unskilled.

The middle panel shows the resulting income distribution, with the unskilled workers worse off than before, even some of the new skilled workers worse off than when they were unskilled, and the more skilled doing quite well, thank you. Secure within these two groups lie our focus percentiles, *l* worse off and *h* better off, as expected.

In the bottom panel, then, the new equilibrium without any policy, *E'*, is therefore above and to the left of the old one, *E*. Moreover, continuing the assumption made before that this country is an exporter of skill-intensive goods – that is, a developed country – I assume that real national income of the country has been increased by this price change. Thus the new equilibrium lies outside the utility possibilities that could have been attained before even with non-distorting redistribution. Likewise, of course, if non-

distorting redistribution were possible now, we could make everybody better off if we chose to.

However, non-distorting redistribution is not an option, only a benchmark, and the question is what we can do with available policies, whatever they are. We know from Figure 5 that the new UPFs for our various policies are all tangent to one another at *E'*, but what we want to know now is where any one of them lies compared to *E*. That turns out to be easy to know. Consider the worst of the bunch: the tariff. Suppose that a tariff were used to just exactly offset the change in world prices, leaving domestic prices for both producers and consumers exactly as they were before. This would restore the upper two panels in Figure 6 to their original configurations, thus yielding exactly the same income distribution as before, except for one thing: the tariff revenue. This would become available for some sort of additional redistribution, perhaps to everybody. Therefore, the UPF for a tariff starting from *E'* must pass above the original equilibrium at *E*.

In case this seems like sleight of hand, Figure 7 confirms in a more conventional context that a tariff that perfectly offsets an improvement in a country's terms of trade leaves it better off than before the improvement. Starting from free trade producing at *P* and consuming at *C*, the world price of the exported good *X* rises. Continuing to trade freely, the country can increase utility from u_0 to u_f. But even a tariff that restores the original domestic prices to both producers and consumers leaves the country free to trade along the new world price line, and the country still achieves a higher utility, u_t, than it had before. This is in fact exactly what is going on in our model in this case, since by

leaving domestic producer prices unchanged, this tariff has also prevented any change in domestic factor prices and endogenous factor endowments.

Returning to the bottom panel of Figure 6, then, what can we say about optimal policy? Not much, without some assumptions about social preferences. But suppose we assume that the initial equilibrium was considered optimal. Then there is a social indifference curve tangent to UPF_N at *E*, regardless of which of the several redistribution policies were available. And without too much more restriction on these social preferences, the new social optimum after the change in world prices will require some redistribution toward the low-skilled population, now that the equilibrium has shifted to *E'*. This is shown in Figure 6 by the tangencies with the two social welfare contours SW_0 and SW_1.

Thus, if a tariff is the only available means of redistributing income, and if the optimal tariff was zero before the trade shock, then after the trade shock one should indeed restrict trade. The figure also suggests (and homothetic social preferences would assure) that even here, one should not restrict trade enough to restore the original income distribution, even though that can be done without eliminating all gains from the improved terms of trade. On the contrary, the optimal policy is likely to dampen only slightly the distributional effects of the shock, leaving the beneficiaries (skilled workers) far better off and the unskilled workers still suffering, relatively if not absolutely.

Of course, all of this will be true of the other policies as well, if they are available, and they always dominate the tariff. Thus if a factor tax can be used, its UPF will lie between *T'E'T'* and *N'E'N'*. This means not only that the factor tax will dominate the trade tax, as we already knew. It also means that the beneficiary of having it available,

instead of a trade tax, will be mostly the unskilled. The skilled may actually suffer from having this more efficient redistribution policy tool in the arsenal.

A Technology Shock

The simplest technology shock that can yield a comparable change in income distribution is not, in fact, the most plausible. If the technology for producing the skill-intensive good were to improve, but only within our small-open economy, then while prices would be unchanged, the unit value isoquant of the skill-intensive sector would shift inward, just as it did in the top panel of Figure 6. Yet it makes little sense that technology would change only locally. If technology improves for producing the skill-intensive goods everywhere, then of course world prices will change too, and things are a bit messier. But as long as the price falls by less than the technology has improved, the net effect of the two together will still be a picture much like Figure 6. That is the case I will consider.

That is, assume a world-wide Hicks-neutral technological improvement of some percentage, say α, in the skill-intensive industry, *X*. Assume also that this causes the world price of good *X* to fall, but by a smaller percentage, $\beta<\alpha$. The net effect in our small country will be to shift the unit-value isoquant for *X* inward toward the origin by the percentage $\alpha-\beta$, exactly as in Figure 6, with all of the same implications that this change had there. The relative unskilled wage falls, the income distribution worsens, and fewer workers choose to remain unskilled even as some of those who now choose to become skilled are made worse off by the entire event. And once again, since the country enjoys higher real income as a result of the shock, the new equilibrium in the bottom

panel is, like *E'*, above and to the left of *E*. But it is nonetheless above and to the right of the old UPF for non-distorting policy.

This time, constructing a policy to reproduce the original income distribution, as we did in showing that *T'E'T'* lay outside of *E*, is not quite as simple as just setting a tariff equal to a price change. But it is not that much harder. A tariff on imports of *Y*, set at the percentage $\alpha-\beta$, will reduce the domestic relative price of *X* still further, pushing the unit value isoquant back where it started and restoring factor prices, factor endowments, and income distribution. And once again, there will be some tariff revenue left over to make incomes higher than before the shock. So once again, the use of a tariff for redistribution is capable, in spite of its many distortionary effects, of completely redressing the income distribution without fully undoing the benefits of the shock.

Indeed, one basis for the major conclusion of this paper – that it does not really matter for policy which was the source of the shock – is in fact that the same Figure 6, without even relabeling, represents both.

V. Conclusion

What really matters, of course, is not what matters, but only what should be done. The fact is that we have seen increasing inequality in the United States and elsewhere over the last two decades, and we must decide what, if anything, to do about that. That increasing inequality has in turn been due, in part, to the growing wage differential, and we must also decide what if anything to do about that. The literature on trade and wages has seemed to imply that the answers to these questions would be at least a little easier if we could only sort out the causes of these events. I disagree. If we have a problem with the

income distribution, it is the same problem, whether or not its cause was trade or its cause was technology. And the solution will also be the same, if we can only figure out what it is.

It is time we turn to the harder questions of whether in fact a policy remedy is needed; if so, which of many available policies will handle the problem best; and then how far to go with it. These are important and difficult questions to which I do not have the answers, but I am convinced that the answers when we find them will not depend on the relative contributions of trade and technology as causes of these problems. And incidentally, for these problems like most others, trade restrictions are almost certainly not the best answers.

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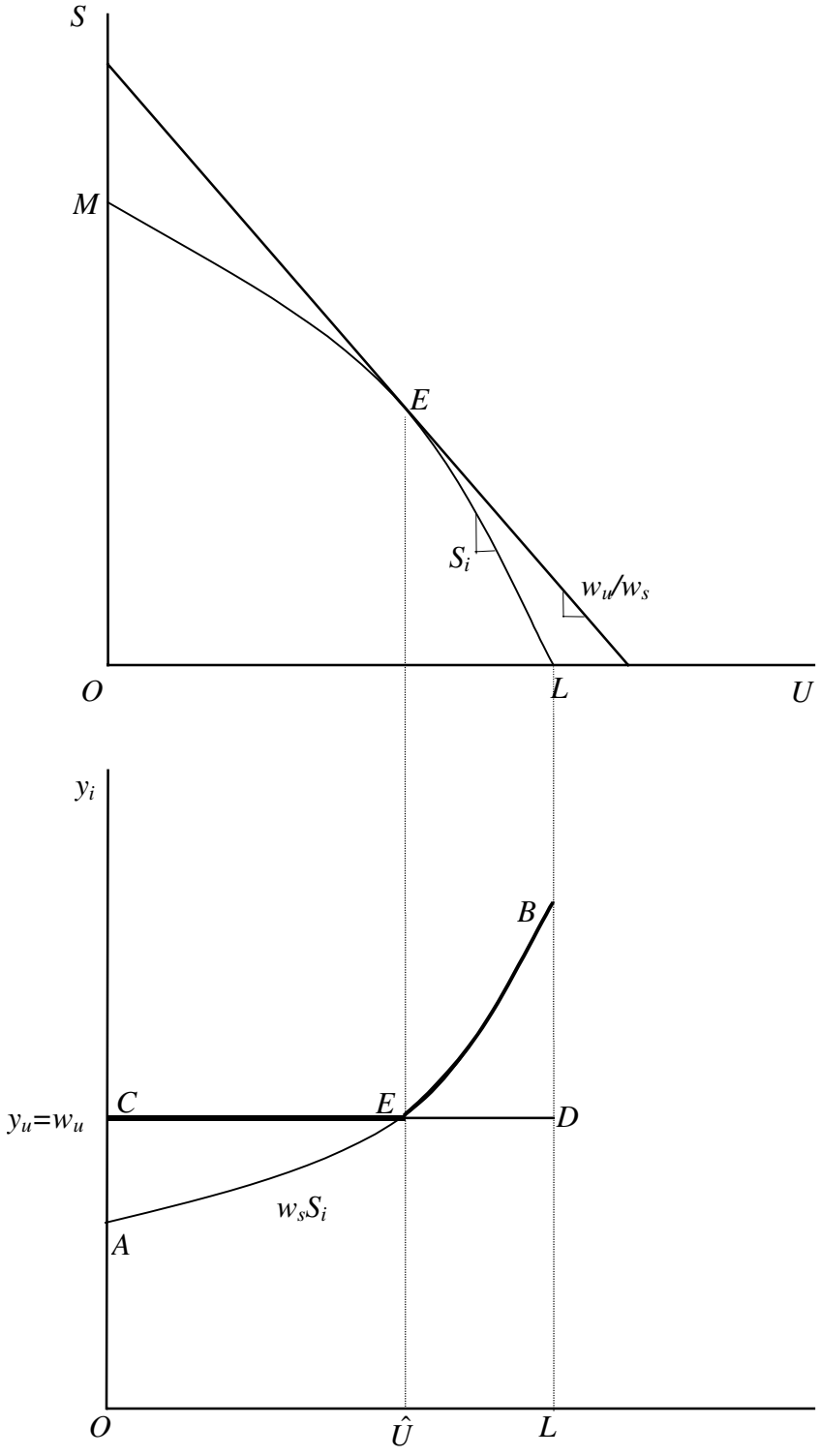


Figure 1

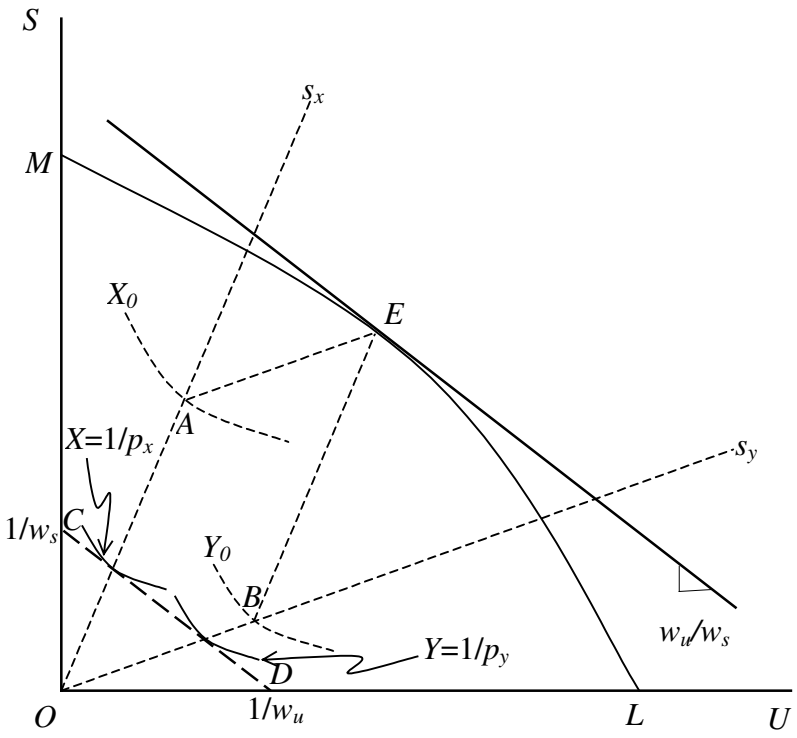


Figure 2

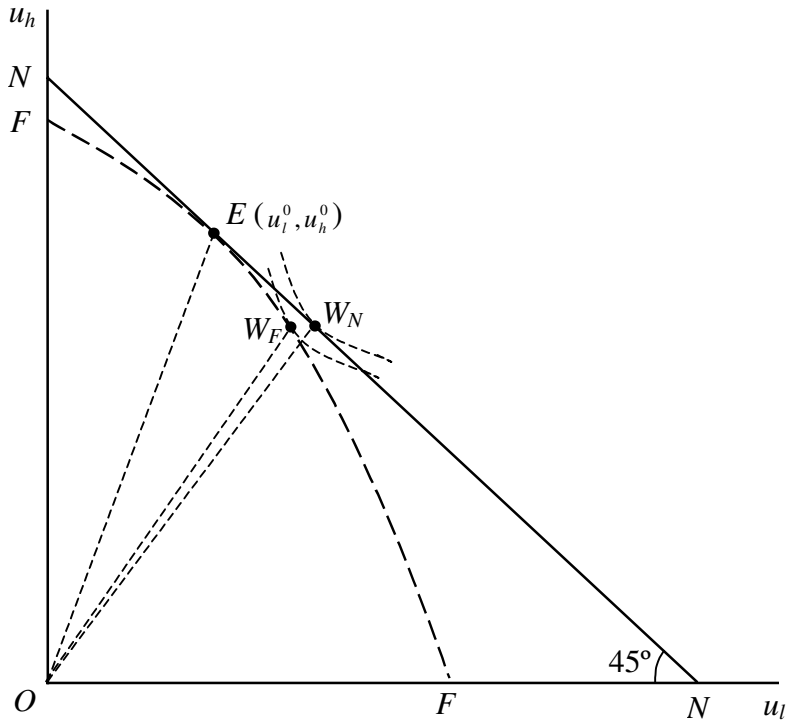


Figure 3

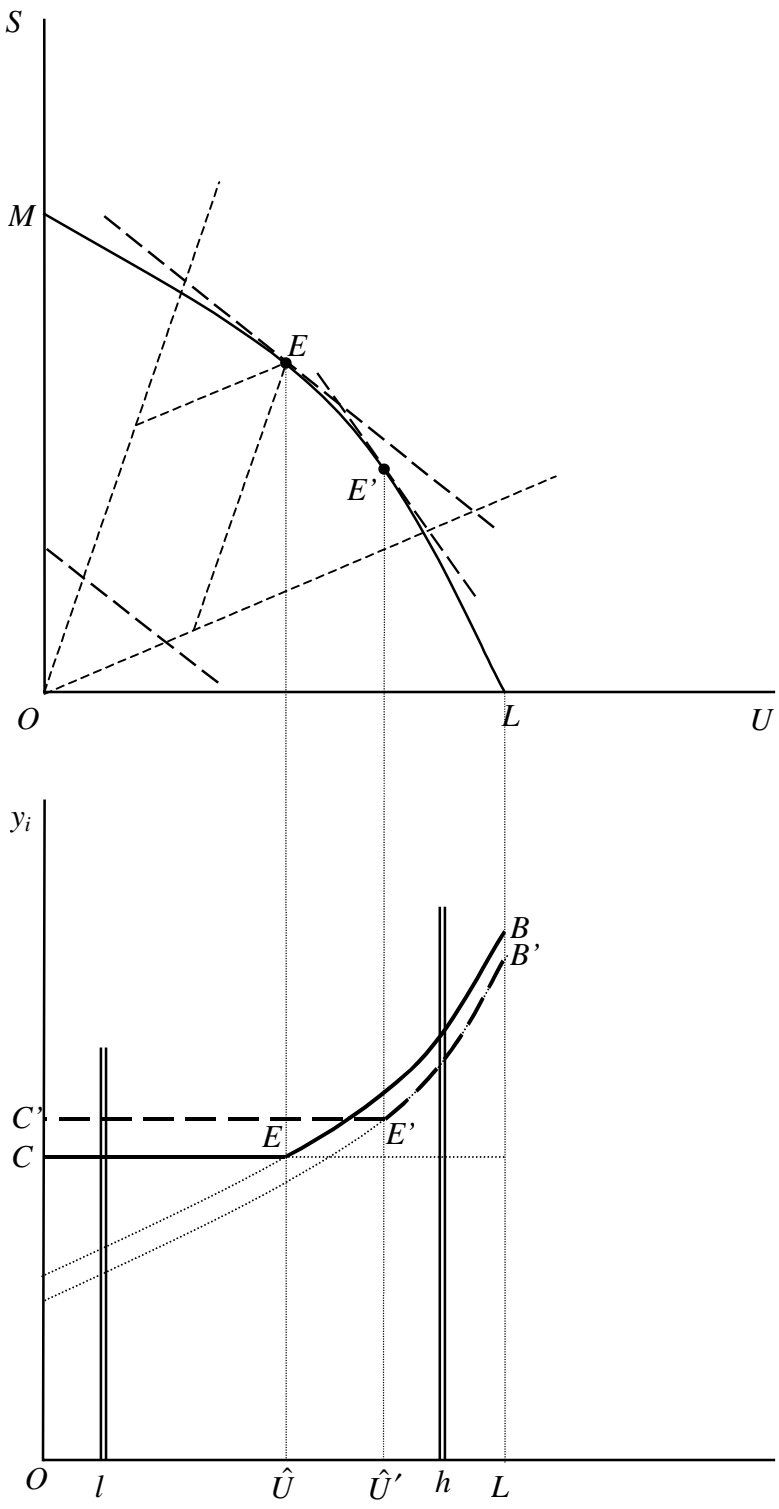


Figure 4

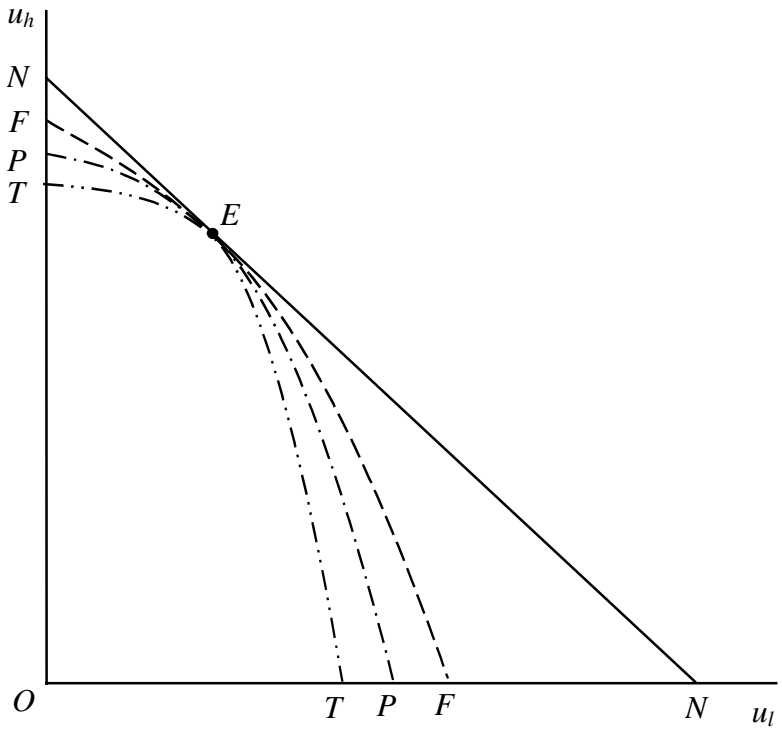


Figure 5

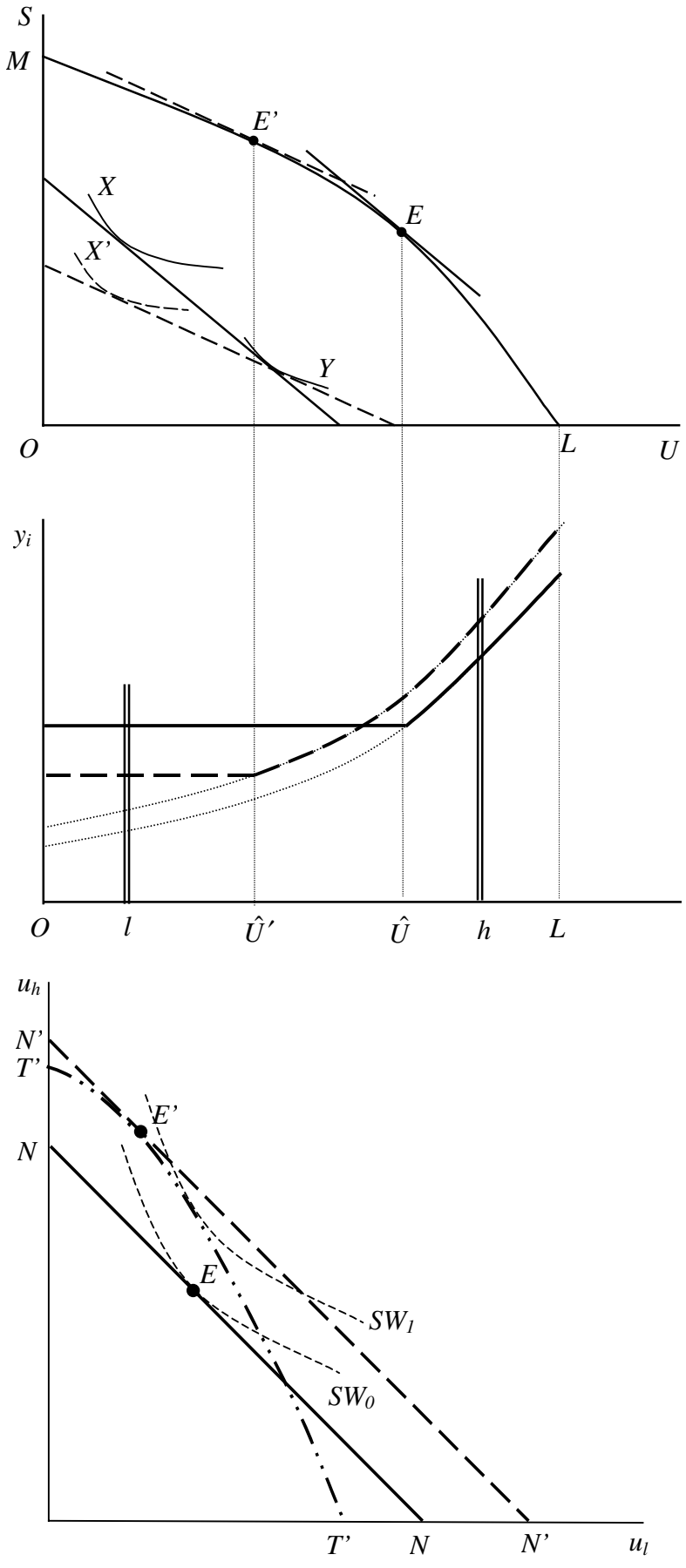


Figure 6

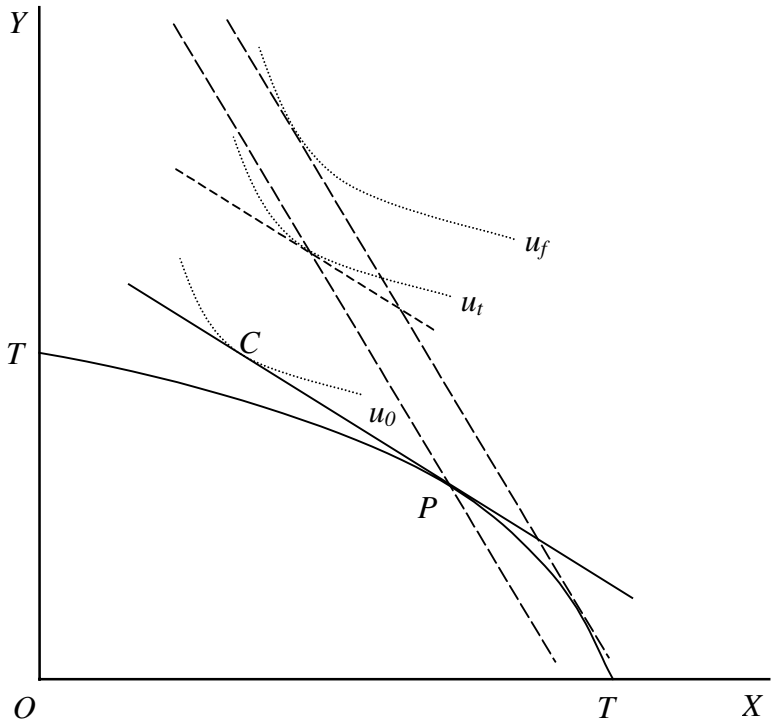


Figure 7