Freer Trade and Wages of the Unskilled:
Is Marx Striking Again?

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FREER TRADE AND WAGES OF THE UNSKILLED: IS MARX STRIKING AGAIN?

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I. INTRODUCTION

Where does the threat to Free Trade come from today? Not from the developments

in the theory of imperfect competition in product markets which defined the scientific

revolution in trade theory in the 1980s: that revolution is now absorbed and its major figures

have returned to the fold of Free Trade as leaders of other such revolutions have done

before them (see Bhagwati, 1992). Instead, there are now, in our judgment, two new

threats, each posing great danger.

The first threat comes from the proliferation of demands for Fair Trade or Level

Playing Fields as preconditions for Free Trade. Where conventionally such demands were

confined to foreign subsidies and predatory dumping, they have now multiplied to a variety

of domestic policies and institutions: among them environmental and labor standards and

technology policy. The presumption today is that diversity among countries in these

domestic policies is harmful to the case for Free Trade, and that Free Trade with such

diversity, instead of being mutually beneficial, will lead to predation at one's expense. It is

evident that the difficulty of achieving harmonization of these several domestic policies (e.g.

even in the EC where political congruence is far greater than among nations trading at

arm's length) and the ease with which such demands can be multiplied to new areas of

diversity by protectionists, make the task of liberalizing trade or maintaining open markets

that much more difficult.[1] The problems that NAFTA has run into with the

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[1]Bhagwati(1991c), in the Harry Johnson Lecture on The World Trading System at Risk, identified this as one of the major problems confronting the world trading system today. Subsequently, Ford Foundation has supported a major Project on the subject of Fairness Claims and Gains from Trade, addressed precisely to the question of the virtues and vices

environmentalists and the labor unions in the US because of different and lower environmental and labor standards in Mexico, the strong opposition to the GATT and to the Uruguay Round's completion around the Dunkel Draft by the environmental NGOs, and the Clinton administration's capture by the Japan-fixated revisionists and the surrender of key administration economists to demands for managed trade because Japan's domestic institutions are "different" and allegedly lead to a lack of level playing fields for market access, are a reminder of the grave importance that the question of Fair Trade has acquired today.

But the other issue that imperils Free Trade as much is the fear that has grown here and in Western Europe that the freeing of trade with the poor countries of the South will hurt the real wages of the unskilled. The Russian proverb goes: fear has big eyes. But the fear in this instance is prompted by the stagnation of the proletarian wages in the US in the 1980s and the substantial increases in European unemployment (which has presumably substituted for the fall in wages) during the same period. There _is_ real cause for worry. At a time when the capacity of the Western states to maintain, leave aside raise, social expenditures to countervail the market-determined declines in real wages has been crippled (as witness the fate of the original Clinton budget proposals), and when the declinist rhetoric of the election campaign reinforced pessimism about the American economy's future, it is

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of diversity (in domestic policies and institutions among trading nations), directed by him and Professor Robert Hudec of Minnesota Law School. Nearly thirty international and other economic theorists, international lawyers and political scientists are writing analytically-oriented papers with policy implications. The findings will be presented at a June 1994 Conference in Washington, D.C., organized by the American Society for International Law.

not surprising that workers have become fearful of real wage stagnation or decline and, with it, of trade which they believe (but without good cause, as we will suggest) is an important, if not the main, cause of this baleful phenomenon. While Marx's prediction of the immiseration of the proletariat was proven wrong by history, will Marx strike again now through the integration of the North with the South in freer trade?[2]

Indeed, it is curious that there has been a reversal of attitudes among the countries of the North and of the South when trade between them is appraised. During the 1950s and 1960s, much of the South regarded trade with the North as a threat, not as an opportunity, was fearful that without protection it could not industrialize, and turned to import substitution while the North was opening to the South (as to itself) through extensive liberalization. Today, starting with the 1980s, there have been fearful voices in the North, dreading trade with the poor South as a recipe for descent into the wages and working conditions of these impoverished nations, whereas many in the South now see trade with the North as an opportunity, not a peril. The contrast between Mexico's and the US Congress' reaction to NAFTA is a stark example of this role reversal.[3]

In this paper, we want to address this fear, prevalent in the North. There is little

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[2]Scholars of Marx are, of course, divided over the question whether, in addition to his prediction of a falling rate of profit, Marx did indeed predict also a falling real wage for the proletariat. But enough numbers of scholars, and much of the public, believe that he did, justifying our allusion above.

[3]We speak in aggregate terms of fears and opinions, fully aware that there are exceptions to the fears of trade in the North (indeed in the US Congress on NAFTA as well) and to the embrace of trade as an opportunity in the South (as among leftist political parties in India). Nonetheless, the central thrust of intellectual and policymaking opinion has indeed changed favorably in much of the South and the fears have grown (though not yet overwhelming policy) in much of the North.

prospect that we can get much farther towards Free Trade if this issue is not addressed clearly and persuasively. We will not present any serious empirical work of our own, confining ourselves instead to clarifying the issues from the viewpoint of international trade theory and relating the arguments to empirical evidence available from others' studies of the issues at hand. Directions for future research should emerge from our analysis.

II. FACTOR PRICE EQUALIZATION (FPE): A THEORETICAL CURIOSUM OR INESCAPABLE DESTINY?

Interestingly, the major theoretical construct which, implicitly or explicitly, has provided the intellectual support, and lent the air of plausibility, to the fears in the North of immiseration of the unskilled from freer trade with the South has been the celebrated Factor Price Equalization (FPE) theorem [and the Stolper-Samuelson (SS) theorem which shows the adverse impact of Free Trade on the factor of production that is scarce in the country relative to abroad in the country's trading partners, i.e. presumably unskilled labor in the North vis-a-vis unskilled labor in the south, relative to other factors of production such as capital].[4]

It is interesting, of course, that when Paul Samuelson wrote his famous pair of articles on the FPE theorem in The Economic Journal in 1948 and 1949, the theorem was

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[4]In the symmetric nxn case, the FPE theorem implies the SS theorem (as stated above), but the SS theorem does not imply the FPE theorem. In principle, it is enough to have the SS theorem to generate the fears that, if one is importing labor-intensive goods from the poor, labor-abundant South, Free Trade will harm the real wage of labor.

considered at first to be implausible[5] and hence possibly wrong[6], and then to be little more than a theoretical _curiosum_. At the same time, when Wassily Leontief (1953) came up with his startling finding that the US was exporting labor-intensive exports, the search for explanations that was set off primarily focused on the reasons why the FPE theorem, building on the Heckscher-Ohlin-Samuelson model, would _not_ hold in the real world because one or more of the sufficiency conditions (such as the absence of factor-intensity reversals) were unrealistic. In short, the approach to the FPE theorem was not that it defined reality; rather it was that the theorem provided the researcher with the necessary clues as to why it did not.

By contrast, economists have generally tended to regard FPE today as an inescapable destiny, with the (unskilled) proletariat facing inevitable immiseration or , at minimum, a heavy drag on the rise of its real wages. Two examples should suffice.

* At a Williamsburg retreat for Congress freshmen after the last election, organized by AEI and Brookings, where one of the authors (Bhagwati) and Lester Thurow were joint panelists, Thurow (an influential Democrat) reminded his audience, in the context of

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[5]Paul Samuelson wrote the second article because the first one met with skepticism and the Economic Journal had to destroy in proof two articles, including one by the celebrated Cambridge economist Pigou, questioning the FPE theorem after Samuelson's first article appeared. Pigou remained skeptical and asked Richard Kahn if Samuelson had consulted a mathematician for his (univalence) proof. Informed that Samuelson was one himself, Pigou reportedly replied: I mean a British mathematician.

[6]Gunnar Myrdal, and others, also found the FPE theorem implausible because they equated the equalization of real wages in the theorem with per capita real income equalization. Obviously, the latter would still be different in the Heckscher-Ohlin-Samuelson world of identical technologies but different capital-labor endowment ratios.

NAFTA, of the economists' FPE theorem and its implications (drawing from it, of course, not protectionist conclusions but the prescription to raise the skills of our labor force).

* Let us quote the celebrated author of FPE, Paul Samuelson himself, in a speech in Italy in 1992, adding the _caveat_ that it is not meant to be a scholarly analysis of the matter at hand:[7]

> First, any top-notch jobs that used to pay well have _not_ disappeared from the face of the globe. They have merely migrated from Europe and North America to Japan, Korea, Taiwan, Singapore, Hong Kong, Malaysia, and elsewhere. (The tennis racket I play with comes from Korea. My partner plays with one made in Taiwan. These words are written on a word processor from Japan. So it goes.)
>
> Have the jobs migrated permanently? Or will they come back? Can good governmental policies bring them back?
>
> Last December when I attended a Nobel Jubilee, I was being driven to the Stockholm airport. Along the road we passed many of Sweden's best factories. They seemed to the tourist's eye to have lost some of their bright glitter and busy-ness. "No wonder", I thought, "that the miracle of the progressive Swedish welfare state has petered out since 1970. Now there is nothing that these factories can do which cannot be done almost as well in the Pacific Basin --- and often with Asian labor at real wage rates only half that prevailing in Sweden. And surely much the same can be said about factories in Turin, Brussels, Birmingham and Chicago. As Madrid and Barcelona begin to enjoy higher living standards, surely they too will begin to encounter effective competition from the developing nations that now master modern routines and have access to up-to-date technical knowledge."
>
> Let me not exaggerate. Of course, the most resourceful Swedish and American operations can survive at some positive level. But all of us cannot be above average. As the billions of people who live in East Asia and Latin America qualify for good, modern jobs, the half billion Europeans and North Americans who used to tower over the rest of the world will find their upward progress in living standards encountering tough resistance.

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[7]Besides, the quote is only an excerpt of a speech that contains several shrewd observations on the relevance of Free Trade at the end of the 20th century. Cf. Paul Samuelson (1992).

But if economists find the FPE argumentation inherently plausible as defining an inevitable pressure on the real wages of the unskilled in today's developed countries, with their presumed freer trade and further freeing of trade with the poor countries, we must not forget two countervailing arguments, one theoretical and one empirical.

The theoretical, which we develop more systematically below, simply resurrects the earlier view, albeit with more sophistication and greater evidence, that FPE's heavy hand is far more frail than currently imagined.

The empirical, at the gut level, is simply that the phenomenon of the drag on real wages of the unskilled appeared in the 1980s when the US (and the EC) were turning to protectionism instead of opening their markets extensively to the developing countries as during the 1950s and 1960s. And the same goes for the inflow of foreign investment into the US, whether direct foreign investment (DFI) or the flip side of our current account deficit, both of which show a net increase in augmentation of US capital from foreign sources in the 1980s, both absolutely and relative to the 1950s and 1960s.[Lipsey(1992)]. Thus, casual empiricism suggests exactly the opposite of what is generally believed! If these facts on trade barriers and foreign investment are confirmed by careful analysis, we have a paradox on our hands from the viewpoint of those who think otherwise: a paradox that could be resolved along the lines developed by us in Section V.

But it is not just the FPE theory's seeming plausibility that has damned foreign trade with the South as a significant cause of the immiseration of the unskilled. The early presumption to that effect was also fed by notable empirical studies by some of today's leading labor economists. In particular, the study most cited, both in academic circles and

in the media (see Passell, 1992), was the 1990 study by Borjas, Freeman and Katz (1992) which concluded that the 1980s had indeed seen trade affect US unskilled wages adversely. While this study seemed to draw on trade-theoretic concepts (arguing that the trade had led to an effective, relative augmentation of unskilled labor supply in the US and thus depressed its real wage), we argue below that it really did not and that their argument was insufficient for the conclusions reached.[8]

In the following therefore we first consider why the FPE theorem, and additionally the SS theorem generally implied by it, are not quite an adequate guide to thinking about the problem at hand. Then, we consider in depth why the Borjas-Freeman-Katz (1992) and Murphy and Welch (1991) studies that alerted us to the adverse impact of trade on US real wages were not well grounded in general-equilibrium theory of the type that underlies the FPE and SS theorems and indeed much of conventional trade theory, thus leaving unproven their case (which implicitly drew on such reasoning).

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[8]In doing so, we will draw primarily on Bhagwati (1991a) (1991b). Recently, Lawrence and Slaughter (1993) have endorsed this critique in their analysis of the problem of trade and wages. Their empirical analysis provides additional evidence, supplementing that in Bhagwati and calling even more compellingly into doubt the Stolper-Samuelson argumentation.

Why FPE and SS Theorems are Inadequate Guides to Reality

If we look at the assumptions that underlie the FPE theorem, it becomes immediately obvious that they are extraordinarily demanding. Few would find the theorem compelling as a guide to thinking about the real world if only they were familiar with these assumptions (without which the iron hand of FPE theorem on real wages of the US unskilled cannot be taken seriously).

Thus, the FPE theorem requires that technology (as also tastes) be identical across trading countries. But then, despite identical knowhow, South and North can _de facto_ be in different technological worlds if the production functions, while identically shared, are characterized by possible factor intensity reversals (such that the same good, at the same goods prices, is intensive in its use of factors differently in South and North) and the relative factor endowments are such that South and North are actually characterized by such reversals. Production functions which can lead to such reversals of factor intensity include CES, where different constant elasticities of factor substitution between sectors are sufficient to create such reversals.[9] Much empirical work, done after the Leontief paradox (alluded to above), underlines the distinct possibility that such reversals, both potential and actual,

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[9]This was first noted by Minhas (1962) in a classic paper, based on his Stanford dissertation. In trade theorists' language, factor intensity reversal possibility means that the capital-labor ratios in the two goods will cross over at some wage-rental ratio. If factor endowments are such that the two trading groups, South and North, are on opposite sides of the cross-over, then the same good will be capital-intensive in South and labor-intensive in North in trade. I.e. technology will _de facto_ be different in equilibrium, even though technological knowhow is identical between North and South.

are not theoretical _curiosa_ at all.[10] When such reversals arise, evidently both South and North can have rising real wages of unskilled labor thanks to free trade.

Differences in technological knowhow itself can lead to a similar outcome, of course. Once again, while the spread of multinationals and the rapid diffusion of technology have narrowed this possibility, this has been so primarily among the developed countries (where convergence of knowhow has been documented by Baumol et.al.) and manifestly knowhow differs across North and South. One can then readily show again the possibility that free trade will increase the real wages of unskilled labor in both South and North.

Yet another way in which technology can differ across trading countries in equilibrium is , of course, when scale effects operate. Scale economies, whether modelled in the old way to allow for perfect competition or in the new way where they lead to imperfect competition, will also enable real wages to rise in both North and South from free trade. And few would deny that scale economies are relevant.

Thus, there are many ways reasons why the presumption that real wages in the North and the South will converge as a result of Free Trade can be considered unrealistic. We will develop here only three, which we consider to be particularly pertinent, and relate them to the SS theorem instead, assuming that the Rich country is importing (unskilled) labor-intensive goods and exporting (human and physical) capital-intensive goods and that the terms of trade improve when trade is freed. In this (2x2) version of the theorem, which is

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[10]See, for instance, the extended review of such work in the early survey of trade theory in Bhagwati (1964).

consonant with the FPE theorem, the real wage of unskilled labor falls.[11]

I. **Scale Economies:** We have already indicated that scale economies can invalidate the SS theorem, causing both factors' real wages to rise. The reason is obvious: the redistributive effect which militates against the real wage of unskilled labor in our instance can be outweighed by the lifting-all-boats effect of scale economies on the marginal products and hence real wages of both factors.

The first theoretical demonstration of this phenomenon was by Arvind Panagariya (1981) who modelled scale economies in the old way where they were external to the firm but internal to the industry, thus retaining our ability to work with models of perfect competition.

Helpman and Krugman (1985) established the same conclusion in the context of scale economies internal to the firm, and hence under imperfect competition. Their analysis was, however, restricted to the special case where the output per firm did not rise with trade so that the added gains from trade were due to variety rather than reduced cost thanks to scale. Brown, Deardorff and Stern (1993) have now produced a more general and illuminating analysis allowing for both these (and other) effects.[12]

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[11]Thus, instead of focusing on whether there is convergence of real wages in South and North, we focus directly on the question on center stage: will cheaper labor-intensive imports from the South under freer trade cause our real wages of the unskilled to fall? In principle, of course, it is theoretically possible for the latter to occur while FPE fails: e.g. the factors that militate against SS, detailed above, may hold in the South and not in the North.

[12]Their Michigan CGE model, applied to Mexico, and incorporating imperfect competition due to scale economies, also predicts a rising real wage for the US from NAFTA.

Diversification: The SS theorem (as also the FPE theorem) depend on the equilibria under autarky and free trade lying in the diversification cone, i.e. trade should not lead to complete specialization. When it does, the unique relationship between goods and factor prices breaks down: while the factor prices are unique at complete specialization on a good, goods prices are manifestly not because rising prices for the good will be compatible with continued specialization on the good.[13]

Equally, while the SS redistributive effect operates as long as trade shifts production towards a good without causing complete specialization, once specialization is achieved it follows that any further rise in that good's (relative) price will mean that both factors will gain from it: the lifting-all-boats effect from this improvement in the terms of trade (implied by the rise in the relative price of the specialized good where, and in terms of which, their reward is fixed at specialization) will ensue. The net effect could be to leave both factors better off under free trade than under autarky.[14]

But this lifting-all-boats effect will help each factor proportionately to how much it consumes of the cheaper imported goods, of course. Hence it is pertinent to observe, that

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[13]We are working here with the 2x2 version of the SS and FPE theorems. For higher dimensionality, see Ethier's (1984) fine review.

[14]We deliberately compare autarky with free trade because, when either of the equilibria being compared has tariff revenues being generated, we must make assumptions about how the revenue is disposed of. Where it is assumed to be redistributed to the factors qua consumers, we must distinguish between the effect of the trade policy in question on real wages and real incomes (inclusive of revenue transfers) as in Bhagwati (1959) and subsequent analyses of the SS theorem. This distinction is clearly important in policy discussions, as noted earlier: the adverse effect on real wages of trade, if any, could be offset by fiscal policy in principle, especially if trade leads to greater income and hence greater tax capabilities.

as the Work of William Cline (1990, pp. 201-206, especially table 8.3) on textiles shows and as casual empiricism suggests for other imported goods such as low-quality footwear, the groups at the bottom of the income distribution (which must include the unskilled) disproportionately spend their incomes on imported goods whose prices are heavily influenced by protection (such as the VERs on footwear and the MFA on textiles). Deardorff and Haveman (1991) have made the complementary observation that the invoking of administered protection has been typically for industries which are <u>not</u> intensive in the incidence of poverty in their workforce, suggesting that protection so given is, in its direct effect, to the (relative) disadvantage of the industries that are and hence of the poor.

Trade and Competition: The lifting-all-boats effect can also arise if trade means more competition and discipline, causing x-efficiency effects which may be captured analytically as Hicks-neutral technical change. If we do this, and if we assume that the effect operates throughout the economy, in both traded sectors, then clearly both factors get their real wages improving from this, countervailing and possibly reversing the fall in the real wage of the SS-impacted factor.

But, even if we were to assume that the production-function-improvement arises differentially more in the import-competing sectors, then we can see immediately from the early work on the general-equilibrium income-elasticities of supply under technical change[15] that, <u>ceteris paribus</u>, the effect will be to raise the real wage of the factor intensively used in these sectors: i.e. of unskilled labor in our instance.

The econometric evidence on this hypothesis is hard to find. However, Jim

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[15]Cf. the beautiful paper by Findlay and Grubert (1959).

Levinsohn's (1993) recent work on the imports-as-competition hypothesis, while not exactly specified in the manner suggested here, is successful in testing that hypothesis with the use of Turkish industry data under near-controlled-experiment conditions. It suggests that our specification of the effects of trade on technical change via competition may also be borne out. As in many areas we discuss in this paper, we must confess that ideas and hypotheses outrun plausible econometric evidence, suggesting more questions than answers for empirical research.

Convergence: To Whose Real Wage?

Even though we do not consider the FPE theorem (and the SS theorem) to be compelling, for the foregoing reasons, suppose that convergence of real wages of the unskilled will occur as a result of trade between poor and rich nations. Will this then mean, as Ross Perot and Pat Choate (1993) have argued in their recent anti-NAFTA tract, that (say) NAFTA "will pit American and Mexican workers in a race to the bottom"? In short, will convergence get US real wages down to the Mexican levels prior to NAFTA, or will it raise the latter up to American levels prior to NAFTA? Where will the real wages settle in each country?

In the context of NAFTA, given the relative sizes of US and Mexico, we would guess that good prices will gravitate towards US prices: so, then, will factor prices. For freer trade in the world economy, between South and North, a gut-answer is harder to give. We need to investigate the question analytically before we can give an informed answer; to our knowledge, no such analysis exists currently. But it is clear that the widespread presumption

that, in case of convergence (which we have argued need to be expected anyway), the real wages in the rich countries will gravitate down towards the levels in the South appears to be based on panic rather than logic.

Early Labor Studies

Should we nonetheless have changed our minds in light of the early labor-economists' studies, especially by Borjas-Freeman-Katz (1992) and by Murphy and Welch (1991), which attributed a definite role to international trade in explaining the unhappy behavior of the real wages of the unskilled in the 1980s?

Excellent as these studies are, our major source of dissatisfaction with them, and hence our inability to admit them as evidence in favor of the thesis they support, is that nowhere do they build on the essential fact that trade should impact on goods prices in the desired direction before anything can be inferred concerning the trade-induced effects on factor rewards.[16] We will consider this by examining the Borjas-Freeman-Katz study which was available by mid-1990, has been much cited by economists and in the media [cf. Passell (1992) in The New York Times)] and has provided intellectual support to those fearful of the effects of trade on real wages of the unskilled.[17]

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[16]This is, of course, at the heart of the FPE and SS theorems and, indeed, is a central part of the general-equilibrium theory of international trade.

[17]Deardorff and Hakura (1993), in their companion paper to ours at the workshop, suggest alternative questions. For instance, if technical change saving on unskilled labor

Borjas, Freeman and Katz essentially compute the unskilled labor embodied in American imports (using the observed coefficients of labor use in domestic import-competing industries) and in American exports, treating the former as (notional) additions to and the latter as subtractions from the stock of such labor. Since imports use more unskilled labor per dollar of gross value than exports, and since the trade deficit means that imports exceed exports, this exercise yields a substantial "addition" to America's unskilled labor, thanks to her trade. Since further, in view of expanding trade deficits during the 80s, this addition to the unskilled labor stock would have been accentuated, it would seem logical to conclude that trade must have contributed pari passu to the observed decline in the real wage of unskilled labor.[18]

This logic is indeed plausible. However, it runs into a problem The only way that real wages can be affected is if, at constant (relative) factor prices, productivity increases or, with productivity change ruled out, through a change in factor prices. Since the burden of the explanation advanced is through exogenous trade changes, the analysis must presume

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happens exogenously, would the real wages of the unskilled fall more or less if the economy was in free trade rather than in autarky? Alternatively, we could ask whether exogenous shifts in the trade offers of foreign nations in trade with us will help or harm unskilled wages: a question which can be fitted more readily into the analysis in the text (since factor prices again would change only insofar as goods prices change due to this exogenous shift in the foreign offer curve).

   We should stress that, in the following critique, we define the question of the impact of trade on wages in the following policy-relevant sense (as stated in our Introduction): is integration into the world economy through the reduction of trade barriers the cause of decline in the real wage of the unskilled? That is also clearly the intent of the labor-economists' studies, although the ones we call "early" studies do not specify a clear question and a model which can analytically deal with it.

[18]Presumably they have in mind then an aggregate production function with diminishing returns. See Section V below, however.

a change in factor prices (unrelated to productivity change or other domestic factors). But such a change in factor prices must reflect a trade-induced change in goods prices. Borjas, Freeman and Katz should have investigated the change in goods prices, establishing that, during the period that real wages of unskilled labor fell, the (relative) price of unskilled-labor-intensive import-competing goods fell too. Else, their argument is incomplete and hence cannot be accepted.

Deardorff and Staiger (1988) have shown that, under certain conditions, there will exist a positive correlation between relative changes in factor prices and relative changes in the factor content of trade. But their model still requires associated changes in goods prices. Our objection is simply that if these changes in goods prices do not conform to what is required, the observed correlation between changes in factor prices and factor content must be dismissed as spurious. As noted below, both the earlier Bhagwati (1991a) and the later Lawrence-Slaughter (1993) studies show that goods prices have changed in the opposite direction to what is required for the SS explanation. Indeed, it is easy to see that the Borjas-Freeman-Katz technique will conclude that real wages have fallen due to trade even when they have not changed. Thus, consider the following simple analytics.

Consider Figure 1 where, for the US economy, the set of production possibilities defined on the (only) two goods M and X is OTT, with TT as the "frontier". The goods price-ratio(PM/PE) being the relative price of the two goods, is given internationally and, at the outset, it is CP. Then, an efficient market economy will produce (at the tangency of the price-line with TT) at P; consumption will be at C; and balanced trade will occur with QC of imports being exchanged for PQ of exports.
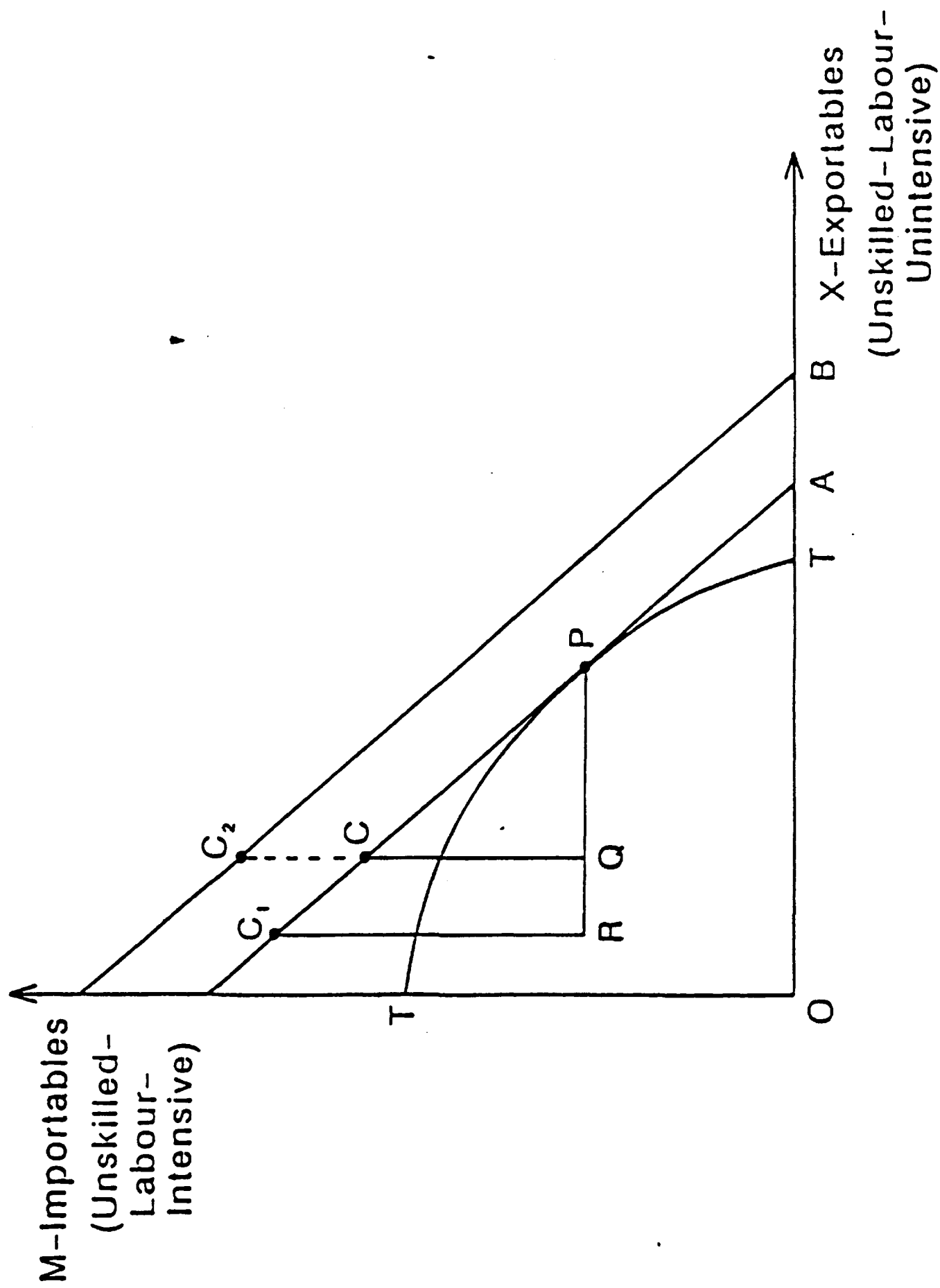
Figure 1

In turn, the goods price-ratio will determine the factor price-ratio, as shown in Figure 2. Assume two factors of production, High School (HS) and College (C) graduates: the former are unskilled and the latter are skilled. The importable industry is HS-intensive in the sense that it uses, at any factor prices W_{HS}/W_C, a higher proportion of HS to C in production than does X, the exportable industry. This is quite intuitive: if the industry M using HS intensively suffers a reduced price, one would expect the (relative) reward of HS to fall. This relationship is, of course, at the heart of the SS theorem.

Now, return to Figure 1. Assume that trade increases at constant goods prices (i.e. without intensifying import competition), due to C shifting to C_1.[19] Imports and exports increase to C1R and PR respectively. The Borjas-Freeman-Katz calculation would show now an increase in the notional addition to the American stock of HS. But nothing would have happened to W_{HS}/W_C and to the real wage of HS since the goods price-ratio has not changed.

Similarly, assume instead that the US now runs a trade deficit so that it can spend AB more than its national income OA (measured in terms of good X). National expenditure then takes place along BC_2 instead of the income-determined national-budget line AC. Let the consumption bundle chosen then be C_2, implying that the deficit is associated with an equivalent increase in imports and leaves exports unchanged. The Borjas-Freeman-Katz calculation will then show again that the endowment of HS has gone up notionally since HS-intensive imports exceed HS-unintensive exports by the amount of

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[19]This could happen due to a shift in tastes, for example.
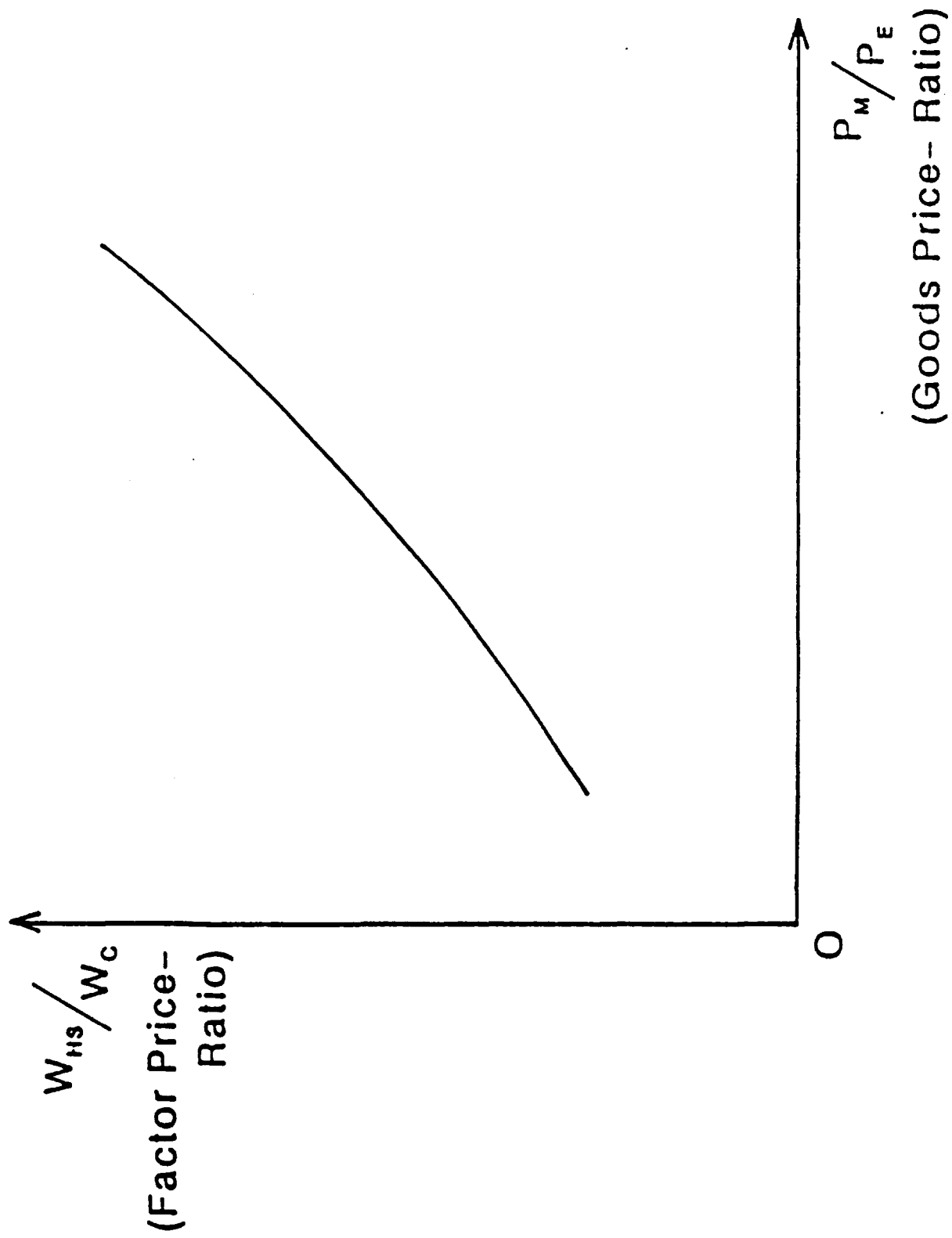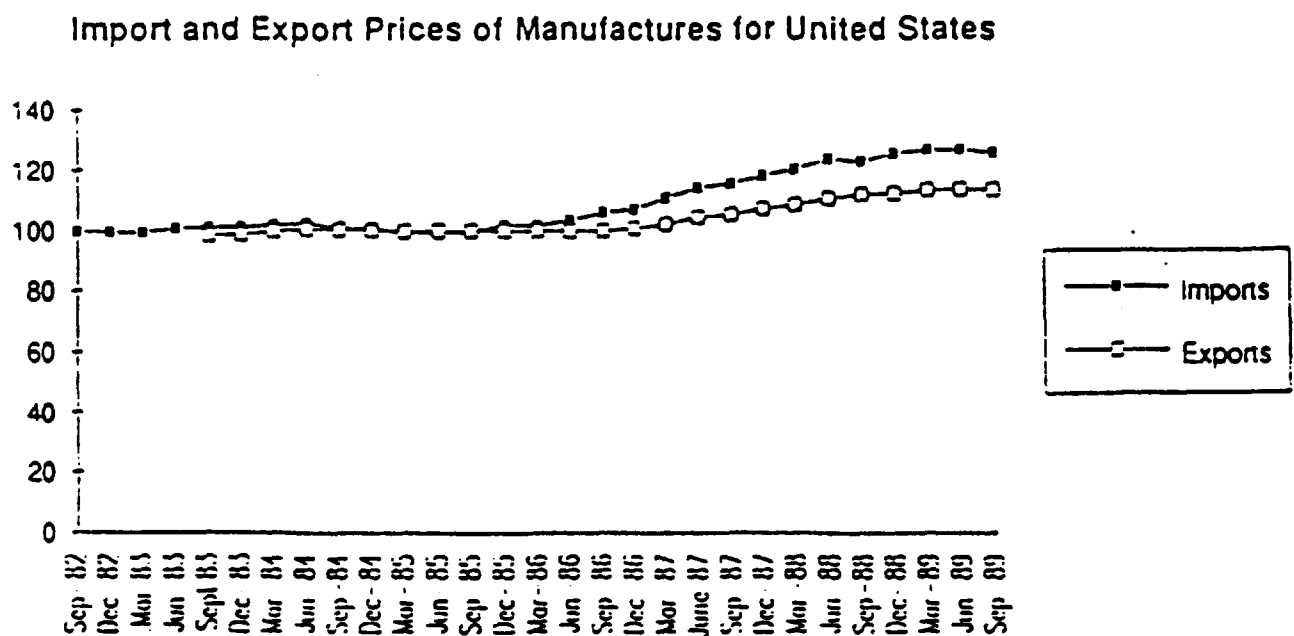
Figure 2

the new deficit.[20] But nothing again would have happened to WHS/WC and to the real wages of HS in the US economy.

Thus, one cannot conclude with Borjas, Freeman and Katz that trade in the 1980s depressed the real wages of the unskilled: their methodology can create invalid inferences to that effect. More important, they do not show that the (domestic) prices of the (unskilled-labor-intensive) import-competing goods fell relatively during the 1980s: without that, they cannot invoke the SS or FPE variety of argumentation to "explain" the decline in unskilled-labor wages. In fact, there does not seem to be any evidence that the (external) terms of trade improved significantly in the 80s for the US, though this may have as much to do with the lack of exogenous improvement as to the increased adoption of voluntary export restraints which generally tend to transfer rents to exporters and thus to offset the improvement in the terms of trade. At minimum, as noted by Bhagwati (1992a), if one looks at the import and export price indices for manufactured goods (which exceed 90% in weight in the overall indices) in Figure 3, the evidence points the other way: import prices _rise_ relative to export prices![21] A subsequent empirical study by Lawrence and Slaughter (1993) has reinforced the Bhagwati critique. The authors find a rise in the relative price of non-production-labor (i.e. skilled labor)-intensive goods as against production-labor (i.e. unskilled labor)-intensive goods at the 2- and 3-digit SIC classification levels. This more disaggregated analysis confirms the impression that our highly aggregated Figure 3 conveys,

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[20]Even if we were to assume homothetic preferences, so that the consumption of both goods increases in the same proportion, exports will fall, imports will rise, and once again the notional endowment of HS will go up.

[21]See Bhagwati(1991a)(1991b).

Import and Export Prices of Manufactures for United States

Figure 3

since both show that the relative prices have moved in the "wrong" direction as far as the FPE-SS explanation is concerned.

A further critical piece of evidence presented by Lawrence and Slaughter is that most sectors (again at the 2- and 3-digit levels) have become more intensive in their use of non-production labor as compared to production labor in the 1980s, a fact which is at variance with the FPE-SS approach, since a key implication of the FPE-SS hypothesis is that firms in all sectors will economize on the more expensive factor (skilled labor) and hence become more intensive in their use of unskilled labor.

This second piece of evidence, in conjunction with the first, effectively kills the FPE-SS hypothesis as a tenable explanation of the phenomenon of the rising wage differential and falling wages of the unskilled. The Borjas-Freeman-Katz conclusion that trade has adversely affected wages may well be right; but their analysis does not show this, and we can be quite confident that the FPE-SS explanation has been a red herring in the story.[22]

Technical Change: A Trade-Independent Explanation

On the other hand, both casual empiricism and the work of Mincer (1991), Davis and Haltiwanger (1991) and Bound and Johnson (1992), suggest strongly that skills-based technical change is the key culprit in the 1980s story and in the unfolding scenario for the

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[22]It is worth noting that several partial-equilibrium studies of the effect of trade on wages, which unlike Borjas-Freeman-Katz do use prices rather than quantities, most notably Grossman (1986, 1987) and Revenga (1992), also fail to find a significant effect of trade on wages in most of the industries studied.
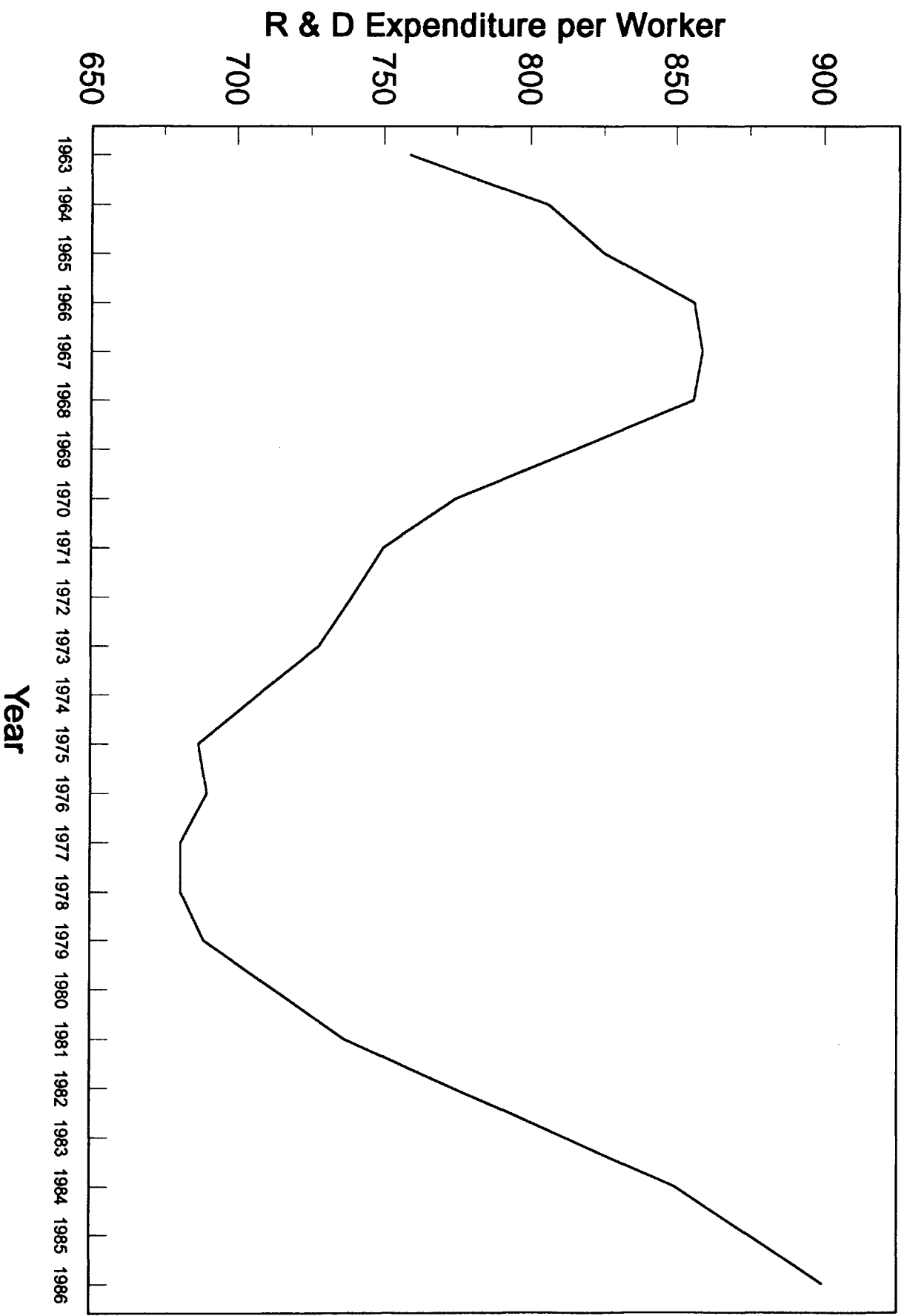
1990s and beyond.[23]

These labor economists cite the prototypical example of the computer revolution, a whole spectrum of technological innovations which inherently require their users to have skills which a College graduate should find it easier to acquire relative to a high school graduate today. To put it another way, a computer with a single skilled operator can replace a half-dozen unskilled typists: a phenomenon that we at this Workshop see in our own Departmental offices and in the publishing houses that bring out our books. In fact, the work of Mincer (1991) is extremely suggestive in this regard. Looking at R& D expenditures per worker (Figure 4a) and deploying a simple model, he is able to predict remarkably well (figure 4b) the College graduates' wage premia over the wages of High School graduates.

If, as in Section V, we consider an aggregate production function approach, we can see readily that unskilled-labor-saving technical change (in a two-factor framework with skilled and unskilled labor) will reduce the wage differential and can depress the real wage of unskilled labor (if the factor-substitution effect of the technical change is outweighed by the overall-productivity effect).[24]

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[23]The decline of unions, as discussed by Freeman (1991), the erosion of the real value of the minimum wage, as discussed in Blackburn, Bloom, and Freeman (1990) and changes in pay norms, as discussed by Mitchell (1989) are factors that, if taken into account, would seem to mean that the pressure on real wages has been institutionally allowed to translate into actual decline in them, whereas in the different, more "sheltering" type of EC institutional setting, this pressure presumably causes relatively less decline in wages and more increase in unemployment. For a recent comprehensive survey of alternative explanations, see Levy and Murnane (1992).

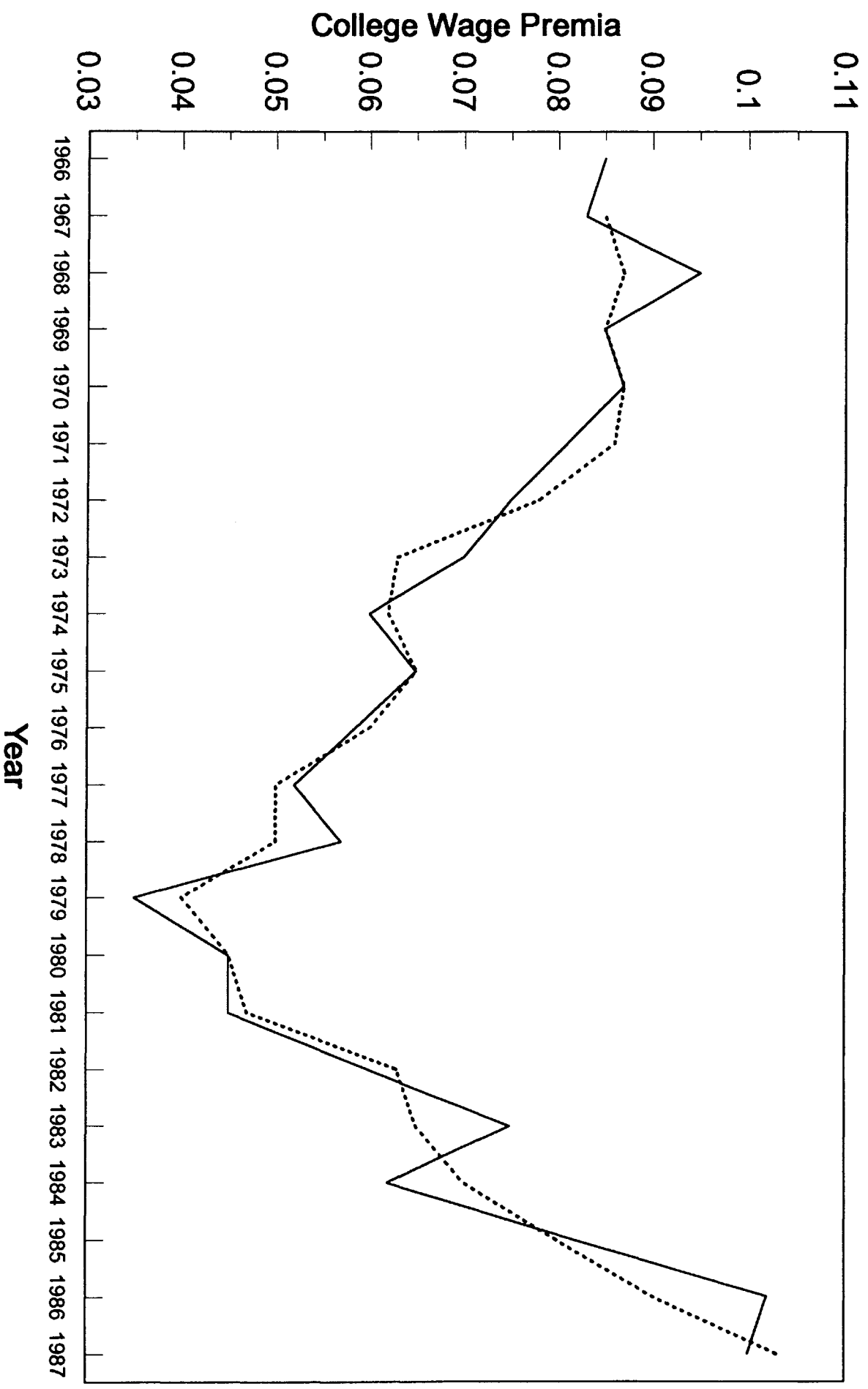[24]Diagrammatically, the latter relates to the upward rescaling of the isoquants whereas the former concerns their being twisted so that, at any factor price-ratio, the ratio of skilled

Figure 4a

R & D Expenditure per Worker

Year

Figure 4b

College Wage Premia

Year

Source: Jacob Mincer, Studies in Human Capital: Collected Essays
(Vol.1), Edward Elgar: Hants, 1993

The analysis gets more complex when we disaggregate the economy, as in the trade-theoretic models, into two sectors with different factor intensities. The effect on the wage differential and the real wage of the unskilled will depend then on the overall rate of change, how biased it is against unskilled labor and its relative incidence in the two sectors.

Thus, if the change is uniformly spread in both sectors, and the economy remains diversified in the new equilibrium at the old goods and factor price-ratios, the result will be to maintain the wage differential: the factor price-ratio corresponding to the goods price-ratio will not change after the uniform technical change, whether Hicks-neutral or biased.[25] While the real wage of unskilled labor will surely rise with Hicks-neutral technical change, it may not however if the technical change is (pro-) skills-biased (and the bias effect outweighs the overall-productivity effect).

We would then argue that the disaggregated-sectors model suggests that the happy experience of the 1950s and 1960s may have been due to technical change that was substantial, was more uniformly spread among exportables and importables, and was more neutral than biased whereas, in the 1980s, it has probably been slower (perhaps due to slowed investment and hence slower absorption of new technology), has been more focused on skills-intensive exportables and has been also more skills-biased. Taken in conjunction, these three factors would tend to widen the wage differential while putting downward

to unskilled labor chosen rises as is consistent with the evidence (see Section II).

[25]The goods price-ratio can itself change if the country's terms of trade are variable: demand conditions then would have to be considered as well to determine the new equilibrium goods and hence, factor price ratios.

pressure simultaneously on the real wages of the unskilled.[26] Of course, these ideas need to be tested empirically.

But the preceding analysis takes technical change to be exogenous to trade. Larry Mishel has rightly raised the question: if trade competition induces technical change, could we not then relate the effects on real wages back again to trade? Our judgement, however, is that this would work against, not in favor of, those who think that trade is adversely affecting the real wages of the unskilled. For, if we proceed along the assumption that trade competition induces neutral technical change in the import-competing unskilled-labor-intensive industries, this should raise, not lower, the real wage of the unskilled. Again, if we assume instead that trade exerts a little downward pressure on the real wages of the unskilled and that the search for technical innovation is biased in favor of economizing the use of the factors of production whose wages are rising instead, the effect again will be to reinforce the conclusion that trade-induced technical change helps, not hurts, the real wages of the unskilled.[27]

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[26]These ideas were explored in the context of a general-equilibrium model of 2 tradeable goods and 2 factors plus a nontrades "services" sector, using the Komiya model, in Bhagwati (1991a)(1991b).

[27]See the discussion of the Kennedy-Weizsacker theory of induced technical change in Samuelson (1965).

III. KALEIDOSCOPIC COMPARATIVE ADVANTAGE:

FOOTLOOSE INDUSTRIES AND LABOR TURNOVER

The technical-change-based explanation, of course, takes us away from trade as a cause of the phenomenon of depressed real wages of the unskilled. Indeed, it was the difficulty we had with the FPE-cum-SS-theoretic approach to this conundrum that helped focus on this alternative explanation.

But if the obvious FPE-SS type trade explanation is not compelling, all is not lost. It is possible to develop an alternative trade-based explanation (Bhagwati, 1991a; 1991b) which departs altogether from the FPE-SS approach. We doubt that this alternative explanation can carry the weight that the technical-change (and technological) explanation probably does; but it could well be a contributory factor of some, perhaps also growing, importance.

The new hypothesis comes from the observation that the world economy is now increasingly integrated and that the convergence of technology among the OECD countries and the spread of global multinational corporations around the world have brought many modern industries within the grasp of countries. Many more industries therefore are "footloose" than before: small shifts in costs can cause comparative advantage to shift suddenly from one country to another.[28] Thus, we suspect that comparative advantage has, over time, become kaleidoscopic: one country may have comparative advantage in X and another in Y today, and tomorrow it may suddenly go the other way. This volatility in a

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[28]This is also the view implicit in the imperfect-competition worlds of symmetric firms although the analysis often goes in the direction of arguing how footloose industries land in one rather than another country as scale economies are exploited.

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comparative advantage will have two serious consequences.

The first is that there will be far greater sensitivity to notions of Fair Trade. Firms will be looking over one another's shoulders to see if that lethal epsilon advantage enjoyed by the other firm is because of some (unfair) domestic institution or policy on its home turf. Demands for "level playing fields" will multiply. They have, as we have already noted in Section I.

The second is that the volatility in comparative advantage will generally imply, *ceteris paribus*, more labor turnover. Thus the frictional or "natural" unemployment should rise, as it appears to have in the 1980s. But the added turnover, in turn, could mean that the growth curve of earnings may become flatter because a more mobile labor force could be accumulating less skills: as put in Bhagwati (1991a) (1991b), a *rolling stone gathers no moss and a moving worker gathers no skills*. As it happens, a forthcoming study by the OECD, reported on by *The Economist* (1993) in the Economics Focus column entitled "Musical Chairs", confirms this conjecture:

> So the OECD concludes that there is a clear link between employment stability and skill training. But which causes which? Most likely the two are mutually reinforcing: too high a rate of labor turnover discourages investment in work-place skills; and workers who get no training are likely to show less commitment to their current employer and so may change jobs more often. A vicious circle develops as higher labor turnover produces a less trained and hence a less loyal workforce.

Then, we get a trade-dependent explanation as to why increased labor turnover reduces, *ceteris paribus*, the real wage of unskilled labor. But what about the wage *differential* between unskilled and skilled labor? Our argument seems to apply symmetrically

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to all labor. Therefore to produce an explanation of increased wage differential as well, we would have to introduce some source of asymmetry which (relatively) shields the skilled from the "rolling-stone-gathers-no-moss" effect.

Such an asymmetry may accrue from the greater transferability of work-place-acquired skills by the skilled: e.g. an accountant handling IBM can shift his acquired knowhow readily to a new job at Caterpillar or Chrysler, whereas working better on the assembly line for autos at Ford may not transfer to working at a blast furnace in Pittsburgh or for that matter to flipping hamburgers at MacDonalds.

Again, the fallow "search"-period spells between jobs are probably used by College graduates (the skilled) to retool and acquire added and more suitable skills—having learnt once, you can and will learn again—whereas High School graduates and dropouts (the unskilled) are less likely to do so, having not learnt in the first place. We can only offer these ideas as speculation; empirical knowledge is hard to come by on this particular hypothesis. Mincer and Higuchi (1988) is one study which attempts to link labor turnover and the wage structure. While not directly addressing the hypothesis we have advanced, this study could provide the basis for its empirical investigation. Furthermore, Steve Davis has suggested to us that one useful empirical construct which could be brought to bear on the hypothesis is the tenure distribution in various disaggregated sectors of the economy. If sectors which were exposed to the"rolling-stone-gathers-no-moss" effect of the type discussed here also exhibited leftward shifts in the tenure distributions, especially of unskilled workers, then this would be consistent with the hypothesis and might therefore constitute partial corroboration of it.

"A Rolling Stone Gathers No Moss" Model

We can readily sketch the essential structure of the foregoing argument in the 2x2 framework.[29] Let the economy be small, i.e. the terms of trade are given and invariant to its trade. Let two goods, X and Y, be produced according to standard neoclassical production functions with the use of two factors, skilled labor, H, and unskilled labor, L, which throughout are in fixed supply. Suppose as well that the terms of trade are such that this economy exports good X and that the economy remains within the (Chipman-McKenzie) diversification cone.

To capture the notion of volatility in the terms of trade, suppose a two-period structure in which the terms of trade of the skilled-labor-intensive good initially improve but then return to their original level, i.e. suppose that the initial relative price of good X in terms of good Y is p, then it becomes p', p'>p, and finally returns to p.[30]

As regards the accumulation of human capital, this for simplicity is assumed to take place between periods, i.e. between the period in which terms of trade p' and p prevail. Suppose that both types of labor, skilled and unskilled, acquire human capital through learning-by-doing, which is modelled as an augmentation of the effective stocks of the two

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[29]Cf. Dehejia (1992b). The model is set up to generate, not merely the adverse effect on the real wage of the unskilled, but also a widening differential between the wages of the unskilled and the skilled. While we use the words "skilled" and "unskilled", Alan Deardorff has correctly noted that, since both types of labor can acquire skills but only differentially as assumed, it would be better to think of College and High School graduates, as earlier in this paper.

[30]In more general form, we can envisage a stochastic process for the terms of trade in which there are stationary disturbances around some trend growth rate (which may be zero, in which case the terms of trade would be pure white noise). Cf. Dehejia (1992b).

types of labor, H and L. Crucially, skilled labor, H, augments at the same rate in either sector, X or Y, and this augmentation is assumed to be unaffected by a shift of skilled labor between sectors.
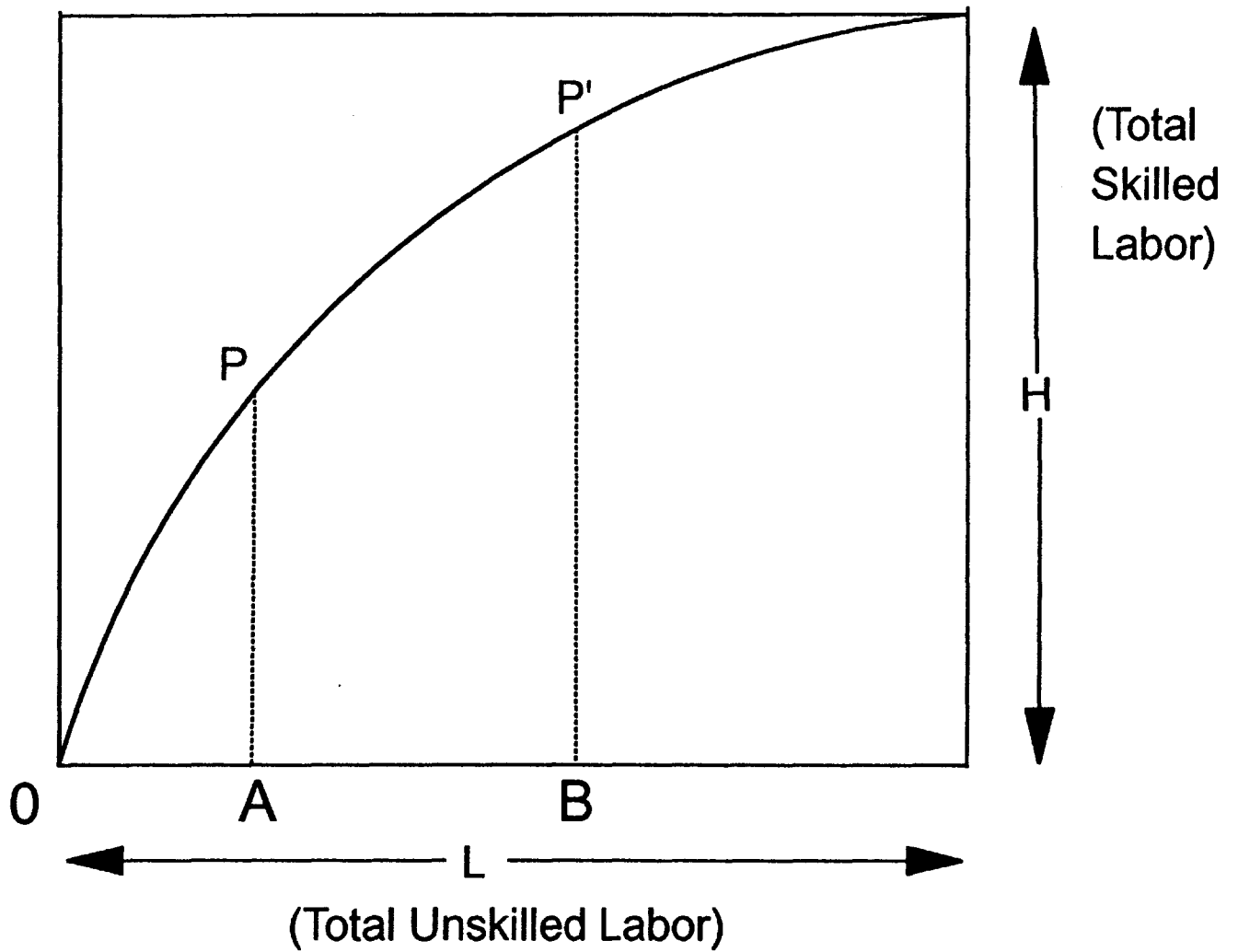
Therefore, suppose that H augments at the end of the two periods to δH, $\delta > 1$, where δ is the gross rate of growth of the effective stock of H. By contrast, unskilled labor, L, augments only if it remains in the same sector but is assumed not to augment if it moves between sectors. Therefore, total augmentation of the effective stock of unskilled labor, L, is δ(L-ΔL)+ΔL, where ΔL is the amount of unskilled labor that moves between sectors X and Y in response to the initial terms of trade shift from p to p'.

This is illustrated in Figure 5 with the aid of the family Edgeworth-Bowley box diagram. Let OPP'O' be the contract curve. At the initial terms of trade, the economy is at point P on OPP'O'. The change in the terms of trade from p to p' induces a shift in the equilibrium to a new point,P', along OPP'O'. Drop vertical lines from P and P' to the horizontal axis and label the corresponding points A and B, respectively. Then ΔL is equal to the distance AB along the horizontal axis.

In the final equilibrium, when the terms of trade have returned to p, there is no change in the real wage per effective unit of skilled or unskilled labor. However, the effective stocks per worker of the two factors now differ due to differential augmentation induced by the fluctuation of p to p' before its return to p. The effective stock of skilled labor is now δH whereas the effective stock of unskilled labor is now δ (L-ΔL)+ΔL.[31] This

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[31]This model assumes that real wages will adjust immediately and fully to terms of trade changes. But in reality there are often lags. Besides, if one thinks of models of labor hiring and firing, their microeconomics suggests that, if terms of trade are expected to be volatile,

Figure 5

differential augmentation induces a Rybczynski (1955)-type reallocation of resources from the unskilled labor-intensive sector, Y, to the skilled labor-intensive sector X, with however no effect on the real wage per effective worker of either type, since diversification is assumed.

However, although real wages per effective worker are unchanged, the observed real wages per worker now differ. Recall that H and L represent total effective stocks of skilled and unskilled labor, respectively. Normalizing the populations of skilled and unskilled labor to unity for simplicity, H and L may thus be interpreted as the total stock of skilled labor per skilled laborer and the total stock of unskilled labor per unskilled laborer, respectively. Initially, the real wage of a skilled worker is $W_H H$ and that of an unskilled worker $W_H L$, where W_H and W_L are the respective real wages per effective worker.

At the end, real wages per effective worker, W_H and W_L, are unchanged, but real wages per worker have increased to $W_H \delta H$ and $[W_L \delta(L-\Delta L) + \Delta L]$ respectively.

Thus, while real wages per worker of both skilled and unskilled labor have increased due to on-the-job human capital accumulation, skilled labor becomes relatively better off (as compared to the initial situation) than unskilled labor. The real income of unskilled labor will thus be lower as compared to a situation with no terms of trade volatility in this model, due not to the SS effect on real wages (as discussed in Section II), but due to differential human capital accumulation which leaves unskilled labor relatively poorly endowed with human capital at the end, unlike skilled labor which by the model's

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firms will not adjust their employment to every change in the price of their output. Models that incorporate these ideas should nonetheless show that increased volatility of goods prices will be associated with increased volatility of factor prices.

assumption is impervious to the volatility in the terms of trade. It is evident that the real wage per unskilled laborer will be lower than if the rolling-stone-gather-no-moss effect were absent.

A multi-period version of this model has been analyzed by Dehejia (1992b), combining the analytics of the 2x2 model of trade theory with the twin new assumptions of the rolling-stone-gathers-no-moss hypothesis on skills acquisition and that the terms of trade of this small country evolve according to a pure white noise stochastic process, so that the terms of trade have no trend but fluctuate noisily around some (unspecified) long-run level due to (unspecified) worldwide technology or taste shocks.

The simulation runs of the wage differentials (per worker)[32] which the model then generates, as per our hypothesis due to the terms of trade fluctuations and the induced divergence of skills acquisition between the "skilled" and "unskilled" workers, do indeed show a rising time trend. Simulation runs by Dehejia on different values of the terms of trade noise parameter bear out the intuitive notion that, the higher this parameter and hence the greater the volatility in the terms of trade, the larger also is the wage-differential effect that is generated.[33]

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[32]The wages per effective worker (i.e. for given skill) remain constant in expected value terms by model specification of stationary white noise disturbances to the terms of trade. The trend change in a worker's real wage can come only from the acquisition of more skills in this model.

[33]For details, see Dehejia (1992b). The simulations are necessary because an analytical solution to the model is not possible due to the inherent nonlinearity in the key equation defining the time path of effective skilled-to-unskilled labor in the model.

Hysteresis: An Alternative Link Between Kaleidoscopic

Comparative Advantage and Wages

The modelling hitherto simply embodied, in the otherwise-static framework, the "rolling-stone-gathers-no-moss" idea. There were no "supply-side" effects in the sense that each of the two types of labor followed its own skills-acquisition trajectory as influenced critically by the kaleidoscopic-comparative-advantage-implied volatility in the terms of trade.

But, of course, the two groups are not pre-determined and nonintersecting over time. The "unskilled" (High School graduates and also dropouts) can, and do, become "skilled" (College graduates and more) if the rewards are enticing. In the foregoing model, if the unskilled could costlessly become skilled, the relative supply of skilled labor would be infinitely elastic at a zero differential; that is, any wage differential induced by terms of trade shifts would instantaneously disappear, which obviously is unrealistic.

But, to allow for costly fixed investment to enter the "skilled" group, we can realistically explore further the wage-differential and wage effect of volatility in the terms of trade. To do this, we must obviously introduce hysteresis into the analysis.[34] We now indicate how this might be done.

Thus, take again as our starting point increased volatility in the terms of trade and introduce Dixit-style hysteresis in the following simple way. Thus, suppose that unskilled

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[34]For a recent survey and synthesis of results in the investment and hysteresis literature, see Dixit (1992), on which we draw below.

workers can transform themselves into skilled workers by incurring an irreversible fixed cost K.[35] Suppose next that the relative reward to being skilled versus being unskilled fluctuates stochastically (due to fluctuations in the terms of trade) according to a geometric Brownian motion process (the continuous time analogue of the random walk in discrete time). Under the critical assumption of a fixed cost of investment in an environment characterized by ongoing uncertainty, there will then exist a band of inaction, or a hysteresis region, in which the wage differential (the excess return to being skilled versus being unskilled) will be positive and in which there will be no supply response by unskilled workers to eliminate this differential.

It is important to note that hysteresis *per se* arises due to the existence of linear adjustment technology (i.e. a fixed cost of retraining per worker) as opposed to neoclassical convex adjustment technology. Even in the absence of uncertainty, there will exist an inaction region which no retraining will take place. In a world without uncertainty, retraining will occur at the Marshallian investment trigger M, where M is defined by:

$$M = \rho K,$$

where ρ is individuals' pure rate of time preference (which we can assume equals the interest rate). By assumption of the model, sufficient retraining will occur when the trigger

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[35]Formally, we must assume for analytical tractability in this simple model that the skilled can costlessly become unskilled. For professors who see how rapidly most students forget a subject once the examinations are over, this may well be the most realistic assumption in this paper!

is reached to ensure that the wage differential will never exceed ρK. Thus, for example, if it costs $100,000 for an unskilled worker to "upskill", so that $K = 100,000$, and if the interest rate is equal to 5 per cent, so that $\rho = 0.05$, then the maximum sustainable wage differential, which is equal to the Marshallian investment trigger M, is given by $(.05 \times 100,000)$ or $5,000. I.e. the skilled job must pay $5,000 more than the unskilled job to elicit a supply response and further (in this simple model) this is also the maximum differential consistent with labor market equilibrium.[36]

The effect of uncertainty is essentially to <u>widen</u> the hysteresis region by increasing the investment trigger from M, given above, to H, where:

$$H = \rho' K,$$

where the interest rate ρ must be replaced by an adjusted interest rate ρ', where $\rho' > \rho$. The precise definition of ρ' is furnished in Dixit (1992). It suffices for our purposes here to notice that the existence of uncertainty can make ρ' exceed ρ by an amount which is not trivial. Thus, sticking to the example in which $\rho = 0.05$, if we assume that σ, the coefficient of variation of the Brownian motion, is 0.2 (i.e. the standard deviation is 20 per cent of the mean of the distribution) --- a magnitude of uncertainty by no means very large --- then ρ' is shown by Dixit to equal 0.093, i.e. 9.3 per cent , giving a maximum wage differential of $9,300.

Intuitively, in an inherently uncertain economic environment in which investment is

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[36]For details see Dixit (1992).

costly and irreversible (in the sense that an unskilled worker once she spends K to upskill can never recover the investment), an unskilled worker will be reluctant to upskill because there is always the danger that the skill differential will drop after the costly investment is made. Of course, even in the presence of uncertainty, given a big enough wage differential, an unskilled worker will still be willing to upskill.

The existence of uncertainty essentially serves to attach a risk premium to the investment decision to upskill which will raise the "hurdle rate" on the investment. Furthermore, it is intuitively appealing (and is proved rigorously by Dixit) that this risk premium increases with the magnitude of uncertainty. Thus, in the numerical example above, if ρ remains at 5 per cent but σ is now set to 0.4, then ρ' jumps to 0.166, or 16.6 per cent - a very high hurdle rate indeed - which raises the maximum skill differential that the labor market will sustain to \$16,600.

The connection between the Dixit-type hysteresis model and the assumption of terms of trade volatility made in this section thus becomes apparent. If indeed our assumption that the 1980s have witnessed increased volatility in the terms of trade and hence an increased induced volatility in the (relative-demand-driven-) wage differential is correct, then the model suggests that in this increasingly uncertain economic environment, unskilled workers become increasingly reluctant to upskill and hence that wage differentials that are larger than the historical norm will likely be observed.
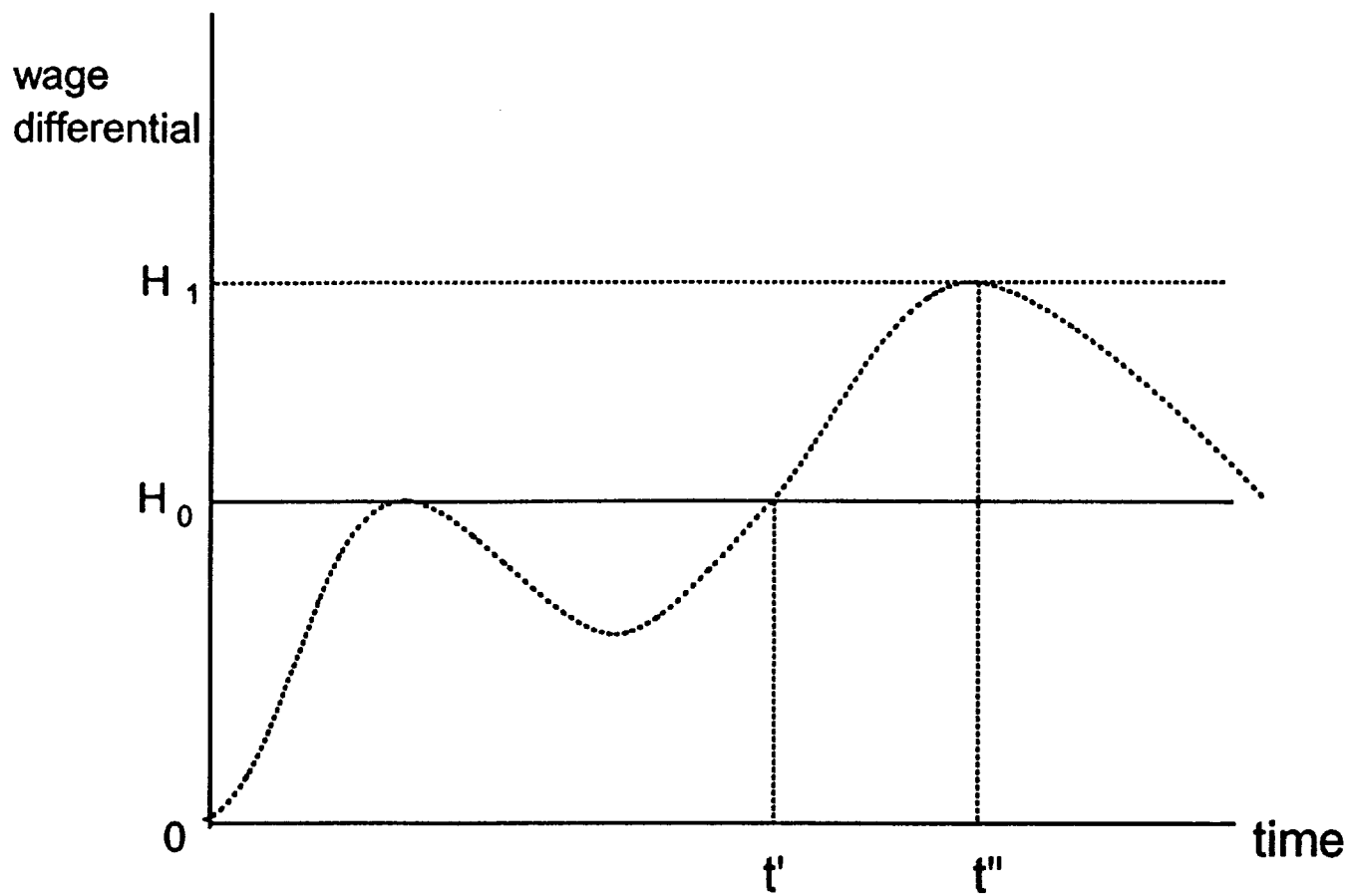
Thus consider for illustration Figure 6. Let H_0 be the investment trigger corresponding to an initial low level of uncertainty before the 1980s (σ_0) and let $H_1 > H_o$ be the new, higher investment trigger corresponding to a new higher level of uncertainty in the 1980s (σ_1).

Then, the wage differential, which fluctuates stochastically in the smaller inaction band before the 1980s, breaks through its historical ceiling at date t', and rises above Ho, since now the new trigger level H_1 is applicable. It is not until date t" that the wage differential reaches its new ceiling, given by H_1, after which it cannot perforce rise any more. Thus, if t' is say 1980, and t" is some indeterminate date in the future, then the time interval [t',t"] would be characterized by rising wage differential. This would seem puzzling to those accustomed to H_0 as the old maximum wage differential (and which would be presumably thought of as the historical norm if H_0 had persisted for a long enough time) but makes sense once it is understood that the level of uncertainty has increased.

The strength of this model, simple as it is, is that not only does it build on the assumption of kaleidoscopic comparative advantage and hence volatility of terms of trade as was the "rolling-stone-gathers-no-moss" model above, but further it is ground firmly in individual choice-theoretic terms and can help to explain the puzzle (first noted, it seems, by Jacob Mincer) that the 1980s and early 1990s have witnessed wage differentials well above historical norms and that relative supply responses have been muted compared to what they were during previous episodes of relatively high wage differentials.

An important corollary follows from this model. Since the action points are individually optimal in this model and since, in the absence of any distortions in the system, those points are therefore also the social action points, it follows that the bigger wage differentials observed in periods characterized by higher uncertainty are also socially optimal, provided that such increased uncertainty is treated as truly exogenous and produced by kaleidoscopic comparative advantage in a highly-globalised economy today.

Figure 6

In other words, in an inherently more uncertain environment, unskilled workers are doing the smart thing in delaying their decision to upskill and hence the big wage differential that we observe today should not of itself be of policy concern. Government policy to narrow the differential by, say, subsidizing retraining by unskilled workers would be harmful in that some unskilled workers would be induced by the government subsidy scheme to retrain whereas they had previously optimally chosen to remain unskilled since the increment to their income due to upskilling would not be large enough to warrant the investment.

Legitimate policy concerns about the incomes of the unskilled should therefore be met not by implementing retraining schemes but by direct lump sum income transfers to them which would accomplish the income distributional goals of policy without distorting incentives pertaining to the upskilling investment decision.

This conclusion, of course, presumes that the reduced real wages of the unskilled produced by other reasons (such as the rolling-stone-gathers-no-moss effect) have not produced an imperfection in the credit market for borrowing to educate oneself, whose effect in the context of the previous model is effectively to increase the private hurdle rate to some $\rho'' > \rho'$ whereas the social hurdle rate remains ρ'. If such distortions have emerged in the 1980s, that would provide an independent argument for subsidizing training and education to the High School graduates (and dropouts), the objective then being to subsidise the unskilled workers to the extent that the gap $(\rho'' - \rho')$ is eliminated.

IV. TRADE AND RENTS

We now turn to yet another, more conventional trade-related explanation which builds on the incorporation of imperfectly competitive _factor_ markets into the picture. Thus, it is often claimed, especially for autos and steel but also more generally now, that international competition has led to the erosion of high-wage jobs: either they have disappeared or the wages on such "good" jobs have been scaled down.

If we merely mean that the decline in the product prices of these sectors is putting downward pressure on labor that is specific to them or is intensively used in them, the resulting decline in the real wage of such labor is simply the SS phenomenon. The present argument is rather that identical-quality labor is getting a higher wage (and hence a rent) in the import-competing sectors and that this rent will be reduced in the new equilibrium or that the number of people enjoying unchanged rents (i.e. the number of good jobs) will be reduced, thanks to the import competition (i.e. improved terms of trade).

The prior questions, of course, before we consider this argument analytically are twofold: (i) is there any evidence that there are such rents; and (ii) why do these rents exist?

The chief source of the current acceptance of the importance of rents in labor markets is the empirical work of Katz and Summers (1989a)(1989b) for US industries for 1984. They estimate the interindustry dispersion of wages, controlling then for explanatory variables but finding that the standard deviation of the estimated wage differentials falls

from 28% without these controls to 15% with them, thus leaving a residual which is then assigned to rents. However, the recent work of Jacob Mincer (1993) by adding better estimates of training and other variables and using different data sets, has succeeded in wiping out more than half of the Katz-Summers residual, leaving too emasculated a result to base serious explanations and policy conclusions on.[37]

But assuming that the rents were significant, what could they be due to? The obvious answer is that the rents are obtained and protected by trade unions, which is surely true for the two major tradeable sectors that have faced import competition: autos and steel. In the more diffused analysis that Katz and Summers deploy, extended to aggregated groups of industries in the US, accounting for unions nonetheless leaves a residual to be explained by other factors. The authors then opt for an efficiency wage explanation of the type produced by Leibenstein and Mirrlees many years ago *via* the productivity effects of higher wages from better nourishment in the context of developing countries and now extended to developed countries in the shape of raising the cost of being fired and hence increasing efficiency in jobs where shirking is possible. As far as we can tell, Katz and Summers do not explore the technology of the industries where they do find significant non-union-related rents to see if the hypothesis of shirking makes sense. It would appear to us that in sectors such as services (where one might be working on one's own in relation to customers) shirking is easier than in manufacturing (where shirking may be difficult because of being on a tight assembly line with many others on it) and yet the rents seem to be higher in the

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[37]This is not to say that the efficiency-wage models are not of great intellectual interest. Their relevance to the issue at hand is what we doubt.
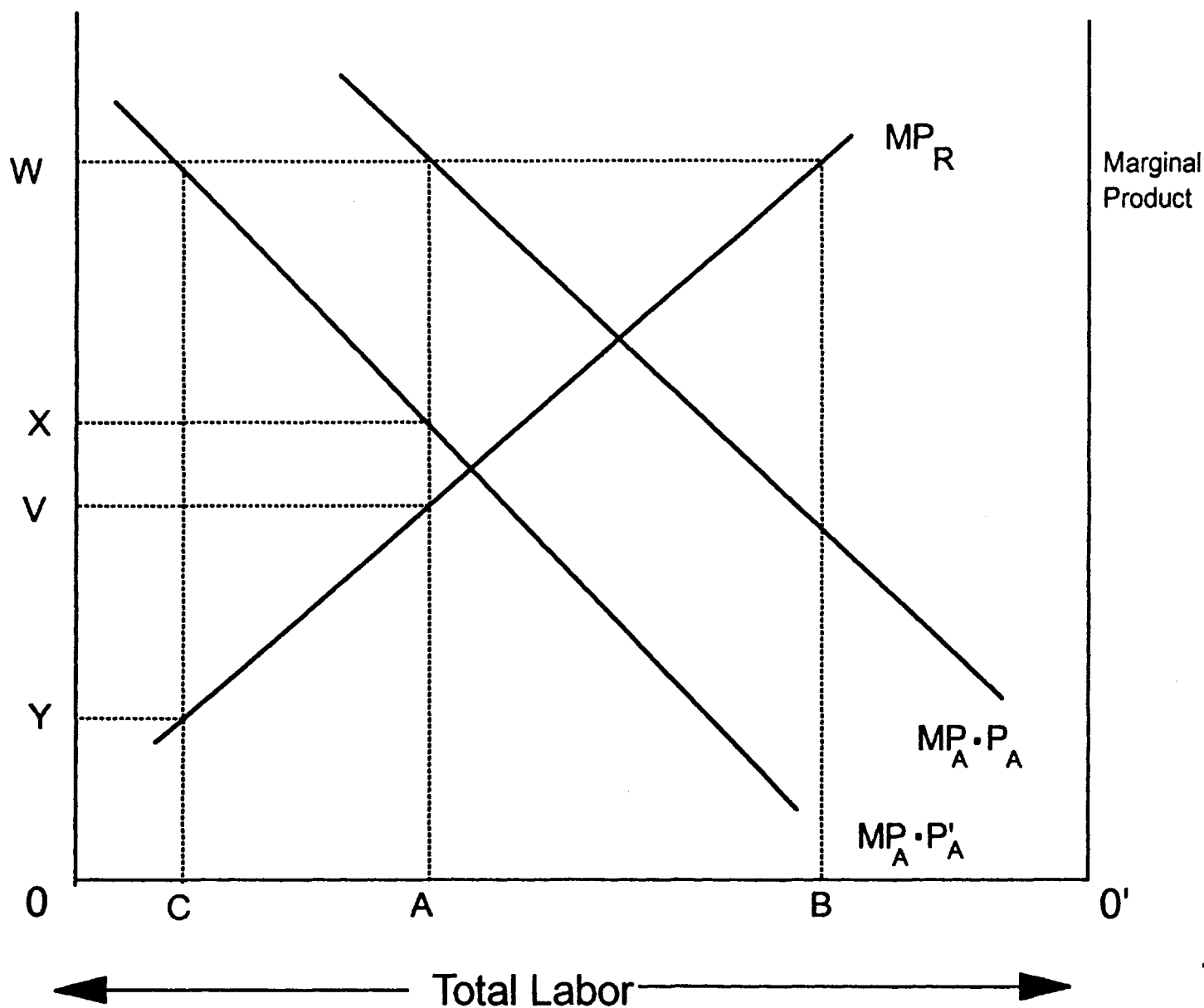
latter than in the former. Then again, the rents seem to obtain in all jobs in an industry rather than in specific jobs in it; but it is hard to see why technology should be such that shirking obtains for all operations in an industry! Then again, Jacob Mincer's forthcoming work shows that the average time spent in queue for the higher-wage jobs is not less than elsewhere, suggesting that the higher wages are for better people, whereas the "rent" explanation would suggest longer wait-time instead.

For these reasons, we do not pursue the idea of modelling here the effect of import competition on rents in efficiency-wage models. Besides, a scanning of the Katz-Summers findings by industry does not suggest any relationship between rents in an industry and its status as a nontradeable or tradeable and, if tradeable, as an exportable or an importable. We therefore confine ourselves to modelling the effect of import competition, i.e. of fall in world prices, on trade-union-generated rents and jobs.

Consider then a simple general-equilibrium insider-outsider model, as in Figure 7. Suppose that the economy consists of 2 sectors: A (autos) and R (the rest). Suppose that the workers in sector R are competitive whereas the auto workers are controlled by a union.[38] Suppose further that the union insiders are OA in number. OO' is the total labor force. P_A is the relative price of autos and MPs are the marginal product curves, measured for R from O' and for A from O as the origins. With OA insiders, whose full employment it will ensure, the auto union will then bargain for (and we assume that the firms will accept) the wage rate OW.

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[38]We make no Freudian slip in using the word "controlled". Substitute the word "represented" if desired.

Figure 7

Now, there are at least three ways to close the model in terms of labor market behavior in the rest of the economy:

First, we can assume that the union-determined wage has such widespread appeal that it perhaps becomes legislated into an economy-wide minimum wage of OW. In that case, employment in the rest of the economy will be O'B, and unemployment of magnitude AB will be observed.

Second, we can assume that the wage in the rest of the economy falls sufficiently to ensure economy-wide full employment. In that case, wage OV will obtain in the rest of the economy, which is lower by VW than the union wage in that auto sector, and AO' workers will be employed in the rest of the economy, with no unemployment.

Third, there may be a convex combination of (i) and (ii), in that wages in the rest of the economy may be below OW but not far enough below to eliminate all unemployment. A version of this third hypothesis is essentially the Harris-Todaro model from development theory.[39] We will work with the second hypothesis, since that is consistent with the wage differentials observed by Katz and Summers (1989a)(1989b) and does not involve unemployment, which is not central to the current discussion and would only complicate matters unnecessarily.

Now, to tell the 'rent-squeezing' story, suppose a deterioration in the terms of trade for autos vis-a-vis other goods. This implies an inward shift of the marginal product of labor schedule, MPA, in proportion to the terms of trade change. If this change is anticipated by insiders, they will bargain for wage OX, which ensures full employment by insiders.

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[39]Cf. Harris and Todaro (1970) and Bhagwati and Srinivasan (1974).

Nominal wage will fall to OX, but notice that the real wage denominated in terms of autos has remained constant since nominal wages fall in proportion to the fall in the terms of trade. Since by construction the numeraire is all other goods, the real wage will have fallen in terms of all other goods. Thus, insider autoworkers will typically perceive a fall in their real wages (unless they consume only autos for breakfast instead of Corn Flakes), but insider employment will be protected.[40]

Consider an alternative scenario in which the fall in the terms of trade was unexpected by the union. Then, the union will bargain for and receive wage OW, but labor demand will fall short of MPA. Thus the number of insiders will shrink to OC, with the disenfranchised insiders joining low-paid workers in the rest of the economy and earning the low wage OY. Now, what has happened to real wages? Since the nominal wage didn't change, the real wage in terms of autos goes up (since the price of autos went down) and since other goods are our numeraire, the real wage in terms of other goods stays constant. Thus, the real wage for the few insiders who are still employed will rise or stay roughly constant, but will not fall. Good jobs will shrink, becoming even better jobs, and bad jobs will increase.

The two stories above at a very crude level might seem to fit the stylized facts of the US and EC respectively. In the US, wages appear to be flexible downward, thus insider employment levels in autos and steel are essentially unchanged. In EC, by contrast, wages have been rigid and employment in autos, etc. has been falling. If this simple insider-

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[40]The real wage of R-workers will, however, rise because of cheaper autos, thus diluting the <u>overall</u> reduction in the real wage of workers.

outsider model is correct, the explanation would have to be either that in the US unions expected the shock and thus bargained for lower wages and unions in Europe did not, or (stepping beyond the model) unions in Europe stuck fast for high wages as they were presumably concerned about the 'super-insiders' OC whereas unions in the US cared about OA and thus let wages fall.[41]

V. AGGREGATE PRODUCTION FUNCTION: THE ULTIMATE THREAT?

The models deployed in the foregoing analysis have been disaggregated (at least two sectors, exportables and importables) and in general equilibrium. But suppose that you think in terms of an aggregate production function for the entire economy.

This makes it analytically impossible to consider trade questions meaningfully. But it is perfectly compatible with thinking about the effects of accumulation and of technical change. [The real problem with it is that it can be quite misleading since disaggregation shows, as trade theorists are aware, that effects such as diminishing returns which seem natural and inevitable in the context of aggregate production functions can be eliminated by compositional effects. Thus, for example, if David Card's (1990) findings on the failure

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[41]Thea Lee has suggested that the effect of trade competition may simply be to weaken the unions' bargaining power generally. Thus, a shift from protecting insiders' wages to protecting their employment may soon yield to inability to be taken seriously and hence their demise eventually. If so, "rents" defining some jobs as "better" than other jobs will obviously tend to vanish with the unions.

42

of the Mariel influx of Cubans into Miami are correct, and there was no effect of the substantial influx on real wages in Miami, that may well be because, as the Rybczynski (1955) theorem underlines, the added labor may have been absorbed at constant goods and factor prices by relative expansion of labor-intensive activities: a hypothesis that we suspect has not been examined.]

Using then the aggregate production function approach, suppose that we allow explicitly for three factors: capital (K), skilled labor (LS) and unskilled labor (LU). Then take a nested CES production function which captures the idea that K and LS are relatively complementary as compared to LU.[42] In that case, the marginal product of LU, and hence its real wage, will _fall_ as capital accumulates. Technology is thus not kind to unskilled labor: the traditional engine for growth, Marx's primitive accumulation, hurts unskilled labor instead of improving its real wage. The same applies, of course, if we receive net inflows of foreign investment: Perot gets to stand on his head!

Furthermore, technical change accentuates this phenomenon in the production function above[43] as indeed in the real world, as the recent work on technical change seems

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[42]Such a production function is:

$$Y = \{ \delta[\alpha K^{-\rho 1} + (1-\alpha)L_S^{-\rho 1}]^{\rho 2/\rho 1} + (1-\delta)L_U^{-\rho 2}\}^{-1/\rho 2},$$

where the condition that $\rho 1 > \rho 2$ guarantees that capital K and skilled Labor LS have a lower Hicks-Allen partial substitution elasticity than K and unskilled labor LU, so that capital-skill complementarity holds in a relative sense. The production function is from Layard and Walters (1978). The original work on the 3-factor production function, with the thesis that capital is more complementary with skilled labor, is due to Griliches (1969). More recent evidence is presented in Bartel and Lichtenberg (1987) and Berndt and Morrison (1991).

[43]This is easily verified by multiplying the production function in the preceding footnote with a technology shift parameter, A, and then showing that the marginal product of

to confirm [e.g. Krueger (1993)]. Then, we have a real problem on our hands: <u>both</u> sources of growth, capital accumulation (including inward foreign investment) and technical change will harm unskilled labor. That becomes then the <u>ultimate threat</u>. Marx indeed is striking again.

Once again, the analysis exaggerates and misleads. Compositional effects can kill the operation of the adverse effect within each industry. Then again, supply response by the unskilled to get skilled as the returns to skills rise, will reduce <u>ceteris paribus</u> the supply of unskilled labor and increase that of the skilled, thus tending to make the widened differential in rewards to the skilled relative to the unskilled a transitory phenomenon. The "adjustment process" whereby the unskilled become skilled, turning the differential back towards its original position, depends of course on the cost of such skill-acquisition.[44]

We may conjecture here, however, that the adjustment may have become more costly, and hence the widening of the wage differential more persistent, in the 1980s due to phenomena such as the rise of lucrative alternatives such as drug-dealing, the fall in the quality of schools and the collapse of the family and hence the motivation and aptitude for getting educated among those affected (as in inner cities).

unskilled labor (the partial derivative of Y with respect to L_U) is decreasing in A.

[44]The transition-path and the steady-state properties of such an adjustment process have been examined in Dehejia (1992a).

VI. CONCLUDING REMARK

Our review and analysis of alternative _theoretical_ ways in which freer trade may affect real wages of the unskilled suggests several areas for further investigation.

But it also indicates that the _empirical_ evidence to date fails to put the burden of the explanation for the observed decline in real wages of the unskilled on freer trade, leaving technology and technical change as the key culprits.

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