AND NOW FOR SOMETHING COMPLETELY DIFFERENT:
AN ALTERNATIVE MODEL OF TRADE, EDUCATION, AND INEQUALITY

The dramatic growth of U.S. wage inequality since the early 1970s has been the subject of intense controversy both among economists and between economists and the broader public. To many people - including a few economists (e.g. Leamer 1995) - the explanation of that increased dispersion seems obvious: it is the result of globalization, and specifically of the growing imports of labor-intensive manufactures from developing countries. However, there are serious difficulties with an explanation of growing inequality that places the main weight on trade. For one thing, despite recent growth the value of North-South trade is still fairly small compared with the GDP of advanced economies; this means that even a complete elimination of that trade would, given reasonable estimates of factor shares and elasticities of substitution, reverse only a fraction of the observed change in wage differentials (Krugman 1995). Moreover, while trade can raise the relative demand for skilled labor by shifting the production mix toward skill-intensive sectors, in reality most of the rise in the relative employment of highly educated workers has taken place not via a change in the sectoral mix but via a shift toward such workers *within* sectors - a shift that has taken place despite a sharp rise in education premia, which should have induced firms to substitute away from college-educated workers (Lawrence and Slaughter 1993).

But if globalization didn't do it, what did? An explanation that is *consistent* with the data is skill-biased technological change, taking place simultaneously in many sectors (and also presumably in many countries). And this is in fact the explanation that has been advanced by a number of economists, myself included, as the best available answer.

Yet even among those economists who believe that skill-biased technological change is the best explanation we have for the growing wage gap - certainly a better explanation than globalization - there is widespread uneasiness. This uneasiness stems both from the indirect nature of the evidence for such change - it is essentially inferred from the fact that the relative wages and the relative employment of the highly educated have moved in the same direction - and from the sense that technology is too much of a *deus ex machina*, something invoked to tie up the loose ends in our story rather than something we believe in on its own merits. I know that I am not alone in wondering whether all of us - both those who insist that globalization must be the explanation and those of us who regard the evidence against a simple Stolper-Samuelson account as overwhelming - are missing something, whether we may not all be on the wrong track.

The purpose of this paper is to offer a suggestive example of how a process quite distinct from either the simple trade or the simple technology story might be central to understanding growing inequality. The basic idea is that the labor market might, over some range of conditions, be characterized by multiple locally stable equilibria, some more egalitarian than others. If that is the case, unequalizing shocks of modest size - shocks that could originate either in changing trade opportunities or in changing technology, or for that matter in both - could push the economy out of an egalitarian equilibrium and thus set in motion a cumulative process of growing inequality. In the specific model presented here that process, which essentially feeds on itself, could easily be misinterpreted as exogenous skill-biased technical change.

The particular mechanism generating multiple equilibria in this model is a version of the screening/signalling hypothesis (Spence 1971, Stiglitz 1975). This approach was taken because it is the simplest labor market model with the required characteristics. It may, however, be only one of a number of possible mechanisms. For example, recent work by Acemoglu (1996), which is in somewhat the same spirit, offers a quite different mechanism involving technology choice in a frictional, search model of the labor market. As we will see, there are some empirical difficulties with the specific model presented here; thus it should be considered only as a first exploration of a class of "exotic" income distribution models that might turn out to recast the nature of the debate.

The remainder of this paper is in five parts. Part 1 lays out the assumptions of the model. Part 2 develops the crucial idea of a distinction between two labor market "regimes". Part 3 then shows how small shocks can precipitate a shift from one regime to the other, and thereby produce a cumulative process of growing inequality; it also shows how such a process might confuse someone trying to interpret the data. Part 4 discusses some empirical predictions of the model, contrasting them with the predictions of alternative approaches and testing them loosely against the data. Finally, Part 5 suggests some qualifications, extensions, and implications of the type of analysis this model represents.

1. Assumptions of the model

We consider an economy endowed with two kinds of labor, "good" (G) and "bad" (B). The difference between these two kinds of workers is assumed to be inherent and unalterable. A worker's type is known to the worker himself but unobservable to employers.

Good workers do, however, have a way to demonstrate their goodness: they can acquire a college degree. It is assumed that only good workers are capable of acquiring such a degree, so the possession of a degree proves that a worker is of type G. However, acquiring a degree is costly. Rather than explicitly model this cost, I will simply assume that G workers will choose to become educated if and only if the ratio of the wage of those with degrees to those without, w_H/w_L, exceeds some value $r>1$.

There are also two kinds of jobs: managerial (M) and nonmanagerial (N). M-jobs actually require a college degree - that is, such a job can only be filled by a good worker with an education. In N jobs, there is no advantage to being educated per se. However, good workers are known to be p>1 times as productive in N jobs as bad workers, so that even in N employment a worker with a college degree - who is therefore certified as type G - will command a higher wage than one without.

Aside from this asymmetric-information feature of the labor market, the economy may be described by the standard 2-by-2 model of trade theory. There are two sectors, manager-intensive X and nonmanager-intensive Y. All individuals are assumed to share the same homothetic preferences over the two goods:

$$U = U(C_X, C_Y) \quad \textbf{(1)}$$

Production in each is described by a constant-returns function of managers and nonmanagers with all the usual properties:

$$Q_X = X(M_X, N_X) \quad \textbf{(2)}$$

$$Q_Y = Y(M_Y, N_Y) \quad \textbf{(3)}$$

In these production functions, M is simply the number of college-educated good workers employed as managers. N, however, must be measured in efficiency units, because each good worker employed in a nonmanagerial role contributes p times as much as each bad worker. Thus the resource constraints for the economy are:

$$M = M_X + M_Y = G_M \quad \textbf{(4)}$$

$$N = N_X + N_Y = \mathrm{p}G_N + B \quad \textbf{(5)}$$

where G_M is the number of good workers employed as managers and G_N is the number employed in nonmanagerial positions.

Finally, this is an open economy. It is not, however, a *small* open economy facing given world prices. Instead, it faces a less than perfectly elastic rest-of-world offer curve. There are two reasons for using this large-open-economy setup. One is that it is arguably considerably more realistic than the price-taking assumption, even for the United States alone, and certainly if we think of ourselves as modeling the OECD as a whole. More to the point for this paper, however, the large-economy setup is, for reasons that will soon become apparent, more convenient as a modeling device.

We will represent the rest-of-world offer curve by assuming that the relative price of X is decreasing in net exports of X:

$$\frac{P_X}{P_Y} = D(Q_X - C_X) \qquad \textbf{(6)}$$

This completes the statement of the model. Next we turn to analysis.

2. Labor market regimes

In order to analyze this model, we need to determine the relationship between the number of good workers who acquire a college education - which we will denote by H - and the payoff to such an education, which we measure by the ratio of college to non-college wages, w_H/w_L .

The nature of that relationship depends on the "regime" in the labor market, which can take one of two forms. First, it may be the case that college-educated workers are employed only in managerial positions - that is, in jobs for which such an education is actually necessary, in which education is actually socially productive. I will refer to this as the *human capital* regime. Alternatively, it may be the case that some college-educated workers are employed in nonmanagerial jobs. By assumption, the education does not enhance their productivity in these jobs; its only function is to demonstrate to employers that they are good as opposed to bad workers. I will refer to this as the *quality signalling regime* - although we must bear in mind that even under this regime there will be workers whose education actually is socially productive.

Before we determine the conditions under which each regime prevails, let us examine the behavior of the economy under each.

Under the human capital regime, the number of college-educated workers is the same as the number of managers, and the remaining workers form the supply of N in efficiency units:

$$M = H \qquad \textbf{(7)}$$

$$N = p(G - H) + B \quad \textbf{(8)}$$

In terms of production and prices, then, the human capital regime constitutes an ordinary 2-by-2 economy, in which increases in the number of college-educated workers amount to an increase in M and a decline in N.

The properties of such an economy are very familiar. In particular, imagine either increasing M or decreasing N at constant relative goods prices. In either case the economy would experience a Rybczynski effect: output of M-intensive X would rise, output of N-intensive Y fall. This would lead at unchanged relative prices to an increase in the excess supply of X. But given the rest-of-world offer curve (6), this means a decline in the relative price of X. So we may think in terms of a reduced-form relationship between the number of college-educated workers and relative prices:

$$\frac{P_X}{P_Y} = F(H) \quad \textbf{(9)}$$

But in such a 2-by-2 economy there is also a direct Stolper-Samuelson relationship between relative goods prices and relative factor prices. Thus we can write a reduced-form relationship between H and relative wages of the form

$$\frac{w_M}{w_N} = f(H) \qquad f' < 0 \quad \textbf{(10)}$$

We are not, however, quite there yet. Equation (10) gives the ratio of the wage per manager (which is also the wage of any college graduate) to the wage *per efficiency unit* of nonmanagerial labor. However, because some of the workers in nonmanagerial jobs are (unidentified) type G, the average number of efficiency units per N worker is more than 1; so the wage paid per actual worker in N jobs is

$$w_L = w_N \frac{\pi(G - H) + B}{G - H + B} \qquad \textbf{(11)}$$

Notice that the ratio of w_L to w_N is decreasing in H. The reason is that the more G workers acquire college educations, the lower the expected productivity of the average worker without a degree. This complicates matters in the human capital regime, but is central to the story under the quality screening regime.

The education premium as a function of H is therefore:

$$\frac{w_H}{w_L} = \phi(H) \frac{G - H + B}{\pi(G - H) + B} \qquad \textbf{(12)}$$

This relationship can in principle be either downward or upward-sloping. It will be downward-sloping if the effect of factor supplies on relative prices is strong (this effect would be nonexistent, of course, in a price-taking economy - which is why the large-economy assumption is useful) and if the “screening” effect is weak. I will assume that this is in fact the case, so that the curve relating w_H/w_L to H in the human capital regime looks like HC in Figure 1.

It may be useful at this stage to give a specific example. Suppose, then, that we consider a *closed* economy - the limiting case of a large open economy - in which both tastes and technology are Cobb-Douglas. Let µ be the share of X in expenditure, and let a and ß be the share of M in the X and Y sectors respectively. It follows immediately that a share µa + (1-µ)ß of total income accrues to M, a share µ(1-a) + (1-µ)(1-ß) to N, so that

$$\frac{w_M M}{w_N N} = \frac{\mu\alpha + (1-\mu)\beta}{\mu(1-\alpha) + (1-\mu)(1-\beta)} \tag{13}$$

and thus

$$\frac{w_M}{w_N} = \frac{\mu\alpha + (1-\mu)\beta}{\mu(1-\alpha) + (1-\mu)(1-\beta)} \frac{N}{M} = ? \frac{p(G-H) + B}{H} \tag{14}$$

Now substituting in (11) we find that

$$\frac{w_H}{w_L} = ? \frac{G-H+B}{H} \tag{15}$$

which is unambiguously a downward-sloping curve

Next let us turn to the quality-screening regime. This is more straightforward. Since (some) college educated workers are competing directly with non-collegiate workers, each college-educated worker will receive a wage equal to p times the wage per efficiency unit in M, while each non-college worker will receive a wage proportional to the average number of efficiency units among such workers. But the total number of efficiency units among non-college workers is

$$E = p(G-H) + B \tag{16}$$

so the average efficiency is

$$\frac{E}{L} = \frac{p(G-H) + B}{G-H+B} \tag{17}$$

implying the relative wage equation

$$\frac{w_H}{w_L} = \pi \frac{G-H+B}{\pi(G-H) + B} \qquad \textbf{(18)}$$

which is unambiguously upward-sloping, yielding a curve like QS in Figure 1.

Which regime prevails? The answer, of course, is whichever provides the higher relative wage. If the HC curve lies above the QS curve for some given H, college graduates can command higher wages as managers than in nonmanagerial jobs, even if all graduates are so employed; so no college-educated workers will use their education purely to demonstrate their type. If HC lies below QS, then if all graduates worked as managers they would earn less than a certified good worker could get in a nonmanagerial job, and so some H workers will shift away from the managerial role.

The overall relationship between H and w_H / w_L, then, is V-shaped; it is defined by the upper envelope of the curves HC and QS.

3. Equilibria and transitions

Let us now endogenize the supply of college-educated workers. We have assumed that good workers will find it worthwhile to acquire a college education if and only if w_H / w_L exceeds some value r>1. Thus in Figure 1, which represents the most interesting case, the solid line (the upper envelope of the HC and QS curves) represents the "demand" for college graduates, while the broken horizontal line at $w_H / w_L = r$ represents the supply.

Clearly, there are three equilibria: one at point 1, where only some good workers get degrees and the labor market is in a human capital regime; one at point 3, where all those who can get degrees and the quality-screening regime prevails; and an intermediate equilibrium at 2.

Which equilibrium does the economy select? For some purposes it would be essential to model the full-fledged dynamics of educational investment, including the formation of expectations about future returns. However, in recent years the interest in evolutionary game theory has made *ad hoc* dynamics, in which the mix of strategies followed by a population gradually changes depending on the current returns to each strategy, suddenly respectable again. Such evolutionary dynamics are particularly useful when, as in this model, there are multiple equilibria and we are looking for a selection criterion. Or to make a long story short, it is acceptable as a first cut to assume that the number of college educated good workers rises if $w_H/w_L > r$, falls if $w_H/w_L < r$. The equilibrium at 2 is then unstable, while the other equilibria are locally stable. (Alternatively, if one thinks of the strategy of good workers as probabilistic - with what probability will I go to college - then 1 and 3 are evolutionarily stable strategies in the sense of Maynard Smith (1976), while 2 is not).

Where the economy ends up, then, depends on history. In particular, if it manages to get into the relatively egalitarian equilibrium at point 1, it will tend to stay there in the face of small shocks.

But now suppose that there is a progressive rise in the demand for managerial workers. This rise could be due either to growing opportunities to export the manager-intensive good X, or to manager-biased technical change. In either case the effect under the human capital regime will be to increase the relative wage of H workers for any given level of H - an upward shift in the HC curve.

As long as this shift is not too large, the labor market will remain in the human capital regime, and the wage differential will not change. At a critical point, however, illustrated in Figure 1 by the curve HC', the human-capital equilibrium will cease to exist. At this point, even if there is no further increase in the demand for managerial workers, the economy will continue evolving toward increasing inequality. As a growing fraction of good workers become educated, the expected productivity and thus the wages of non-college workers will fall, further increasing the incentive to acquire a degree, and so on until the unequal equilibrium at 3 has been reached.

Two points need to be made about this transition to higher inequality. The first is that if anything like this story is right, the whole attempt to apportion the causes of growing wage differentials between technology and trade may be missing the point. Either trade or technology - or more likely both - may push the economy to the critical point, but thereafter the unequalizing process simply feeds on itself, and the proximate cause may therefore be irrelevant.

The second point is how easily such a transition might be misinterpreted by an observer - me, for example - who works with the wrong model. Suppose that exogenous forces in fact were to push HC just to the critical point, and that the economy were then to evolve spontaneously from 2 to 3. What would we see?

Because of the strong structure of this model, we can immediately determine that there will be no change at all of the wage of managers relative to the cost of one efficiency unit of nonmanagerial work. We know this because all college graduates under the quality signalling regime receive a wage equivalent to p units of N. But if these "true" relative factor prices are unchanged, relative goods prices must also remain unchanged, and so therefore must production, consumption, and trade. *Nothing real changes as the economy moves from 2 to 3 except the distribution of wages.*

But an observer who classifies labor not by unobservable quality but by education level will see two things happening: a fall in both the relative and the absolute wage of non-college-educated workers, and a fall in their relative employment as well. This seemingly perverse outcome will not appear to be explained by trade: neither the volume of trade nor the prices at which trade takes place will change, nor will the industry mix of employment; all of the increased demand for H and reduced demand for non-H will therefore come from within-sector shifts. The only hypothesis that will appear to be consistent with the data will therefore be skill-biased technical change - even though no technical change has in fact taken place!

4. Empirical implications

At the beginning of this paper I described some reasons why even those of us who have provisionally adopted a technology story for growing wage inequality nonetheless feel uneasy. But beyond gut feelings, is there some way to distinguish among alternative explanations of inequality?

Suppose for a moment that we try to explain rising wage differentials with one of three "pure" stories: Stolper-Samuelson effects with no change in technology, skill-biased technological change with no change in factor supplies, and a pure story about transition from a human capital to a quality-screening regime (that is, the movement from 2 to 3 in Figure 1). In reality, of course, there is no reason why the data should be generated by a pure story; but this comparison is nonetheless illuminating. Let us therefore compare the implications for three observable variables:

- *Skill-intensity within industries*: The original exposition of Stolper and Samuelson relied on the device of a contract curve within an Edgeworth box to make the now familiar, though sometimes still misunderstood point, that trade affects the demand for factors via its effect on the industry *mix*; in their analysis a rise in the relative price of the labor-intensive good causes employment to shift towards that good. Full employment of factors is preserved via a compensating shift toward *capital*-intensive techniques within each sector. Thus in a pure Stolper-Samuelson account of rising wage differentials, we would expect to see the skill-intensity of production falling within each industry.

Skill-biased technological change, by contrast, would tend to raise the relative demand for skilled labor within each industry. If we take factor supplies as given, however, the skill premium would have to rise enough to choke off this shift in relative demand in the aggregate; while the precise effects on each industry would depend on both the distribution of technical change and the elasticity of substitution, on average there would be no change in skill-intensity within industries. (Of course if we imagine that relative supplies of skilled labor are increasing at the same time, changes in factor prices would be less, and we would therefore see increases in skill intensity within industry).

Finally, in the transition from human-capital to quality-screening, nothing real would change, but firms in both sectors would begin to employ college-educated workers for previously unskilled jobs; thus observed skill-intensity would rise in all sectors.

- *Factor prices*: It is a fundamental proposition in trade theory that following a change in relative prices, the bundle of factors initially employed must be at least able to afford the goods they were previously producing. (This proposition is the basis for the demonstration of gains from trade in terms of the dual; see Helpman and Krugman (1985), ch. 1). Thus a Stolper-Samuelson explanation of changing factor prices implies that the purchasing power of the original employment of factors in terms of output (or, given the absence of strong terms of trade effects, in terms of consumption) must rise or at least not fall.

The same is *a fortiori* true of an explanation in terms of technological change: technological progress must increase the purchasing power of the initial bundle of factors for any given goods prices, and any change in goods prices can only further increase that purchasing power.

A pure transition from human-capital to quality-screening, however, actually reduces the purchasing power of the initial bundle of factors, if workers are classified by education. In the transition from 2 to 3 in Figure 1, neither the average wage rate nor the wage rate of skilled workers change; but the wage rate of workers without a college education falls. Thus an index with fixed weights on the college and non-college wage will unambiguously decline.

- *Total factor productivity*: Roughly speaking, this is dual to the measurement of factor purchasing power. If TFP is properly measured, it should not change at all in a pure Stolper-Samuelson story. It should, of course, rise if there is technological progress - so it must increase in a technology-driven account. Again, a transition from human-capital to quality-screening should have a perverse implication, if labor types are measured by education: there will an increase in human capital, but no increase in output, so TFP will (as measured) actually fall.

We may therefore summarize the predictions of the two standard approaches to inequality, and of the exotic alternative offered here, with Table 1.

What do we observe in practice? It is a familiar point since the work of Lawrence and Slaughter that in the United States there has been a pervasive shift toward higher skill-intensity within industries, with relatively little shift of the industry mix of employment toward skill-intensive products. Thus on this first criterion the two conventional approaches seem to fail (although the technology-driven story can be rescued by supposing that factor supplies have exogenously shifted, albeit not as rapidly as factor demands).

When we come to the purchasing power of factors, what we observe for the United States over the period of rising inequality is a slow rise in average real wages (returns on capital are more problematic to measure). However, this rise in real wages has been accompanied by a rising average educational level, so that it is unclear whether the real income of the initial basket of factors has increased. Table 2 presents a calculation using data from Mishel (1996). The first column shows the 1979 share of workers by educational category; since the total does not add to 100, the second column prorates the difference to derive an "adjusted" share. The third column shows the real hourly wage rate (in 1996 dollars) of each worker type in 1979; the fourth the real wage in 1989. As the last line of the table indicates, according to these numbers the average real wage *weighted by 1979 labor force composition* actually declined approximately 7 percent over the decade of the 80s. While this rough calculation might not stand up in the face of careful cleaning up of the data, it is remarkable that such a fixed-weight wage index falls despite technological progress, a roughly constant labor share in GDP, and stable or improving terms of trade. The result is, at least on the face of it, inconsistent either with Stolper-Samuelson or technology-driven stories; it is consistent with the transition to a screening equilibrium.

As one might expect given its rough conceptual equivalence, calculations of total factor productivity yield similarly puzzling results. Table 3 shows a typical recent calculation, from Collins and Bosworth (1996); it suggests that during the post-1973 period, despite what looks like continuing technological advance, growth in total factor productivity ground to a near-halt. Again, a possible though not necessarily correct explanation is that the accumulation of human capital over that period represented socially unproductive investment in screening.

To me, at least, this rough evidence clearly indicates not only the well-established point that Stolper-Samuelson effects cannot have been the main driving force behind changes in the wage distribution, but also that something funny is going on that is not easily mapped into a simple technology-driven story either. In particular, the aggregative implications of the transition to screening seem to fit the actual data quite well.

However, we should note that there is one important implication of the particular type of model developed here that appears to be contradicted by the data. If the multiple equilibria arise only because workers are better sorted by quality than they used to be, one ought to observe a difference in the growth of inequality by cohort: the skill premium for workers from older cohorts, who made education decisions at a time when screening motives were not as important, should not have increased at the same rate as that for more recent cohorts (a worker who chose not to go to college in 1960 revealed less about himself than a worker making the same choice in 1975). In fact, however, cohort studies (e.g. Juhn, Murphy, and Pierce (1993)) suggest comparable increases in inequality across cohorts.

5. Qualifications, extensions, and implications

It should go without saying that the model proposed here is very special, and that there are in particular good reasons to be skeptical about the mechanism proposed. In general, signalling/screening models of the labor market have been questioned by many labor economists, who wonder why employers would not attempt to create cheaper sorting mechanisms and spare good workers the huge expense of pointless college attendance. More generally, this model suggests that what looks like skill-biased technological change might actually be something else; but then again it might be skill-biased change after all.

On the other hand, the mechanism described here is only one of a class of possible “positive feedback” stories about growing inequality. As mentioned in the introduction, Acemoglu (1996) offers an alternative story roughly along the following lines: in a search economy, in which neither firms nor workers can expect to find an immediate match, firms must choose whether to implement a technology that is highly productive but only if a skilled worker uses it, or a more robust technology that any worker can use. Firms will have an incentive to implement the skill-sensitive technology if they can quickly find skilled workers, so the demand curve for such workers will be upward rather than downward-sloping. (This story does not suffer from the objection that it should apply only to younger cohorts of workers). Other economists have suggested that since the power of an individual union depends in part on the strength of a national union movement, the dramatic decline in union membership in the US in recent decades may represent a self-reinforcing process contributing to inequality. One might even invoke linkages that run through the political economy of policy; e.g., Benabou (1996) has proposed that over some range increased inequality tends to lead to policies that reinforce that inequality. And no doubt there are other possible mechanisms to be considered - nor need such stories be mutually exclusive.

If anything like the mechanism proposed in this paper is indeed at work, the policy implications cut sharply across *all* current orthodoxies. Consider, for example, the implications for trade policy. It is possible in this kind of model that globalization could be the proximate cause of a process that then gives the false appearance of being driven by exogenous skill-biased technical change. This does not mean, however, that the process could be reversed by reversing the globalization: even if trade tipped the balance and undermined the human capital equilibrium, once the economy is in a quality-screening equilibrium a small downward shift in the HC curve will not push it out again. So one could blame trade for increased inequality yet at the same time conclude that protectionism cannot do much to reduce wage differentials.

Or consider the popular proposals of Reich (1991) and others to combat inequality by promoting the acquisition of human capital - in effect, by subsidizing education. In this model such policies would be completely ineffective once the economy is in the quality signalling regime. Indeed, they could actually be counterproductive if an economy is still in a human capital regime but close to the critical point: anything that encourages good workers to get educated can set in motion a cumulative process of growing inequality!

In short, while the specific model presented in this paper is implausible in its details, it may be very important as a practical matter to contemplate the possibility that the real causes of growing inequality are very different from any of the explanations that have dominated recent debate.

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TABLE 1: PREDICTIONS OF ALTERNATIVE APPROACHES

	Change in: Skill-intensity within industries	Purchasing power of initial factors	Total factor productivity
Stolper-Samuelson	Negative	Non-negative	Zero
Skill-biased technology	None	Positive	Positive
Transition to screening	Positive	Negative	Negative

TABLE 2: REAL WAGES OF A CONSTANT-SKILL BASKET

	1979 share of work force	Adjusted share	Real wage, 1979	Real wage, 1989
Non-high school	28.5	29.2	10.59	8.91
High-school	41.7	42.7	11.86	10.79
Some college	15.1	15.5	12.92	12.53
College	8.8	9.0	16.55	16.98
Advanced degree	3.6	3.7	20.34	22.07
Weighted average			12.39	11.48

TABLE 3: ACCOUNTING FOR US GROWTH

		Accounted for by:		
	Output per worker	Capital per worker	Human capital per worker	Total factor productivity
60-94	1.1	0.4	0.4	0.3
60-73	1.9	0.5	0.6	0.8
73-94	0.6	0.3	0.2	0.1
73-84	0.2	0.3	0.5	-0.5
84-94	0.9	0.3	0.0	0.7

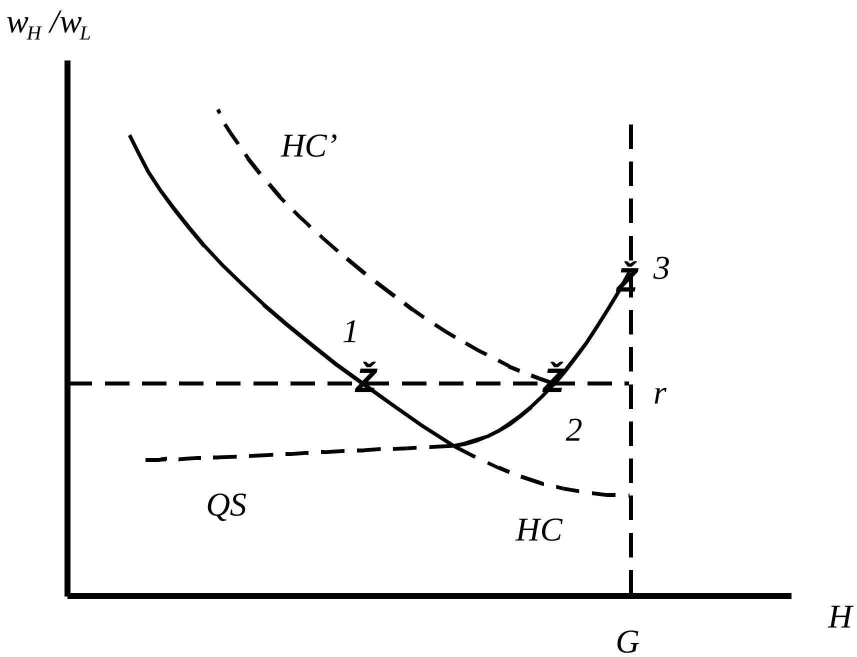

Figure 1