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Globalization and Redistribution: Feasible Egalitarianism in a Competitive World

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Globalization and Redistribution: Feasible egalitarianism in a competitive world

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Abstract

A reduction of impediments to international flows of goods, capital and professional labor is thought to raise the economic costs of programs by the nation state (and labor unions) to redistribute income to the poor and to provide economic security. But some of the more politically and economically successful examples of such policies -- for example Nordic social democracy and East Asian land reform-- have occurred in small open economies which would, on the above account, provide a prohibitive environment for egalitarian interventions. I present a model of globalization and redistribution to answer the following question: *in a liberalized world economy, what programs of egalitarian redistribution and social insurance are implementable by democratic nation states acting independently?*

While in the absence of international coordination, globalization indeed makes it difficult for nation states to affect the relative (after tax) prices of mobile goods and factors of production and for this and other reasons may limit the effectiveness of some conventional strategies of redistribution, a large class of state and trade union interventions leading to substantial improvements in the wages, employment prospects, and economic security of workers is not ruled out by globalization. Included are redistributions of assets which provide efficient solutions to incentive problems arising in principal agent relationships such as wage employment, farm and residential tenancy.

1. Introduction

For well-known reasons, a reduction of impediments to international flows of goods, and factors of production -- commonly termed globalization -- may enhance allocative efficiency both globally and within national economies, and the associated competition among nation states may contribute to governmental accountability.¹ However, globalization is also thought to raise the economic costs of programs by the nation state to redistribute income to the poor and to provide economic security for their populations. Among the reasons is the fact that the more internationally mobile factors of production -- capital and professional labor -- tend to be owned by the rich, and a nation-specific tax on a mobile factor induces national-output-reducing relocations of these factors. Similar reasoning demonstrates the high cost of attempting to alter the relative prices of factors of production, for example, by raising the wage relative to the return to capital through trade union bargaining. Even Pareto-improving insurance-based policies are compromised, as cross-border mobility of citizens allow the lucky to escape the tax costs of supporting the unlucky, thereby reintroducing the problem of adverse selection plaguing private insurance and which public insurance was thought to avoid (Sinn, 1997).

The result is a generalization of what Arthur Okun (1975) called redistribution in *leaky buckets*: the net benefit to the recipient may fall considerably short of the loss to those paying the costs. In a democracy, leaky buckets thus make it more difficult to secure governmental support for egalitarian redistribution, and thus compromise both the ethical appeal and the political viability of redistributive programs. By exacerbating the generalized leaky bucket problem, trade liberalization and other aspects of globalization are thus thought to restrict the range of redistributive policy which is politically sustainable in democratic nation states.²

¹ Thanks for research assistance by Bridget Longridge, Yongjin Park, and Lawrence Evans helpful contributions from Pranab Bardhan, Daniel Bromley, Helena De Letourdis, Steven Durlauf, Maurizio Franzini, Ugo Pagano, Fabio Petri, Eric Verhoogen, and Elisabeth Wood, and to the MacArthur Foundation for financial support.

² Globalization can work powerfully to reduce inequalities, both between countries, and even within, where it may induce more competitive product markets (reducing the discrepancy between prices and marginal costs and thus raising real wages) and providing greater accountability for state and para-statal institutions often dominated by elites. It is in part for these reasons that center-left parties such as the African National Congress in South Africa and the former Communist Party in Italy have supported trade liberalization. On the basis of available data, however, one cannot conclude that either recent or long-term globalization tendencies have on balance

But some of the more politically and economically successful redistributive policies -- for example Nordic social democracy and East Asian land reform-- have been implemented in small open economies which would, on the above account, seem to provide a prohibitive environment for egalitarian interventions (Moene (1998), Huber and Stephens (1998), Moene and Wallerstein (1993) Yang (1970), Putzel (nd), and Yager (1980)). Other cases of open-economy egalitarianism include the Costa Rican welfare state (Mesa-Lago, (1989), Rosenberg (1981) Yashar (1995)), egalitarian distribution of health services and nutrition in Sri Lanka (Anand and Kanbur (1991), Isenman (1980)) and wage compression in Singapore (Lim, (1984)) and the public health policies and dramatic reduction in infant mortality under the socialist government of the Seychelles Republic (Republic of Seychelles, (1999)).³

Particularly striking are the cases of two Indian states, Kerala and West Bengal. Goods and factors of production move freely across their boundaries, and their state governments have limited control over the legal and fiscal environment of their state economies. But investments in health, schooling and other human capacities in Kerala and land tenure reform in both states (especially West Bengal), have substantially redistributed income and improved the well-being of the poor (Ramachandran (1996), Sengupta and Gazdar (1996), Banerjee and Ghatak (1996) Besley and Burgess (1998)). The leftist governments credited with these policies have been repeatedly returned to office in democratic elections.

As even this brief description of cases of relatively successful egalitarian redistribution suggests, the reasons for the policies, as well as their design and the mechanisms by which they worked have differed substantially. Some owe their existence to electoral competition in polities with substantial majorities of poor voters; others have been implemented to forestall populist political successes. Each case exhibits serious shortcomings; but I will not dwell on these as my point is not to elevate them as models but rather is more modest: unless the cases are entirely idiosyncratic they suggest that the commonplace opposition between globalization and egalitarianism may be overdrawn.

In the pages which follow I present a model of globalization and redistribution seeking to answer the following question: in a globalized world economy, what programs of egalitarian redistribution and social insurance are implementable by democratic national states acting independently? A program is implementable if its

favored greater equality in world income. The period of increased liberalization from 1988-1993, for example was marked by a substantial increase in world inequality (Milanovic, 1999). See also Zimmerman (1962) and Schultz (1998).

³ The nature of the openness which characterizes these cases differs of course; all have relatively large trade flows while some have (or had) relatively restricted capital flows.

desired outcome is a stable Nash equilibrium of the appropriately defined game.⁴ An implementable program must therefore be economically and politically sustainable: not susceptible to being undone either by the electorate or by private exchange.⁵

My response, drawing on recent work of many authors, is that in the absence of international coordination, globalization indeed makes it difficult for national states to affect the relative (after tax) prices of mobile goods and factors of production, and for this and other reasons may limit the effectiveness of some conventional strategies of redistribution. But globalization does not rule out all egalitarian interventions. There remains a large class of governmental and other collective interventions leading to substantial improvements in the wages, employment prospects, and economic security of the less well off. Included are redistributions of assets which are productivity enhancing, namely those which provide efficient solutions to incentive problems arising in principal agent relationships such as wage employment, farm and residential tenancy, and the provision of environmental and social public goods in local commons situations.⁶

Because the model I present depicts a deliberately exaggerated version of global openness, a caveat on empirical realism is necessary. A number of empirical studies beginning with Gordon (1988) have stressed the while cross-border flows have increased in recent years, by these measures the degree of both trade and investment openness is quite limited in recent decades compared to a century earlier.⁷ The measure of globalization crucial to the above argument, however, refers not to the aggregate quantities on which these studies focus, but to microeconomic responses. The relevant indices should measure the impact of globalization on the elasticity of demand for labor with respect to the real wage (openness possibly raising the employment costs of wage increases) as well as the possibly heightened responsiveness of national investment to own-country wage levels and tax rates

⁴ More stringent requirements might be imposed, namely that the changes needed to enact the transition from the status quo to the desired program (not just the program itself) be implementable, or that the underlying preferences be stationary. I do not explore these problems here.

⁵ The cases of open economy egalitarianism cited above fail to meet some criteria of democracy over the relevant years (especially alternation of parties in power for South Korea, Taiwan, and Singapore) but none were outright dictatorships and most were exemplary democracies. Przeworski, *et al.* (2000).

⁶ A review of these cases is provided in Bardhan, Bowles, and Gintis (2000). Asset based redistribution is also stressed in Birdsall and Londono (1997). Atkinson (1999) and Franzini and Milone (1999) likewise view the constraints thought to be posed by globalization as exaggerated.

⁷ See also Taylor (1999), Glyn and Sutcliffe (1999) and the works cited there.

relative to the rest of the world. There is little hard evidence that by these microeconomic measures openness has increased in recent years, but it seems plausible to think that it has, or at least will.⁸ In any case given the widespread view that these aspects of globalization will thwart attempts at egalitarian redistribution, it is worth finding out if this is indeed the case, under admittedly extreme globalization assumptions. Whether the model illuminates real (if very long term) tendencies operating in the world, or alternatively is a more hypothetical exercise (how the world would work if it were like that) cannot be determined on the basis of existing empirical information.

In the next section I present a highly abstract model of a national economy embedded in a globally competitive environment. The subsequent section addresses a range of conventional state and trade union policy measures. I then turn to asset redistributions before concluding with a discussion of policies and institutions.

2. Globalization

The model presented below seeks to illuminate the opportunities for egalitarian redistribution in a national economy integrated into a world economy characterized by minimal impediments to capital mobility among nations. To focus on the contribution of globalization *per se* to the leaky bucket problem (and because the problems constituted by corruption and other forms of governmental malfeasance and unaccountability are well known) I will assume that governments are not self-serving leviathans (as in the public choice literature) but rather seek to improve the living standards of the less well off.

Redistribution takes the form of increases in the living standards of a homogeneous class of workers, either by raising their income or improving their prospects of being employed. Its focus is not on inequality *per se* but on labor market outcomes affecting two important aspects of workers' well-being, jobs and pay. It abstracts from differences among workers, and much else of importance, but seeks to explore the ramifications of two important empirical regularities. The first is that investment relocates globally in response to differences in expected after-tax profit rates, and the second is that under a wide range of institutional conditions real wages

⁸ Slaughter's (1999) estimate of an impact of openness on the wage elasticity of demand in the U.S. economy cannot be distinguished from a time trend, and the same is true of Heintz and my estimates showing a secular increase in the elasticity of demand for labor in South Africa (1997). Gordon et al (1998) found some evidence of a substantial negative "rest of the world profit rate" effect on U.S. investment, but while Koechlin (1992) also found a statistically significant negative effect of other countries' profit rates on domestic investment in the U.S. this was true in none of the six other countries for which he estimated investment functions. Epstein (1996) found little evidence of convergence of profit rates among nations.

covary with the level of employment.⁹

The basic assumptions of the model follow. All markets are perfectly competitive, but labor (which is homogeneous within countries) is not mobile between countries. The global economy is thus modeled as if it were a national economy with a single capital market but segmented labor markets; the difference, of course, is that each labor market segment is represented by an autonomous government. There is a single good which is both consumed and used as capital (corn is eaten and planted as seed). At the end of each period, after the payment of wages, wealth holders (those who own the corn surplus, if it exists) may either consume corn or allocate it as an investment good among many national economies in response to national differences in expected after-tax profit rates.

Actors differ by wealth level: the wealthy are risk neutral while those without assets (workers, employed and unemployed) are risk averse. Neither work effort nor the promise to repay a loan is contractible, so the relations between employers and workers and between lenders and borrowers are principal-agent relationships. Employers use monitoring and the threat of dismissal to induce workers to provide satisfactory levels of effort. For this reason (and perhaps others), the equilibrium of the labor market in each national economy is characterized by involuntary unemployment. Thus labor suppliers are quantity constrained in labor markets. Lacking wealth they are unable provide collateral or other means of attenuating the incompleteness of the credit contract, they are also quantity constrained in credit markets.

The competitive equilibria of this model for the single global markets in capital goods (corn) and credit support a common rate of expected profit and rate of time preference globally (and hence the risk-free interest rate). By contrast, nation-specific institutions and cultures concerning labor relations, government policies and security of property rights give rise to national differences in equilibrium wages and employment. There are thus $n+1$ prices in this model: each of n nations' real wage (price of an hour of labor relative to the price of corn) and the global risk free interest rate (price of goods now relative to goods later). As I will investigate just a single national economy, I will not give national subscripts to the relevant variables.

Because firms use a single production function and are otherwise identical, we can analyze production and wage setting as if it took place in a single (competitive) firm. Aggregate output, Q , is simply total labor effort times average output per unit of

⁹ Econometric evidence of profit-led investment is presented in Catinat (1988), Clark (1979), Kopcke (1985), Feldstein (1982), Bashkar and Glyn (1995), Boyer and Bowles (1995), Bowles, Gordon and Weisskopf (1989), Gordon, Weisskopf and Bowles (1998) and the works cited there. Evidence concerning the covariation of real wages and employment is found in Bowles (1991) and Blanchflower and Oswald (1994).

effort, y , with a fixed capital (seed) requirement k per hour of labor. Total effort is the average effort level per hour, e , of those employees (the directly productive workers) not engaged in monitoring multiplied by their hours of work, $h(1-m)$ where h is the total (productive and monitoring) hours of work and m is the fraction of total work time accounted for by the monitors. So

$$(1) \quad Q = yeh(1-m) \text{ for } K \geq kh(1-m) \\ = 0 \text{ for } K < kh(1-m)$$

I normalize national labor supply at unity (given exogenously); so $h \in [0, 1]$ is the level of employment. Effort is determined by workers in response to the incentives and sanctions devised by the employer. As these include monitoring and the threat of job termination, the worker's optimal effort choice varies inversely with his or her fallback position, namely expected utility if employment is terminated which depends on the expected duration of a spell of unemployment and the level of support conditional on being unemployed, b . Suppose effort may be either 1 (imposing a disutility of \underline{a} on the worker) or 0, and that the probability of termination if $e=0$ is J . Then, with suitable simplifying assumptions, the wage that will just induce workers to choose $e=1$ equates the expected utility of the two effort choices, which gives

$$(2) \quad w^* = \underline{a}/J(1-h) + b$$

as the "no shirking wage."¹⁰ Of course J and \underline{a} depend on the institutional structure governing labor relations (the costs to the employer of firing a non-working employee, the perceived fairness of the wage determination process, the degree of effectiveness of the monitoring system, and the like). Along with $e=1$ which it insures, (2) implements both the firms' and the employees' first-order conditions, describing the feasible combinations of w , h , and total effort supplied to firms; it is thus the *labor supply equilibrium condition*. The model underlying equation (2) is quite particular, but it gives a convenient analytical form to the much more general empirical regularity

¹⁰ A bare bones model is this. Workers commit to a level of effort at the beginning of each period at which point with some probability they will be monitored and detected if they are shirking. The utility of providing effort is just $u(w) - \underline{a}$ while for providing none is $(1-J)u(w) + J[(1-h)u(b) + hu(w)]$ where the second term gives the consequences of termination, namely a probability $(1-h)$ of remaining unemployed and receiving b , and a probability (h) of finding work at the going wage. The assumption that those who are terminated and then find work will not be monitored again until the beginning of the next period allows a particularly simple no-shirking condition: $u(w) - u(b) = \underline{a}/J(1-h)$. See Shapiro and Stiglitz (1984) and Bowles (1985); Bowles (1991) provides empirical estimates of the resulting wage function. The equation in the text lets $u(w) = w$ and $u(b) = b$, thus abstracting from workers' risk aversion. Endogenizing the employers' choice of the desired effort level and monitoring intensity would complicate the model but not alter the results.

mentioned earlier, namely $w_h > 0$, the covariation of wages and the employment level.¹¹ (For simplicity I assume monitors are paid the same wage as other employees and I do not address the problem of their incentives to work.) It will be important later to note that because employees do not shirk, they are not fired, and so bear no risk. There is therefore a group of $1-h$ permanently unemployed.

Labor demand (and hence the level of unemployment) depends on the allocation of the global capital stock among national economies in response to differences in the expected after-tax profit rate. Recalling that the capital good is an intermediate input, the profit rate before tax is just

$$r = \{(y-k)h(1-m)-wh\}' kh(1-m)$$

or expressed in per hour of employment (by eliminating h) the profit rate is net output per hour of labor minus the wage rate, divided by the capital input required to employ an hour of labor. Suppose that to finance its activities the national government levies a linear tax, t , on profits so the after tax profit rate is

$$(3) \quad B = r(1-t) = (1-t)[(y-k)(1-m)-w]' [k(1-m)]$$

Wealth holders finance a project if its expected return exceeds their rate of time preference, which I will assume is globally equal to the return on some risk-free instrument, D . Projects are exposed to a risk of “confiscation” or other unexpected reduction in their value, the probability of which, $c \in [0,1]$, varies among countries, reflecting national differences in macroeconomic policy, political stability, criminality, and the like. (In a less abstract model with distinct national currencies, risk includes adverse changes in foreign exchange rates.) Suppose the return is zero in the period of the confiscation: wages are paid but the expected costs of contestation occasioned by the confiscation exactly exhaust the profits. The expected profit rate is thus $B = B(1-c)$. Writing the insecurity premium, $\mu = 1/(1-c)$, the national economy's level of corn investment is stationary if expected after-tax profit rates are equated across nations and are jointly equal to the risk-free interest rate ($B=D$) or:

$$(4) \quad B=D\mu$$

Because r is monotonically declining in w , there is just one wage rate which will satisfy (4); using (3) to rewrite (4) we find that this wage \underline{w} is given by

$$(5) \quad \underline{w} = (1-m)[y-k(1+D\mu)]' (1-t)$$

¹¹ An alternative formulation yielding similar qualitative results would make the wage level and effort level the outcome of a collective bargaining process, with the (Nash) bargain struck depending on the fallback position of the two parties, and labor's fallback rising with h .

When (5) obtains, the level of the capital stock, and hence employment is stationary; it is the *equilibrium labor demand equation* (conditional on $e=1$).¹²

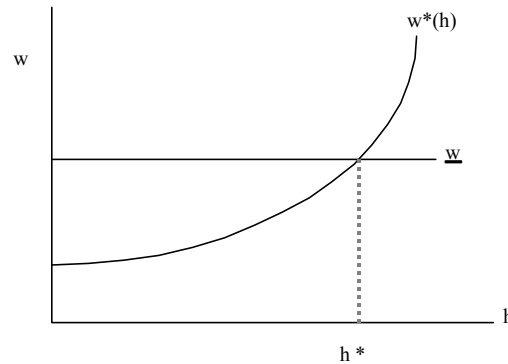


Figure 1: Equilibrium Employment and Wages.

Because $w^*(h)$ is monotonic, there is just one h consistent with \underline{w} . The general equilibrium of the national economy (taking D as exogenous) is defined by

$$(6) \quad w^* = \underline{w},$$

satisfying the condition for stationarity of both the employment rate and the wage rate.¹³ Their determination may be described as follows: the nation's specific institutions which influence the net after tax productivity of labor and the risk premium determine the national wage rate consistent with optimizing by the owners of mobile investment resources, and the nation's institutions concerning labor markets and work organization determine what national level of aggregate employment makes that wage consistent with individual optimizing by firms and workers. Figure 1 illustrates the equilibrium of this model for a given national economy. (Notice that for any wage less

¹² Nothing of substance depends on the assumption that k is exogenous. If firms using a production function with the conventional properties chose an optimal level of k depending on the wage rate so that $k=k(w)$ with $k'>0$ and $y=y(k)$ with $y_k>0$ the unique wage rate consistent with world capital market equilibrium (and independent of h) would exit as in (5) but with the production technology endogenous; (5) would represent the wage satisfying both the firm's first order conditions for the choice of inputs and the global capital market equilibrium consistent with those inputs. Thus making the dependence of y and k on w explicit does not alter the fact that there exists just one national wage rate consistent with equalized expected wage rates among nations. The invariance of \underline{w} with respect to h results not from exogeneity of k but from the assumption that there are constant returns to scale at the national level and no factors are in fixed supply.

¹³ The equilibrium exists as long as $w^*(0;b) < \underline{w} < w^*(1;b)$. The equilibrium is stable and unique under current assumptions, but as we will see presently, need not be.

than w^* , $e=0$, so $dh/dt < 0$ for $w < w^*$ or $w > w^*$.)

Finally, the global supply and demand for corn as an investment good together with the above conditions determine the risk-free interest rate, D . Suppose that in every country, production takes place according to the nationally specific versions of (6) and at the end of each period there exists a corn surplus, a given fraction of which is consumed by the wealthy, the remaining fraction, N , being allocated to investment among national economies.¹⁴ As capital (unlike labor) is not nationally specific, I assume N is common across countries. At the end of each period, the corn output net of wages per unit invested is $[B(1-c) + 1]$ and N of this is supplied to the global stock of corn capital in the next period (by contrast, the supply of investment goods available in the country is infinitely elastic at the rate D). Call the amount $(B(1-c) - 1)N$ the corn surplus. Because in equilibrium $B(1-c) = D$ in every country each country supplies an amount to next year's global capital stock equal to $[D + 1]N$ for every unit of the current period's stock. The rate of growth of the world capital stock is thus $(D+1)N - 1$ or $DN - (1-N)$.

The equilibrium global demand for investment goods is just the amount of corn necessary to provide the capital goods required by the employment the fraction of each country's the labor force consistent with the zero profit condition (i.e. that given by (6).) Thus market clearing (and stationarity of D) requires that the global corn surplus (the global supply of capital goods) grow at the same rate as the world labor supply, $<$. The D which equates the growth rates of capital goods supply and labor supply is given by

$$< = DN - (1-N), \text{ or}$$

$$(7) \quad D = (< + 1)/N - 1.$$

Countries with slower labor force growth will be permanent exporters of corn-capital and conversely. This is because excess supply of investment goods per unit of the current period capital stock (in a given country whose labor force is growing at the rate O) is

$$(8) \quad) = N(B(1-c) + 1) - (1+O)$$

The first term in is the corn surplus available for investment per unit of the current period capital stock and the second is the increase in the capital stock required to sustain the equilibrium level of employment. Using (7) and the fact that $B(1-c) = D$ we

¹⁴ The invariance of N with respect to D may be motivated in a number of ways, for example it results from an inter-temporal utility function of the wealthy of the form $u = ux^{1-N}g^N$ where x is this period's consumption and g is a bequest to the next generation equal to the returns on the invested corn, given next period. Nothing of substance would be altered if D and the investment share of the surplus were jointly determined.

can see from (8) that $\frac{dH}{dD} < 0$. An implication is that when national labor forces all grow at the global average, in equilibrium all investment is domestically financed.¹⁵

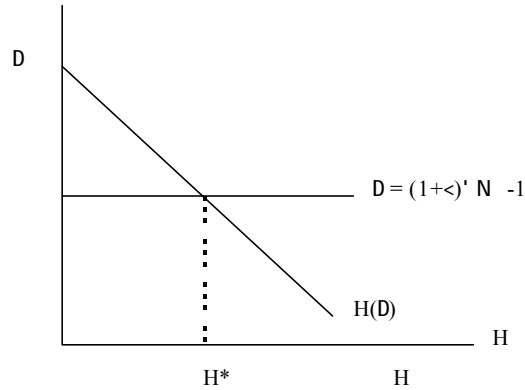


Figure 2: World Labor Demand

To analyze the determination of global employment, notice that a common global D implies country specific $\underline{w}_i(D)$'s for each of the n national economies; given nation specific $h_i(w)$'s the h_i 's are determined as well. So we may define global employment, $H(D)$, as the horizontal summation of the implied $h_i(D)$ functions, giving $H(D)$, with $H' < 0$, where the variation in world employment is simply that generated by varying D given the equilibrium condition (6). Figure 2 illustrates the determination of global employment. In the following analysis of a single national economy I treat D as exogenous.

3. Increasing Wages and Employment

Where, as in Figure 1, the equilibrium is unique and stable, the effect of country-specific policy interventions may be studied (as I will do presently) by a comparative static analysis of the displacement of the exogenous terms in $w^*(h)$ and \underline{w} . But the more complicated case of multiple equilibria (some of them unstable) cannot be ruled out. To see this, suppose that the confiscation probability c varies inversely with h -- high levels of unemployment supporting a populist or criminal environment, for example -- so $\mu = \mu(h)$ with $\mu' < 0$. Then \underline{w} is increasing in h , which (because w^* is also increasing in h) means that there may exist many values of h equating the two.¹⁶

¹⁵ Note that in this "hyper-globalized" economy, there are no investment or trade flows in equilibrium, underlining the importance of distinguishing between aggregate flow-based and microeconomic response-based measures of openness.

¹⁶ I here provide no reason to expect multiple equilibria -- they are not difficult to imagine -- but simply note that their possibility may help explain the pattern of divergence among apparently similar national economies ((Nigeria's per capita

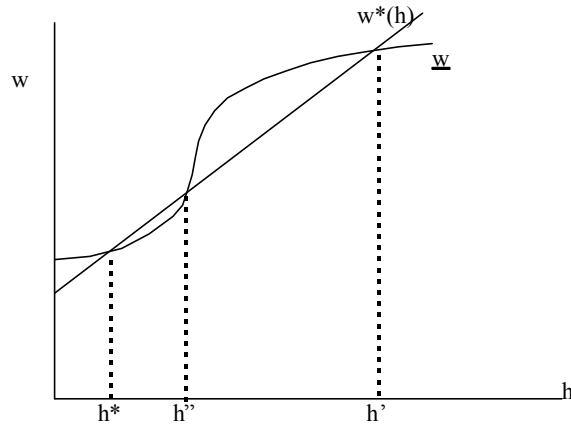


Figure 3: Multiple Equilibria (endogenous risk)

Figure 3 illustrates an upward-rising equilibrium labor demand function, with the labor market equilibria a exhibiting the vicious circle of low employment, low wages, and high insecurity premium ("Nigeria") and a' exhibiting the virtuous converse ("Taiwan"). The possibility of multiple stable equilibria enriches the policy analysis considerably, as it allows small one-time interventions to have permanent, non-marginal effects, and it provides a framework for analyzing possible divergent growth paths ("high road" vs "low road" wage strategies, for example.) A one-time demand expansion, for example, pushing the employment level above the critical value of h'' in figure 3 could permanently shift the equilibrium from the low wage/high insecurity poverty trap to its virtuous converse.

The impact of strategies to raise wages and employment may now be assessed through their curve-shifting effects in figures 1 or 3. For example, enhanced security of property rights by reducing c (for any level of h) lowers μ , hence raises \underline{w} , and increases both h^* and w^* (from figure 3, it can be seen that the implied upward shift in $\underline{w}(h)$ might also eliminate the "low road" equilibrium, displacing a national economy previously entrapped there to a rapid transition to the "high road".)

The effects of changes in labor relations and labor market structure are equally transparent. Efforts to protect workers from dismissal for cause by reducing J through job protection strategies shift the $w^*(h)$ function upwards without affecting \underline{w} , leaving the wage rate unaffected but reducing employment. Raising b , the magnitude of transfers whose availability is conditional on being out of work, has a similar effect, but unlike a reduction in J , the welfare implications of an increase in b are ambiguous, as it raises the well-being of the least well off (the jobless), while increasing their

income exceeded that of Taiwan, for example, in 1950 (Summers and Heston (1984)) and more generally what Quah (1996) calls the "twin peaks" pattern of divergence in income levels among countries.

numbers.

Trade unions may increase wages and/or employment in a number of ways, however (Bowles and Boyer, 1990b). First, unions may draw on workers' private information concerning the performance of other workers to improve the disciplinary environment of the workplace (raising J or lowering m). Second "union voice" effects (Freeman and Medoff, 1984) may raise productivity and reduce the disutility of labor, (the latter would lower the $w(h)$ function, supporting a higher level of employment). Third, collective bargaining agreements to provide well-defined job ladders and security from cyclical job loss provide greater incentives for firm-specific investments by workers (Pagano (1991)). Both union voice and specific investment effects shift \underline{w} upwards and $w^*(h)$ to the right.¹⁷ Fourth, negotiated incomes policies may lower or flatten the $w^*(h)$ function.¹⁸ Finally, if \underline{w} becomes accepted as a fairness norm -- perhaps because it is the wage rate that will give the employer a rate of return equal to what other employers receive, or to the marginal disutility of foregoing current consumption -- and if, as seems likely, perceived fairness is a determinant of work effort, the $w^*(h)$ function will flatten, thereby increasing the employment gains associated with upward shifts in \underline{w} due to productivity gains. Because in equilibrium, no employee is working harder as a result of any of these changes, and because the unemployed prefer employment, the welfare gains associated with the implied trade union induced increases in wages and or employment are unambiguous.

The effects of government expenditures and the efficiency of public service delivery may be explored in similar fashion . Suppose the productivity of a unit of effective labor depends on θp , the effectiveness (θ) and level (p) of public expenditure

¹⁷ In a multi-period context, a reduction in the probability of job loss for reasons other than insufficient effort (protection from cyclical layoffs, for example) reduces the no-shirking wage because it increases the value of not shirking.

¹⁸ Where, as in the Nordic social democratic countries and especially Sweden, collective bargaining explicitly sought to implement wages consistent with successful competition in global markets, the $w^*(h)$ function came to approximate the \underline{w} function itself (the latter defining the target wage in the above bargaining model), with firm- and industry-specific wage drift accounting for discrepancies between the two functions. Perhaps surprisingly, negotiated incomes policies can lower the labor supply equilibrium condition (for all values of h) even if $w^*(h)$ represents a conventional efficiency wage no shirking condition; for the competitive equilibrium wage in that case will exceed that which would minimize the cost of an effective unit of labor if implemented by collusion among employers. The reason (explained in Bowles and Boyer, 1990a) is that each worker's fallback position includes the prospect of a job at *other* employers' wages, so employers face a coordination problem resulting in their overpaying relative to their joint profit maximum. Thus there exists a lower wage which colluding employers would prefer, and which might be implemented through negotiated incomes policies.

on productivity-enhancing complementary inputs (such as nutrition, health care, schooling and infrastructure) so $y = y(\delta p, \dots)$. Assume the government spends all of its tax revenues on p as well as b , the benefit paid to a worker when unemployed, giving the budget constraint (expressed as an equality):

$$(9) \quad b(1-h) + p = th\{[(1-m)y(\delta p) - k] - w\}$$

From (9) it can be seen that for a given tax rate, there is a level of employment such that unemployment benefits exhaust the entire budget, and productivity per effective unit of labor is $\underline{y} = y(0)$.

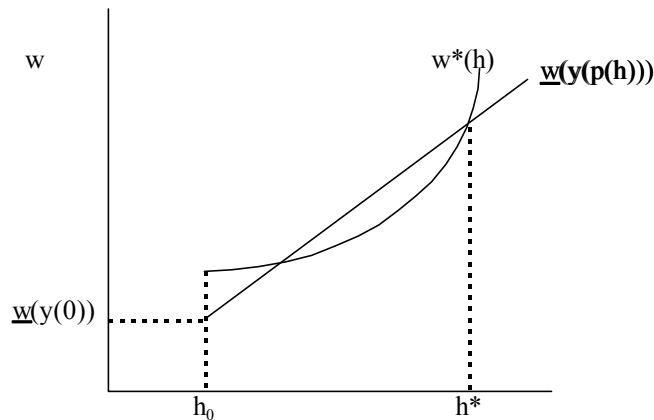


Figure 4: Endogenous Transfers and Public Investment

Above this level of employment, productivity-enhancing public expenditures increase, which by (5) then require a higher wage to equilibrate the capital market, yielding the upward rising \underline{w} function in figure 4. The also upward-rising $w^*(h)$ function (as drawn) intersects the equilibrium labor demand function twice, suggesting a possible high and low public investment divergence among nations.¹⁹ Because for any level of h , \underline{w} covaries with δ and varies inversely with b , and because (as we have seen) decreasing b also shifts the $w^*(h)$ function to the right, it follows that reallocating expenditure from transfers conditioned on unemployment towards productivity enhancing public investment and increasing the effectiveness of public expenditures will simultaneously raise the (stable) equilibrium wage and employment level.²⁰ It might appear that this change is unambiguously welfare enhancing, but a

¹⁹ There is no "low road" equilibrium in this case, as h_0 violates (6) while lower levels of employment violate the budget constraint.

²⁰ For a given level of b , δ and h , there exists a tax rate that maximizes \underline{w} (and hence both employment and wages); for obvious reasons it varies inversely with b (if taxes were spent only on b , the optimal rate would be zero) and covaries with δ and

more realistic model in which the employed periodically lose their jobs would show that for sufficiently high levels of risk aversion among workers, the lost insurance would more than offset the higher expected wage.

Increases in productivity (y), whether due to public expenditure or exogenous technical change, shift \underline{w} upward allowing increases in equilibrium employment. Differentiating (6) we see that the size of this employment effect depends critically on db/dy , the effect of the change in productivity on the fallback position of employed workers:

$$(10) \quad dh/dy = \{(1-m) - db/dy\}/w_h$$

which has the same sign as its numerator, as we know that $w_h > 0$. Where productivity gains are shared with the unemployed through increases in b , and where monitoring levels are substantial, the upward shift in the equilibrium labor supply condition (2) may even reverse the potential employment gains. There is thus a policy choice concerning the manner in which productivity increases should be shared with the unemployed through expanding the number of jobs on the one hand, or by raising the average income of those remaining unemployed on the other.

As the examples in this section make clear, opportunities for raising wages and/or employment arise when allocative inefficiencies can be corrected either at minimal cost (as when union voice effects may attenuate the misalignment of incentives arising from the incomplete employment contract) or through expenditures on which the expected social rate of return exceeds μD (as when credit constraints or other reasons induce workers to acquire inefficiently little schooling.) The problems of credit constraints and incomplete contracts may also be addressed more directly by a redistribution of assets, or more precisely by a redistribution of the rights of residual claimancy and control commonly bundled with asset ownership, and by extending to the asset poor the credit market and insurance opportunities of the wealthy.

4. Asset-Based Redistribution

Suppose at the beginning of each period, a national government borrows corn on the world market at the rate D , in turn lends it to teams of producers at the rate $D\mu$, who at the end of the period are equal residual claimants on the income of the team, after repaying the government an expected amount of $1+D$ per unit of corn borrowed (accounting for confiscations occurring as before at the rate c .)²¹ Assume that these

h (where h is high little tax revenue goes to unemployment benefits and more to productivity enhancement, so as long as the rate of return of public investment exceeds D it raises \underline{w} .)

²¹ The simpler case in which individual producers use the corn to produce independently is transparent, but not empirically relevant where team production is

coops adopt a labor discipline strategy similar to their erstwhile employers (dismissing non-performing team mates). Coops are therefore constrained to offer members a level of income equivalent to $w^*(h)$, to deter shirking (as we will see immediately below, because the producers now bear risk, the coop must offer a certainty equivalent income equal to $w^*(h)$.) Work mates have private information on each others' work activities, and as residual claimants on the income of the team members are motivated to participate in mutual monitoring, so the monitoring costs of maintaining work effort will be reduced, to $m^- < m$.²² As before I assume that the monitors receive the same hourly payment as the directly productive coop producers. Finally, let the implicit tax rate on the use of capital remain unchanged.

The co-op's advantage of reduced monitoring may be more than offset by suboptimal risk-taking. The reason is that risk-averse members now control the production process and (relaxing the assumption of given production technologies) face a choice among production methods of varying risk and expected output. Recall that as wage employees the producers bore no risk, but as residual claimants they must, given that they are residual claimants on a stream of output which is subject to stochastic variation. For concreteness imagine that corn may be planted at various times, and the expected return and its variance depend on the planting date, with greater risk covarying with higher expected returns over some range.

Suppose that expected output per hour of effective labor is $y(F)$ where F is the standard deviation of output and y is increasing and concave in its argument, reaching a maximum at F^* . The risk-neutral employer of course selected F^* , so the analysis of the previous section assumed a level of expected productivity of $y = y(F^*)$. Utility-maximizing risk-averse coop members will select some level of $F^- < F^*$ and hence generate a level of expected income $y(F^-) < y(F^*)$. Coop members are thus residual claimants on income stream generated by this lesser level of risk taking and, using (5), have an expected income of

$$(11) \quad T = (1-m)\{y(F) - k(1+D\mu)/(1-t)\}$$

Of course the expected value of their residual income $T(y(F^-))$ may nonetheless exceed the \underline{w} possible under wage employment, depending on the magnitude of the monitoring savings relative to the reduced expected income occasioned by suboptimal risk taking. But what matters for them is a comparison of the certain income \underline{w} in wage employment with the certainty-equivalent income associated with the coop's risky

required by economies of scale or for other reasons. I assume that there is no rental market in corn.

²² Bowles and Gintis, (1999) present a model of this process and point to a number of empirical cases in which reassigning residual claimancy to members of even very large teams has substantially increased output per worker hour.

income stream, namely $\underline{I}(y(F^-), F^-)$.²³

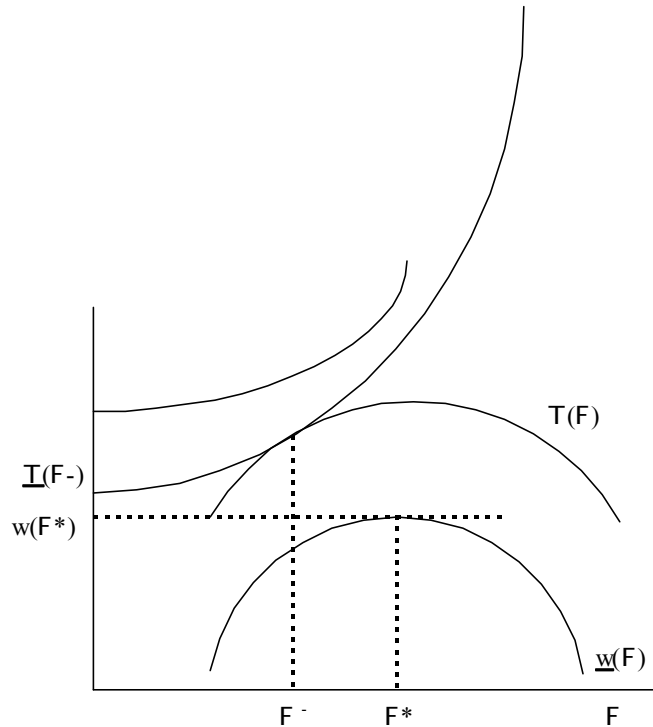


Figure 5: Reduced monitoring and suboptimal risk

In order to define the members' certainty-equivalent income, I assume the disturbances in the income stream of the coop are such that one can represent the utility function of the risk-averse members simply as

$$(12) \quad u = u(T, F)$$

where T is a "good" and F is a "bad"; Figure 5 illustrates two of the implied family of indifference loci.²⁴ The figure also indicates the capital market clearing wage rate, \underline{w}

²³ To ensure that the loan is repaid with certainty, I must assume either that in those presumably rare cases where their realized residual claim is negative (realized gross income = $y^r < k(1+D\mu)/(1-t)$) coop members have consumption smoothing opportunities, or that these cases are sufficiently unlikely that they may be ignored.

²⁴ A sufficient assumption is that risk is generated by a linear class of disturbances which would arise, for example, if the realized output level is defined by $y^r = Fz + y(F)$ where z is a random variable with mean zero and standard deviation unity. This treatment draws on Bowles and Gintis (1999) and the works by Sinn (1990) and

defined as before by (5), and the expected residual claim of the coop member $T(F)$; the later, using (5) and (11) is given by

$$T(F) = \underline{w}(F)(1-m)/(1-m)$$

Risk neutral indifference loci are flat of course, which is why the erstwhile employer selected F^* . The vertical intercept of an indifference locus is the certainty equivalent of each point making up the locus, so $T^{\wedge}(y(F), F)$ for example, is the certainty equivalent income of the expected income and risk level resulting from the coop's choice of F .

For this example, $T^{\wedge}(F) > \underline{w}(F^*)$ -- producers' certainty equivalent income would be raised by the formation of coops--and for this reason, coops would proliferate and wage employment would be eliminated. As Figure 6 shows, the level of joblessness would fall as a result, though not more than h producers can belong to coop work teams as the $1-h$ jobless are required to sustain the no-shirking condition

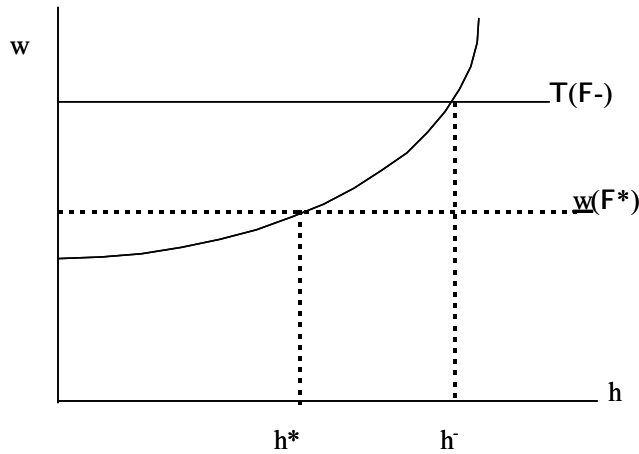


Figure 6: Coop income and employment

at the certainty-equivalent income consistent with the stationarity of the country's capital stock. If, by contrast, $T^{\wedge}(F) < \underline{w}(F^*)$ of course, producers would not accept the government loans, and coops would not form.

Suppose, however, that as in figure 5 the coop is advantageous to the producers; why was the government's intervention required to allow their formation? The obvious answer -- that the asset-less producers were precluded from borrowing at economically viable rates of interest -- raises a more difficult question. If, as this answer implies, the wealth-poor producers' subjective cost of postponing current consumption exceeds $D\mu$, why would they not prefer to use the government loan for

Meyer (1987) cited there.

consumption purposes? They would; so a successful loan program would have to embody an enforceable provision restricting the use of the corn to planting rather than eating. But as we will see, this administrative difficulty is an artifact of the simplicity of the model.

Gintis and I (1999, Theorems 2 and 3) show that a transfer of an asset (rather than a loan) mandated by the government may induce the producer to hold the asset and use it productively even when the transfer of property rights could not have occurred through private contracting. This implies, of course, that both the *ex ante* and the *ex post* distribution of property rights are Nash equilibria. There are two reasons why this is possible. Both stem from the fact that the asset transfer alters the opportunities and constraints of the producer, with the *ex post* situation supporting use of the asset by the producer while the *ex ante* situation is precluding it. First, changing the wealth status of the producer also changes his or her credit market status (and hence subjective cost of delaying consumption), increased wealth lowering the subjective cost of capital. And second, increased wealth may plausibly reduce the degree of risk aversion, so that while the choice of F by a wealthless producer (say, renting the asset or using borrowed funds) might have precluded the project being viable, the (riskier) choice of the same producer with increased wealth (as owner of the asset) may be viable.²⁵ For this reason a one-time mandated redistribution of wealth -- making the producers owners and residual claimants -- may be sustainable in competitive equilibrium and thus have permanent effects.²⁶

Whether the peer-monitoring advantages of the coop will outweigh its risk avoidance will depend among other things on the policy environment, of course. More adequate insurance may induce risk-averse producers to choose a higher level of F (effectively rotating the indifference loci in figure 5 clockwise (Gintis and Bowles (1999)). Such insurance policies may protect the producer against risk unassociated with the production process (health insurance, insurance against exogenous variation on housing wealth) or against those aspects of stochasticity in the income stream of the production process which are observable and not affected by the actions of the producer (for example, macroeconomic stabilization, Shiller (1993)). Because these insurance policies may be self-financing (fair), the gains to producers constitute Pareto-improvements and the range of egalitarian redistribution of residual claimancy and control of assets (through loans or outright transfers) which is consistent with

²⁵ Evidence for an inverse relationship between wealth and risk aversion is presented in Saha, Shumway, and Talpaz (1994) and the studies cited there.

²⁶ Technically, the distribution of wealth is governed by a non-ergodic dynamical process in which initial conditions (or one time exogenous interventions) determine which of many possible equilibria will obtain. Galor and Zeira (1993) and others have shown that where credit constraints face the asset poor, and where there is a minimum economically viable project size (accounting for the necessity of team production in this case) the wealth distribution process may be non-ergodic.

global competitive equilibrium is expanded.

Egalitarian asset redistribution may have other productivity enhancing effects, for example, supporting more effective governance institutions in communities, firms, and the national level, and in promoting a more growth inducing structure of human capital accumulation.²⁷

5. Policies

Of course actual governments and trade unions may fail to implement efficient redistributions for a variety of well known reasons. But on the basis of the above reasoning, there appears to be ample scope for the implementation of policies capable of raising wages, employment levels and living standards of the less well off owners of globally immobile factors of production, even in the empirically unlikely world of hyper-globalization posited in the model. It seems likely that substantial majorities of the relevant populations would benefit from these policies, so the policies might be sustainable in democratic polities.

That these objectives can be furthered by nation states acting singly is suggested by the dramatic national differences in real wage growth that have been sustained over long periods. Figure 7 presents data (from Verhoogen 1999) on real manufacturing wage growth over an 22-year period.²⁸ Even taking account of the

²⁷ Examples are given in Engerman and Sokoloff (1997), Engerman, Sokoloff and Mariscal (1998), Bowles and Gintis (1998), and Birdsall and Londono (1997)

²⁸ The data (for this figure and the next) are from the United Nations Industrial Development Organization Industrial Statistics Database. The wage measure is average annual earnings in manufacturing. The subsequent productivity measure is value added per employee in manufacturing.

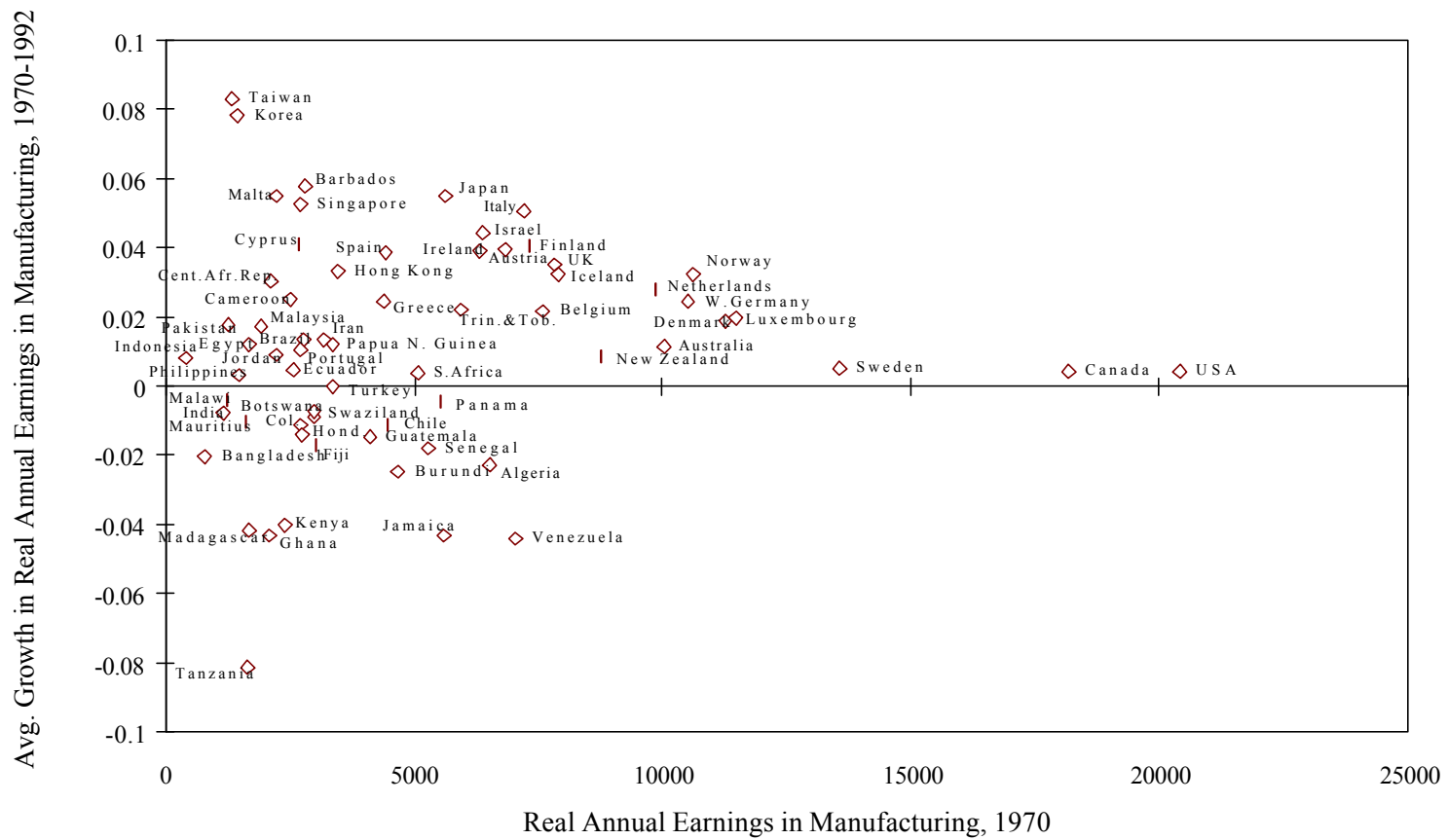


Figure 7. Annual Rate of Change of Real Wages and Initial Wage Levels, 1970-1992

possible importance of productivity catch-up effects (by comparing national economies initially at the same wage level) one finds extraordinary differences: the *annual* rate of change of real wage was 16 percentage points higher in Taiwan and S.Korea than in Tanzania and 10 percentage points higher in Barbados and Italy, than in Jamaica and Venezuela. Some of the high wage growth economies have also experienced very rapid employment growth.

Figure 8 confirms what one would expect -- that wage growth is closely tied to productivity growth; but even for economies experiencing similar rates of increase in manufacturing value added per worker, the differences in wage growth are substantial. Productivity grew in Indonesia grew at the same rate as in Italy, for example, but wages grew over 5 per cent faster per annum in the latter. While much of the differences are due to idiosyncratic events and circumstances -- the differing impacts of the two oil shocks, for example -- national contrasts of this magnitude suggest that institutional and policy choices do matter, even for small open economies 1972 and which shared broadly similar institutions, experienced far less variability in subsequent wage growth.)

We know little, it seems, about which institutions and policies account for the success stories. A common opinion in some policy circles is that strong unions and substantial redistributive programs are counter-productive in attempting to raise living standards of the less well off. The reasoning behind this view is that these institutions favor the egalitarian division the pie, rather than more promising long-term strategies of rapid growth in investment and average income. Examples confirming this reasoning are all too easy produce. (this is consistent with the fact that economies in which wages exceeded \$10,000 in 1972 and which shared broadly similar institutions, experienced far less variability in subsequent wage growth.)

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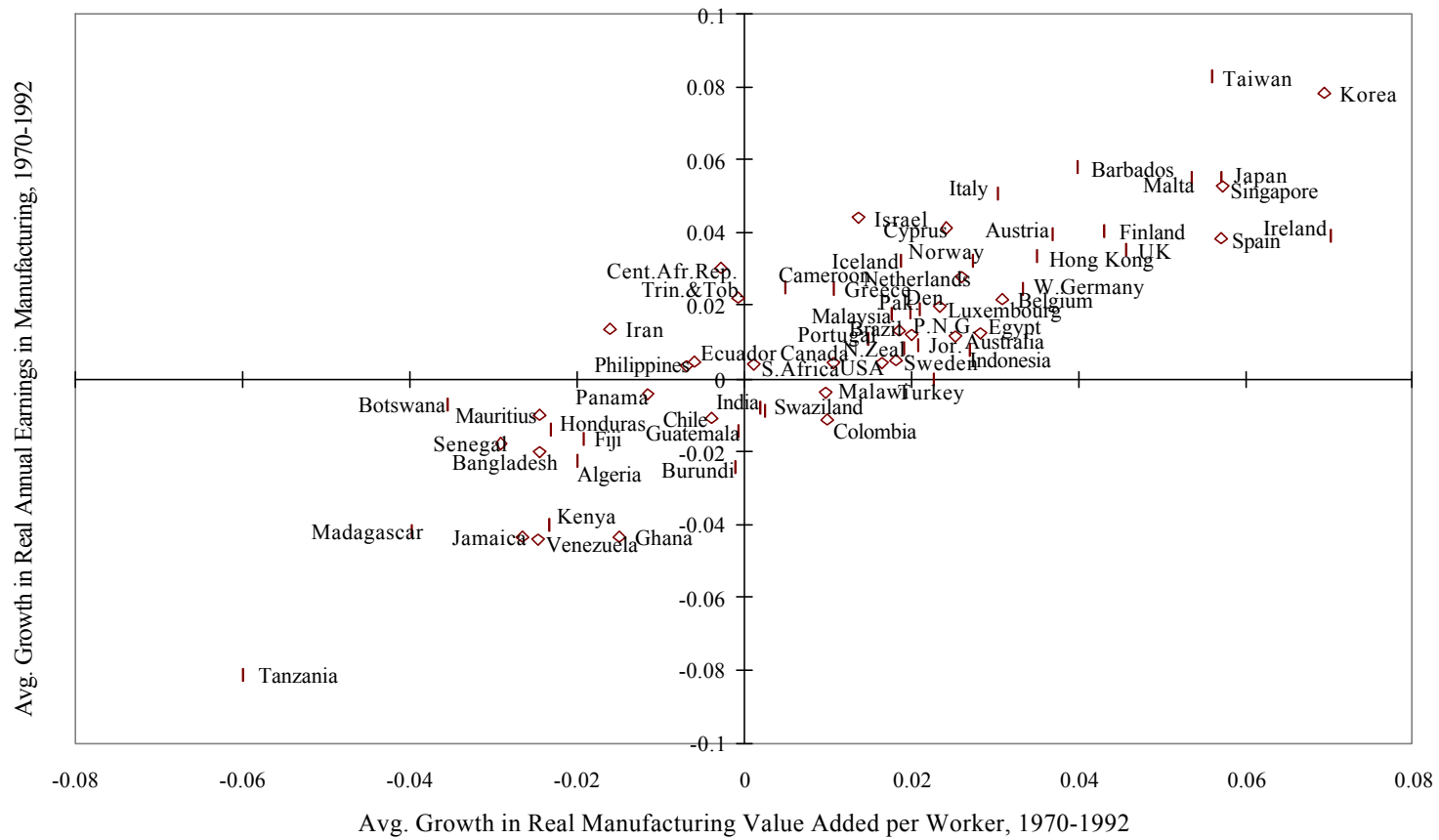


Figure 8 Rate of Change of Real Wages and Value Added per Worker, 1970-1992

But this view finds little support in the above data. Indeed a long historical perspective suggests the opposite: as figure 9 shows, the golden age of the welfare state and of trade unionism in the advanced economies witnessed by far the most rapid rates of growth of income per capita and investment in the history of capitalism.²⁹ In most countries, the improvement of living standards of the less well off was correspondingly rapid.

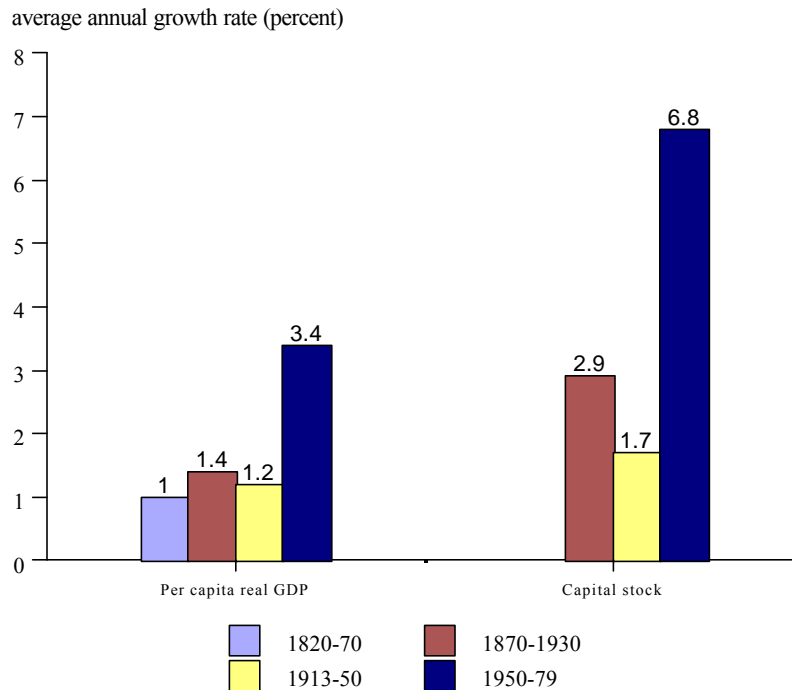


Figure 9: Growth and Investment, 1820-1979

The model presented here and the empirical evidence suggests three ways that egalitarian redistribution in open economy settings may have succeeded. The first is by increasing productivity (or certainty-equivalent income, where risk-bearing is involved). Examples include the East Asian asset redistributions and the Nordic (especially Swedish), and Singaporean policy of eliminating wage disparities among similar workers, thus putting competitive pressure on low productivity firms and sectors and driving resources into higher productivity uses. The second is improving the labor discipline environment and thereby reducing monitoring costs and shifting the equilibrium labor supply condition to the right. Examples include the effect of wage increases the disutility of effort (through the fair wage effect), trade union and work team participation in monitoring, and the effect of centralized wage bargaining

²⁹ The data refer to 13 economies comprising most of world output over the period covered and are from Glyn et al., (1990) based on Maddison's (1982) data set. The measure of capital accumulation is based on the tangible reproducible non-residential fixed capital stock.

on flattening the labor supply function. The fact that supervisory labor input is strikingly lower in countries with more egalitarian earnings distributions (Sweden, Japan) may reflect these and related effects (Gordon, 1994)

The third strategy is simply to redistribute labor income in a more egalitarian manner without eroding effort incentives. Suppose, instead of providing income conditional on unemployment, the government gave all adult members of the population an unconditional grant $\$$ and financed the grant by a tax on wages supplemented by the general revenue savings occasioned by setting $b=0$. Assume the government sought to do this while maintaining the status quo work incentive situation, as modeled in Bowles (1993). As $b=0$ the equilibrium labor supply condition (no shirking condition) is now

$$(2') \quad w^* = a/J(1-h)$$

a flat tax on wage income of b would restore equilibrium labor supply condition. As the labor demand equation has not been altered, the employment and (before tax) wage level would thus remain at the status quo levels. The unconditional grant would be financed from tax revenues of hb plus savings on the elimination of the previous transfers of $(1-h)b$. All adults would thus receive an unconditional grant of $\$=bh/N$ where N is the adult population. The effect would be a redistribution from the employed and the unemployed to those not in the labor force, obviously favoring the old, the young, women, and other groups sometimes called "excluded." It might be thought that the effects of the unconditional grant would be slight because family structure and other sharing arrangements allow income pooling. But even in the empirically implausible case that all of the differentially affected groups were paired in pooling arrangements so that the expected income of each was unaffected by this policy, dispersion of unconditional income claims to those not in the labor force would predictably alter the intra-family bargaining power and possibly also the credit market status of the previously relatively poor and powerless. This appears to be the case, for example of the quite generous transfers to the elderly in South Africa (Ardington and Lund (1995)). Of course the grant $\$$ need not take the form of a cash transfer but could rather be dedicated claims on health, education, recreation, and other services.

As this last example suggests, in the design and implementation of policies consistent with the supply side egalitarian approach surveyed here, the heuristic distinction between the asset redistribution approach of the previous section and the wage and employment policies of section 3 will lose some of its salience. Where labor contracts embody both job security and group- or firm-level gain sharing, for example, employees, may become defacto residual claimants on a substantial fraction of the income streams they generate. Trade union bargaining can thereby capture some of the peer monitoring advantages of outright asset distribution to coops. This is particularly likely to be the case where the monitoring labor effort by outsiders is ineffective (as in many information based and other service activities), where firm

specific human resource investments are important, and where the capital required is either limited in amount or general (rather than transaction specific) and not subject to depreciation through misuse. The land tenure reform in West Bengal mentioned at the outset embodied exactly this logic: the outright transfer of assets to farmers was precluded by the property clauses in the Indian constitution. Rather, the farmer's share of the crop was increased from a customary one half to three-quarters, and tenants were given protection from eviction as long as they granted the landlord the stipulated reduced share. The result was a substantial increase in the rights of residual claimancy due not only to the increased share, but also to the reduced threat of eviction and hence the greater likelihood that the farmer would enjoy the future returns to land improvements and other investments.

6. Conclusion

Does globalization impede egalitarian redistribution?

What globalization does is to make it quite costly and possibly politically infeasible to depress the expected after tax rate of return to capital, or to alter the relative prices of tradeable goods and services. But while globalization – at least in the *hyper* form illustrated here – fixes the relative prices of some productive services, it precludes neither an egalitarian redistribution of the tangible and human assets from which those services flow, nor the enhancement of the assets currently owned by the less well off, nor the improvement of the institutionally determined flow of services from labor assets. Thus, gain-seeking competition does restrict the range of economically and politically sustainable relative prices, but it does not preclude egalitarian redistribution. The fundamental theorem of welfare economics defines conditions under which *any* technically feasible and Pareto optimal distribution of welfare can be attained by *some* redistribution of assets followed by perfectly competitive exchange. The theorem is not intended as a guide to policy, but it does underline an important truth: to the extent that globalization heightens competitive pressures it may reduce the attractiveness of redistributive approaches which rely on altering relative prices, but this hardly exhausts the set of egalitarian strategies.

An implication of the above is that the traditional vehicles of egalitarian aspirations -- trade unions and states -- have a different but no less important role to play in a highly competitive world than in closed economies. The scope for conventional governmental and trade union measures which reduce the after-tax expected rate of profit is indeed restricted. But policies to implement Pareto-improving productivity gains may in some respects require a greater rather than lesser degree of collective interventions in atomistically competitive outcomes. Examples include an expanded role for publicly-provided insurance to improve the tradeoff between peer monitoring gains and suboptimal risk-taking losses entailed by more extensive residual claimancy and control of assets by the non-wealthy, and greater involvement of collective bargaining in more closely aligning the incentives of employers and employees with respect to both working and learning on the job.

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A notable effect of globalization, unremarked thus far, is that (in the extreme form assumed here) it makes the non-wealthy members of a national population residual claimants on the results of both their productive efforts and their success in solving productivity dampening coordination failures. It thus inverts the more common relationship in which the wealthy are the residual claimants on the income streams generated by the efforts of the less well off. While in competitive equilibrium the wealthy cannot get *less* than D , they also cannot get *more*, so productivity improvements are fully captured by the non-wealthy. To the extent that conditions approximate those assumed in this model, then, the globalization may reduce the collective action problems confronting would-be coalitions of the non-wealthy seeking to enhance productivity by attenuating coordination failures.³⁰

The theoretical results presented here, as well as the data in the previous section, suggest that efforts to raise the living standards of the less well off may succeed where they attenuate the incentive problems arising when property rights are ill defined or insecure, contracts are incomplete, and wealth is highly concentrated. The rationale for the egalitarian supply-side interventions summarized here -- in contrast to policies restricted to pie-dividing or demand expansion -- is dramatized by globalization, but it is no less compelling for closed economies.³¹

³⁰ The argument is not that the non wealthy have identical interests, but simply that the difficulty of securing mutually beneficial cooperative solutions with mobile wealth owners may be circumvented.

³¹ Abstracting from different national rates of population growth, equilibria of a closed economy version of this model are identical with the open economy version (though the out of equilibrium dynamics are quite different and may be critically important). To see why this is true, consider the supply of investment goods in a closed economy: the national surplus remaining after the consumption of the wealthy, in the open economy case, is the contribution of the nation to the global supply of

This is not to say that globalization makes no difference. Even in the very long-run perspective taken here the effect of globalization on the out-of-equilibrium dynamics may be decisive. A one-time aggregate demand expansion may be crucial, for example, in permanently displacing an economy from a low road to a high road equilibrium of the type illustrated in Figure 3, but the effectiveness of the necessary macroeconomic policies may be reduced by greater openness.

investment goods; in the closed economy case this becomes the supply function for capital goods in that country (the open economy supply function is infinitely elastic at the rate D). Thus country-specific supply and demand for corn as an investment good are as indicated in equation (8) (supply is increasing in D , as expected while demand is invariant). If $O <$ there are no out of equilibrium flows of corn among countries. As before there is a single interest rate $D = (1 + \alpha) / N - 1$ that clears the market in corn-for-investment, and (by the zero profit condition) this D determines w and therefore h . Thus the closed and open economy equilibria are identical. Of course, closed economies in which populations are growing more rapidly than the world average support higher equilibrium rates of expected profit and interest and thus experience lower wages and employment (because this years workers must produce a larger surplus to employ a constant fraction (h^*) of the relatively more numerous workers of the next period.)

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Appendix: The model and notation

Equations

- | | | |
|------|--|--|
| (1) | $Q = yhe(1-m)$ for $K \geq kh(1-m)$
$= 0$ for $K < kh(1-m)$ | production

capital requirement |
| (2) | $w^* = \underline{a}/J(1-h) + b$ | labor supply equilibrium cond. |
| (3) | $B = r(1-t) = (1-t)[(y-k)h(1-m)-hw]^t [kh(1-m)]$ | after tax profit rate |
| (4) | $B=D\mu$ | stationary K |
| (5) | $\underline{w} = (1-m)[y-k(1+D\mu)^t (1-t)]$ | labor demand equilibrium cond. |
| (6) | $w^*=\underline{w}$, | equilibrium in national economy |
| (7) | $D = (\dot{c} + 1)^t N - 1$. | global rate of return |
| (8) | $\dot{c} = N(B(1-c) + 1) - (1+O)$
$\dot{c} = \dot{c} - O$ | excess national supply of k |
| (9) | $b(1-h) + p = th\{[(1-m)y(\delta p)-k] - w\}$ | government budget constraint |
| (10) | $dh/dy = \{(1-m) - db/dy\}/w_h$ | employment effects of \dot{c} productivity |
| (11) | $T = (1-m)\{y(F^t) - k(1+D\mu)^t (1-t)\}$ | exp. residual claim of coop members |
| (12) | $u = u(T,F)$ | coop members risk averse $u()$ |

Notation

<p>y output per unit of effort</p> <p>h hours employed (labor demand)</p> <p>m monitoring (fraction of labor time)</p> <p>k capital per hour of productive labor</p> <p>w* no shirking wage</p> <p>a disutility of effort</p> <p>J probability of detection (shirker)</p> <p>b terminated workers fallback</p> <p>B after tax profit rate</p> <p>t profits tax rate</p> <p>μ risk premium ($=1^t (1-c)$)</p>	<p>c probability of confiscation</p> <p>D risk free interest rate</p> <p>N fraction of corn surplus invested</p> <p>\dot{c} rate of change of world labor supply</p> <p>O rate of change of nation's labor supply</p> <p>δ effectiveness of public expenditure</p> <p>p level of public investment</p> <p>T expected residual claim (coop)</p> <p>F st.dv. of members's income stream</p> <p>u coop members utility</p>
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