



Taxation, Public Policy, and Dynamics of Unemployment

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Abstract

This paper provides an overview of the key issues relating to taxation, public policy and the dynamics of unemployment. It takes issue with the widely held view that generous social insurance schemes and the associated high payroll taxes have been the major cause of the high unemployment rates which have persisted in Europe over the past 15 years. It puts forward a framework for a theory of adjustment, based on the portfolio theory of the risk averse firm and the efficiency wage theory of labor markets. This is used to explain why in the onset of a downturn, the hiring rate may lag the layoff rate, thus giving rise to rising unemployment rates. It is also shown to provide guidance as to policies which enhance the ability of firms to bear risks and which reduce costs of hiring and firing. The paper argues that while policies which increase severance or layoff costs may be well intended they may actually serve to exacerbate the magnitude of employment fluctuations. Similarly, unemployment compensation, which is designed to ease the burden on those who are unemployed, may lead to higher levels of equilibrium unemployment. These programs can be restructured in ways which simultaneously ease the short-run burden of those thrown into unemployment, while reducing the adverse impact of these programs on the unemployment rate.

Keywords: unemployment, taxation, public policy

JEL Code: H3, J3, J6

Introduction

Critics of social insurance have often cited its high costs—and the associated high payroll taxes—as the source of the high unemployment rates that have persisted in Europe over the past decade and a half. Their reasoning is simple: taxes raise the cost of labor, and the higher cost of labor reduces the demand for labor. As chairman of the Economic Policy Committee of the Organization of Economic Cooperation and Development 1995–1996, I repeatedly heard these charges, by those advocating both a cutback in social insurance programs and a greater reliance on value-added taxes rather than payroll taxes. While such reasoning might indeed be understandable when heard from a business executive who sees the payroll tax as simply increasing his costs of production, I found it shocking coming from seemingly well-trained economists who based their analyses—and their conviction that governments should be intervening less in markets—on the standard competitive model. And while their reasoning was faulty, there may in fact be a grain of truth in the conclusion, but establishing this requires going beyond the standard competitive equilibrium model. These broader perspectives also raise a broader set of public policy strategies for how government can lower unemployment from what it otherwise would be.

This paper is divided into four parts. The first establishes the basic principles, by focusing on the effects of public policies on equilibrium unemployment in models with competitive

labor markets and also in models with efficiency wages. The second focuses on the dynamics of unemployment, emphasizing the ways in which policies affect the rate of hiring and firing. The third section develops a general framework for analyzing other strategies for reducing the level and variability of unemployment in the context of imperfect risk markets, both for firms and for workers. Finally, the fourth section discusses some of the implications of these ideas for developing countries.

I. Basic Principles

Underlying this paper are eight propositions:

(i) To understand unemployment, one needs to distinguish between *equilibrium* unemployment and *transitional or cyclical* unemployment.

(ii) The major impact of social insurance depends on the difference between the (marginal) expected present discounted value of benefits and contributions. In particular, the impact of social insurance financed by payroll taxes on the *supply of labor* depends on the precise specification of the social insurance system; designs exist which have little, if any, effect on labor supply. And whether there are adverse effects on labor supply does not depend on whether the contributions are set aside into individual retirement accounts, though such accounts may serve to enhance the *transparency* of the system. By enabling individuals to see more clearly the link between contributions and benefits, one reduces any adverse incentive effects arising from a failure to see the link.

(iii) The fundamental issue in the design of social insurance is the extent to which there is distribution; the trade-offs between incentives and redistribution are similar to those in the tax system more generally: increased redistribution *may* have an adverse effect on labor supply, but similar adverse effects would arise if the same redistributive objectives were accomplished through the tax system.

(iv) In the competitive equilibrium model, public policy interventions affect equilibrium wages and *unemployment*, but there is no unemployment.

(v) A minimum wage can give rise to unemployment, and social insurance financed by payroll taxes may exacerbate—or reduce—the level of unemployment; but most of the unemployment in OECD countries cannot be explained by a minimum wage in a competitive labor market.

(vi) Efficiency wage theory can give rise to equilibrium unemployment; but again, social insurance financed by payroll taxes may have little effect on the equilibrium level of unemployment.

(vii) Policies which affect the costs of hiring and firing have no effect on unemployment in the competitive labor market, but may lead to unemployment among minimum wage workers if there is a minimum wage, but can lead to increased unemployment more generally in the efficiency wage model.

(viii) The factors affecting cyclical unemployment may be quite different from those affecting equilibrium unemployment. While social insurance financed by payroll taxes may have little effect on cyclical unemployment, there are other public policies that can have marked effects.

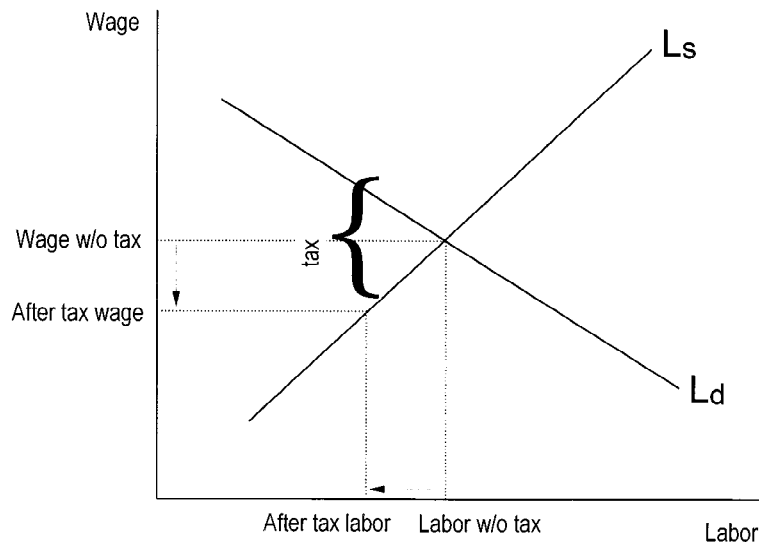


Figure 1. Pure payroll tax.

1.1. *Competitive Equilibrium*

In the standard competitive model, (real) wages adjust to *equilibrate* demand and supply for labor. Thus, *any* policy which affects either the demand for, or supply of, labor can affect both the level of employment and real wages, but it will not result in unemployment.

The key public policy issue in competitive labor markets is thus *incidence*, to what extent before-tax wages will be lowered or employment decreased. The social security program-cum-payroll tax is often thought of as a public expenditure program financed by a payroll tax, in which case we could decompose the effects into two parts; first, a payroll tax, which drives a wedge between wages paid and wages received, lowering the latter and lowering employment, as illustrated in Figure 1; and second, a benefit program which increases income in retirement, thus having a life-time wealth effect, which leads to a shift to the left in the labor supply curve, as illustrated in Figure 2. The impact of this is to raise wages, but again to lower employment. The net effect is thus an unambiguous lowering of employment, with ambiguous effects on wages.

But this analysis is misleading, since benefits are, in fact, *tied* to contributions. The more an individual contributes, the more he receives. The impact of social insurance then depends largely on the difference between the present discounted value of the individual's contributions and (the certainty equivalent of)¹ his benefits (or more precisely, in any year, the difference between the present discounted value of the individual's marginal contribution and his marginal benefits.)

Because benefits increase with contributions, the adverse effects on labor supply are far less than they would be if there were no connection between contributions and benefits.

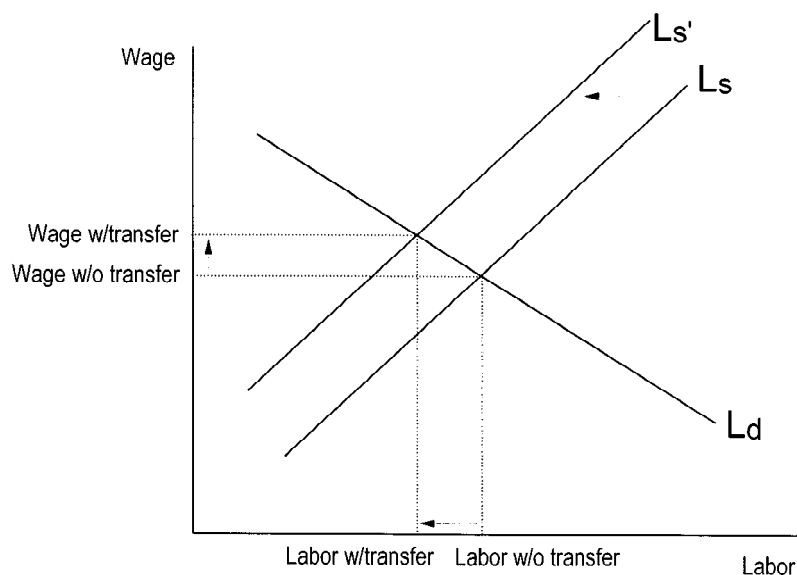


Figure 2. Pure retirement benefit.

The best way to see this is to look at the increase in lifetime income as a result of social insurance. This increase (discounted back to the present) minus the contribution to social insurance is the net change in “consumption” equivalent as a result of the social insurance-cum-payroll tax system. *For most individuals in their prime earnings period (in the United States) the “net tax” is far less than the payroll tax, and for many individuals, there is in fact a subsidy.* Under current U.S. law, the net income effect of the social insurance system is small for most individuals, with a slight negative impact on lifetime income on high income individuals and a positive effect on low-income individuals. Figure 3 shows one set of calculations estimating the net transfer for individuals in different situations under current laws. Indeed, for a fully funded system, on average, the net transfer of the social security system is zero; though there may be gainers and losers, on average, they are offsetting. This implies that, at most, the income effect under a fully funded system will be weak.² Even for a pay-as-you go system the effects are likely to be small, so long as growth rates are small, since then the amount received by each generation is roughly equivalent to what it contributes.³

But the total effect depends both on *transfer* (tax or subsidy) and on the *marginal* distortion, the relationship between the marginal (certainty equivalent present discounted value) benefit and contribution. Figure 4 shows schematically the effect on the lifetime income/hours budget constraints for individuals at different levels of lifetime income. From the figure, it is clear that there is a substitution effect which is negative for high-income individuals, and nonexistent or even positive for some low/middle-income individuals.⁴ Similarly, there is a negative income effect on low-income individuals (they are subsidized, so work less

(Thousands of Constant 1993 Dollars)

Wages	Single Male			Single Female			Couple (One Income)			Couple (Two Incomes)		
	Low	Avg	High	Low	Avg	High	Low	Avg	High	Low & Low	Avg & Low	High & Avg
1995	13	-5	-37	33	28	7	90	123	135	63	79	37
2010	1	-36	-135	23	0	-84	87	107	78	40	40	-73

Source: Steuerle and Bakija (1994). All amounts are present discounted value at age 65 using a 2 percent real interest rate. Adjusts for chance of death in all years after age 21. Includes actuarial value of all Old Age and Survivors Insurance (OASI) workers, spousal, and survivor benefits payable over a lifetime. Includes both employer and employee portions of OASI payroll tax. Couples are assumed to be the same age and to have two children born when parents are aged 25 and 30. Assumes retirement at the OASI Normal Retirement Age. Projections are based on the intermediate assumptions from the 1993 OASDI Board of Trustees report. OASI tax rate is assumed to be set at 10.65 percent after 1992.

Figure 3. Net lifetime social security transfers (thousands of constant 1993 dollars).

hard), and a positive income effect on high-income individuals. Thus, labor supply for most groups in the population is ambiguous: for lower middle-income individuals, the income effect leads to lower labor supply, while for upper income individuals, the income effect leads to increased labor supply, while the substitution effect leads to lower labor supply. The only groups for which the effect is unambiguous are individuals with sufficiently low income that they receive a net subsidy, but still face a positive effective marginal tax rate.⁵

1.2. Redistribution and Social Insurance

The reason that there is a discrepancy between the expected present discounted value of contributions and benefits is redistribution: poor individuals get more than they have contributed, with richer individuals paying the difference.^{6,7} *The fundamental issue is the long recognized trade-off between distribution and incentives.* If distribution is of no concern to society, then a social insurance system based on payroll taxes in which benefits are fully commensurate with contributions can easily be designed, and—so long as the required level of savings is less than the level which individuals would save on their own account—there would be no effect on labor supply.⁸ So long as there is some redistribution to the very poor, and there is a phase out of benefits, then there will be an adverse income effect on the poor, a positive income effect on the rich, and an adverse substitution effect during the phase-out range. But these labor supply effects will hold, whether the redistribution occurs through the social insurance system, or perhaps more transparently, through the income tax system. (A full discussion of the relative merits of the alternative bases of redistribution would take me beyond the scope of this paper; suffice it to say that the social insurance system is based more on *lifetime* income, a more appropriate basis of redistribution than year-by-year income, so long as capital markets function reasonably well.)

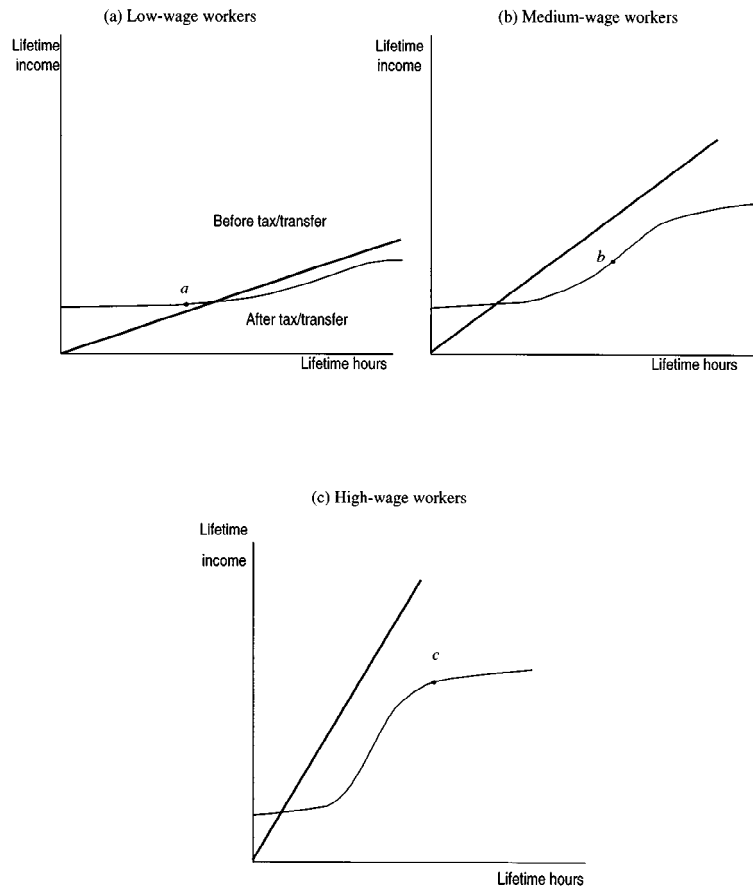


Figure 4. Income and hours.

Once we recognize that the government will, in any case, be engaged in redistribution, discussions of the impact of social security need to focus on the *counterfactual*: what would have happened in the absence of social insurance. Assume, for instance, that if individuals did not save adequately for their retirement, the government would have “bailed out” poor elderly individuals, with a minimal level of support. Poor individuals may then decide that they are better off by not saving. Figure 5 shows a budget constraint for the trade-off between consumption today and consumption tomorrow. In panel (a), the elderly are “bailed out” to guarantee a minimum consumption. As a result, they may consume all of their income when young and live on this minimal handout when old. For poor individuals, the adverse income effect is similar to that of social insurance. While the substitution effect is weaker (since individuals can keep any extra income they earn, so long as they do not save it); but the fact that they must consume all their income in the first period (to be eligible for the

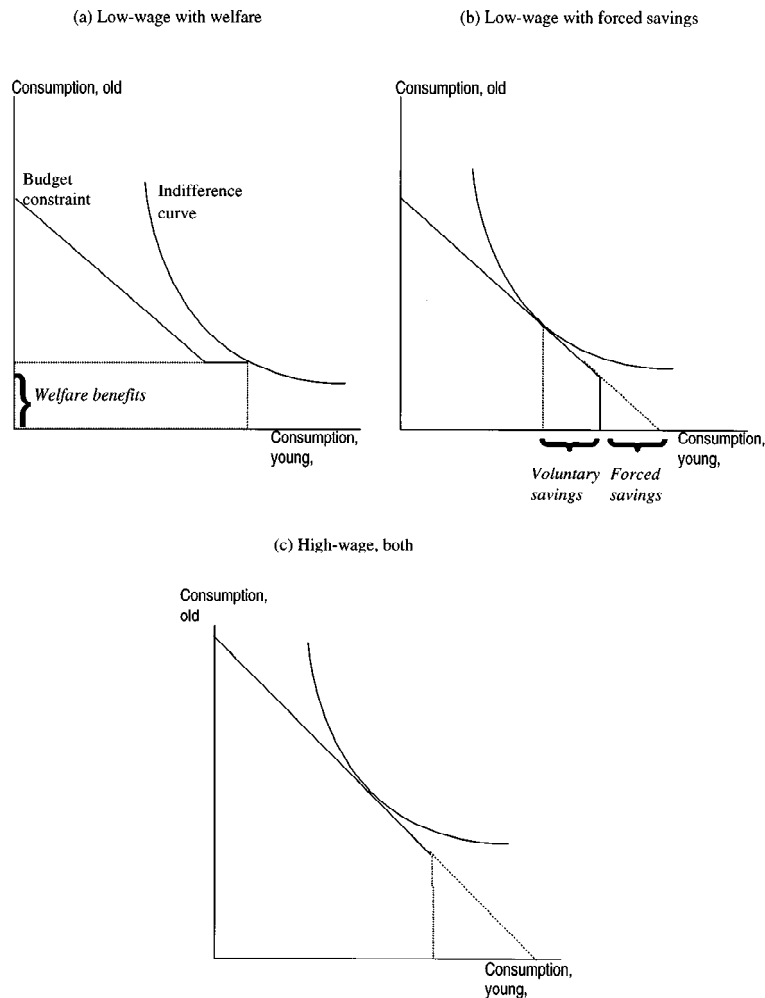


Figure 5. Savings and social security.

welfare program in their old age) means that the marginal value of income is lower, and this discourages work. Moreover, financing these redistributions requires the imposition of taxes, and these taxes (income or value added) typically have adverse effects on labor supply. In panel (b) the welfare program is replaced with social insurance in the form of mandatory savings. As a result, low-income individuals might supplement their mandatory savings with voluntary savings, as shown in the diagram. (High-income people, shown in panel (c), are probably on the interior of their budget constraints, and are thus unaffected by these policies: the introduction of social insurance simply replaces some of their voluntary

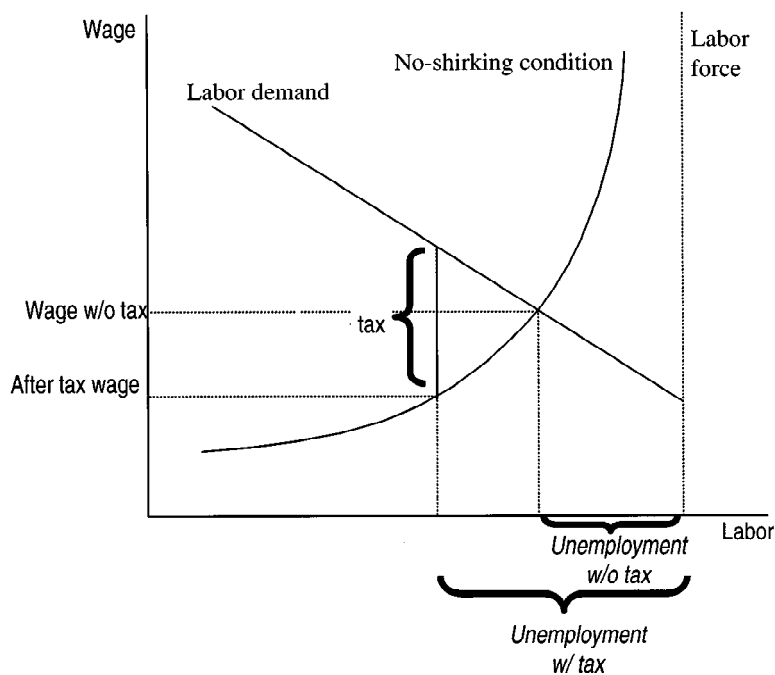


Figure 6. Efficiency wages and labor.

savings with forced savings.) In short, the *relevant* comparison is not between an economy with social insurance and one with a welfare program, but between an economy with social insurance and one with no welfare program; and in that comparison, the reduction in labor supply is smaller—or there may even be increase in labor supply.

1.3. Beyond the Basic Model

There are several caveats to this basic model, some of which suggest that the distortionary effects of social insurance is even less than the previous analysis might have suggested, some of which suggest that it may be slightly greater.

1.3.a. Forced Savings

If social insurance “forces” an individual to save beyond the level which he otherwise would have saved, and which he cannot undo by borrowing,⁹ then the social insurance program will have effects on the labor market, even if the present discounted value of benefits equals that of contributions. There is a distortion—it is as if current consumption is being taxed, with

the tax revenue being rebated. The distortion makes individuals worse off, and the *income* effect of the distortion leads to greater labor supply. But there are also substitution-like effects, the sign of which is ambiguous.¹⁰

(If individuals are saving privately—beyond the mandated level of savings required by social insurance—then aggregate savings is unaffected (other than through an income effect), since the marginal returns to savings are unaffected. The income effect is the difference (in present value terms) between the risk-adjusted returns that the individual would have obtained and what the “forced” savings yields.)

There is an additional effect: we have seen that typically, low-wage (unskilled) workers face a decreased labor supply, while the effect on the labor supply of upper income (high-skilled) workers is more ambiguous. If the relative supply of skilled laborers increases, then there is some presumption that the before-tax wage of low-skilled workers may (on this account) have increased, while that of higher-skilled individuals may have decreased, thus reinforcing the direct redistributive effect of social insurance.¹¹

In addition to these effects, there is a risk effect: the return profile of social insurance differs markedly from that generally available in market-securities: not only is the return fully indexed for inflation, but there is an adjustment for productivity increases in the working population. This reduces the adverse “income” effect—indeed, there may be relatively few individuals who are worse off as a result of social insurance.

Of course, even if it were not the case that only inframarginal returns were reduced, the relationship between returns on savings and labor supply is ambiguous. In the central case of a logarithmic utility function, the return has no effect on labor supply.

Redesigning Social Insurance

While (at least in the United States) there is in general a close relationship between benefits and contributions, there may be particular periods in which this is not true—for instance, social insurance benefits are based not on total contributions, but on contributions made in the best 35 years. Thus, for elderly individuals whose income is lower than in their “best” 35 years, the social insurance system provides no incremental benefits in return for additional contributions, so the effect is that of a tax alone. While the overall magnitude of the resulting distortion (relative to the size of the total labor force) may be small, still, it makes sense (on this and other grounds) to redesign the social insurance system to make benefits more fully dependent on contributions.

Medicare and Other Benefits Not Related to Contributions

In the United States, health care benefits for the aged (Medicare) are not related to the size of contributions. Hence, there is no marginal benefit from a marginal contribution. Accordingly, the Medicare payroll tax (used to finance the Medicare program) acts like a tax—it imposes a wedge between the wage paid and the wage received, reducing employment and the wage received. Still, in a competitive market, it does not give rise to unemployment.

1.2. Money Illusion

A major thrust of some reformers who blame the high costs of social insurance for high levels of unemployment is to shift the basis of taxation away from payroll taxes. Such discussions seem to ignore one of the most fundamental results of public finance, the equivalence between wage taxes and consumption taxes (including consumption-based V.A.T. taxes).¹² Only if there is money illusion would such a shift, in general, make a difference. (This result has to be qualified: in those countries, such as the United States, in which there is a limit on payroll contributions, a general V.A.T. has a broader base, and therefore would necessitate a lower rate *on lower wage rate individuals*. Then (ignoring for the moment the impact on minimum wage workers), the effects vary with the income group: for very low-wage workers, the higher after-tax wage probably increases labor supply; for very high-income workers, there is an income effect which result in greater labor supply and a substitution effect in a lower labor supply—the net effect is ambiguous; for workers just above the current contribution limit, both the income and substitution effects results in lower labor supply; since a large fraction of the effective labor supply is clustered around this group, it is this negative effect on labor supply which might well dominate.)

Minimum Wage

The imposition of a social insurance program financed by a payroll tax, at least part of which is paid for by employers, necessitates a fall in the before-tax wage. If there is a minimum wage, that fall is not possible. Hence, a payroll tax will result in an increase in unemployment if there is a minimum wage.

By the same token, *if there is money illusion*, a shift to a V.A.T. to finance social insurance will reduce the level of unemployment resulting from the interaction of the social insurance-cum-payroll tax and the minimum wage. But if there is no money illusion, unions and other advocates of the minimum wage will realize that the V.A.T. has decreased the real value of the minimum wage. However, since the base of the V.A.T. is typically broader than the base of the payroll tax, the tax rate is lower, and hence the offsetting increase in the minimum wage is less, so that the adverse employment effect is smaller.

The interaction of minimum wages and social insurance cum payroll tax may account for some of the unemployment among very unskilled workers. But much of the employment observed in Europe is among workers in skill categories receiving wages in excess of the minimum wage, and hence, such unemployment cannot be explained by a competitive model with minimum wages. In recent years, there have been a variety of models to explain why wages fail to fall, even in the presence of unemployment. In the discussion below, we focus on one such model that has drawn extensive attention, the efficiency wage model.¹³

1.3. The Efficiency Wage Model

Perhaps the simplest efficiency wage model is that of Shapiro and Stiglitz (1986), where high wages (and the resulting unemployment) are used to induce workers not to shirk.¹⁴

In that model, there is a critical wage w_s , which is a function of the (un)employment rate required to induce individuals not to shirk, as illustrated in Figure 5. The equilibrium is determined as the intersection of this no-shirking wage curve and the demand for labor curve. In this model, unlike the standard competitive equilibrium model, there is an equilibrium level of unemployment. Thus, in this model, we can meaningfully ask, what is the impact of social insurance financed by a payroll tax on the equilibrium level of unemployment.

If the worker received no benefit from the social insurance system (for instance, if he knew that he would die before being able to draw benefits), then the payroll tax acts simply as a wedge between the wage paid and the wage received, as illustrated in the figure. The unemployment rate would increase. High payroll taxes would lead to high levels of unemployment.

But social insurance does bring with it benefits. If the benefits were perfectly commensurate with the contributions, and the individual would have saved more than the mandatory amount in any case, then the social insurance-cum-payroll tax would have no effect. *The effects on the no-shirking constraint depend on the effect of the social insurance-cum-payroll tax on the surplus associated with working.* In systems, such as the United States, where benefits are based on the best 35 years out of an individual's lifetime, where 35 is several years less than the normal working life, retirement benefits are unaffected by a spell of unemployment; thus the cost of shirking is lower than it would be in a system where there was a direct link between contributions and benefits. The social insurance system does lead to more unemployment.

But this is a problem that can be easily rectified, simply by making benefits directly linked to lifetime contributions. There will still be an effect on the no-shirking constraint, because of the redistribution associated with the system. But the remarks made earlier, in conjunction with the competitive model, are equally apropos here: these are the inevitably adverse effects associated with redistribution, and society must balance the perceived benefits from redistribution with these costs. The effects arise not from the social insurance system financed by a payroll tax, but from society's desire to redistribute.

Moreover, for lower-income individuals, the social insurance system acts more like an earned income tax credit;¹⁵ it supplements the workers' effective wage (while the percentage subsidy may decrease as income increases, the absolute subsidy increases, at least over a range), and for these workers, the unemployment rate is accordingly actually reduced.

By the same token, for elderly workers and for very young workers, whose benefits (at least in the United States) are likely not to be dependent at all on their current contributions, the payroll tax acts simply as a wedge, leading to higher levels of unemployment (in groups which typically face high levels of unemployment in any case.) Again, a redesign of the social insurance program can ameliorate these problems.

Efficiency Wage Theory, Unemployment, and Progressive Taxation

But efficiency wage theory has some striking implications concerning the incidence of redistributive taxation (including redistributive social insurance programs), which are markedly different from those of the standard competitive model.

First, *what matters in efficiency wage theory is the average tax rate, not just the marginal tax rate*. Shirking is determined by the magnitude of the surplus associated with working, and that is related to the average tax rate. (The marginal tax rate matters as well, since it is the surplus associated with the work week which maximizes the worker's welfare, which in turn will depend on the marginal tax rate.)

What matters for the no-shirking constraint is the after-tax wage. A tax on the high-wage workers opens up a wedge between the wage paid and the wage received, as in Figure 4; the after-tax wage falls, but by far less than the tax; and the unemployment rate increases. To see the role of progressive taxation, assume, for instance, that there are two categories of jobs, those which can easily be monitored (or in which a piece rate can be paid) and those in which the efficiency wage has to be paid to elicit effort. Wages in the former sector will be determined in the usual competitive way, while in the latter sector, wages are higher. Then the threat of being fired is a return to the low-wage competitive sector (or the unemployment pool). Assume, moreover, that workers can only search for a new job from the unemployment pool. Then a tax imposed only on high-wage workers does not affect the expected utility of a worker in the competitive-wage sector, and hence in equilibrium, the expected utility of the unemployed (job seekers) must remain unchanged. It follows then that the equilibrium (after-tax) wage must remain unchanged.¹⁶ That means that there is no effect of progressive taxation on after-tax wages or wage inequality; the tax does increase the cost of labor to the firm, thereby decreasing employment at the high wage. Since what matters for the expected utility of the unemployed is the probability of getting a high-wage job, and that is determined by the ratio of jobs in the high-wage sector to job seekers, the decrease in the number of jobs in the high-wage sector decreases the number of job seekers; the aggregate unemployment rate thus decreases. The sole effect of the tax is to shift workers from the high-wage/high-productivity efficiency wage sector and the zero productivity unemployment into the low-wage/low-productivity competitive sector.

This analysis suggests that *the scope for redistributive taxation may be far more limited than with the standard competitive model*.¹⁷ But even more disturbing is the fact that the scope for redistribution through expenditure policy is also limited: what matters for shirking is the level of expected utility, and if the government provides public goods which are of more value to those with lower incomes, it will reduce the discrepancy between the expected utility of the unemployed and those at high-wage jobs, and thus reduce the incentive not to shirk.

Unemployment Compensation

Policies which lower the no-shirking constraint lead to lower unemployment and reduce wage inequality. Among such policies are lowered unemployment benefits and policies which reduce the likelihood of voluntary separations. Since most periods of unemployment are relatively short—and therefore impose risks which are small, relative to lifetime income and which can therefore be borne by individuals themselves—this provides an additional argument (besides the standard moral hazard arguments associated with any insurance¹⁸) for redesigning unemployment policies. Rather than providing *insurance*, at least against the risk of short-term unemployment, the focus should be on improving access to funds. A

consolidated provident fund, providing both social security (pensions) and unemployment benefits, would enable individuals to finance short spells of unemployment without seriously risking old-age poverty. (See Stiglitz, 1998b.)

1.4. Mandated Health Benefits

Mandated health benefits, of the kind proposed by the Clinton Administration in 1993, provide an interesting application of the general principles outlined above. One of the issues in the debate was the effect on employment or unemployment, and some of the features of the proposal—including large subsidies for low-wage workers—were intended to avoid adverse effects on the labor market. The mandated coverage would have cost approximately \$4000 per family, in effect increasing the minimum wage by 50%.

First, consider the impact in a standard competitive model, with no minimum wage. And assume that the government would provide coverage for the unemployed. Then the mandated health benefit—combined with government provision for the unemployed—reduces the return to working. It would thus shift the labor supply curve to the left—it would be equivalent to the transfer of a lump sum amount, equal in value to the health services provided. Since the benefits typically increase with age, it would shift the labor supply curve most for older workers, leading to earlier retirements, thus putting further strains on the security system (to the extent that benefits are not fully adjusted to reflect date of retirement.)

To the extent that small businesses have been able to acquire insurance for their employees only at a higher price, it would have reduced the implied discrimination against small businesses, leading to more employment in that sector.

Those not currently receiving health benefits would see a decrease in their wage, as the demand for labor (at any wage) would be shifted to the left. This would be true even for those who do not value the health benefits highly. They would be worse off.

Those at the minimum wage and not receiving health benefits clearly could not have their wage reduced. Hence for these workers, employment would decrease. But, as we have noted, there would also be a shift in the supply curve. It is not obvious whether the unemployment rate would increase or decrease.

Consider now the effects in an efficiency wage model of the kind described in the previous section. The wage in the competitive sector would fall, to offset the provision of the mandated health care. Assuming that the health care benefits roughly approximate the value of the consumption individuals would have otherwise purchased with their wages, since the expected utility of these in the competitive sector must equal that of the unemployed, the expected utility of the unemployed must remain roughly unchanged. But the provision of health benefits to the unemployed is equivalent to an increase in unemployment compensation, so that *the equilibrium unemployment rate would have increased*. With the expected utility of the unemployed unchanged, the expected utility of the high-wage workers in the efficiency wage sector would remain unchanged, and the wage of those workers would fall to offset the increased health benefits.

But a closer look at the impact, focusing on different groups, shows a more complicated picture. The benefit is of different value to different groups of workers. Consider a young

worker who does not value the benefit at all. The wage required to induce him not to shirk remains the same as before, but the cost of hiring him has increased by \$4000. Thus, firms in the efficiency wage sector will hire these workers only when the efficiency wage for this group has fallen commensurately, and this will only happen when the unemployment rate has increased for this group. But their wage in the competitive sector will also have decreased, and a commensurate increase in the unemployment rate is therefore required to equilibrate the expected utility in the unemployment pool with the utility in the competitive sector. Thus, younger workers would find that they were worse off, and older workers that they were better off.

1.5. Hiring and Firing Costs

Hiring and firing costs—which can be affected by a variety of elements of public policy—can be analyzed by the basic tools that we have already presented.

Competitive Markets

In the standard competitive model, where information is perfect and individuals always perform as promised, individuals would never be fired either because of a failure to perform or a mismatch with their job. But still, jobs might be of temporary duration. Assume the government imposed a mandatory severance payment. That would simply be reflected in the wage paid during the employment period—the total compensation for the “job” would remain unchanged. The severance payment would have no effect either on employment, unemployment, or the distribution of income.

Efficiency Wages

By contrast in the efficiency wage model, workers may get fired—and the threat of being fired is an important part of the economy’s incentive system. In the Shapiro-Stiglitz model, it is only the threat of being fired which is required: given the threat, workers never shirk, so workers are in fact never fired, and thus firing costs are in fact never incurred.

But there is a straightforward generalization in which firing does occur. Assume that the nature of the job changes randomly, with Poisson probability φ in such a way to make the worker badly mismatched with the firm. The firm can observe a mismatch, and fires the worker when a mismatch occurs, paying a penalty f . Furthermore, the firm must pay a fixed cost of H to hire a worker. In addition, as with the standard model, the worker is paid w , his marginal product is given by $F'(L)$, and there is an exogenous quit rate of b per unit of time. In this case, the firm hires a worker, incurring hiring costs H , if the expected present discounted value of his productivity equals the expected present discounted value of labor costs (r is a discount rate):

$$\frac{F' - w}{\varphi + b + r} = H + \frac{\varphi f}{\varphi + r}.$$

It is apparent that an increase in firing costs shifts the demand curve for labor down. If the firing cost is a pure transfer to the worker, the no-shirking constraint shifts up, further increasing the unemployment rate.

II. The Dynamics of Unemployment

Much of the unemployment is not *equilibrium* unemployment, but cyclical unemployment. It occurs when the rate at which firms hire workers is less than the rate at which workers enter the labor force and are laid off by other firms. To see this define the number of employed people as $E(t)$ as employment, the number of unemployed as $U(t)$, and $L(t) = E(t) + U(t)$ is the labor force. New entrants join the labor force at rate e ; at the same time people exit from the labor force at rate b . Thus, the evolution of the labor force is described by:

$$\dot{L} = (e - b)L$$

where the dot indicates the derivative with respect to time.

At the same time, people get laid off from employment and move into the unemployment pool at rate l ; and new jobs get created and filled with new hires from the unemployment pool at rate h . Therefore, the evolution of employment and unemployment is described by:

$$\begin{aligned}\dot{E} &= (h - b - l)E \\ \dot{U} &= (e - b)L - \dot{E}\end{aligned}$$

If we define the unemployment rate as $u = U/L$, then the unemployment rate will evolve according to:

$$\dot{u} = (e + l - h)(1 - u).$$

The change in the unemployment *rate* depends on the disparity between the combination of the rate of labor force entry and the lay-off rate (both of which increase unemployment) and the hiring rate (which decreases it). In the competitive equilibrium model, the wage of new hires always adjusts to equilibrate supply and demand: there is never any dynamic unemployment, just as there is never any equilibrium unemployment.

While this may seem obvious, there are innumerable macro-economic models which seem not to have taken this observation fully into account. Consider, for instance, the overlapping (staggered) contracts models (Taylor 1979), or the implicit contracts models. Both of these models explain (assume) that most workers' wages are fixed, or at least exhibit downward rigidities. But this by itself cannot explain unemployment. The question is, why isn't there sufficient flexibility among those workers whose wages are in principle flexible—workers currently being hired (in the implicit contract model) or workers whose contracts are currently under negotiation (in the staggered contract model) to ensure full employment? These models by themselves do not even attempt to provide an answer, and are, to that extent, at best incomplete, at worst possibly misleading. (Insider-outsider theory is perhaps the literature which has some closest to focusing explicitly on this question.¹⁹)

Efficiency wage theories can, for instance, help explain why new hires might not be paid markedly less than existing workers, or why contracts under negotiation will not pay

workers markedly less than workers with ongoing contracts. Of course, efficiency wages by itself can explain unemployment—without invoking either implicit contract or staggered wage contract theory; and by Okam’s razor, one might therefore argue that those theories are superfluous. But they may in fact play an important role in explaining the *dynamics* of unemployment. If, for instance, workers’ perceptions of a “fair” wage (which affects their willingness to exert effort) is affected by wages others are receiving, then the process by which wages are determined may affect the pace of adjustment of those expectations; adjustments may be slower in a world with staggered contracts, or in which because of implicit contract theory, existing workers are sheltered from wage cuts.

The fact of the matter is that wages and employment are not set in an auction market, but are set by firms (or by negotiations between firms and unions) on the basis not only of the firm’s perception of the market today, but also of the future. There is by now a large body of literature arguing that normally firms act in a risk averse manner (either because of capital market imperfections, or because of principal agent problems within firms). There are risks associated both with changing wages and with hiring and laying off workers. The decisions can be viewed from the perspective of general portfolio theory and sequential decision making under uncertainty.

For instance, large reductions in wages are risky, because the firm’s best workers may leave, and there can be large adverse effects on incentives (morale). This helps explain why such changes seldom occur.

So long as there are hiring, training, and firing costs, hiring a worker is a risky investment. A firm can avoid these investment costs by asking workers to work overtime. Typically, as an economy pulls out of a recession, firms extend the work week before they start hiring new workers. The fact that firms are willing to incur—for an extended period of time—overtime pay, which is typically 50% or more over ordinary wage rates—to avoid the risks of hiring is evidence of the importance of these costs and the risks associated with incurring them. They wait to become more convinced that the upturn is likely to be long lasting. Moreover, as their fortunes return, their ability and willingness to undertake risks is enhanced.

By the same token, laying off a worker is a risky decision. The probability of a laid-off worker finding alternative employment—and leaving—is larger than for a worker who is working; and departures are costly, if the firm anticipates having eventually to rehire (and thus train) workers in the future. Laying off workers is less costly than firing workers, in two senses: first, the probability of the worker finding alternative employment is smaller, and secondly, the firm does not have to incur severance pay. On the other hand, to make it credible that a layoff is not permanent (that is, that it is not a disguised fire), it is necessary that there be some ongoing cost of a worker remaining with the firm in a laid-off status. Again, the firm faces a decision under risk and imperfect information: with perfect information about when the firm’s demand would pick up, it could easily calculate whether a layoff or severance is preferable; if the downturn was protracted, the worker would be fired. But with imperfect information, the calculations become more complicated. Layoffs have an option value.

In the absence of risk, an increase in severance costs (say mandated by government) would favor layoffs. But with imperfect information, an increase in severance pay may actually induce a firm to fire a worker earlier. To see this, assume that there are two possible

states of the world—a protracted slowdown, or a recovery after say three periods. The question is, should the firm wait for four periods—when it knows the slowdown will be protracted—before firing the worker. Firing the worker today lowers profits if the early recovery occurs, but increases the net wealth of the firm if the recovery is delayed. An increase in the severance costs thus forces the firm to bear more risk in the “bad” state; with sufficient risk aversion, the firm will respond by firing more workers earlier.

At the same time, an increase in severance pay increases the fixed cost of hiring. As a result, firms will wait longer to undertake hiring—until they are more sure that the recovery will in fact occur. Thus, an increase in the severance costs may both induce a pattern of quicker firing and retarded hiring, thus increasing the onset of unemployment early in the downturn and delaying the recovery of employment in the upturn. And because of the risk associated with lowering wages, firms will not fully offset these increased costs by lowering wages instantaneously. (Note that the required adjustment in wages to offset severance costs will vary with the state of the business cycle; the higher severance costs will necessitate a larger reduction in wages in a downturn, since the expected period of duration of employment is lower, the riskiness of hiring is higher, and the willingness to accept risk is lower. Thus, severance pay increases the “equilibrating” fluctuations in the wage.)

In the competitive equilibrium model, with perfect information and perfect capital markets, severance payments affect the pattern of timing of payments to workers, but have no other effect. In effect, the wage contract can “contract” out the full effects. Similar results hold with uncertainty, so long as the variables which determine whether an individual’s employment should be terminated are fully observable and so long as capital markets are perfect. But neither assumption is valid. More generally, the relevant variables are not fully observable, or at least cannot be contracted upon.²⁰ Then the firm’s decision about whether to fire a worker will be affected by the magnitude of the severance pay. The kinds of considerations described earlier then come into play. Still, in the absence of firm risk aversion and efficiency wage effects, *ex ante* wage reductions could still serve to equilibrate the labor market (even though the movement of labor from one job to another might be far from efficient).

These effects operate with perhaps even greater strength in the wage decision concerning new employees than they do in the wage decisions concerning current employees. Those workers most willing to accept a very low wage offer today are those most pessimistic about getting a good offer in the future, since accepting a low-wage job offer may both provide a stigma which adversely affects future job offers,²¹ and may hamper further job search.²² Because of these effects, good workers’ reservation wages may fall more slowly than firms’ wage offers in a cyclical downturn.

It is problematic whether when this occurs it should be called voluntary or involuntary unemployment. The worker is refusing to accept jobs for which he is qualified *at the going wage for new hires* (though with imperfect information, even the notion of a going wage for new hires may not be well defined.) But doing so may adversely affect his lifetime income, the expected present discounted value of future wages. It is as if there were a tax on entering the labor market this period—but a tax imposed by the market, not by the government.

III. Other Policy Interventions

There are other policy interventions on the part of government which might reduce the level of unemployment, especially cyclical unemployment. In the perspective that we have put forward, there are three major determinants of the level of unemployment: (i) the risk aversion of firms; (ii) the (endogenously determined) flexibility of wages, especially of new hires; and (iii) the risks associated with hiring. Policy interventions can be aimed at each of these.

Increasing the Ability of Firms to Bear Risk

Current tax policy has adverse effects on firm's ability and desire to bear risks. The government is a "silent partner" (through the corporate income tax)—but one which shares profits, but not losses. And it is precisely in economic downturns when the firm's ability and willingness to bear risks is lowest that the impact of this limited risk sharing is felt most.

While the reasons for these limitations are well understood—a worry about losses being used as tax avoidance mechanisms—there are ways which these effects can be mitigated. In particular, the government can engage in more effective provisions for loss carry backs and carry forwards (with interest); such provisions would, in addition, be more equitable, since taxes would be based on more of a "permanent" income basis, rather than being dependent on particular time profiles of profits. Moreover, to encourage employment, the extent to which firms could avail themselves of these opportunities could be linked to employment in an economic downturn (with the government, say, providing wage and hiring subsidies in periods of high unemployment.)

Increasing Wage Flexibility

It has been noted that the Japanese economy has exhibited less volatility in employment, even though the volatility in output is similar to that of other OECD countries.²³ Part of the reason for this may be their greater risk sharing: a larger fraction of compensation is in the form of bonuses which are related to profits.

Several questions have been raised: (a) Why should workers bear these risks, when firms are in a seemingly better position to bear risks? (b) If the social outcomes seem so much more desirable with more risk sharing, why haven't other markets gravitated towards the Japanese model?

It is worth noting that much of the earlier literature on rigid wages (implicit contracts) was based on the hypothesis that firms were better able to bear risks. But in fact, risk markets are incomplete, and there are high costs of firm's risk bearing, especially in major economic downturns, where firms face the threat of bankruptcy. Some degree of risk sharing seems, under the circumstances, desirable.

But why don't markets evolve towards this "optimal level" of risk sharing? First, note that there is no presumption concerning the efficiency of decentralized markets when information

is imperfect and risk markets are incomplete (see Greenwald and Stiglitz 1986). There are inefficient Nash equilibrium.

But there is a good reason that, if firms in general are not engaged in profit sharing, why any single firm may find it unprofitable to do so. Note that profit sharing is equivalent to giving workers an equity stake in the firm. But the same arguments that impede equity markets in general impede providing compensation through equity.²⁴ For the owners of firms who know that the market has overvalued their shares are most likely to want to be issue equities to their workers. But workers know this.

On the other hand, if the government mandates, or provides sufficient tax encouragement, to profit sharing arrangements, then the adverse signal associated with profit sharing systems will be mitigated or eliminated. (For a broader discussion of the desirability of such profit sharing compensation schemes, see Weitzman 1984).

Reducing the Risks Associated with Hiring

Severance pay (or even worse, severance costs, such as litigation associated with severance) has a particularly adverse effect on hiring, since firms will typically have to bear those costs precisely at times when they are least able to do so, that is, in the midst of a severe downturn. Note that it matters little whether workers receive a lump sum severance pay or compensation as long as they are unemployed matters little for these purposes. What matters is the timing of the payments of the firm; a social insurance program, even if it is experience rated, enables the costs to be shifted away from the period of contraction.

IV. Implications for Developing Economies

Most of this paper has focused on the issue of social security in the context of a more developed economy. While many of the general principles remain valid in less developed countries, two issues in particular require comment.

First, many developing countries face serious problems in collecting taxes. A primary determinant of tax structure in these cases is, and should be, associated with effective implementation. Traditionally, this has provided part of the rationale for the focus on trade taxes, at least in countries where there are a limited number of ports of entry and where smuggling can be controlled. In countries where compliance is a problem, there are strong arguments for looking for as broad a tax base as possible, since this enables the imposition of a lower rate, and typically, the lower the rate, the less the evasion. Indeed, depending on the magnitude of the response of evasion to tax rates versus the response of savings to taxation, it may be desirable to have a V.A.T. whose base is all of GDP, not just consumption. Moreover, given the difficulties of effectively imposing steeply progressive income taxes, an argument can be made for excise taxes on luxuries and other goods largely consumed by upper-income individuals.

So long as benefits increase commensurately with contributions, the incentives to evade payroll taxes used to finance social security are limited, and indeed, if the government provides a form of insurance (e.g. against inflation) not provided by the market, there

is even scope for some limited redistribution without any incentive for evasion. But these arguments do not hold for social insurance programs in which benefits do not depend on contributions. And these arguments suggest that there may be severe limitations on the extent of redistribution that can be accomplished through a payroll financed social security system. But note, one can have a social security system which is basically payroll financed, but with the redistributive component (the excess of present discounted value of benefits over contributions) financed out of other sources, such as a broad based V.A.T.

Second, in many developing countries, the fraction of the population that works in the formal sector may be very small, and these tend to be among the better-off individuals within society. It is typically difficult to establish a good pension system (or a good income tax system) for those in the informal sector. This has some very strong implications. In particular, it seems inequitable to use general revenues to subsidize pensions for workers in the urban sector; the social insurance program should be financed through contributions. Given the high productivity in the formal sector and the key role that it plays in transforming society and providing revenues to government, one needs to be particularly attentive to policies which may adversely affect this sector. As we have seen, for instance, payroll taxes not linked to benefits may well result in higher labor costs, adversely affecting employment and output in this sector.

V. Concluding Comments

Governments are rightly concerned about the impact of public policy on unemployment. To be sure, the most important policies, especially for cyclical unemployment, are macro-policies. Such policies cannot only affect the dynamics, but even the longer run levels of unemployment.²⁵ But tax and other public policies, including the detailed design provisions, can affect both the level of employment and unemployment.

This paper has argued that much of the standard frame of reference is of little use in analyzing these issues, simply because it begins with the premise that there is full employment. *By assumption*, in the competitive equilibrium model, most policies have no effect on unemployment, since there is no unemployment. Only policies which interfere with market clearing—minimum wages—can give rise to unemployment.

By the same token, most of the literature which has focused on wage rigidities *among employed* workers, such as the implicit contract or staggered wage contract theories, cannot explain the failure of wages (or more generally contract terms) to adjust to clear the market for job seekers, and thus cannot provide the basis either of a theory of unemployment or of an analysis of their impact of policy on unemployment.

I have argued that social insurance financed by a payroll tax should not be blamed for the high levels of unemployment which exist in many such countries with large programs. Particular features of these programs, which can be altered while leaving the basic objectives of the programs intact, may have adverse effects on labor supply. And, as with many *redistributive* programs, there may be trade-offs between equity and efficiency, trade-offs which may lead to limitations on the extent of redistribution one wishes to accomplish through social insurance programs.

I have argued, however, that rather than focus on these issues, attention should be directed to understanding the dynamics of employment and unemployment. What is required then is a theory of adjustment. I have put forward a framework for such a theory, based on the portfolio theory of the risk-averse firm and the efficiency wage theory of labor markets. This theory helps to explain why in the onset of a downturn, the hiring rate may lag the layoff rate, thus giving rise to rising unemployment rates. Such a theory provides some guidance as to policies which can mitigate the fluctuations in unemployment, especially policies which enhance the ability of firms to bear risks and which reduce costs of hiring and firing. The paper argues that while policies which increase severance or layoff costs may be well-intended, and under certain circumstances may discourage firms from firing or laying off workers, under more general conditions, may actually serve to exacerbate the magnitude of employment fluctuations. By the same token, unemployment compensation, which is designed to ease the burden on those who are unemployed, may lead to higher levels of equilibrium unemployment. These programs can be restructured in ways which simultaneously ease the short-run burden of those thrown into unemployment, while reducing the adverse impact of these programs on the unemployment rate.

Acknowledgments

Prepared for the Keynote Address to the 54th Congress of the International Institute of Public Finance, August 24th, 1998. I am grateful to Jason Furman and Martin Rama for helpful comments. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author. They do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

Notes

1. The risk profile of benefits is distinctive, since typically benefits are indexed for inflation after retirement and may be related (as in the United States) to increases in productivity in the population more generally. The valuation of these risk benefits must be taken into account (see below, I.3.b)
2. The net impact on the labor supply depends on whether the income effect of those receiving a subsidy is the same as those providing the subsidy. A full analysis is complicated by the fact that the labor supplied by those of different income typically are not perfect substitutes; thus, skilled labor supply may increase at the same time that unskilled labor supply decreases (from the income effect). These impacts on relative labor supplies have further effects on relative wages, which have to be taken into account in a full incidence analysis.
3. More precisely, in steady state, benefits are $(1 + g)$ times contributions, where g is the growth rate. The return is thus less than (or equal to) what they would have received had they invested the funds in a fully funded account, provided that the interest rate is greater than (or equal to) the interest rate, which it must be in an efficient equilibrium. Thus, in an efficient equilibrium, in steady state, the *income* effect of social security is to increase labor supply relative to the equilibrium that would have emerged had the same amounts been put into individual accounts (and assuming that the interest rate would have remained the same.)
4. One must take into account the interaction between social security and other benefit programs and the tax structure. Thus, in the United States, very low income individuals receive supplementary benefits; thus as social security benefits increase, these supplementary benefits decrease. The net increase in consumption—determining the substitution effect—may be small. Higher income individuals are taxed on their social security benefits, so that the net increase in consumption is considerably smaller than the increase in benefits themselves.

5. These include the very poor (for the reasons explained in the previous footnote) and lower-middle income individuals who face marginal tax rates at the same time that the overall subsidy remains positive (individuals in the “transition” phase, where the subsidy is being phased out and converted into an overall tax.)
6. Before the 1983 revisions of the U.S. social security system, all individuals, rich and poor, in the current older generation received more in benefits than they contributed, with the rich individuals receiving an absolutely larger subsidy, even if (by most reckonings) the ratio of the expected present discounted value of benefits to contributions was smaller. The difference was partly a Ponzi scheme, with each generation receiving transfers with future generations. But as designed, it was, like many Ponzi schemes, unsustainable, which is the driving force for the revisions.
7. There are a variety of other transfers: from married couples with two earners and singles to married couples with one earner. As the social structure of the United States has changed, some of these provisions seem increasingly anachronistic. We will have little to say about these provisions, either their implications for equity or efficiency in this paper.
8. One might well ask, why should the government impose a requirement that individuals save, when they would save more than that amount on their own? The reason, discussed at fuller below and in Stiglitz [1993], is that without the mandated savings, some individuals would be tempted to “free-ride” on the public, knowing that if they did not save, and were therefore poor in their old-age, government would “bail” them out. The government cannot make a credible commitment not to do so.
9. If he does undo it by borrowing, there may still be an effect resulting from the discrepancy between (appropriately risk adjusted) borrowing and investing (lending) rates.
10. The individual maximizes $U(C_1, C_2, L)$, where C_t is consumption in period t and L is labor, subject to the constraint that $C_2 \geq (1+r)twL$. If the constraint is binding (as is hypothesized), then L is chosen so that

$$U_1(1-t)w + U_2tw(1+r) = -U_L.$$

By hypothesis, t is “too” high, so that

$$U_1 > U_2(1+r)$$

If, for instance, there were constant marginal utility of consumption the first period, with diminishing marginal utility the second, then forced savings leads to a lower average marginal utility—a lower marginal return to working; on the other hand, if there were constant marginal utility of consumption the second period with diminishing marginal utility the first, then forced savings leads to a higher average marginal utility—a higher return to working.

11. With normal upward sloping labor supply curves, the second round effects
12. There are many important qualifications to this statement based on the distortionary nature of taxes and imperfect collection. These issues may be especially important in designing tax regimes in developing countries. Some of these are addressed in the section on the implications for developing countries at the end of this paper.
13. In efficiency wage models, the minimum wage can affect wages of those above the minimum wage; an increase in the minimum wage “norms”, inducing firms to increase wages of those at above the minimum wage (though they are not forced to do so by the law, and would not do so in the standard competitive model.) Such spillover effects are widely observed. In that case, an increase in the minimum wage may lead to unemployment in skill categories receiving wages above the minimum wage.
By the same token, efficiency wage theory suggests that the adverse employment effects of increases in the minimum wage may be much smaller than predicted by the standard competitive model, because the increased wages of unskilled workers may be accompanied by offsetting increases in productivity. Other theories of imperfect competition in the labor market suggest that there may even be positive effects on employment of an increase in the minimum wage. The empirical evidence remains highly controversial, but the absence of convincing evidence of large negative effects from the minimum wage is itself striking. See Card and Krueger (1995).
14. There are a variety of other efficiency wage models, based on selection, labor turnover, and morale effects. See, for instance, Stiglitz (1974, 1975, 1982, 1987a) and the papers in Akerlof and Yellen (1986).
15. The earned income tax credit increases the likelihood that a worker participates in the labor force but may have adverse effects on the hours worked. The effect on total labor supply may thus be ambiguous. Here, what is relevant is the surplus associated with working, so that the effect is unambiguous.

16. Let V_u = expected present discounted value of utility of an individual in the unemployment pool, V_s of a worker who shirks, V_{ns} of a worker who does not shirk. Following Shapiro and Stiglitz, assume that when workers work and receive a wage their utility is $w - e$, while when they shirk and receive a wage of w their utility is w . Let δ be the discount factor, and p_s be the probability of a shirker leaving (and moving to the unemployment pool or the competitive sector, both of which have the same expected utility), and p_{ns} be that of the non-shirker, with $p_{ns} < p_s$. Then

$$V_s = w + \delta[(1 - p_s)V_s + p_s V_u] = [w + \delta p_s V_u]/[1 - \delta(1 - p_s)].$$

Similarly,

$$V_{ns} = [w - e + \delta p_{ns} V_u]/[1 - \delta(1 - p_{ns})].$$

The no-shirking constraint simply says that

$$V_{ns} \geq V_s.$$

But with V_u fixed, that implies that w is fixed.

17. Note that these arguments are quite distinct from those that focus on the fact that skilled and unskilled labor may not be perfect substitutes, so that policies that discourage labor supply by more skilled workers have adverse effects on before-tax wages of unskilled workers. See Stiglitz, 1987b and 1998a.
18. See Wang and Williamson (1996), Atkeson and Lucas (1995), and Hansen and Imrohroglu (1992).
19. See Lindbeck and Snower (1988) and Lindbeck (1993).
20. See Arnott and Stiglitz (1985).
21. See Berkovitch (1990) and Vishwanath (1989).
22. See Greenwald and Stiglitz (1995).
23. See Greenwald and Stiglitz (1988).
24. See Myers and Majluf (1984), and Greenwald, Stiglitz, and Weiss (1984).
25. See the extensive literature on hysteresis effects, including Blanchard and Summers 1986 and Layard et al 1991. More recently, I have argued that the policies of cautious expansion, gradually lowering the unemployment rate, has in fact enabled a corresponding lowering of the NAIRU, a reverse of the hysteresis effect observed in Europe. See Stiglitz (1997).

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