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Income Contingent Loans for the Unemployed: A Prelude to a General Theory of the Efficient Provision of Social Insurance

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16.1 Introduction

Income contingent loans (ICL) have mainly been discussed in the context of the finance of education. But, in fact, they are equally relevant whenever there is a simultaneous need for smoothing across states of nature and over time. This chapter explores in detail one such application, to unemployment.

Some macro-economists have tried to argue that the costs of business fluctuations are small (Lucas, 1987), using models where there are perfect capital markets, and ignoring the differential effects of business cycles on different individuals. Were those assumptions correct, the conclusions might be correct, but then economic downturns would not be the subject of such concern among the body politic. But they are, and rightly so.

Most bouts of unemployment are relatively short, and represent a relatively small diminution in an individual's lifetime income. Nonetheless, unemployment can have severe welfare consequences, because individuals cannot easily smooth out the shortfall of income that occurs during such episodes. There are both institutional and economic reasons for the inability of individuals to smooth. This is especially the case when unemployment occurs early in life, before individuals have had a chance to build up their savings. But with social security taking on such an important role in the provision of retirement income for individuals in the bottom half of the income distribution, they can't draw upon these savings to help smooth out their consumption even

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later in life. Individuals save less for their retirement, and hence have less of a savings buffer to protect them against an episode of unemployment.

Governments have typically imposed restraints on individuals using their social security retirement income as collateral against borrowing, even in the case when individuals are unemployed. And for good reason: they worry that individuals may borrow excessively from their retirement funds, leaving them destitute in old age. This would defeat one of the main purposes of *compulsory* retirement savings programs – to ensure that individuals don't become a public burden in their old age. Modern societies know that they can't simply ignore such destitution *no matter how it originates*, so they take strong actions to prevent the occurrence.

Typically, the risk associated with an episode of unemployment is thought best dealt with through unemployment insurance (UI)¹, not loans. But UI has been criticized because of its adverse incentive effects.² It would be preferable (so it is conventionally argued) if individuals smooth their own consumption, self-insuring, using loans to do so if they have not previously accumulated savings, rather than relying on market or publicly provided insurance. Doing so would avoid the adverse incentives. For most individuals, the fraction of lifetime income that is lost as a result of episodic unemployment is small, so that individuals are close to risk neutral with respect to such losses.

To understand the above, consider an individual with a single bout of unemployment lasting six months who would have worked for 45 years; such an individual would lose just over one per cent of his or her lifetime income³, if income were constant and we ignore discounting. With low real interest rates but normal wage profiles, the fraction of lifetime income lost with a bout of unemployment early in life is even smaller. With combined (employer and employee) social security payments of, say, 12 per cent a year, at the point of retirement (again ignoring interest) the individual would have a savings account of 540 per cent of annual income (assuming constant income), far more than should be required as collateral on a loan covering a half year's unemployment.

All of this would presumably work out if there were perfect capital markets. The problem is that, with imperfections in capital markets⁴, temporarily unemployed individuals who have not accumulated savings are forced to cut consumption. Several studies (Chetty, 2008) have shown that the liquidity constraint is one of the most serious difficulties facing unemployed individuals. But allowing borrowing against one's retirement savings can effectively 'resolve' the market imperfection created by capital market constraints.

In a model where the unemployment shock is small (so that there is no risk of default associated with loans), Stiglitz and Yun (2005) show that under seemingly fairly weak conditions and provided that the duration of unemployment is limited, self-insurance through borrowing (for example,

against future retirement benefits), could enhance the welfare of workers by providing them with intertemporal income smoothing without attenuating incentives.⁵ The optimal mix between loans and insurance always entails a positive amount of loans, collateralized by pension savings: Contrary to current practice, individuals should be allowed to borrow at least a limited amount against their future retirement benefits when they are unemployed. There should not be complete reliance on UI. Indeed, when unemployment risk is negligible compared to lifetime income, there should be *no* reliance on UI. Since there is negligible risk to lifetime income, the only market failure is related to the inability to borrow, and government loan programs should be relied upon.

There are two reasons that government loan programs (for example, enabling individuals to tap into their retirement accounts) do not fully address the problem of unemployment. First, while government loan programs provide intertemporal consumption smoothing (which would not otherwise be possible given capital market imperfections), with little incentive cost they do not provide any interstate consumption smoothing (that is, insurance across states of the world where there are episodes of unemployment).⁶ This is unimportant if an individual faces a single short episode of unemployment, since the impact on an individual's lifetime budget constraint is, as we have seen, relatively small, but it is important if there are large unemployment shocks, for example, extending cumulatively over a significant fraction of an individual's working life.

Of course, early in an individual's life, the individual doesn't know whether a particular episode of unemployment will be a small, isolated one, or whether he or she will be unlucky, and face many other bouts of unemployment. So even early in life, with the first small bout of unemployment, the individual has to contemplate the possibility of larger 'losses'. Unemployment insurance provides interstate smoothing, but with some incentive costs. This suggests that a desirable form of income support for unemployed individuals may involve a combination of loans and UI benefit, which is what Stiglitz and Yun (2005) established.

However, when there is a risk of extended unemployment, the benefits of loans may be limited. With extended unemployment, there is the risk that the borrowing against retirement savings required to smooth consumption results in individuals depleting their pension accounts. If the individual faces a series of bouts of unemployment, the obligations undertaken in a conventional loan would impose extreme hardship later in life. The benefits of improved incentives (relative to a conventional insurance program) may be outweighed by this adverse effect. An income contingent loan program provides a resolution to this apparent dilemma: in the event of these adverse outcomes, some, or all, of the loan would be forgiven.

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Income contingent loans can thus be thought of as a 'compromise', providing better incentives than a pure insurance program, but far better risk sharing than a conventional loan program. Moreover, the risks that they insure against are quite different: unemployment insurance is insurance against a *current* risk – the risk of being unemployed today. Of course, the conventional UI program also provides insurance against the future risk of being unemployed at some date in the future. An unemployment ICL provides money today in the event of a bout of unemployment, with the repayment contingent on some future risk. It is, then, essentially a 'compound' insurance policy and, as a result, the incentive effects differ.

Better risk sharing itself cannot only improve the well-being of risk averse individuals directly, but it can also improve the efficiency of the economy. Risk averse individuals will be tempted to accept any job offer, no matter how badly matched it is to their skills and preferences, lest they face the prospect of unemployment. With ICL, the risk of continued search is shared: if the individual is successful, part of the gain accrues to the loan fund. ICL in this context are in effect 'equity', and there is a large literature explaining why equity contracts are superior to debt contracts in sharing risk and therefore in encouraging activities with high returns and high risk.⁷

One might ask, if ICL are so desirable, why hasn't the market provided them? (For more discussion on this point for ICL generally, see Quiggin, Chapter 20, this volume.) There are a number of reasons related to the similar question, if UI is so desirable, why doesn't the market provide it? A reason is that private provision suffers from adverse selection; government can force a pooling equilibrium, avoiding the incentives and associated costs that arise in private insurance markets to cherry-pick, to differentiate among individuals who may face differential risks.

But as in other areas of ICL, government provision benefits from another distinctive advantage: lower costs, since tax authorities can simultaneously verify income and collect what is due (see Stiglitz, Chapter 2, and also Dennis, Chapter 22, this volume).

16.2 The optimal design of income contingent loans

So far we have explained why it makes sense to make the repayment of a loan made to enable an individual to manage his or her way through a bout of unemployment contingent on income. That leaves open the questions of the design of the ICL and the balance in any unemployment program between insurance and loans.

Conventional educational ICL are in fact highly 'non-linear'. Repayment is not just proportional to (lifetime) income. There is typically a cap on repayment limited to the amount borrowed plus interest, for those who manage to do very well; and for those who do very poorly, the remaining debt

is typically forgiven after, say, twenty years, or on death. Here, we explore a similarly non-linear contingent loan scheme, where if the individual is very unfortunate, experiencing a series of bouts of unemployment, all or part of the debt is forgiven. (We sometimes refer to this provision as a 'hailout'.) This addresses one of the criticisms most often leveled against programs that would provide for intertemporal smoothing by allowing borrowing against social security savings (which, for many individuals, is the only form of financial savings they have), a criticism that we noted earlier, which is that such borrowing would increase the risk of old-age poverty and destitution.

16.2.1 The role of income contingent loans in an unemployment program

We argued earlier that when the risk associated with unemployment was small enough, the optimal unemployment program entailed only loans. There was no real need for interstate smoothing, and intertemporal smoothing was best done through a loan program, which would ensure full incentives.

But when risks are not small – where there is, for instance, some prospect that an individual will be unemployed for a non-negligible fraction of his or her life – then the unemployment program should entail a mix of UI and ICL. This chapter and the more formal paper on which it is based (Stiglitz and Yun, 2013) discuss the optimal mix. We explain, for instance, that this mix should vary over the individual's lifetime, and depend on the individual's work history and on the elasticity of search – how much individuals change their search intensity in response to incentives (that is, on the size of the moral hazard problem).

Obviously, in the absence of any incentive effects, the optimal design of the unemployment program focuses only on risk sharing, and so there is need only for an insurance program providing interstate smoothing (with the presumption that if the market understood that the government would provide full interstate smoothing, the market would provide full intertemporal smoothing; if the market failed to do so, the government would also have to engage in intertemporal smoothing.)⁸

One of the factors that makes the analysis of the optimal unemployment program with ICL so difficult is that making loans income contingent improves interstate smoothing, but precisely because it reduces the penalty associated with not getting a job, has adverse incentive effects: there is the familiar trade-off between risk reduction and incentives. Not surprisingly, when the risk is high enough (that is, the variability in consumption across states is large enough) with the optimal conventional loan program, then it is optimal to provide some debt forgiveness, even though there will be some adverse incentive effects.

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16.3 The critical role of cross-market and cross-instrument externalities

Central to our analysis is an exploration of cross-market and cross-instrument externalities. We focus on the moral hazard (adverse incentive) effects that arise in labor and capital markets, and their interactions. The provision of loans at one date affects search at not only the same date, but other dates, and especially if loans are income contingent. As we have noted, an income contingent loan at any date affects the cost of being unemployed, and thus adversely affects search. If an individual experiences a loss of a job at a later date, but has an overhang of debt from a previous bout of unemployment, incentives to search will be attenuated by the knowledge that that debt will be (partially) forgiven if the individual does not get a job.⁹

The fact that incentives can be adversely affected means not only that the likelihood that loans will not be fully repaid is increased, but also that there will be greater losses in the unemployment insurance program. (The individual does not take into account either of these in making search decisions.) These externalities, which we refer to as cross-instrument externalities, are important in shaping the optimal unemployment program, as the analysis below will explain in greater detail.

But just as one government program (government provided income contingent unemployment loans) affects another government program (unemployment insurance), private savings and borrowings affect the (marginal) benefits and costs to government UI and loan programs. In particular, actions individuals take in private capital markets (both savings and borrowing) exacerbate the adverse incentive effects associated with government unemployment programs. For instance, in earlier periods, individuals save too much, not taking into account the adverse effects of such savings on search, and therefore on, say, the UI system. And were private capital markets to work in ways consistent with rational expectations, there would be excess lending in earlier episodes of unemployment, because the private sector would not take into account the effect of such borrowing on search in later periods.¹⁰

On the other hand, a *non-market* group (such as a family or village) that has a superior monitoring ability (to that of government or markets) and a sense of peer pressure among its members, can through loan-cosigning mitigate the adverse incentive effects, improving welfare.¹¹ The informational advantage and the peer pressure associated with a non-market group can interact with each other, leading to an equilibrium where loans for one member are voluntarily cosigned by another member. This equilibrium can be Pareto-superior to one without cosigning. In these situations, there is a positive externality between individual actions and government programs.

16.4 Basic results

In the appendix we summarise a simple three period model, in which individuals can be unemployed in either the first or second period, or both, and are retired in the third.¹² Search in each period can be modeled in a particularly simple way: if the individual searches, he or she finds a job, but has to decide on whether to search; different individuals randomly face different search costs, and in making a decision about whether to search or not, they assess the expected benefits with the costs. The cost-benefit calculus depends, of course, on the unemployment program, the mix of unemployment insurance and loans.

With this approach a change in the unemployment program may induce more or fewer people to search, with the percentage increase in the number of people searching depending on the *search elasticity*.¹³ In the event that an individual is unemployed in the first period, the second period, or both periods, the unemployment program consists of: insurance benefits, which provides income the individual receives that doesn't have to be repaid; and loans which do have to be repaid, in full or partially (contingently) out of retirement benefits. We assume that each loan program (to those who are unemployed when young and to those who are unemployed when old) is self-sustaining, that is, they charge an interest rate high enough to recuperate returns actuarially. And we assume that the UI program is financed by taxes on those who work.

16.4.1 First best allocations

With perfect information, the optimal allocation is relatively easy to describe: (a) those with low search costs (below some critical threshold) will search and those with high search costs will remain unemployed; and (b) income will be smoothed over all states and times. In particular, assume that at each date the utility function is separable between consumption and search costs, that is $W = U(C) - e$ where C is consumption, e is expenditure on search, U is the utility associated with consumption C , and W is *overall* utility, depending on the level of consumption, C , and the level of expenditure on search e . (This implies that having to spend more effort at search has no effect on the marginal utility of consumption.) Assume moreover that there is complete separability in utility between different periods – so consuming more or searching more at one date has no effect on the marginal utility of consumption at another. We also assume that the utility $U(\cdot)$ of consumption at each date is the same – young people and old people get the same ‘utility’ out of the same consumption and that the time-preference rate and interest rate are equal to each other (which are assumed to be zero in the model). Under these conditions, there will be perfect smoothing of consumption across states and times. Smoothing requires the marginal utility of consumption to be the

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same in all states and all times, and under the special assumptions above, that entails the same level of consumption at all times and all contingencies. In this first best world, workers don't have to be motivated to work. Since the costs of search are observable, we get the efficient outcome, where workers agree to work when it is socially optimal for them to expend e to find the job, that is, when the benefits of the job exceed the costs of search.

This simple model illustrates strongly the limitations of the Arrow-Debreu securities framework: there would have to be an Arrow-Debreu state contingent security for each unemployment shock *and* each outcome of the draw of search costs. The key failure is the lack of observability of search costs, which gives rise to the moral hazard problem.

Since e is not observable, unemployment benefits can only be based on the observable variable, which is whether the individual is unemployed. And that means that were we to offer the UI benefits implicit in the first best allocation, individuals with search costs just below the critical threshold would not search; they would receive no consumption benefits, but have to bear the costs of search. As usual, the consequence of moral hazard is that the insurer (here the government) only provides *partial* insurance. And it is why, if the risk is small, individuals should self-insure. But as we noted, this chapter is about non-negligible risks in which self-insurance is not optimal.

16.4.2 Optimal provision of income contingent loans and unemployment insurance

If there were only one episode of unemployment, say early in life, we can easily describe the optimal unemployment program. There is partial insurance, because we want to motivate more search than would occur with perfect insurance. But partial insurance in the presence of imperfect capital markets means that the individual faces far more consumption volatility than is optimal: consumption is highly constrained in the first period.

In this situation a loan program helps smooth consumption over the individual's life. It is clear then that, in general, one would want to supplement the unemployment *insurance* with a loan. But there are incentive effects even of a loan program: because a loan reduces the cost of not getting a job, it leads to less search, which imposes a cost on the unemployment program; hence, the optimal loan will also depend on the search elasticity. And it will also depend on the curvature of the utility function: the greater the curvature, the greater the benefit of intertemporal smoothing. But the greater the curvature, the greater the incentive to search provided by risk aversion.¹⁴

If there were only one episode of unemployment, but it occurred later in life, we can again easily describe the optimal unemployment program and, as before, we will want partial insurance. However in this situation, a loan program can't achieve quite the same degree of smoothing. When the unemployment occurs early in life, consumption can be potentially smoothed

over all three periods. Because of our concern about incentives, however, we may leave consumption in the first period at a level below that of the last two periods, should the individual *not* experience the unemployment shock. When the unemployment occurs later in life, we can't go back in time. In earlier periods, the individual will have recognized that there is a risk of unemployment, but if that risk is small, he or she may make only limited provision.¹⁵ This provision is referred to as precautionary savings.

Thus with this situation, consumption in the first period will be *higher* than in the last two periods in the event of unemployment later in life. Now, the loan in the second period is simply intended to smooth out consumption between the retirement period and the last period of his or her working life. Again, there are the same kinds of benefits and costs of such smoothing (costs in terms of reduced incentives for search) as in the case when unemployment occurs in the first period. But it should be noted, both because the elasticity of search may differ when unemployment occurs in different periods, and because the benefits of smoothing differ as well, there is no reason that the unemployment package – either the amount of insurance or the size of the loan – should be the same. It follows that the unemployment program should be contingent on age (the point in one's life that one experiences the unemployment episode).

16.4.3 Cross-markets and cross-instruments externalities

Even in this simple case there are cross-period externalities. By saving more in the first period, the individual is better protected against an unemployment shock in the second period. The result is that individuals near the threshold search costs will be induced not to search – imposing costs on the unemployment insurance system. If savings were observable and government could tax savings (and this were the *only* reason for savings), it would be desirable for the government to discourage this savings.

By the same token, if an individual who is unemployed in the first period could get a loan, it would affect search incentives (since the penalty of not getting a job is reduced) and thus the losses borne by the unemployment insurance program. So again, if loans were observable, and government could tax these 'unemployment loans' (and separate out these loans from other loans), it would be desirable for the government to do so. But, of course, this can't be done.¹⁶

The critical idea is that loans and insurance need to be seen as interactive, in some ways complementing each other, in some ways substituting for each other. Search is affected both by insurance and loans, since each reduces the penalty of not getting a job. Each imposes a cost on the other.

There are externalities both cross-instruments and cross-periods. If an individual faces an unemployment shock later in life, but has an outstanding loan as a result of an earlier unemployment episode, it affects search in that

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The possibility that there can be two episodes of unemployment thus raises two further issues: (a) more extensive cross market (cross-period) and more complicated cross-instrument externalities; (b) in the event that the individual has two episodes of unemployment, it may be optimal *not* to repay the loan fully – it is optimal to have income contingent loans.

We can ask: (a) how does the mix of unemployment insurance and loans change over an individual's life?; (b) how does the mix of unemployment insurance and loans depend on various parameters, like the search elasticities in different periods?; and (c) how does the optimal unemployment program change when we move from ordinary loans to income contingent loans? Each of these turns out to be complicated, largely because of the cross-period and cross-instrument externalities, because, as we have noted, the unemployment program (loans and insurance) each period must take into account the effect of the program on search behavior in other period(s).

To get some hints at the answers to these questions, we need to take a closer look at each of the externalities described above.¹⁷ Consider a situation where we do not need to employ income contingent loans. Assume, say because the search elasticity is low, the amount of insurance in the event of a first period episode of unemployment is high, and there is little reliance on loans in the first period, so there is no need for debt forgiveness if the individual experiences a second episode of unemployment. But providing first period loans *decreases* unemployment in the second period, as we have already noted, because the cost of not getting a job is increased: the optimal first period program must take that into account. This implies that, especially if the second period search elasticity is large, because of the cross-period externality, first period loans will be larger than they otherwise would be, and the insurance component of the unemployment program will be smaller. This effect will be larger the greater the likelihood that the individual faces two episodes of unemployment, that is, the higher the correlation across unemployment episodes.

At the same time, individuals in making their search decisions in the first period, look forward to the consequences of not searching this period, and in particular, to the possibility that they might be unemployed in the next period as well. The consequences of that second episode will be greatly mitigated if there is very good insurance in the second period, for example, because there is a very low search elasticity for those with two episodes of unemployment. But that means that the provision of insurance in the second period will have to be sensitive to the impact it has on first period search.¹⁸ Second period

insurance is smaller than it otherwise would be because of the adverse effect of that insurance on first period search.

There is another effect: if the probability of unemployment in the second period is dependent on the work history – if, for instance, an individual who is unemployed in the first period is more likely to be unemployed in the second, or if the costs of search are greater,¹⁹ then the cost of not getting a job in the first period is greater (than it would be if the unemployment shocks were uncorrelated). Of course, the individual will recognize this, and this will provide motivation to search harder the first period. But in his or her search calculus, the individual doesn't take into account the social cost imposed on the government through the second period UI program. (This effect is even more important if there is an ICL, because there is then a social cost associated with the first period loan program.)²⁰

In short, because of the cross-market externalities, there is an even stronger presumption than we noted earlier that loans will play a more important role in the unemployment program early in life than in later life.²¹

Matters get even more complicated once we introduce income contingent loans. If the amount of outstanding loans is sufficiently large, then it is optimal to forgive all or part of the loan if the individual experiences two episodes of unemployment. That is, it is optimal to make the loan an ICL. There is now a new parameter that has to be settled: the fraction of the loan that should be forgiven; and there is a new set of moral hazard issues.

Return to the analysis of the impact of the design of the second period unemployment program on first period search, and assume we have a significant amount of income contingency, that is, large debt forgiveness for someone experiencing two periods of unemployment. A larger first period loan will increase the benefit of not-searching in the second period, that is, the individual will receive a large implicit subsidy. Moreover, the magnitude of the consumption variance should the individual not get a job is reduced (compared to an ordinary loan). On both accounts, second period search is reduced.

On the other hand, one of the major drawbacks in providing (non-income contingent) loans rather than insurance is that, in the event of a second bout of unemployment, individuals could face hardship – depending on the curvature of the utility function, there can be a very large cost associated with insufficient interstate smoothing.

Hence, it is ambiguous whether the optimal first period loan is reduced or increased *relative to what it would be without the income contingency provision*. If the curvature of the utility function is large and the elasticity of search is low, we would expect loans to play a more important role in the first period, reinforcing the earlier result that we expect loans to play a more important role in the unemployment program for an episode of unemployment early in life.²² Whatever adjustment is made to loans, we expect a partially

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offsetting adjustment to insurance. For example, if the level of loans is reduced, we might normally expect the adverse effects on interstate and intertemporal smoothing would be partially offset by more first period insurance.²³

The reciprocal externalities going the other way are also affected by the fact that loans are income contingent. Consider the individual in the first period; knowing that should he or she be unemployed in both periods, there will be debt forgiveness. The first period loan now has an element of insurance in it. If the individual doesn't get a job this period, and also doesn't get a job next period, it will be (partially or totally) forgiven. Hence the incentive benefit of loans is reduced. This in turn means that there will be fewer incentives for search, and the first period unemployment program (loans combined with insurance) gets cut back. But while loans have less of an incentive effect, the fact that they are income contingent means that their welfare benefit (ignoring the incentive effect) is greater; they not only facilitate cross-period smoothing, but they also enhance cross-state smoothing. It thus may be desirable to increase the amount of first period unemployment loans *relative to what they would be without the income contingency provision*. This is especially so if the adverse incentive effects are limited. (Depending on the design of the ICL program, this may well be the case. If the expectation on the part of most individuals is that they will fully repay the loan – debt forgiveness only occurs under the worst contingencies – then ICL can be very effective in intertemporal smoothing, with very little effect on incentives (see Quiggin, Chapter 3, this volume); but, of course, under these conditions, there is very little interstate smoothing. The more important interstate smoothing becomes, the greater the potential for an adverse incentive effect.)

The critical parameters determining the nature of the unemployment program in this model are the search elasticities (which we have noted can vary from period to period and can depend on work and search history), the curvature of the utility function (which affects both aversion to risk and the importance of intertemporal smoothing) and the correlation of the bouts of unemployment. With zero search elasticity (no incentive effects), not surprisingly, we get perfect interstate and intertemporal smoothing in this model. Conventional loans allow some intertemporal smoothing, provide no interstate smoothing, but accordingly, do not have the adverse incentive effects associated with insurance.

ICL can, in fact, be thought of as a mixture of a conventional loan with an insurance program – which provides a payout (equal to the amount of loan forgiveness) in the event of two bouts of unemployment (more generally, low income in the future). The new insurance has, like any insurance, adverse effects on incentives – here, we observe on search both periods; and because of the cross-instrument externalities, on the losses experienced in other insurance programs (here, unemployment insurance).²⁴

It is thus apparent that, in general, the nature of the unemployment program should differ not only over the individual's life, but should also depend on his or her employment history. For instance, loans for the long-term unemployed are zero in this model, as they have no future income to borrow against. On the other hand, as we have noted, loans may play a more important role in the optimal unemployment package for an individual who is unemployed when young than is the case when his or her bout of unemployment occurs when old. Not surprisingly, the mix of insurance and loans depends on the search elasticity and the likelihood that an individual who is unemployed when young will face another bout of unemployment when old, as well as the curvature of the utility function.

16.4.4 Why private savings and loan markets may lower welfare

Earlier, we explained why private savings generates an externality: it induces less search in later periods. The same is true for private loan markets, but the problems are, in some ways, even worse, especially with income contingent loans. We noted earlier that loans, while they facilitate cross-period income smoothing, lead to less search. And so long as there is any UI, less search imposes a cost on the providers of UI. But if there is an ICL program, there is also an adverse effect on the implicit subsidy of the loan – a greater likelihood of the necessity of loan forgiveness as a result of two episodes of unemployment.

If the government can directly intervene in these other markets, to 'correct' the externality, it should. But there are good reasons to believe it can't, or can't do so 'perfectly'. In that case, in implementing the optimal package the government needs to take into account the adverse incentive on the part of private markets.

In particular, the optimal design of the unemployment program (the level of insurance and loans, and the extent of forgiveness) will need to respond to the existence of private savings and loan markets. The excessive precautionary savings, while increasing the ability of individuals to smooth out consumption on their own, aggravates incentive costs (when individuals have a large 'nest egg', they search less intensively). Normally, we would expect the programs (both insurance and loans) to be reduced, both because the costs of the programs will have increased (because of reduced search) and the benefits are reduced.

Similarly, unfettered markets may offer excessive loans, since lenders will not take into account the adverse externalities to either the public income contingent loans or UI programs.²⁵ With more private loans, individual incentives to search are reduced. But it would seem that there is some ambiguity about the optimal level of forgiveness, especially if the bankruptcy laws are such as to make it difficult for individuals to discharge their debts. The reason is that the private loans may (when compounded with public loans)

result in unemployment. Thus, the response by

16.4.5 Loans

Faced with unemployment without unemployment insurance in the model, two individuals may be cosigned a loan. This ensures that

An individual in an informal group may be in a position to cosign for others. Second, an individual may be cosigned about the probability of control actions (cultural norms)

It can be an individual cosignee through an incentive program cosignees by two individuals to agree to become unemployed

16.5 Conclusion

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result in further hardship in old age in the event of two episodes of unemployment, and government programs will need to take this into account. Thus, the existence of private loans may, in effect, 'force' the government to respond by providing more cross-state insurance through ICL.²⁶

16.4.5 Loan-cosigning in the provision of loans

Faced with the possibility that an individual might not be able to repay, without undue hardship, a loan if facing extended unemployment (in our model, two episodes of unemployment), the government may want the loans to be cosigned by other employed workers. An employed worker who has cosigned a loan with an unemployed worker makes (partially) good on the loan. This provides the employed worker with an incentive to monitor – to ensure that the person for whom he cosigns searches for a job.

An individual who is close to the cosignee, such as member of the same informal group (for example, the same family or close friends) is in a superior position for loan-cosigning for a couple of reasons. First, he or she may be in a position to monitor the actions taken by the cosignee more effectively than others. Second, the cosignee may be subject to so-called peer pressure from an individual within the same informal group.²⁷ How much an individual cares about the peer pressure within a group and how much one can effectively control actions taken by the others would depend upon many other factors (cultural ones, for example) exogenous to this model.²⁸

It can be shown that loan-cosigning increases welfare so long as an individual cosigner is better informed of the realized search cost for the cosignee than the government. Cosigning reduces the moral hazard (adverse incentive) problems, implying that the government could offer to those with cosignees better terms for their loans. *Ex ante*, there would be incentives for two individuals in a position to monitor and exert peer pressure on each other to agree to co-sign an unemployment loan, should one or the other of them become unemployed.

16.5 Conclusion

There is little doubt that under current arrangements those who face a bout of unemployment suffer a great deal: there is imperfect consumption smoothing over time and imperfect risk-sharing across states.

Markets, on their own, did not provide UI – government had to step in to fill the lacuna. But government programs have been criticized for their adverse effects on search. In the United States, for instance, normally benefits are cut off after six months because of the concern that extended benefits would greatly attenuate search and job acceptance.

One of the reasons that unemployment extracts such high costs – even when the loss of lifetime income is relatively small, as a result of a short term bout

of unemployment – is that individuals are unable to smooth consumption over their lifetime: capital markets are imperfect. That is why models assuming perfect capital markets ascribe so little cost to economic fluctuations (Lucas, 1987). It was that insight that motivated our earlier paper (Stiglitz and Yun, 2013) which showed that, indeed, if episodes of unemployment are short enough, one could make extensive use of loans: a well-designed government loan program could ensure income smoothing without the attenuation of incentives, while only a limited UI program might be needed. In fact, however, most advanced industrial countries do not make use of loans, whereas Singapore, with its Provident Fund, in effect relies heavily on loans.

Some individuals do experience episode(s) of unemployment that represent a significant fraction of their potential lifetime income, and in that case, one cannot rely simply on loans, and especially on conventional loans. As we have suggested above, ICL by simultaneously providing cross-state and cross-period smoothing, represent a welfare improvement over conventional loans.

This chapter analyzes the optimal combination of UI benefit and loans for unemployed individuals from a lifetime perspective. Taking into consideration the possible interactions between UI and loans and the interactions between the government program and private savings (and loans), it examines how the level and composition of benefits (say the proportion of benefits provided in the form of loans) changes over time in a model where unemployment may occur in any period.

Not surprisingly, even though the optimal mix of loans and UI changes over time, it does not achieve perfect consumption smoothing, so long as there are any incentive effects; it should entail more loans when unemployed young than when old, while the amount of consumption for those unemployed when young should be greater than for those unemployed when old. After all, those unemployed when they are young anticipate that the losses are likely to be made up over the rest of their lives; while those who are unemployed when they old know that that cannot be the case.

The above in turn means that there is greater need for insurance when an unemployment episode occurs later in life: the UI benefit should be smaller in the earlier periods than in the later periods. But this in turn means that those who are unemployed when young especially need intertemporal consumption smoothing – that is, there is a role for loans. But the possibility of long-term unemployment reduces the amount of loans for the young unemployed (from what it would be if there were not this risk), and the amount of consumption for those unemployed (that is, the combined loan plus UI benefit) is decreasing in the probability of extended unemployment.

Of course, with government programs, unemployment may be higher than it would be without government programs, but optimally designed government programs balance out carefully the benefits of risk reduction and the costs of any induced unemployment.²⁹ The private sector does not. Alleged

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improvements in capital markets – increasing the availability of private loans for the unemployed – can be welfare reducing.

This chapter can be viewed as a first theoretical attempt to extend the notion of income contingent loans to unemployment programs. As we have noted, ICL can be thought of as a compromise providing better incentives than a pure insurance program, but far better risk sharing than a conventional loan program.

An important direction of future research is the optimal design of such an ICL.³⁰ In analyzing this, we need to think carefully about why it is that markets fail to provide the ‘risk products’ that would ameliorate key risks that individuals face, and what advantages that government might have. For instance, one of the reasons for the absence of equity markets is costly state verification and contract enforcement; but government, especially through its role in taxation, has a comparative advantage in enforcement of debt contracts.

Another reason for the absence of risk markets is adverse selection; but in some instances, government can enforce a pooling equilibrium, at least mitigating the adverse effects that arise from adverse selection. While the adverse incentive effects that arise from insurance will be present whether such insurance is publicly or privately provided, the government has at least the incentives to take account of the cross-market and cross-instrument externalities that have been at the center of the analysis of this chapter.

This chapter has explored the implications of a number of externalities which, to date, have received insufficient attention, and which result in market inefficiency with and without government programs.³¹ While earlier literature had called attention to the externalities within and across insurance markets (that is, the provision of insurance by one firm affects the risk-taking behavior of individuals, and therefore the losses experienced by other insurance firms (Arnott and Stiglitz, 1990)), here we show that such externalities are more pervasive, for example, between savings, credit markets, and insurance.

This chapter has uncovered a new market failure – the risk that the market provides too much income smoothing, both as a result of excessive savings and possibly excessive lending.³² Unrestrained loan markets and excessive precautionary savings are socially dysfunctional, leading to too little effort at job search, with private agents not taking into account effects on losses on unemployment insurance and contingent loan programs. Indeed, even a private loan program that carefully balanced the benefits of interstate and intertemporal smoothing with the private costs of adverse incentives would *not* be Pareto-efficient. Well-designed government programs take these externalities into account, thereby limiting the effects.

One set of externalities upon which we have focused and which has sometimes been given short shrift in the literature are those that arise from the interactions between government programs, markets and non-market institutions. The latter is particularly important, given the limitations in the

ability of government to monitor and control externality generating activities. We show how non-market institutions (such as family) may be used to enhance the welfare performance of government programs: a government program of cosigning can be welfare enhancing, and can be implemented voluntarily by members of a group, if members of the cosigning group have an informational advantage over the government and can exert peer pressure to induce 'better' behavior. (In this context, better behavior means that some individuals with say, medium search costs, search for a job when they otherwise would not have.)³³

The externalities and market failures that we have analyzed here arise whenever there are insurance markets (public or private), and whenever individuals take actions at one date that may affect their willingness to take actions at a subsequent date that will affect the magnitude or likelihood of a loss. Moreover, similar effects arise in all loan markets in which there is a probability of default – and since virtually all individuals pay interest rates in excess of the T-bill rate, there is a presumption that such risks are relevant for *all* consumption smoothing loans. These are examples of *diffuse* externalities – hard for any insurance firm to control. A health insurance company might naturally try to restrict smoking, which is directly related to a number of risks insured by the company. But individuals save and borrow for many reasons, and savings and debts affect behavior in many ways – including individual risk-taking behavior, and their incentives and ability to repay loans to others. In this chapter we have illustrated the risk of excessive lending (borrowing) in one particular context, but the problem is more pervasive. A loan by one lender may reduce the likelihood of another lender being repaid. Excesses in this market played a big role in the financial crisis of 2008. Those excesses may partially be attributable to miscalculations of risk (hardly consistent with assumptions of rational expectations); but even with rational expectations such problems could arise, as we have noted, simply because individual market participants do not take into account the externalities that their actions impose on others.

The analysis of this chapter suggests that there is considerable room for improvement in most UI programs. Most important, our analysis suggests that optimal policy maximizing lifetime utility involves greater reliance on income contingent loan programs, since with such a loan program there can be (especially for the young) greater consumption smoothing with less incentive-attenuation. The loan programs, like the insurance program, have to be sensitive to: (a) the impact that they have on search; (b) the risk of not being repaid; and (c) private incentives for savings and lending which, too, may attenuate search incentives. It seems clear too that unemployment benefits should depend on the individuals' work and unemployment experience.

In our model, the optimal policy involves a larger UI benefit for those with past episodes of unemployment. This stands in contrast to current US

programs, which give a smaller benefit than in the recent past.

On the other hand, we show the relationship between the relative ability to consume in our idealized model suggests the UI model, the relative lifetime benefits may be weaker.

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programs, which pay no attention to longer term employment experience, but give a smaller benefit to those who have been unemployed at least in the recent past.

On the other hand, we are not convinced of the robustness of our result on how the relative reliance on UI benefits versus loans should change with age. In our idealized model, those who are unemployed when older have less ability to compensate for an adverse shock by smoothing over time, and that suggests the UI benefit for the young should be smaller. But in a more general model, the relationship between UI and age is not so clear; because the lifetime benefits of search are greater when young, adverse effects on search may be weaker, suggesting a higher UI benefit for the young.

There is one more qualification to the direct application of our results: we have conducted our analysis within the usual rational individuals with rational expectations framework, modified only by a recognition of certain market failures. If young people excessively discount the consequences to their retirement consumption³⁴, then switching from UI benefits to loans may not have the positive incentive effects predicted in this chapter; instead, it may simply result in greater poverty among the elderly and/or a greater need to engage in loan forgiveness for those who have had the misfortune of experiencing several unemployment shocks over their lives.

The chapter has focused on how governments, with limited information, and limited ability to correct these market failures, can intervene to improve welfare. It assumes that when individuals search for a job, there is a job to be found; if the number of jobs is less than the number of job seekers, more search simply increases the length of queues for the jobs that are available, and can worsen welfare. The implication is clear: UI systems should be made contingent on the state of the economy.

We have focused too on how market forces affect individuals' willingness to search. There are other market externalities that might affect the ability to search, some manifest in the current crisis. Excessive indebtedness may, for instance, restrict the ability to invest in search over longer distances and may inhibit the ability to purchase a home in another locale (particularly important in countries with limited rental markets).³⁵

Given the suffering associated especially with extended periods of unemployment, and given the significance of potentially adverse incentive effects for job search posed by poorly designed unemployment systems, there is need for thinking carefully about how one can structure systems which improve the well-being of the unemployed while limiting societal costs from adverse incentives.

But the issues raised here have a broader import, going well beyond unemployment. Firstly, each bout of unemployment can be thought of as a separate risk. We have explained how it makes sense to pool these risks together, to have a lifetime unemployment program. By pooling risks together,

one can rely more on loans, and the adverse incentive effects of insurance are mitigated without the adverse consequences of limited intertemporal smoothing. But the same arguments apply to pooling other risks together, for example, those associated with health or longevity or disability. This is, of course, what the Singapore Provident Fund does. Secondly, even with risk pooling across a large number of risks, there is a risk of large losses (relative to an individual's lifetime income). One cannot rely just on intertemporal smoothing. There has to be interstate smoothing – that is, insurance against such large losses. ICL effectively provide such insurance.

Over the past century, the provision of social insurance has increased security and individual well-being enormously. Recent years have seen an attack on social insurance, based on concerns about the adverse incentive effects. We believe that a Provident Fund, an integrated social insurance program, based on ICL, provides an effective way of simultaneously providing for interstate and intertemporal smoothing with minimal adverse effects on incentives. This chapter can be thought of an initial exploration, in the context of unemployment, of some of the key considerations in the design of such a program.

Notes

This paper was inspired by discussions at the International Economic Association Roundtable on Income Contingent Loans, Bangkok, March 2013. The authors acknowledge helpful comments from Bruce Chapman. Stiglitz is indebted to the Institute for New Economic Thinking for financial support.

1. This is particularly the case in the United States. A significant number of other countries provide grants-based welfare to the unemployed and this is not the comparison pertinent to this chapter.
2. See Flemming (1978), Hopenhayen and Nicolini (1997).
3. There would of course be some additional lifetime income costs from unemployment arising from the depreciation of human capital and the non-accumulation of labor market experience while unemployed.
4. Imperfections which themselves can be explained by imperfect and asymmetric information.
5. See also Altman and Feldstein (1998), and Costain (1997).
6. As the discussion that follows will make clear, this is not quite accurate, because if there is a risk of default, there is some interstate smoothing.
7. There is similarly a large literature (based on imperfect and asymmetric information) explaining why private markets in human capital equity are essentially absent. Indeed, the imperfections in these equity markets are even greater than in debt markets. See the discussion that follows.
8. Interstate smoothing implies that the individual's lifetime income is the same whether or not they face a bout of unemployment since the government makes up for the loss. But if the private market knew that the individual's income was guaranteed, regardless of whether or not the individual faced an episode of unemployment, it would be willing to lend sufficient amounts to smooth consumption over the individual's life. To

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a large extent, at least, the inability to borrow follows from the insecurity of the individual's income (There are, in addition, important problems in contract enforcement).

9. If an individual has an outstanding non-contingent debt, he will search harder in the event of an episode of unemployment later in life, because the consequences of not getting a job are more severe. An ICL (of any given size) has weaker incentives compared to a straight loan. It is a more difficult matter to ascertain whether the net effect is positive or negative.
10. There is a small literature directed at the moral hazard/incentive effects arising from unobservable savings. See, for example, Arnott and Stiglitz (1985), Koehne (2010), and Abraham and Pavoni (2011). Hopenhayn and Nicolini (1997), Kocherlakota (2004) and Shimer and Wernings (2008) analyze a model of repeated moral hazard with hidden savings to characterize the optimal profile of UI benefits over a single unemployment spell. The externality that they are concerned with is, therefore, the one that the savings made by the unemployed (out of UI benefits they receive) may exert upon incentives in the next period within the same episode of unemployment, while this chapter deals with the externality that precautionary savings made by employed workers early in life would exert upon incentives for them when they get unemployed in the future.
11. This can be compared to Arnott and Stiglitz (1991), who argue that the presence of a non-market group may not be welfare-increasing in the provision of insurance unless it has control of the actions taken by its members.
12. Readers interested in the full analysis are referred to Stiglitz and Yun (2013).
13. Defined more precisely in the appendix.
14. What matters for the extent of loan provision is the *marginal* reduction in incentives. We would normally expect that the marginal effect on search is greater the greater the curvature of the utility function, in which case *a priori* the effect of the curvature of the utility function on loan size would appear to be ambiguous.
15. If there were a full set of Arrow-Debreu securities, he would be protected should he have a bout of unemployment later in life, so he could have complete smoothing. But with moral hazard, there has to be consequences for not searching, so that consumption in the second period in the event of unemployment has to be lower than it would be with full insurance.
16. But it does suggest that government should not encourage unemployment loans, beyond the amount which is optimal, for example, by allowing individuals to borrow freely against their pensions. Access to borrowing should be limited.
17. Of course, even in the absence of an externality, the optimal unemployment program will depend on the period of an individual's life that the unemployment occurs, as we explained above. The discussion that follows highlights additional reasons that the unemployment program will differ at different stages of an individual's life and depend on his employment history.
18. Note that there is no reason that the search elasticity of those unemployed in the second period, who have not had a previous bout of unemployment, should be the same as those who have had a bout of unemployment. In the model in the appendix, we allow the two search elasticities to differ (and to differ from the first period search elasticity).
19. That is, the search costs of an individual experiencing an unemployment shock in the second period may depend not just on whether the individual experienced an unemployment shock in the first period (as the model described in the appendix

- assumes), but also of whether he succeeds in getting a job the first period. Note the effects can be ambiguous: having searched in the first period, he may be more expert in searching (he has learned how to search), reducing his search costs, but he may be 'tainted' as a result of not having found/accepted a job, and that would increase his second period search costs. Normally, we would expect the second effect to dominate.
20. The effects that we have just described are in addition to those noted earlier: as we observed, an individual who is unemployed in the first period has the possibility of smoothing consumption over his entire life; but an individual who is unemployed in the second period (in the absence of full insurance) will already have consumed more in the first period than he would have, had he known that he would be unemployed in the second period. Income smoothing possibilities are thus reduced.
 21. We say presumption, because the mix of loans and insurance depends on other parameters, such as the search elasticities. If the search elasticity in the first period was substantially less than that in the second period, there might well be greater reliance on insurance in the first period than in the second.
 22. In the model formulated in the appendix, we are able to show that loans are larger and UI benefits are smaller earlier in life, unless the probability of being unemployed long term is high.
 23. Indeed, the provision of ICL also reduces search in the first period, since the consequences of not getting a job in the first period are also reduced. Thus, if the incentive effects are large enough, the optimal unemployment program might entail not just fewer loans, but also less insurance. The reduction of risk vis-a-vis the worst contingencies (two episodes of unemployment) that results from income contingent loans is partially (but only partially) offset by an increase in risk bearing in the event of a single first-period episode of unemployment.
 24. Arnott and Stiglitz (1990) discuss at some length the externalities imposed by one insurance program on other insurance programs.
 25. In our simplified model, in which there are no problems of adverse selection, there is excessive private lending. In more general models, this may not be the case.
 26. In some countries, such as the United States, there seems to be insufficient precautionary savings, but this probably has to do more with 'behavioral economics' considerations; for example, individual's underestimation of the risk of their facing spells of unemployment. In this model, we have assumed rational expectations.
 27. The incentive effects created by the peer pressure in a group have been discussed by Kandel and Lazear (1989).
 28. Here we suppose that an individual does not care about the well-being of the others within a group, implying that there is no need for intra-group transfers, *ex post*.
 29. Of course, some governments may have provided UI benefits in excess of the optimum. Our analysis shows that to obtain the optimal level of unemployment, restrictions have to be placed both on the amount of insurance that government provides and the amount of borrowing that individuals can undertake.
 30. Because, in our model, repayment depends on whether individuals get a job in subsequent period, the loans are, in that sense, 'income contingent' but, of course, they would be more-so if the wages individuals received when employed were variable, and repayment depended on those wages. If the extent of search affected the wages individuals received, then the design of the income contingent loans would affect the extent of search. See Stiglitz and Yun (2013). Also see Chapman and Hunter (2009), Chapman and Tan (2009), and Chapman (2010) for a discussion more generally about ICL design considerations.

31. Greenwald and Stiglitz (1980) analyzed the equilibrium effects of insurance.
32. In a sense, the insurance who point to the insurance theorem of Gale (1974) in the presence of insurance.
33. See Haggard (1999) for an application of the insurance theorem.
34. As asserted by Tversky and Kahneman (1979).
35. Delli Gatti (2009) discusses the recession and development.

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31. Greenwald and Stiglitz (1986, 1988) show that whenever there is asymmetric information (such as that associated with incentive issues, including those of the kind analyzed here) there are pecuniary externalities that matter, so that the market equilibrium is not constrained Pareto-efficient.
32. In a sense, this market failure is related to that analyzed by Arnott and Stiglitz (1990), who point out that the provision of insurance against one risk may affect other insurance contracts. This, in turn, is related to the fundamental non-decentralizability theorem of Greenwald and Stiglitz (1986). Chetty and Saez (2010) discuss how the presence of private insurance market affects the optimal social insurance.
33. See Higgins (Chapter 20, this volume) for discussion of the benefits of cosigning in the application of ICL to paid parental leave.
34. As asserted by much of the recent literature in behavioral economics (Kahneman and Tversky, 1992; Benartzi and Thaler, 2004).
35. Delli Gatti et al (2012a, 2012b) have raised this possibility in the context of the current recession. The role of capital constraints in affecting migration was long noted in the development literature (Stiglitz, 1969).

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Appendix

Outline of the model

Consider a 3-period model in which an individual may work for period 1 and 2 at the wage w per period, and then retires in period 3. For simplicity, we

assume w is fixed with an unemployment period 2 dependent on the probability of being employed is p .

There are three types of unemployment: unemployment in period 1, unemployment in period 2, and unemployment in period 3. (unemployment in period 1 have previous period 1, a worker may be unemployed and spends sufficient time to find a job, and does not search across the three periods to find a job, and costs $\{e_1, e_2, e_3\}$, F_1, F_2, F_3 , respectively, committing to $\bar{e}_i (i = 1, 2, 3)$, the shock is ϵ_i and the elasticity of u with respect to search costs is η .)

An unemployment benefit r_i ($i = 1, 2, 3$) is provided to workers, and the benefits for search costs are imposed upon workers for all three periods for all three periods. The bail-out for workers is as part of the period 1 and 2.

The model is characterized by the following features of the model (for $i = 1, 2, 3$) of the model account individual features of the model following results:

- (i) Desirable provision of unemployment insurance

assume w is fixed and there is no discounting. The worker may be confronted with an unemployment shock in each of the two periods. The probability of an unemployment shock occurring to an individual in period 1 is q , while that in period 2 depends upon whether or not the individual is unemployed in period 1. The probability of a shock in period 2 for a worker who was previously employed is p_N while that for a worker who was unemployed is p_U .

There are thus three different unemployment shocks in the model: unemployment shock in period 1 (called unemployment shock 1), unemployment shock in period 2 for those who have not been unemployed (unemployment shock 2), and unemployment shock in period 2 for those who have previously been unemployed (unemployment shock 3). After each shock, a worker may choose to search or not to search for a job. If the individual expends sufficient search effort e , then he or she finds a job; if the individual does not search, he or she is unemployed that period. Search costs may differ across the three shocks: we denote e_1, e_2, e_3 for the amount of search required to find a job, given the unemployment shock 1, 2, 3, respectively. The search costs $\{e_1, e_2, e_3\}$ are independent random variables with distribution functions F_1, F_2, F_3 , respectively. The individual finds out his or her search costs before committing to search. It is easy to show that there exists a threshold level $\bar{e}_i (i = 1, 2, 3)$, such that the unemployment rate among those who have faced the shock is $1 - F_i(\bar{e}_i)$. We denote by $h_i \equiv \frac{f_i(e)}{1 - F_i(e)}$ ($i = 1, 2, 3$) the search elasticity of unemployment, that is, the sensitivity of unemployment with respect to search activity, for shock i , and assume that h_i is constant over e .

An unemployed worker (under shock i) receives money from the government consisting of two components: an unemployment insurance (UI) benefit r_i ($i = 1, 2, 3$) which is financed by a tax imposed upon employed workers, and a loan in the amount of R_i ($i = 1, 2, 3$). In particular, the UI benefits for shock 1, 2 and 3 - r_1, r_2 and r_3 - are financed by the tax T that is imposed upon those who are employed. Loans taken out are repaid in the third period for all the workers except for those who are unemployed in both of the two periods. These are allowed to default on their loans. The *expected* cost of the bail-out for defaulted loans is borne by borrowers at the time of borrowing as part of the price for the loan.

The model described above characterizes the optimal package $\{r_i^*, R_i^*\}$ ($i = 1, 2, 3$) of UI and loans for the unemployed at each shock i , taking into account individual worker decisions on savings and search. Examining the features of the optimal mix of UI and loans, the model yields a set of the following results:

- (i) Desirability of Loan Provision. A set of parameters under which loan provision is desirable is identified. (In this model, because of the

cross-market externality with those who face extended unemployment, it is possible that there is a corner solution in which no loans are made – that is, an increase in the amount of loans, even from zero, induces less search, increasing the losses on the unemployment insurance program.)

- (ii) **Comparative Statics.** The model analyzes how the benefit mix of UI and loans varies with timing of unemployment as well as with incidence and duration of unemployment.
- (iii) **Presence of Private Loan Market and Excess Savings.** The model examines how the optimal package of UI and loans changes in the presence of excessive private savings and loans.
- (iv) **Welfare Effects of Loan-Cosigning in the Provision of Loans.** The model shows how loan-cosigning improves welfare through the interaction of informational advantage and peer pressure among the members within an informal group.

The detailed propositions on the above results and their proofs can be found in Stiglitz and Yun (2013).