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Soft Budget Constraints, Firm Commitments and the Social Safety Net

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Abstract

It is shown that the inefficiencies created by the "soft" budget constraint, enjoyed by enterprises in Eastern Europe and elsewhere, will continue so long as governments are unable credibly to threaten not to bail out loss-makers. Commitment to a "hard" budget constraint can best be achieved by the institution of a suitable social safety net. The burden on the social safety net can be reduced by the (endogenous) development of financial markets.

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1/ International Monetary Fund, Washington D.C. 20431. In particular Manuel Guitian, Jan van Houten, Ashok Lahiri, Dubravko Mihaljek and Richard Quandt provided perceptive comments; all errors are, of course, the responsibility of the author.

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Summary

Enterprises in socialist economies were accustomed to operating under a "soft" budget constraint, implying that their losses were covered by more or less explicit subsidies. Individual enterprises tended to be too large and tied up resources, which could not be reallocated to more productive uses. Similarly, in market economies, governments frequently bail out loss-making firms and sustain declining sectors.

The prevalence of subsidies reflects a commitment problem: once threatened by costly unemployment, government's best response is to provide a subsidy. Since a preannounced policy of letting enterprises fail is not credible, enterprises will come to expect bail-outs, and resources will continue to be inefficiently allocated.

Commitment to a "hard" budget constraint can be achieved by instituting a suitable social safety net: once unemployment costs no more than subsidies, the government can resist calls for bail-outs. Anticipating this resistance, enterprises will act more prudently to increase expected operating profits. They will also have an incentive to devise private means of insurance, which in turn will relieve the burden on the social safety net.

I. Introduction

Kornai (1980, 1986) used the term "soft budget constraint" to describe the system whereby enterprises in socialist economies were accustomed to receiving various forms of subsidy more or less automatically and to having any operating profits largely expropriated. If enterprises are required to meet quantitative targets and prices are administered, it is necessary to let the budget constraint soften and to regard the financial system as little more than an accounting device. When, however, the controlling interests of enterprises are allowed more flexibility, rent-seeking behavior may be encouraged and a moral hazard problem will arise in the absence of a "hard" budget constraint. Half measures that grant managers power without responsibility may drag the economy further away from an efficient allocation and make it more vulnerable to disturbances. Competition can function in an effective and desirable way only when enterprises have the means and incentives to pursue their individual interests, and when the institutions of financial discipline are in place, such as the absence of systemic subsidies and capricious taxation, the separation of lenders from borrowers, a mechanism to remove unsatisfactory management, and the ultimate threat of bankruptcy.

Hence all reform proposals and programs for Eastern Europe have insisted on the hardening of budget constraints, even at the cost of many plant closings and the laying-off of many workers. Nevertheless some enterprises and groups seem to have continued to enjoy a privileged position. A similar process was observed in the West during the 1980s as governments attempted with difficulty to restructure loss-making public enterprises and to deny subsidies to firms in difficulties, which before had relied on their size and locally dominant position to guaranty their continued existence. It is easy to find examples even from the recent past of industries that have been saved from bankruptcy by an injection of public funds, and of firms and sectors that survive in their present form because of long-term government support. 1/

The pervasiveness of more or less soft budget constraints suggests that there are similar mechanisms in both East and West that serve to induce government intervention, even when the government would not want people to anticipate its reactions. Specifically, this paper starts with a formalization of the widely-held intuition that a policy not to subsidize loss-making enterprises may be time-inconsistent; a

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1/ Holzmann (1991) provides evidence of the extent to which loss-making enterprises in Eastern Europe were supported by the state; during the 1980s, a period of putative reforms in some countries, budgetary subsidies alone were typically almost 10 percent of GDP. Budgatary support by the European Communities for the agricultural sector averaged 0.6 of members' GDP during the 1980s (European Economy, 1990).

preannounced policy of letting loss-makers go under may not in itself be credible. The government's intention to let firms fend for themselves may be undermined once hardship threatens, and the intensity and frequency of such threats will be increased by habitual government intervention as enterprises will foresee this backsliding and therefore act less prudently. While the effects of a soft budget constraint on the firm's behavior is examined in some detail by Kornai and Weibull (1983) and Goldfeld and Quandt (1988, 1990, 1991), only Schaffer (1989) looks at the game from the government's perspective, and he concentrates on incentives to fulfill quantitative targets.

The issue of time-inconsistency is well known in macroeconomics following Kydland and Prescott (1977), and is addressed also for instance in the literature on taxation policy (Persson and Tabellini, 1990, provide a good synthesis), which in some respects is the converse of subsidization policy. In the terminology of game theory, policies are required to belong to subgame perfect, or at least sequential, equilibria, in which agents base their decisions at each stage on rational expectations concerning the subsequent evolution of the equilibrium. Hence no player can systematically surprise another.

One means of generating commitment to policies that have short-run costs is to build a reputation for toughness in a repeated game by following a retaliatory "trigger" strategy or by mimicking a player who lacks a commitment problem; even a player for whom toughness is very costly may wish to invest in a demonstration that it is following a rule such as "tit-for-tat", or to imitate the behavior of a genuinely tough player. In the context of hardening the budget constraint, one may want to close a few prominent loss-making enterprises "pour encourager les autres". Reputational equilibria, however, generally must presume uncertainty about the government's preferences or the termination of the game, and tend not to be robust to slight modifications to the informational assumptions. Models in which reputations can be created often have multiple equilibria, several of which may seem intuitively plausible. Therefore, after a history of concessions a mere announcement of a new policy of toughness without institutional changes may not be granted much credence, and defending a reputation for not subsidizing loss-makers (or not generating surprise inflation, or not taxing committed capital, etc.) relies on a degree of coordination of expectations that is implausible in a complex economy. Furthermore, in the context of a model that generates a time inconsistency problem, it seems inappropriate to assume the possibility of a government with an exogenous commitment to toughness (see Rogoff, 1987, and Persson and Tabellini, op. cit., for a summary of these criticisms). A reputational mechanism alone, as proposed for instance by Schaffer (op. cit.), seems unlikely to be a reliable and general remedy for governments' tendency to bail out loss-makers.

A more concrete and unambiguous device is therefore desirable to reinforce the credibility of the hard budget constraint. In this paper

it will be shown that the introduction of a suitable social safety net will do the job: once enterprises see that the government has provided a cushion against unemployment, they will recognize that the government no longer has a motive to cover their losses, and they will plan accordingly. No uncertainty about preferences, actions or the duration of the game is required, nor does government have to arrange to make reneging costly. While in practice the institution of a social safety net and the taxes needed to fund it may create their own inefficiencies, so may the taxes that finance subsidies; here an additional argument in favor of the provision of adequate unemployment benefits is isolated.

Moreover, the imposition of a hard budget constraint on enterprises will have important implications for the demand for financial instruments and thus for monetary conditions in a reforming economy. As subsidies or low-cost loans are eliminated, demand for precautionary balances and other forms of insurance will increase. As a consequence, the demands on the social safety net will be reduced.

In the second section a model of a simple repeated game is laid out that captures much of the policy dilemma facing government and the reaction of firms. In section III the model is extended to allow government to establish a social safety net, and some inferences concerning the relationship between financial markets and the need for a social safety net are drawn. Extensions are discussed in section IV, and section V concludes.

II. Subsidies, Moral Hazard and Time Inconsistency

The model of this section simplifies the production technology used in Goldfeld and Quandt (1988) but makes the interaction between the firm and government explicit. An effective lobbying "technology" will not simply be posited; rather, the mechanism whereby firms can extract benefits from government is the first subject of analysis.

The economy has two sectors, one atomistic with constant returns to scale technology and the other represented by a single firm. There is just one factor of production. The factor will at times be referred to as labor and its unit cost as the wage rate. The total potential supply of the factor is fixed at $\underline{x}$, but the available supply equals $\underline{x}$ less those who are temporarily out of the factor market. The game is repeated over an indefinite number of periods. At the start of each period, the firm writes contracts to hire its desired level of inputs, which is always below the total available supply. The remainder of the available factor supply is employed in the atomistic sector. Technology in the atomistic sector exhibits steady constant returns to scale, which determines the

non-varying wage rate w. 1/ At the end of the period the firm decides whether it will have to reduce employment; all factors made redundant are excluded from the factor market for one period. Perhaps workers need time to search for new employment, to relocate, and to be retrained. The stipulation that factors need one period to be reallocated is the only technological link between periods.

1. The behavior of firms

The firm is a risk neutral, profit maximizing price taker. No financial instruments are available to the firm and there is unlimited liability. Borrowing or reserves are unavailable. At the start of each period the firm commits to a level of input x to use in its production function f(x), where $f' > 0$, $f'' < 0$, given the unit input cost w. 2/ Production takes place, and the revenue earned is subject to a lognormal disturbance $\exp(\tilde{y})$, $\tilde{y} \sim N(0,\sigma^2)$, which might represent a price or a technology shock. The random variable $\tilde{y}$ is independently and identically distributed across periods. 3/ With the output price normalized to unity, operating profits in each period are defined as realized revenue minus input costs and minus a fixed cost C:

$$\Pi(x,\tilde{y}) = \exp(\tilde{y})f(x) - wx - C \qquad (1)$$

If the firm can meet its costs, the owners of the firm enjoy the realized operating profit and continue to operate the firm. If operating profits are negative, the owners are assumed to be able to meet their immediate costs but in the absence of government intervention the firm closes down. Profits are negative if the realization of $\tilde{y}$ is smaller than the level

$$u(x) = \log\left[\frac{wx + C}{f(x)}\right], \qquad (2)$$

which occurs with probability $\Phi_1(u)$, where Φ_1 is the cumulative distribution function (c.d.f.) of $\tilde{y}$. The ex ante value at time t of operating the firm, $V_1(t)$, given that no subsidy is anticipated, equals its expected operating profits this period plus the value of expected

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1/ Decreasing returns to scale in the aggregate production function of the atomistic sector could be introduced with little effect on the qualitative results.

2/ Time subscripts have be dropped whenever ambiguity is not thereby created.

3/ There is no conceptual difficulty in introducing more explicit dynamics. For instance, if $\exp(\tilde{y}_t)$ is replaced throughout by $P_t = P_{t-1}\exp(\tilde{y}_t)$, where $\tilde{y}_t$ remains an i.i.d. normal random variable, expected future operating profits become negative when current operating profits are negative.

future profits, discounted at rate ρ, contingent on the firm continuing in business, which occurs when current operating profits are non-negative:

$$V_1(t) = E(\Pi(x,\tilde{y})) + \text{prob}(\Pi \geq 0).\rho V_1(t+1)$$

$$= \exp(\sigma^2/2)f(x) - wx - C + [1-\Phi_1(u)].\rho V_1(t+1) \qquad (3)$$

since $\exp(\sigma^2/2)$ is the expected value of $\tilde{y}$. The firm maximizes $V_1(t)$ by choosing x according to the first order condition

$$\exp(\sigma^2/2)f' = w + \Phi_1'\left[\frac{w}{wx+C} - \frac{f'}{f}\right].\rho V_1(t+1) \; . \qquad (4)$$

Let x_1 be the value that satisfies (4) and let u_1 be the corresponding value of u. The last term on the right-hand side of (4) must be positive if the firm wishes to operate at all. 1/ The managers of the firm are concerned not only to maximize expected profits this period, but also to preserve their rights to the stream of future profits. Employment of an extra unit of the input not only raises revenue and costs w, but also increases the probability of losses being incurred. Therefore management is more cautious and employs less of the factor than would a myopic firm.

A firm that anticipates a bail-out if it makes losses has a different expected value because it does not have to worry about the lower end of the distribution of operating profits. Expected profits net of subsidies are increased, and the firm is certain to continue operating. Suppose in particular that the firm knows that all loses will automatically be covered. Then its expected value to be maximized will be

$$V_2(t) = \text{prob}(y \geq u).E(\Pi(x,\tilde{y}) \,|\, \tilde{y} \geq u) + \rho V_2(t+1)$$

$$= \int_u^{\infty} [\exp(y)f(x) - wx - C]\, d\Phi_1(y) + \rho V_2 \; . \qquad (5)$$

1/ The term Φ' must be positive because it describes a distribution function, ρ is the positive discount factor and V_1 is positive if the firm is worth operating. Assume that the term in square brackets in (4) is negative, which implies that $\exp(\sigma^2/2)f' < w$. But if expected profits are positive, $\exp(\sigma^2/2)f > [wx+C]$. Hence $w/[wx+C] > f'/f$, which leads to a contradiction of the assumption.

It can be shown that, if $\Phi_2(\tilde{y})$ is the c.d.f. for $\tilde{y} \sim N(\sigma^2,\sigma^2)$, 1/

$$V_2 = [1-\Phi_2(u)]\exp(\sigma^2/2)f(x) - [1-\Phi_1(u)][wx + C] + \rho V_2. \quad (6)$$

The first order condition for the maximum of (6), fulfilled by x_2, can be expressed as 2/

$$\exp(\sigma^2/2)f'(x) = w.\left[\frac{1-\Phi_1}{1-\Phi_2}\right]. \quad (7)$$

Since $\Phi_1(u) > \Phi_2(u)$ for all u, a comparison of (4) and (7) indicates that necessarily $x_2 > x_1$; if subsidies are expected, the firm chooses to hire more of the input because it can then gain more in good states while it is protected in bad states. As a consequence, revenue and profits of the firm vary more in response to exogenous disturbances when the budget constraint is soft, and the probability of a loss being incurred increases.

Obtaining the right to a subsidy is analogous to receiving a "put" option with a striking price at $\Pi=0$; an extra unit of the input increases the variance of operating profits and therefore increases the value of the put. Notice that the value of this put ensures that expected profits V_2 when a subsidy is foreseen are always positive, whereas V_1 could well be negative, in which case the firm would prefer not to begin operations. Indeed, a firm that is sure of receiving a subsidy in case of need has a positive private value even if expected operating profits are negative at any level of input use.

2. The government's reaction

Turning now to the behavior of government, it will be assumed that the government is risk neutral, that it has no purely distributional preferences, that it has the same rate of time discounting as private

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1/ It can be verified that for any arbitrary parameter s

$$\int_u^\infty \exp(sy)d\Phi_1(y) =$$

$$\int_u^\infty \frac{1}{\sigma\sqrt{2\pi}}\exp(sy)\exp(-y^2/2\sigma^2)dy = \exp(s^2\sigma^2/2)\int_u^\infty \frac{1}{\sigma\sqrt{2\pi}}\exp\left[\frac{-(y-s\sigma^2)^2}{2\sigma^2}\right]dy.$$

The last term on the right above is the normal c.d.f. for $\tilde{y} \sim N(s\sigma^2,\sigma^2)$.

2/ Note that $d\Phi_2/dx = d\Phi_1/dx.[wx + C]/[f'\exp(\sigma^2/2)]$, which allows simplification of the derivative of (6) with respect to x.

agents, and that revenue can be raised without creating distortions. 1/ The government acts as a benign dictator in maximizing the social welfare function, one component of which is the operating profits of the firm. There is scope for policy because if the firm closes, its inputs are unemployed for one period as they are reallocated. 2/ The firm is not concerned about this potential negative externality, which government is motivated to correct. At the same time, the government is unable or unwilling to control the firm's production decisions directly but can only react to their effects. Reputation building and trigger strategies are ignored; the government's decision to provide subsidies is taken independently each period.

It is useful to distinguish between the welfare effect of reallocating the potential supply of the factor between the two sectors and that of any reduction in available supply due to unemployment. At the start of some period t before the realization of $\tilde{y}$ is known, the present expected social value of potential output from the two sectors is

$$W(t) = \sum_{\tau=t}^{\infty} \rho^{\tau}\left[\exp(\tilde{y}_{\tau})f(x) - C + w(\underline{x}-x)\right]$$

$$= \sum_{\tau=t}^{\infty} \rho^{\tau}\left[\Pi(x,\tilde{y}_{\tau}) + w\underline{x}\right] . \qquad (8)$$

Note that the wage rate w and the firm's choice of input level x are constant across periods, although the latter does depend on what government policy is anticipated.

With a certain probability, in any period τ the realization of $\tilde{y}_{\tau}$ will be less than u and the firm makes a loss. If the firm is allowed to close, next period its workers are unemployed and enjoy only their reservation wage v ($v < w$). 3/ The loss to society from the unemployment of x workers is thus $x[w-v]$. Let $D(\tau)$ be a dummy variable characterizing government policy such that $D(\tau) = 1$ if any loss-making firm at time τ will be rescued, and 0 otherwise. Then the present value of losses due to unemployment, evaluated at the start of some particular period t, can be written as

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1/ In this model a tax on wage income is non-distortionary because the labor supply is fixed.

2/ The model does not rely in any very important way on the specification of the costs associated with the firm being left to fail.

3/ The (shadow) reservation wage v reflects whatever cost or benefit arises from being idle.

$$\Gamma(t) = \sum_{\tau=t}^{\infty} \rho^{\tau+1} D(\tau) \text{prob}(\Pi(x,\tilde{y}_\tau) < 0) x[w-v] \ . \qquad (9)$$

At the start t total discounted expected welfare is W(t) - Γ(t) (for convenience it is assumed that no unemployment has been inherited from the previous period; in any case current policy cannot reduce inherited unemployment).

Consider now the government's choices at the end of the period once the realization $\tilde{y}_t = y_t$ is known. If $y_t > u$ so the firm is profitable, there is nothing for government to do. If $y_t < u$ and the government decides not to provide a subsidy, welfare will equal output this period less losses from unemployment next period, plus the value of potential output in the future, less expected losses from unemployment from t+1 onwards:

$$[\Pi(x,y_t) + w\underline{x}] - \rho x[w-v] + [W(t+1) - \Gamma(t+1)] \ . \qquad (10)$$

If the government saves the firm from closing, realized welfare will be just

$$[\Pi(x,y_t) + w\underline{x}] + [W(t+1) - \Gamma(t+1)] \ , \qquad (11)$$

as no unemployment occurs. 1/ Equations (10) and (11) embody the government's dilemma: after a firm has chosen its inputs, and if losses are made, it is certainly better to subsidize than to let the firm shuts down and suffer unemployment. If subsidies are the only policy instrument, the government cannot resist calls to bail out loss-makers of any size. But once the firm realizes that it is protected from closure, it will take greater risks and increase its demand for inputs from x_1 to x_2. Notice also that, by assumption, even if the incumbent loss-maker is forced to close, a new entrant will be attracted by the prospect of subsidies and recreate the dilemma for government 2/.

It may be helpful to look at the extensive form representation of the game shown in Figure 1. At the start of each round, the firm chooses x_1 or x_2. "Nature" chooses the realization of $\tilde{y}$, so with probability

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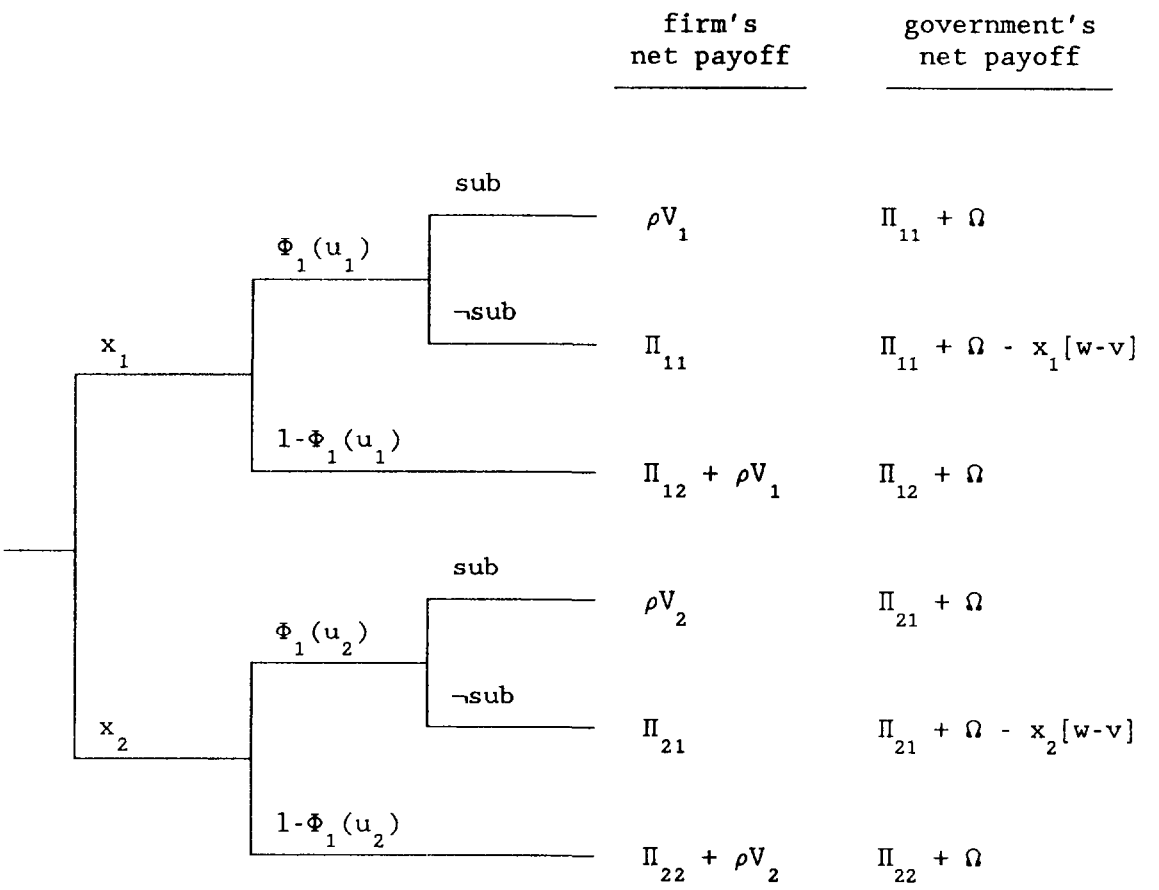
1/ As by assumption the government does not care about distribution and taxes are non-distortionary, the transfer from the rest of society to the loss-maker does not itself enter into the welfare calculation.

2/ If, contrary to the assumption here, the firm is not replaced if it ever has to shut, the W(t+1) - Γ(t+1) in equation (10) would be replaced with $w\underline{x}\rho/[1-\rho]$, which is the discounted value of production when only the competitive sector produces. Then subsidizing loss-makers is still the only credible policy if $\rho x[w-v]$ is large enough.

Figure 1

Extensive form when the social safety net is absent.



$$\Pi_{11} = \exp(\sigma^2/2) f(x_1) \Phi_2(u_1)/\Phi_1(u_1) - wx_1 - C$$

$$\Pi_{12} = \exp(\sigma^2/2) f(x_1)[1-\Phi_2(u_1)]/[1-\Phi_1(u_1)] - wx_1 - C$$

$$\Pi_{21} = \exp(\sigma^2/2) f(x_2) \Phi_2(u_2)/\Phi_1(u_2) - wx_2 - C$$

$$\Pi_{22} = \exp(\sigma^2/2) f(x_2)[1-\Phi_2(u_2)]/[1-\Phi_1(u_2)] - wx_2 - C$$

$$\Omega = w\underline{x} + W(t+1) - \Gamma(t+1)$$

See text for definitions of variables.

$\Phi_1(u_i)$ (i=1,2) losses are incurred, where this probability depends on the level of x. The government can choose between subsidizing the firm so it is kept operating (marked by sub[sidize] in Figure 1), and letting it fail and leave its inputs unemployed for a time (¬sub[sidize]). The payoffs for the firm and government are indicated in the columns on the right. The expected current operating profit when the firm chooses to hire x_i, if profits are positive, is denoted by Π_{i2}, and the firm certainly continues to operate. Given that realized operating profits are negative, their expected value is Π_{i1}. If a subsidy is received, the firm's current profit is raised to 0 and in addition the owners retain rights to the stream of future profits, but the government and society must still bear the operating losses. If no subsidy is given, the operating losses remain, and the government must also account for the social cost of unemployment, equal to the level of unemployment multiplied by the discounted difference between the market wage and the reservation wage. Working backwards from the last move in the round, it can be seen that if profits are positive, there is no motivation for government action. Once losses have occurred, the government will always subsidize loss-makers so as not to add the cost of unemployment to the firm's operational losses. In anticipation thereof, the firm will always choose x_2, which maximizes expected net profits, conditional on their being non-negative thanks to subsidies.

The first best allocation is not achieved in this equilibrium due to the unemployment externality and the moral hazard problem. If the government could dictate the firm's use of inputs, ex ante at time t the government would choose x and the sequence D(t), D(t+1),... to maximize W(t) - Γ(t). It can easily be shown that the global first best outcome is achieved by granting a subsidy whenever a loss occurs to keep the firm operating and avoid all unemployment; the firm should employ x^*, given implicitly by

$$\exp(\sigma^2/2)f'(x^*) = w \ , \tag{12}$$

which is the familiar condition that marginal revenue product should equal marginal cost. It is apparent that $x_1 \leq x^* < x_2$; in the absence of subsidies the firm may be too cautious, but when its survival is assured it certainly over-expands.

If the government must commit itself to not saving loss-makers (so $D(\tau) = 1$ for all τ) to avoid a moral hazard problem, expected welfare is reduced by the possible occurrence of unemployment when profits are negative:

$$W(t) - \Gamma(t) = \sum_{\tau=t}^{\infty} \rho^{\tau} E\left[\Pi(x,\tilde{y}_{\tau}) + w\underline{x} - \rho \text{prob}(\Pi(x,\tilde{y}_{\tau})<0)x[w-v]\right]$$

$$= \frac{1}{1-\rho}\left[\exp(\sigma^2/2)f(x) - wx - C + w\underline{x} - \rho\Phi_1(u)x[w-v]\right]. \qquad (13)$$

This expression is maximized by choosing $x = x^{**}$ according to

$$\exp(\sigma^2/2)f'(x) = w + \rho[w-v]\Phi_1 + \rho x[w-v]\Phi_1'\left[\frac{w}{wx+C} - \frac{f'}{f}\right]. \qquad (14)$$

The two last terms on the right of equation (14) can be shown by an argument similar to the one applied to equation (4) to be non-negative in the relevant range, and so $x^{**} < x^*$. In general one cannot say which of x_1 and x^{**} is the smaller; the owners of the firm are made cautious by their desire to preserve privileged access to the stream of profits, but the social planner is concerned by the risk of unemployment. However, if the expected operating profits of the firm is zero, $x_1 = x^*$, which is certainly greater than the second best x^{**}; then the government would prefer the firm not to operate at all for fear that unemployment be created.

The firm choosing x_1 and sometimes failing is not necessarily superior to the firm choosing x_2 and being supported, but the case can obtain when the addition to expected operating profits from choosing x_1 over x_2 outweighs the potential losses from unemployment. Then the problem considered here is most interesting: the government will want agents to believe that it will not subsidize loss-makers, but then feels compelled to do so and undermines its own credibility. The relevant condition is

$$\exp(\sigma^2/2)f(x_1) - wx_1 - C - x_1[w-v]\Phi_1(u_1) > \exp(\sigma^2/2)f(x_2) - wx_2 - C$$

or

$$\exp(\sigma^2/2)[f(x_1)-f(x_2)] - w[x_1-x_2] > x_1[w-v]\Phi_1(u_1). \qquad (15)$$

Notice that by the definition of x_1 and Φ_1, both sides of the inequality must be positive.

III. Commitment and the Social Safety Net

1. The effect of a social safety net

If the government wants firms to believe that they must rely on themselves alone, a mechanism must be devised that makes the government willing to let firms fail. In particular, it is suggested that a form of social safety net or national insurance will be effective and practical.

Suppose that the government arranges in advance to provide benefits to all unemployed workers equal to the difference between the going wage and the reservation wage. When x workers are to become unemployed next period, so each produces an amount v rather than w, the present value of these benefits is $\rho x[w-v]$, which just offsets the expected cost of unemployment. If the social safety net succeeds in granting credibility to a policy of no bail-outs, with probability $\Phi_1(u(x))$ the firm will make losses and be forced to close, so the safety net will be called upon. To finance benefits in bad states of nature, in good states the government pays an "insurance premium", which again is assumed to be funded through non-distortionary taxes. The premium must equal $\rho x[w-v]\Phi_1/[1-\Phi_1]$ for the scheme to be self-financing, i.e. for the scheme to have an expected cost of zero. In effect the country runs a current account deficit (runs down assets) when there is temporary unemployment and an offsetting surplus (saves) at other times. In this setting the socially desirable level of employment remains x^{**} given by equation (14).

The extensive form of the game with the new net payoffs is shown in Figure 2. The firm's payoffs under different strategies and the probabilities of losses being made are unaffected. The owners may have to cover operating losses and may then lose control of the firm if there are no bail-outs, so they would choose to hire an amount x_1 of the input; if the government is known to support loss-makers, the firm will expand by hiring x_2. However, because compensation is now automatic, the government does not have to worry about preventing an additional welfare loss through unemployment once operating losses have been incurred. Subsidizing loss-makers to preserve jobs has the same end effect on welfare as allowing unemployment to rise, which is in itself costly but is offset by social safety net benefits. Taking it as given that the latter course is marginally preferable, the government never provides a bail-out. The social safety net transforms the cost of unemployment $\rho x[w-v]$ that must be borne if the government decides not to subsidize, into a fixed contribution that is paid contingent only on the realized disturbance. 1/ Hence the policy of imposing a hard budget constraint

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1/ An analogy can be made with schemes that make deviation from a preannounced monetary policy automatically costly to the government itself, perhaps through its effect on the government's portfolio of nominal and indexed bonds (see Persson, Persson and Svensson, (1987)).

becomes credible, and the firm will choose to hire x_1 of the input rather than x_2.

The demands placed on the social safety net depend on a readily observable quantity, the level of unemployment, rather than on preferences, individuals' information sets, or the market conditions and technological parameters faced by the firm. Therefore this mechanism is likely to be more robust than a purely reputational equilibrium (were that available). Nor are direct controls on input levels or the monitoring of effort required; although in this simple model direct controls can achieve the first best allocation, in practice state planning of the production process has often led to informational inefficiencies, excessive rigidity, and enlarged scope for rent-seeking.

Note also that, with x_1 rather than x_2 workers vulnerable to being laid off and a lower probability of losses occurring, the social safety net has to bear less extreme levels of unemployment, less often, than if the firm had remained too large; the anticipation by the firm of the hard budget constraint makes it easier to enforce. This is not to say that the social safety net will be cheap. In the bad state safety net payouts could be much larger than realized losses, so the immediate cost of keeping people employed could be much less than the sum of social security benefits. Furthermore, firms with positive private and social value will be shutting down because of the liquidity constraint, which on average costs society $\Phi_1(u_1)\rho x_1[w-v]$.

It would in principle be superior to conduct a policy of subsidizing firms with realized losses if and only if they had chosen to hire x_1, so that "well behaved" firms are not forced to close and unemployment is avoided alltogether. However, such a strategy is only feasible when the government has enough information to be a perfect social planner, and it is only credible when the social safety net operates whenever employment differs from x_1. 1/

2. The role of financial markets

In addition to the unemployment externality, the availability of more or less complete asset markets will become important once the budget constraint becomes hard. Subsidies to cover losses may be interpreted in this model as an ex post response to the negative effect of the liquidity constraint. Yet if a firm anticipates a bail-out, it not only modifies its production decisions but also lacks any incentive to do something

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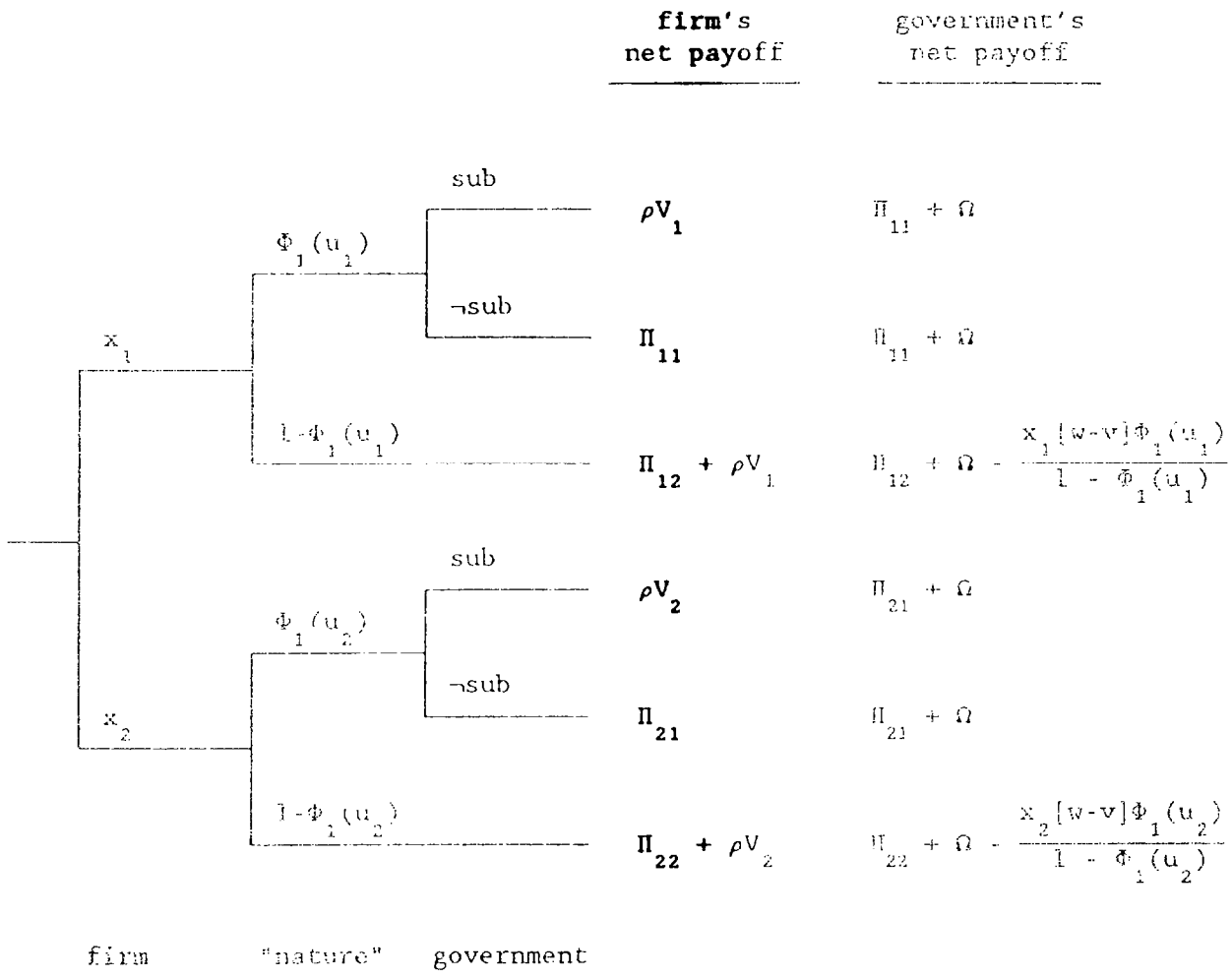
1/ In the model of this paper the government could also achieve the first best solution by taxing input use by the firm and always subsidizing loss-makers. However, such an approach would create new distortions if the firm's technology is known imperfectly or if taxes have to be uniform across industries.

Figure 2

Extensive form when the social safety net is operational.



Notation defined as in Figure 1.

about that constraint. Given that cheap government financing is always available, there is no need for the firm to purchase insurance or otherwise protect its existence.

When the threat to let loss-makers close is made credible, a firm with positive expected profits has the means and the motivation to acquire financial instruments that will help it through hard times.

Suppose, to take an extreme case, that the firm can enter into a contingent contract always to pay an amount (q), in return for complete compensation for any shortfall of profits below q, that is, the firm can buy a suitable "put" option. If this contract is priced as a "fair bet", q is defined implicitly by

$$\begin{aligned} q &= \text{prob}(\Pi < q).E(\Pi|\Pi < q) \\ &= \int_{-\infty}^{u'} [\exp(y)f(x) - wx - C - q]d\Phi_1(y) \\ &= \Phi_2(u')\exp(\sigma^2/2)f(x) - \Phi_1(u')[wx + C + q] \quad , \end{aligned}$$

where $u' = \log(wx+C+q) - \log(f)$. Then the owners of the firm would certainly wish to purchase such a contract: as a fair bet, the contract does not change expected profits in the current period, but it does allow the firm always to continue operations, and thus the stream of future profits can be enjoyed by the current owners. Insuring the preservation of control over the firm increases the effective discount factor from $[1-\Phi_1(u_1)]\rho$ in (3) to ρ. Employment is given implicitly by equation (12) and the first best allocation is obtained.

If such a well-tailored "put" is unavailable, the firm may still be motivated to insure itself partially, for example, by holding precautionary cash balances or negotiating lines of credit with banks. The imposition of a hard budget constraints is thus likely to be accompanied by an increase in the demand for liquid assets by firms.

Once financial markets have developed in response to the firm's desire to insure itself, the cost of providing the social safety net will greatly diminish. Indeed, if the firm acquires perfect insurance through a contingent contract, as sketched above, unemployment will never arise (at least not in this stationary model). The first-best level of employment is achieved and the social safety net will never be called upon -- but the institution must still be operational to ensure that everyone knows in advance that government subsidies will not be forthcoming. If a mechanism is in place to give credibility to the government's threat, the response of firms and the development of private institutions may eliminate occasions for the mechanism to be employed and the threat carried out.

IV. Extensions

The simple model considered in the previous two sections can be readily extended in a number of directions without altering the tenor of the argument.

1. The objectives of firms and government

The assumption that the firm seeks to maximize profits and is risk neutral may be questioned, but from the government's point of view the problem is similar if the firm aims at maximizing revenue subject to an expected profit constraint, or is managed by its workers who wish to maximize income per head. 1/ Profit-maximization is a convenient and familiar objective; perhaps the firm is controlled by management that maximizes true profit so as to increase their own benefits while announcing the minimum rate of return necessary to satisfy the owners.

Typically risk aversion on the part of the owners and controllers of the firm reduces output (see Goldfeld and Quandt, 1991), and, if the government is known not to provide bail-outs, risk aversion may lead to an undersupply of entrepreneurship. The limitations on liability that are common in market economies can be interpreted as a relatively simple way of ensuring that idiosyncratic risks get diversified, thus encouraging entrepreneurial activity, but they can also generate a moral hazard problem similar in kind to that posed by the possibility of bailouts. In this model limited liability legislation that permits the occasional removal of the owners of a firm in exchange for restricting their losses, results in employment set between the levels implicit in (4) and (8). On a more political level, since a subsidy to cover losses smoothes income, risk-averse owners may be especially assiduous in pursuing government assistance.

The government's objectives could also be refined. The traditional argument for the provision of a social safety net is based on fairness: since people typically have one job each but are not individually responsible for the fate of their employer, the cost of an adverse shock ought to be spread between those directly affected and the rest of society. In utilitarian terminology, aggregate utility is maximized by equalizing marginal utility across individuals, so, ceteris paribus, income should be smoothed. Alternately, there are grounds for presuming that a government that must face the electorate at periodic intervals will tend to have more difficulty committing itself than will a Pigovian

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1/ A liquidity constraint is less likely to bind on a labor managed firm than on a profit maximizer because the latter must treat the return to labor as a contractual obligation. When bankruptcy is possible, a labor managed firm will typically have the longer time horizon.

autocrat, if only because the electoral cycle tends to shorten the government's time horizon, and will be more prone to providing bail-outs. In this paper, however, it has been shown that there is a credibility problem even in the best of political circumstances and when income distribution does not matter to government.

2. Lobbying mechanisms

In practice firms do not wait for subsidies but lobby actively for protection and support. A rational government would not, however, be persuaded by loud "whining" alone, and so attention has been given to the process whereby political pressure is generated. In an electorial context, firms might be able to increase their chances of being rescued by promising to make contributions to campaigns. Those potentially hurt by the imposition of a hard budget constraint may also make a credible threat to retaliate, perhaps through civil disobedience, or, as suggested by some evidence and casual observation, certain firms are protected by their very size from being allowed to fail. It is easy to imagine economic and political forces that might induce a government to be disproportionately concerned about large closures, for example, when larger groups can retaliate more effectively against the imposition of a hard budget constraint. If the probability of rescue was proportional to size, firms would then have a further motive to increase employment (see Hillman, Katz, and Rosenberg (1987) for a discussion of the implications for factor demands of such a policy reaction function). However, a well-funded social safety net would strengthen the government's resistance to demands for special treatment even from large interest groups.

3. Relation to other policies

Just as government may feel compelled to rescue loss-making firms, once their production decisions have been made and the uncertainty is resolved, so government may be tempted to introduce supplementary taxes on profit makers if it has a strong desire for revenue. Taxes on those who have been exceptionally successful have much political appeal, especially if they are called "windfall gain taxes", "contributions" or "loans". Ultimately, if the government cannot commit itself to either not taxing away profits or not covering losses, all incentives for the firm will be lost. Goldfeld and Quandt (1991) present a model with a fixed tax rate on positive operating profits and subsidies obtained through lobbying.

Generally one may want to consider the political economy of spending, taxation and transfers together. Most immediately, if revenue can only be obtained by distortionary means, all government spending becomes less beneficial. The provision of subsidies to loss-makers will be discouraged by any loss of welfare incurred in financing the transfers, while the maintenance of a social safety net will be more

costly, the greater the inefficiencies generated by the counterpart taxation. In practice these offsetting losses, which can be determined only if the details of the relevant tax system are known, will need to be added to the balance in choosing between bail-outs and unemployment insurance.

More indirectly, unemployment compensation may be too generous if it discourages mobility and the expenditure of effort on looking for work, and the construction of any social safety net will have to take into account the risk of moral hazard on the part of factors. 1/ In the notation used here, v could fall as the generosity of social safety net provisions increases because workers remain unemployed longer. Indeed, if v falls far enough, subsidizing loss-makers could again become optimal at very high levels of compensation.

On a macroeconomic level, the subsidy to keep a firm operating after losses have been incurred may be financed by money creation; a transfer to one party is achieved by diminishing the real balances of others. With many firms in the economy, some of which are always in difficulties, sustained inflation will result. As the benefits provided by the social safety net are not just intra-societal transfers, their financing must take the form of paying a real premium in the good states, and so this inflation bias can be avoided. Then, once a hard budget constraint has been established, it has been suggested there may be a structural increase in the demand for liquid assets, which would be deflationary.

V. Conclusion

Government declarations that firms must be fully responsible for their actions and that bail-outs will not occur are often heard. And the imposition of a hard budget constraint is considered necessary for price-signals to be meaningful and for resources to be induced to move towards an efficient allocation. Yet the discretion that a sovereign government enjoys can make pressure to support loss-making industries irresistible. Once the threat of costly unemployment becomes actual, government will not, and rationally should not, be impassive. If subsidies are the available instrument, the threat of a hard budget constraint will not be credible. In anticipation of bail-outs, firms will tend to become too large and to undertake projects with too large a risk of being unprofitable. Even a firm with negative expected operating profits may continue operating if the government feels compelled to support it rather than face unemployment.

1/ However, since in the model here the government is indifferent about the distribution of income, there is no reason here why the unemployed themselves should receive the compensation.

The most practical mechanism to generate credibility is the institution of an adequate social safety net. Provision of benefits to the unemployed is motivated not just by a sense of fairness or the desire to even out marginal utilities of income, but by the need to stiffen the government's resolve when faced with demands for subsidies. The transfers provided by the social safety net may be large, and the main net benefit, namely, the effect on firms' behavior of hardening the budget constraint, will be indirect.

Financial markets are likely to remain underdeveloped in an economy with pervasive softness of budget constraints because they are not needed when income is smoothed through grants and concessionary government loans. The hardening of firms' budget constraints will provide incentives for the introduction of new financial instruments and strategies as firms (and individuals) learn to guard themselves against periods of low income or illiquidity. At the same time, the more developed are financial markets, the less strain will be placed on the social safety net. Put another way, in the model considered in this paper there are two distortions, namely, the possibility of costly unemployment and a liquidity constraint; with the single instrument of subsidies, the ill effects of these distortions can be mitigated only at the cost of creating a moral hazard problem. Allowing for a second instrument, the social safety net, lends credibility but is still second best because it is imperfectly targeted. However, incentives are provided which should lead to a resolution of most of the liquidity constraint problem and reduce the cost of using the available instruments. The general implications are that a social safety net must be established, if budget constraints are to be made truly hard, and that the early encouragement of financial markets will be both more successful and more important, once firms can be sure that a government rescue will not be forthcoming.

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