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# Subsidies, Soft Budget Constraints and Financial Market Imperfections*

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**Abstract**

In this paper we analyze the interaction between subsidies, soft budget constraints and financial market imperfections in a simple model of occupational choice. The basic message is that the effect of soft budget constraints has to be analyzed jointly with other possible distortions that are affecting the economy. In particular in environments where there are severe forms of financial market imperfections, subsidies and soft budget constraints can ease those imperfections and reduce credit rationing problems. The "positive" effect of soft budget constraints depends also upon the degree of institutional failure of the economy.

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# 1 Introduction

During the last twenty years, since Janos Kornai (1979) first introduced the concept of soft budget constraints, the formulation and definition of this phenomenon has changed substantially, even though its economic implications remained the same.

Kornai's original definition[1], later formalized by Kornai and Weibull (1983), saw a paternalistic state rescuing loss-making firms because unwilling to accept the economic and social consequences of their failure. In Kornai's view, subsidies were seen as determinants of soft budget constraints, in the sense that soft budget constraints were the outcome of an automatic use of subsidies to loss-making firms. This view has been challenged by some recent contributions that widened the definition and application of the notion of soft budget constraints.

In a path breaking article, Dewatripont and Maskin (1995) identify soft budget constraints with a dynamic commitment problem. Their key insight is that when the implementation of a project requires a sunk initial investment, *ex post* the financial intermediary can find optimal to bail out the entrepreneur even if *ex-ante* such action would not have been undertaken. The reason is that since invested funds are sunk, the continuation value of the firm may be higher than its liquidation value. In other words, from the soft budget constraints arise an inability of the financial intermediary to commit to a specified financing scheme. This approach has stimulated a series of important contributions that range from the analysis of banking reforms (Berglöf and Roland (1997, 1998)), to the analysis of financial crises (Huang and Xu (1999b)),[2] to the issue of federalism (Qian and Roland (1998)).[3]

An interesting application of this literature is the one provided by Huang and Xu (1998, 1999):[4] they embed the Dewatripont-Maskin argument in a standard model of endogenous growth à la Aghion-Howitt, showing that soft budget constraints (SBC) induce a lower investment in technological advances and R&D than hard budget constraints (HBC), with the result that SBC economies display a lower growth rate than HBC economies. They also show that when technological progress is driven by imitation rather than by innovation, a SBC economy will catch up with a HBC economy. Therefore, there are

[1] See Kornai (1979).

[2] Mitchell (2000) provides a good survey on the theories of soft budget constraint, applied to banking and financial crises.

[3] Several other applications of the theory of soft budget constraint, are provided by Maskin and Xu (1999).

[4] See also Qian and Xu (1998).

conditions in which soft budget constraints are not necessarily deleterious to economic development.

On the whole, although there is much debate on the *origins* of soft budget constraints (paternalism, dynamic commitment problems etc.), there is a widespread consensus on their *consequences*: subsidies and soft budget constraints distort agents' incentives, determining a loss of efficiency. Moreover, in addition to the distortion of incentives, SBC often imply additional costs: they are in fact generally associated with widespread institutional failures, such as unclear definition of property rights, inefficient bankruptcy procedures etc. These institutional failures impose costs on the economy as a whole and generate rents that can be extracted by some classes of agents.

In this paper we challenge the general view that subsidies and soft budget constraints have necessarily a negative impact on the economy. Our argument is based on the observation that in several economies soft budget constraints are accompanied by other forms of market and institutional failures. Most transitional economies, for instance, are plagued by severe imperfections in their financial markets. The effects of those imperfections are forms of credit rationing and/or high cost of external borrowing. Subsidies can be viewed as a relaxation of these credit constraints and, in some cases, they can exert an overall positive effect. Our argument is therefore a simple application of the "theory of second best": subsidies and SBC, alone, are a cost for the economy, but if they are introduced in an environment where other distortions are already in place, under some conditions they can mitigate them.

We explore these aspects in a simple model of development derived from Aghion and Bolton (1997). Our approach complements the one by Huang and Xu (1998, 1999) in that we emphasize a different channel through which SBC can affect the long run performance of an economy. In our model agents may become entrepreneurs by implementing a project. The likelihood of success of the project can be increased by spending effort on it. Depending on their wealth, agents may need to borrow in order to become entrepreneurs. Individuals' limited liability generates an agency problem in the borrower-lender relationship that in turn increases the cost of borrowing. In this framework, we introduce soft budget constraints in the form of a subsidy to entrepreneurs in case of failure of the project. The effect of the subsidy is twofold: on the one hand it distorts agents' incentives inducing them to provide less effort; on the other hand it reduces the agency problem, diminishing the interest charged by financial intermediaries.

We look at the general equilibrium effect of the subsidy assuming that it is financed with a proportional tax on income. We show the existence of an optimal "level" of the subsidy that is strictly positive. This level is related to two crucial features of the economic environment: the degree of financial market imperfections and of institutional failures present in the economy. Throughout the paper we relate the issue of subsidies with the notion of soft budget constraints, following the initial interpretation given by Kornai, rather the most recent views. The implications and applications of the argument made here are however wider and have profound implications on the normative side (reforms design).

The remainder of the paper is organized as follows: section 2 sets up the modelling framework, section 3 characterizes its equilibrium, section 4 introduces the issue of soft budget constraints and analyzes its implications; section 5 presents the numerical results. Section 6 provides some possible extensions of the modelling framework. Section 7 discusses the policy implication of the analysis. Section 8 concludes.

# 2 Modelling framework

The modelling framework relies on a simplified version of the model by Aghion and Bolton (1997).
Consider a *small open economy* populated by a continuum of individuals who live for one period. In this period each agent works, consumes and invests; the remaining income is left as bequest to her off-springs. The population is stationary, that is each agent has one child to take care of.

## 2.1 Preferences

Agents are assumed to be risk neutral and to have preferences over consumption and bequest:

$$U(c_t, b_{t+1}) = c_t^{1-s} b_{t+1}^{s}, \tag{1}$$

where $c_t$ and $b_{t+1}$ denote consumption and bequest, respectively. At the beginning of the period individuals receive a bequest, invest their wealth, and choose an occupation. We assume that $b$ is distributed with a distribution function $G_t(\cdot)$ over the support $[0, \bar{b}]$.

At the end of the period agents receive labour income and interest earnings on their investments, and choose consumption and bequest so as to maximize utility. Denote with $\omega_t$ the total revenues of an individual at the end of the period. Given this simple utility function, the optimal consumption and bequest are a constant fraction of total revenues, thus,

$$b_{t+1} = s\omega_t \tag{2a}$$

$$c_t = (1-s)\omega_t. \tag{2b}$$

It follows that rational individuals maximize their total income otherwise they would not maximize utility.[5]

## 2.2 Technology

Agents have an "occupational choice": they can either choose to work in a backyard activity that yields a fixed wage $n$ or invest in an entrepreneurial activity that requires a sunk initial investment of $h$ and yields a return $R$.[6] The return $R$ uncertain, that is

$$R = \begin{cases} R & \text{with probability } p \\ 0 & \text{with probability } (1-p) \end{cases} \tag{3}$$

Agents who want to implement a project can spend an effort that increases the likelihood of its success. Effort has a cost that we assume to be convex. Following Aghion and Bolton (1997) we assume the cost function to be quadratic.

$$c(p) = \frac{Rp^2}{2a} \tag{4}$$

Not all potential entrepreneurs have the resources to finance the investment project. Those with wealth $b > h$ can rely on internal finance, the others have to borrow the difference $(h-b)$. Denoting with $i$ the interest rate on loans, the entrepreneurial expected return

[5] The indirect utility function is given by $U(\omega_t) = s^s(1-s)^{1-s}\omega_t - C(\cdot)$ where $C(\cdot)$ denotes the cost of effort (to be defined below).

[6] Alternatively one could assume that there are two sectors: a sector for which output is produced with a constant return to scale technology that uses unskilled labour and capital as inputs, and another sector for which output is produced from entrepreneurial activity. In the first sector factors are paid their marginal product and, as the economy is small and open, the world interest rate also fixes the wage rate.

(net of effort costs) is given by

$$E(\Pi) = pR - p(h-b)(1+i) - c(p) \tag{5}$$

Because of the non observability of effort and of the limited liability of each entrepreneur (each individual cannot repay to the lender more than her available wealth), there is a moral hazard problem that generates an imperfection in the credit market.
The moral hazard problem arises in the effort choice, which is made optimally by each entrepreneur:

$$p = \arg\max\{pR - p(h-b)(1+i) - c(p)\} \tag{6}$$

Note that each entrepreneur takes the interest rate $i$ (determined below) as given. The solution to equation (6) is given by

$$p = a\left\{1 - \frac{h-b}{R}(1+i)\right\} \tag{7}$$

Effort increases with the return from the investment, decreases with the interest rate and decreases with borrowed wealth.[7] In other words the more one borrows, the lower is the effort provided, due to the fact that the share of the return that the agent can keep is reduced. Those who do not need to borrow provide the first best level of effort ($a$).

## 2.3 Financial intermediation

Banks act as financial intermediaries and are assumed to behave competitively. Therefore for any amount $(h-b)$ borrowed the interest rate $i$ charged on the loan has to satisfy the zero profit condition:

$$(h-b)(1+i)p = (1+r)(h-b) \tag{8}$$

where $r$ denotes the riskless world interest rate. From equation (8) it follows that there is a spread between the lending and the deposit interest rate that reflects the moral hazard problem (the spread is inversely related to $p$).

The equilibrium effort choice is determined by inserting equation (8) into (7). The equilibrium level of $p$ is thus the solution to the following equation:

[7] This is a standard result of this literature, see Sappington (1983).

$$p^* = a\left\{1 - \frac{h-b}{R}\frac{(1+r)}{p^*}\right\} \tag{9}$$

It can be shown that $p^*$ increases with $b$, that is, also in a general equilibrium perspective optimal effort increases with wealth.

Potential entrepreneurs also have a participation constraint to satisfy: the income they receive from being entrepreneurs has to be greater than the revenues they would obtain simply lending their wealth at the market rate and enjoying the outcome of the backyard activity:

$$\left[pR - (1+r)(h-b) - \frac{p^2 R}{2a}\right] \geq (1+r)b + n \tag{10}$$

This last equation determines a threshold level of wealth ($\hat{b}$) such that all agents with $b \geq \hat{b}$ choose to be entrepreneurs, while the others work at the backyard activity.

The economy is therefore characterized by three classes of agents:

1. Agents who do not reach the threshold $\hat{b}$. Those agents are too poor to become entrepreneurs and work at the backyard activity.

2. Agents whose wealth is greater than $\hat{b}$ but lower than $h$. Those agents are entrepreneurs who have to borrow in order to finance the investment project. For this reason they do not exercise first best effort.

3. Agents whose wealth is greater than $h$. They are entrepreneurs as well, but they are sufficiently rich to finance the investment project with internal funds. They provide first best effort.

# 3 Dynamic equilibrium

The dynamic equilibrium of the economy is characterized by the evolution of the transition functions of the three classes of agents described above. The transition functions are as follows: for the poor agents who cannot become entrepreneurs

$$b_{t+1} = s[(1+r)b_t + n] \tag{11}$$

For the entrepreneurs whose wealth does not exceed $h$

$$b_{t+1} = \begin{cases} s\left[R - (1+i)(h-b)\right] & \text{with probability } p \\ 0 & \text{with probability } (1-p) \end{cases} \tag{12}$$

Finally, for the rich entrepreneurs whose wealth exceeds $h$

$$b_{t+1} = \begin{cases} s\left[R + (1+r)(b-h)\right] & \text{with probability } a \\ s(1+r)(b-h) & \text{with probability } (1-a) \end{cases} \tag{13}$$

The dynamic evolution of an economy like the one described above is complex, since the state variable is the wealth distribution itself. For this particular model it is easy to show that the transition functions described above have certain properties that allow us to use some recent results obtained by Hopenhayn and Prescott (1992) and state the following proposition:

**Proposition 1** *For any given world interest rate there exists a unique limiting wealth distribution to which the economy converges.*

**Proof.** It is easy to check that transition functions like (11), (12) and (13) are monotone and bounded, and satisfy the mixing condition. We can therefore apply theorem 2 by Hopenhayn and Prescott (1992) and show the existence of a unique invariant wealth distribution. □

The proposition ensures that the economy converges to a stochastic equilibrium in which the stationary distribution of wealth replicates over time.

# 4 The effect of soft budget constraints

We modify the set up outlined in the previous section in order to analyse the effects of subsidies which soften the budget constraints of the agents. In doing so we will limit ourselves to a comparative static analysis between steady states. In the modelling framework used here, this means that starting from an equilibrium wealth distribution we will analyze the effects of soft budget constraints on individual choices and output, taking the distribution as given. In section 6 we will analyze possible extensions of the present framework to a full dynamic analysis.

We introduce subsidies in a very simple way: let us suppose that, for any amount borrowed $(h-b)$, the state subsidizes a fraction $x$ in case of failure of the project. This subsidy is

given to the firm that in turn is required by the lending contract to transfer it to the bank that provided the loan. However, the entrepreneur can "hide" a fraction $\phi$ of the subsidy, and keep it for herself. Considering the whole economy, $\phi$ is a known parameter, but it is not possible to monitor the behavior of each entrepreneur.[8]
This specification, although simple, allows to capture two effects of subsidies:

1. The fact that subsidies generally modify the effective return of an investment project in the bad state of the world. This is the major channel through which subsidies generate soft budget constraints and distort the incentives that agents face.[9]

2. The fact that subsidies and soft budget constraints are often accompanied by other institutional deficiencies (unclear definition of property rights, ineffective bankruptcy laws, etc.). Typically, institutional deficiencies allow agents to exercise rent seeking activities.[10] The parameter $\phi$ captures the extent to which such rents are extracted by entrepreneurs.

This second aspect is not crucial for the analysis that follows but is nevertheless very important. Subsidies and soft budget constraints are in fact a problem that ultimately derives from the inability or unwillingness to fully apply the concept of (financial) accountability of an investment project. It may happen that the financial authorities are unable to do that simply because there are institutional failures that prevent the determination of financial responsibilities and punishments. This is the case when there is an unclear definition of property rights, when bankruptcy procedures are ineffective, etc. In this case soft budget constraints are a natural consequence of such institutional failures.[11]
It is worth analyzing the link between subsidies, soft budget constraints and institutional failures for two reasons: firstly, because it is a common situation in many transitional economies (for example Russia and the other ex-Soviet Republics), and secondly because institutional failures modify the channel through which the effects of subsidies affect the

[8] A possible interpretation for this assumption is that the relationship between the entrepreneur and the government is not observable, in which case the entrepreneur can claim to have received less that what she actually had.

[9] This channel has been emphasized recently as the major factor affecting the Asian financial crisis; Huang and Xu (1999a) provide an application of SBC to the Asian crisis.

[10] See Boycko, Shleifer, and Vishny (1996), Shleifer and Vishny (1993, 94)

[11] Pistor, Raiser, and Gelfer (2000) provide an assessment of the extensiveness and effectiveness of legal and market institutions in Eastern Europe; Johnson, McMillan, and Woodruff (1999a, 1999b) analyse the impact of the lack of institutional development on private sector growth using survey data in Poland, Romania, Slovak Republic, Russia and Ukraine.

economy. Clearly, when $\phi = 0$ the entrepreneur cannot hide anything from the subsidy which goes entirely to the bank. This situation ia analogous to the case in which the subsidy is given directly to the bank.

As stressed in the introduction, the interpretation of subsidies as a source of soft budget constraints used here is somewhat closer to the original definition of Kornai rather than to the one used by the recent literature. We are in fact mainly interested in the macroeconomic implications of subsidies rather than their microeconomic foundations.

To close the model, since we are addressing this issue from a general equilibrium perspective, we have to consider the provision of resources that pay for the cost of soft budget constraints. To keep matters simple we assume that they are financed by a proportional tax on income $\tau$.

The modelling framework is therefore modified as follows. Banks receive the part of the subsidy that is not hidden by entrepreneurs, which affects their zero profit condition. Equation (8) now becomes

$$(h-b)p(1+i(b)) + x(1-p)(h-b)(1-\phi) = (h-b)(1+r) \tag{14}$$

i.e. in case of failure of the entrepreneurial project (which occurs with probability $1-p$) the bank gets back a fraction $x(1-\phi)$ of the loan, given by the subsidy multiplied by the fraction not hidden by the entrepreneur. From (14) it follows that the interest rate on loans is given by

$$(1+i) = \frac{(1+r) - (1-p)x(1-\phi)}{p} \tag{15}$$

Equation (15) shows the important transmission channel of the effects of subsidies. By increasing banks' return in the bad state, subsidies reduce the premium between the interest rate charged on loans and the risk free return.

From the entrepreneurial point of view, subsidies increase also the return of each entrepreneur in case of default for the portion she can "hide". The expected return for the entrepreneur now becomes

$$E(\Pi) = (1-\tau)\left[pR - p(1+i)(h-b)\right] - c(p) + (1-p)x(h-b)\phi \tag{16}$$

In the case of the good state the entrepreneur earns the return from the investment net of effort costs, interest payments and taxes; in the bad state she gets the fraction $\phi$ of the

subsidy.
The optimal effort that maximizes (16) becomes

$$p^* = a(1-\tau)\left\{1 - \frac{(h-b)}{R}\left[(1+i) + \frac{x\phi}{(1-\tau)}\right]\right\} \tag{17}$$

Compared with equation (7) there is an additional term that affects the choice of $p$: subsidies distort incentives, inducing agents to reduce the amount of effort. This happens for two reasons: on the one hand they directly increase the return in the bad state, on the other hand they indirectly (through taxes) reduce the return in the good state; both these effects reduce the incentives to provide effort. The effect of taxation also affects the first best level of effort that falls from $a$ to $a(1-\tau)$. Therefore even rich entrepreneurs who do not benefit from subsidies (because they do not have to borrow) have their effort distorted by the fact that they have to pay for it.
Putting together equation (17) and (15) we obtain the optimal level of effort as a function of the parameters of the model and of the level of wealth. The optimal level of effort is the solution to the following equation

$$p^* = a(1-\tau)\left\{1 - \frac{(h-b)}{R}\left[\frac{(1+r)-(1-p^*)x(1-\phi)}{p^*} + \frac{x\phi}{(1-\tau)}\right]\right\} \tag{18}$$

Equation (18) shows clearly that, considered from a general equilibrium perspective, the impact of subsidies on optimal effort is mixed.
On the one hand subsidies distort incentives both directly and indirectly (through taxes) thus reducing effort (see equation (17)). On the other hand, through banks' zero profit condition (equation (15)), an increase in $x$ reduces the relevant interest charged to entrepreneurs, which in turn raises the expected return of the project, inducing an increase in effort. The net effect will depend on the strength of these two opposite forces.

The participation constraint is also modified; equation (10) now becomes:

$$\begin{aligned}&(1-\tau)\left[pR - \left[(1+r)-(1-p)x(1-\phi)\right](h-b)\right] - \frac{p^2R}{2a} \\ &+ (1-p)x\phi(h-b) \geq (1+r)b + n\end{aligned} \tag{19}$$

This expression implies a threshold level of wealth ($\hat{b}$) such that all agents with $b \geq \hat{b}$ choose to be entrepreneurs, while the others work at the backyard activity.

Subsidies are financed levying a proportional tax on income. Therefore $x$ and the tax rate $\tau$ have to satisfy the government budget constraint:

$$\begin{aligned}
&\tau \int_{\underline{b}}^{\hat{b}} ((1+r)b+n)dG(b) \\
&+\tau \int_{\hat{b}}^{h} \left[pR - \left[(1+r) - (1-p)x(1-\phi)\right](h-b)\right] dG(b) \\
&+\tau \int_{h}^{\bar{b}} \left[aR + (b-h)(1+r)\right] dG(b) \\
&= x \int_{\hat{b}}^{h} (1-p)(h-b)dG(b)
\end{aligned} \tag{20}$$

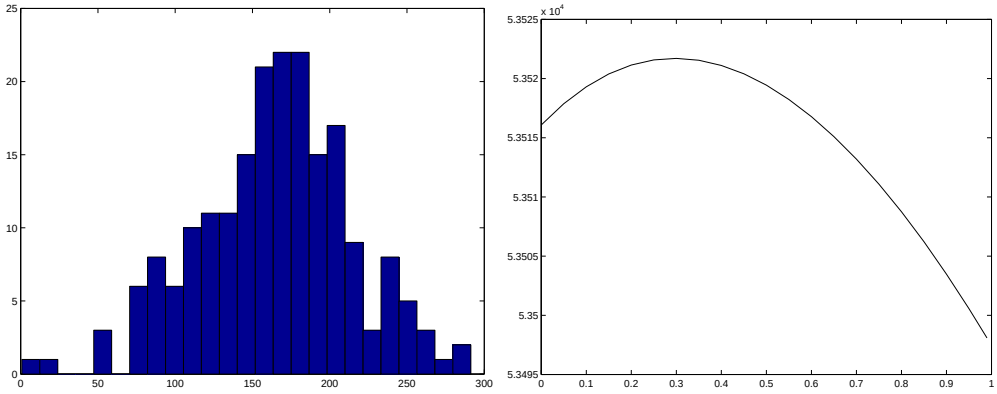
Here we have assumed that the tax is levied on all incomes (also those of the poorest agents). None of the results is affected if the tax is levied only on the entrepreneurial class.

We are now in the position to assess the effect of subsidies on the total output of the economy, which we take as a measure of aggregate efficiency. Therefore we characterize total output as a function of $x$ and we look at its behavior. Total output is defined as

$$\begin{aligned}
Y = &\int_{\underline{b}}^{\hat{b}} \left[(1-\tau)((1+r)b+n)\right] dG(b) \\
&+ \int_{\hat{b}}^{h} \left\{(1-\tau)\left[pR - \left[(1+r) - (1-p)x(1-\phi)\right](h-b)\right] - \frac{p^2R}{2a}\right\} dG(b) \\
&+ \int_{h}^{\bar{b}} \left\{(1-\tau)\left[aR + (b-h)(1+r)\right] - \frac{aR(1-\tau)^2}{2}\right\} dG(b) \\
&+ \int_{\hat{b}}^{h} ((1-p)x\phi(h-b))dG(b)
\end{aligned} \tag{21}$$

# 5 Numerical Results

Despite the simplicity of the model, it is not possible to assess the impact of subsidies analytically. We therefore have to conduct a numerical analysis. The model was simulated as follows: given the initial distribution and the initial number of agents, total wealth is determined. The latter, given the project size $h$, determines in turn how many projects can be financed; sorting the agents by wealth this in turn determines the threshold $\hat{b}$. For




(a) (b)

Figure 1: a) Initial distribution b)The effect of soft budget constraints on total output

each level of $x$ one can then compute effort ($p$) and project returns as a function of the tax rate $\tau$. The government budget constraint (equation (20)) is then used to calculate the tax rate.

The simulations assumed agents to be distributed according a gamma distribution[12] which is displayed in panel a) of figure 1.

Moreover $h$ was set at 130; $a = 0.65$, $r = 0.1$, finally $\phi$ was set to 0.15.

**Proposition 2** *Numerical results show that there exists a positive level of $x$ (call it $x^*$) that maximizes total output; moreover:*

**i** *Ceteris paribus an increase in $a$ shifts $x^*$ to the left;*

**ii** *Ceteris paribus an increase in $\phi$ shifts $x^*$ to the left.*

The "optimal" level $x^*$ (shown in panel b) of figure 1) trades off between a positive and a negative effect of subsidies. To better understand the mechanics of the model, note that the three classes of agents that characterize the economy can also be classified into two groups: net borrowers and net lenders. Agents belonging to the first and third class are in fact net lenders, while agents belonging to the second class are net borrowers. This distinction is crucial because, as it will be explained in the next section, the effect of subsidies operates on two levels: an *efficiency level*, as it affects the effort level $p$, and

[12] In particular the distribution is $Gamma(b; 10, 1/9)$ so that $E(B) = 90$.

a *distribution level* that operates through taxation. In both cases it affect differently borrowers and lenders.

The *positive effect* of subsidies comes from the reduction in the interest premium charged by financial intermediaries. From this point of view they reduce imperfections in the financial markets (theory of the second best).

The *negative effect* comes from taxation and the distribution of income. Subsidies operate a redistribution of income from net lenders to net borrowers. Net lenders (both very rich and very poor agents) do not benefit at all from soft budget constraints, but they are taxed in order to pay for it.

After a certain value of the subsidy, the benefits to the borrowers deriving from a reduction in the interest rate are outweighed by the costs to the lenders deriving from an increase in taxes.

There is a *mixed effect* on the effort of net borrowers. On the one hand subsidies tend to reduce effort, on the other (through the reduction of the interest rate) they tend to increase it. What determines the sign of the variation of effort is the size of the amount borrowed. This is an intuitive result: the more an agent borrows, the more important is the positive effect on effort exercised by the reduction in the interest rate which outweighs the negative incentive effect of soft budget constraints on effort.

This can be appreciated by inspecting figure 2, which shows a surface plot of the effort function by borrowers (in order to improve the readability of the figure we have excluded poor lenders which do not provide effort). As can be noted from the figure "poor" borrowers which exert very low effort (approx. 0.5 in the figure) increase it when subsidies are introduced. On the other hand, "rich" borrowers (with effort higher than approximately 0.6 in the figure) reduce effort in the presence of subsidies. Effort of rich entrepreneurs which are net lenders, unambiguously decreases.

The remaining part of proposition 2 refers to a comparative static analysis that looks at the effect of some key parameters on the optimal level of $x$ (call it $x^*$)

*Ceteris paribus* an increase in $a$ shifts $x^*$ to the left: this is due to the fact that $a$ provides an upper bound to the level of effort, and that subsidies affect the interest rate only in the bad states of the world. Therefore the higher is $a$ the less effective are subsidies in reducing the interest rate and the earlier the negative effects outweigh the positive ones.

*Ceteris paribus* An increase in $\phi$ shifts $x^*$ to the left: this is due to the fact that the higher the share of the subsidy that is hidden by entrepreneurs, the less effective they are

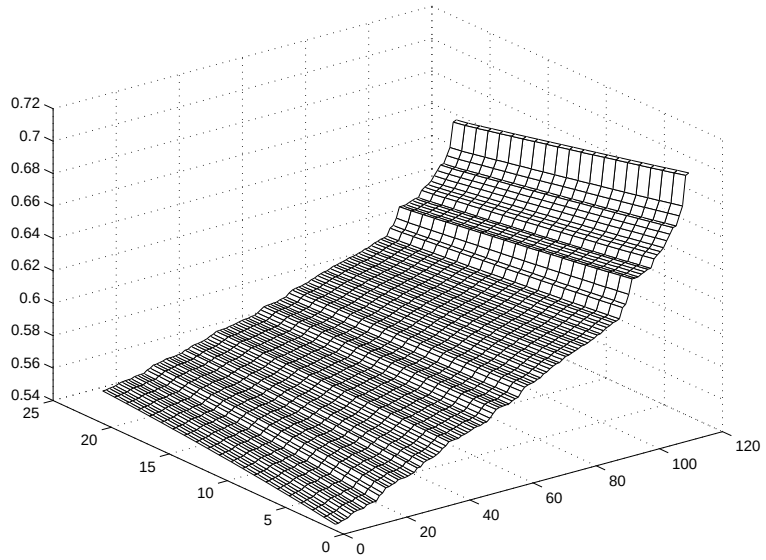



Figure 2: effort as a function of $x$ ($\phi = 0.15$)

in reducing the interest rate. The effect of the parameter $\phi$ can be appreciated by looking also at the behaviour of effort. As it is clear from equation (17), $\phi$ affects optimal effort in two ways: on the one hand it increases the entrepreneurial return in the bad state, inducing to exert higher effort. On the other hand, a higher $\phi$ reduces the return to the bank in case of failure and therefore it reduces the effect of subsidies on the interest rate. This latter effect tends to reduce the level of effort. The numerical exercise suggests that the latter effect outweighs the former: the parameter $\phi$ smooths the effect of subsidies on effort.

A comparison of figures 3 (where $\phi$ was set to 0) and 2 ($\phi = 0.15$) shows that in the former more agents are increasing effort and that effort increases are much higher, with respect to the latter.

Apart from comparative statics exercises, the parameters $a$ and $\phi$ have some simple and interesting economic interpretation. $a$ can be interpreted as the degree of imperfections of financial markets (a moral hazard parameter): the higher is $a$, the more efficient financial markets are (in fact the higher $a$, the higher is effort, the lower the interest rate spread).[13] $\phi$, on the other hand, can be interpreted as the degree of "institutional failure". When institutions are not functioning properly (lack of property rights, bribes, etc.) it is easier

[13]More precisely, $a$ is an *indirect* measure of moral hazard. Since agents are risk neutral, what is crucial for moral hazard to have a bite on the borrower-lender relationship, is borrowers' limited liability which in turn is triggered by the realization of the bad state of the world. A higher $a$ makes the bad outcome a less likely event and therefore reduces the limited liability problem.

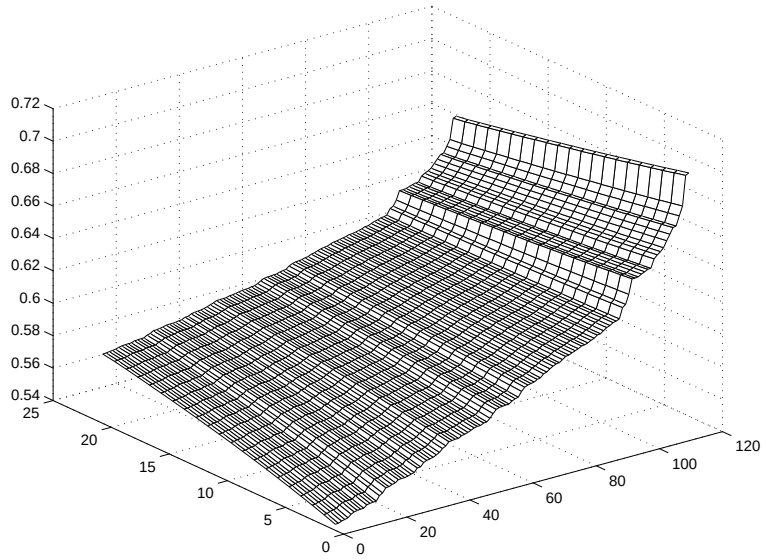



Figure 3: effort as a function of $x$ ($\phi = 0$)

to hide resources and to extract rents from soft budget constraints.
This suggests that subsidies as a source of soft budget constraints are deleterious in developed economies where financial markets are functioning well ($a$ is high), but also in countries like Russia, where, despite financial markets being highly imperfect, the lack of institutional development makes $\phi$ very high and this decreases the effectiveness of subsidies in reducing financial market imperfections.

# 6 Extensions

## 6.1 Different bailing out practices

The modelling framework used here assumes that the state bails out a fixed percentage of borrowed wealth ($h - b$) in case of failure. An alternative set up would see the state bail out a fixed fraction of the investment needed ($h$) in case of failure. This would slightly modify the effect of soft budget constraints on incentives. To see this, let us consider again equation (16). In this case the equation is changed as follows:

$$E\Pi = (1 - \tau)\left[pR - p(1 + i)(h - b)\right] - c(p) + (1 - p)xh\phi \tag{22}$$

which determines the following effort choice

$$p^*(b) = a(1-\tau)\left\{1 - \frac{(h-b)}{R}(1+i) - \frac{x\phi}{(1-\tau)}\frac{h}{R}\right\} \tag{23}$$

In this case the distortion effect of soft budget constraints on effort is higher simply because in the case of failure agents receive a higher payoff. The analysis would then carry on as before yielding similar results.

## 6.2 A dynamic framework

As previously stressed, the paper performs a comparative statics exercise, that is taking the limiting wealth distribution as given. An interesting extension of the current set up would consider the effects of soft budget constraints on the dynamic evolution of the economy and therefore on wealth distribution. The analysis is by no means trivial because there is a two-way interaction between wealth distribution and soft budget constraints. On the one hand, we have seen that soft budget constraints redistribute resources from net lenders to net borrowers, on the other hand changes in the distribution of wealth modify the effect of soft budget constraints on total output.

What the previous section has shown is that, in some circumstances, subsidies can be considered as means of increasing aggregate efficiency through redistribution. Note, however that subsidies are not a costless measure, as people are taxed to pay for them. This means that in a dynamic setting it is not possible to implement in every period an optimal subsidy policy (i.e. choose the subsidy optimally in every period) since this would not guarantee the existence of a unique limiting steady state wealth distribution.

On the other hand, if the level of subsidy is kept fixed over time, as the distribution evolves the chosen level may turn out to be distortionary. However, there are conditions under which there is an optimal level of subsidy which is constant over time. For example, if the investment return is sufficiently high and the level of $\phi$ is set to 0, it turns out that it is optimal to set the level of subsidy equal to 1. This would correspond to a policy of (almost) complete insurance. The intuition for this result is the following: subsidies have a direct positive effect on effort; if the return on the project is high, by increasing effort individuals generate a high increase in total output, since they get a high return in the good state which becomes more likely with higher $p$ . The increase in output more than outweighs the increase in effort cost, therefore total output increases.

Table 1 compares the average output of the steady state wealth distribution when $\phi =$

Table 1: Comparison between zero and total subsidy

| $x$ | Relative output level |
|---|---|
| 0 | 100.00 |
| 1 | 305.03 |

0 and compares the two extreme cases, a policy of zero subsidy ($x = 0$) and a full subsidization ($x = 1$).

From the table it emerges clearly that, considering also the dynamic evolution of the economy, subsidies can increase the level of output. Albeit this is an extreme case, it gives a more complete characterization of the intuition presented in the previous section.

# 7 Policy implications

The conclusions reached by the model seem somewhat surprising and provocative: soft budget constraints may actually help the economy instead of increasing inefficiency. The implications of the paper are in fact wider. In this section we examine them more closely.

Firstly, as it clearly appears from the model, soft budget constraints, *alone* (i.e. *without* other imperfections) have a negative impact on the economy: in the absence of imperfections everybody would provide first best effort and there would be no scope for redistributive policies.

Secondly, SBC are an example of a possible welfare improving policy instrument, but others can be considered as well. The effect of SBC in the model is twofold: on the one hand it eases financial constraints reducing the spread between $i$ and $r$, on the other it redistributes resources in favour of (constrained) entrepreneurs. From this point of view *any* redistribution policy would improve efficiency.[14] For instance an insurance scheme for entrepreneurs would accomplish this task; in fact SBC can be considered an implicit insurance scheme in which $x(h-b)$ is the amount insured and $\tau y$ is the insurance premium. It can be argued that, since they are one of many possible policy instruments that can be implemented in the model and that can increase efficiency, the emphasis put in this paper on soft budget constraints is excessive.

[14]This is a standard result in models of occupational choice and income distribution of this kind, see Aghion and Bolton (1997).

There are two reasons that justify our choice: firstly SBC were already in place at the beginning of transition and are still widespread among transitional economies; dealing with them implies understanding all their implications, even the ones that do not appear obvious. Secondly, as the model suggests, the effect of soft budget constraints is also linked to the level of institutional deficiencies present in the economy. In other words, in order to exert a positive effect, SBC require not only severe imperfections in financial market but also a low level of institutional failures.

The link between soft budget constraints and institutional failures has profound implication for the design and sequencing of economic and institutional reforms. The paper suggests that institutional reforms constitute prerequisite for other reforms. This is confirmed by both macroeconomic and microeconomic evidence. On the macroeconomic side it is now well established that countries that implemented earlier and more effectively institutional reforms are now experiencing higher and sustainable growth (see the 1999 EBRD Transition Report for a documentation on the progress and measurability of institutional developments). On the microeconomic side Johnson, McMillan, and Woodruff (1999a, 1999b), using survey data, show that in the absence of a clear definition of property rights and of an appropriate legislative framework, financial liberalization and the easing of credit constraints has no impact on entrepreneurial development. They show that in countries such as Russia and Ukraine which are mostly behind in term of regulatory framework and institutional development, the relaxation of financing constraints had a limited impact on firms' growth. By the same token, in countries where institutional developments are more advanced, easing credit constraints, even through forms of subsidies, can have a positive economic effect.

A further extension of the argument of this paper refers to the application of bankruptcy procedures. Instead of soft budget constraints one can interpret the subsidy $x(h-b)$ as a refinancing scheme to firms that otherwise would go bankrupt and then compare the two situations with and without SBC as two different degrees of toughness of bankruptcy procedures. The message of the paper in this case would be that, in the presence of financial market imperfections and in the absence of severe institutional failures, a bankruptcy law too severe can be deleterious for the economy.

This argument is supported by the experience of Hungary. Hungary is one of earliest reformers and it is now one of the countries in Eastern Europe where institutions are more developed. In September 1992 the Hungarian parliament passed the Bankruptcy

Act that became effective on 1st January 1992. This bankruptcy law was very tough as it contained an automatic trigger that required firms holding overdue debts of any size to any creditor to initiate liquidation proceedings.[15] According to many observers[16] the Hungarian bankruptcy reform was too severe, and coupled with the existence of financial market imperfections, was one of the determinants of the severe credit crunch that affected the Hungarian economy until 1996.[17]

# 8 Conclusions

In this paper we have analysed the interaction between subsidies, soft budget constraints and financial market imperfections in a simple model of occupational choice. Despite being very simple, the analysis conveys a basic message: while subsidies considered alone are a source of distortions, when evaluating their effects on the macroeconomy one has to consider the possible contemporaneous presence of other distortions with which subsidies and soft budget constraints may interact. In particular, in environments where there are severe forms of financial market imperfections, subsidies and soft budget constraints can ease those imperfections and reduce credit rationing problems. From this point of view they can be welfare improving.

[15] For a detailed description of the Hungarian bankruptcy law see Mitchell (1998).

[16] See Bonin and Schaffer (1995, 1999) and Mitchell (1998).

[17] Also the Hungarian authorities were aware of this, in fact they amended the bankruptcy law in a softer direction only one year after its implementation.

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