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Soft budget constraint theories

From centralization to the market[1]

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Abstract

This paper surveys the theoretical literature on the effect of soft budget constraints on economies in transition from centralization to capitalism; it also reviews our understanding of soft budget constraints in general. It focuses on the conception of the soft budget constraint syndrome as a commitment problem. We show that the two features of soft budget constraints in centralized economies – *ex post* renegotiation of firms' financial plans and a close administrative relationship between firms and the centre – are intrinsically related. We examine a series of theories (based on the commitment-problem approach) that explain shortage, lack of innovation in centralized economies, devolution, and banking reform in transition economies. Moreover, we argue that soft budget constraints also have an influence on major issues in economics, such as the determination of the boundaries and capital structure of a firm. Finally, we show that soft budget constraints theory sheds light on financial crises and economic growth.

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1. Introduction

This paper has two purposes. One is to examine the effect of soft budget constraints (SBC) on economies in transition from centralization to capitalism. The other is to survey our understanding of SBC more generally. Of course, this latter aim is also pertinent to the former.

Current work on soft budget constraints follows in the tradition of the famous debate in the late 1930s and early 1940s on market socialism (Hayek-Mises *versus* Lange-Lerner). Like that earlier discussion, it is concerned with why some economic institutions work well while others do not. And, although focused particularly on socialist institutions, it also has considerable bearing on our understanding of markets. The 1940s debate was a major inspiration for the theory of mechanism design, while recent contributions have stimulated the study of commitment problems in game theory and contract theory. However, differences between the two literatures are also evident. Lange and Lerner wrote about the potential benefits of socialism at a time of socialist ascendancy, whereas modern studies emphasize its flaws in an era of precipitous decline.

The fundamental feature of a centralized economy is the dominance of the state sector. A large body of evidence documents that a major problem in socialist transitional economies has been a lack of financial discipline in this sector (Kornai, 1980, 1992). The lack of discipline derives from the unenforceability of bankruptcy threats, together with various subsidies, credits, and price-supports, implying, as Kornai (1979, 1980) recognized, that state firms are subject to *soft budget constraints*. Soft budget constraints directly influence the efficiency of the state sector through their effect on the expectations of state-firm managers. Moreover, they are strongly linked to most of the basic problems confronted by socialist and transitional economies, e.g., shortage and inefficient innovation.

The SBC syndrome has by no means been absent from market economies. Notable recent examples of its mischief include the US government's bailouts in the Savings and Loans and the Long-Term Capital Management crisis. Nevertheless, its force appears to be more attenuated in relatively decentralized economies. Why this should be so seems important both for understanding transition (how to transform a centralized economy into a market economy) and for understanding the market economy itself.

Several explanations for the origins of soft budget constraints have been proposed, including political explanations. In this paper, however, we will focus on economic explanations. This is because a full-fledged political theory of soft budget constraints has yet to be developed, although various writers including Kornai (1980, 1992, 1998) have made suggestive observations about the elements of such a theory. Moreover, as we will point out later, an economic explanation can be compatible with or may underlie some political stories.

Describing the soft budget constraint syndrome as deriving from the absence of bankruptcy is an over-simplification, although perhaps a useful one. There are two ways in which this absence has been explained. The first – and mainstream –

approach has been to model soft budget constraints as a financial commitment problem: an inability to prevent an *ex ante* financial plan (or budget) from being renegotiated *ex post*. The second approach has been to model soft budget constraints as instruments to solve a moral hazard problem. We will focus primarily on the first approach, in which the soft budget constraint syndrome is conceived as a commitment problem. This is in part because there is a substantial empirical literature that supports the validity of this point of view.

Kornai (1980) characterizes soft budget constraints as having two major features: (i) *ex post* renegotiation of firms' financial plans; and (ii) a close administrative relationship between firms and the centre (a 'vertical relationship' in Kornai's phrase). In this paper, we will show that these two features are intrinsically related. Moreover, we will argue that they are not only central to the fundamental problems of centralized economies, but also bear on major issues in economics more generally, such as the boundary of the firm (Coase, 1937) and the capital structure of the firm (Modigliani and Miller, 1958).

They are pertinent to the location of a firm's boundary because administrative control is the primary means of co-ordinating transactions within the firm, whereas beyond that boundary the market predominates. Thus, the proper location of the boundary is determined by trading off the effectiveness of these two co-ordination mechanisms, and a major factor affecting the trade-off is commitment. As we will see, the decentralized nature of the market makes renegotiation in market relations harder than under administrative control.[2]

The soft budget constraint framework also sheds light on optimal capital structure. We typically think of a firm's debt as imposing greater financial discipline than equity on managers since debt increases the chance that the firm will go bankrupt. But this threat is compromised if the firm can renegotiate its way out of bankruptcy. Thus, the optimal debt/equity ratio turns on the hardness of the budget constraint imposed by debt.

The rest of the paper is organized as follows.[3] In Section 2, we review the Dewatripont-Maskin model (Dewatripont and Maskin, 1995), one of the early theories to endogenize soft budget constraints as a financial commitment problem. Section 3 surveys models that explore the consequences of soft budget constraints, as modeled in Section 2, in a centralized economy. Section 4 examines the relevance of soft budget constraints, again conceived as in Section 2, to transitional issues. Section 5 links soft budget constraints to corporate finance and the literature on market structure more generally; we also consider alternative theories of SBC's origin. Section 6 examines the connection of SBC to banking and financial crises. Finally, the last section discusses how soft budget constraints affect economic growth.

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[2] This view of the boundary of the firm is complementary to that in property rights theory, e.g., Grossman and Hart (1986) and Hart and Moore (1990).

[3] Some of the material in Section 2 and Section 3 is drawn from Maskin (1996); some of that in Section 4 is based on Dewatripont, Maskin and Roland (1998) and Maskin (1996, 1999); and some of that in Section 5 is based on Maskin (1996, 1999).

2. A theory of soft budget constraints: The Dewatripont-Maskin model

Following the seminal work of Kornai (1979, 1980), which introduced the concept of soft budget constraints, formal theories were developed to model their implications. Schaffer (1989) and Goldfeld and Quandt (1988) examined soft budget constraints in the case of central planning and showed how they would lead to inefficiency. Freixas, Guesnerie and Tirole (1985) modelled a closely related dynamic inefficiency in central planning – the ratchet effect – in which a planner is unable to commit not to change a firm's incentive scheme after it learns more about the firm's productive capacity. However, neither line of work explained why commitment is a more serious problem in a centralized than a decentralized economy. Dewatripont and Maskin (1995) suggested an answer to this question.

The following is a stripped-down version of the Dewatripont-Maskin (DM) model. Imagine that there are two kinds of (potential) projects, fast and slow. Each project requires one unit of capital per period. Slow projects require two periods to complete, whereas fast projects can be completed in one. We shall assume that it is *ex ante* profitable for fast but not slow projects to be undertaken. Each project is associated with an entrepreneur, who knows its quality (i.e., its speed). However, entrepreneurs have no capital and so must get their funding from banks. Banks have capital, but cannot initially distinguish between fast and slow projects. We assume that they can make the distinction only after they have already made a loan.

For simplicity, suppose that banks have all the bargaining power in negotiating financial arrangements, i.e., they make take-it-or-leave offers, and can extract a project's entire (observable) return R_f or R_s (where f and s are mnemonics for 'fast' and 'slow'). All that is left to the entrepreneur is his private return, e.g., what he can divert from the project into his own pocket or the extent to which he can enhance his reputation. Let this return be E_i if the project is left incomplete and E_c if completed, where $E_i < 0 < E_c$.

To capture the basic feature of a centralized financial system, we suppose that there is a single bank (e.g., the state bank) with *all* the capital, which, for our purposes, means at least two units. If an entrepreneur shows up asking for a loan, the bank makes a proposal, where the repayment terms depend on (i) the project's return' (ii) when it is realized, and (iii) whether or not there is refinancing. If the bank actually extends credit, it might as well loan only one unit of capital in the first period: there is no need to loan more if the project turns out to be fast, and the bank – if it chooses – can later lend another unit for the second period when the project is slow.

Now, if the bank finances the entrepreneur and the project turns out to be fast, then the bank will extract the observable return, R_f. Thus in this case the bank's

and entrepreneur's net pay-offs are, respectively,

$$R_f - 1 \text{ and } E_c \tag{1}$$

Moreover, because we are assuming that fast projects are profitable – i.e., $R_f - 1 > 0$ – it is worthwhile for banks to finance such projects. Suppose instead that the project turns out to be slow. (The bank will discover this only after it has made the loan.) If the project is not refinanced, then the bank recoups nothing on its investment, and so its and the entrepreneur's pay-offs are, respectively,

$$1 \text{ and } E_i . \tag{2}$$

Let us suppose that, even if the project is ultimately completed, the bank must play a supervisory role in the first period to ensure that the funds it has invested are used properly by the entrepreneur. However, assume that such monitoring is costly. Specifically, suppose that the return R_s is random – either 0 or $\overline{R}_s$ (> 0) are the possible realizations – and that, to ensure probability p of the high outcome, $\overline{R}_s$, the bank must incur a cost of $\psi(p)$ (where the function ψ is increasing and convex). Then it will choose $p = p^*$ to satisfy:

$$\overline{R}_s = \psi'(p^*).$$

Thus the bank's net return from financing and then refinancing a slow project to completion is:

$$\pi_s^* = p^* \overline{R}_s - \psi(p^*) - 2, \tag{3}$$

whereas the entrepreneur's pay-off is E_c. We conclude that, provided that

$$\pi_s^* > -1, \tag{4}$$

the bank will choose to refinance the project if slow.

Notice that, when (4) holds, a slow project is subject to a soft budget constraint in a centralized economy. Even though such a project is, by assumption, *ex ante* unprofitable ($\pi_s^* < 0$), it will nevertheless be refinanced once it is started.

Let us compare what happens under centralized credit to that under decentralization. To capture (rather crudely)[4] the idea of decentralized credit, let us suppose that, instead of one bank, there are two, each with one unit of capital.

Notice that if the project turns out to be fast, nothing is changed from before;

[4] In the actual DM model, the market structure of the banking industry is determined endogenously.

the project is financed and completed in one period. Suppose, however, that the project is slow. In this case, the bank that initially provides the financing *cannot* refinance because it does not have the capital. (In a less extreme version of the model, the bank might technically be able to refinance but finds this disadvantageous because too high a proportion of its assets would be tied up in one project.) Therefore, if the project is to be completed, the entrepreneur must go to the other bank.

Suppose that this second bank cannot observe the first bank's monitoring intensity, i.e., the level at which p was set. Thus, if it extends credit for the second period, the amount it is repaid must be some fixed fraction of R_s (when $R_s = \overline{R}_s$); the repayment terms cannot depend on p. But, since the second bank must get some fixed cut, the first bank's marginal gross profit from an additional unit of monitoring will be strictly less than $\overline{R}_s$ (the marginal gross profit from monitoring when credit is centralized). Therefore, the first bank's incentive to monitor is blunted relative to the framework with centralized credit. It will, therefore, monitor less than p^*, and this may render refinancing unprofitable for the second bank. If this is the case, the budget constraint will be *hard*. Furthermore, since an entrepreneur's pay-off is negative when he does not complete his project ($E_i < 0$), he will not even attempt, in this hard budget-constraint case, to obtain financing if his project is slow. Hence, in equilibrium, only fast projects – the profitable ones – are financed.

To summarize, when credit is centralized, slow as well as fast projects are financed in equilibrium because entrepreneurs with slow projects forecast that they will be able to obtain refinancing to see their projects through to completion, earning them a return of $E_c > 0$. This is an inefficient outcome because such projects are ex ante unprofitable. By contrast, the decentralization of credit can act as a commitment device to prevent slow projects from being refinanced and therefore may serve to keep these projects from being undertaken at all.

This theory accords well with Kornai's notion that the key to soft budget constraints is the *ex post* negotiation of subsidies, taxes and credits etc.

Some explanations of soft budget constraints (e.g., Shleifer and Vishny, 1994) invoke politics: a government bails out a firm or a bank when the political price of permitting bankruptcy is too high (perhaps because ideology favours full employment, or because politicians receive favours from the firm's manager or because of potential social unrest when a large number of enterprises fail). The theory that we have outlined readily accommodates such 'political considerations', and some other important variations.

In particular, suppose the creditor in the centralized model is not a bank, but the government. Suppose, moreover, that the government cares about both employment and profit. To model this, we can change the creditor's maximand – which in the basic model is profit – to 'social welfare', which includes both employment and profit (the maximand could perhaps be a weighted sum of the bank's profit, employment, the entrepreneur's utility, and the welfare of the rest

of society, presumably an increasing function of the entrepreneur's output). It is easy to see that in such a modified (and probably more realistic) model, the incentive to refinance a slow project will be even stronger than in the basic model because the benefit from refinancing is higher. That is, the contrast between the centralized and decentralized model – the intensity of the soft budget constraint effect – is more pronounced.

The model and its variants convey the idea that the soft budget constraint syndrome arises from the inability of a central planner to commit not to 'meddle' *ex post*. Moreover, the model identifies the root of this commitment failure: the centralized financial system itself. According to the theory, the soft budget constraint syndrome will not be expunged by any reform that leaves this financial system intact; abandoning centralized planning or introducing product market competition for state-owned firms will not suffice. That is, the theory implies that Lange-Lerner market socialism will not work. It also sheds light on the failure of reforms in centralized economies (such as Hungary) prior to the fall of communism. Finally, it suggests a policy direction for hardening budget constraints in transition economies, a goal embraced by nearly all policy experts.

3. Consequences of soft budget constraints in centralized economies

3.1 Innovation

The failure to innovate was a major reason for the final collapse of central planning. Why should centralized economies have fared so poorly in innovation, while succeeding in various other economic spheres? Qian and Xu (1998) provide an answer based on soft budget constraints. They argue that the market is able to select projects *ex post*, i.e., after their prospects are known. But centralized economies do not have the luxury of *ex post* selection because of soft budget constraints. Therefore, they must rely on *ex ante* bureaucratic screening, which is less effective.

The argument goes as follows. To reflect the uncertain nature of innovation, suppose that before a project is launched no one knows its cost and its ultimate pay-off: information is (symmetrically) imperfect for both investors (those who supply capital) and innovators (who are endowed with projects but not capital). However, suppose that by consulting experts, holding committee meetings, etc., investors can (at a price) acquire a signal of a project's cost (pre-screening). Innovators' private benefits are similar to those in the DM model.

At date 0, the investors decide whether or not to pre-screen R&D projects. Pre-screening takes one period of time, and the price of delay is captured by a discount factor. At date 1, each approved project is launched by the infusion of I_1 units of capital (the research stage). The innovator acquires knowledge about his project's cost (its type) during the research stage, but investors still do not know

this type – asymmetric information arises. At date 2, both types of projects require I_2 units of capital to be continued (the development stage). A low-cost project is completed at date 3 and generates discounted revenue R if a success (which occurs with probability, p) and 0 if a failure, where $pR > I_1 + I_2$. A high-cost project has a delayed completion time, and so its revenue at date 3 is zero. If an additional investment I_3 is made in the high-cost project at this time (a further development stage), then the project is completed at date 4 and generates revenue R if it is a success and 0 if it is a failure, where $I_3 < pR < I_1 + I_2 + I_3$ (hence, a high-cost project is not *ex ante* profitable to finance but, after $I_1 + I_2$ has already been sunk, will be *ex post* profitable to refinance).

In a centralized economy, all financial resources are controlled by the state. Once a high-cost innovative project is financed at date 2, it will be refinanced at date 3 because, given that the first two stage investments are sunk, it is *ex post* efficient to do so. Foreseeing this, an innovator with a high cost project has no incentive to stop at date 2 when he obtains that information, because the private benefit accruing to an innovator is positive when the project is completed.

In a decentralized economy, there will be multiple investors. Either because of asymmetric information (as in the DM model or Huang and Xu, 1998) or because of hold-up problems (as in Hart and Moore, 1995 or Bolton and Scharfstein, 1996) this multiplicity of investors makes it credible that high-cost projects will not be refinanced at date 3. Anticipating this, innovators with high-cost projects will stop at date 2 as soon as they learn the type of project they are stuck with.

Given the state's inability to terminate high-cost projects *ex post*, it will employ bureaucratic measures in an effort to identify these projects *ex ante*. Indeed, such pre-screening was used intensively in the Soviet Union. However, because such measures are themselves costly, they will be employed less often in a decentralized economy, where their usefulness is more limited.

This model predicts that bureaucratic screening will work relatively well when prior knowledge is good (as in the case of the aerospace industry, where the relevant physical principles were well understood from the outset), but relatively badly when prior knowledge is poor (as the case of the Soviet computer industry, where the relevant science was still in its infancy at the time of the first computer development). Thus, the model suggests – and experience bears this out – that gaps in innovative performance between centralized and decentralized economies will be particularly great for technologies relying on recent scientific advances.

3.2 Shortage

Shortage of consumer goods is a phenomenon common to virtually all centralized economies (Kornai, 1980, 1992). Qian (1994) explains its origin in a model similar to that of DM. Consider a centralized economy subject to soft budget constraints. Suppose that certain goods are demanded not only by consumers but also by firms (as inputs to their production process) but that sellers do not (or cannot) distinguish firms/entrepreneurs from households. Then, setting the prices of the goods below market-clearing levels to induce a shortage is a way of partially

overcoming the soft budget constraint problem: having his refinanced project will do an entrepreneur no good if he cannot buy the goods he needs with the loan. Hence, entrepreneurs with poor projects will be discouraged from undertaking them in the first place. This means that although consumers will suffer from the shortage, they could well gain overall by not having to compete with poor projects for scarce resources.[5]

3.3 Soft budget constraints due to public ownership

In the DM model, the only difference between a centralized and decentralized economy is the structure of the banking sector. Li (1992) argues that public ownership in socialist economies may be another reason why these economies are more prone than their capitalist counterparts to soft budget constraints. In his model, public ownership means that the bank and the enterprise *jointly* decide whether refinancing occurs, in contrast to private ownership, where the bank unilaterally makes this decision.

To formalize this idea, Li examines a framework similar to the DM model but in which – under either capitalism or socialism – there is only a single bank. Thus, he does not identify capitalism with decentralization but rather with private ownership. Whereas the Section 3 model assumed that, once a slow project is begun, a centralized bank will choose to see it through to completion – i.e., (4) holds – Li supposes instead that a slow project is not profitable to refinance, i.e., that:

$$\pi_s^* < -1. \tag{5}$$

For the analysis of Section 3, adopting (5) rather than (4) implies that there will be no difference between centralized and decentralized economies; in either case, slow projects are not refinanced, and so are not undertaken. However, Li's (1992) contrast is between private and public ownership. Specifically, if public ownership implies that refinancing occurs as long as *either* the bank or the entrepreneur favours it, refinancing gets the greenlight provided that:

$$E_c + \pi_s - 1 > E_i. \tag{6}$$

Because $E_c > E_i$, the entrepreneur must be 'bribed' by the bank if he is to refrain from voting for refinancing. But formula (6) says that such a bribe is not worthwhile for the bank to make. Observe that a soft budget constraint arises in this model because of the extension of ownership rights to entrepreneurs.

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[5] Prell (1996) also studies excess demand caused by soft budget constraints. His work focuses on Kornai's argument that a soft budget constraint increases input demands.

4. Soft budget constraints in transition economies

It is well recognized by economists and policy-makers that a central task of economic transition is to harden the budget constraints of firms and banks. However, considerable empirical work indicates that the soft budget constraints syndrome continues to play an important role in virtually every transition economy, even those that have already undergone many years of reform.

In this section, we survey what theory has to say about further steps that might be taken to help eradicate the syndrome. We will see that a common theme is that decentralization is the key to hardening budget constraints. In most of the literature surveyed here, decentralization succeeds by making *ex post* renegotiation more difficult. In Berglof and Roland (1998) and Segal (1998), by contrast, decentralization's role is to create competition.

4.1 Devolution

In discussing the many contrasts between China and the other transitional economies, Qian and Xu (1993) observe that fiscal authority in China was devolved from central to local governments even before the reforms of the late-1970s and that this seems to have worked against soft budget constraints. They argue that by decentralizing financial resources in this way China has been able to mimic the hard budget constraints of market economies: the limited resources of local governments have prevented them from bailing out loss-making enterprises.

More formally, Qian and Roland (1998) argue that devolution (which they call 'federalism') can help to harden budget constraints through regional competition. They conceive of a federal structure as a three-level hierarchy, with central government at the top, a collection of independent local governments in the middle, and a set of state and non-state enterprises at the bottom. In old-fashioned socialism, the central government taxes state enterprises and uses the proceeds for transfers to state employees, public infrastructure investment, and bailouts to state enterprises. In the case of federalism, the central government delegates most fiscal authority to local governments, who tax and spend only within their jurisdictions. In either case, it is assumed that governments act to maximize welfare (although, local governments are interested only in local welfare).

Certain state enterprises will be profitable only if they undergo restructuring. But restructuring is costly to an enterprise's manager and so will be undertaken only if the enterprise would otherwise go bankrupt. Therefore, if the manager anticipates that he will be bailed out by the government, he will not restructure. Whether or not a bailout occurs depends on the opportunity cost of the government's funds, in particular the marginal benefit of investing in infrastructure.

In the case of federalism, the various local governments compete among themselves to attract outside capital to their non-state enterprises by investing in

infrastructure. Infrastructure investment raises the marginal product of capital and therefore is a useful instrument in the competition for capital. Indeed, under federalism, the private marginal benefit of investment will exceed its social marginal benefit (since a local government ignores the loss imposed on another jurisdiction when it lures capital away). But the bigger the infrastructure investment the higher is the opportunity cost of bailing out failing firms. Hence, this opportunity cost is higher under federalism than under centralized fiscal authority (where infrastructure investment is efficient), and this implies that federalism entails a harder budget constraint.

4.2 Banking reform

The idea of creating a market system of credit and financial intermediation has figured prominently in recent policy debate on how to harden firms' budget constraints. The literature on soft budget constraints in banking has emphasized the importance of the quality of the loan portfolio in determining whether banks are effective in disciplining enterprises. Berglof and Roland (1998) endogenize banks' opportunity cost of refinancing using a logic similar to that of Qian and Roland (1998).

Assume that at time 0, C units of capital are handed over by government to a profit-maximizing bank for financing projects. At time 1, the bank can use the returns generated in the first period to finance new projects and/or refinance *ex ante* 'bad' projects financed at time 0. Will bad projects be submitted at time 0? This depends on the opportunity cost of refinancing them at time 1, given the alternative of the new projects. If the expected quality of new projects is high enough, hard budget constraints obtain because, even though refinancing a bad project may be profitable, profit is still higher from financing a new project.

An implication of this reasoning is that soft budget constraints are not a serious problem if new projects are of sufficiently good quality. This may explain why soft budget constraints are not more pervasive in advanced market economies and why they persist in transitional economics, where entrepreneurial skills are still developing. But conversely, the model implies that when there are soft budget constraints at time 1, new projects are crowded out by the refinancing of bad projects. Under soft budget constraints, a smaller proportion of funds is available for new projects because: (i) fewer returns are generated from the projects financed at time 0, and (ii) bad projects must be refinanced.

Berglof and Roland (1995) show that a close relationship between banks and government may also cause soft budget constraints, i.e., enterprises may have soft budget constraints even in the case where banks by themselves would refrain from refinancing them. The idea is that refinancing is a way for banks to exploit the 'softness' of a government, who, unlike them, cares about total welfare.

More precisely, assume that the government first gives a bank funds to finance n projects at time 0. At time 1, the bank can be 'hard' and liquidate bad projects or instead be 'soft' and ask the government for subsidies to refinance these projects. Assume that the bailout money provided by the government just covers the

difference between the total refinancing requirements of the bank and its total funds at time 1. Assume, moreover, that the government cannot recover this bailout money. Government can, however, monitor the use of funds so that the bank lends the money properly (i.e., for refinancing). Suppose that the bank has initially invested a proportion of funds in bad projects. If the proportion of good projects is sufficiently small, soft budget constraints will result. This is because a lower proportion of good projects generates less revenue at time 1 for the bank and thus enables it to obtain more subsidies, implying that it bears a lower share of the costs of refinancing.

A principal finding of this paper is that, provided banks are free to choose the number of projects to invest in, initial bank recapitalization will generate a hard budget constraint; i.e., it is in the interest of banks to set aside enough reserves as a commitment to be hard. Low initial average project-quality implies that hardening budget constraints has a high cost in terms of enterprise liquidity.

Faure-Grimaud and Rochet (1998) propose a way to harden budget constraints for banks in transition economies. They argue that by introducing regulations that serve to increase capital requirements, one can raise the cost of funds to banks, making it less attractive to refinance bad projects. The authors also study the consequences of different modes of privatization on soft budget constraints, specifically, the question of whether it is better to put current or new management in charge of banks.

They suppose that current bank managers have a better knowledge of the existing loan portfolio than do newcomers. Thus, they argue, these managers have an advantage in extracting surplus from firms whenever refinancing occurs. This superior surplus-extraction ability may exacerbate the soft budget constraint syndrome because it makes refinancing more likely. And so, they conclude, it may be better to put outsiders in charge precisely because their information is poorer.

Aghion, Bolton and Fries (1996) argue that a major source of soft budget constraints is bank managers' incentives to misreport their bank's loan losses, and this can lead to banking crises. They analyze how different bank bailout rules affect bank managers' *ex ante* incentives to lend, and their *ex post* incentives to disclose a non-performing loan problem truthfully. Their model consists of firms, banks, and regulators. Firms and banks are run by managers who derive private benefits. If a firm or a bank is insolvent, the manager may be dismissed and lose his benefits. The regulators' objective is to maximize *ex ante* efficiency.

ABF argue that if a tough recapitalization policy is associated with dismissal of the bank manager, then to avoid losing his job, the manager may try to hide losses by rolling over bad loans. Thus such a policy may result in worsening adverse selection and in softening firms' budget constraints. However, if the manager of a failing bank is not dismissed in recapitalization, he is encouraged to take an overly tough approach to firm liquidations, and will exaggerate his recapitalization requirements.

ABF propose that the recapitalization of insolvent banks should be

accomplished by buying out non-performing loans through a non-linear transfer pricing mechanism. Such a mechanism can be used to counteract the adverse-selection problem, and in particular to avoid over-reporting of non-performing loans by healthier banks at the time of the bailout.

4.3 Privatization and restructuring

That privatization is a useful device to harden budget constraints of firms was recognized before transition began (Kornai, 1986) (see also Laffont and Tirole, 1992). Schmidt and Schnitzer (1993) argue that if state-owned enterprises (SOEs) are not privatized, i.e., the government stays in control, then social costs will be lower since SOEs will not be closed. However, in this case, managers will face soft budget constraints and have less incentive to restructure. Still, while immediate privatization provides strong management incentive to restructure, it also imposes a high social cost through bankruptcies and lay-offs. Thus optimal privatization policy should be determined by the trade-off between the incentive gains and lay-off losses.

Schmidt (1996) argues that different allocations of ownership rights lead to different allocations of inside information about the firm. However, with too much information, the government will not be able to solve the soft budget constraint problem. Thus, privatization can be viewed as a commitment device by the government to cut back subsidies when costs are high so as to give managers better cost-saving incentives (a 'harder budget constraint').

It is evident that the restructuring of SOEs in transition economies has been very slow, and that most SOEs are still subject to soft budget constraints. However, in many cases the soft budget constraints take new forms, such as debt repayment falling into arrears. Perotti (1998) develops a theory that attributes delayed debt repayment to measures that were intended to harden budget constraints. He argues that managers anticipate that the government will not allow massive insolvency and will therefore provide financial relief to insolvent firms. Given this anticipation, many firms may be inclined not to restructure but to grant credit to unworthy buyers when measures are introduced to tighten bank credit. This is because tight bank credit decreases firms' liquidity. When unrestructured firms are unable to switch to alternative markets, they are forced to accept trade credit from illiquid buyers, which raises the likelihood of insolvency. When the number of illiquid and insolvent firms reaches a critical level (corresponding to the prospect of imminent massive bailouts), even reformable firms will choose not to restructure; they have the incentive to gamble on a collective bailout. As a result, the attempt to harden budget constraints – introducing tight credit policy – actually leads to less restructuring.

5. Soft budget constraints in corporate finance and market structure

5.1 Boundary of the firm and soft budget constraints

Coase (1937) raised a fundamental economic question: what is the boundary of the firm? Huang and Xu (1998) address a related question: how does the boundary of the firm affect efficiency when the firm's projects are highly uncertain? For example, when a firm has the prospect of developing a new product line through an R&D project, should it carry out the project itself, or find an outside contractor?

Huang and Xu (1998), hereafter HX, take the view that a firm's boundary affects its commitment capability, and thus the efficiency of its R&D. In the DM model, an entrepreneur may have the incentive to seek financing for a project that is *ex ante* unprofitable because its poor prospects are discovered by the financier only after she has already made a significant capital investment. At that point, the financier may well be better off allowing the project to be completed by making a further infusion of capital. As we have seen, the question then arises: how do capitalist economies succeed in 'hardening' the budget constraint, thereby discouraging entrepreneurs from proceeding with poor projects in the first place? The answer proposed by the HX model is that a multiplicity of financiers can help constrain refinancing. However, for this to work the financiers must be independent of one another. In particular, financiers must each have private information.

To see the logic of the HX proposal, suppose that two financiers make the initial capital investment in an entrepreneur's project. Assume, moreover, that the financiers arrange matters so that each receives private information about the best way to make any further investment. To be more concrete, imagine that each financier *i, i=1, 2* observes a *private* real-valued signal s_1. If additional investment later proves necessary, the project can be completed according to 'plan A' or 'plan B.' However, which plan is better depends on the financiers' signals: if $s_1 > s_2$, plan A is preferred, whereas the reverse is true if $s_1 < s_2$. Suppose that the financiers have set things up so that the difference between financier 1's gross pay-offs (i.e., before any *ex post* transfer) from plans B and A is increasing in s_1, whereas the difference between financier 2's gross pay-offs from plans A and B is increasing in s_2. Then it can be readily shown that there is *no* mechanism that both induces the financiers to reveal their signals truthfully and uses this information to make the efficient choice of A or B. (To see this intuitively, note that there is an inherent conflict between efficiency and incentives: as s_1 rises, plan A becomes more likely to be efficient, but financier 1's preference for plan B grows stronger). Of course, the financiers could choose between the plans by randomizing, but such a resolution might well be so inefficient as to be dominated by simply liquidating the project. Hence, by deliberately ensuring that they have different information, the financiers may be able to commit themselves not to

refinance a project that they have already invested in. That such multi-party financing arrangements are possible under capitalism may be one reason why market economies seem better at hardening budget constraints than their socialist counterparts, where there is, in effect, only a single financier.

This logic leads to the prediction that financial non-integration is more efficient for riskier projects (the risk being the possible requirement of additional infusions of capital), such as R&D in high-tech projects. That is, it may be more efficient to finance these projects through multiple investors, as in a typical venture capital arrangement, by contrast with safer projects, where integrated financing is more likely to be preferable.

5.2 Project selection

Bai and Wang (1998) show that soft budget constraints can occur as a result of the centralization of capital ownership and the concomitant need to rely on agents to monitor the allocation of capital.

Formally, suppose that the Centre 'owns' a large number of potential projects, but must rely on an Agent to assess each project's profitability and hence whether or not it should be launched. Suppose that a project, if launched, takes two periods to complete and requires capital input costing c each period. The Agent can exert (unobservable and costly) effort to pre-screen the expected gross returns of a fraction e of these projects *ex ante* (where e increases with effort). It then launches a number of the potential projects (including, presumably, all projects that its pre-screening indicates are profitable – i.e., the projects whose expected gross return minus $2c$ is positive – but possibly also some projects that have not been pre-screened). At the end of the first period, it learns the expected gross returns of all launched projects and can choose to terminate some of them, thereby saving the cost c of continuing them for a second period (presumably, any project that is terminated would be one that is unprofitable to complete i.e., one for which the expected gross return minus c is negative – but, as we shall see, not *all* unprofitable contracts ought to be terminated).

The Agent requires a fee from the Centre to induce it to exert effort. But because effort is unobservable, the fee must be made contingent on the variables that the Centre *can* observe: the total net return (which is assumed to be the sum of the expected gross returns of completed projects less the capital costs of completed and terminated projects plus the realization of a shock common to all projects), the number of projects launched, and the number of projects terminated after the first period. In fact, since they are assumed observable, we can think of the launch and termination numbers as being chosen directly by the Centre as part of the fee schedule. Assume that, on average, a project that is not pre-screened turns out to be unprofitable to complete. Bai and Wang show nevertheless that if the Agent is risk-averse, then the optimal fee schedule will have the properties that the Agent should (i) launch some projects that it has *not* pre-screened, and (ii) allow some unprofitable projects to be completed.

To see why this is so, note that the crux of designing an optimal fee schedule is

inducing the Agent to undertake sufficient pre-screening effort. Suppose, for example, that there are just two possible levels of effort: an optimal level and lower level. Then we would expect that, when confronted with the optimal fee schedule, the Agent will be left just indifferent between these two levels, i.e., the Agent's 'incentive constraint' will be binding. Suppose, contrary to our claim, that when facing the optimal fee schedule, the Agent launches no project that it has not pre-screened, i.e., the set of projects launched consists only of projects that pre-screening indicates are profitable. Suppose that the Centre now slightly increases the number of projects it requires to be launched. This will, in effect, force the Agent to launch some projects that it has not pre-screened (it could alternatively launch some projects that have been pre-screened and shown to be unprofitable, but this option would be dominated). Since this change will reduce the overall net return on average, it will lower the Agent's expected fee. Thus, the Agent's expected utility will fall, whether it exerts the optimal or lower level of effort. But because its marginal utility of income is higher in the low-effort case (since the overall net return and hence the corresponding fee are lower in that case), its expected utility will fall more than when its effort is optimal; indeed, in the optimal-effort case, the fall in expected utility is zero to the first-order. Hence, the Agent's incentive constraint will be relaxed, which – given that the fall in the Agent's utility when it exerts optimal effort is (almost) zero – means that the fee schedule could not have been optimal to begin with, and so property (i) is established. For exactly the same reason, if the Centre slightly decreases the number of projects it requires to be terminated after the first period (i.e., slightly increases the number of projects it requires to be completed), starting from the point where (when the Agent exerts optimal effort) no unprofitable projects are continued to completion, the Agent's expected utility will again fall more for low than for optimal effort – implying the same sort of incentive constraint relaxation as before. This establishes property (ii).

That the Agent is induced by the optimal fee schedule not to terminate some projects it expects to be unprofitable is very much in the soft budget constraint tradition. However, unlike formalizations such as that of Dewatripont and Maskin (1995), the 'softness' in the Bai-Wang model is in fact desirable, given the informational constraints, and has nothing to do with lack of commitment ability.

5.3 Market information and soft budget constraints

It is often taken for granted in discussions of privatization that the information free markets generate (e.g., prices) is unequivocally a good thing. Faure-Grimaud (1996) shows, however, that such a conclusion is unwarranted in the context of soft budget constraints; such information can readily make things worse.

Consider a regulated firm undertaking a large investment project whose probability of success depends on (unobservable) effort by the firm's manager. Suppose that the regulator has the ability to divert capital to the firm (in a non-contractible way) to ensure the success of the project. Diversion is costly, however, and so if there is a good chance that the project would succeed anyway,

the regulator will refrain from such action. Indeed, assume that when the manager takes the optimal level of effort, the probability of success is high enough to deter the regulator from engaging in diversion.

But imagine that, owing to privatization, a stock market is created and that the firm becomes publicly owned. Then, in addition to the regulator, there are now many other 'monitors' of the firm's behaviour, namely, its shareholders or potential shareholders. This additional scrutiny is likely to improve the quality of information about the firm. Let us assume, in fact, that the firm's stock market value accurately predicts whether or not the firm's project will succeed. This advance warning enables the regulator to intervene selectively whenever the project seems likely to fail. But the guarantee of having the project bailed out in advance of any failure destroys the manager's incentive to exert effort. And thus the ultimate effect of the stock market may well be harmful to the firm.

5.4 Monopoly

Segal (1998) studies a model in which, in the face of soft budget constraints, a monopolistic producer has the option of making an investment to reduce its marginal cost. Imagine that if it undertakes the investment (which we might as well assume to be costless), its resulting (net) profit π_m^* is positive, whereas if it fails to do so, its profit from continuing to operate is negative. Even so, the monopolist may find it optimal not to make the investment. The reason is that although $\pi_m^{**} < 0$, the corresponding social surplus S^{**} may be positive. In that case, a government that wishes to maximize social surplus will attempt to induce the monopolist to produce. But, since production leads to negative profit, the government will need to provide a subsidy. And this subsidy could well exceed the profit that the monopolist forgoes by not investing. More specifically, the government is, in principle, willing to pay a subsidy up to S^{**}, and if, in the negotiation between the two parties, the monopolist can command a fraction of λ of this figure, then, provided that:

$$\pi_m^{**} + \lambda S^{**} > \pi_m^*,$$

the monopolist is better off not making the investment. That is, it profits from deliberately putting itself in a position of weakness in order to exploit the government.[6]

In this model, the softness of the budget constraint – the willingness of the government to bail out an unprofitable monopoly – leads to two possible kinds of inefficiency. First, there is the allocative loss due to the failure of the monopolist to

[6] In a related model, Wang (1991) shows that granting state-owned enterprises partial autonomy can lead to soft budget constraints and inflation. This is because increased autonomy allows these firms to strategically misallocate their funds, forcing the government to increase spending in their favour. And such spending, if financed by printing money, is inflationary. Brandt and Zhu (2000) develop a similar model and provide some evidence.

invest. Second, if the subsidy is financed by distortionary taxation or inflation, an additional dead-weight loss is sustained. [7]

As in most of the other models we have reviewed, the softness of the budget constraint reflects an absence of commitment ability. If the government could somehow bind itself in advance not to pay the subsidy, the problem would evaporate.

Another way to dispel the soft budget constraint would be to demonopolize the industry. Suppose that instead of a monopoly there are N firms in the industry, each of which can make a cost-saving investment. (Assume, as before, that profit from production is negative if this investment is not made.) Let N^* be the socially optimal number of operating firms (assuming that each of these firms makes the investment), where $N^* << N$. Suppose, furthermore, that if no more than N^* firms invest, each makes a profit of least π, where $\pi > 0$. In this case, the government clearly will not pay a subsidy if N^* or more firms choose to invest. But there cannot be an equilibrium in which fewer than N^* firms invest. To see this, note that any firm that refrains from investing does so because it expects to be subsidized. But such a firm could earn profit π for certain by investing, and, if in equilibrium at least $N - N^*$ firms do not invest, its probability of receiving a subsidy is at best $1/(N - N^*)$. Thus, for N large, it would be better off opting for the sure thing, a contradiction. Of course, the fact that N is large may itself introduce an allocative inefficiency, which must be traded off against the elimination of the soft budget constraint.

5.5 Soft budget constraints and capital structure

Ever since the Modigliani-Miller irrelevance theorem (1958), many theories have been proposed to explain why a firm's capital structure should matter after all, and, in particular, why the debt/equity ratio is pertinent. One line of work argues that debt is more effective than equity in disciplining managers, and its logic once again turns on soft budget constraints.

Hart and Moore (1995) provide a prime example of this line. In their model, there is separation of ownership and management. The company's capital structure is chosen at date 0; an investment decision is taken by managers at date 1; and funds are paid out to investors at date 2. It is assumed that managers have a strong private incentive to invest as much as they can regardless of the return. The firm's value as a going-concern is more than its liquidation value, but the company's date 1 earnings are not sufficient to finance the investment internally. Hart and Moore show that the optimal level of short-term debt is zero. However, long-term 'hard' debt is important in limiting managers' ability to raise new funds. By 'hard' debt is meant debt that is not renegotiable. With too little hard debt, managers would overinvest by borrowing. However, with too much hard

[7] In a recent paper, Che (2000) argues that refinancing can result from the government's caring about negative externalities from closing down loss-making firms. He argues that, from this point of view, refinancing can be beneficial, since it serves to 'internalize' the externalities.

debt, managers would underinvest because the company would be over-mortgaged. Hart and Moore show that the optimal capital structure of a firm is determined by this trade-off. To ensure that hard debt is non-renegotiable, they assume that the number of debtors is large, which renders renegotiation costly because of free-rider and holdup problems among debtors.

Within an optimal contracting framework, Bolton and Scharfstein (1996) analyze the optimal number of creditors a company should borrow from, the optimal allocation of security interests among creditors, and inter-creditor voting rules that affect renegotiation of debt contracts. They argue that the debt structure affects the outcome of debt renegotiation following a default. Debt structures that lead to inefficient renegotiation are beneficial from an *ex ante* point of view since they deter default (impose a hard budget constraint). As in Hart and Moore (1995), the key to hardening budget constraint is a multiplicity of debt holders, who make *ex post* negotiation costly. Specifically, the number of creditors determines the pay-off of the firm when there is renegotiation. The authors show that firms with very high or very low credit quality may be better off with multiple creditors; intermediate firms are more likely to gain from having only one creditor.

Povel (1995) also captures the idea that multiple-bank financing can make renegotiation more difficult, thus rendering the threat of liquidation more credible. In this model, which is similar to that of DM, two banks will bargain over the refinancing a project that they have jointly financed. Because the bargaining process may drag on for too long, renegotiation may ultimately not be worthwhile.

6. Soft budget constraints in banking, financial crises, and central banking

6.1 Soft budget constraints, bankruptcy rule and financial crises

Various authors (e.g., Krugman, 1998) have argued informally that certain financial policies, such as bailing out firms and banks and providing government guarantees to private investment, had much to do with the East Asian Financial Crisis that began in 1997. As we have seen, such policies are intimately connected with soft budget constraints. Indeed, some Korean economists explicitly use the term ‘soft budget constraint’ to describe the recent financial problems in Korea.

Huang and Xu (1999a) provide a formal theory to explain financial crises from a soft budget constraint point of view. In this model, there are many banks, each of which receives deposits and invests these in projects. Banks rely on the interbank lending market to ease liquidity shortage problems when they face liquidity shocks. There are numerous depositors who, as in Diamond and Dybvig (1983), are divided between early consumers (those who consume only at date 1) and late consumers (who consume only at date 3). *Ex ante* all depositors are

identical in that they do not know their own types until date 1 and make their deposit decisions *ex ante*. There are many entrepreneurs who have innovative ideas, but have to rely on banks to finance their projects. Any project proposed by an entrepreneur can be either unprofitable *ex ante* – a bad type – or profitable *ex ante* – a good type. A project's type, however, is not known to an entrepreneur until date 1; and is not known to the bank(s) until date 2, after the earlier investments are sunk. A bad project will generate no return as originally constituted, but has the potential to generate an *ex post* profitable return if 'reorganized' at date 2 using the right strategy. But for the investing banks to find the right strategy, they need to pool their private information as in HX (1998).

From HX (1998), an economy in which all projects are financed by multiple banks will face hard budget constraints. In contrast, an economy in which projects are financed by a single bank (or co-ordinated via a single agent – the government or the main bank) will be subject to soft budget constraints.

In both soft and hard budget constraint (HBC) economies, every bank stores the optimal amount of cash to meet expected early consumer withdrawals. The interbank lending market is an instrument for banks to avoid bank runs when some of them face idiosyncratic liquidity shocks, i.e., excess early withdrawals. In an HBC economy, a bank stops any bad project it has funded at date 1, and the termination is observable by other banks as well. Given this common information, a bank with a good project has no problem borrowing if it faces excess early withdrawals. And so bank runs do not occur.

In an SBC economy, project types are not publicly known because bad projects are not terminated. Thus when a bank faces liquidity shocks and needs to borrow from other banks, potential lenders assume that its investment projects are of only average quality. This raises the cost of borrowing. Therefore, when a liquidity shock is severe enough, even banks with good projects can be pushed into liquidation. Anticipating this, depositors may be induced to make further early withdrawals. Such a bank run contagion can lead to the collapse of the lending market.

In another paper, Huang and Xu (1999c) show that, under an institution, soft budget constraints prevail, depositors are more likely to herd to overinvest when there is no bankruptcy ('frenzy'); and they are more likely to herd to panic when bankruptcy occurs ('crash'). Moreover, soft budget constraints may result in excessive bad loans, thus exacerbating the macroeconomic situation. The bad loans will lead to the eventual inevitability of bankruptcy for some banks, which will then trigger a crash. In comparison, in an HBC economy, there will be a swift information flow from the firms and the banks regarding liquidation. Then, better-informed investors are less likely to herd wrongly.

Bai and Wang (1999) study how government insurance of risky projects can increase the risk facing an economy. Although insurance rewards the investors in these projects, this comes at the expense of those investing in safer projects. The result will be over-investment in risky projects and an overly risky economy-wide portfolio.

Rochet and Tirole (1996) study how interbank lending itself can create soft budget constraints. Imagine that bank A is in distress and that, according to the interbank agreement, bank B is supposed to lend to it. Such a loan may leave the lender insolvent, requiring rescue by the central bank. But the prospect of this rescue will dull bank B's incentives to monitor the bank A.

One relatively unexplored question is the bearing of soft budget constraints on the optimality of different bankruptcy procedures. In US bankruptcy law, for example, there are both 'tough' procedures (Chapter 7, liquidation) and 'soft' procedures (Chapter 11, reorganization) with respect to debtors. It has been documented that Chapter 11 has given rise to SBC problems. Specifically, it apparently weakens the bonding role of debt (Aghion, Hart, and Moore, 1994), and protects poor managers (Bradley and Rosenzweig, 1992). Some proposals for reforming Chapter 11 bankruptcy procedure have been proposed (Aghion *et al.*, 1994). However, these have focused mainly on improving the *ex post* efficiency of the procedure. The effect of such improvement on *ex ante* incentives (the heart of the SBC problem) remains to be analyzed.

Mitchell (1993) shows that soft budget constraints may arise from creditors' reluctance to force debtors into liquidation. One reason for such passivity she argues, may be bank managers' desire to guard their reputation. Assume that a bank's solvency is a signal about its manager's competence. If the bank's balance sheets are private information, but if liquidation is public, then the manager may have the incentive to forestall default by rolling over debt even when this is *ex post* inefficient.

Mitchell (1998, 1999) proposes another reason for creditor passivity: a banker may choose to rollover bad loans if he believes that the government will rescue him. In turn, the government may not be able to commit not to bail out insolvent creditors if there is large number of them.

Mitchell (1998) calls this failure of government commitment the 'too many to fail' (TMTF) syndrome. She argues that if a bank has private information about its projects, then when it is closed, the cost of financing its projects will increase because this information is lost. If the number of bank failures is high, the informational cost to the economy may be severe. Indeed, it may exceed the cost of keeping the banks operating. This scenario can create soft budget constraints. Specifically, a troubled but solvent bank may roll over loans to defaulters with the understanding that others are doing the same thing and that the government will bailout all banks to avoid TMTF.[8]

Mitchell draws the policy conclusion that, if the government expects banks to behave in this way, it may wish to 'relax' its oversight, for example, to reduce its *ex ante* monitoring capacity. As a result, fewer banks will be classified as insolvent, and the risk of TMTF will be reduced *ex post*. In turn, fewer troubled banks will rollover loans, and so, firms' budget constraints will be hardened.

[8] In fact, a bank may rollover a loan to a bad project even when refinancing it is *ex post* inefficient.

6.2 Central bank as the lender of last resort

When there is financial-market failure (e.g., a failure of the interbank lending market), it may be desirable for the government to step in and provide liquidity to prevent bank run contagion. Goodhart and Schoenmaker (1995) show that in recent years a high percentage of failing banks have been bailed out by central banks.[9] But bailing out illiquid banks is costly. The cost of bailout has reached 30 per cent of GDP for Japan and 27 per cent in the case of Mexico (Freixas, 1999), bringing the central banks' roles as lender of last resort (LOLR) into serious question.[10]

The first detailed scheme of having a central bank operate as the LOLR was proposed by Bagehot (1873). The Bagehot rules emphasize that a central bank should lend only to solvent but illiquid institutions (such as those with good collateral). Obviously, this is designed to curb financial institutions' proclivities toward moral hazard. In our language, the Bagehot rules amount to requiring that the LOLR should not create a SBC.

Following the Bagehot logic, non-interventionists argue that LOLR bailouts distort the incentives of bank managers and lead bank managers to excessive risk taking (Goodfriend and King, 1988; Humphrey, 1989; and Schwartz, 1995). To avoid the SBC problem, they argue the LOLR should intervene only at the macroeconomic level through open market operations. Their critics retort that a bank's bankruptcy generates externalities, such as bank-run contagion; and so bailing out banks may after all be efficient (Mishkin, 1995; Santomero and Hoffman, 1998; Freixas, 1999; Freixas, Parigi and Rochet, 1998). Moreover, the Bagehot rule of lending only to solvent banks is often not implementable because solvency is difficult to determine. Indeed, Goodhart (1995) contends that in most cases it is impossible to distinguish illiquidity from insolvency. Moreover, it is also debatable whether the central bank should confine its bailouts to solvent banks, since as Goodhart and Huang (1999) argue, letting even insolvent banks go under may trigger bank runs. Indeed Goodhart and Schoenmaker (1993) make the case that it is really only insolvent banks that need LOLR anyway.

Goodhart and Huang (1999) suggest that one way to limit the SBC problem if the central bank acts as LOLR would be to restrict bailouts to very large banks. That is, a too-large-to-fail (TLTF) policy may be optimal. Freixas (1999) argues instead for a 'creative ambiguity' approach: bailing out banks randomly.

Huang and Xu (1999a) argue that although the TLTF policy may be optimal when restricted to short-run and narrowly defined problems, it may lead in the long run to inefficient bank mergers, which could be dangerous. Indeed if every bank was large, they would all qualify to be bailed out by the TLTF doctrine, giving rise to an aggravated SBC problem. Thus, Huang and Xu (1999a) argue, the

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[9] In their sample of 104 failing banks, 73 were rescued and only 31 were liquidated.

[10] The actions of the central bank as a lender of last resort in several grave financial crises, e.g., the US Saving and Loans crisis, Mexico's 1994 crisis, and the failure of Credit Lyonnais and the Long Term Credit Bank of Japan, have been widely criticized.

optimal LOLR policy should not be separated from the reform of financial institutions.

7. Financial institutions and economic growth

New growth theory (Aghion and Howitt, 1992; Lucas, 1988; Grossman and Helpman, 1991; and Romer, 1990) has served to endogenize the process of technological change. However, in most models, the influence of institutions on incentives to innovate has been ignored.

Huang and Xu (1999b) provide a theory to examine how financial institutions affect technological innovation and growth. In their model, consumers (and investors) live infinitely long. In each period, a small proportion of consumers generates innovative ideas; some consumers randomly become entrepreneurs but none continues in that role for more than one period. A period consists of three stages, the length of time it takes to complete a project.

Firms produce outputs from two activities: conventional production and R&D. Conventional production is riskless and gives rise to no asymmetries of information. Thus banks play no active part in conventional production, except to provide capital – just as in most growth models. However, banking institutions have a more complicated role in R&D.

The production of a representative firm has an AK technology:

$$y_t = \left[(1-\alpha_t)\overline{A} + \alpha_t \tilde{A}\right] k_t$$

where $\overline{A}$ and $\tilde{A}$ are productivity coefficients for production and R&D respectively; α_t is the share of investment in R&D; and k_t is the capital to labour ratio. In this one good economy, capital can be consumed or invested; depreciation is subsumed in the productivity coefficient. Not surprisingly, equilibrium investment in R&D will increase and the growth rate will rise, if the expected return from R&D rises or if its variance decreases.

The nature of R&D outcomes depends on financial institutions. An R&D project requires three stages to complete. Let I_j be the investment required in stage j and denote that $I_d = I_2 + I_3$. Let X and Y be the returns of bad and good projects respectively, $Y > I_1 + I_d$ and $I_3 < X < I_d$. In an SBC economy, all R&D projects will be completed, and thus the mean of the net pay-off of an R&D project is, $r_s = \left[(1-\lambda)X + \lambda Y\right]/(I_1 + I_d) - 1$, where λ is the proportion of good projects. In an HBC economy, by contrast, all bad projects are liquidated at stage 1, and so the mean of the net pay-off of an R&D project is, $r_h = \lambda Y/(I_1 + \lambda I_d) - 1$. Because bad R&D projects are not liquidated, an SBC economy amplifies the impact of bad R&D outcomes. Thus, the variability of R&D outcomes in SBC and HBC

economies differs. In particular, when uncertainty is high, variation is larger under an SBC economy. In this case, the distribution of R&D outcomes in an SBC economy is worse than that in an HBC economy.

Soft budget constraints not only constrain the efficiency of R&D projects, but also deter investors from investing into R&D. In the long run, this will reduce economic growth in an SBC economy. However, HBC are not always unambiguously better. Before an economy reaches the frontier of economic development, its R&D may entail mainly imitating technologies from successful economies. In this case, uncertainty will be comparatively low, and an SBC economy will be preferable.

This prediction is consistent with the trajectory of many East Asian economies, which fared very well during the period in which they were catching up with the West but which later ran into trouble after they reached a technologically more advanced stage of development.

8. Conclusions

Janos Kornai's pioneering work identified the soft budget constraint syndrome as a fundamental problem in centralized economies. We now know that the same is true for transitional economies. And, although market economies seem less vulnerable, even they have not escaped the syndrome. From the theoretical point of view, research on the soft budget constraint is not only highly relevant to economic policy in transition economies, it also bears on major issues in economics more generally, such as the capital structure of a corporation, the boundaries of a firm, banking and finance, and growth.

In this paper we have proposed a common conceptual structure for all these seemingly disparate subjects. We hope that this may provide some common ground for theoretical economists and regional specialists. Mainstream economists, we trust, will see the survey as a useful introduction to the soft budget constraint phenomenon. And specialists in transition economies perhaps can exploit our analytical framework to assist their thinking about the thorny but fascinating issue of soft budget constraints.

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