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Delegation and Delay in Bank Privatization[1]

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Abstract

The paper explains why bank privatization in transition economies is frequently delayed in comparison to privatizing non-financial firms. In the model, the government inherits a distressed bank with bad loans to a representative non-financial firm. The firm will only abstain from wasteful opportunistic behavior if there is a credible to signal that its future budget constraint will be hard. If the government takes over the state-owned bank directly or recapitalizes and privatizes it immediately, then signaling leads to excessive liquidation. Delay in privatization allows to delegate the signaling and can be beneficial because the signaling distortion can be shifted across "types". The analysis assumes a political constraint to sell the state-owned bank to a domestic investor (shallow pockets), but shows also that a Pareto improvement can typically be achieved if a buyer with a deep pocket can be found (foreign investor). Policy implications concerning timing and scope of bank privatization are discussed.

Key words: Bad loans, delegated signaling, delayed recapitalization.

JEL classification: G21, P21, P34, P41, P43.

1. Introduction

It is a notable fact that bank privatization has been substantially delayed in all of the the transition economies of Central and Eastern Europe, at least in comparison to the large-scale privatization of non-financial enterprises. The five most advanced Central European economies, namely Hungary, Slovakia, the Czech Republic, Poland and Slovenia, may serve as an illustration representing also the other countries. [2] In Poland and in Hungary, bank privatization programs were launched only in 1995. In Hungary, where the process is well under way, the sale of ailing banks to foreign owners can still cause public anxiety or stir a political row, just as in Poland where problems were exacerbated by scandals surrounding bank privatization (see Abarbanell-Bonin (1997)). In the Czech Republic, banks were initially part of the voucher privatization and the state kept a controlling majority of the large bank even through the second wave. The Czech government has only very recently announced that it is willing to sell its largest domestic banks to foreign owners and only now are bank failures on a larger scale acknowledged. In Slovenia, there is a general impression that banks' financial assets have been successfully cleaned up and banks are sound; still, bank privatization has yet to see the day. In Slovakia, no plans for the privatization have yet been publicly announced. Instead the government has announced a plan for saving enterprises in trouble through a centralized consolidation fund. Looking at the picture as a whole, two observations stand out: first, while bank privatization is now at different stages across these countries, bank restructuring and privatization is everywhere delayed relative to the restructuring and privatization of industry and services. Second, there was and is a general hesitation to have foreigners take controlling stakes in banking firms or in the financial sector in general.

There is a general view now that a swift and prompt restructuring of banks in distress is desirable. Delay in bank restructuring is seen as creating additional costs, for example do to distorted incentives for the management of a distressed bank. Recent evidence from Western countries with banking crises seems to confirm this

[2] See Bonin (1995) for the Visegrad countries and the August 1997 issue of Journal of Comparative Economics.

view both in the case where this prescription has been followed (Finland, Norway, Sweden and perhaps Spain) as well as when it has been ignored (France, Italy, Japan).

This seems to hold *a fortiori* for transition economies. If it is true that the most devastating deficiency of the preceding socialist system was that firms were laboring under the conditions of the soft budget constraint, then establishing efficient and strict financial entities should have been set up immediately.

With respect to transition economies, several authors have argued in this sense. Mitchell (1994), Perotti (1993), and Bergloef and Roland (1995, 1997) all sketched scenarios in which banks dealing with enterprises during the transition may find it worthwhile to extend loans for bad projects in order to force out subsequently support for themselves. In these models, two soft budget constraint situations are stacked into each other: the firms try to create a fait accompli for the banks which in turn attempt to blackmail the government to bail them out.

The question is then why, in spite of these arguments, delay in bank privatization is so wide-spread a phenomenon in transition. This question has not been addressed in the theoretical literature. This paper tries to fill the gap. The purpose of this paper is to present a formal theory explaining why delay in bank privatization may be less costly than conventional thinking suggests, or may even be beneficial. The paper also assembles elements towards an analysis of the optimal privatization policy, notably relative to timing and scope. The paper addresses also the question of foreign versus domestic ownership of privatized banks.

In the non-formal transition literature, the most prominent explanation for the actual delay in bank privatization points to scarcity of resources and, ultimately, to a political constraint of domestic ownership: countries were very reluctant to opening their financial institutions to foreign ownership. Given this constraint, the capital and the human resources for large-scale bank privatization were absent on the domestic market, ad therefore there was no option other than to put bank privatization on hold. But there are also strictly economic arguments in favor of delay which would hold absent the restriction to domestic ownership: the peculiar features of a banking firm,

like the exacerbated moral hazard problems of highly leveraged firms and the need to obtain information, in particular information relative to the performance of loans and the quality of clients' account, which becomes only available as the restructuring of the non-financial sectors proceeds are among the economic explanations. Moreover, banking operations comprise always some public goods character of a certain sort. A stable banking sector is undoubtedly vital for an economy in transition. In the past, this has become very transparent in many countries when bank failures lead to forbearance or during times of banking crises with the risk of contagion.

In each of the three original Visegrad countries, commercial banks were initially created out of the former central mono-bank, according fairly arbitrary dividing lines which differed from country to country. In Hungary, commercial banks were developed according to sectoral lines, in Czechoslovakia according to functional divisions, and in Poland according to territorial reasons. The shortcomings of these carve-ups, together with the prevalence of monopolies and vertically integrated market arrangements, led to several crises in the banking systems of CEE.

The case of Hungary will serve as an example here. Four elements deserve attention. First, the restrictive monetary policy adopted in that country right at the beginning of the transition induced a crisis called "queueing" there, which should be rather called a wave of forced trade credit among enterprises.[3] Even though most firms were threatened to be cut off from further financing in case of default, some of them were successfully evading this pressure by not paying for supplies from their smaller trading partners. This generated an economy-wide credit crunch, and the ultimate source of delinquency in payment was difficult to ascertain. The crisis was resolved by a consolidation of the accounts of the firms involved. Second, an extraordinary episode in bankruptcy management followed: enterprises were called upon to file for bankruptcy (meaning liquidation) at the newly established bankruptcy courts if they had been unable to meet the payment requirements for three months. The ensuing chaos in the inexperienced and fragile bankruptcy courts was concluded by the termination of this approach to restructuring. Third, since the essentially state-owned commercial banks inherited a large portfolio of bad loans from its ancestor

[3]This crisis is by now very well-documented (see Bonin and Schaffer (1995)).

mono-bank in 1987, prudent lending on their part was much jeopardized. Their balance sheets were burdened by the these loans; it has been argued that they did not, and do not, mind this situation since having a business relationship with the non-performing firms gave them a good bargaining relationship with the Treasury and the Central Bank. A "consolidation" program was finally launched in early 1993, providing capital injections in order to cover bank losses from the bad loans. The idea of creating a Consolidation Bank, aseparate fund for the financial management of the bad assets loans, was rejected. Finally, the existence of firms with chronic insolvency was still a major concern for economic policy makers in 1995 (the year of starting "serious" bank privatization). This was indicated by the first pledge in the inaugurating speech of the new Finance Minister, stating that consolidation of the accounts of persistently loss-making firms will not continue.

In Hungary as elsewhere, there seem to be three reasons for eventually launching a program of bank privatization: the accumulated experience about the characteristics of product-market operations in transition, the improvement of the performance of non-financial enterprises, and the experience with banking during this time. These reasons are taken up in the present theory of optimal delay.

Our model is placed within the context of the theory of the soft budget constraint. In our model, firms and banks are initially in equal need of restructuring. The restructuring of firms leads to ensuing soft budget constraints which are prominently discussed in the literature and well-documented in practice. In the model, whether the budget constraint would be soft or hard in the future depends on the opportunity costs of the financier which are initially unknown and become later on private knowledge of the financier. If the budget constraint will be hard, the financier has every interest the signal this to the firm to prevent it from costly opportunistic behavior. As is well-known in micro-economics, signaling in an environment of asymmetric information is costly. We assume that if the financier will have a hard budget constraint in the future, she will attempt to signal this with a rigid restructuring policy earlier on, implying excessive liquidation. The East German case, in spite of all peculiarities, could serve as an example of such excessive liquidation in order to signal determination to a certain course of action in the future.

We consider the following policy options: First, the government can take over the bank directly and handle its financial affairs directly. Second, the government can recapitalize and sell the bank immediately. Third, the government can wait until enough information has arrived so that the sales contract of the bank can be written conditional on the restructuring policy that the bank will adopt, ad recapitalize and sell the bank upon arrival of this information. Moreover, we consider two types of investors: domestic investors have shallow pockets and can therefore not make losses when acquiring the bank. Foreign investors have enough capital to assume losses, but are willing to assume such a risk only if it is offset by sufficient profit opportunities. Thus, there are five options in total.

The main proposition shows that in a signaling environment, in can actually be beneficial to have the signaling done through an agent rather than through the government itself. We interpret delay in privatization as such a delegation of signaling, with the following interpretation: the government waits with privatizing banks until the different scenarios of financial opportunity costs have become sufficiently clear so that they can be impounded in the contract by which the bank is sold. The advantage is that the signaling distortion can be shifted across "types" of opportunity costs; the more likely the government believes it to be that a hard budget constraint has to signaled, the larger is the benefit from delegation. The second proposition shows that a better allocation can be achieved if privatization is optimally delayed and the buyer has a deep pocket.

Concerning domestic versus foreign ownership of privatized banks, we find that imposing a constraint to domestic policy is a strictly dominated policy. The model identifies the cost of a domestic ownership bias in transition which is important both int the strict economic context as well as in the wider Political Economy environment of the economics of transition.

As to existing literature, this paper draws much inspiration from work on the theory of the soft budget constraint. Our model describes a firm be able to start a socially wasteful project without fearing thatits financier would cut back the financing of this project ex post. Such opportunism can be successful if the firm brings the

project beyond the "point of no return" where it is too costly for the financier to stop providing new funds ex post, even if ex ante the financier would have wished to not enter the relationship at all. This approach to the soft budget constraint was pioneered by Lindbeck and Weibull (1987). They investigate situations where one party can create a *fait accompli* featured as a Markov-state: in order to be successful, the first party has to increase the likelihood that a state is brought about in which the second party will find it in its interest to embark upon the action most favored by the first party. While Lindbeck and Weibull were mostly concerned with issues in public economics, Schaffer (1989) constructed the first Markov-model of the soft budget constraint.

Other related models of the soft budget constraint include notably the seminal model of Dewatripont and Maskin (1995) as well as the papers on the dual soft budget constraints quoted earlier which build on Dewatripont and Maskin (1995). Qian (1994) uses the model of Dewatripont and Maskin for the examination of the erstwhile socialist economic system by arguing that one way of discouraging firms to attempt forcing out the refinancing of their inefficient projects ex post is to deprive them of certain inputs ex ante Our contribution is also related to the more conceptual, policy-minded papers on the soft budget constraint like Begg and Portes (1992), Kornai (1995), Bonin (1995), Anderson, Berglöf and Mizsei (1996) and Schaffer (1997). The relationship to specific contributions in this heterogenous literature is pointed out intersparsingly.

The paper is organized as follows. The model is set up and the second period game is solved in Section 2. Section 3 looks at the first best. In Section 4, centralized financing is analyzed. In Section 5, we investigate decentralized financing. Section 6 discusses an interesting result if a deep pocket taker for the state investment bank can be found. Section 7 concludes.

2. The model

2.1. Simultaneous firm and bank restructuring

At the beginning of the transition, an enlightened government finds itself with a difficult inheritance: the handling of the financial affairs of a problematic industrial firm which represents a large and inefficient firm. In the socialist past, the firm has been financed by the state investment bank. The reason that the government has inherited the problem of this firm is that the state investment bank itself is run-down. Thus, the government has the double inheritance of both an outdated firm and its financier in need of recapitalization.

The state investment bank starts with the following balance sheet: there are deposits on the liability side with a total value of L. These deposits must be honored under all circumstances. On paper, everything looks fine because there are assets worth D in the books of the state bank and $D = L$. In reality, however, these assets represent "bad loans".

These bad loan risks are represented by the single firm that we consider here. It has an inflated park of assets and personnel and needs to be restructured to recover. This firm owes D to the bank. We assume that the firm is *insolvent*, i.e. the value of its debt exceed the asset value.[4] This implies that the financier can recoup all of the remaining firm value (via a standard bankruptcy procedure, say). The firm has assets A which can be liquidated or be brought to productive use. Piece-meal liquidation is possible. Suppose a fraction R is liquidated. Then the remaining part $A - R$ will be in productive use and produce an output worth $y(A - R) = (A - R)R$ where the quadratic form of the production function is chosen for simplicity.

The liquidation value of the liquidated assets is initially unknown. There are two possible scenarios for the capital costs of the financier; if the capital costs are high,

[4]Formally, the assumption that the firm is insolvent amounts to the condition that $D > \max_{i,R}\{(A - R)R + c_i R\}$.

then liquidating a fraction R now rather then later yields proceeds of $c_H\ R$; if the capital costs are low, then liquidating a fraction R yields proceeds of $c_L\ R$ where $c_H > c_L$. The prior probabilities of the low liquidation costs is θ and for the high liquidation costs it is $1-\theta$. The type c_i is, at the beginning of the first period, learnt by the party who is the holder of the claim D. c_i is private information.

As for the timing, there are three periods in total. In period t_0, the government decides which of the three restructuring options to choose. In all these scenarios, the government, the firm and its generic financier interact for two periods, t_1 and t_2. In the first period, the financier - whose identity depends on the restructuring option - inherits nominal assets[5] worth D which, via the imminent bankruptcy threat for the firm, carry the right[6] to manage assets of value A belonging to the firm. The financier then makes the decision on firm restructuring. She decides what amount R of the assets A should be liquidated, i.e. be put into another use. Financiers are distinguished by the return they may get from liquidated funds. For the more efficient type, liquidation yields c_H per unit, while the less capable one expects to get c_L per unit, where $c_H > c_L$ holds of course. In t_0, the liquidation cost type c_i is unknown to everyone. In t_1, the type c_i becomes privately observable for the financier and it remains private information into period t_2 unless there is signaling of the type.

Below, we focus on the choice of the government concerning whether she should continue to finance this firm *directly*, or should *delegate* this task, either to an ordinary commercial bank or to a state bank. In the *direct* case the model is already fully specified. In the *indirect* case, we suppose that there is a delegate or agent bank who bears all the relevant payoffs as described above. Also, the delegate bank is now the financier having private information about c_i in t_1. That is, the government cannot observe the underlying cost conditions of the financier in this decentralized scenario.[7] The delegate bank may also receive transfers $T(R)$ which can be specified

[5] We presume that this is a legacy from a previous debt contract. Even in socialism, debt contracts were in place.

[6] Or rather, from the government's point of view, the obligation because of the soft budget problem explained below.

[7] This assumption relates in a formal sense our model to the delegated signaling literature (Caillaud and Hermalin (1993)).

as a function of the liquidation amount R. $T(R)$ denotes then the *gross* transfer to the delegate or agent running the bank which includes notably any cash injection to recapitalize the bank (necessary to find a taker willing to assume liabilities of D) and any incentive payments. We suppose that $T(R) \geq 0$ which has the following rationale: the delegate bank is the residual claimant having full discretion over the firm's assets. The government has no legislation whatsoever to command to the delegate bank what to do with the assets, it can however, like anyone else could, try to buy its way into the bank's decision by bribe. Acceptance of such a bribe is completely voluntary which explains why $T(R) \geq 0$. Given that there are only two types, a complete menu of such transfers inducing a separating equilibrium on the part of the delegate bank's strategies can be characterized by a menu (T_L, R_L, T_H, R_H) where the firm chooses a transfer/restructuring pair (T_i, R_i) according to its type $\tilde{c}_i$. We will call this menu, as is usual in the theoretical literature, a *contract*. We assume that a contract cannot be proposed in t_0, but only in t_1. This may capture some uncertainty as to the possible states of nature which is resolved between t_0 and t_1. The contract with the bank cannot be renegotiated at any time of the interaction.

In the subsequent sections, we will notably consider the following three options for the government in t_0: either it can take over the handling of the firm's financing directly and deal with the bad loan problem separately. We call this scenario the *centralized case*. On the other hand, the government could delegate or *decentralize* the restructuring of the firm. It could either restructure the state investment bank first so as to transform the latter into a regular commercial bank. This restructured bank would then deal with the restructuring of the firm like any good and mean capitalist bank. We call this route the *recapitalization* solution. Finally, the bank restructuring can be delayed in that the bank is recapitalized later on. We call this option the *delayed privatization* scenario. Moreover, we consider two types of buyers: either there is policy restriction that the buyer of the state-owned bank be domestic. In this case, we assume that the buyer has too shallow a pocket to assume future losses of the bank. Or such a domestic buyer restriction is absent. Then we assume that a buyer with a deep pocket can be found.

In the Dewatripont and Maskin model, the scenario when the government assumes

the task of dealing with this firm directly does not differ from a scenario in which it would hand over or sell the property rights in the commercial bank. This is one reason why we call the first scenario (that of directly financing the firm) as the centralized case, irrespective of whether the actual financing activities are run by a state-owned consolidation bank or a privatized bank. Its alternative (the scenario when a delegate handles the firm) can be referred to as the decentralized case.

2.2. The second period game

After the restructuring decision in t_1 is made, the firm will continue to operate. As we will argue next, the second period is characterized by a soft budget situation. Right after the beginning of the second period, the firm makes a decision whether it would launch an additional project, which is known to be undesirable from the point of view of the government, i.e. from the social point of view. Let us denote the action of starting the project by a; if the project is launched then we have $a = 0$, if the firm abstains from it then we have $a = 1$. However, the leadership of the firm can reap some private (and non-contractible) benefit B from the project only if the infusion of an additional and fixed amount of money can be induced on the part of the financier of the firm. If for some reason this fails to happen, then it is not worthwhile for the management to attempt the pet project venture at all.[8]. Recall that the firm does not directly observe the cost conditions c_i of the financier in t_1 are when it makes its decision about whether it should launch the parasite project or not. In a separating equilibrium, though, it can deduce this from the restructuring decision R_i of the financier. We stick to the rationality assumption throughout, so the firm is thought to be capable to make such inferences.

We assume that at the beginning of the second period, under all circumstances, the financier needs to put up a sum of $F > 0$ to enable the continuation of the activities of the firm. This will, *ceteris paribus*, lead to a return of $\alpha > 0$ at the end of the period, where $\alpha > F$ holds. If the pet project is actually launched, the firm'

[8]This assumption is so well analyzed by now in the incomplete contracts literature that we do not need to formalize it further (see Grossman and Hart (1986)).

value is damaged by an amount d; where $\alpha - d - F < 0$. On the other hand, if the financier does opt for refinancing, that will lead to an additional *net* return of $\beta > 0$. However, it is also the case here that the financier has other potential projects to deal with, and by the time she deliberates on whether the firm should be refinanced it also contemplates spending its resources on other deals. Specifically, we assume that the efficient financier has an opportunity to gain $c_H G$ from this alternative use of its funds; while the less efficient one could get $c_L G$ from this opportunity. Further, the following condition holds:

$$c_H G > \beta > c_L G$$

Note that the decision between refinancing the firm and spending on the alternative project amounts to a discrete choice, the financier will not wish to do both (irrespective of is type), due to our assumptions. Our last hypothesis is that

$$G((1-\theta)c_H + \theta c_L) < \beta,$$

which means that if the firm does not know the type of the financier than it will expect to be bailed out. The characteristics of the second-period interaction have now been specified.

The following claim summarizes then the possible outcomes of the second period game:

LEMMA 1: *The high liquidity financier c_H will refuse to refund the project and the low liquidity financier c_L will accept to refund the project. Therefore if the firm knows the type of the financier, it will launch the pet project if and only if the financier is of low efficiency. If the firm does not know the type of the financier, then it will not launch the pet project.*

In fact, Lemma 1 highlights that our second period problem is a simple form of a soft budget constraint (SBC) model based on adverse selection. Comparing to the classical SBC model of Dewatripont and Maskin (1995), the main difference is that their financier finds it worthwhile to bail out the firm whenever it has sufficient funds for such a move. Exactly as they do, we assume there does *not* exist any

contractual remedy against the firm pursuing a destructive project in anticipation of being bailed out. Just as in their case, the theory of incomplete contracts provides the back ground justifying this assumption. Our model, like theirs, conceives of the soft budget constraint as an instance of time inconsistency. It is instructive to note, though, that our model differs drastically in its predictions. To see the difference, if we were to add an assumption that the size of a financial intermediary is correlated with its efficiency of providing liquid funds, then our result is the opposite of the conclusion of the DM model: larger banks are better in credibly discouraging firms to undertake spurious projects. We do not claim, however, that any of the two models possesses enough conceptual richness to arbiter in the issue of whether large or small banks are better in handling soft budget constraint situations. But we can safely say is that high liquidity banks may just as well be capable of dealing with this kind of a situation than low liquidity banks.

We can now introduce a convenient notation for the outcome of the second period interaction. If the firm avoids undertaking the pet project, then the return from the second period for the government is $I_i = \alpha + c_i G - d - F$, $i = L, H$ (where the symbol I suggests that the favorable outcome is *Implemented*). For the better type, this becomes $I_H = \alpha + c_H G - d - F$. On the other hand, if the firm goes for the opportunistic move, then the return to the government is $\pi_i = N_i$, $i = L, H$ (the favorable outcome is *Not* implemented). Denote then the return for the low efficiency government (the financier) in this contingency as $N_L = \alpha + \beta - d - F =< 0$.

Specifically for the second-period interaction in a *separating equilibrium*, we denote the generic return from by π_i where the subscript refers to the type c_i which is truthfully revealed. As it turns out, in a separating equilibrium, only differences between N_i and I_i will matter and we therefore normalize $I_H = 0$. I_H can therefore be dropped from most of the analysis, and the single variable $\pi_L = N_L < 0$ is enough to represent the second period game as it is anticipated earlier on.

3. The full information case

Let us then turn our attention to the first period interaction between the financier and the firm. We begin with the full information case, i.e. there is no information problem concerning c_i. As it has been stated above, the financier has an opportunity/right to liquidate an amount R of the total assets A of the firm available at the beginning of the first period. Recall that the first period payoff of the financier is specified then as

$$(A - R)R + c_i R$$

where $i = L, H$. This payoff points to a trade-off between leaving assets at the firm and putting them into other uses. We have seen that this payoff will be conditional of the perceived type of the financier at the time when the firm decides upon launching the pet project. Then there is clearly an incentive for the high efficiency financier to signal its type by its first-period action in order to influence the future action of the firm. This is because according to our assumption the adoption of the parasite project harms the financier *ceteris paribus* and because the efficient type can discourage the undertaking of a spurious project if only it can convey its type to the firm.

The government, after observing that capital costs are c_i, would liquidate

$$R_i^* = \arg\max_R \{A - R)R + c_i \; R = \frac{A + c_i}{2}$$

The financier would then recoup a profit of

$$P_i^* = (A - R_i^*)R_i^* + c_i \; R_i^* = \frac{(A + c_i)^2}{4}$$

The government's ex post utility is:

$$W^{FI} = \begin{cases} (P_L^* + \pi_L & \text{if } c_i = c_L \\ P_H^* & \text{if } c_i = c_H \end{cases}$$

and the ex ante utility of the government can be determined as:

$$\begin{aligned} EW^{FI} &= \theta(P_L^\circ + \pi_L) + (1-\theta)P_H^\circ \\ &= \theta\frac{(A+c_L)^2}{4} + (1-\theta)\frac{(A+c_H)^2}{4} + \theta\pi_L \end{aligned} \tag{1}$$

Naturally, the government's expected utility decreases in $\theta\pi_L$, the expected SBC loss. It is interesting to note that the government's utility increases in the cost difference $c_H - c_L$.

4. Centralized financing

Let us next consider the case when there is centralized financing. There are two cases to consider: either the government does the restructuring itself. Or it sells of the liabilities and the assets of the bank immediately to a *foreign* investor with a deep enough pocket to assume future losses. In the latter case, an appropriate capital injection is needed in order for the foreign buyer willing to assume liabilities L. We will argue that both solution are allocation equivalent.

4.1. Direct government intervention

Recall that $a \in \{0,1\}$ represents the pet project decision of the firm's management. Let $1-a \in (0,1)$ denote the probability of the project being undertaken if we allow for mixed strategies. Given a, we can determine the expected profit function of the government, (note that we abstract from discounting):

$$(A-R)R + c_iR + aI_i + (1-a)N_i. \tag{2}$$

where again $i = L, H$.

Under the conditions of the model, it is clear that if the government happens to be of high liquidity, then she also has an incentive to signal this to the firm, so that she can discourage the undertaking of the opportunistic investment move on the part

of the latter. In particular, the assumption $G((1-\theta)c_H + \theta c_L) < \beta$ insures that the high cost type will prefer a separating outcome to a pooling one. It is standard (and omitted here) to show that the least cost separating or Riley outcome is the unique outcome surviving all the usual refinements developed for signaling games. In fact, in our model, the Intuitive Criterion of Cho and Kreps (1987) is sufficient to yield this as the unique equilibrium outcome. We will henceforth concentrate on this outcome. We can then simplify (2) to:

$$(A - R)R + c_i R + (1-a)\pi_L. \tag{3}$$

As in the full information case, a low efficiency government would liquidate $R_L^* = \frac{A+c_L}{2}$. Provided that the loss $\pi_L < 0$ is sufficiently large, it is immediate to verify that for the high type, it is not sufficient to liquidate the amount which full information this type of government would restructure, $R_H^* = \frac{A+c_H}{2}$, because then the low efficiency type would have an incentive to imitate the high efficiency type. To see this, note that the incentive compatibility constraint for the low financier to stick to its first best level is:

$$P_L^* + \pi_L \geq (A - R_H^*)R_H^* + c_L R_H^* \tag{4}$$

If equation (4) is violated, then the high cost type will have to adopt an excessive liquidation policy in order to credibly to signal her type. The minimum liquidation quantity R_H^* is then the amount satisfying the incentive constraint with equality:

$$(A - R_H^*)R_H^* + c_L R_H^* = \frac{(A - c_L)^2}{4} + \pi_L \tag{5}$$

It can be easily be verified from (5) after some cancellations:

$$\begin{aligned} R_H^* &= R_L^* + \sqrt{\pi_L} \\ &= \tfrac{A+c_L}{2} + \sqrt{\pi_L} \end{aligned} \tag{6}$$

Clearly, (6) indicates that R_H^* will be larger than R_H^*, the full information liqui-

dation, provided π_L is large enough. As it was expected, the demand of signalling forces the government to distort the first-best level of investment. Let $\delta = 2\sqrt{\pi}$. We can finally express the expected, *ex ante*, profit of the government if she does the financing herself:

$$EW^C(\theta) = \theta\left(\frac{(A+c_L)^2}{4} + \pi_L\right) + (1-\theta)\left(\frac{(A+c_H)^2}{4} - \frac{(c_L - c_H + \delta)^2}{4}\right). \quad (7)$$

where the symbol C stands for "centralization". Comparing equation (7) to (1) reveals that $\frac{(c_L - c_H + \delta)^2}{4}$ is a convenient measure for welfare loss due to the signaling distortion.

4.2. Immediate privatization: foreign buyer

Now consider an immediate and complete sell-off in t_0. That means, the state investment bank is given a cash injection of

$$D - EP^C$$

where

$$EP^C = \theta P_L^C + (1-\theta)P_H^C$$

denotes the expected value of the firm in this case which is a probability-weighted average of the firm value in the high and in the low cost case. With this injection, the government will find a taker (risk-neutral, deep pocket) to buy the state investment bank including the liabilities D for a symbolic price of 0.

The problem of this solution is the following. Once the bank is privatized in t_0, the newly private bank will, if left unattended, adopt the same solution as the government in Section 3.1 because it internalizes all the cost. This may not be the optimal solution (see below). In principle, the government could in t_1 offer a transfer so as to induce the private bank to adopt a different, say less vigorous, restructuring policy. The government will not do so, however, since all the benefits would accrue to the private bank in form of a higher recovery rate of its loans, while the government would only have the additional cost of bribing the bank. in other words, because the

government, when selling off in t_0, *cannot commit* to offer a transfer, the allocation will be the same as if the government undertook the restructuring itself.

A crucial assumption behind this equivalence, however, is that the private bank has a "deep pocket": it will be able to meet the liabilities D even in the bad state, when the shortfall of the assets exceed the initial capital injection of $D - EP^C$. The outcome would be different if the government had to recapitalize again in this case, say because the bank had a "shallow pocket". Thus, implicitly, we address here the case of a foreign taker, not a domestic one.

4.3. Immediate privatization: domestic buyer

We will briefly discuss the sale of the state bank to a cash- constrained buyer. In this case, a recapitalization in the amount of EP^C covering the expected losses of the bank is not sufficient because the bank would be insolvent in the bad state c_L. The government would have to give an additional cash injection to keep the bank afloat. Not only would such a policy of forbearance be more costly; in addition, it raises the problem of opportunistic behavior on the part of the privatized bank, viz type c_H imitating the policy of a type c_L in order to solicit the additional injection earmarked for the bad type only. Both of these problems indicate that this solution is clearly inferior to both direct state control or immediate privatization to a foreign buyer.

5. Delayed privatization: domestic buyer

We turn next to the scenario where the government delegates signaling to a bank. In the recapitalization case considered here, the government decides to recapitalize the state investment bank only in t_1. The advantage is that now, the government can *tie* the recapitalization with the transfer which induces a different signaling allocation. An important element here is that there is no equityholder of the delegate bank with a deep pocket in sight. As a result, the government has to offer enough capital so that the difference between D and the actual worth of the assets is met *in every state*.

Next, we turn to identify the optimal menu. We denote by $\hat{R}_H$ and $\hat{R}_L$ the separating liquidation quantities. Let $\hat{P}_i = (A - \hat{R}_i)\hat{R}_i + c_i\hat{R}_i$ in the usual manner. The task is then the analysis of the contract $(T_i, R_i)_{i\in\{L,H\}}$ which the government ought to propose to the delegate bank. We denote by T_i then the gross transfer in this case which encompasses the necessary recapitalization in each cost state $D - \hat{P}_i$ and an incentive payment u_i. The assumption that the delegate bank has no deep pocket is captured by the condition $u_i \geq 0$, for $i \in H, L$.

Recall that the government does not know the type of the bank once she is committed to decentralize the liquidation decision. Still, the eventual level of liquidation, R, can be discerned and verified, and we also involve the rationality assumption. In this case, it is certain that the optimal action to be enforced on the part of the bank has to be contingent on the underlying information, i.e. the efficiency type. By the Revelation Principle, it is enough to extract a declaration of the type of the bank from the point of view of optimal contract design.

There are the usual two incentive constraints to consider. First, the IC for type c_L not imitating c_H (this is the "upwards" IC)

$$(A - \hat{R}_L)\hat{R}_L + c_L(\hat{R}_L - \hat{R}_H) + \pi_L \geq (A - \hat{R}_H)\hat{R}_H + (T_H - T_L) \tag{8}$$

Conversely, for the "downwards" incentive constraint or the IC for c_H not imitating c_L

$$(A - \hat{R}_H)\hat{R}_H + c_H(\hat{R}_H - \hat{R}_L) + (T_H - T_L) \geq (A - \hat{R}_L)\hat{R}_L + \pi_L \tag{9}$$

For the menu $(T_i, R_i)_{i\in\{L,H\}}$, we can infer the following:

LEMMA 2: *For any optimal menu* $(T_i, R_i)_{i\in\{L,H\}}$, $u_L = 0$, $u_H > 0$, $\hat{R}_L < R_L^*$ *and* $\hat{R}_H \geq R_H^*$.

Proof: See the Appendix.

□

Lemma 2 identifies that only the high capital cost type receives an information rent $u_H > 0$. This is the standard result in signaling games, because c_H is here the good type. In fact, according to standard reasoning, the information rent must be

$$u_H = (c_H - c_L)\hat{R}_L \tag{10}$$

That is, the good type obtains a compensation in the amount of what she would save, compared to the bad type, by imitating the bad types' liquidation policy. Taking into account this information rent, the problem for the government is equivalent to the following problem:

$$\max_{R_L,R_H}(1-\theta)[(A-R_H)R_H + c_H R_H - u_H] + \theta[(A-R_L)R_L + c_L R_L + \pi_L]$$

and after substituting (10) and rearranging:

$$\max_{R_L,R_H}(1-\theta)[(A-R_H)R_H + c_H R_H] + \theta\left[(A-R_L)R_L + \left(c_L - \frac{1-\theta}{\theta}(c_H - c_L)\right)R_L + \pi_L\right]$$

The last expression illustrates that when determining the optimal quantity $\hat{R}_L$, the government takes into account the additional outlay this imposes on type c_H: for, with $\hat{R}_L$, the information rent u_H grows linearly, see expression (10). The government takes therefore the full social cost of type c_L into account. This is as if the government calculated that the cost of type c_L is $t = c_L - \frac{1-\theta}{\theta}(c_H - c_L)$. t is frequently called the *virtual cost*, the true social cost of employing the bad type c_L of the bank for the purpose of handling the investment task under the current circumstances. In other words, the virtual cost captures nothing but the fact that there is an *externality* between the types: the larger is $\hat{R}_L$, the larger has to be u_H. The virtual cost internalizes the impact on the good type c_H which any change of $\hat{R}_L$ causes. In the centralized case, this externality is ignored because each type maximizes independently. In the delegate bank case, it can be incorporated, explaining a potential for an efficiency improvement.

The difference between c_L and t reflects information rents, it represents the cost to the government to give incentives to the low type not to announce that it is a

high type. Thus, the interaction between the bank and the firm is equivalent to a modification of the signalling game between the government and the firm (that is of the previous scenario of financing), in which the low type financier's effective liquidation cost becomes t. What is the outcome then of the game between the bank and the firm?

First of all, it clearly has to be the case that $t > -A$, so that the low type would break even. This will hold if

$$\theta \geq \frac{c_H - c_L}{A + c_H} = \underline{\theta}.$$

If indeed this is the case, then $\hat{R}_L = \frac{A+t}{2}$. Define the *virtual profit* here as the profit which can be attained by the low efficiency bank in the first period. If $\theta \leq \underline{\theta}$, then the virtual profit is 0; while if $\theta \geq \underline{\theta}$, then it is $\frac{(A+t)^2}{4}$. Let us turn now to the efficient type. Next, by the logic of signaling games, the investment level of this type is $\hat{R}_H = max(R^*_H, \underline{R})$, where R^*_H stands for the optimal action of this type in the full information case; while $\underline{R}$ is the solution to the equation (expressing the individual rationality constraint of the low type):

$$\frac{(A+t)^2}{4} - \pi_L = (A - \overline{R} + t)\overline{R}$$

We can now identify a cut-off level of θ, $\overline{\theta} = \frac{c_H - c_L}{\delta}$, such that for a value of θ below this level, the government will opt for the full information investment level; while if θ is above that, then $\hat{R}_H = \frac{A+t}{2} + \frac{\delta}{2}$. *A fortiori*, this equilibrium is also unique.

In this case as well, we can express the *ex ante* expected profit of the government. Suppose that $\theta \geq \overline{\theta}$ (and thus $\theta \geq \underline{\theta}$ holds as well), then the expected profit becomes:

$$EW^D(\theta) = \theta\left(\frac{(A+t)^2}{4} - \pi_L\right) + (1-\theta)\left(\frac{(A+c_H)^2}{4} - \frac{(t - c_H + \delta)^2}{4}\right). \qquad (11)$$

where the symbol D stands for "delegation".

Is it worthwhile for the government to delegate the project of financing the firm in this model? In order to be able to say something sharp about this, we need to make

some preliminary observations. Note first that in both cases, that of centralization and that of delegation, the distortionary cost of signalling is of the form: $\frac{(\lambda - c_H + \delta)^2}{4}$. Here $\lambda = c_L$ in the case of centralization, and $\lambda = t$ in the case of the delegation to the bank. Next we need to make some further observations. First, the cost of the signalling distortion increases in δ. Second, the cost of signalling is always greater in the case of centralization. Third, this cost increases faster in δ if the government does the financing herself. From these we can conclude that $\delta = A + c_H$ minimizes $EW^C(\theta) - EW^D(\theta)$. Therefore it is the most advantageous to employ the bank for financing the enterprise when the signalling costs are the highest.

All this allows us to focus on the case when indeed $\delta = A + c_H$, which also means that $\bar{\theta} = \underline{\theta}$, and thus

$$EW^C(\theta) - EW^D(\theta) = (2\theta - 1)\left(\frac{(A+t)^2}{4} - \frac{(A+c_L)^2}{4}\right). \tag{12}$$

From this it follows:

PROPOSITION 1: *In the current scenario, whenever $\theta < \frac{1}{2}$, the expected utility of the government is larger if she delays privatization and opts for a delegate bank.*

Clearly, signaling a better type distorts the first-best level of activities for the bank. Extracting cost information from an agent introduces an additional cost for the principal (that is the government) in this model. How is it possible then that decentralized signalling would be more desirable than direct signalling? First we have realize that under the conditions of delegation, the presence of what we termed the virtual opportunity cost relaxes the incentives of the inefficient type to mimic with its *signalling* action the equilibrium behavior of the efficient type. If the probability that the liquidation yields will be low is small enough, this will render enough gains in the dimension of signalling to countervail the losses arising from writing a separating screening contract. But why cannot the government bootstrap the equilibrium action in the delegation case when it is left alone to deal with the firm? This because the incentive contract signed with the commercial bank also commits that bank un-

dertake the signalling actions which are *in effect* prescribed by the contract. Once the government is left alone, it would act as its then emerged efficiency type would dictate, and not as it would have wished before that information was available.

6. Delayed privatization: foreign buyer

In this section, we consider the case where the government sells the state investment bank to an investor who has a deep pocket and is therefore willing to take over assets and liabilities for a compensation just in the amount of the *expected* loss. This could for example be a foreign bank. The case we consider here differs from the one in Section 3.2 and that we are considering a delayed sell-off where the recapitalization can be tied to the incentive payments under the contract T_i, R_i). What the government then would do is to propose a contract where the investor just expects to break even, before learning her type. In this case we find the following strong result:

PROPOSITION 2: *If the menu is not constrained by limited liability, then the first best allocation R_L^* and R_H^* can be attained and the government keeps all the surplus.*

Proof: See the Appendix. □

Proposition 2 allows us to identify a second source of inefficiency of bank privatization which belongs more to the Political Economy environment. To the extent that the government is committed to sell out to cash-poor investors, additional costs accrue in forms of information rents. These cannot be saved because at the same time, the government has to make sure that the bank is sufficiently recapitalized. By contrast, when the privatization deal is proposed to a deep pocket investor, the expected information rents can be fully deducted from the cash injection that the investor requires in order to break even.

This then provides the intuition for the efficiency result: by offering recapitalization and menu as a bundle, the government can commit to any information rent it wants.

Moreover, higher information rents are neutral for the government as the expected value is deducted from the cash injection.

7. Discussion and Conclusion

The theory laid out in this paper suggests that bank privatization should optimally be timed, and delayed, as a function of the prospective arrival of the relevant information. That is, the government recapitalizes and sells the bank only after some information has arrived which permits to identify the parameters a costly signaling situation of the government vis-a-vis the interested public. It is easy to extend this interpretation to a more dynamic course of events and actions: suppose arrival of information concerning the restructuring policy of various bank assets is staged over time. Then at each time when information pertinent to a future signaling situation for a particular group of bank assets has been assembled, these assets may be sold off.

This implies that the optimal boundaries of commercial banks carved out of a former monopolistic state bank should be arranged as a function of the time and nature of information, rather than according to arbitrary or political lines as has happened in the Visegrad countries.

This is of course just one element of a theory of the boundaries of the banking firm which has to be complemented by aspects of the optimal portfolio mix, economies of scale and the industrial organization of banking as well as of product markets.

This theory has implications both for the creation and for the optimal management of a Consolidation Bank which has emerged in a couple of CEE countries and is also frequently proposed in used in banking crises in other countries.

A Consolidation Bank would amount to a strict separation of problematic and sound assets of the bank. Agency problems with the creation of Consolidation Banks have recently emerged in Western countries using this approach to troubled bank clean-up. A Consolidation Bank can be viewed as undertaking the restructuring faced

by the distressed bank in the present model. Suppose there is some an additional cost of delaying bank privatization by distorting the bank's incentives. Albeit not part of the present model, this could be added for example in the spirit of the work by Mitchell, Bergloef and Roland and Perotti. Because of this additional cost which can be saved if clean and problematic assets are separated immediately, as does a Consolidation Bank is

supposed to do, then such a separation assets and creation a distinct is a superior choice of action because it maintains all the benefits discussed here for delayed privatization.

This is a straightforward extension which is not formalized in the model. Most importantly, the theory has direct implications for the design of such a Consolidation Bank, in particular for the timing and the scope of launching such an institution. This is so as the insights of this theory carry over with little changes from the case assumed in the present paper, viz. where all assets of the bank are left together in one banking firm rather than being separated according to their quality.

As mentioned, the first two propositions of the paper predict that such an optimal delay may be beneficial for a government committed to the domestic ownership constraint and that such an optimal delay may be beneficial if there is no domestic ownership constraint, respectively. In the latter case, the first best can be achieved. Thus comparing delay with and without a domestic ownership constraint, we find that the latter is a strictly dominant policy. In other words, this model identifies a cost of a domestic ownership bias in transition which is important both in the context of strict economics as well as in the wider context of the political economy of transition. even if the underlying liquidity yields in the two scenarios are not identical. Even more efficient private banks, if privatization happens immediately, could do worse than controlled state-owned banks, where privatization is timed to coincide with events of incentive payments (information rents) accruing to the decentralized bank.

Of course, all policy conclusions should be put forward only with great caution,

due to the simplicity of the present model. A full assessment of the merits of treating problematic legacy firms by means of state-owned banks or by means of private banks would have to address other pertinent features of these financial institutions. For its significance, it is enough to reflect on the fact that consolidation banks have been rarely privatized in the most developed economies, either. Finally, we do not intend to argue against bank privatization in the transition economies. An important aim rather is to point to the challenges and pitfalls when modelling bank privatization.

Appendix

Proof of Lemma 2:

First note that:

$$T_L = [D - (A - \hat{R}_L)\hat{R}_L - c_L\hat{R}_L - \pi_L] + u_L \tag{A.1}$$

$$T_H = [D - (A - \hat{R}_H)\hat{R}_H - c_H(\hat{R}_H] - u_H \tag{A.2}$$

Substituting and cancellations allow to rewrite (8) and (9) as:

$$\hat{R}_H(c_H - c_L) \geq u_H - u_L \tag{A.3}$$

and

$$u_H - u_L \geq \hat{R}_L(c_H - c_L) \tag{A.4}$$

Rewriting the problem as a maximization problem - which is equivalent to minimizing the expected transfer - the Kuhn-Tucker Lagrangean of the whole problem is:

$$\begin{aligned} L = \; & (1-\theta)[(A - R_H)R_H + c_H R_H - u_H] + \theta[(A - R_L)R_L + c_L R_L + \pi_L - u_L] \\ & + \lambda_1 \cdot \text{equation } (A.3) \\ & + \lambda_2 \cdot \text{equation } (A.4) \end{aligned}$$

The Lagrangean is maximized w.r.t. to all four instruments T_i and R_i.

An immediate observation is that $\hat{R}_H > \hat{R}_L$. Suppose not. Then it would be cheaper for c_L than for c_H to switch from R_L to some $R_H < R_L$ implying that if c_H prefers R_H to R_L, so would c_L and separation is not possible.

Rewriting (A.3) and (A.4) compactly as:

$$\hat{R}_H(c_H - c_L) \geq u_H - u_L \geq \hat{R}_L(c_H - c_L) \tag{A.5}$$

Then condition (A.5) implies that $u_H - u_L > 0$. Because only the difference matters, and both u_H and u_L enter with negative sign in the objective function, we can wlog infer that $u_L = 0$. $\hat{u}_H$, the optimal value of u_H, is then such that $\hat{u}_H = \hat{R}_L(c_H - c_L) > 0$. Since $u_H > 0$ and $u_L = 0$, it follows that the downward IC must be binding (if not, $u_H < \hat{u}_H$ were possible) while the upwards IC is not binding (because not both can be binding at the same time). Any increase in $\hat{R}_H$ such that $(A - \hat{R}_H)\hat{R}_H + c_H\hat{R}_H$ permits to reduce u_H by the same amount (since corresponding change in $(A - \hat{R}_H)\hat{R}_H + c_L\hat{R}_H$ is smaller and hence the upwards IC remains slack) which both reduce T_H. Hence $\hat{R}_H = R_H^*$. Finally, a decrease of R_L permits to reduce u_H by an amount of $(c_H - c_L)$ times the change in R_L, which explains that $\hat{R}_L < R_L^*$.

□

Proof of Proposition 2: Proposition 2 follows from the fact that spending on information rents is neutral for the government because it will be deducted from the cash injection $D - EP^F I$. The problem of the government can then be written as:

$$\begin{aligned} L = \; & (1-\theta)[(A - R_H)R_H + c_H R_H - u_H] + \theta[(A - R_L)R_L + c_L R_L + \pi_L - u_L] \\ & + \lambda_1 \cdot \text{equation } (A.3) \\ & + \lambda_2 \cdot \text{equation } (A.4) \end{aligned}$$

The Lagrangean is maximized w.r.t. to all four instruments T_i and R_i. Again, $\hat{R}_H \geq \hat{R}_L$ is necessary to obtain separation. Consider again the incentive constraints in the compact form:

$$\hat{R}_H(c_H - c_L) \geq u_H - u_L \geq \hat{R}_L(c_H - c_L) \tag{A.6}$$

It is then clear that for any pair of $\hat{R}_H \geq \hat{R}_L$ there exist values of $u_i \geq 0$ such

that (A.6) is satisfied, provided u_H is high enough. As this is without cost for the government, the only solution can be R_H^* and R_L^*.

□

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