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Federalism and the Soft Budget Constraint

by

Yingyi Qian¹
Gérard Roland²

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Center for Economic Policy Research
Stanford University
Stanford, CA  94305
(415) 725-1874

¹Stanford University
²ECARE, CEME, Université Libre de Bruxelles and CEPR

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Yingyi Qian
Department of Economics
Stanford University

and

Gérard Roland
ECARE and CEME
Université Libre de Bruxelles
and CEPR

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Abstract

We study the relationship between the organization of government involving fiscal decentralization (i.e., federalism) and the degree of the soft budget constraint. The incentives of the government to bail out inefficient projects are determined by the tradeoff between political benefits and (endogenous) economic costs. Two effects of federalism are derived: First, fiscal competition among local governments in the presence of mobile factors increases the opportunity costs of bailout at the margin and thus can be viewed as a commitment device (the "competition effect"). Second, monetary centralization together with fiscal decentralization may not only harden budget constraints but also reduce inflation (the "checks and balance effect"). Our theory is used to interpret China’s experience of transition to markets.

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Federalism and the Soft Budget Constraint

1. Introduction

Soft budget constraints represent a major incentive problem. They were a key characteristic of socialist economies and remain an important concern in transition economies. There are also instances of soft budget constraints in market economies such as bailouts of banks (e.g., the S&Ls) and big corporations (e.g., Chrysler). Following Kornai (1980, 1986), an enterprise or any organization is said to have a soft budget constraint when it expects to be bailed out in case of financial trouble. This creates an incentive problem because the manager would fail to observe financial discipline. According to Dewatripont and Maskin (1995), the fundamental reason for this incentive problem is the inability of rescuers to commit to no bailout ex ante. Thus, time inconsistency is at the heart of the soft budget constraint problem.¹

In reality, soft budget constraints mostly involve a government, through the bailout of enterprises (public and private) or of lower level governments. This paper studies the relationship between forms of federalism (that is, organizations of government involving some fiscal decentralization) and the degree of the soft budget constraint. Based on the tradeoff between political benefits and (endogenous) economic costs, it analyzes how the government’s incentive to soften budget constraints depends on the extent of decentralization of fiscal and/or monetary authority. Although our study is motivated by the recent Chinese experience where devolution of authority from the central to regional governments is a major feature of reform, the theme of the paper is more general. Indeed, both in the U.S. and Europe there is a growing interest in studying the relationship between federalism and the incentives of government.

We build a model of the soft budget constraint in a three-tier hierarchy with a "central government" at the top, multiple "local governments" in the middle, and "enterprises" (state and non-

¹ Subsidization of loss-making enterprises is often an indicator of soft budget constraints. However, subsidies are not identical to soft budget constraints. There are cases in which firms receive subsidies but do not expect to be bailed out in case of bad financial performance.
state) at the bottom. The model has the following features. First, the soft budget constraint game between government bodies and enterprises is sequential: government bodies face sequential bailout decisions in the presence of sunk costs; and enterprises behave strategically in securing subsidies. Second, the local governments compete with each other in allocating their own budgets to attract mobile factors and grants from the central government in a simultaneous-move game. And third, the central government plays a sequential game against local governments in deciding on the allocation of grants and, if monetary financing is possible, on total money supply. The study of incentive problems in a three-tier hierarchy is generally complicated and difficult, and this difficulty is only reinforced by the introduction of fiscal competition and factor mobility. Nevertheless, we are able to derive several results on the effect of federalism in hardening budget constraints.

We first show that decentralization of fiscal authority to local governments together with factor (say capital) mobility across regions may be effective in hardening budget constraints of enterprises under local governments’ control. This is because competition among local governments in attracting capital to their region creates an externality which increases the opportunity cost of subsidizing inefficient enterprises, which in turn reduces the incentives for bailouts. Fiscal competition can thus be viewed as a commitment device (the "competition effect"). However, this comes at the cost of distortions such as excessive infrastructure investment.

When fiscal decentralization is not complete and the central government has the power to allocate part of fiscal revenues, local governments will also compete for grants. Interestingly, if the central government earmarks grants for local public goods and subsidies, strategic distortions by local governments further increase the opportunity cost of bailout, thus achieving hard budget constraints, provided the grant size is not too large.

We then introduce the possibility of monetary financing where the central government has the power to allocate seigniorage revenue to local governments. Fiscal competition together with competition for monetary grants works in a similar way towards hardening the budget constraint of enterprises. However, consequences on inflation depend on the allocation of powers between the central and local governments. Inflation is higher than under fiscal and monetary centralization if
fiscal authority is decentralized but the central government creates money and allocates earmarked grants hoping to "correct" distortionary decisions by local governments ("accommodation"). However, we show that if local governments have full authority over their expenditures and moreover if the central government has no discretion over the allocation of seigniorage revenue between local governments, inflation will be lower than under fiscal and monetary centralization. The reason is that the differences in spending preferences between the central and local governments due to fiscal competition induces endogenously a conflict of interests, which achieves both harder budget constraints and monetary restraint (the "checks and balance effect").

In the extreme case of monetary decentralization, with the externality of inflation, each local government receives the full benefits from monetary creation but shares the costs of inflation with other regions. This creates high inflation and generally softens budget constraints.

Our paper presents the first macroeconomic model of the soft budget constraint, viewed as a dynamic commitment problem, in the framework of a federal government. Even though our concept of the soft budget constraint is the same as Dewatripont and Maskin (1995), there are a number of important distinctions between our model and theirs. First, in their model, firms are bailed out by profit-maximizing banks, and in ours by government who also cares about employment rents. Second, our model endogenizes sources of revenue for bailouts. This allows us to endogenize the opportunity cost of bailouts which depends on the organization of government. Finally, crucial conditions leading to hard budget constraints in their model are the limited liquidity of the bank and costly information transfer between banks. In our model, the size of the budget matters less than its allocation between various expenditures. In fact, government budgets are larger when budget constraints are hard, as a higher efficiency yields more tax revenues.

The paper contributes to the literature on local public finance and fiscal federalism (e.g., Tiebout, 1956, Oates, 1972, Gordon, 1983, and Wildasin, 1988) by analyzing the link between fiscal

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2 Both models of Shleifer and Vishny (1994) and Segal (1993) on soft budget constraints are based on the difference in objectives between the government and the private sector. In the former, the government cares about employment and in the latter about the total social surplus.
competition and incentives for hard budget constraints. It thus adds to the growing literature on incentive problems in the context of organization of government. For example, Laffont and Martimort (1994) investigate the role of duplication of regulators in preventing collusion, and Persson and Tabellini (1996) study the tradeoff between interregional risk and moral hazard of local government in federal states. Our results are also in accordance with recent historical analysis (e.g., Weingast 1995) and studies on transition economies (e.g., Montinola, Qian and Weingast, 1995) emphasizing the commitment effects of federalism.

Our model sheds considerable light on the unique features of China’s transition process to markets. In Russia and Eastern Europe, privatization is the main focus and the priority of transition, and it is largely driven by the central government. In contrast, China’s transition was first and foremost associated with the devolution of government authorities from the central to local levels. Restructuring and privatization of enterprises came later as a result of such decentralization. Our analysis shows how fiscal decentralization and competition among local governments endogenously increases their costs of bailing out enterprises. Our analysis also shows that the institutional source of inflation is not fiscal decentralization per se, but rather monetary centralization with accommodation or monetary decentralization. The combination of full fiscal decentralization with monetary centralization and fixed rules for seigniorage allocation between regions produces both lower inflation and hard budget constraints. Evidence from China shows that inflation was lowered and restructuring and privatization of enterprises by local initiatives started to emerge precisely at the time when these conditions were met.

The paper is organized as follows. Section 2 presents the three-tier hierarchy model of the soft budget constraint in a macroeconomic context. Section 3 demonstrates the role of fiscal competition among local governments as a commitment device to harden budget constraints of enterprises. Section 4 introduces monetary creation as an additional source of financing and analyzes implications of alternative monetary arrangements under fiscal decentralization on inflation and soft budget constraints. Section 5 uses our theory to interpret the reform experience of China. Section 6 concludes with general implications of the model.
2. The Model

We consider an economy with N identical regions. In each region, there are state enterprises and new non-state enterprises. The economy can be viewed as a three-tier hierarchy composed of a central government at the top, N local governments in the middle, and enterprises at the bottom. Although the setup of the model is tailored to the situation of the Chinese economy, the logic of the model can be applied to other federal states. The model has two periods.\(^3\)

**State Enterprises**

At date 0, there are n (n is large) state enterprises, each having one project in place. The return on a project has two components: a verifiable (taxable) return \(R_i\) and a non-verifiable (non-taxable) private benefit \(B_i\) (net of effort) accruing to employees (workers and managers). A type 1 project, present in proportion \(\alpha\), yields \((R_q, B_q)\) at date 1 independently of worker/manager effort (Figure 1). A type 2 project, present in proportion \((1 - \alpha)\), yields \((R_q, B_q)\) at date 1 only if the enterprise chooses action (effort) \(e_h\), which can be interpreted as "restructuring" or "privatization." If, however, action (effort) \(e_t\) is chosen, which means maintaining "status quo," then the project yields \((0,0)\) at date 1. In the latter case, the government and the enterprise can engage in efficient renegotiation: if 1 unit of funds is injected (i.e., bailout), a type 2 project will yield \((R_s, B_s)\) at date 2. For the sake of simplicity, we assume no discounting and \(R_s = 0\). We assume further that the private benefits are ranked such that \(B_s > B_q > 0\). This implies that if all verifiable revenues are taxed away, the manager with a type 2 project prefers \(e_t\) to \(e_h\) if and only if bailout is expected.

**Non-State Enterprises**

Non-state enterprises emerge at date 1 and their activities in region i are described by a production function \(f(K_i, I_i)\) where \(K_i\) represents non-state capital and \(I_i\) represents public infrastructure.

\(^3\) By focusing on a two period model we leave aside the role of reputation in sustaining hard budget constraints. As is known from the theory of repeated games, reputation is an effective mechanism only if there is a long enough time horizon and a low enough discount rate. In this paper, we prefer to focus on the role of the institutional environment in hardening budget constraints.
investment, which is financed from the government budget at date 1. We make standard assumptions
\[ f_k(K, I) > 0, \ f_l(K, I) > 0, \ f_{kk}(K, I) < 0, \ f_{ll}(K, I) < 0, \text{ and } f_{kl}(K, I) > 0. \]

Thus, public infrastructure investment raises the marginal productivity of non-state capital. We can think of the non-state enterprises as foreign firms and of \( K_i \) as foreign capital. It is reasonable to assume that foreign capital mobility across regions inside a country is higher than that across countries.\(^4\) We assume that the total foreign capital inflow is fixed (\( \Sigma K_i = K \)) and that foreign capital is perfectly mobile across regions, which allows us to derive conveniently the result that an increase in \( I_i \) diverts foreign capital away from other regions. The analysis goes through if capital is imperfectly mobile across regions as long as the capital mobility is higher across regions inside a country than across countries.

**The Government's Budget**

We consider the government budget at date 1. In each region, on the revenue side, \( T_i - t_i \) is the net tax revenue exclusively from state enterprises, where \( T_i \) is total taxes and \( t_i \) is transfers to state employees. On the expenditure side, the budget is used for three purposes: subsidies (or bailout) \( S_i \) for type 2 projects; public infrastructure investment \( I_i \); and local public goods provision \( z_i \):\(^5\)

\[ T_i - t_i = S_i + I_i + z_i. \]

Actual tax revenues and expenditures will depend on whether budget constraints of enterprises are hard (action \( e_h \) and no bailout of type 2 projects) or soft (action \( e_l \) and bailout of type 2 projects). We can rewrite the government budget as:

\[ t_i + I_i + z_i = T_i - S_i = E \]

where \( E = E^H = nR_q \) or \( E = E^S = \alpha nR_q - (1-\alpha)n (E^H > E^S) \), depending on whether budget constraints are hard or soft.

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\(^4\) We know from Feldstein and Horioka (1980) and Bayoumi and Rose (1993) that international capital markets are less integrated than intra-national capital markets.

\(^5\) The difference between \( z_i \) and \( I_i \) is that the choice of the latter exerts an externality on other regions while the former does not. Whether \( z_i \) is a form of public investment or consumption is irrelevant for our results.
The Government’s Objective Function

We assume a welfare maximizing government: The local government in region \( i \) maximizes \( W_i \) and the central government maximizes \( W = \sum W_i \). We assume that population in region \( i \) consists of two groups: employees in state enterprises and employees in non-state (foreign) firms. Let the total private benefits of the employees in foreign firms be \( x_i = x(K_i, I_i) = f(K_i, I_i) - f(K, I_i) \), where \( x_i \) is assumed to be an increasing and concave function of \( I_i \). The total private benefits of the employees in state enterprises are \( y_i \), where \( y_i = nB_q + t_i \) under hard budget constraints and \( y_i = \alpha nB_q + (1-\alpha)nB_s + t_i \) under soft budget constraints. The total utility of the two groups derived from local public goods is \( u(z_i) \), which is assumed to be concave in \( z_i \). Then, the objective function of local government in region \( i \) can be expressed as

\[
W_i = x(K_i, I_i) + y_i + u(z_i),
\]

where additive separability of the three components is assumed for simplicity.

Equilibrium

The grand game played under federal institutions consists of the following three games:

The game between governments and state enterprises. This is a sequential game in which an equilibrium is defined by: a) a choice of action \( e \) of state enterprises at date 0 to maximize private benefits given the expected choice of \( t_i, S_i, I_i \) and \( z_i \) by the government; and b) government’s choice of \( t_i, S_i, I_i \) and \( z_i \) at date 1 in order to maximize social welfare given the choice of action by state enterprises. We define soft budget constraint equilibria as subgame perfect equilibria in which enterprises with type 2 projects choose \( e_i \) and the government chooses bailout, and hard budget constraint equilibria as equilibria in which enterprises with type 2 projects choose \( e_i \) and the government chooses termination.

The game among local governments. Except for the case of complete centralization, there is a
game of competition between local governments at date 1 to attract foreign capital and grants from the central government. The game between local governments is a standard simultaneous-move game where strategies are choices of budget allocation. The equilibrium of that game is a Nash equilibrium in which each local government takes the budget allocation of other local governments as given.

*The game between the central and local governments.* There is also a game between the central and local governments at date 1 in allocating grants and deciding monetary creation (except for the cases of complete centralization and complete decentralization). This game is a sequential one. We assume that the central government makes decisions (such as allocating grants and creating money) after the local governments' decisions, which reflects the fact that the central government often accommodates the local governments' needs.

We define an equilibrium of the grand game as strategy profiles of state enterprises, local governments and the central government such that neither party has incentives to deviate unilaterally in any one of the three games. Our analysis is considerably simplified because whether an enterprise has a soft or a hard budget constraint is determined by a simple comparison between the benefits of bailout ($B_C$) and the opportunity cost of doing so. Soft budget constraints are obtained when the benefits exceed the cost of doing the best alternative. Hard budget constraints are obtained otherwise.

3. Fiscal Competition as A Commitment Device

This section demonstrates the central theme of our paper: Fiscal competition among local governments may serve as a commitment device to harden budget constraints of enterprises.

*The First-Best*

In the first-best allocation all inefficient projects are terminated ($S_{i}^{FB} = 0$) and infrastructure investment ($I_{i}^{FB}$) and local public goods provision ($z_{i}^{FB}$) are chosen to maximize total social welfare $W$
\[ \sum W_i. \] The first best optimum \((I_i^{FB}, z_i^{FB})\) satisfies\(^6\)

\[ \frac{\partial x(K_i, I_i^{FB})}{\partial I_i} = u'(z_i^{FB}) \]  
(1)

\[ I_i^{FB} + z_i^{FB} = E^H. \]  
(2)

**Fiscal Centralization**

In the benchmark case of fiscal centralization, the central government is entitled to all tax revenues, has full authority over its budget, and has control rights over public investment and subsidies. Here the three-tier hierarchy degenerates to a two-tier one in which local governments play no role. Define \((I_i^C, z_i^C)\) as a solution to

\[ \frac{\partial x(K_i, I_i)}{\partial I_i} = u'(z_i) \]  
(3)

\[ I_i + z_i = E^S. \]  
(4)

The following proposition provides a condition under which hard budget constraints cannot be achieved with fiscal centralization. Proofs of all propositions are in the Appendix.

**Proposition 1:** Under fiscal centralization, there exists a soft budget constraint equilibrium with \(I_i^C\) and \(z_i^C\) but no hard budget constraint equilibrium provided \(B_s > \frac{\partial x(K_i, I_i^C)}{\partial I_i}\). Furthermore, there is underinvestment in infrastructure \(I_i^C < I_i^{FB}\) and underprovision of local public goods \(z_i^C < z_i^{FB}\).

There is a soft budget constraint equilibrium because, once enterprises with type 2 projects have chosen \(e_i\), the social marginal benefit from bailing out an enterprise is greater than the marginal cost, measured by the welfare loss from less infrastructure investment and local public goods. Notice that because \(E^H > E^S\), hard budget constraints would yield more tax revenues and thus would allow a

\(^6\) We assume that \(u'(z_i^{FB})\) is greater than 1. This ensures that, at the optimum, \(t_i = 0\), which simplifies our analysis. The model can, however, be accommodated to the case where \(u'(z_i^{FB}) = 1\) and \(t_i > 0\).
higher welfare level. Thus, the government would prefer a commitment to no bailout.\textsuperscript{7}

Comparative statics on $\alpha$, the proportion of type 1 projects, yields interesting results which provide a reason for the increased number of bailouts after reforms of expanding enterprise autonomy in China and other transition economies. To see this, assume that the government monitors enterprises with probability $p$, forcing thereby enterprises with type 2 projects to choose $e_n$. Because monitored enterprises with type 2 projects behave as if they had type 1 projects, the effective proportion of type 1 projects becomes $\alpha' = \alpha + p(1-\alpha)$, which increases with $p$. Reforms of expanding enterprise autonomy reduce government monitoring and have the effect of reducing $\alpha$. A decrease in $\alpha$ worsens the average quality of the projects and thus increases the number of bailouts under a soft budget constraint equilibrium. On the other hand, it also lowers revenues and raises $u'(z_0)$ which reduces the incentive of the government to bail out enterprises with type 2 projects. In contrast, reforms that increase effective monitoring of projects increase $\alpha$ and thus reduce the number of bailouts.

\textit{Fiscal Decentralization}

We now examine the effect of fiscal competition under the condition of Proposition 1. With fiscal decentralization, each region is entitled to all tax revenues generated in the region. Moreover, it has full authority over its own budget and has control rights over public investment and subsidies in its jurisdiction. Because the number of projects $n$ is large, each region seen in isolation is identical in structure to a centralized nation. As local governments are assumed to have the same objective

\textsuperscript{7} In our model soft budget constraints are a consequence of a distortionary taxation (all verifiable revenues are taxed away). If enterprises were allowed to keep $(R_q - 1)$ of their verifiable revenues, then enterprises with type 2 projects would get $(R_q - 1) + B_q$ under $e_n$ and only $B_q$ under $e_n$. However, because the two types of projects are indistinguishable, in order to induce $e_n$ from type 2 projects, the government would have to concede $B_q - B_q$ to all enterprises. If $B_q - B_q > (1-\alpha)(R_q+1)$, this leads to a fall in tax revenues and thus to a lower welfare level as compared to a soft budget constraint equilibrium. In such a case, the government prefers to tax away all verifiable revenues.
function as the central government, it is therefore not self-evident that fiscal decentralization should
be superior in achieving hard budget constraints.\textsuperscript{8}

The crucial element is that fiscal decentralization implies competition between jurisdictions.
In addition to the game between government and enterprises, there is a game between local
governments. In our model, local governments compete with each other by making infrastructure
investment $I_i$ to attract foreign capital $K_i$ into their region. Given the choices of any other region $j$
($j \neq i$), local government $i$ chooses $S_i$, $I_i$, and $z_i$ so as to

$$\max W_i = x(K_i, I_i) + y_i + u(z_i)$$

s.t. $I_i + z_i = E$.

Given any choices $(I_1, \ldots, I_N)$, perfect mobility of foreign capital implies that\textsuperscript{9}

$$f_K(K_i, I_i) = f_K(K_j, I_j)$$

for all $i$ and $j$. This, together with equation $\Sigma K_i = K$, determines foreign capital allocation
$(K_i(I_1, \ldots, I_N), \ldots, K_N(I_1, \ldots, I_N))$ for any given $(I_1, \ldots, I_N)$. Complementarity between infrastructure
investment and foreign capital inflow gives the following standard result:

**Lemma 1:** If $f_{KK}(K, I) < 0$ and $f_{KI}(K, I) > 0$, then $dK_j/dI_i > 0$ and $dK_i/dI_i < 0$ for all $j \neq i$.

Because of the fiscal competition, the first order condition for local government $i$ becomes:\textsuperscript{10}

$$\frac{\partial x(K_i, I_i)}{\partial I_i} + \frac{\partial x(K_i, I_i)}{\partial K_i}(dK_i/dI_i) = u'(z_i).$$

\textsuperscript{8} The fact that local governments do not receive grants from the central government (i.e., the budget constraints of local governments are hard) is not really relevant here. Indeed, under centralization, the fiscal budget of the central government is also hard but enterprises have soft budget constraints as shown in Proposition 1.

\textsuperscript{9} As all regions are identical, we will look at symmetric Nash equilibria.

\textsuperscript{10} For this first order condition to make sense, we assume that the left-hand side, i.e., the marginal value of infrastructure investment to region $i$, is decreasing in $I_i$. One can verify that this will be the case if $f(K_i, I_i)$ takes the form of a Cobb-Douglas function.
Define $I^I_i$ and $z^D_i$ as a solution to (5) above and (6) below

$$I_i + z_i = E^H.$$  \hspace{1cm} (6)

**Proposition 2:** If $\partial x(K_i, I_i)/\partial I_i < B_s < \partial x(K_i, I^I_i)/\partial I_i + (\partial x(K_i, I^I_i)/\partial K_i)(dK_i/dI_i)$, then budget constraints are hard under fiscal decentralization but soft under fiscal centralization. However, hard budget constraints under fiscal decentralization come at the cost of an allocative distortion: $I^D_i > I^C_i$ and $z^D_i < z^C_i$.

The intuition is as follows. Because $I_i$ and $K_i$ are complements, competition among local governments generates externalities under foreign capital mobility: It increases the marginal *regional* value of infrastructure investment above its marginal *social* value. This creates an allocative distortion with too much infrastructure investment and too few local public goods for a given budget. This distortion increases the marginal utility from local public goods provision and thus increases the opportunity cost of subsidizing type 2 projects in the state sector. When this cost outweighs the benefit of bailout ($B_s$), terminating type 2 projects becomes credible.\(^{11}\) To the extent that under-provision of local public goods is a general feature of fiscal competition, our results should be robust.

Hard budget constraints under decentralization yield more tax revenues but the cost of obtaining commitment is an under-provision of public goods, not only compared to the first-best solution, but even compared to fiscal centralization. Figure 2 shows a possible welfare comparison among the first-best optimum, the soft budget constraint equilibrium under fiscal centralization, and the hard budget constraint equilibrium under fiscal decentralization. If the income effect from hard budget constraints dominates the distortionary effect in the choice of $I_i$ and $z_i$, fiscal decentralization is

\(^{11}\) Similar results could be obtained by assuming labor mobility, where regional competition would take the form of higher investment to increase the marginal product of labor in order to attract labor from other regions.
welfare improving.

It is important to note the difference between commitment to hard budget constraints and commitment to decentralization. Interestingly, they differ for the same reason — irreversibility of earlier decisions. The lack of commitment to hard budget constraints is due to irreversibility of effort decisions of enterprises at date 0, which gives rise to a bailout possibility at date 1. In contrast, because of the irreversibility of expenditure decisions of local governments, commitment to fiscal decentralization is self-enforced. Indeed, after observing the allocative choices of local governments at date 1, the central government would find it impossible to bail out enterprises since revenues would have already been spent. But the central government would have no incentives for recentralization before date 1 if the total welfare is higher under fiscal decentralization. Recentralization is then either ineffective ex post, or undesirable ex ante.

Partial Fiscal Decentralization and Competition for Grants

In federal states, the central and local governments generally share fiscal revenues. One motivation for fiscal transfers between the central and local governments is to "correct" distortions created by fiscal competition between regions. In our model, this could happen through earmarked grants for local public goods and/or subsidies. However, it is not clear that such "corrections" would not have adverse consequences for incentives. One may in particular wonder to what extent hard budget constraints can still be obtained when there are inter-governmental transfers.

Consider a situation of partial fiscal decentralization where each local government transfers G to the central government who then reallocates NG back to N local governments. Suppose the central government earmarks grants for local public goods and subsidies. Partial fiscal decentralization

\[12\] The general case where the central government can also earmark grants for infrastructure investment is technically more complicated and does not yield additional economic insight in the current set-up given that local governments already overspend in infrastructure investment.
introduces the possibility of soft budget constraints of local governments as the fiscal grants they receive \textit{ex post} depends on the expenditure decisions they make \textit{ex ante}. But at the same time it also introduces a competition among local governments for grants from the central government, in addition to competition for foreign capital.

Given the choices of any other region $j$ ($j \neq i$), local government $i$ chooses $S^g_i$, $I^g_i$, and $z^g_i$ to

$$\max \ W_i = x(K_i, I_i) + y_i + u(z_i + z^g_i)$$

$$\text{s.t. } I_i + z_i = E - G,$$

with the expectations of the rule determining $z^g_i$ and $S^g_i$ from the central government and $K_i$ by foreign firms. Given the choices of local governments, the central government chooses $z^g$ and $S^g$ to

$$\max \Sigma x(K_i, I_i) + y_i + u(z_i + z^g_i)$$

$$\text{s.t. } \Sigma z_i^g + S^g = NG.$$

Again, foreign capital is allocated to equalize the marginal returns: $f_k(K_i, I_i) = f_k(K_j, I_j)$, for all $i$ and $j$.

Because foreign capital allocation $K_i$ in a particular region depends only on the allocation of local infrastructure investment ($I_1, ..., I_n$), the central government’s allocation of grants does not have a direct impact on foreign capital allocation. Hence the central government’s optimal allocation of grants must satisfy

$$u'(E - G - I_i + z^g_i) = u'(E - G - I_j + z^g_j)$$

for all $i$ and $j$. This, together with $\Sigma z^g_i = NG$ (assuming $S^g = 0$), determines the allocation of grants $(z^g_1(I_1, ..., I_n), ..., z^g_n(I_1, ..., I_n))$ for any given $(I_1, ..., I_n)$. We have an analogue to Lemma 1:

**Lemma 2:** If $u'' < 0$, then $dK_i/dI_i > 0$ and $dK_j/dI_i < 0$ for all $j \neq i$.

The mechanisms underlying competition for grants and competition for foreign capital are in fact the same: By distorting more in the direction of higher $I_i$, a local government can obtain more
grants from the central government, given the choice of other regions. In any symmetric Nash equilibrium including \( S_i^0 = 0 \), we will have \( z_i^0 = G \) for all \( i \). Let \((I_i^p, z_i^p)\) satisfy
\[
\frac{\partial x(K_i, I_i^p)}{\partial I_i} + \left( \frac{\partial x(K_i, I_i^p)}{\partial K_i} (dK/dI_i) + (\partial u/\partial z)(dz_i^0/dI_i) \right) \geq u'(z_i^p + z_i^0)
\]  
(7)
\[
I_i^p + z_i^p = E_i^H - G
\]  
(8)
with a strict inequality holding under \( z_i^p = 0 \).

**Proposition 3:** Under partial fiscal decentralization with earmarking of grants for local public goods and subsidies, under the conditions of Proposition 2, there is a hard budget constraint equilibrium and no soft budget constraint equilibrium if and only if \( G < z \), where \( u'(z) = B_z \).

Competition for grants pushes local governments toward even more infrastructure investment and keeps budget constraints of enterprises hard as long as the grant size is not too large.\(^{13}\) When the size of the grant is small (i.e., \( G < z_i^0 - z_i^p \)), the central government is unable to provide a sufficient amount of local public goods. Competition for grants then leads to more distortions. Total local public goods provision is even smaller than under complete decentralization, and so is total welfare. When the size of the grant is moderate (i.e., \( z_i^0 < G < z \)), local public goods provided by the central government through grants are larger but hard budget constraints still prevail because the central government prefers allocating grants for local public goods rather than for bailouts. Welfare is also improved because the distortion by local governments is partly corrected while maintaining hard budget constraints.

\(^{13}\) Wang (1991) demonstrates similar distortionary effects in a model with a Cobb-Douglas production function (with fixed investment and circulating capital as two inputs).
4. Fiscal Decentralization and Monetary Finance

In reality, the central government also has access to monetary sources of revenue. By incorporating the possibility of monetary financing by the central government, we can analyze the relationship between fiscal and monetary arrangements under federalism on the one hand, and soft budget constraints and inflation on the other. Two effects will play: (i) monetary finance will increase budgets and thus tend to soften budget constraints; and (ii) monetary finance may induce more distortions towards infrastructure investment due to competition for monetary grants. Whether budget constraints can be hardened will depend on the net result of those two effects.

We assume that \( R \) is the level of \textit{real} resources from inflationary taxation available for additional government expenditures. Because inflationary finance is distortionary, we assume that the total welfare loss is equal to the amount of resources withdrawn \( R \) plus a quadratic deadweight loss \((a/2)R^2\). Therefore the central government maximizes

\[
W = \Sigma \{x(K_i, I_i) + y_i + u(z_i)\} - (R + (a/2)R^2).
\]

\textit{The First-Best}

In the first-best allocation, all inefficient projects are terminated \((S^{FB} = 0)\) and total monetary financing \((R^{FB})\), infrastructure investment \((I_i^{FB})\), and local public goods provision \((z_i^{FB})\) are chosen to maximize total social welfare. We therefore have:

\[
\frac{\partial x(K_i, I_i^{FB})}{\partial I_i} = u'(z_i^{FB}) = 1 + aR^{FB}, \quad \text{and} \tag{9}
\]

\[
z_i^{FB} + I_i^{FB} = E^H + R^{FB}/N. \tag{10}
\]

\textit{Fiscal and Monetary Centralization}

In the benchmark case of fiscal and monetary centralization, the central government maintains both fiscal and monetary authority, but commitment to termination of inefficient projects is
determined endogenously. Let \((I_i^{CC}, z_i^{CC}, R^{CC})\) be the solution to

\[
\frac{\partial x(K_i, I_i^{CC})}{\partial I_i} = u'(z_i^{CC}) = 1 + aR^{CC}, \quad \text{and}
\]

\[
I_i^{CC} + z_i^{CC} = E^5 + R^{CC}/N. \tag{12}
\]

**Proposition 4:** If soft budget constraints prevail under fiscal centralization without monetary finance, they will also prevail under fiscal and monetary centralization. Moreover, soft budget constraints have inflationary effects: \(R^{CC} > R^{FB}\).

The possibility of monetary finance increases the government budget, thus reduces the opportunity cost of subsidies. Therefore, the budget constraint of enterprises can only be made softer, the softer the lower the marginal cost of inflation \((1 + aR^{CC})\). In the following discussions, we take as benchmark the case where budget constraints under fiscal and monetary centralization are soft.

**Fiscal Decentralization and Monetary Centralization**

We first consider a situation which we call "accommodation" where the central government intends to use monetary grants to "correct" distortionary decisions of local governments. In such a game, the local governments first decide on their expenditures, then the central government chooses total monetary finance and allocates monetary grants to local governments earmarked for local public goods and subsidies.

Given the choice of \(I_i^{DA}\) and \(z_i^{DA}\) of local governments, the central government determines simultaneously aggregate monetary finance \(R^{DA}\) and allocation of grants \(z_i^G\) (and possible subsidies \(S_i^G\)) to each region to solve:

\[
\max \sum (x(K_i, I_i^{DA}) + y_i + u(z_i^{DA} + z_i^G)) - (R + (a/2)R^2)
\]

\[
s.t. \sum z_i^G + S_i^G = R,
\]
The first order conditions of the central government are given by
\[ u'(z_i^{DA} + z_i^G) = u'(z_j^{DA} + z_j^G) = 1 + aR^{DA}, \] and
\[ \sum z_i^G + S_i^G = R^{DA}. \]  
\[ (13) \]  
\[ (14) \]
Anticipating the central government's decisions, local governments behave strategically and make their choice \((I_i^{DA}, z_i^{DA})\) according to
\[ \frac{\partial x}{\partial K_i} (K_i, I_i^{DA})/\partial I_i + (\frac{\partial x}{\partial K_j} (K_j, I_j^{DA})/\partial K_j (dK_j/dI_j) + (\partial u/\partial z)(dz_i^G/dI_i) \geq u'(z_i^{DA} + z_i^G) \]
\[ (15) \]
\[ I_i^{DA} + z_i^{DA} = E, \]
with a strict inequality holding in (15) if \(z_i^{DA} = 0.\)

**Proposition 5:** There exists a hard budget constraint equilibrium under fiscal decentralization with monetary accommodation if \(R^{DA} > (B - 1)/a.\) However, it is associated with higher inflation than that under fiscal and monetary centralization: \(R^{DA} > R^{CC}.\)

Proposition 5 shows that, due to the fiscal competition and competition for grant effects, hard budget constraints may still be obtained under monetary centralization with accommodation. Nevertheless, they are necessarily associated with higher inflation. This is because local governments behave strategically to invest less in local public goods, which increases the marginal benefit of inflation for the central government as it uses monetary creation to correct the distortions of the local governments. This increases inflation. But inflation is costly, so the distortion can only be partially corrected. In particular, if inflation is costly enough (a is large), budget constraints can remain hard. The situation resembles that in Proposition 3 with small (monetary) grants. Clearly, if inflation is not too costly (a is small), budget constraints will become soft.

Under what conditions is it possible to obtain lower inflation than under fiscal and monetary centralization, together with hard budget constraints? To answer this question we examine the
situation polar to the preceding one ("no accommodation"). The central government commits ex ante to a rule of money creation and seigniorage allocation between regions (which eliminates competition for grants) and local governments have full control over the use of revenues including the allocated seigniorage. More precisely, the central government first decides total monetary creation $R$ and allocates monetary grants to each region. Afterwards, each local government decides on $I_i$, $z_i$, and $S_i$ given their grant. For a given grant $R/N$, a Nash equilibrium $I_i^{DN}(R/N)$ and $z_i^{DN}(R/N)$ satisfies:

$$\frac{\partial x(K_i, I_i^{DN})}{\partial I_i} + (\frac{\partial x(K_i, I_i^{DN})}{\partial K_i}) (\frac{dK_i}{dI_i}) = u'(z_i^{DN}).$$ (17)

Anticipating the local governments' decisions, the central government thus chooses $R$ to solve:

$$\max \Sigma \{x(K_i, I_i^{DN}(R/N)) + y_i + u(z_i^{DN}(R/N))\} - (R + (a/2)R^2).$$

The first order conditions of the central government are given by

$$(\frac{\partial x(K_i, I_i^{DN})}{\partial I_i}) (dI_i^{DN}/dR) + u'(z_i^{DN}) (dz_i^{DN}/dR) = 1 + aR^{DN}.$$ (18)

**Proposition 6:** Compared with fiscal and monetary centralization, budget constraints can only be hardened under fiscal decentralization without monetary accommodation, and moreover, inflation will be lower ($R^{DN} < R^{CC}$) provided $dI_i^{DN}/dR$ is sufficiently high.

Because of fiscal competition, the central and local governments exhibit (endogenously) different spending preferences as the marginal regional value of infrastructure investment is higher than the marginal social value. Therefore the local governments will use an increased regional budget in a different way (more for infrastructure investment) from the one the central government prefers (more for local public goods). Because the central government has no power to correct the distortion, it has less incentives for monetary creation. The conflict of interest between the central and local governments yields monetary restraint under the intuitive condition that fiscal competition is important enough (i.e., $dI_i^{DN}/dR$ is sufficiently high).
Comparing the results of Propositions 5 and 6 with those of Proposition 4, we see that higher inflation is obtained under fiscal decentralization when the central government has the power to use monetary creation to correct distortions made by local governments. In contrast, when the local governments have full control over their expenditures and the central government has no discretion over the allocation of seigniorage revenues between regions, both lower inflation and hard budget constraints can be achieved. The system of separation of powers underlying Proposition 6 is thus better structured to achieve both objectives.

Fiscal and Monetary Decentralization

Although the case of monetary decentralization in which the central government completely loses control over money supply to local governments is extreme, it finds empirical relevance in China in the 1980s and in the Commonwealth of Independent States after the break-up of the Soviet Union. Decentralized monetary creation creates an inflationary externality as each local government gets the full benefits from money creation but shares the costs of inflation with other regions, which leads to an extreme form of beggar-thy-neighbor policy, a "tragedy of the commons."

Because regions are all identical, we assume that when region i secures itself $R_i$ from inflationary finance, it only bears $1/N$ of the total cost. The local government in region $i$

$$\max x(K_i, I_i) + y_i + u(z_i) - (R + (a/2)R^2)/N$$

subject to $S_i + I_i + z_i = R_i + E_i$,

by taking other regions’ decisions (including $R_j$, $j \neq i$) as given. The first order conditions are:

$$\frac{\partial x(K_i, I_i^{DD})}{\partial I_i} + \frac{\partial x(K_i, I_i^{DD})}{\partial K_i}(dK_i/dI_i) = u'(z_i^{DD}) = (1 + aR^{DD})/N.$$  \hspace{1cm} (19)

**Proposition 7:** Inflation is always higher under fiscal and monetary decentralization: $R^{DD} > R^{CC}$.

Furthermore, soft budget constraints also prevail as long as $R^{DD} \leq NR^{CC} + (N-1)/a.$
Because of the externality of inflation, inflation is always higher. Concerning budget constraints, there are two offsetting effects: Fiscal competition tends to harden them while monetary expansion tends to soften them. The latter effect tends to dominate because the inflation externality reduces the marginal cost of inflation, leading to higher budgets with high $I_i$ and $z_i$ and thus with a lower opportunity cost of bailouts.\(^\text{14}\)

5. Interpreting the Reform Experience of China

The above theoretical analysis sheds considerable light on the reform experience of China and its unique features. It is well known that in Russia and Eastern Europe, privatization is the main focus of transition and it is largely driven by the central government. Privatization has also been considered as a major instrument in hardening budget constraints of enterprises. In contrast, one of the most distinct features of China's transition has been associated with devolution of authority from the central to local levels of government (Montinola, Qian and Weingast 1995). Decentralization in China started as early as 1980. In 1994, the local government expenditure as a percent of total government expenditures was 60% in China, as compared with 34% in industrialized countries and 22% in developing countries (World Bank 1996). State-owned enterprises controlled by local governments account for about three-quarters of total industrial output in the state sector since 1985.

Decentralization induces fiscal competition among local governments. Indeed, local governments in China compete vigorously in making tax concessions, investing in infrastructure, and establishing development zones in order to attract foreign capital and domestic business into their regions. Broadman and Sun (1995) show that the level of infrastructure development along with the market size, the educational level of the labor force and the geographical location accounts for 80%\(^\text{14}\)

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\(^{14}\) A pathological case of hard budget constraints may prevail when the marginal value of infrastructure investment is very high and decreases slowly so that local public goods provision is always very small for any budget size.
of the variation in the stock of foreign direct investment across provinces.

Unlike Eastern Europe and Russia, restructuring and privatization of state-owned enterprises in China began as a result of decentralization, and they are pushed by the local governments without any centralized program. Since 1993, many state-owned enterprises controlled by local governments started to cut back wages and reallocate and lay off workers. For example, in Shanghai alone, about 385 thousand workers were re-allocated or laid off in 1994 (Economic Daily, January 10, 1995) and more in 1995. More radically, region by region, local governments started to privatize state-owned enterprises under their control. For example, Zhucheng of Shandong province virtually privatized all of their state-owned enterprises in 1994 (Economic Daily, March 29-April 3, 1996 and Wall Street Journal, June 10, 1996).

The incentives of local governments for restructuring and privatization come mainly from their tight budgets and the pressure of competition among local governments. Section 3 shows exactly how fiscal decentralization and competition among local governments increases the opportunity costs of providing subsidies and hardens budget constraints of enterprises. What is more interesting is the timing of such local government initiated restructuring and privatization, and our analysis in Section 4 sheds light on this. Before 1993, China’s monetary institutions were problematic: On some occasions China experienced a de facto monetary decentralization as local governments forced the central bank branches in their regions to extend credits and print money; and in other occasions the central bank made monetary expansion hoping to correct distortions made by the local governments. In other words, conditions were close to those of Proposition 5 or even of Proposition 7. Since 1993, China has centralized the monetary authority and the central bank has refused to accommodate monetary policy to local governments’ behavior (World Bank 1996). Under

\[\text{\footnotesize{15 Recall that in the case of Proposition 5, hard budget constraints are obtained only if inflation is sufficiently costly.}}\]
these conditions, Proposition 6 shows that fiscal decentralization tends to lower inflation and harden budget constraints. That was what happened in China in 1994 and 1995: Inflation started to decline and restructuring and privatization by local initiatives started to emerge precisely at this time.

6. Conclusions

We presented a model putting the soft budget constraint in a macroeconomic perspective. We have analyzed how fiscal and monetary arrangements under federalism affect the degree of softness budget constraints of enterprises. We showed that decentralization of government can be an important dimension of the overall process of transition. Although the model was tailored to the Chinese economy, the themes we analyzed have applications more general than China.

The first general insight relates to the commitment effects of fiscal competition which tends to change the incentives of government and limit its behavior. The literature on fiscal federalism has shown how fiscal competition can inefficiently reduce government activity. Our paper has shown that in a second best world fiscal competition may serve as a commitment device to prevent inefficient government spending. The issue is important in the context of European unification where the question of the adequate level of fiscal centralization or decentralization is high on the policy agenda. It is also important in the U.S. context where there are renewed debates over the advantages of fiscal expenditures being taken away from the federal government and given to the states.

Second, the paper sheds light on the effects of fiscal decentralization on the composition of government expenditures in general. Recent empirical evidence on developing and industrialized countries alike shows that decentralization of fiscal authority leads to a change in the composition of public expenditures, and in particular to an increase in the share of infrastructure expenditures (Estache and Sinha, 1994). Our model precisely predicts such a change due to fiscal competition.

Third, the paper shows the importance of the link between monetary institutional
arrangements and the degree of fiscal decentralization. In our model, low inflation and hard budget constraints are associated with decentralization of fiscal expenditures and the centralized rules of money supply and allocation of seigniorage revenues to local governments. Fiscal centralization would lead to higher inflation and softer budget constraints. The issue is of particular concern for Europe in the perspective of monetary unification. Because the issue of how to allocate seigniorage revenue to European Union members under a monetary Union has not been settled, competition among local governments for monetary grants may lead to higher inflation and tend to soften budget constraints.
Figure 1  The Mechanism of the Soft/Hard Budget Constraint

Figure 2  Welfare Comparison
References


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Appendix

Proof of Proposition 1: Because the cost of not bailing out m (m ≥ 1) projects is mB, but the benefit is less than mu(z^C_i), "no bailout" is not a worthwhile deviation under the specified condition.

Comparing (1) and (3), E^H > E^S together with concavity of u(z_i) implies that I_i^C < I_i^{FB} and z_i^C < z_i^{FB}. Concavity of x(K_i, I_i) with respect to I_i ensures that

\[ B_s > \frac{\partial x(K_i, I_i^C)}{\partial I_i} > \frac{\partial x(K_i, I_i^{FB})}{\partial I_i}. \]

Hence there cannot be a hard budget equilibrium (which has to be I_s = I_i^{FB}). ■

Proof of Proposition 2: The condition implies that bailout is not worthwhile. If there were a soft budget constraint equilibrium with I_s^*, we would have, considering (5) and (6) and E^H > E^S,

\[ \frac{\partial x(K_i, I_i^*)}{\partial I_i} + (\frac{\partial x(K_i, I_i^*)}{\partial K_i})(dK_i/dI_i) = u'(E^S-I_i^*) > u'(E^H-I_i^{FB}) > B_s, \]

then bailout is not preferred, a contradiction. Comparing (3) and (5), we have u'(z_i^C) < u'(z_i^D), hence z_i^C > z_i^D. Finally, E^H > E^S implies that I_i^C < I_i^D. ■

Proof of Proposition 3: When (7) holds with equality, comparing (5) and (7), dz_i^G/dI_i > 0 implies for a same budget E^H = z_i^P + G = z_i^P + z_i^G < z_i^D. Hence, u'(z_i^P + z_i^G) > u'(z_i^D) > B_s by the condition of Proposition 2. Then neither the central government nor local governments have incentives for bailout. When (7) holds with inequality, if z_i^P + z_i^G = G < z_i^D, then the left hand side of (7) is greater than u'(z_i^P + z_i^G), which is greater than u'(z_i^D) and B_s. If z_i^P + z_i^G = G > z_i^D, we must have \( I_i^P < I_i^D \), then the left hand side of (7) is greater than \( \frac{\partial x(K_i, I_i^P)}{\partial I_i} + (\frac{\partial x(K_i, I_i^D)}{\partial K_i})(dK_i/dI_i) \) which is in turn greater than B_s. In both cases, the local governments have no incentives for bailout. Under the condition G < z, u'(G) > B_s, the central government has no incentives for bailout either.

To show there is no soft budget equilibrium, use (7) and apply the proof of proposition 2. ■

Proof of Proposition 4: If R^{CC} < R^{FB}, E^S + R^{CC}/N < E^H + R^{FB}/N as E^S < E^H. The smaller budget would imply u'(z_i^{CC}) = 1 + aR^{CC} > u'(z_i^{FB}) = 1 + aR^{FB}, or R^{CC} > R^{FB}. ■
Proof of Proposition 5: Take a high enough so that R^{DA} > 0 is arbitrarily small. This implies that (15) holds with equality since z_i^{DA} > 0. Suppose z_i^{DA} > z_i^{D}. Since I_i^{DA} + z_i^{DA} = I_i^{D} + z_i^{D} + R_i^{DA}/N and R_i^{DA} is small, then I_i^{DA} < I_i^{D}. This would imply that (15) holds with inequality, a contradiction. Hence z_i^{DA} ≤ z_i^{D} < z and z_i^{DA} + R^{DA}/N < z. Furthermore, under a hard budget constraint, u'(z_i^{DA} + z_i^{C}) > B, > u'(z_i^{CC}), using (11) and (13), this implies R^{DA} > R^{CC}.\[\]

Proof of Proposition 6: z_i^{DN} > z_i^{CC} would imply u'(z_i^{DN}) < u'(z_i^{CC}), the budget constraint would remain soft. By (17), we would obtain \(\delta x(K_i, I_i^{DN})/\partial I_i < u'(z_i^{DN}) < u'(z_i^{CC})\). Using dI_i^{DN}/dR + dz_i^{DN}/dR = 1, we derive

\[
1 + aR^{DN} = (\delta x(I_i^{DN})/\partial I_i) (dI_i^{DN}/dR) + u'(z_i^{DN}) (dz_i^{DN}/dR) < u'(z_i^{CC}) = 1 + aR^{CC}
\]

Therefore, R^{DN} < R^{CC}, which would imply z_i^{DN} ≤ z_i^{CC}, a contradiction. Therefore, z_i^{DN} ≤ z_i^{CC}, that is, the budget constraint can only be made harder. If u'(z_i^{DN}) > B, > u'(z_i^{CC}), the budget is hard.

Given u'(z_i^{DN}) > u'(z_i^{CC}), we establish, using dI_i^{DN}/dR + dz_i^{DN}/dR = 1, (17) and (18),

\[
R^{DN} < R^{CC}
\]

if and only if

\[
[\delta x(K_i, I_i^{DN})/\partial I_i - u'(z_i^{DN})](dI_i^{DN}/dR) < u'(z_i^{CC}) - u'(z_i^{DN})
\]

if and only if

\[
dI_i^{DN}/dR > \{u'(z_i^{DN}) - u'(z_i^{CC})\}/[\delta x(K_i, I_i^{DN})/\partial K_i] (dK_i/dI_i)].\]

Proof of Proposition 7: R^{CC} > R^{DD} would imply 1 + aR^{CC} > (1 + aR^{DD})/N, thus u'(z_i^{CC}) > u'(z_i^{DD}) and z_i^{CC} < z_i^{DD}. As B, > u'(z_i^{CC}) > u'(z_i^{DD}), budget constraints are always soft. But R^{CC} > R^{DD} and z_i^{DD} > z_i^{CC} imply I_i^{CC} > I_i^{DD}, which gives \(\delta x(K_i, I_i^{DD})/\partial I_i + (\delta x(K_i, I_i^{DD})/\partial K_i)(dK_i/dI_i) > \delta x(K_i, I_i^{CC})/\partial I_i\), that is, u'(z_i^{DD}) > u'(z_i^{CC}), a contradiction.

By (11) and (19), R^{DD} < NR^{CC} + (N-1)/a if and only if u'(z_i^{DD}) < u'(z_i^{CC}). Then the budget constraint is soft if R^{DD} < NR^{CC} + (N-1)/a.\[\]


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