Bailouts and Soft Budget Constraints in Decentralized Government: A Synthesis and Survey of an Alternative View of Intergovernmental Grant Policy

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Abstract: This paper selectively surveys the theoretical literature to date on governmental soft budgets where governments are bailing out other governments. The traditional view of intergovernmental grants is that grants can be used by the central government to correct for positive spillover externalities or fiscal equalization. We first we explain how the set-up of the developing "soft budget constraint" view of grant policy differs from the traditional view in fundamental ways. We then use a simple workhorse model of intergovernmental soft budgets under perfect information to examine different motivations for central government bailouts and expand the usual textbook analysis of grants to illustrate the intertemporal distortions under the alternative view of grants. This type of model has been extended in various directions. We examine extensions that include capital taxation, tax competition, forms of equalizing grants, overlapping budget constraints, multiple grant instruments, and the case when public spending is an input to private production. We also briefly review certain papers that examine intergovernmental soft budgets and bailouts when public investment has uncertain returns, a feature of the original models relating to SOEs, and a closely related literature that deals with decentralized leadership and an analogy to Becker's Rotten Kid Theorem. We conclude with some thoughts on directions for future research.

I. Introduction

Traditional textbook analysis of intergovernmental grant policy focuses on the ways in which the central government can incentivize lower levels of government to achieve particular aims or internalize externalities. For instance, as discussed by Oates (1999), matching grants are typically viewed as an appropriate tool to internalize inter-jurisdictional positive externalities since they lower the price faced by lower-level governments and hence encourage the activity. In theory one could alter the price to just compensate for the external marginal benefit and so enhance efficiency. A different sort of grant, lump-sum fiscal equalization grants, can be used to help achieve fiscal parity between governments (Dahlby and Wilson, 1994). While certain undesirable aspects of these grants, such as a distortion in own-tax choices (Smart, 2007) have been uncovered in the literature, such grants are considered a useful tool to offset unequal tax bases and hence equalize spending on goods such as education that are considered fundamental.

Yet there is a less sanguine view of intergovernmental grants that has been developed over the past fifteen years. This view draws on initial work by Kornai (1986) who developed the concept of a soft budget constraint for government-financed firms such as state-owned enterprises (SOEs). The work of Kornai and others, surveyed in Maskin (1999) and Kornai, Maskin, and Roland (2003), suggests that state-owned enterprises can be very inefficient in part because investment projects initiated by the SOE will rely on funding from the central government. Since the central government does not know whether the investment project is good or bad but the SOE does, the SOE can use its knowledge to obtain more funds from the central government than warranted.

This idea was first applied to intergovernmental relations in a paper by Qian and Roland (1998) that is developed in the context of Chinese SOEs but that has some general implications. In their model, there are potentially three economic actors: SOEs, regional governments, and a central government. An

SOE undertakes investment that may be good or bad and at a certain point a government may need to decide whether to bail out the SOE. Which government has bail out authority and under what circumstances is the focus of the analysis. A first scenario is the central government making decisions vis-à-vis the SOE and regional governments playing no role. In this first scenario, the central government does not face competition for mobile capital (or at least faces less competition than a regional government in the next scenario). A second scenario is regional governments making the bailout decision. Regional governments compete with each other for private capital, which is complementary to public investment. Over-investment and under-provision of public goods is the result, and this has implications for bailouts of SOEs. Public good provision becomes more valuable (since there is under-provision) and this increases the cost of diverting revenue for a bailout of the SOE. Hence Qian and Roland (1998) find that fewer bailouts of SOEs occur because of the competition among regional governments.

Notice that a bailout for Qian and Roland is for the SOE, not for a particular government. Nevertheless, many of the fundamental ideas lie at the heart of the developing literature on bailouts of decentralized governments. In particular, commitment to a hard budget constraint, or lack thereof, is key. In this paper we review the theoretical literature to date concerning the presence of soft budgets and bail outs of decentralized governments by a higher level government.

The remainder of this survey proceeds as follows. In the next section we explain how the newer "soft budget constraint" view of grant policy differs from the traditional view. Section III develops a workhorse model of intergovernmental soft budgets under perfect information and uses the model to examine different central government motivations for bail outs. Section IV examines extensions of the basic model that have been developed in the literature. The initial soft budget constraint literature that dealt with SOEs examined models of asymmetric information. Some authors have returned to this

original framework and considered public investment with uncertain returns. We examine these papers in Section V. A closely related literature examines decentralized leadership and an analogy to Becker's Rotten Kid Theorem. This line of research is examined in Section VI. Finally, we conclude in Section VII.

II. How the Soft Budget Constraint View of Grant Policy Differs from the Traditional View

The modeling of soft budget constraints differs considerably from the traditional approach of grants. The traditional view of grants developed over several decades, starting from about 1970. While there have been many contributions, two of the early main ones are Bradford and Oates (1971) and Boadway and Flatters (1982). These approaches use somewhat different models but are similar from a game-theoretic perspective in that the subnational government reacts passively to the policy set by the central government. One way to think about this in terms of game theory involves the implied timing of moves by the central government and subnational governments. While timing was not made explicit in these early models, the implicit timing that is consistent with a subnational government passively reacting to the policy set by the central government is that the central government moves first in setting grant policy and subnational governments move second, taking as given the central government policy.

Thought about in this way, timing turns out to be extremely important. The theory developed from this timing is that the central government can set grant policy to influence subnational government decisions. To encourage a particular activity, the central government can offer either a matching grant or a lump-sum grant. The matching grant lowers the price of public spending (thus generating both income and substitution effects) while a lump-sum grant acts like an increase in income to the subnational government. Either way, public spending is encouraged. Thus, if the central government wants to correct an externality (such as would occur from spillover benefits) or equalize spending across subnational governments, it need only undertake the appropriate grant policy to achieve its aims. SNGs take the incentives offered by the central government as given and react accordingly. Knowing this the

central government simply sets a grant that achieves its aims, whether that is efficiency, equality, or something else.

In practice, things turned out not to be so simple. Empirically it was found that grants stimulate more spending than a simple increase in income for the community. This was dubbed the "flypaper effect" and this finding resulted in a large empirical and theoretical literature to try to explain this observed phenomenon. A short but insightful recent review of the themes of this literature is Inman (2008).

Meanwhile, decentralization was being experimented with across many countries of the world, as the institutions of government in many countries were being reformed. This was due in part to the break-up of the Soviet Union, but other causes were also at work. For instance, the fall of apartheid in South Africa led to a reform of government institutions there (see Inman and Rubinfeld, 2012). And many developing countries had some historic reasons for a federal structure, such as in India and Brazil. (For a number of case studies of the problems of soft budget constraints in these and other developing and developed countries see the volume edited by Rodden, Eskeland, and Litvack, 2003).

Researchers began to recognize fiscal profligacy of regional governments as a problem, so much so that in some countries such as Argentina it was viewed as part of the reason for national government default and abandonment of a strict one-to-one peg to the US dollar. Researchers realized that the traditional view of grants was lacking as it could not explain the problem of fiscal profligacy. In particular, researchers began to recognize that strategic decisions of subnational governments had been left out of the equation. The soft budget constraint literature put this aspect front and center.

One crucial change required to model the federal version of a soft-budget constraint is a change in the order of moves of different levels of government. Rather than the characteristic traditional approach in which the implied order is a first move by the central government followed by a subnational

government, the standard version of a soft budget constraint in a federation is a model where subnational governments move first and the central government moves second. This reversal of moves will imply a first-mover advantage for sub-national governments. This opens up the possibility for lower-level governments to undertake actions that influence the central government response.

Simply reversing the order of moves is however not sufficient to create a soft budget constraint for this depends as well on the expectations of the subnational government concerning future central government actions. Since the typical soft-budget constraint case involves a decision on borrowing by the subnational government, let us consider this case as an example. As the sub-national government borrows it is crucial for it to make a prediction about central government behavior when the borrowing must be paid back. Will the central government fill any deficit in funding by increasing grants, or will it force the regional government to come up with the funds on its own? The soft-budget constraint issue will emerge in a model in which a sub-national government's borrowing decision is taken prior to the decision by the central government on grants and in which the expectation is that the central government will increase grants in response to an increase in borrowing, at least partially paying for any borrowing. The natural response to an expected (at least partial) bail out is to borrow too much.

What would motivate such an expectation on the part of a SNG? Even though the central government may not want to bail out regions ex-ante, ex-post they often do so for political or other reasons as described below. This creates a soft-budget constraint and an incentive for the SNG to borrow and spend too much. The switch in the order of moves is sensible when trying to explain fiscal profligacy on the part of subnational governments because it seems to reflect real world situations: subnational governments borrow keeping in mind what they think the behavior of the central government will be in the future.

This sort of dynamic game in which the timing of decisions is important should be distinguished from dynamic optimization models. True dynamic optimization models would typically solve for the dynamic path of a control variable and might address dynamic issues in asset or financial markets. And while soft budget constraint models usually involve some sort of borrowing to be paid back later making the time dimension relevant, the soft budget constraint literature has not addressed in any depth these issues and we do not delve deeply into them here. We confine ourselves to the most rudimentary form of a dynamic optimization model – the 2-period model. And while the 2-period model is a natural and particularly easy place to start in a model involving borrowing, it of course does not get us very far in describing the dynamics of the problem, financial markets, or asset pricing. There are however some common elements that dynamic games and dynamic optimization share, particularly the important role played by expectations. The two-period model thus provides a useful starting point as it allows a neat fit of a two-stage dynamic game in a two-period optimization problem. Still, there is likely much insight to be gained by expanding the analysis to a many-period model and thinking about the evolution of important variables over time.

III. A Workhorse Model of the Soft Budget Constraint in a Two-Period Model

In order to further describe the issues, it is useful to sketch a basic workhorse model of soft budget constraints for illustrative purposes. I follow the basic outline of Goodspeed (2002). This model incorporates both the dynamic game aspects mentioned above and a (albeit very rudimentary) time dimension as it is a two-period model. As there are two types of players (one type of which moves first) and two time periods, it very simply combines the dynamic game with a 2-period inter-temporal model.

The two types of players are (i) a set of m subnational governments and (ii) the central government. The subnational governments move first in period 1, choosing borrowing and any subnational period 1 taxes. The central government moves second in period 2, choosing period two

grants (period 1 grants are taken as exogenously set), and subnational governments also choose period 2 subnational taxes. There will be strategic interactions between the m SNGs and between the SNGs and the central government. Note that while there are 2 types of players, there are m subnational governments (potentially many which adds some realism to the model), that play a non-dynamic Nash game between them. The multi-player dimension of the non-dynamic game will be discussed later when the solution to this part of the problem is solved. Thus there are essentially two types of games that are being played: (i) a non-dynamic Nash game between the m SNGs in periods 1 and 2 and (ii) a sequential dynamic Stackelberg game between the SNGs and the central government.

Regions can be of different sizes. Subnational government i is inhabited by n_i identical consumers. The utility of the representative consumer in region i is assumed to be a function of private consumption in periods 1 and 2, C_{i1} and C_{i2}, and per-capita public consumption in periods 1 and 2, G_{i1} and G_{i2}. The representative consumer has private income in each period, Y_{i1} and Y_{i2}.

Before play begins, the central government is assumed to decide on an initial level of grants for each region in period one, denoted g_{i1}. This initial decision is exogenous to the game to be played. In addition to the exogenous central government grants received in period one, the region is able to borrow an amount per capita for public consumption in period 1 denoted B_{i1G}, and chooses a period one tax rate. Consumers can borrow an amount for private consumption in period 1 denoted by B_{i1C}. In period two borrowing is repaid, regions choose a tax rate and the central government chooses second period per-capita grants, g_{i2}.

I emphasize again that there are strategic interactions among the subnational governments, and between the SNGs and the central government. Subnational governments are playing a non-dynamic Nash game between themselves in choosing taxes in period 1. However, with respect to the central government, the SNGs are playing a dynamic sequential Stackelberg game where the SNG moves first in

its choice of subnational borrowing and first period taxation. The game is one of perfect information and each SNG predicts (correctly in equilibrium) how the central government will react in period two, taking as given the actions of the other SNGs and taking into account the reaction function of the central government in its choice of borrowing in period one.

The typical solution methodology for the dynamic game is backwards induction, solving first for the player who moves second and then using the solution to this problem to solve for the players who move first. The set-up of the model is such that the dynamic game is easily folded into the inter-temporal model since the player who moves second in this case (the central government) moves in period 2 and the players who move first in the dynamic game (the subnational governments) move in period 1. Of course subnational governments also choose taxes in period 2 but since they are playing Nash with the other subnational governments and utility is separable this part of the problem can be solved simultaneously with the other subnational choice variables. We consequently first describe the solution to the period 2 central government problem followed by the subnational government solutions in period 1 as well as period 2.

The motivation of the central government has been the subject of a number of papers and must be specified to solve the model. We begin with the political motivation developed in Goodspeed (2002). We will then discuss other motivations of the central government discussed thus far in the literature.

A. Solving the Model with a Central Government Political Motivation

We begin the workhorse model with the central government motivated by a probabilistic voting model as in Goodspeed (2002). Given the probabilistic set up, the central government will choose period 2 grants for each of the i SNGs to maximize the probability of votes summed across regions. The probability of a representative citizen of region i voting for the incumbent government, p_i, depends on that voter's utility function. We further assume that the utility function of the voter is additively

separable. Since voters are assumed to be identical in a region, the utility function for a citizen of region i is multiplied by that region's population. The maximization problem is subject to constraints for public and private spending in periods 1 and 2 for each region as well as the central government budget constraint. This latter constraint equates total spending on grants to total tax collections, assumed below to be central income tax revenues. The problem is thus:

$$\underset{g_{i2}}{\text{Max}} \sum_i n_i p_i \left(u_i \left(G_{i1} \right) + v_i \left(G_{i2} \right) + w_i \left(C_{i1} \right) + z_i \left(C_{i2} \right) \right)$$

$$\text{s.t. } G_{i1} = g_{i1} + t_{i1} Y_{i1} + B_{i1}^G$$

$$C_{i1} = Y_{i1} \left(1 - t_{i1} \right) + B_{i1}^C$$

$$G_{i2} = g_{i2} + t_{i2} Y_{i2} - B_{i1}^G (1 + r)$$

$$C_{i2} = Y_{i1} \left(1 - t_{i2} - t_2^C \right) - B_{i1}^C (1 + r)$$

$$t_2^C \sum_i n_i Y_{i2} = \sum_i n_i g_{i2}$$

The i first-order conditions define the optimal grant policy for each SNG which will also constitute the central government's reaction function for each SNG:

$$n_i \frac{\partial p_i}{\partial v_i} \frac{\partial v_i}{\partial G_{i2}} - \sum_{k=1}^{m} n_k \frac{\partial z_k}{\partial C_{k2}} \frac{n_i Y_{k2}}{\sum_k n_k Y_{k2}} = 0$$

It is useful to note is that this can be rewritten as

$$n_i \frac{\partial p_i}{\partial v_i} \frac{\partial v_i}{\partial G_{i2}} - n_i \sum_{k=1}^{m} \frac{\partial z_k}{\partial C_{k2}} \frac{n_k Y_{k2}}{\sum_k n_k Y_{k2}} = 0 \quad \text{for all i}$$

It then becomes obvious that, except for the n_i, the second term is the same for all jusrisdictions and since the n_i cancel, the entire set of i first order conditions will be

$$\frac{\partial p_i}{\partial v_i} \frac{\partial v_i}{\partial G_{i2}} = \frac{\partial p_j}{\partial v_j} \frac{\partial v_j}{\partial G_{j2}} \quad \text{for all i, j}$$

The central government will choose grants to equate the weighted marginal utility of regions' voters, with the weights depending on the increase in probability that a resident of a region will vote for the incumbent. On the one hand the central government is attempting to equalize marginal utility, but on the other hand the political element indicates that not all regions are the same from a political point of view. The central government wants to get the greatest political bang from giving more grants. A high weight for region i implies it is viewed as more valuable politically and the central government will give it more grants, ceteris paribus.

Moving to period 1, SNGs will choose a level of taxes and borrowing to maximize their utility subject to the usual constraints of period 1 and period 2 public and private consumption, and in addition subject to the predicted behavior of the central government in period 2. In equilibrium, this will be the actual behavior of the central government derived above, the reaction function of the central government. Solving the reaction function for the level of grants for SNG j and denoting this function by f_j, the problem is:

$$\underset{t_{i1},t_{i2},B_{i1}^G,B_{i1}^C}{\text{Max}} \; u_i\left(G_{i1}\right)+v_i\left(G_{i2}\right)+w_i\left(C_{i1}\right)+z_i\left(C_{i2}\right)$$

$$\text{s.t. } G_{i1}=g_{i1}+t_{i1}Y_{i1}+B_{i1}^G$$

$$C_{i1}=Y_{i1}\left(1-t_{i1}\right)+B_{i1}^C$$

$$G_{i2}=g_{i2}+t_{i2}Y_{i2}-B_{i1}^G(1+r)$$

$$C_{i2}=Y_{i1}\left(1-t_{i2}-t_2^C\right)-B_{i1}^C(1+r)$$

$$t_2^C\sum_i n_iY_{i2}=\sum_i n_ig_{i2}$$

$$g_{j2}^*=f_j(1+r) \;\; \text{for all j}$$

A key question is the exact form of the reaction function f_j, and particularly whether it is a function of first-period borrowing. A glance at the constraints of the central government's problem should convince the reader that it certainly is a function of first-period borrowing since v_i is a function of G_{i2} and G_{i2} is a function of B_{i1G}.

The first-order conditions for this problem are:

$$\frac{\partial u_i}{\partial G_{i1}} Y_{i1} - \frac{\partial w_i}{\partial C_{i1}} Y_{i1} = 0$$

$$\frac{\partial w_i}{\partial C_{i1}} - \frac{\partial z_i}{\partial C_{i2}}(1+r) = 0$$

$$\frac{\partial u_i}{\partial G_{i1}} - \left(1 - \frac{\partial f_{i2}}{\partial B_{i1}^G}\right)\frac{\partial v_i}{\partial G_{i2}}(1+r) - \frac{\partial z_i}{\partial C_{i2}} \sum_{j=1}^{m} \frac{n_j Y_{j2}}{\sum_k n_k Y_{k2}} \frac{\partial f_{j2}}{\partial B_{i1}^G}(1+r)$$

$$\frac{\partial v_i}{\partial G_{i2}} Y_{i2} - \frac{\partial z_i}{\partial C_{i2}} Y_{i2} = 0$$

The incentive problems of the SNG related to the soft budget constraint are laid out in the third first-order condition. It is useful to use the fourth first-order condition to rewrite this as

$$\frac{\dfrac{\partial u_i}{\partial G_{i1}}}{\dfrac{\partial v_i}{\partial G_{i2}}} = \left(1 - \frac{\partial f_{i2}}{\partial B_{i1}^G}\right)(1+r) + \sum_{j=1}^{m} \frac{n_j Y_{j2}}{\sum_k n_k Y_{k2}} \frac{\partial f_{j2}}{\partial B_{i1}^G}(1+r)$$

Notice that if the reaction function of the central government is such that it does not adjust future grants to prior borrowing, the first-order condition reduces to the usual Euler condition. If however the central government does react to borrowing by increasing future grants, there are two effects. The first is that the region perceives a lower cost for borrowing because the opportunity cost of borrowing becomes smaller. In the extreme case in which the central government finances entirely any borrowing including interest, the opportunity cost effect becomes zero and vanishes. The second effect has been dubbed the common pooling effect and is due to the fact that the central government must raise additional revenues to increase grants. Thus, even if the central government finances entirely any borrowing including interest, the central government tax rate must be higher and the SNG will pay its proportionate share. This implies that the perceived cost of borrowing by a SNG will be greater than

zero but less than (1+r) so the SNG will over-borrow. Of course, as the number of SNGs rise this term becomes smaller as well, approaching zero as the number of SNGs gets very large. Thus, incentives to over-borrow are greatest with a central government that finances entirely SNG borrowing combined with a large number of SNGs.

The multi-player dimension of this part of the problem raises some other interesting issues. In general, the nature of the Nash equilibrium among regions potentially depends on the exact nature of the central government reaction function and the knowledge of each government. However some aspects of the problem help to simplify the solution. Note that each sub-national government cannot influence the borrowing of others – the borrowing of regional government i takes the borrowing of others as given and there is no externality. If the central government reaction function takes a form such that only region i's grant allocation is affected when region i borrows so that $\frac{\partial f_{j2}}{\partial B_{i1}^{G}} = 0$ for all i ≠ j, then this part of the problem is analogous to the problem of the diner's dilemma with the attendant profligacy. In the diner's dilemma problem, a set of people shares the cost of a meal in a restaurant. The solution is that each diner will order something more expensive than each would on his or her own, and the incentive to order a more expensive meal only rises as the number of people sharing rises. This result will also arise in the present problem for the case where $\frac{\partial f_{j2}}{\partial B_{i1}^{G}} > 0$ but region i is not privy to that information – that is, if each region predicts the response to its own borrowing but is not knowledgeable about what will happen to other regions. On the other hand, if $\frac{\partial f_{j2}}{\partial B_{i1}^{G}} > 0$ and region i correctly predicts the entire reaction function (meaning all the changes in grants to other regions as well as to it) things become more complicated. Potentially it is possible for grants to other regions to increase enough to offset the fall in the price of borrowing.

Taking the simplest case of $\frac{\partial f_{j2}}{\partial B_{i1}^{G}} = 0$ for all i ≠ j,, it is perhaps pedagogically instructive to relate these themes to a typical textbook analysis of the effect of grants on subnational government behavior by expanding the textbook analysis inter-temporally and allowing borrowing by the SNG. Figure 1 illustrates the period 1 and period 2 budget choices of a SNG with endowment E. The solid line AEB indicates the hard budget constraint choices and has a slope of –(1 + r). Points to the right of E along the budget constraint indicate borrowing while points to the left indicate saving. The large-dashed line EC indicates how the budget constraint changes when there is a bailout and a small number of SNGs so that each sees a positive tax share from increased grants. If this is a full bailout, the slope of the line EC is –(1 + r)*(tax share) reflecting the lower price of period 1 spending. Given this budget constraint, optimization implies both income and substitution effects and hence a technically ambiguous response, a point that has not gotten much attention in the literature and could be explored in empirical work. This possibility also makes the motivations of the different levels of government all the more important to specify and analyze. The small-dashed line ED indicates the change in the SNG budget constraint in the extreme case of a full bailout with a very large number of jurisdictions (so that the tax share approaches zero). In this case the budget constraint attains a slope of zero and there is no cost at all to the SNG of borrowing.

B. Too Big to Fail: The Spillover Externalities Motive

A different sort of motivation for SNG bailouts is explored by Wildasin (1997), who develops a (one-period) model in which the central government is motivated to bail out regions by spillover benefits from regional public good provision. Wildasin models the central government as choosing grants to maximize the spillover benefit to other regions from public good provision. In his model larger regions are associated with larger spillover benefits so that the central government has an incentive to bail out larger regions rather than smaller ones.

The gist of Wildasin's argument is based on a presumption that the externality depends on the size of the externality-generating region. The spillover externalities motivation and the flavor of Wildasin's results can be derived in a 2-period model using a variation of the workhorse model. To simplify matters we only model spillover benefits for period 2 regional spending and assume that the external benefit to all other regions from region i's public spending is proportional to region i's size. Following Wildasin, we denote these external benefits as $\beta(n_i)(G_{i2})^2$ where the β incorporates external benefits to all other regions. A modified central government problem that incorporates spillover benefits is then:

$$\underset{g_{i2}}{\text{Max}} \sum_i \left(u_i\left(G_{i1}\right) + v_i\left(G_{i2}\right) + \beta\left(n_i\right)\left(G_{i2}\right)^2 + w_i\left(C_{i1}\right) + z_i\left(C_{i2}\right)\right)$$

$$\begin{aligned}
\text{s.t. } & G_{i1} = g_{i1} + t_{i1}Y_{i1} + B_{i1}^G \\
& C_{i1} = Y_{i1}\left(1 - t_{i1}\right) + B_{i1}^C \\
& G_{i2} = g_{i2} + t_{i2}Y_{i2} - B_{i1}^G(1+r) \\
& C_{i2} = Y_{i1}\left(1 - t_{i2} - T_2^C\right) - B_{i1}^C(1+r) \\
& T_2^C = \frac{1}{N}\sum_i g_{i2}
\end{aligned}$$

The first order condition for period two grants is then:

$$\frac{\partial v_i}{\partial G_{i2}} + 2\beta\left(n_i\right)G_{i2} - \sum_{k=1}^{m}\frac{\partial z_k}{\partial C_{k2}}\frac{1}{N} = 0 \quad \text{for all i}$$

The set of first order conditions reduces to:

$$\frac{\partial v_i}{\partial G_{i2}} + 2\beta\left(n_i\right)G_{i2} = \frac{\partial v_j}{\partial G_{j2}} + 2\beta\left(n_j\right)G_{j2} \quad \text{for all i, j}$$

Suppose that jurisdictions are symmetric except for the external effect and consider a small increase in period one borrowing by region i and region j (which reduces period two public spending of each

region). The (uncompensated) marginal utility of period 2 spending rises equally for both i and j since we have assumed symmetry and each must pay off its borrowing. However, since the external effect is greater for the larger region, a reduction in spending by the larger region is considered more valuable by the central government. It will therefore need to increase period two grants to the larger region by more than the smaller region for the above equality to hold.

C. Externalities and Bailing out of Smaller Jurisdictions

Crivelli and Stahl (2013) argue that the externalities motivation can also be used to explain bailouts of smaller regions.[1] They examine the central government's bailout motives when a SNG underprovides the public good. Externalities of public good provision are present as in Wildasin's model, but unlike that model externalities do not depend on jurisdiction size. Given under-provision, the central government would like to encourage greater public good provision.

While the focus of Wildasin is on the external benefits that differ between jurisdictions of different size, Crivelli and Stahl assume that these are the same and concentrate on the cost side of a bail-out. They argue that, for those outside of the bailed-out region, the per-capita cost of a bailout is greater for a large than small region – that is, the central government tax rate must rise more for a one dollar per-capita bailout in a large than a small region. This is because those outside of a large bailed-out region must share in the cost of the bail-out, but those outside the region are relatively few. Hence, it is more costly to the rest of society to bail out a large rather than small region, and the central government will therefore give larger bailouts per-capita to smaller regions.

The gist of this argument can also be explained using a variation of the workhorse model. Take, as they do, the case in which only one jurisdiction is bailed out. Further, modify our analysis of Wildasin's case by doing away with the assumption that the externality depends on size and also have

[1] Of course the political motivation mentioned previously could also explain bailouts of small regions that are politically important.

central government taxes paid by a regional government be proportionate to that region's size. Making these three changes to the variation of the workhorse model used to explain Wildasin's case, the first order condition of the central government in choosing grants becomes

$$\frac{\partial v_i}{\partial G_{i2}} + 2\beta G_{i2} - \sum_{k=1}^{m} \frac{\partial z_k}{\partial C_{k2}} \frac{n_i}{N} = 0$$

The social marginal cost associated with an increase in central government period 2 grants per-capita (the bailout) is greater for a larger jurisdiction (one with a higher ratio n_i/N) than for a smaller jurisdiction. Crivelli and Stahl (2013) conclude that a larger jurisdiction will therefore be bailed out to a lesser extent.

IV. Extensions to the Basic Model

A. Capital Taxation and Tax Competition

Marie-Laure Breuille, Thierry Madies, and Emmanuelle Taugourdeau (2006) have extended the basic model to incorporate capital taxation and horizontal tax competition. They take the basic structure of the model described above but incorporate a capital market by allowing savings and capital investment in period 1. Savings are taxed in period 2 and capital mobility ensures that the post-tax returns are equalized across regions where post-tax returns are after subtracting both the regional and central government capital tax.

Since the objective of the central government is to equalize marginal utility across regions, they find that the central government will want to act to bail out regions that borrow as above. The results with respect to regional behavior are more interesting. They find that regional governments respond to three effects. The first is a lower opportunity cost of borrowing from the bailout as above. The second effect is a common pooling effect that is similar to that above except that the tax base is different (as it

is a capital income tax) and the change in the central government tax rate increases the regional interest rate, which increases the cost of debt. The third effect is unique to the tax competition structure and results from the fact that the regional government changes its tax rate in response to the change in the central government tax rate. The third effect is ambiguous in sign but will be positive if a region's savings is greater than its borrowing and negative otherwise. To summarize, the soft budget from the first effect is mitigated somewhat by the second effect and may be mitigated further by the third effect if savings is greater borrowing.

A second paper that studies the interaction of tax competition and central government grant policy when regional governments are first-movers is that of Kothenburger (2004). In a similar vein, he finds that the standard tax competition result of taxing too little is offset to some degree when revenue sharing grants are available and regions are first-movers. In this case, regions are able to obtain more grants by raising capital taxes, giving regions an incentive to tax capital too much as opposed to the under-taxation due to tax competition.

B. Net versus Gross Equalization

Breuille, Madies, and Taugourdeau (2010) investigate whether financing grants on a net basis (where higher grants to one region are offset by lower grants to another) versus a gross basis (where higher grants to one region are financed by higher central government taxes) makes any difference. The model is the same as Breuille, Madies, and Taugourdeau (2006) described above except that regions provide both a regional public consumption good and a regional public investment good.

With respect to soft budget constraint issues, they find that the net equalization scheme results in lower ex-post transfers than the gross equalization scheme. This is because in the gross scheme regions anticipate additional grants when they increase capital expenditures and only bear a proportion of the additional central government tax costs, and the central government responds to capital

expenditures with additional transfers. Hence under the gross scheme, capital expenditures are too high. By construction, the net scheme does not allow all regions to enjoy additional grants. Under the net scheme, additional grants will come only at the expense of lower grants to other regions. However, under a symmetric Nash equilibrium all regions will behave the same, so there will be no differences in marginal utility across regions to compensate and hence no additional grants are forthcoming. Nevertheless, tax competition results in lower public spending for current consumption.

To summarize, the gross equalization scheme results in higher transfers and inefficiently high public capital spending but efficient current public spending. The result of the net equalization scheme is lower transfers, inefficiently low current public spending, and efficient capital public spending.

C. Public spending as an Input to Private Production

Akai and Sato (2011) extend the model to consider the case in which public spending has elements of both public good consumption and public investment, which enters as an input in private production. In their model public good consumption is excessive in period one as in the workhorse model. However, public investment is efficient. This latter result stems from the fact that both costs and benefits of the investment are subject to common pooling. The region bears only 1/N of the cost of any borrowing as in the workhorse model, but in their model the central government redistributes ex-post any returns from the investment. This ex-post redistribution reduces the benefit of public investment to 1/N as well, leading to efficiency. However, when they extend their model to migration, this result fails to hold and investment is underprovided.

Ihori (2011) similarly studies a case where regional public investment has beneficial external effects. He adds a political element to the regional government, however, which now engages in rent-seeking. As in Akai and Sato (2011), by stimulating public investment spending, a soft-budget constraint

can improve efficiency on that margin. However, the soft-budget also leads the regional government to engage in more rent-seeking. Overall, he finds that the soft-budget constraint will lower welfare.

D. Two Grant Instruments

Kothenburger (2007) investigates a one-period model that contains the main elements of a soft-budget constraint when the central government has both an equalizing grant and a grant to internalize externalities at its disposal. In his model each of two regional governments provides a public good that has spillover effects. Regional revenues consist of regional taxes and grants, and the central government has control over both an equalizing transfer and a grant to correct for the spillover effects.

Kothenburger considers two cases for grants. In the first case the corrective and equalizing grants are set prior to regional tax choices. In this case, the optimal corrective grant is a simple Pigouvian one. In the second case the equalizing grant is set after regional tax choices while the corrective grant is set prior to the regional tax choice. In this case, the optimal corrective grant takes into account the fact that the regional tax choice influences the amount of equalizing grants.

E. Multiple layers of government and overlapping soft budgets

Breuille and Vigneault (2010) consider a one-period model with three levels of government, cities, regions, and the central government. Cities move first and provide local public goods from own taxes and transfers from regions. Regions move next and provide a regional public good as well as transfers to cities using transfers from the central government. The central government moves last and distributes a fixed amount of money to regions as transfers.

They find that the soft budget constraint problem becomes worse as the number of levels of government expand. Local governments will expect additional resources from regional governments and they know that the central government will provide additional resources to the regional

government. Local governments are thus in a position to demand more resources from the regional government and the regional government in turn will receive more from the central government. Interestingly, tax competition among regional governments does not moderate the soft budget problem (as in Qian and Roland, 1998) in this model since central transfers are designed to correct horizontal externalities.

V. Public Investment and Uncertainty in Investment Returns

The initial analyses of soft budget constraints, surveyed in Kornai, Maskin, and Roland (2003) are concerned with a setting of asymmetric information in which information is incomplete. Investment returns are uncertain and projects may be good or bad. Investments are made by managers who know the type of investment (good or bad) but funded by the center which does not know the type of investment. Once a project is underway, it may turn out to be bad; in this case, a decision must be made as to whether to refinance the project or not, creating a soft budget. Besfamille and Lockwood (2008) apply this sort of soft budget constraint model to analyze soft budget constraints in federations. Importantly, unlike previous models, project quality is not random but rather depends on the level of effort exerted by the regional government. They find that in some situations like this soft budget constraints can be better than hard budget constraints. Specifically they find that regional governments may provide too much effort under a hard budget constraint, and some efficient projects will not be started. The finding then is that hard budget constraints can in some circumstances result in underinvestment.

Robinson and Torvik (2009) extend this type of model in which there is uncertainty in the returns on publicly funded investments in a different way to consider the impact of politics. The model builds on Dewatripont and Maskin (1995) in a way that is different from Besfamille and Lockwood (2008)

both because of the political motivation for the soft budget constraint and because information is complete.

Dewatripont and Maskin (1995) view politicians as benevolent economic actors who cannot commit not to bail out bad projects ex-post. In contrast in the model of Robinson and Torvik (2009) projects known to be bad may be financed by a politician because it allows politicians to deliver benefits to potential supporters and thereby maximize votes. In their probabilistic voting model, politicians will bail out projects operated by their core constituencies but not those operated by other groups. In this way politicians who cannot commit to arbitrary forms of redistribution find that they can redistribute to their core group by bailing out only the core group's projects. In the model of Robinson and Torvik, this increases the probability of re-election.

Thus, the soft budget constraint may induce economic inefficiency but at the same time be politically rational. This is the same rationale that lies at the heart of the political motivation of the central government in the workhorse model taken from Goodspeed (2002) and discussed above, but Robinson and Torvik (2009) develop this in an infinite horizon model and add more structure. In doing so they make explicit a particular way that bailouts by central government politicians change the probability of a citizen voting for the incumbent.

VI. Decentralized Leadership and the "Rotten Kid" Theorem Analogy

Closely related to the above literature is one that suggests that a federation is analogous to a family in which the central government acts as a parent and the regions act as children. An important argument in the economics of the family literature is Gary Becker's (1974) "rotten kid theorem." Becker argued that children who are to receive a bequest from a benevolent parent will act to maximize family income, internalizing intra-family externalities in a fashion reminiscent of Coase (1960). This implies that the parent need do nothing more than be benevolent for selfish children to behave well.

Bergstrom (1989) formalizes the analysis, finds several cases of failure for the theorem, and also finds that the theorem holds only for a particular class of utility functions – conditional transferable utility. Among the possible problems identified by Bergstrom are public goods, asymmetric information, work effort, and problems involving more than one period. Further work by Cornes and Silva (1999) found that the theorem also follows from nontransferable utility when externalities are pure public goods.

An important paper that applies the rotten kid theorem to a federation is Caplan, Cornes, and Silva (2000), who use the term "decentralized leadership" to describe a situation in which regions move first and the central government follows in a Stackelberg fashion. This is the same general set-up as the workhorse model, but in stark contrast to the soft-budget constraint results derived above they find that public goods are efficiently supplied.

What accounts for the different results? The important difference in the two analyses is in the nature of the public good provided. Caplan, Cornes, and Silva (2000) assume that each region supplies a pure public good (or equivalently that the regional public good has perfect spillover effects making it a pure public good). This implies that although more grants can be obtained by increasing spending as in the soft-budget constraint case, the regions would otherwise underprovide the public good since it is pure in nature. In other words, the regional marginal benefit of the public good is 1/N of the total marginal benefit where N is the number of regions (hence underprovision), but the regional marginal cost is also 1/N of the total marginal cost since the cost of an additional grant dollar is also shared (leading to overprovision). Given that the social MB and MC are both reduced by a factor of 1/N, the distortionary effects offset and the result is efficient provision. Akai and Sato (2008) elucidate this reasoning in a one-period model.

Notice that this efficiency result cannot happen in the workhorse model. There are two reasons for this. On the benefit side the regionally provided public good has no intertemporal spillovers so marginal benefits are not shared. On the cost side a region only bears a proportionate share of the increase in grants.

VII. Conclusion

This paper presents a synthesis and selective survey of the theoretical underpinnings of an alternative view of intergovernmental grants relating to soft budget constraints. The traditional view of intergovernmental grants is that subnational governments react passively to central governments grants. Under this view, such grants can be used by the central government to correct for positive spillover externalities or for fiscal equalization. Under the alternative view, subnational governments can make strategic spending or borrowing decisions in order to influence the amount of future grants received. Central governments can end up with incentives to bail out SNGs after the fact even when they do not intend to do so before the fact.

We first we explain how the developing "soft budget constraint" view of grant policy differs from the traditional view in fundamental ways. Based on previous work, we then develop a simple workhorse model of intergovernmental soft budgets under perfect information. We use this model to examine the different motivations for central government behavior uncovered in the literature and expand the usual textbook analysis of grants to illustrate the intertemporal distortions under the alternative view of grants. The model has been extended in various directions. We examine extensions that include capital taxation, tax competition, forms of equalizing grants, overlapping budget constraints, the case when public spending is an input to private production, and more than one grant instrument. We then turn to papers that examine intergovernmental soft budgets and bailouts when public investment has uncertain returns, a feature of the original models relation to SOEs. Finally we

briefly examine a closely related literature that deals with decentralized leadership and an analogy to Becker's Rotten Kid Theorem.

In conclusion let me raise three areas where further research could prove fruitful. These are (1) empirical work (2) dynamic analysis and (3) political and institutional controls of the problem. These areas are not really independent, but I will briefly discuss each in turn.

A first area of useful research is empirical in nature. In the end we want to know whether the alternative view of grants presented here holds water empirically. There are a number of papers that have started to look at this empirically and while it is beyond the scope of the present paper to thoroughly review the empirical literature, I will mention that a number of case studies in Rodden, Eskelund, and Litvack (2001) and the review of Vigneault (2007) suggest that the alternative view presented can be quite important in many cases. Some econometric studies have added to the evidence. Pettersson-Lidbom (2010) finds that Swedish local governments borrow more when facing a soft budget constraint. Baskaran (2012) finds evidence suggestive of soft budgets in Germany while Sorribas-Navarro (2011) uncovers some evidence for Spain. Interestingly, Hopland (2013) finds that public shaming of bad behavior in Norway has been effective in controlling profligate behavior.

One of the difficulties in these empirical studies is identification and properly accounting for expectations. For it should be clear from this review that a SNG's expectation of what will happen given its actions is a key, but empirically modelling an expectation of a future action by another player is challenging. A review of these and other papers offering empirical evidence, the problems involved in estimating the motivation of the central government, and whether and to what extent the soft-budget is problematic for SNG behavior would make a fine complementary survey.

A second area for future research is developing further the dynamic part of the analysis. Clearly borrowing involves financial markets, the pricing of assets, the appearance of deficits, and the

accumulation of debt, all of which should be properly dealt with in a dynamic analysis. How do these things evolve over time, is there a steady-state, and what are the welfare consequences? The transition from one steady-state to another could also prove interesting since the welfare consequences in the short-run could differ from that of the long-run change. Some macroeconomic analysis has addressed somewhat similar questions and could be drawn upon to analyze the impact of soft-budget constraints. For instance, Velasco (2000) has analyzed the related issue of fragmented fiscal policy while Eyraud and Lusinyan (2013) have empirically examined the related issue of the effect of vertical fiscal imbalances on overall budgetary measures. Buettner and Wildasin (2006) as well examine fiscal adjustment by US municipalities to deficits in a VAR econometric approach, finding substantial future adjustments in expenditure but also in grants. There is, however, much more to do in this area.

A final set of questions relate to ways to set up institutions and political rules in order to better control any soft-budget problems. This is an area that has received too little attention, although the newer "second generation" models of fiscal federalism (see the discussion in Oates, 2005) are expanding the toolset and perspectives on intergovernmental relations. What sort of institutional and political systems would best control soft budget problems of an intergovernmental grant system? Expanding some parts of the "new political economy" literature discussed at length in Drazen (2000) to an intergovernmental setting may be a way to proceed.

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Figure 1

Grants and the SNG Intertemporal Budget Constraint under Alternative Bailout Assumptions