Risk, Taxpayers, and the Role of Government in Project Finance

Michael Klein

A perennial question has been the relative cost of public and private finance for investment projects in infrastructure. Klein argues that the apparent cheapness of sovereign funds stems from taxpayers' not being remunerated for the contingent liability they effectively assume. So the proper role for government is to reduce the cost of risk-bearing for all projects by providing a stable and efficient policy framework.

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Summary findings

Klein concludes that government, through the tax system, cannot really do better than private financial markets at funding infrastructure projects. All the financial advantages of sovereign finance are due purely to coercive powers and are of no social value.

Under government finance the taxpayers would bear a contingent liability that, if properly remunerated, would wipe out any cost advantage of sovereign borrowing. Governments should then refrain from investing in projects or firms, whether with equity or with debt. They should not cover commercial risks.

In particular, one cannot argue that there is a tradeoff between the low cost of government finance and private efficiency. Private markets will do the best they can to tap low-cost funds while maintaining project discipline. They solve whatever tradeoff there is. The government cannot do better by raising funds. As a corollary, discount rates for private and public sector projects would not be expected to differ (contrary to standard practice).

Arguing that the government cannot be expected to improve on the outcome of free financial markets is not

to argue that all is the best in the best of all possible worlds and that there is no role for government. Private markets may not always find the best solutions. Market participants constantly search for better ways of trading risks. On average we could not expect governments to do better.

More important, governments can significantly reduce the cost of risk-bearing by following prudent macro-economic policies, supporting secure property rights, and deregulating and liberalizing financial markets so that private players can take the best advantage of low-cost funding opportunities. But it is inefficient to offset the risks created through bad policy by taxpayer-supported funding (which would amount to stealing from investors and compensating them by taking from taxpayers).

Multilateral finance institutions should apply their financial instruments to support the development of better government policies — for example, by granting guarantees against policy failures where new policy regimes are not yet credible — and not simply invest in projects or guarantee the full credit risk of loans.

This paper — a product of the Private Participation in Infrastructure Group, Private Sector Development Department — is part of a larger effort in the department to analyze issues relating to private participation in infrastructure. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Sandra Vivas, room G4-031, telephone 202-458-2809, fax 202-522-3481, Internet address svivas@worldbank.org. December 1996. (16 pages)

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I. Introduction

"The other solution [to highway finance] is to finance the project wholly in the public sector, either with government or multilateral funds. It is, after all, more expensive to raise debt on a project finance basis. When considered alongside the guarantees and commitments which have to be provided to attract commercial finance, the best approach would be to borrow on a sovereign basis" (Euromoney 1995).

"The view that "private sector capital costs more" is naive, because the cost of debt both to governments and to private firms is influenced predominantly by the perceived risk of default rather than an assessment of the quality of returns from the specific investment. We would lend to government even if we thought it would burn the money or fire it off into space, and we do lend to it for both these purposes" (John Kay 1993).

These two quotes provide a flavor of the opposite positions that are being advocated for the finance of infrastructure projects. In an ironic twist, a trade magazine for the private sector advocates government solutions, whereas a prominent advisor to the current leader of the Labour Party in the United Kingdom, takes the opposite view.

One may look at the issue as follows: For example, when a tollroad is financed on the basis of sovereign borrowing, the tolls will be lower than if the road had been funded by private investors. But the taxpayers will have assumed a contingent liability for which they are not remunerated, i.e., there is no risk premium in the sovereign borrowing rate. In fact, the taxpayers play the role of investors bearing the risk of failure. The question is: Who is better placed to *bear* (as opposed to "manage") the risk - taxpayers or investors? If taxpayers are just as good or bad at bearing risk as investors, then they should ideally receive a remuneration equivalent to the risk premium demanded by investors. If they are better at bearing risk, then project finance by way of sovereign borrowing is "truly" cheaper than private funding, because the cost of risk-bearing is lower, i.e., taxpayers would be less interested in buying insurance - via charging risk premia - than investors.

Obviously, the view one takes on the "true" cost of sovereign funds affects one's attitude toward the role of government in financing projects. If government funding is really cheaper than private finance, then the government should have a greater role than otherwise. At the same time it is clear that the cost of funds is only one argument among others that determines what governments should or should not do.

This paper takes the view that the apparent cheapness of sovereign funds reflects the fact that the taxpayers,¹ who effectively provide credit insurance to the sovereign, are not remunerated for the contingent liability they assume. If they were to be remunerated properly, then the advantage of sovereign finance would - almost by definition - disappear.

If one takes that view, then the government should, in principle, not participate in the financing of projects, neither with debt nor with (quasi) equity. There are other useful roles for the government (see annex 1), but there is no argument for government funding of projects based on the cheapness of government funds.

Also, there is then no argument for the typical "lobbyist" position on private finance, which argues for privatization of some sort (because the private sector is more efficient), but then requests financial support from the government or an agency underwritten by government (because government funds are cheaper).

The implication of the argumentation that government funding is not cheaper than private funding runs counter to the worldwide practice of using risk-free rates to discount cashflows in public sector project appraisal (cost-benefit analysis), whereas risk-adjusted discount rates are used in private appraisals. Current practices of cost benefit analysis introduce a bias against private solutions in decisions about projects.

The paper starts with a review of both basic positions and some of their implications, followed by an analysis of the rationales for each view. The policy implications of this view are drawn out. Annex 1 sketches some other arguments affecting the role of government in project finance using, in particular, examples from highway finance.

At times the arguments may strike some readers as either "esoteric" or "completely obvious." While that may be so, the arguments are indeed central to many practical discussions, for example, in the current debate about the merits of the private finance initiative in the United Kingdom.²

¹ Taking into account that one form of taxation is inflation.

² See for example, Financial Times editorial writer Martin Wolf noting that "by looking to the private sector to finance public projects, the government is losing the benefit of its position as the most creditworthy borrower" (Wolf 1996).

II. The basic positions staked out

II.1. "Private sector capital costs more"

The view that "private sector capital costs more" starts from the observation that in general sovereign borrowing is cheaper than borrowing by private firms.³ This reflects the lower default risk of the sovereign, which tends to be able to raise money by way of taxation including the inflation tax. As a result the interest rate on sovereign debt is commonly called "risk-free."

To put this in the context of the example of an independent power generation project, a privately funded project would have to charge higher tariffs than a publicly funded project - everything else being equal. Why then is anyone advocating private power projects?

II.1.1. "The public sector cannot fund all the project needs"

One commonly heard answer is that the government cannot be expected to fund the enormous projected requirements for new projects. But somehow the private sector is expected to be able to do so. This answer is not convincing per se. Total saving (domestic and foreign) available to fund investment is unlikely to be affected by the shift from public to private projects. Why should the private sector be better able to tap these savings than the public sector - for the very same projects?

For there to be substance to the argument the government must be credit-rationed, while the private sector is not. In other words government debt would need to be more risky than private debt. This is conceivable when government default is a possibility, i.e. when the government is not able to print the means of payment itself.⁴ In a sense government is then like a firm that is not able to borrow for the great new project it has identified but has to let others invest in it, because it is already overextended. Overextension means the government (the firm) has financial obligations due to other projects, which may render service of new financing difficult. So the new project needs to be incorporated separately and independently, the definition of project finance. Alternatively, a credit-worthy firm could fund the project on-balance-sheet. In any case, the government is a riskier, i.e., more expensive borrower - contrary to the basic assumption that "private sector capital costs more."

³ In fairly stable economies with well-functioning capital markets (e.g. the United Kingdom, the United States, and other major OECD economies) "risk-free" interest rates on sovereign debt are currently about 3 to 4 percent in real terms. Private corporate debt may be priced one percentage point higher, and structured project debt yet another 1 or 2 percentage points above this. On average private equity tends to trade at some 2 to 4 percent above the risk-free rate on sovereign debt, the so-called equity premium. Rates tend to be higher in other economies due to higher country risk, which affects all rates or higher policy risk in a particular sector, which affects firms and projects in that sector (Blanchard 1993 and Spackman).

⁴ Government is unable to print the means of payment when a project contract is, for example, denominated in foreign currency. In some extreme cases governments may have been so abusive that its own citizens are unwilling to pay taxes and to hold domestic currency. That, first of all, reduces the scope for viable contracts drastically and, second, new contracts may often be concluded in "foreign currency," which government cannot debase, for example payment in commodities such as gold or cigarettes.

II.1.2. "Government funding is cheaper, but private management is better"

When governments are not credit-rationed, they tend to be able to raise funds at lower rates than private firms. To still advocate private projects in this situation one would need to assume that the government's funding advantage is more than offset by the private sector's management efficiency.

An example of this argument can be found in the World Bank's *World Development Report 1994*.⁵ "In infrastructure projects, the cheaper credit available to governments needs to be weighed against possible inefficiencies in channeling funds through government." The report cites an example where a 3 percentage interest rate advantage of government funding would need to be offset by cost savings of more than 20 percent for private ownership to be advantageous.

There are a number of cases where efficiency gains of 20 or more percent have, indeed, been achieved by transferring management to the private sector.⁶ But efficiency gains vary widely. They may amount to only a few percent and in some important cases it is not clear whether private is really more effective than public management, particularly when private enterprise is subject to monopoly regulation. For example, the most thorough study of the relative efficiency of private versus public sector power utilities in the United States suggests that - controlling for differences in cost of capital, tax treatment and other factors - public utilities are more efficient than investor-owned ones (Kwoka 1996). Should the United States, therefore, nationalize all power utilities? If we believe in the basic arguments about the cost of government borrowing, the case would seem strong, because public sector utilities deliver slightly cheaper service even when one does not add in the borrowing cost advantage.

If one believes that a tradeoff between low-cost government finance and greater private sector efficiency exists, then one needs to be careful with privatization unless it is reasonably clear that private management will yield sufficient benefits to offset the lower cost of sovereign funds. By the same token private management is then justified to clamor for government financial support up to the point where its own incentives to perform efficiently are undermined.

This line of arguments also lies behind calls for government or multilateral financial participation in private projects. Such calls are, for example, made by the Institute for International Finance,⁷ which suggests World Bank lending to the private sector. As is well known a number of infrastructure projects benefit from some type of government financial participation (beyond guarantees for policy failures), for example, Hungary's M5 motorway project.

⁵ World Bank 1994, box 5.1, p. 91.

⁶ See for example Carnaghan and Bracewell-Milnes (1993) and Domberger, Meadowcroft, and Thompson (1994).

⁷ Institute of International Finance (1995), p.6. The IIF suggested World Bank lending to the private sector without a host government counter guarantee. Private companies would thus benefit from the low cost funds the World Bank can raise due to its backing by the best credit risks of the world i.e. the major governments of this world.

Extending this argument then means that privatization of infrastructure should often be reserved for countries with highly inefficient government enterprises. But countries with good public enterprises could gain relatively little from privatization. Given the cost advantage of public borrowing they should then not privatize. In particular the cost of government funds would appear cheaper than private equity.

II.2. "There is no real cost advantage to public borrowing"

How can one deny that sovereign borrowing is not cheaper than private finance? A task force of the Australian government on private infrastructure has formulated the position thus: "[The task force] rejected the argument that the cost of government debt is necessarily cheaper than the private sector cost of capital (which would have implied that government should finance most infrastructure investment). The task force argued that governments' lower cost of funds largely reflects the fact that taxpayers are providing an implicit guarantee for project risks under public ownership. Thus it concluded that much of the difference in the private and public cost of capital is apparent rather than real" (Economic Planning Advisory Commission 1995, p. 37).

In other words, if the taxpayers were to receive appropriate remuneration for the insurance they provide, the apparent cost advantage of government finance would disappear. If this were so, there would be no tradeoff between the cost of sovereign funds and efficiency gains from private management. It would still be true that in countries with good public enterprises the benefits from privatization may be lower than in countries with bad ones - assuming equally good private firms. Yet, privatization could still be advocated even if it brought only very small improvements. By the same token there would be no rationale for private firms to ask for government financial support in the form of debt or equity or guarantees of credit obligations. To take the example of World Bank instruments, there would be no rationale to use straightforward loans or credit guarantees - only policy guarantees and like instruments would be justified.⁸

Government efforts should be directed to improve macroeconomic stability, improve the policy environment for private projects and deregulate and liberalize the financial sector to allow private entrepreneurs to put together the best possible deals. Multilaterals should support governments in these efforts but stay away from taking on commercial risk. This position has, for example, been forcefully expressed by Charles Frank of GE-Capital (Frank 1995) and underlies the philosophy of the World Bank's new policy guarantee program.⁹

⁸ In the case of World Bank credit taxpayers in industrial countries underwrite risks. When loans or guarantees are counterguaranteed by the host government, then taxpayers of that country also underwrite leaving taxpayers in developing countries to assume risks as a last resort.

⁹ The policy risk guarantees are also called partial risk guarantees by the World Bank - as opposed to partial credit guarantees for guarantees of full loan obligations.

III. The underpinnings of the basic positions explored

Is one of the basic positions the right one or is there some middle ground? In the following discussion the analytical underpinnings for a possible answer will be explored. To do so a central position will be taken, namely that - from a normative point of view - the government has no interests apart from those of the individuals it represents. Government policy should thus express and represent the interests of individual citizens. It may not do so in practice, but such deviations from the will of the citizens would be illegitimate and could not be adduced to justify policy.

III.1. The cost of risk-bearing and the choice of discount rates

The core issue can then be recast as follows. Differences in the cost of finance or capital reflect differing abilities to bear risk or cope with it. In a seminal article written by Nobel prize winner K. Arrow and R. C. Lind (1970) the "essence of the controversy" is introduced as follows: "It is widely accepted that individuals are not indifferent to uncertainty and will not, in general, value assets with uncertain returns at their expected value." For example risk aversion implies that an individual would be interested in trading a gamble with a 50-50 chance of winning or losing US\$5,000 for the certainty of neither gaining nor losing anything and would be willing to pay some positive sum - not choose investments to maximize the present value of expected returns, but to maximize the present value of returns properly adjusted for risk. The issue is whether it is appropriate to discount public investments in the same way as private investments."

This issue is equivalent to the basic question here of whether the cost of sovereign borrowing is cheaper than that of private finance, because the cost of capital determines the discount rate for projects.¹⁰ Projects have to earn at least the cost of capital to be acceptable to investors. Discounting project cashflows by the cost of capital, therefore, is an appropriate method to identify viable projects. If the cost of risk-bearing in the public sector, i.e., of the taxpayers, were the same as in the private sector, then the discount rates would be the same. The lower cost of sovereign borrowing would simply be due to the fact that government forces taxpayers to provide funds without remunerating them for the risks they take. If the cost of risk-bearing of the taxpayers were, however, lower than that of private parties, then the lower cost of sovereign borrowing would be due to a "real" advantage, i.e., a lower cost of risk. Note that each individual whether in the role of taxpayer or investor has identical attitudes to risk, although such attitudes will vary among individuals.

Arrow and Lind argued that government finance was indeed cheaper than private finance. They claimed that the government discount rate should be a risk-free rate reflecting risk-neutrality on the government's part. Private discount rates, however, should reflect risk-aversion and therefore contain a risk premium rendering private finance more expensive than public finance.¹¹

¹⁰ For a standard exposition see Brealey and Myers (1991).

¹¹ A higher private discount rate would also imply that the private sector would tend to choose projects and technologies with quicker payback or shorter gestation periods than the government.

Before looking at the arguments in detail it may be worth mentioning that the Arrow-Lind view of government discounting has in fact dominated the debate for years. Recently a new World Bank Handbook on Economic Analysis of Investment Operations (1996) states that "the accepted view is that, save for very special cases, governments should not be concerned with the probability of failure or with the variance of outcomes [of projects]. ... Government decisionmakers should be "risk-neutral."

In other words, governments should care only about expected values, not variances of outcomes. That is they should be indifferent between a project with a certain value of US\$100 and a project, with an expected value of US\$100, which is based on a 50-50 chance of losing US\$100 or winning US\$300.

III.2. Risk-pooling and risk-spreading

As stated by the World Bank (1996) the position of Arrow and Lind "is based on the concepts of "risk pooling" and "risk spreading." If a country's portfolio has many projects whose outcomes are mutually independent, the country need not be concerned with the variability of the net present value (NPV) of a project around its expected values, as measured, for example, by the "variance" of the probability distribution of the NPV. The reason for this is that while many projects will result in lower-than-expected NPVs, others will result in higher than expected NPVs; if the projects are small and do not systematically reinforce each other's outcomes, then the negative and positive effects will tend to cancel out to a large extent."

In the case of zero correlation between all projects the variance of the portfolio is reduced to zero by diversification. If project risks are correlated, risk-pooling will not eliminate all risk. The size and sign of the covariance of returns on prospective projects is an empirical question. It seems, though, that a large number of projects undertaken by the State have outcomes correlated with national income. Electric power, highways, waterways, airports, and postal service, for example, all facilitate ordinary commerce and will thus be positively correlated with national income, allowing for a lower degree of risk reduction.

Arrow and Lind had mentioned the risk-pooling concept in their article, but did not present it as crucial. The private sector too can pool risks. Any advantage the state may have in pooling diverse risks can be transferred to the private sector by privatizing the projects in question.

The crucial argument by Arrow and Lind is about risk-spreading. They suggest that any financing system that is able to spread risks in tiny amounts over very large numbers of investors can tap funds at the risk-free rate. Increasing the number of investors will diminish the overall costs of risk-bearing at a faster rate than the summation of the individual costs will increase the overall costs. With an infinite number of investors the costs of risk-bearing will therefore converge to zero.

Thus, the total cost of risk-bearing of a project which is independent of all other projects in the economy¹² is made negligible by the spreading of the risk over a large number of individuals.

Arrow and Lind argue that the government is actually able to spread risks in tiny amounts over millions of taxpayers thus exploiting their "near-zero" cost of risk-bearing. Thus the government could help the economy exploit the willingness of taxpayers to insure projects with non-negative NPVs without asking for remuneration given that the cost of risk-bearing is zero. In this way the government provides a good substitute for missing insurance markets.¹³ By relying on taxpayer guaranteed finance the economy could reach the level of investments that is technically possible.

A recent variant of the Arrow and Lind arguments underlies the choice of discount rates in the United Kingdom. M. Spackman (no date) of the U.K. treasury argues that there is a flaw in the Arrow-Lind analysis, but that the flaw is immaterial. In the spirit of modern finance theory, e.g. the capital asset pricing model he argues that risk-spreading cannot diversify away all risk. There remains some undiversifiable risk after optimal pooling of projects, which is correlated with incomes or wealth of taxpayers and thus imposes some positive cost of risk-bearing on taxpayers. When estimating the cost of risk-bearing for taxpayers he finds that it affects the discount rate - estimated at some 6 percent annually in real terms - only marginally adding 0.1 percent.¹⁴ The discount rate of small countries or countries with a small tax base would be affected more dramatically.

The government would thus be able to tap the low cost of risk-bearing of individuals carrying small amounts of risk efficiently. But then why could large corporations not achieve the same result? Arrow and Lind argue "that in order to control the firm, some shareholder may hold a large block of stock, which is a significant component of his wealth. If this were true, then, from his point of view, the costs of risk-bearing would not be negligible and the firm should behave as a risk averter. ... even though from the stockholder's point of view, risk should be ignored, it may not be in the interest of the corporate managers to neglect risk. Their careers and income are intimately related to the firm's performance. From their point of view, variations in the outcome of some

¹² Risk-spreading crucially depends on the returns from the project being independent of other components of national income. As discussed in the case of risk-pooling, this is not necessarily the case for infrastructure projects since (1) they are often correlated with other components through the business cycle, or (2) they constitute a large fraction of national income.

¹³ Imagine a hypothetical benchmark case, in which insurance markets exist for every conceivable risk and circumstance. If such a complete set of insurance products existed everybody could lock in riskless values of investment (Arrow and Hahn 1971). Financing such investment would then be possible at the risk-free rate, which would also be the appropriate discount rate. A complete set of insurance markets does, however, not exist, a major reason being that the existence of insurance would make people behave more recklessly (moral hazard) and thus change the underlying risk profile of the projects. Due to moral hazard total investments in the country will be lower than they ideally could be if people were to "restrain themselves better."

¹⁴ The social cost of the risk that taxpayers bear would be higher if one accounted for the distortions that are typically associated with taxation. The full cost of raising a dollar of tax revenues may well be much higher. Studies suggest ranges from 20 to over a hundred percent higher. However, accepting Spackman's calculations that would still leave the discount rate essentially unchanged, maybe rising to 6.2 percent.

corporate action impose very real costs. In this case, given a degree of autonomy, the corporate managers, in considering prospective investments, may discount for risk when it is not in the interest of the stockholders to do so."

If one accepts the Arrow and Lind arguments, then decisions on projects will be biased against private participation. This is not based on considerations of fairness and equity in the economy or arguments about so called public goods like the rule of law or defense, where some form of government may be required. The argument is valid even for pure private goods i.e. those where benefits and costs can be fully appropriated by individuals.

III.3. Risk allocation and incentives of intermediaries

What are possible counterarguments? First, one may note that one large shareholder is not necessary for reasons of corporate control. If there are private benefits of control, the threat of exit to the manager (with a concurrent drop in shareprices) can equally serve for control purposes. Moreover, the major shareholder could be an equity fund itself consisting of a large number of shareholders, thus spreading the costs of risk-bearing over an even greater number of shareholders, given that the internal incentives mechanism of the fund manager are appropriately designed. Furthermore, bureaucratic managers might be just as risk averse and reluctant to undertake risky projects as are corporate manager. The rationale for better risk-spreading capabilities of the government is thus rather doubtful.

More fundamentally one may ask what it is about the tax system that allows it to tap lots of "investors" with low costs of risk-bearing. Is it the unique "technology" of the tax system or the fact of coercion or maybe both? If individuals are willing to part with small amounts of money in return for no more than the risk-free rate of return, why are private players not able to exploit this?

Many financial systems have large banks, which raise small deposits from a large number of people. However, when investing in projects the first-in-line risk-takers are the equity investors, for many of which the project risks are not negligible. They therefore require risk-adjusted rates of return.

If large banks could collect "deposits" from their customers and invest them without exposing the bank's equity holders, then they should be able to mimic the tax system's ability to tap low cost funds. Indeed, "trust" accounts would be the equivalent of such a transaction being mere pass-throughs. But we observe no project finance based on such pass-through mechanisms. Apparently, depositors will want to be reasonably sure that their money will not be abused. If the trustee is not exposed and small depositors cannot directly assess and monitor project performance, it is not likely that people will provide money. Almost by definition small depositors will not be able to monitor projects. An exposed agent is thus necessary to gain confidence. As a result depositors in banks are willing to provide money at low interest rates, but the bank will require risk-adjusted rates when investing in projects or portfolios of assets.¹⁵

¹⁵ Because depositors cannot monitor intermediaries easily, they like contracts with specified interest rates, so that they can easily recognize default (Diamond 1984).

One could easily test the hypothesis that providers of small amounts of money would require an exposed agent. On income tax returns a field could be created where taxpayers could voluntarily indicate the amount of money they would be willing to invest into projects via the government. The money could be collected with the tax bill and returns from such voluntary investment could be automatically credited to future tax bills.

Somehow we might expect that not too much money would be raised that way. If so, this would support the view that the financial advantages of government finance are based on coercive powers and not on a superior system to exploit the low cost of risk-bearing of tiny investors. In fact, it would become clear that the low cost funds cannot be tapped unless the intermediaries have good incentives to use the money well, which gives by necessity rise to significant costs of risk-bearing on the part of the exposed intermediary. In turn this requires risk-adjusted rates of return on financial instruments. Crucially, we cannot consider the cost of funds independent of the incentive system, under which intermediaries collect them. This is similar to modern theories of intermediation, which emphasize the monitoring problem of small investors in intermediaries and not only optimal risk diversification issues (Hellwig 1990).

III.4. Incentives of the government as intermediary

For the Arrow and Lind argument to still hold the government as intermediary would need to have better incentives to invest well than private parties. Arrow and Lind state "that many of the uncertainties which arise in private capital markets are related to what may be called moral hazards. Individuals involved in a given transaction may hedge against the possibility of fraudulent behavior on the part of their associates. Many such risks are not present in the case of public investments and, therefore, it can be argued that it is not appropriate for the government to take these risks into account when choosing among public investments."

It seems Arrow and Lind assume that the government will in fact do what it ought to do, namely act benevolently and efficiently. Clearly that is not the case in practice for many governments throughout history. So Arrow and Lind may be right that there are low cost funds out there, but they may err in jumping to the conclusion that the tax system is a good way of tapping them.¹⁶

But maybe one could argue that government should collect "cheap" money and pass it on to projects, which have private sponsors, who have first-risk-of-loss and will want to invest well. This line argument may be seductive at first sight. However, any such rule "invest only when there is serious private equity" or "invest only *pari passu* in senior debt and not more than 5 percent of total

¹⁶ We know that in some cases people are willing to invest in opportunities with negative expected values, for example lotteries. If one could create a lottery for project finance this should lower the cost of funds. After investing into a project investors lots could be drawn assigning very high proportions of the project return to some investors and nothing to others. The fact that we don't see such mechanisms may have to do with the fact that abuse under normal lotteries is easier to monitor. But maybe there are unexploited ways of setting up mutual funds here. The equity contributors to projects like Eurotunnel may in fact have been driven by a lottery spirit.

project costs" can be adopted by private pass-through trusts, the trustees of which may have quite reasonable incentives to maintain a decent reputation, arguably better than government officials whose reputation is much less dependent on any particular project than a trustee's reputation. But we know that in practice investors are wary of trustees who are allowed considerable discretion in interpreting rules of a trust.¹⁷

IV. Conclusion

The discussion suggests that government through the tax system cannot really do better than private financial markets. As a result, all the financial advantages of sovereign finance are purely due to coercive powers. Because there is no free rider issue here such coercion has no social value. As argued by the Australian task force cited earlier, under government finance the taxpayers would bear a contingent liability, which if properly remunerated would wipe out any cost advantage of sovereign borrowing. Governments should then refrain from investing in projects or firms whether with equity or with debt. They should not cover commercial risks.

In particular, one cannot argue that there is a tradeoff between the lower cost of government finance and higher private efficiency. Private markets will do the best they can to tap low cost funds while maintaining project discipline. They solve whatever tradeoff there is. The government cannot do better by raising funds. A corollary is that discount rates for private and public sector projects would not be expected to differ - contrary to standard practice.

Arguing that the government cannot be expected to improve on the outcome of free financial markets is not to argue that all is to the best in the best of all possible worlds and that there is no role for government. Private markets may not always find the best solution. Market participants constantly search for better ways of trading risks.¹⁸ But on average we could not expect governments to do better.

More importantly, governments can significantly reduce the cost of risk-bearing by conducting prudent macroeconomic policies, supporting secure property rights and deregulating and liberalizing the financial markets so that private players can do their best to take advantage of low-cost funding opportunities. But it is not efficient to offset the risks created through bad policy by taxpayer supported funding. That would amount to stealing from investors and compensating them by taking away from taxpayers.

In principle, multilateral finance institutions should apply their instruments to support the development of better government policies, for example by granting guarantees against policy

¹⁷ see for example Millman (1995).

¹⁸ In fact, if financial markets were fully efficient, i.e. all arbitrage opportunities (profitable trades) had been exhausted, there would be no incentive left to look for better deals. That in turn would imply that arbitrage stops and we could not assume that markets would really be efficient.

failures, where new policy regimes are not yet credible, but not to invest in projects or by guaranteeing the full credit risk of loans.

In this paper examples have been drawn from infrastructure projects, but none of the arguments about risk allocation and management are specific to infrastructure. In competitive markets it is by now fairly widely accepted that there is no clear role for government finance. The debate is, however, still alive for services, which are provided by monopolies or exclusive providers such as many infrastructure services.

As sketched in annex 1 there may be cases where subsidies are advisable, for example, to enable prices to be set at efficient levels, i.e. marginal cost. For example, on uncongested tollroads the government may choose to pay subsidies in the form of shadow tolls so as not to push drivers off the tollroad by high average cost covering tolls. However, the policymaker should not offer to fund construction of the road with either debt or equity.

Annex 1: "Special policy issues for natural monopolies"

In sectors such as gas and water pipelines, power transmission and distribution or road networks competitive markets do not exist. First, consumers may be "taxed" through regulation or by monopolists. Second, governments might need to pay subsidies¹⁹ to ensure efficient pricing of infrastructure services.

1. Risk-sharing between investors and consumers

In infrastructure sectors private incentives to operate efficiently may be weakened, because all forms of regulation or contracting tend to contain elements of cost-plus pricing. Wherever cost-plus pricing methodologies are pronounced, risks are shifted from investors to consumers. The cost of capital for investors and their projects is accordingly reduced. A number of U.S. investor-owned utilities are effectively able to raise finance at little more than the risk-free rate of return (Alexander 1995).

Shifting risks to consumers may yield similar implications for the cost of capital as shifting it to taxpayers. But at least consumers have the option of not buying the service. Their effective willingness-to-pay places a limit on the scope for exploitation, which does not exist in the same way for taxpayers. Even if one interpreted the high cost to consumers as a tax, it would be a tax with some optimality features as it is imposed on price-inelastic consumption.

2. Subsidies to support efficient pricing

Those elements of infrastructure that contain strong elements of natural monopoly have by definition low variable and high fixed costs, such that average cost will generally be above marginal cost. For investors to amortize their investment they need to receive prices that are at least equal to average cost. However, optimal pricing should be marginal cost based. For example, in the case of a tollroad, if the road is uncongested the cost an additional passenger car imposes on the road is minimal. Ideally, all cars should be allowed to drive on an uncongested road as long as they pay for marginal cost. Tolls would thus collect prices corresponding to marginal cost and uncongested roads would not recover sufficient funds to service debt and equity²⁰. The difference

¹⁹ Traditionally, it has been argued that there are cases where financial subsidies from the state are justified on other grounds than the taxpayer's low cost of risk-bearing. Social justice may argue for supporting the poor. Environmental concerns may argue for subsidies for clean production processes. In all these cases, economic reasoning suggests that the best possible outcomes for society cannot be expected to result from the free interplay of private parties. Instead, properly designed "subsidies" should improve the outcome. In this respect the arguments are similar to the Arrow Lind argument. However, the Arrow-Lind thesis assumed that taxpayers were willing to provide small amounts of insurance for "nearly" free. As argued, intermediaries would have the option of attracting many mini-investors into an insurance scheme. Subsidies on the other hand are unlikely to be paid voluntarily, because individuals might not directly gain from them and/or are likely to hope that others will pay and try to free ride on them.

²⁰ The development of transport infrastructure may have positive effects on adjacent land development, i.e. benefits due to the infrastructure but not captured by its builders. Therefore the infrastructure developers should be able to obtain land at its value prior to their investment so as to provide optimum incentives to them for the expansion of infrastructure. Alternatively they might benefit from the rise in property taxes due to appreciation of property

between marginal and average cost should be paid as a "subsidy" or shadow toll to the operator of the tollroad.

The problem is, of course, that demands for subsidies may well get out of hand. In the case of tollroads it might well be that all sorts of uneconomic roads would get built if taxpayers were to foot the bill, the Mexican tollroad program being a recent example. While no perfect solution exists, a number of methods are available to limit undue discretion of government authorities while trying to retain as many optimality features as possible.

Balanced budgets. The first may be called the "balanced budget rule."²¹ Adam Smith noted that marginal cost pricing for roads and bridges might tempt the monarch into excessive construction.²² This is a reason why we may see infrastructure funded fully by consumers, for example water in France or power in the United States. Utilities do not receive government transfers and are thus subject to a tighter budget constraint. As mentioned before "taxation" via high consumer prices may also have certain optimality properties. A further rationale for a balanced budget pricing rule hinges on different incentives to monitor the government. When the firm overstates its true fixed costs under marginal cost pricing, taxpayers will bear the costs in the form of subsidies. Under average cost pricing, an overreport of fixed costs is passed to consumers in the forms of higher prices. If consumers are better organized than taxpayers average cost pricing might induce better monitoring of the firm's activities and prove superior to otherwise first-best marginal cost pricing.²³

Transparency. Greater transparency is another method to limit governmental discretion by exposing decisions to greater scrutiny of interest groups. Cross-subsidies are often criticized for being intransparent and open to abuse. In many countries cross-subsidies benefit the middle classes, while the poor do not get any service at all.

Elements of competition. Finally, multiple players with conflicting objectives might be introduced to limit abuse. Auctions among competing bidders may, for example, be used to obtain a quote for the lowest possible subsidy.

consequent to infrastructure development.

²¹ see Laffont and Tirole (1993), chapters 15 and 16 for a discussion.

²² Oral communication by J.J Laffont.

²³ Laffont and Tirole (1993), pp. 591-613.

Bibliography

- Alexander, I. 1995. "Regulatory Structure and Risk: An International Comparison." World Bank, Washington, DC. Mimeo.
- Anderson, J.R. 1989. "Forecasting, Uncertainty, and Public Project Appraisal." Policy Research Working Paper 154. World Bank, Washington, DC.
- Anderson, J.R., and J.C. Quiggin. 1990. "Uncertainty in Project Appraisal." Paper presented at the World Bank Annual Conference on Development Economics, Washington, DC.
- Arrow K., and F. Hahn. 1971. "General Competitive Analysis." San Francisco.
- Arrow, K.J., and R.C. Lind. 1970. "Uncertainty and the Evaluation of Public Investment Decisions." *American Economic Review*.
- Bishop, M., J. Kay, and C. Mayer. 1994. "Privatization and Economic Performance." *Oxford University Press*.
- Blanchard, J.O. 1993. "The Vanishing Equity Premium." In *Finance and the International Economy* 7. Oxford University Press.
- Brealey, R.A., and S.C. Myers (1991), *Principles of Corporate Finance*, 4th Edition, McGraw-Hill.
- Carnaghan, R., and B. Bracewell-Milnes. 1993. "Testing the Market: Competitive Tendering for Government Services in Britain and Abroad." Institute of Economic Affairs, London.
- Devarajan, S., L. Squire, and S. Suthiwart-Narueput. 1996. "Beyond Rate of Return: Reorienting Project Appraisal." World Bank, Washington, DC. Mimeo.
- Diamond, D. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies*.
- Economic Planning Advisory Commission. 1995. "Private Infrastructure Task Force Report." Canberra.
- Euromoney. 1995. "Where, When - and How Much?" March.
- Frank, C.R., Jr. 1995. "The Role of the World Bank in Infrastructure Investment." Paper presented at Forbes Infrastructure Conference, New York, January 18.
- Hellwig, M. 1990. "Banking, Financing Intermediation, and Corporate Finance." Discussion Paper 9015. University of Basel.

- Institute of International Finance. 1995. "Increasing the Supply of Bankable Infrastructure Projects in Developing Countries." Washington, DC.
- Inter-American Development Bank. 1995. "Directory of Innovative Financing." Washington, DC.
- Kay, J. 1993. "Efficiency and Private Capital in the Provision of Infrastructure." In *Infrastructure Policies for the 1990s*. Paris: OECD.
- Kwoka, J.E., Jr. 1996. "Privatization, Deregulation, and Competition: A Survey of Effects on Economic Performance." World Bank, Washington, DC. Mimeo.
- Laffont, J.J., and J. Tirole. 1993. "A Theory of Incentives in Procurement and Regulations." Cambridge, Massachusetts.
- Millman, G. 1995. "In Whom Should Projects Trust?" *Infrastructure Finance*. June/July.
- Spackman, M. "Discount Rates and Rates of Return in the Public Sector." Government Economic Service Working Paper 113. H.M. Treasury, London.
- Wolf, M. 1996. "A Clever Spending Wheeze." *Financial Times*. July 16, p. 16.
- World Bank. 1994. *World Development Report 1994*. Washington, DC.
- _____. 1996. "Handbook on Economic Analysis of Investment Operations." Washington, DC.

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