

Sovereign Wealth Funds and Dedicated Infrastructure Investment

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Sovereign Wealth Funds are government owned funds typically funded through excess foreign currency reserves. This paper explores the arguments for and against including infrastructure investment in Sovereign Wealth Fund Portfolios. The benefits to private sector productivity, portfolio diversification, external public benefits and possibly lucrative returns all argue for inclusion. We evaluate the process for choosing infrastructure projects and then explore dedicated funding methods in order to find an efficient funding strategy. We conclude that infrastructure investing is likely to enhance the utility of the citizen owners of the fund but that care needs to be taken in properly evaluating projects and Fund management.

INTRODUCTION

Sovereign Wealth Funds have recently become a significant force in the investment world. These Funds are owned by governments and are typically funded through excess foreign currency reserves (reserves beyond those needed for liquidity and foreign exchange management purposes). Much of the public discussion around these Funds has centered on the fear that host nations appear to have; that such Funds pose political threats. (Summers 2007, Truman 2007)¹ In fact there is scant evidence to defend such a position. (Balding 2008 and Nuno 2009)²

We assume that the job of Sovereign Wealth Funds is to maximize the welfare of their citizen owners. Toward that end, we focus on one area of concern to these funds. This study analyzes the role that public infrastructure investment *should* play in a Sovereign Wealth Fund (SWF) portfolio and how to manage the investment process in an efficient way.

In the next section we investigate the benefits of infrastructure investment from the point of view of the home nation. We then analyze the possible costs of infrastructure investment to the country for which the SWF operates. The following section focuses on the process for choosing public infrastructure projects. We then look at a set of dedicated funding methodologies and the development of an efficient funding scheme. We conclude with a summary of our work.

BENEFITS OF INFRASTRUCTURE INVESTMENT

While controversy exists over the benefits of public sector infrastructure investment, the general view is that there are a number of possible benefits accruing to such investment. One significant benefit is the impact on private sector productivity. Infrastructure investment can improve productivity either through expanding the total production function or through “catching-up” investments. The general view is that the SWF, which is owned by the citizens of the country, and, therefore, is likely to have a lower cost of capital than would a private firm, can make profitable infrastructure investments that will improve private

sector productivity. While investments in transportation and communication systems may have more clear-cut paths to improving private sector productivity, investments in education and health systems are also likely to improve productivity in the private sector.

A second type of benefit is the possible benefit flows from social infrastructure investments. Investments in education and health care can be included in this category as well, but so can the investment in public parks and recreational facilities. Investments in such areas, even if they do not generate net cash flows, are likely to raise the quality of life of the citizen owners of the Fund. While, at least in the case of social facilities, many economists argue that efficiency requires that the funds be distributed to the individual citizens for allocation, the standard notion that there is no “societal psyche” is certainly being challenged by some of the emerging economies around the world. As a minimum, it can be argued that the investment in social infrastructure is likely to create positive returns to societal welfare in the gross sense of that measure.

It is also possible that the investment in public infrastructure can create revenue flows. Toll roads, harbors, and airports are clear cut examples, but leveraging even social infrastructure investments such as charging for concessions at public parks and swimming pools or charging to use facilities at public schools and public universities can create significant revenue streams for the Fund.

Finally, investments in public infrastructure have the added virtue of increasing diversification in the investment portfolio. This is particularly clear where revenue streams are included, but holds for strictly social investment utility as well.

In the end, the charge to SWF managers should be to maximize the utility of their owners; which are the citizens of the Country. It is the view here that dedicating some SWF money to public infrastructure is likely to help accomplish that task.

COST OF INFRASTRUCTURE INVESTMENT

If a Sovereign Wealth Fund invests in infrastructure then they reduce, at least in the short-run, their ability to invest elsewhere. In short, the opportunity cost of infrastructure investments must be considered. Note that assuming utility maximization is the goal, it is not perfectly clear that a two parameter risk-return model will efficiently describe the utility function of the investor owners of the Fund. The benefits accruing to the citizens of the SWF were noted in the previous section, but the issue here is whether or not they would be better served by more traditional investments at home and abroad. The Board of the Fund needs to consider this issue carefully.

Another concern is that it is likely that some poor investment choices will be made. Poor investment choices are not limited to infrastructure investments, but poor performance will harm the Fund. Any infrastructure investment should include an expected outcome showing how the investment benefits the citizen-owners of the Sovereign Wealth Fund.

PROCESS FOR CHOOSING PROJECTS

We categorize infrastructure investments into two broad groups; public infrastructure investments and social infrastructure investments. The former are more traditional economically oriented investments and the latter are more directed to lifestyle welfare. Any categorization of this nature is limited in value and will have overlapping investments. For example, we include investments in transportation and communication systems in the public infrastructure realm, and the investment in parks and athletic and fine arts facilities in the social infrastructure category. However, investments in education and health care span the two categories.

Many public infrastructure projects can be analyzed leaning heavily on more traditional valuation methodologies. Will a toll bridge be a money-maker for the SWF? Will an investment in port facilities and management make money when compared to other investments?

However the externalities in favor of the private sector and the citizen owners of the project need to be considered. Even though there will be a tendency to evaluate the SWF in isolation, it should be noted

that investments that increase citizen income and tax revenues create external benefits to the owners of the Fund.

There is also an issue of whether or not Sovereign Wealth Funds should invest in public infrastructure projects when revenue is not generated. For example, should the fund participate in the construction of a freeway? Here the question begs the issue of the role that the SWF plays in the investment. For example, if a Fund enters a freeway project as an investment partner, paid by tax funding, then the decision to invest becomes somewhat easier than if the Sovereign Wealth Fund's investment is substituting for tax funding. In the latter case, some imputed return or reduction in return expectations needs to be explicitly noted in the Fund's goal statement.

There is also the tricky issue of investments in education and health care. As noted earlier, we see investments in this area as spanning the public infrastructure and social infrastructure classifications. There is little doubt that, at least in the gross sense, investing in education and healthcare improves productivity and enhances public sector and private sector performance. Is this, however, a place for Sovereign Wealth Fund investment? The answer is not simple. In richer economies where other investment funding is easily substituted, not employing SWF investment will keep the monitoring of the SWF performance more clear. While in the case of poorer countries and poorly performing economies, Sovereign Wealth Funds may be one of the few sources of funding available, and, recalling that the mission is to maximize ownership welfare it might make sense to employ SWF financing. Noting that last point, in turn muddles the issue of whether Sovereign Wealth Funds should make such investments even when there are alternative funding sources.

Investments in education are crucial in building human capital and human capital is crucial to the productivity gains so important to economic growth. For Sovereign Wealth Funds, investments in education could run the gamut from investing in buildings, to equipment and software, and even into consulting and educational services. In the latter two cases there are revenues to be earned.

Healthcare investments can be even more on the cusp of public versus social infrastructure than is education. Education is typically focused on the young who have the potential to return benefits to the Sovereign Wealth Funds' country for decades into the future. Healthcare tends to focus on the very young and the old. If revenues cannot be produced from the investment in healthcare for the aged, then we have a classic social infrastructure investment. However, investments in long-term care facilities, for example, could be profitable. Alternatively, investment in healthcare for the young promises to yield productivity gains in the future. Should Sovereign Wealth Funds invest in such healthcare when revenues are either non-existent or are too low to be profitable? The income and wealth dilemma noted above plays a role again. When there are multiple revenue sources it may make more sense to fund non-revenue generating health projects through other sources, but where Sovereign Wealth Funds are a significant part of the wealth pool, society may gain more from healthcare investments than from return generating investments.

Some social investments are quite clearly non-essential life style enhancing investments. There are many such investments. Parks, beaches, arts complexes, sports complexes, and sporting and art events are just a sample. Should Sovereign Wealth Funds participate in such investments? In the case of revenue earning investments the process is fairly clear. If discounted cash flows are great enough then the Funds should participate. However, the investment becomes more complicated when either there is a cash flow short fall or no cash flow at all. Since the goal is to maximize the welfare of the citizen owners of the Funds, and since the citizen owners may have a richer utility function than the simple two parameter return-risk function typically assumed, even non-revenue generating investments may make sense.

Where cash flows exist, and the project is viewed as a purely economic event, then the efficacy of undertaking the project should be based on analyzing the present value of the expected cash flows along with any flexibility benefits that are imbedded in the project. The key differences between the public and private sector in evaluating an economic project is the likelihood that the public sector has a lower cost of capital and the political constraints on flexibility benefits.(Arrow and Lind, 1970, Schubert and Barenbaum 2007)^{3,4} Modern financial theory argues that the value of a project is the present value of the net cash flows discounted at the appropriate cost of capital, which in this case is the cost of capital to the SWF, and then add to that value any imbedded real option benefits.

The cost of capital to a Sovereign Wealth Fund is likely to be somewhat higher than that of the central government due to a lack of access to Treasury credit. However, the owners of the Sovereign Wealth Fund are the same citizens who *own* the government. The benefits of a wide ownership base apply equally to Sovereign Wealth Funds as to Treasury investments. Sovereign Wealth Funds may invest in a number of projects with real option value. Real option value is generated by the ability to alter a project when new information is available. The flexibility to change the net present value results to the investor's benefit (enhancing good outcomes and mitigating bad outcomes) is an important element of investing. Because, however, the public owns the Sovereign Wealth Fund, some real options may be more theoretical than real. For example, a metro project financed by a SWF may include in its analysis the ability to run more or fewer trains at certain periods, but when the option is actually attempted, public outcry can reduce the flexibility. Since the owners of the Fund are the public, this problem will be greater for Sovereign Wealth Funds than for private firms. Still, generally projects can be evaluated in a relatively traditional manner with the key focus on net cash flow generation.

Is it possible that the SWF should invest in projects that have negative expected returns when calculated employing traditional methodologies? We argue here that the answer is yes. While the Fund's solvency and management reward systems need to be carefully adjusted for projects that are knowingly entered into with an expected financial short fall, the goal is maximizing the welfare of the citizen owners of the Fund. Thus, while we would certainly argue that such projects need to be few, and due diligence with respect to the Fund's solvency and management performance evaluations need to be undertaken, we believe that a broader utility function might argue for social investing on the part of the SWF. As noted above, we believe such investments should typically be left only to Funds where alternative funding sources are significantly limited.

Measuring the success of social utility projects is difficult, but some analysis needs to be conducted. We are arguing here that it is possible that the citizen owners have at least a three parameter utility function.

$$U = U[E(R_p), \sigma_p, SV_p]$$

Where

U = The utility gained by the citizen owners of the Fund from Sovereign Wealth Fund Investments

$E(R_p)$ = The Expected Return on the Portfolio of Sovereign Wealth Fund Investments.

σ_p = The risk of the Sovereign Wealth Fund Investments as measured by the standard deviation of portfolio returns.

SV_p = The Social Value of the Portfolio of Sovereign Wealth Fund Investments

Where the partial derivatives are:

$$\begin{aligned} [\delta U / \delta E(R_p)] &> 0 \\ [\delta U / \delta \sigma_p] &< 0 \\ [\delta U / \delta SV_p] &> 0 \end{aligned}$$

In short, expected return and social value are "goods" and risk is a "bad".

It is beyond the scope of this paper to argue over the possibilities and the measurement of the Social Value of Portfolio Investments beyond their discounted net cash flows. However, decisions on the matter should receive no less attention or be ignored than their cash flow counterpart. The practical side of finance is that the estimates of such benefits need to be made and ignoring them is not properly valuing their impact.

HOW SHOULD DEDICATED FUNDING FOR INFRASTRUCTURE INVESTMENT BE ALLOCATED?

Sovereign Wealth Funds appear to be dedicated to one or a combination of four strategies for maximizing owner utility. The strategy of the Fund might simply be to earn returns on excess foreign reserves and thereby increase the national wealth. A second goal may be to diversify the earnings of the economy. A third goal may be to create a stabilization fund whose wealth can be used to offset economic downturns. Finally the fund may be geared to intergenerational subsidy. Of course some combination of the four goals may be in play.

The motivation of the Fund may alter the dedicated funding model and the amount that the Sovereign Wealth Fund commits to infrastructure investment. The simple answer in terms of how much infrastructure investing should take place is that such investment should be at the level that maximizes the utility of the citizen owners. That amount is likely to change depending on economic circumstances and the purpose of the Fund.

Perhaps the more interesting question is determining what dedicated funding should mean. The most obvious answer is that a fixed local currency value of funds will be dedicated to infrastructure investing each budget year. While the investment manager may like the certainty of the model, it is not likely to meet the goal of maximizing citizen utility. Citizen utility maximizing infrastructure projects may depend on opportunities and economic conditions. For example, a bid to win the World Soccer Cup may include the need to build extra public facilities, or a faltering economy may provide an opportunity to invest in capital maintenance and development which creates jobs in a downward moving economy. Alternatively, the notion of fighting for budget money within the management of the fund misses the entire point of dedicated funding. What should be done?

The dedicated funding model needs to fit the maximization problem as well as meeting the spirit of dedicated funding. In short, while the local currency amount need not be known year to year the methodology for calculating the amount should be understood. A fixed local currency amount has several advantages but a greater number of disadvantages.

Model types:

- I.) Fixed local currency amount
- II.) Fixed Proportion of returns on Sovereign Wealth Fund portfolio investment
- III.) Fixed Proportion of long-term return on investment.
- IV.) Fixed Proportion of Current Fund Wealth and then Independent
- V.) Sliding scale depending on portfolio performance
- VI.) Sliding scale depending on economic performance

These model types are not exhaustive of the possibilities, but they form a good base to analyze the key issue of dedicated infrastructure investment.

Fixed Local Currency Amount

For the manager in charge of infrastructure investing this may seem like the optimal model. “Knowing” how much she or he can invest improves the planning process. In addition, we assume investment funds not spent will remain dedicated to the infrastructure investment manager. It is quite clear that to force a use it or lose it model on the manager makes little utility maximizing sense. However, the other side of the problem can be severe with dedicated funding in general. That is, when there are available critical infrastructure investment opportunities but there is a lack of funds what should the manager do? One argument is to allow borrowing against future allocations from either the Sovereign Wealth Fund or an alternative source. Another issue with the fixed local currency model is that the real value of funds will deteriorate from inflationary pressure. Of course, an inflation index can be added but that could be detrimental to the larger fund. Finally, an additional problem is that this model is likely to be a poor proxy for a built in stabilizer (assuming that is one of the goals of infrastructure investing and in the maximization function of the Fund). The model is not linked directly to either the performance of the Fund or to the economy.

Fixed Proportion of Returns

For those analysts whose main focus is on the Funds performance this model is one of the best. Infrastructure investment is considered a part of the diversification process and allocating investment returns in constant proportion may seem quite appropriate. Obviously, fund returns can be negative and assuming that infrastructure assets will not be liquidated this asymmetry reduces the model's viability. Assuming that in-place infrastructure investments would not be liquidated an inequality is created where infrastructure investment funds are allocated during positive return periods and receive a zero allocation during negative return periods. In addition to the theoretical issues of asymmetry (infrastructure investing shares in the Fund's victories but not their defeats), the model exacerbates spending during good times and reduces it under bad times, which may not be appropriate if one of the goals of the Fund is economic stabilization.

Fixed Proportion of Long-Term Returns

This model creates both a modified fixed local currency model and reduces some of the stabilization problems with the fixed proportion of return model. In addition it has the virtue of being a leader not a follower. Long-term average returns based on historical performance of like allocated funds is determined. Then a fixed proportion of that return is allocated every year. That means that it is assumed that on average the capital value of the fund will grow and so the local currency value of the infrastructure allocation will grow irrespective of actual Fund performance. This is a natural hedge model. When the Fund is performing above the average the infrastructure investment allocation will be a smaller proportion of return than on average and when the Fund is performing below the average the infrastructure component will grow at a greater rate than the average. Assuming correlation is high between Fund performance and the local economy, this provides built in stabilization spending.

Fixed Proportion of Current Fund Wealth and then Independence

The models above all suffer from a lack of accountability concerning the actual performance of infrastructure investments. This model allocates from current portfolio value a certain proportion of the wealth. It is then incumbent upon the infrastructure manager to grow that segment of the Sovereign Wealth Fund. The obvious virtue of this model is the "one and done" nature of the decision. Once the portfolio allocation has been completed there are no more complications or interesting formulas to deal with. The problem here revolves around two issues. The first is the original allocation, which is a problem in general, but allows for little flexibility here. How will the funds enter the infrastructure market once the lump sum has been allocated? The efficient path of entry will certainly be incentivized by the reward structure of the investing team. Without additional instructions there is little hope that the funds would be used in a stabilization manner. Further, it is likely that any of the social type investments noted earlier will receive short shrift due to the nature of how the infrastructure fund needs to grow. This model assumes that returns will all be kept by the infrastructure management team, a result that might not be in the best interest of the Sovereign Wealth Fund.

Sliding Scale Depending on Portfolio Performance

Here the idea is to tie the investment in infrastructure to portfolio performance but in a more sophisticated manner than in previous models. Specifically, the notion of a graduated allocation model is introduced. An interesting aspect of this model is its potential flexibility. The allocation process can be pro performance or based on countercyclical performance. In addition the allocation can be a follower or a leader (i.e. based on ex post or expected returns). The pro-cyclical model allocates an increasing proportion of portfolio returns to infrastructure investing as returns grow. The notion here is that as performance grows so does the potential for success in infrastructure investing both in terms of public infrastructure and social infrastructure. There is an assumption that portfolio growth and local income growth are highly correlated. The counter cyclical model makes the similar assumption that portfolio performance is highly correlated with local economic performance but that infrastructure investing should have a counter cyclical tone. In some sense there is a battle between new infrastructure and improving or

maintaining older infrastructure. Note that it is possible to create a model in which negative returns create positive flows to infrastructure investing. In that case Sovereign Wealth Fund portfolio investments are liquidated and the cash is allocated to infrastructure investments.

Sliding Scale Based on Economic Performance

In this model the idea is to link infrastructure investing by the Sovereign Wealth Fund directly to local economic performance. Again the model can be of the ex post or ex ante type. Once again the model can be pro-cyclical in nature arguing that growth can be leveraged with greater infrastructure investing or counter-cyclical arguing that infrastructure investing should be grown as a stabilization device. The benefit of this model is that it is linked directly to the economic performance of the local economy rather than proxied through the performance of the Sovereign Wealth Fund. Of course, from a financial portfolio performance point of view that is also the problem with the model. Liquidation or allocations made to fund the Infrastructure component of the Sovereign Wealth Fund will be predicated not on the performance of what the Fund managers have control over, but rather a broader variable. That makes it difficult to value manager performance and certainly impacts their results. Alternatively, the Fund should not lose sight of the fact that the purpose of the Sovereign Wealth Fund is to maximize owner (the citizens of the Country) utility.

Which model is best? The best model will in part be dictated by the key secondary motive for the existence of the Fund. As we noted, the owners of the Sovereign Wealth Fund are the citizens of the Country from which the portfolio's funds are drawn. Maximizing the owners' utility should be the major motivation. Sovereign Wealth Funds do seem to constrain the maximization model by emphasizing the goal of risk and return, economic diversification, economic stabilization, or intergenerational transfer. Given the secondary motivation, different model may lead to maximization.

Where do earnings go? Other than the allocation of wealth model, in which the infrastructure allocation of the Sovereign Wealth Fund is segmented from the rest of the portfolio, the allocation of infrastructure earnings is of interest. In order to maximize the welfare of the Fund owners, earnings from the Fund should be allocated along the lines noted in the model. That means that the Funds earnings are considered generic to the fund and then reallocated according to how the utility of the Fund's owners can be maximized.

Finally, we note that infrastructure investing performance will be a contributor to the overall performance of a Sovereign Wealth Fund. As such, the performance of these investments should be closely analyzed and desired outcome goals should be monitored. Shortfalls should be dealt with as would shortfalls in any other part of the portfolio.

SUMMARY

This paper has analyzed the critical topic of infrastructure investment by Sovereign Wealth Funds. We have argued that given the goal of maximizing citizen welfare, investment in local infrastructure is an appropriate allocation. We present arguments for why such investments increase owner utility and some negative consequences from using Sovereign Wealth Fund monies in this manner. We come down decidedly on the pro-investment side. We discuss different types of infrastructure investments with the conclusion that all types merit at least some consideration. We analyze different methodologies for allocating funds for infrastructure investment. Our concluding position is that Sovereign Welfare Funds should conduct infrastructure investment. We believe that such investment within the portfolio of the SWF is more likely to lead to maximizing citizen welfare than is a portfolio without such investment. We do agree that the issue carries more weight when other financing sources are not available or are extremely limited. Practically, we suggest that, in cases where Sovereign Wealth Funds are not currently invested in local infrastructure projects, a part of the current capitalization of the Fund be transferred for the purpose, but after that one of the strategic allocation models noted above be applied. In finance we buy the future and so we favor the use of expected values in allocation over ex post values. While the actual outcomes will vary from those expected, on average expectations should be accurate and basing

investment allocation on expected values should help the Fund reap better rewards for their secondary objective (greater return for risk, diversification, stabilization, or intergenerational transfer) than would ex post distributions. Finally we noted that infrastructure investment performance needs to be clearly goal oriented and shortfalls need to be monitored and explained. In the end, the key goal is to maximize the utility of the Sovereign Wealth Fund's citizen owners and managing performance is critical to that end.

NOTES

- 1.) See for example: Summers, L. "Sovereign Funds Shake the logic of Capitalism" Financial Times, July 30, 2007. And, Truman, F. "Sovereign Wealth funds: The Need for Greater Transparency and Accountability" Policy Brief No. PB 07-6, 2007, Peterson Institute for International Economics.
- 2.) See for example: Fernandez Nuno. "Sovereign Wealth Funds: Investment Choices and Implications Around the World", Finance Working Paper No. 238/2009, February 2009. ECGI. And, Balding Christopher. "A Portfolio Analysis of Sovereign Wealth Funds, Working Paper, June 2008, University of California, Irvine.
- 3.) Arrow, K and Lind R. "Uncertainty and the Evaluation of Public Investment Decisions" AER 1970.
- 4.) Schubert, Walt and Barenbaum, Les. "Real Options and Public Sector Decision-making", Public Budgeting, Accounting and Financial Management, Vol.19, No.2, Summer 2007.

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