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## EPRI RESEARCH PAPER #4

# Social Investment, Economic Growth and Redistribution: Implications for South Africa's Policy Dilemmas

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## ABSTRACT

This paper outlines a framework for evaluating the impact of social investment on the objectives of equity and economic growth. It casts light on the current policy dilemma facing the South African government as it grapples with the twin task of redressing the legacy of apartheid while maintaining a stable growth-oriented economic environment. The analysis suggests that fiscal austerity that undermines social investment may in fact be counter-productive.

## 1) INTRODUCTION

Efficient social investment can play an important role in promoting economic growth while improving distribution in countries characterized by severe inequality. Large-scale consumption-oriented redistribution may be unsustainable (and ultimately counter-productive). Yet attempts to maintain the *status quo* may foment severe political and social unrest, and lead to similar economic stagnation. Accumulated social investment—access to high quality education, effective mechanisms for ensuring public health, economical housing integrated with efficient mass transit systems, etc.—complements labor and private capital in the production process. In addition to increasing overall productivity, these assets improve social welfare independently of their contribution to the production of market goods and services.

Social investment, however, must be financed, usually through taxation or budget deficits. In a closed economy, the resources come at the expense of consumption or private savings, while an open economy allows the option of external borrowing. These costs, compounded by the deadweight loss of distortionary taxation, can undermine the positive growth effects of the social capital. An optimal policy balances the positive growth and distributional effects of social investment against the full economic costs imposed by taxation and/or increased indebtedness.

The debate over social investment encompasses a broad range of issues, including a lively controversy over the productivity of public capital, with estimates of the United States output elasticity of public capital ranging from 10% (Lau and Sin 1997) to 40% (Aschauer 1989). In addition, the need to finance social investment through taxation, borrowing, and money creation introduces questions about how macroeconomic factors affect economic growth (Fischer 1993).

South Africa provides a compelling environment in which to explore these questions. Apartheid severely skewed the distribution of South Africa's social capital stock, undergirding the maldistribution of private income and wealth and creating an intransigent persistence. In spite of social spending levels (relative to income) comparable to those found in the most highly industrialized countries, indicators of illiteracy, infant mortality, life expectancy, and housing conditions for black South Africans are comparable to those for the world's poorest countries. In South Africa's case, efficient increases in social capital will undoubtedly improve social equity.

In light of this, in 1994 the newly elected South African government committed itself to a fiscally restrained long-term development strategy which precluded direct redistribution, aiming instead at economic growth and job creation through social capital development and reallocation. The adoption of an austere macroeconomic framework in 1996, however, required substantial reductions in social investment. The strategy's blueprint projected the creation of hundreds of thousands of private sector jobs in the first two years—in reality, the economy subsequently cooperated on the absolute magnitude but differed on the sign. The government, however, continued to commit itself unequivocally to the

binding constraint of a fixed fiscal deficit target (in practice, an operational surplus).

This paper explores the public choice problem of determining the optimal level of social investment and taxes taking as given the long-term economic strategy. Policy-makers construct an overarching macroeconomic policy that specifies borrowing limits and the instruments of fiscal policy. Then the government optimizes taxation and social investment spending given the fiscal constraints. The goal is to balance the objectives of increased growth and improved social equity, where equity is proxied by social capital. This model is applied to South Africa's situation.

## **2) LITERATURE REVIEW**

The relationship between public capital and economic growth has long been a subject of economic debate. Earlier work focused on the relationship between public and private investment. Blejer and Khan (1984) show that public investment "crowds in" private investment, while Khan and Reinhart (1990) analyze the importance of the complementarity between public and private investment. Increasing public investment that competes with the private sector leads to a decline in private investment, but additional public investment that corrects a market failure leads to increased private investment. Easterly and Schmidt-Hebbel (1993) also find that higher public investment usually leads to greater private investment.

The endogenous growth literature examines the direct link between public expenditure and growth. Aschauer (1989) identified a powerful role for public

capital in the production function, identifying a strong relationship between public investment and total factor productivity growth. Cashin (1995) examines a similar question, but explicitly develops a theoretical model that analyzes the effects of public investment, transfers, and taxes on economic growth, showing how both social infrastructure and transfer payments have growth-enhancing economic effects. Munnell (1992) criticizes this work on methodological grounds, and Lau and Sin (1997) find a much weaker relationship between public capital and economic growth.

The practical reasons for the link between social capital and growth has been an important topic for policy research. A World Bank (1993) report found that social infrastructure investment was a critical ingredient to the success of the high growth East Asian economies. More recently, the World Bank (1997) reports a strong link between citizen involvement in local public affairs and the effectiveness with which government manages high quality schools, develops innovative day care programs and job training centers, and promotes economic growth. This highlights the inclusiveness of the concept of social capital—it comprises not just the physical public capital stock but also embodied human capital and assets such as citizen involvement and social cohesion.

The stress on fiscal resources from financing social investment can potentially lead to macroeconomic instability or excessively high taxation and/or borrowing, undermining economic growth. Fischer (1993) analyzes the role of macroeconomic factors in determining growth, finding a strong correlation between low deficits and high rates of growth. His analysis is predicated on two premises: (1) that deficits cause “crowding out”, and/or (2) that high fiscal deficits

indicate that the government is “losing control of its actions”. Levine and Renelt (1992), however, find no robust relationship between macroeconomic factors and economic growth—only investment in physical and human capital explains differences in rates of growth among countries over time.

### 3) A MODEL OF SOCIAL INVESTMENT

This section develops a model that links social investment to fiscal policy, addressing the issues of growth and redistribution.

#### The firm’s microeconomic problem

The microeconomic analysis is based on the behavior of  $M$  identical optimizing firms who face the problem of maximizing profit ( $\Pi$ ) subject to production ( $y$ ) and tax policy ( $T$ ) constraints. The problem for the  $j$ th firm can be represented:

$$\text{MAX } \Pi = y - T_j - rK - wL \text{ with respect to } K \text{ and } L$$

$$\text{Subject to } y = y(E, K, L) \text{ with } y_K, y_L, y_E, y_{KL}, y_{KE}, y_{LE} \geq 0$$

$$\text{and } T_j = T(y, K, L) \text{ with } T_y, T_K, T_L \geq 0$$

where  $\Pi$  is the firm’s profit,  $y$  is the firm’s output,  $T_j$  is the firm’s taxes (which include income taxes paid by its workers and investors),  $K$  is the firm’s demand for private capital,  $L$  is the firm’s demand for labor,  $E$  is aggregate social capital (for the whole economy),  $r$  is the cost of private capital (the after-tax return to investors), and  $w$  is the wage rate (the after-tax wage paid to workers). Solving the optimization problem yields two first order conditions:

$$y_K(E, K, L) = \frac{r + T_K}{1 - T} \qquad y_L(E, K, L) = \frac{w + T_L}{1 - T}$$

The marginal productivities of capital and labor are equated to the respective tax adjusted factor prices. These equations implicitly (and under further restrictions explicitly<sup>1</sup>) determine factor and output demand as functions of the factor prices ( $r$  and  $w$ ), the publicly determined quantity of social capital ( $E$ ), and parameters of the tax policy. Assuming diminishing marginal productivity of inputs, factor demands are decreasing in their own prices and decreasing in their own tax rates and output tax rates. Output and factor demands respond positively to increases in social capital.

### The micro underpinnings of the macroeconomic model

Given the production function and tax policy above, the full macroeconomic model can be formulated by postulating consumption behavior and by specifying the budget constraint determined by fiscal policy. Assuming  $N$  individuals in the economy, the  $i^{th}$  individual's lifetime consumption vector ( $c_i$ ) is assumed to depend on this individual's lifetime after-tax wages and capital income:

$$c_i = c(w, r) \text{ with } c_w > 0, c_r > 0$$

Fiscal policy is governed by a policy rule (implicitly subject to a feasibility constraint), that can be generalized as:

$$f(E, T) = 0 \text{ with } 0 > -f_E \geq f_T$$

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<sup>1</sup> For instance, a constant elasticity production function and a linear tax policy yields a closed form solution for  $K$  and  $L$ .

This general form can handle a number of policy rules. A balanced budget rule is  $f = E - T$ . If a fiscal deficit is constrained to a fixed percentage of total revenue, then the rule can be written  $f = E - T(1 + \phi)$ , where  $\phi$  is the fixed percentage. Intertemporal budget constraints relate the present values of  $E$  and  $T$ . For instance, consider a simple two period model where social investment occurs only in the first period and is financed entirely through borrowing at interest rate  $r$ , which is repaid through taxes in the second period. Then the fiscal policy rule can be written  $f\{PV(E), PV(T)\} = 0$  where  $E$  and  $T$  are vectors of social investment and taxes and the present value calculation uses the return on social investment  $\rho$  as the discount rate. The defining condition becomes  $0 > -f_{PV(E)} \geq f_{PV(T)}$  and holds as a strict equality if  $\rho = r$ . If  $\rho > r$ , the condition holds as a strict inequality.

Given the assumption of  $N$  identical individuals and  $M$  identical firms, total consumption  $C$  is equal to  $cN$  and total output  $Y$  is equal to  $yM$ . The government determines the tax schedule and fiscal policy rule, which jointly with production decisions determine total tax revenue  $T$ . If fiscal policy permits public borrowing, it is equal to gross social investment less taxes (social capital accumulation is the only role for government in this model). Savings determine gross private investment, and is equal to output less consumption, taxes and public borrowing (if any).



### The government's macroeconomic problem

The government optimizes the society's welfare function, which depends on private output ( $Y$ ) and social capital ( $E$ ):

$$U = U(Y, E) \text{ with } U_Y \geq 0, U_E \geq 0$$

Social capital enters explicitly into the welfare function because, in addition to contributing productively to private output, it directly improves the well-being of the people.<sup>2</sup>

The optimization problem is constrained by the aggregate production function and the policy-determined fiscal constraint, and can be written:

$$\text{MAX } U(Y, E) \text{ with respect to } T \text{ and } E \text{ subject to } Y = Y(E, T) \text{ and } f(E, T) = 0$$

The slope of the efficient frontier defined by the constraints can be expressed:

$$\frac{dY}{dE} = Y_E - Y_T \frac{f_E}{f_T}$$

At lower levels of social capital, when the positive marginal productivity effect of social capital dominates the negative tax effect, this derivative is positive. Eventually, the derivative becomes negative as the marginal productivity of social capital falls and the negative impact of taxes on output becomes dominant. The effect of taxes on output is moderated or intensified by the fiscal policy constraint—the more costly is borrowing, the stronger is the second term on the

right hand side. The inflection point represents the output-maximizing level of social capital, where the positive contribution of increased social capital is exactly offset by the negative impact of required taxes (adjusted for the fiscal policy effect).

The welfare-maximizing solution is described by the problem's first order condition:

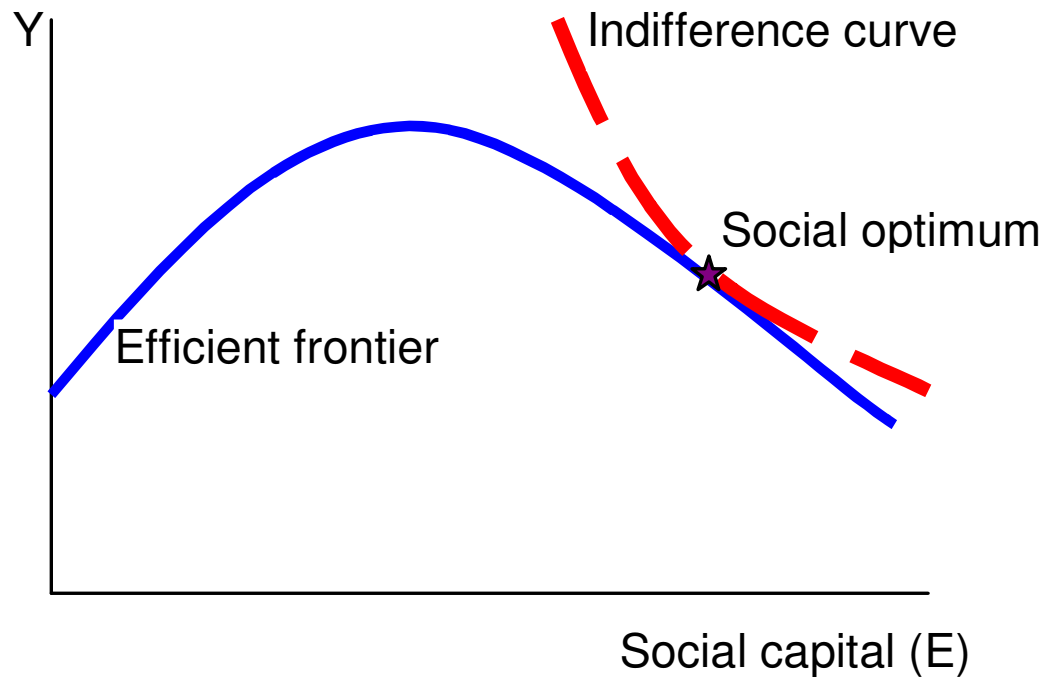
$$\frac{U_Y Y_T}{f_T} = \frac{U_Y Y_E + U_E}{f_E}$$

At the margin, the welfare-eroding effects of higher taxes (which are determined by the interaction of fiscal policy and the profit-maximizing behavior of firms and are manifested through lower output) are balanced against the positive welfare effects of greater levels of social capital (which include both the direct enhancements to welfare from a higher level of social capital, as well as the benefits of higher output).

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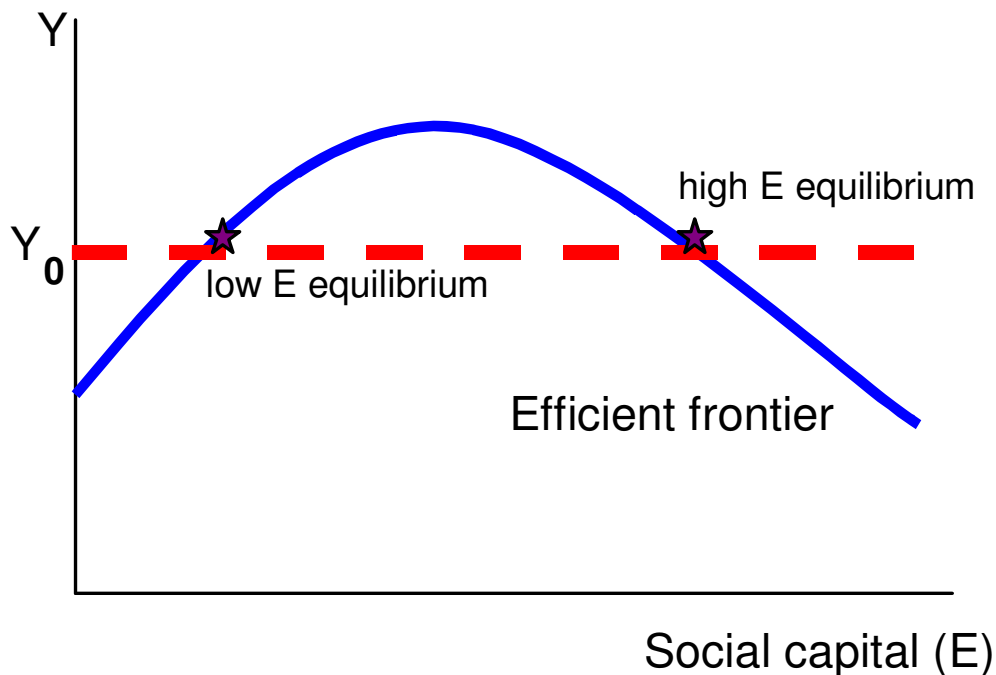
<sup>2</sup> For instance, roads contribute to production of private output as well as the utility of leisure. Access to health care improves worker productivity as well as quality of life.

The solution is graphically depicted in the figure below. The efficient frontier represents a menu of feasible equilibria available to policy-makers—each point on the frontier represents the highest level of output consistent with fiscal



policy and the optimizing behavior firms, given the choice of the level of social capital. A. If society values both output and social investment independently, then the welfare indifference curves have negative slope and are associated with higher welfare as they shift to the right.

The solution is characterized by multiple equilibria. For example, the figure below indicates two equilibria associated with the level of output  $Y_0$ . Any feasible level of output other than the maximum level of output can be produced either with a relatively low level of social capital and a relatively high level of private capital (the low E equilibrium in the figure below), or with a relatively high level of social capital and a relatively low level of private capital (the high E equilibrium in the figure below).



An economy may find itself at a low social capital equilibrium for a number of reasons, such as history, politics, or error. If the government at some point in history had valued inequality even at the expense of national income, the economy might find itself on the undesirable side of the frontier, and it would require time and resources to move to the socially desirable point on the frontier.

Alternatively, since each point along the efficient frontier represents a different distribution of income, minority interests might use their political and economic power to maintain the economy at a socially undesirable point. Third, the economy might be at such an equilibrium because of a policy error: economic policy is fraught with complexity and ambiguity—the history of economic policy analysis is the history of grappling with the consequences of policy mistakes.

### Model dynamics for a simple case

The dynamic evolution of the economy to an equilibrium depends on the specific functional forms the economic relationships, and cannot be easily generalized. However, some implications of incorporating social capital into the production function can be explored with a rudimentary example.

Consider a simple case where there are  $N$  workers and  $M$  firms, and the  $N$  workers retire after one period, yielding their jobs to  $N$  replacements, and then consume their wealth before expiring at the end of the subsequent period. Workers save proportion  $s$  of their wage, paying proportion  $\tau$  in taxes, and consume the remainder. Thus, consumption for a worker at time  $t$  (their working period) can be related to the before-tax wage  $\omega$ , where the after-tax wage is  $w = (1 - \tau) \omega$ :

$$c_t^W = (1 - s - \tau)\omega_t$$

Thus, the worker saves  $s\omega_t$ , which earns real return  $r$ . Therefore, the consumption of a retiree at time  $t+1$  can be written:

$$c_{t+1}^R = (1 + r)s\omega_t$$

The worker pays  $\tau\omega_t$  taxes at time  $t$ , which is invested in social capital that enters the production function in the subsequent period and depreciates completely by the following period.

Assume the aggregate production function takes the form  $Y = A(E)K^\kappa L^\lambda$ , where  $A'(E) > 0$  and  $A''(E) < 0$ . Then  $E_t = \tau\omega_{t-1}N$ ,  $K_t = s\omega_{t-1}N$ , and  $L_t = N$ . By substitution, the capital:labor ratio  $k$  can be expressed as a function of the wage in the previous period:

$$k_{t+1} = s\omega_t$$

If workers are paid their marginal product, the equation relating the current period capital to labor ratio to next period's ratio (the transition equation) can be written:

$$k_{t+1} = \frac{s\lambda A(\tau\omega_{t-1}N)}{N^{1-\kappa-\lambda}} k_t^\kappa$$

In contrast to the implications of the Solow growth model<sup>3</sup> the economy will not necessarily converge to a fixed capital:labor ratio, even if the production function is characterized by constant returns to scale in private capital and labor. Since  $E_t$  depends on previous period wages and  $A'(E_t) > 0$ , the transition equation itself shifts up as the economy grows. Furthermore, the long run growth path depends on initial conditions as well as the interaction between savings and the policy-determined tax rate. For instance, suppose  $s = 40\% - \tau$  and assume

<sup>3</sup> As formalized by Lucas (1988).

$\kappa = \lambda = 0.5$  and  $A(E) = E^{0.5}$ . Then, simulations of the model indicate that the economy decapitalizes completely if  $\tau = 30\%$  but converges to a positive capital:labor ratio if  $\tau = 20\%$  (and the long run capital:labor ratio depends on the initial conditions).

#### 4) POLICY IMPLICATIONS

What does this analysis imply in terms of constructing policies for equity and growth?

- First, income (growth) depends negatively on taxes and positively on rates of social investment. Improved equity in this model is unidimensionally assumed to be an increase in social capital.
- Second, if social investment is financed through higher taxes, then the impact on income (growth) will depend on whether the tax effect is stronger or weaker than the social investment effect. This depends on the tax burden relative to the marginal productivity of social capital.
- Third, the optimality of the overall macroeconomic strategy depends on, among other things, the degree to which the central government faces binding borrowing constraints. If the public debt burden is excessive, the need to run fiscal surpluses makes the budget constraint more onerous. However, if public debt levels are relatively low and returns to social investment are higher than the interest rate, a fiscal strategy aimed at reducing debt might not be optimal.

- Fourth, an economy in a low social capital equilibrium can improve both equity and income (growth) by increasing taxes and expanding social investment. The marginal productivity of social investment offsets the growth eroding effects of higher taxes.
- Fifth, an economy in a high social capital equilibrium faces a trade-off between equity and income (growth). Expanding the social capital stock reduces income (growth).

## 5) SOUTH AFRICA

The policy implications of the model provide a framework for assessing the relevance of the analysis to South Africa's situation.

### A simple test of the growth model

The first implication suggests an avenue for cross-country or country-specific time-series growth regressions. Are increases in social investment associated with increased growth? Do higher taxes reduce growth? This approach is rife with problems. Social spending on health, education, and housing is not necessarily equivalent to delivery of social capital on the efficient frontier, particularly in South Africa's case. The legacy of apartheid continues to skew the allocation of social investment—the best schools are in historically white suburbs, and they absorb higher levels of non-discretionary maintenance.



Also, average tax rates do not necessarily reflect the true tax burden, which depends on the deadweight loss from associated distortions.

In spite of these problems, a simple regression along the lines of Aschauer (1989) or Cashin (1995) is indicative of the relevance of the model. Using time series data<sup>4</sup> for South Africa from 1980 to 1996, the following regression was estimated:

$$\dot{Y}_t = 0.33 + 0.41\dot{K}_t + 0.55\dot{L}_t + 1.35\frac{E_{t-1}}{Y_{t-1}} - 0.52\frac{T_{t-1}}{Y_{t-1}} - 0.26r_{t-1}$$

(1.45)          (1.87)          (1.44)          (3.42\*\*)          (-2.37\*)          (-4.18\*\*)

$Y$  is real GDP,  $K$  is the private non-residential capital stock,  $L$  is the index of private sector labor hours,  $E$  is non-consumption government expenditure plus public spending on health, education, and housing, and  $T$  is total tax revenue, and  $r$  is the prime lending rate less the percent change in the Consumer Price Index. A dot (•) over the variable represents the year-over-year percent change in the variable. The t-statistics are indicated in parentheses underneath the coefficients, and a single asterisk (\*) represents statistical significance at a 95% level, and a double asterisk (\*\*) represents statistical significance at a 99% level. The adjusted R-squared is 73.48%, the Durbin-Watson is 1.78, and the Dickey-Fuller t-statistic of -2.47 from the cointegration test by Engle-Granger

<sup>4</sup> Data is from the International Monetary Fund's *International Financial Statistics* and *Government Finance Statistics Yearbook*, the Reserve Bank of South Africa, and the National Institute for Economic Policy.

(1987) indicated failure to reject the null hypothesis of the existence of a unit root at a 95% level.

While  $E$  as measured is at best a proxy for the social capital stock, the strong statistical significance of its coefficient is consistent with the findings of Aschauer (1989) and Cashin (1995). The absolute magnitude of the effect of the social capital stock is more than twice that of the tax rate. The relatively weaker statistical significance of the average tax rate is consistent with the large amount of deficit finance over the sample period. This also suggests that South Africa's tax effort (actual taxes relative to taxable capacity) might be relatively low.

### **South Africa's fiscal position**

The question of South Africa's tax effort addresses the second policy implication outlined in section 4. Given the skewed allocation of social capital created by apartheid, the marginal productivity of efficiently allocated social capital is likely to be high. The tax burden effect depends in part on whether South Africa's taxes are too "high". One way to quantify this is through an international comparison, since a major risk of excessively high taxes is human capital flight. Since the overwhelming majority of professional emigration from South Africa is to OECD countries, these provide one basis for comparison. At 26% of national income, South Africa's average tax rate is substantially lower

than that of any of the OECD countries, the average of which is about (OECD 1997).

One influential study by the IMF (1992) compared South Africa's tax structure to those of a sample of ten middle-income countries, concluding that South Africa is "over-taxed". The report did not, however, explain how the sample was constructed, and the inclusion of countries like Argentina significantly lowered the sample's average tax rate. A comparison with the ten countries with the most similar *per capita* incomes yields a sample average of 32%<sup>5</sup>, six percentage points higher than South Africa's average tax rate. An econometric study by Harber (1995) which controlled for individual structural characteristics for a large sample of countries concluded that South Africa's tax effort is about five percentage points higher than that predicted by the regression.

Another factor indicating South Africa's strong fiscal position is the relatively low level of public debt. Expressed as a percentage of national income, South Africa's public debt ratio of 56% is lower than that of nearly every industrialized country and most developing countries. Also, since domestic residents hold more than 90% of South Africa's government debt, the payment of interest on the debt does not constitute a significant net drain on the nation's resources. This suggests that the third policy implication in section 4 supports

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<sup>5</sup> The sample, in order of per capita income, includes Turkey, the Czech Republic, Malaysia, Venezuela, Brazil, Botswana, St. Kitts and Nevis, Uruguay, Hungary, and Mexico. South Africa's per capita income stands in the middle of the sample. Data is from the International Monetary Fund's 1997 Government Finance Statistics Yearbook using averages for the 1990s.

fiscal flexibility—South Africa has the capacity to increase borrowing in a prudent manner.

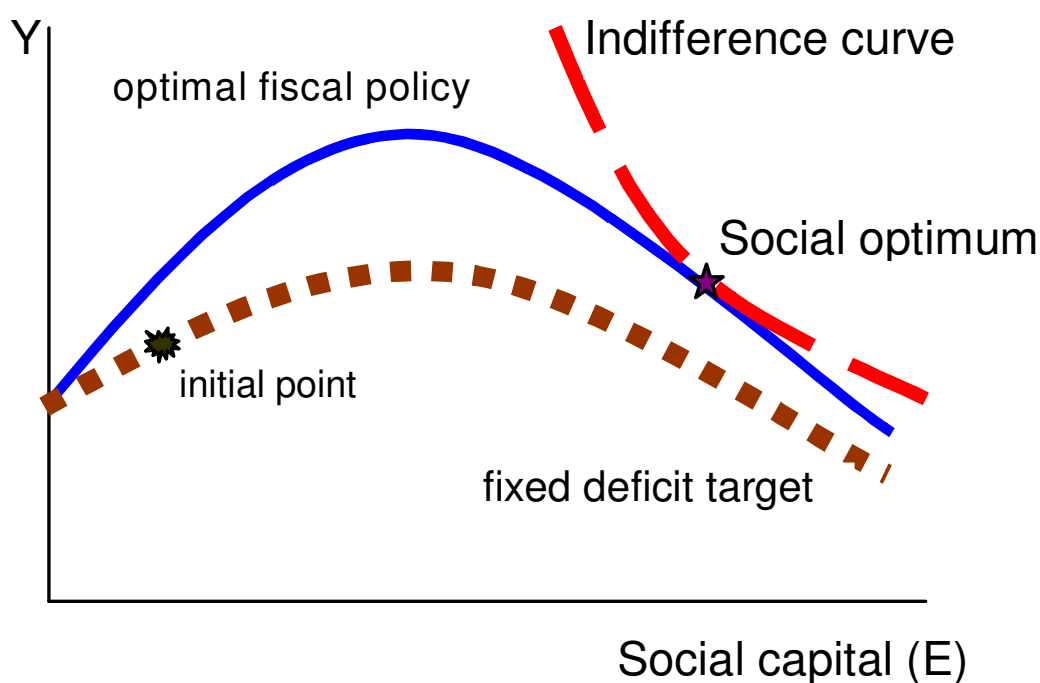
### **Opportunities presented by the low social capital equilibrium**

The evidence presented here is consistent with South Africa being in a low social capital equilibrium. Taxes and borrowing are relatively low, and the marginal impact of social investment on growth is substantially stronger than the negative effect of additional taxes. This suggests that increasing social capital expenditure can potentially increase both equity and economic growth. This is consistent with the historical nature of apartheid policy-making: lower rates of economic growth were accepted as part of the price for suppressing and skewing social investment. The current equilibrium—largely the same equilibrium that prevailed under apartheid—reflects the inverted social welfare objectives of the previous regime.

The potential growth path requires substantial but careful increases in employment-creating investments such as education, training, health care, housing, and physical infrastructure. Expenditure in these areas creates jobs by both expanding overall demand in the economy while increasing overall productivity. The strategy's focus on human resources shifts the economy's orientation towards a more labor intensive mode of production, helping to correct inefficient biases created by capital intensive industrial policies over the past

several decades. Furthermore, by increasing labor productivity, the strategy leads to increased wages as well as higher rates of growth and employment.

The optimal strategy may require relaxing the fixed fiscal deficit targets. Mobilizing the necessary resources entirely through taxation may involve inefficiently excessive short-term increases in the deadweight burden of



distortionary taxation. As depicted in the graph below, the optimal fiscal policy offers a more favorable path from the initial low social investment equilibrium compared to that posed by the fixed deficit target policy.

As the economy adjusts to the high social capital equilibrium, it reaches the output-maximizing level of social capital. Generally, the optimal level is greater than this, since social investment has favorable consequences for society

that extend beyond its positive effects on productivity. However, at this point the government must explicitly weigh the trade-off between equity and growth.

## **5) CONCLUSIONS**

This paper outlines a framework for evaluating the impact of social investment on the objectives of equity and economic growth. It casts light on the current policy dilemma facing the South African government as it grapples with the twin task of redressing the legacy of apartheid while maintaining a stable growth-oriented economic environment. The analysis suggests that fiscal austerity that undermines social investment may in fact be counter-productive.

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