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Optimal Taxation of Financial Savings in Developing Countries: Relevance of Supply-Side Tax Policies

Prepared by Liam P. Ebrill 1/

Approved by Ved P. Gandhi

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Contents

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Abstract

This paper evaluates the impact of recently advocated supply-side proposals for savings in developing countries. In particular, on the presumption that the interaction of inflation and high marginal rates of income taxation has an adverse effect on savings, it evaluates the recommendation that marginal income tax rates be sharply reduced in those countries.

The paper disaggregates savings by whether they are accumulated in organized financial markets or in unorganized financial and nonfinancial markets. Such alternative savings outlets are in fact important in many developing countries. This taxonomy is analytically useful precisely because one of the defining characteristics of savings placed in organized markets is that they are readily subject to income taxation. Further, allowing for the existence of alternative savings outlets raises the possibility of portfolio reallocation effects as a concomitant of that taxation.

The paper develops an optimal tax framework in which is incorporated this categorization of financial assets. This framework allows for the existence of artificially low nominal interest rates, a possibility in many developing countries as a result of government intervention. The resultant financial repression influences the optimal tax treatment of financial savings in a manner which depends on the degree to which the financial repression exists.

The conclusion is that, if economic efficiency is the decisive criterion, then the best reform proposals, within the limited context of tax/price policy, would be the abolition of financial repression. Failing that, there remain more specific tax policy recommendations which would depend on the particulars of each individual case. A useful benchmark case is one where financial repression exists and outright subsidization of savings is not feasible. In that case, a consumption tax is superior to an income tax.

When the supply-side proposal of reducing the marginal income tax rates in developing countries is evaluated against the optimal tax framework developed in the paper, it is seen not so much to be wrong as to be insensitive to local conditions. As a blanket solution to savings problems in developing countries, the proposal is deficient in that it does not accommodate the heterogeneity of developing country conditions in respect of financial markets and interest rate policies.

I. Introduction

The purpose of this paper is to evaluate, for the case of developing countries, the potential impact of recently advanced supply-side proposals for stimulating savings. Supply-side economists argue that the interaction of inflation and high marginal rates of income taxation is such as to imply a serious disincentive to savings. As a result, they recommend sharp reductions in marginal tax rates. If applied to developing countries, would such reductions be either desirable or lead to a pronounced increase in savings?

Particular attention is paid to that component of savings accumulated in organized financial markets. This concentration can be justified on a number of grounds, of which three are worth special mention. First, it is often argued that, while aggregate savings are generally not very sensitive to changes in the net rate of return, that is not the case with individual components such as financial savings in organized markets--changes in the rate of return that can be earned on any one form of savings can be expected to induce significant shifts into substitute assets. Second, organized financial markets are of particular importance since they are often central to the efficient allocation of available funds. Third, and most important given the supply-side perspective of this study, the particular disaggregation of aggregate savings employed here is useful precisely because the components can be distinguished by whether they represent savings in organized as opposed to unorganized financial markets. Since supply-side proposals for reform are typically directed at lowering high marginal rates of income taxation, the most immediate effect of these proposals in developing countries will be on those savings placed in the organized rather than the unorganized money markets.

This paper first describes the financial markets in developing countries as the backdrop against which the appropriateness of supply-side proposals are evaluated. Particular attention is devoted to the significance of financial repression, an indicator of which is the policy of institutionally setting nominal interest rates at artificially low levels--the resulting low (indeed, negative) real rates of return inducing asset holders to shift out of assets issued by organized financial markets into investments that are less productive, such as gold and housing. Should this effect be empirically significant, it has important implications for this study given the study's concentration on savings behavior in organized financial markets.

Given this background, what are the appropriate tax reform policies? The consideration of this question begins with a discussion of the reform proposals associated with traditional public finance theorists. It is argued that the existing optimal tax literature does not adequately accommodate the circumstances of developing countries. A modified optimal tax framework is suggested. The results of this exercise are then contrasted with the recommendations of the

supply-side school. The conclusion is that, while not necessarily incorrect, the proposals of the supply-side school are deficient in that they do not take account of the heterogeneity of the developing countries. This is a deficiency they share with the traditional public finance literature. Specifically, the modified optimal tax framework developed in this paper suggests that, depending on which country is under consideration, the optimal tax treatment of financial savings runs the gamut from subsidies to substantial taxation.

All of the above treats the problem from a microeconomic perspective. It is also pointed out, however, that the ramifications of financial repression extend to macroeconomic policy, a factor which should be acknowledged in any study of tax policy in this area.

The traditional public finance literature, the supply-side approach, and the modified optimal tax framework developed here, do, however, share a common theme: that appropriate tax rates should depend on the sensitivity of savings behavior to changes in the rate of return. A subsequent section of the paper provides a summary of the existing empirical literature on this matter.

II. Institutional Background

Any tax reform recommendations must take account of the economic environment in which the reform takes place. Thus, the financial structures of developing countries have a number of features which, though not unique to those countries, are held to be more widely experienced by them. While this is undoubtedly correct, it should also be kept in mind, as these features are introduced and discussed, that the degree to which any feature is relevant varies greatly from country to country. As argued later, this variability has important implications for tax policy.

First, financial institutions in many developing countries tend not to be well developed (cf., Miracle, Miracle, and Cohen (1980)). This has a number of implications. In particular, McKinnon (1973) argued that, in developing countries, investors are constrained to using self-finance and that investments are relatively lumpy. As a result, investors must accumulate money balances prior to their investments, leading to the hypothesis that the aggregate demand for money will be greater, the larger is the share of investment in total expenditures. (This is McKinnon's complementarity hypothesis.)

Second, it has often been pointed out that in many developing countries, interest rates on assets in organized markets are often set at low nominal rates given the rate of inflation (see Galbis (1979 a)). A large body of literature exists in which it is argued that such

institutional restraints can only result in financial repression (Shaw (1973), McKinnon (1973)). 1/ The existence of these interest rate ceilings, it is held, leads to a reduced supply of financial savings to organized markets, as savers turn to alternative, non-productive, investments such as property and precious metals. Depending on foreign exchange market conditions, savings may even be placed overseas. These effects, it is argued, require some type of investment rationing mechanism. 2/

Financial repression may not only result in portfolio reallocations out of organized financial markets, but may also influence short-run macroeconomic developments in many developing countries. Specifically, Leff and Sato (1980) identify a couple of macroeconomic implications. First, ex ante investment will tend to exceed ex ante savings. Second, and more important for short-run policy, interest rates cannot be used to maintain equilibrium in the savings-investment market. They argue that investment tends to be relatively more buoyant than savings with the concomitant possibility of instability. Price-level movements and foreign capital flows then become central to absorbing shocks. The

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1/ Tables 1 and 2 in the Appendix show that financial repression varies both across countries and across time. The phenomenon may not be as prevalent today as formerly. However, that only serves to emphasize the heterogeneity of developing country financial policies.

2/ Many papers have tried to evaluate the empirical implications of this. For example, Fry (1980) postulated that severe financial re-5ression, associated with low real rates of return, results in reduced growth rates. In a pooled time-series cross-section regression for seven Asian countries, he reported the following result:

$$g = \underset{(4.761)}{0.033} + \underset{(3.733)}{0.405}\, r \qquad \bar{R}^2 = 0.16 \quad F = 14 \qquad (1)$$

where g is the growth rate and r is the real rate of return. The t-ratios are in parentheses and $\bar{R}^2$ and F stand for adjusted R-squared and the F-ratio, respectively. The positive and significant coefficient on the rate of return variable is taken as evidence of the adverse impact of financial repression, i.e., an increase in the real rate of interest implies an increase rather than a decrease in secular growth rates. Analogous results are reported in Fry (1978) and IMF (1983). However, it should be noted that single-equation results such as equation (1) are highly aggregative and cannot rule out the possibility that liberal interest rate policies may correlate positively with a whole range of other policies instituted with a view to encouraging growth.

general conclusion is that inflation and dependency on foreign capital inflows are structurally rooted in many developing countries. 1/

A third distinctive feature of financial markets in some developing countries is that investors enjoy the existence of unorganized curb-markets (Van Wijnbergen (1983 a) and Buffie (1984)). 2/ By emphasizing the role of curbmarkets for portfolio allocation decisions in developing countries, Van Wijnbergen questions the presumption that the alternative asset to financial holdings in organized markets must consist of non-productive investments. Instead, it may consist of holdings of financial assets issued in unorganized money markets of the curbmarket type (Van Wijnbergen (1983 b)). This possibility alters the implications of financial repression for economic policy. For example, an increase in interest rates in organized markets may no longer result in the "free lunch" of financial flows attracted from nonproductive sources, but may instead lead to a general increase in the working cost of capital faced by firms. Further, the central governments of many developing countries exercise a major claim on savings channeled through organized money markets. If such governments invest less efficiently than the private sector, an increase in interest rates then achieves the ambiguous result of alleviating the distortion faced by savers at the expense of exacerbating the distortion associated with inappropriate government investment decisions.

1/ An empirical implication of their modified IS-LM framework is that changes in the volume of real credit should have a direct supply-side effect on the volume of investment by altering the stock of working capital available to investors. Their estimated investment functions, while suffering from multicollinearity due to the high correlation between the credit variable and the output variable, does tend to support this hypothesis.

2/ How important are these curbmarkets? Tun Wai (1977) argues that the ratio of total agricultural or rural indebtedness to the claims of the banking system on the private sector is the best index of the size of unorganized money markets relative to that of the organized money market. By that criterion, he concludes that for India, Nepal, and Pakistan the unorganized markets are larger than the organized markets. (The data he collects refers to 1969/70, 1970, and 1971, respectively.) He finds that, in general, these markets are less important in those Latin American and Middle Eastern countries for which data were available. Chandavarkar (1971) confirmed these results for India, while, of course, the importance of curbmarkets in Korea has long been recognized (see, for example, Williamson (1979)). On this last case, Van Wijnbergen (1982) uncovered evidence, some indirect, to the effect that increased savings are mainly channeled into the curbmarket over time. Specifically, he discovered that wealth effects were not significant in his M2 demand equations. Since financial assets assuredly have positive wealth elasticities in the aggregate curbmarkets must have been the beneficiary of increased wealth.

A fourth and final characteristic is that many developing country governments employ compulsory savings schemes. 1/ For example, Shome and Squire (1983) point out that some Asian countries such as Malaysia, Sri Lanka, and Singapore, have, in varying degrees, funded social security systems.

Given that the above features are not uniformly experienced, the above also serves to emphasize the heterogeneity of developing country circumstances. In view of the prominence it has attained in the economic literature, the following assessment of supply-side tax proposals will concentrate on the particular role played by financial repression. An optimal tax framework will be developed that will explicitly allow for such a phenomenon. The robustness of this framework will then be assessed in light of the other structural features of developing country capital markets just discussed. The framework will also form a basis for evaluating the relevance of supply-side tax policies as they apply to savings. Even at this stage, however, there is already the sense that the heterogeneity of the financial systems of developing countries imply that tax changes based on simplistic rules of thumb are unlikely to be appropriate. In particular, any evaluation either of traditional optimal tax policy or of supply-side tax policy, as they apply to developing countries, should take into account not only the microeconomic portfolio allocation effects of taxes but also their general macroeconomic effects.

III. Evaluation of Reform Proposals

The recent supply-side literature is large. However, perhaps out of a desire to make politically feasible tax policy recommendations, the actual number of recommendations contained in that literature is quite small. Most relevant to the present study are those associated with the Laffer Curve, especially, that high marginal tax rates should be sharply reduced. Lest it be thought that this type of recommendation has been made solely with the United States in mind, it should be noted that Wanniski (1983) argues for the relevance of the Laffer Curve for a number of developing countries.

More broadly, it would also appear to be in the spirit of the supply-side approach to say that they favor tax cuts aimed at stimulating (private) savings. This, of course, begs the question of the adequacy of the pre-existing level of savings. Presumably the supply-siders believe that aggregate savings are depressed in the first place due to the existence of the tax system and other distortions. In that respect, it should be noted that there is general agreement that savings in developing countries are low in relation to investment needs.

1/ From the perspective of this study, long-term schemes such as compulsory funded social security systems are the most important. However, as documented by Prest (1969), many countries have also resorted to shorter-term schemes.

1. Summary of theoretical literature

One way of evaluating the supply-side approach is to contrast its recommendations on savings with those of the more traditional public finance literature. In particular, there are a number of papers which address the issue of how to tax savings. 1/ The orientation of this literature has been to determine whether the tax base should be income or expenditure (consumption). As early as 1921 Mill argued for a consumption base, not so much on efficiency as on equity grounds--income taxes tend to favor those who derive their income from wealth rather than work effort. More recently, the consumption base received further support in the work of Kaldor (1955) who argued for an expenditure tax on both efficiency and equity grounds.

Even more recently optimal tax theorists sought to resolve this question by considering solely the efficiency implications. Their solution lay initially in a simple extension of the optimal commodity tax literature. Thus, Feldstein (1978) gives the static framework associated with that literature an intertemporal flavor by labeling consumption in different periods as different commodities. A two-period life-cycle model is postulated. The consumer is then assumed to allocate his endowment across leisure, which is untaxable, first-period consumption, and second-period consumption. In general, since leisure cannot be taxed, second-best theory suggests that it is optimal to violate all first-order conditions. There are circumstances where a consumption tax is optimal--as when a compensated change in the wage rate induces the same proportional changes in consumption in the two periods. 2/

1/ This issue is logically different from that of how best to stimulate savings. However, to the extent that the literature provides qualitative results, it does provide a benchmark against which the desirability of stimulating savings can be weighed.

2/ This is implicitly an implication of the Ramsey Rule (Ebrill and Slutsky (1983)). Under the circumstances laid out by Feldstein (1978), a labor income tax is optimal and is equivalent to a uniform consumption tax and vice versa. Accordingly, a consumption tax is all that is required to guarantee a compensated proportionate reduction in all distortable commodities where this is precisely a statement of the Ramsey Rule. Compensated reductions are the relevant reductions since the conceptual exercise is one where whatever revenue is raised is neutrally redistributed to the taxpayers, precluding income effects. Thus, by the Slutsky equation, the compensated effect of a change in wages on labor supply is defined as

$$(\partial L/\partial W)\bar{u} = \partial L/\partial W + L\ \partial L/\partial I$$

where L refers to labor supply, W to the wage rate, I to income. The subscript u indicates that the term is compensated.

This type of result suggests that in general neither a consumption tax nor an income tax will be optimal--it will in general be preferable to have separate tax rates on savings and consumption.

This inconclusiveness in the optimal tax literature is reinforced by more recent work. For example, Atkinson and Sandmo (1980) develop an explicit overlapping generations growth model and demonstrate that the Feldstein type of analysis can be generated within that framework if the government possesses a range of additional instruments, such as an unconstrained debt policy, to achieve the desired intertemporal allocation where the steady-state marginal product of capital equals the discount rate. They then consider the optimal tax solution in a second-best world where the government cannot attain the first-best intertemporal equilibrium. This part of their analysis is of more interest to this paper since, as pointed out above, the supply-side concern with stimulating savings is presumably predicated on a belief that the capital stock is inadequate. The Feldstein approach, however, assumes that capital markets are efficient and asks whether savings should or should not be taxed in an overall package of taxes levied with a view to raising a given amount of revenue with minimum excess burden. Unfortunately, even when it is known that the capital stock is below its "first-best" level, the effect of the recommended tax system remains ambiguous. Indeed, in the specific Cobb-Douglas example they consider, Atkinson and Sandmo (1980) point out that a tax on capital income is desirable, a result which depends on the shape of the aggregate savings function.

In the absence of qualitative results concerning the optimal treatment of savings, some authors have taken the more pragmatic route of parameterizing general equilibrium models and then evaluating the advisability of various tax reform proposals. For example, Fullerton, Shoven, and Whalley (1983) use a dynamic numerical general equilibrium model of the U.S. economy to determine the welfare implications of substituting a progressive consumption tax for the current income tax structure. The initial effect is that individuals consume less. The welfare changes are influenced by both the transition and the steady-state balanced growth paths. Notwithstanding the initial drop in consumption, the net effect of the tax change is welfare enhancing. Of course, the outcome depends on the precise parameters, as is evident from the range of opinions on the magnitude of the transition costs implied by this type of tax change (Auerbach and Kotlikoff (1983), Seidman (1984)). Nonetheless, there appears to be growing interest in the proposition that, within the context of the models employed, consumption is a more appropriate base for taxation than income.

The main thrust of this paper is not to evaluate the conclusions of the optimal tax literature concerning the appropriate treatment of aggregate savings, but to determine the implications of supply-side policies for financial savings, where the latter are but a component of aggregate savings. While the traditional public finance literature

has not explicitly addressed the optimal tax treatment of this component, those papers concerned with determining the optimal rate of inflation are relevant. Inflation is viewed as a tax on money balances, which is a component of financial savings. Beginning with Phelps (1973) and Siegel (1978), it has been argued that a positive tax on liquidity (a positive rate of inflation) is in general desirable, on the principle that the demand for all taxable goods ought to be proportionately reduced (the Ramsey Rule). Subsequent writers have pointed out that, along lines analogous to those taken by Atkinson and Sandmo (1980) above, the economy need not be on the golden-rule path. Since inflation can affect the long-run capital intensity of the economy, its impact on this pre-existing distortion should be accommodated (Summers (1981 b)). Further, it is argued that account should be taken of the fact that money is costless to produce (Drazen (1979)). As might be expected, since the outcome depends both on the degree to which other distortions are recognized and on the empirical magnitude of numerous own- and cross-price derivatives, there are no unambiguous qualitative conclusions. In addition, as has already been pointed out, neither stream of the optimal tax literature (i.e., that pertaining to aggregate savings and that to money balances) is directly applicable to circumstances in the developing world.

2. An optimal tax framework for financial savings in developing countries

Given the deficiences of the existing optimal tax literature, an alternative optimal tax model is developed below, which incorporates certain salient features of the financial structures of developing countries as described earlier. In particular, financial repression is explicitly allowed for, in a framework where the rate of inflation is assumed to be exogenous. The menu of financial assets available to the representative consumer consists of money for transactions purposes, financial savings deposited in organized money markets, and other savings. Financial repression is allowed for in the form of pre-existing distortions on both money and financial savings.

The model does not allow for the fact that money for transactions purposes is costless to produce. This is not a serious problem since our purpose is to determine the optimal tax treatment of financial savings other than money (M1), given a rate of inflation and a degree of financial repression, rather than to determine the optimal rate of inflation. Nor does the model allow for the possibility of a further distortion due to the typical economy being below the golden-rule path. However, while such an effect will in general alter the magnitudes of the optimal tax changes, it is unlikely to change their direction. This point will be discussed in greater detail.

The important notations used in the model are defined in the following list.

C_0 = consumption of leisure;

C_1 = consumption of current goods and services;

C_2 = consumption stream associated with nonfinancial savings;

C_3 = consumption stream associated with financial savings other than financial savings for transactions purposes;

C_4 = consumption stream associated with financial savings for transactions purposes (M1);

B = government's net revenue requirement;

t_i = ad valorem tax rate on C_i;

$\bar{t}_i$ = pre-existing proportional distortion on C_i, $i = 3,4$;

P_i = market price of C_i;

θ_i = share of tax in total price of C_i;

α = share of financial savings (C_3) mediated through the government;

η_{ij} = compensated elasticity of demand for C_i with respect to P_j;

μ = multiplier on the government's budget constraint;

λ = private marginal utility of income.

The underlying methodology of this type of exercise is well known (cf., Atkinson and Stiglitz (1980)). Accordingly, where possible, the explanation below will concentrate on aspects of the formulation which are unique to the problem at hand. Specifically, there are five commodities, including leisure (C_0), where leisure is untaxable. Of the other commodities, those of greatest interest are C_2 - C_4. C_4 is a proxy for the consumption stream a typical consumer obtains from financial wealth held for transactions purposes. The underlying stock which provides this consumption stream is assumed to be M1. C_3 refers to the remainder of financial savings. It is assumed that organized money markets act as intermediaries, so that these savings are productively invested. Accordingly, C_3 is best viewed as a proxy for the consumption stream which results from that investment. As for the investment itself, a proportion, α, is financed by the government via borrowing. This proportion is assumed to be subject to government manipulation, implying that the private sector is a residual investor. C_2 refers to the consumption stream which results from the disposition of the remainder of aggregate savings. It might be useful to view this in terms of the "consumption" of owner-occupied housing, works of art, etc.

Finally, C_1 is a variable representing the aggregate of current consumption. Given this structure, it is clear, as pointed out above, that this exercise does not accommodate the intertemporal, investment, dimensions of the problem or the fact that M1 is costless to produce. It is not, therefore, a true general equilibrium exercise.

The market environment assumed for this exercise, in common with most other optimal tax exercises, presumes competitive behavior on the part of private firms and consumers. The formulation of the consumer's problem requires some elaboration. Since the paper is concerned with economic efficiency rather than equity, the general equilibrium structure is set in the context of a representative price-taking individual who has a twice continuously differentiable, monotonic, strictly quasi-concave, utility function $U(C_0, C_1, C_2, C_3, C_4)$. The consumer's maximization problem is:

$$\underset{C_0 \ldots C_4}{\text{Max}}\ U(C_0, C_1, C_2, C_3, C_4)$$

$$\text{s.t.} \quad \sum_{i=1}^{4} P_i C_i = P_0(\bar{C}_0 - C_0) + (1-\alpha)\bar{t}_3 C_3$$

where $\bar{C}_0 - C_0$ is labor supplied and the other variables are as defined above. The last term in the budget constraint requires explanation. The widespread use of interest rate ceilings is in the present context modelled as a pre-existing tax on C_3 ($\bar{t}_3$). Some of the implicit revenue from this tax accrues to elements of the private sector, to the extent that the government only borrows some of the available financial savings. This quantity is gauged by the final term above. However, in order to avoid unnecessary complications, it is assumed that the representative consumer responds to the gross rather than the net price of C_3--that is, the consumer is assumed to view this income as lump-sum income. 1/ Accordingly, the consumer's first-order conditions are:

$$\frac{\partial U}{\partial C_i} = \lambda P_i \qquad i = 0, \ldots 4$$

Consider the government's maximization problem. The nature of the optimal tax exercise is critically dependent on the constraints placed on the range and flexibility of policy instruments at the disposal of

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1/ This treatment avoids the complications associated with the existence of profit income influencing firm behavior at the margin (Munk (1978)).

the authorities. In the case under consideration, two constraints are important. The first, already mentioned, is that interest rates on financial assets are institutionally fixed and that the rate of inflation is not readily amenable to control. The net effect of this is modelled as pre-existing taxes on both C_3 and C_4. The second constraint comes from the assumption that the consumption stream associated with investment in owner-occupied housing etc. (C_2), is not taxed. (This could be due to administration costs.) The government's objective is then to raise a required amount of revenue, some of which is levied by the pre-existing "inflation taxes," given that the only variables under its control are the tax rates on C_3 and C_1, the latter being a consumption tax. 1/ This can be expressed as follows,

$$\underset{t_1,\, t_3}{\text{Max}}\ U(C_0, C_1, C_2, C_3, C_4)$$

$$\text{s.t. } t_1C_1 + t_3C_3 + \alpha\bar{t}_3C_3 + \bar{t}_4C_4 = B: \mu$$

where $\bar{t}_4 = \bar{t}_3 + \partial$, $\partial > 0$, constant, in recognition of the fact that the inflation tax on C_4 is greater than that on C_3 given that cash balances pay a zero nominal interest rate. Differentiating, and substituting for the consumer's first-order conditions, the following first-order conditions are immediate:

$$\lambda \sum_{i=0}^{4} P_i \frac{\partial Ci}{\partial P_1} + \mu \left[C_1 + \sum_{i=1,3} t_i \frac{\partial Ci}{\partial P_i} + \left(\alpha\bar{t}_3 + \bar{t}_3 \frac{\partial \alpha}{\partial C_3}\right)\frac{\partial C_3}{\partial P_1} + \bar{t}_4 \frac{\partial C_4}{\partial P_1} \right] = 0 \qquad (2A)$$

$$\lambda \sum_{i=0}^{4} P_i \frac{\partial Ci}{\partial P_3} + \mu \left[C_3 + \sum_{i=1,3} t_i \frac{\partial Ci}{\partial P_i} + \left(\alpha\bar{t}_3 + \bar{t}_3 \frac{\partial \alpha}{\partial C_3}\right)\frac{\partial C_3}{\partial P_3} + \bar{t}_4 \frac{\partial C_4}{\partial P_3} \right] = 0 \qquad (2B)$$

Note the inclusion of a term in $\partial\alpha/\partial C_3$ (< 0) in recognition of the fact that a reduction in C_3 (say) may in general be expected to result in the government increasing its share of financial savings. A more complete exercise in an intertemporal framework would employ a broader government budget constraint incorporating, in addition, the optimal trade-off between borrowing and taxation. This is not attempted here. 2/

1/ Note that all variables are defined in real terms. The economy is assumed to be in an initial equilibrium where there is a positive underlying rate of inflation with all relative prices being constant. The tax changes are assumed not to affect the underlying rate of inflation.

2/ Note that such a framework would also make the consumer's maximization problem more dynamic.

Differentiating the individual's budget constraint with respect to P_i, i=1, 3, respectively, and substituting, allows one to re-express equations (2A) and (2B) as follows,

$$-\lambda\Big[C_j-\Big\{(1-\alpha)-\frac{\partial\alpha}{\partial C_3}\Big\}\,\bar{t}_3\frac{\partial C_3}{\partial P_j}+\mu\Big[C_j+\sum_{i=1,3}t_i\frac{\partial Ci}{\partial P_j}+\Big(\alpha+\frac{\partial\alpha}{\partial C_3}\Big)\bar{t}_3\frac{\partial C_3}{\partial P_j}+\bar{t}_4\frac{\partial C_4}{\partial P_j}\Big]=0 \qquad j=1,3 \tag{3}$$

Substitute for the Slutsky equation into total demands $\partial C_i/\partial P_j$, where I refers to private income and S_{ij} is the compensated substitution effect of commodity i with respect to a change in the price of commodity j. Further, assume that the general equilibrium income effect associated with $\partial C_3/\partial P_j$ can be set equal to zero. Equation (3) becomes,

$$\lambda\Big[C_j-\Big\{(1-\alpha)-\frac{\partial\alpha}{\partial C_3}\Big\}\,\bar{t}_3S_{3j}\Big]+\mu C_j\Big[\sum_{i=1,3}t_i\frac{\partial Ci}{\partial I}+\Big(\alpha+\frac{\partial\alpha}{\partial C_3}\Big)\bar{t}_3\frac{\partial C_3}{\partial I}+\bar{t}_4\frac{\partial C_4}{\partial I}\Big]=\mu\Big[C_j+\sum_{i=1,3}t_iS_{ij}+\Big(\alpha+\frac{\partial\alpha}{\partial C_3}\Big)\bar{t}_3S_{3j}+\bar{t}_4S_{4j}\Big] \qquad j=1,3 \tag{4}$$

These equations are analogous to the first-order conditions of the traditional optimal commodity tax literature with the caveat that the equations here incorporate terms in the pre-existing distortions, t_i (e.g., Sandmo (1976)). To this point, they lack qualitative content as far as the optimal tax rates are concerned. To alleviate this, some structure can be placed on the magnitude of some of the substitution terms by considering the context of this exercise. Specifically, given the level of aggregation, the utility function is assumed to be separable between C_1 and C_i, i = 2,3,4. The net effect of this assumption is that $S_{1j} = 0$ for j = 3,4. Using symmetry ($S_{ij} = S_{ji}$) and expressing in terms of elasticities, equations (4) become, respectively,

$$\nu=\theta_1\eta_{11} \tag{5}$$

$$\nu=\Big[\Big\{\lambda\frac{(1-\alpha)+\mu\alpha}{\mu}\Big\}\,\bar{\theta}_3+\theta_3\Big]\,\eta_{33}+\bar{\theta}_4\eta_{34}+\frac{\mu-\lambda}{\mu}\,\frac{\partial\alpha}{\partial C_3}\,\bar{\theta}_3\eta_{33} \tag{6}$$

where

$$\nu=\frac{\lambda-\mu}{\mu}+\Big[\sum_{i=1,3}t_i\frac{\partial Ci}{\partial I}+\Big(\alpha+\frac{\partial\alpha}{\partial C_3}\Big)\bar{t}_3\frac{\partial C_3}{\partial I}+\bar{t}_4\frac{\partial C_4}{\partial I}\Big]$$

and can be assumed to be negative by the negative definiteness of the substitution matrix. θ_1, θ_3, $\bar{\theta}_3$, $\bar{\theta}_4$ are the relevant shares. 1/

It is clear from equation (6) that the traditional Ramsey Rule, calling for compensated proportional reductions in those markets which are distortable, must be altered in light of the terms in pre-existing distortions. The Ramsey Rule is a statement about quantities. The concern here is with prices. What are the optimal tax rates t_1 and t_3? By equation (5), given the zero cross-price effects between C_1 and other distortable commodities, the inverse elasticity rule holds--the larger the absolute value of η_{11} the smaller the value of θ_1 (and hence, t_1).

The determination of t_3, the optimal tax rate on financial savings, is of greater interest for this paper. The magnitude (and sign) of t_3, as is clear from equation (6), are influenced by a number of factors in addition to own- and cross-price elasticities. These factors are all a function of the pre-existing distortions, $\bar{\theta}_3$ and $\bar{\theta}_4$. The term in $\bar{\theta}_4$ is obvious. To the extent that the cross-price effect between C_3 and C_4 is nonzero, any change in the price of C_3 will interact with the pre-existing distortion on C_4. This interaction should be allowed for, and is elaborated on below.

To see how the pre-existing distortions on C_3 affect θ_3, collect the terms in $\bar{\theta}_3$. These are

$$\left[\frac{\lambda(1-\alpha) + \mu\alpha}{\mu} + \frac{\mu - \lambda}{\mu} \frac{\partial\alpha}{\partial C_3}\right] \eta_{33} \equiv \left[\gamma + \frac{\mu - \lambda}{\mu} \frac{\partial\alpha}{\partial C_3}\right] \eta_{33} \qquad (7)$$

The first term is a weighted average of the distortion on C_3 where the weights are the shares of C_3 invested by the private sector and the government, respectively. The weights are valued at λ, the private marginal utility of income, and μ, the social marginal utility of income, respectively. This reflects the fact that the cost of the distortion varies depending on whether it is mediated through the private or the public sector.

The second term reflects the impact of changes in the share of C_3 mediated through the government sector. It is negative, since $\partial\alpha/\partial C_3 < 0$ and $\mu > \lambda$ where the latter is due to the excess burden associated with government intervention. Thus, this term mitigates

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1/ Care should be taken in interpreting θ_3 and $\bar{\theta}_3$. $\theta_3 = t_3/P_3$ while $\bar{\theta}3 = t_3/P_3$ where P_3 is inclusive of the pre-existing distortion. Thus, for the new (derivative) distortions, the shares are in terms of original prices, whereas, for the pre-existing distortions, they are expressed in terms of final prices.

the effects associated with θ_3. The intuition is that $\bar{\theta}_3$ is a pre-existing distortion. The larger in absolute value is the magnitude of $\partial\alpha/\partial C_3$, the more will this distortion or tax be used to finance government activities thereby reducing the need on the part of the government to rely on other taxes. 1/

Some further insight into the value of t_3 can be gained by appealing to homogeneity, namely,

$$\sum_{j=0}^{4} \eta_{ij} = 0 \tag{8}$$

Given that $\eta_{31} = 0$ by assumption, and substituting, it follows that (6) can be re-expressed as,

$$\nu = -\left[\left(\gamma + \frac{\mu - \lambda}{\mu} \frac{\partial\alpha}{\partial C_3}\right)\bar{\theta}_3 + \theta_3\right](\eta_{32} + \eta_{30}) \tag{9}$$

$$+ \left[\bar{\theta}_4 - \left(\gamma + \frac{\mu - \lambda}{\mu} \frac{\partial\alpha}{\partial C_3}\right)\bar{\theta}_3 - \theta_3\right]\eta_{34}$$

The value of θ_3 (i.e., t_3) remains in general ambiguous. However, one of the terms in (9), namely that in η_{34}, can be assumed to be small. Thus $\bar{\theta}_4 > \bar{\theta}_3$ and, accordingly, the coefficient of η_{34} may not be large. Further, the absolute magnitude of η_{34} itself may be small. This is the elasticity of financial savings to a change in the rate of return on transactions money. Some analysts, by modeling the transactions demand for money as being a function solely of the level of income, implicitly assume that this elasticity is zero. If this term is ignored, equation (9) reduces to

$$\left[\left(\gamma + \frac{\mu - \lambda}{\mu} \frac{\partial\alpha}{\partial C_3}\right)\bar{\theta}_3 + \theta_3\right] = -\frac{\nu}{\eta_{32}+\eta_{30}} \tag{10}$$

This expression shows that the magnitude, indeed the sign, of θ_3 depends critically on the magnitudes of $\bar{\theta}_3$ and η_{32}.

From the above, it is clear that, even given a number of (plausible) assumptions concerning the magnitudes of some cross-price effects, the optimal tax treatment of financial savings will depend on the circum-

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1/ This immediately raises the issues of why the government does not absorb all of C_3 from the outset ($\alpha = 1$). It is assumed that there are some constraints on the government and that, further, the authorities may well view interest rate ceilings as a device for subsidizing private investment.

stances of the individual country under consideration. Specifically, the above limited exercise suggests two obvious polar cases as a mechanism for summarizing and highlighting the possibilities.

Case I: Absence of Financial Repression

In the absence of financial repression, $\bar{\theta}_3 = 0$ which, together with the assumption that $\eta_{34} = 0$, implies that equations (5) and (6) can be expressed as

$$\nu = \theta_i \eta_{ii} \qquad i = 1,3 \tag{11}$$

which is a modified Ramsey Rule. To elaborate, as pointed out above, the Ramsey Rule requires that all distortable outputs be reduced proportionately. 1/ In general, in a world of nonzero cross-price elasticities, this rule does not hold if there are pre-existing distortions. Pre-existing distortions imply that the output of the goods associated with those distortions has already been reduced. Accordingly, when introducing new distortions, account must be taken of how these affect the equilibrium quantities of the predistorted commodities. Ceteris paribus, the size of a new distortion will tend to be larger if the commodity on which it is levied is a substitute for the goods with the pre-existing distortions--the new distortion will tend to cause demand to shift back into the predistorted goods. This argument holds in reverse for goods which are complements. If the new distortion is to be placed on a good with a pre-existing distortion, the new distortion is by this line of reasoning reduced since any good is the perfect complement of itself.

Turning to the case at hand, since $\bar{\theta}_3$, the pre-existing distortion on financial savings, is zero, one does not have to be concerned, at least within the context of the model, about prior direct reductions in the equilibrium quantity of financial saving. As for the other pre-existing distortion, that on cash balances, θ_4, since the cross-price effects between the demand for cash balances and the demand for both financial savings C_3 and consumption C_1 are assumed to be insignificant, one cannot use changes in the "price" of either of the latter two, i.e., changes in θ_3 or θ_1, to mitigate the effects of the pre-existing distortion on cash balances. It is in this sense that the outcome is a modified Ramsey Rule. There is no guarantee that the demand for all distortable commodities will be proportionately reduced. Rather, the rule is that the demand for both consumption C_1 and financial savings C_3

1/ To be more precise, the Ramsey Rule specifies a reduction along the tangent plane approximation to the compensated demand curve for the good in question due to the distortions. This approximate reduction will equal an actual reduction if the derivatives of the compensated demand curves are constant or if the approximation is taken for small distortions in the neighborhood of zero revenue requirements.

be proportionately reduced irrespective of the prior reduction in the demand for cash balances, since the latter is unaffected by the new distortions.

Proceeding from a statement of the optimal outcome in terms of quantities to one in terms of prices, it can be seen by equation (11) that the optimal tax rates depend inversely on the own-price elasticities. Concentrating on the optimal tax treatment of financial savings and using the adding up condition implied by homogeneity, equation (10) becomes

$$\nu = -(\eta_{32} + \eta_{30})\ \theta_3 \qquad (12)$$

Thus, the statement that the optimal tax on financial savings depends on the own-price elasticity for financial savings has been restated in terms of cross-price elasticities. In particular, the magnitude of the cross-price elasticity between financial savings C_3 and savings mediated through unorganized markets, C_2, summarized by η_{32}, is important. For large η_{32}, θ_3 should be small.

The intuition of this result is clear. The efficiency losses associated with the taxation of savings in organized markets is the larger the greater is the sensitivity of savings flows to changes in the relative rates of return to be earned in organized and unorganized money markets.

Case II: Existence of Financial Repression

The optimal tax treatment of consumption, C_1, is unaffected by the existence of financial repression. Since the cross-price elasticity between consumption and financial saving, η_{13}, is taken to be zero, changes in θ_1 have no effect on the demand for financial savings and therefore cannot mitigate the effects of the distortion implied by financial repression.

As for the treatment of financial savings itself, equation (10) now applies. In particular, if the degree of financial repression is large (θ_3 is large) and if the capacity of the government to borrow at the margin at subsidized rates is limited ($\partial\alpha/\partial C_3$ small), then the pre-existing distortion on C_3 becomes of paramount importance. As a result, θ_3 could easily be negative--a subsidy rather than a tax is appropriate. 1/ The intuition for this result lies in the fact that the distortion associated with the existence of financial repression with the concomitant shifting of savings into other assets is such as to imply that the government should counteract it in spite of the revenue loss.

1/ A parallel result can be found in Nellor (1983). In that paper, while considering the positive question of how precisely to counter inflation, he points out that capital income subsidies (or their equivalent in terms of other tax instruments) may well be necessary.

This is an important case since it may apply to many developing countries. If the further constraint of precluding the use of subsidies is imposed, this case implies the interesting result that consumption ($\theta_3 = 0$) is more appropriate than income as a tax base.

3. Evaluation of limitations of optimal tax framework

Some further general comments on the relevance and completeness of the above optimal tax modelling exercise are in order. Leaving aside the somewhat technical issue that it does not accommodate the fact that cash is effectively costless to produce, how closely does the optimal tax framework comply with the description of the financial structures of developing countries presented in the previous section?

A first observation is that the model has nothing to say about the public policy implications of whether the alternative asset to organized money market assets consists of precious metals, property, investments held abroad, etc., or of an unorganized money market asset such as that created by Korea's curbmarkets. In analytical terms, this appears to be a re-emergence of the question of whether an economy is or is not on its golden-rule path. What individuals view as savings and what constitutes capital from the point of view of society as a whole are not necessarily synonymous. Investments in land speculation etc., increase the probability that a given country's capital stock lies below its golden-rule level. This can be modelled in a more complete optimal tax framework as a pre-existing distortion and, while the outcome is not certain (cf., Atkinson and Sandmo (1980)), it would appear to increase the probability that financial savings should be subsidized. Note that this effect is over and above those direct effects described above associated with financial repression. 1/

A further institutional feature not incorporated in this exercise is the compulsory savings schemes employed by some governments (Datta and Shome (1981)). Introducing this element into the framework above would excessively complicate matters. Given the short-term illiquidity of assets implied by forced investments in funded social security programs, these savings are not perfect substitutes for other forms of savings. That would require the introduction of a new variable into the utility function. This variable would be quantity constrained, which has implications for the market behavior of other variables (cf., Neary and Roberts (1980)).

1/ The optimal outcome depends, of course, not only on the nature of the alternative asset but also on its institutional context. In the case where, for example, one of the alternative assets consists of investments held abroad, the attitude of the authorities toward external capital flows is important. For our purposes, the influence of this type of consideration will be captured in the magnitude of the relevant compensated price elasticity.

The role of forced savings, on the presumption that they are productively invested, is analogous to the role discussed above of curb-markets. Their primary influence may not be on the marginal first-order conditions but rather on the discrete issue of whether the economy is or is not on its golden-rule path. The intuitive implications, though they should be expressed with reservations, again seem clear. For example, a country with a large stock of forced savings and no financial repression is more likely to be a country where financial savings should be taxed.

The above reservations modify the analytical framework. More fundamental is the reservation that financial repression also influences the short-run macroeconomic performance of economies. This is a problem which cannot be solved by recommending a specific tax rate--what is required is greater flexibility of the price system, particularly nominal interest rates, rather than second-best tax reform policies.

4. Relevance of supply-side tax policies

The above analysis affords a background for a theoretical evaluation of supply-side proposals. At one level, it would appear on efficiency grounds that supply-side tax reform proposals would be, for many countries, a move in an appropriate direction--recommendations to reduce the top marginal income taxes or to exempt completely interest income from taxation would counter some of the effects associated with financial repression.

There is a more general lesson, however. The model and the reservations presented above imply that the optimal tax treatment of financial savings depends critically on the degree of financial repression, which, as shown in Appendix Tables 1 and 2, varies widely both across countries and over time. Accordingly, there is no single recommended policy such as reducing marginal tax rates. Each country has to be considered individually. This all implies that global supply-side proposals must be carefully evaluated and tailored to what is desirable. Thus, the appropriate tax policy depends not only on the degree to which financial repression and compulsory savings schemes exist but also on whether these latter distortions, and in particular financial repression, are themselves amenable to elimination.

IV. Price Elasticity of Financial Savings

The paper has so far examined the merits of proposals for tax reform merely in analytical terms. There were few unambiguous qualitative results, since optimal tax rates depend on the magnitudes of various own- and cross-price elasticities. This section briefly considers the available empirical literature to see if the recommended tax reforms, that aim to reduce or eliminate the taxation on savings, will actually stimulate savings. Note that this is a somewhat different issue from

the one discussed above. The tax reform discussion above goes beyond a concern for stimulating the quantity of savings. Many of the recommended reforms above are desirable insofar as they mitigate the effects of pre-existing distortions, such as those associated with financial repression. Such a goal could quite easily be attained without a substantial change in the quantity of savings. The topics are, of course, related since, abstracting from the macroeconomic effects, the optimal tax rates depend critically on the own-price elasticity of financial savings (or, which is effectively the same quantity, on the cross-price elasticities between financial and other forms of saving). 1/ This section attempts briefly to assess the generalizations resulting from the empirical work on this matter.

Begin by considering the price elasticity of aggregate savings. The benchmark model for aggregate savings behavior is the life-cycle model (Modigliani and Brumberg (1954)). It is easy to show, within the context of a two-period life-cycle framework, that the impact of a change in interest rates is ambiguous, since it depends on a balancing of substitution and wealth effects (Atkinson and Stiglitz (1980)). Some of the ambiguity is removed when it is recognized that the balanced-budget incidence analysis used in the optimal tax framework allows one to concentrate on the compensated rather than on the total price elasticity. Ambiguity remains, however, in that, within the two-period life-cycle framework, the elasticities are defined in terms of consumption rather than savings. 2/ The compensated elasticity of savings to

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1/ Note that this presumes that an increase in the tax rates on interest income implies a one-for-one reduction in the net return received by savers. This incidence assumption is noncontroversial and holds in a world in which the aggregate stocks of capital and labor are fixed and government revenue is neutrally spent. It should be noted, however, that in a longer-term framework, with capital and labor supplies endogenous, and allowing for the possibility of differences in the savings propensities of the government and the private sector, Feldstein (1974 a, 1974 b) found that the incidence assumption had to be altered.

2/ Following Feldstein (1978), note that savings are defined as $S = PC$, where S designates savings, C retirement consumption, and $P = 1/(1+r)$ the "price" of consumption in retirement (r is the interest rate). In compensated terms this yields

$$\frac{\partial S}{\partial P}\bigg|_u = C + P\,\frac{\partial C}{\partial P}\bigg|_u$$

where $\frac{\partial C}{\partial P} < 0$ by assumption. The compensated effect of a change in the rate of interest is therefore ambiguous. A compensated increase in r (a decrease in the "price" of future consumption) is guaranteed to result in an increase in the demand for retirement consumption (C). However, savings might not increase since one does not have to save as much as before to ensure a given consumption level.

interest rate changes in the quantity is of greater concern to the analysis here. The conclusion is that the interest elasticity of aggregate earnings can take on any sign. 1/

Some writers question the relevance of the life-cycle framework, either because it is too limited, or because it represents an inappropriate specification of consumer preferences. Under the former critique is the work of Kotlikoff and Summers (1981), who argue for the inclusion of a bequest motive while, under the latter critique, should be included the work of those who favor a myopic consumption function (e.g., Ball and Drake (1964), Clower and Johnson (1968)). Indeed, in the Clower and Johnson formulation of the myopic consumption function, interest rates do not even play a direct role in the savings process.

The results of the literature on the myopic consumption function may be particularly relevant for developing countries. Thus, it is quite possible that, in these countries, the precautionary motive for savings is more important than the life-cycle motive. For example, account must be taken of the role of children in providing for the retirement of their parents. 2/

There is, however, much more agreement on the price elasticity of the components of aggregate savings. Thus, an increase in the rate of return on treasury bills alone, say, could well lead to a large increase in holdings of that asset due to the much greater substitution possibilities on both the demand side and the supply-side of the market for treasury bills. Indeed, this logic has led Blinder (1981), among others, to argue that the recently popular supply-side policy recommendations are most appropriately applied to taxes whose bases are narrow.

Empirical work on the price elasticity of both aggregate and financial savings is somewhat limited even in developed countries. As far as aggregate savings are concerned, most studies have concentrated on macroeconomic issues such as determining the marginal propensity to save rather than on the interest elasticity of aggregate savings. This was at least in part due to the minor role researchers expected interest rates to play. There are exceptions. For the United States, Wright (1967, 1969), for example, on the basis of his consumption function

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1/ Observe that though the measured elasticity of savings supply may turn out to be zero, this does not imply that the excess burden associated with the taxation of interest income is also zero since the magnitude of the distortion is based on the substitution term alone.

2/ Indeed, Kotlikoff and Spivak (1981) suggest that the current instability of family arrangements in the United States may in part be due to the improvement in the completeness of U.S. capital markets where this reduces the need for risk-sharing behavior on the part of the family!

estimates, concluded that the interest elasticity of savings was about 0.2. More recently, Blinder (1975) uncovered an extremely low value, while Boskin (1978) argued for a "preferred" elasticity value of 0.4. Given the attention received by this last estimate, it is noteworthy that Howrey and Hymans (1980) have re-examined Boskin's estimates and concluded that a value closer to zero would be more appropriate, a position which has received further corroboration in Friend and Hasbrouck (1983). 1/

The quality of the work for developing countries is particularly suspect, given the inevitable data deficiencies and conceptual problems. In a world of institutionally set interest rates, what is the appropriate choice of an interest rate variable, for example? Leff and Sato (1975) concluded that interest rate data were so suspect that it was preferable to exclude all interest rate variables from their regression equations. Further, as pointed out by Mikesell and Zinser (1973) in their survey, the data on aggregate savings are inaccurate by the very nature of their method of calculation, that is, savings figures are frequently obtained residually.

Early results were controversial. Williamson (1968) found that, for his sample of six Asian countries, interest rates tended to have a negative effect on personal savings. He argued that this could have been due to a close interdependence between savings and investment decisions. It could also be due to data deficiencies, a point which was argued strongly by Gupta (1970) for the case of India.

More recent work includes that of Fry (1980) and McDonald (1983), both of whom found evidence of predicted interest rate effects on aggregate savings, though the effects were not always large or significant. When the estimates of Fry (1980) and others were re-estimated by Giovannini (1983) using more recent observations, he found no evidence of a positive real interest rate elasticity of aggregate savings. So, though definitive conclusions cannot be made, it appears that the interest rate elasticity of aggregate savings in developing countries is not large.

However, given this paper's concern with the behavior of financial savings, the work which evaluates the interest elasticity of components of aggregate savings are of greatest relevance. For an example of the type of result presented in this literature, consider the following regression equation, taken from Chandavarkar (1971), for the case of Korea, namely,

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1/ The large number of elasticity values near zero would appear to validate Denison's Law (Denison (1950)). Summers (1981 a, 1982) argues against this position--parameterizing a more sophisticated model, he argues for interest elasticities of aggregate savings as high as 3.71 (Summers (1981 a)).

$$M = -124.36 + 0.21Y + 1.10r \qquad R^2 = 0.94 \qquad (13)$$
$$\qquad\qquad (0.03) \quad (0.37)$$

where M denotes real money saving, Y real income levels, and the standard errors are in parentheses. An analogous result is reported in Vogel and Buser (1976) based on pooled data on 16 Latin American countries drawn from the period 1950-71,

$$TS/Y = -4.8 - 0.5\ (\underline{\Delta P})_t - 0.46\ (\underline{\Delta P})_{t-1} - 0.06Y_t + 1.33Y_{t-1}$$
$$\qquad\quad (7.0)\ P \qquad (7.1)\ P \qquad (0.2) \qquad (3.4)$$

$$R^2 = 0.81 \qquad (14)$$

Here, TS refers to time and savings deposits at commercial banks, $\Delta P/P$ refers to the rate of inflation (current period and lagged one period), and the t-ratios are in parentheses. The rate of inflation is a proxy for the real rate of return. Thus, given that nominal rates of interest are institutionally fixed and therefore relatively rigid, changes in the real rate of return in these countries will be primarily due to changes in inflation.

All of the above results suggest that financial savings is positively and significantly affected by its own real rate of return. This impression is also confirmed by our own regression results presented in the Appendix.

Unfortunately, none of the empirical work is of such a quality as to form a sound basis for public policy decisions. In the regression equations, the only price variables are the own-rate of return variables. The coefficient values of these variables will be affected by the rates of return on alternative assets, where these have been left out. In particular, one would not expect the coefficient on the own-rate of return variable to be large if all rates of return tend to move in parallel. Nonetheless, the fact that the results uniformly show some sensitivity to price is important, lending support to the qualitative conclusions presented earlier.

V. Conclusions

The main conclusions of this paper may be summarized as follows. First, when considering the question of the optimal treatment of financial savings in developing countries, a number of factors must be considered. In particular, the degree of financial repression is an important variable.

Second, having determined the particulars of any given case, in general a number of policy options must then be evaluated. The best reform proposals within the limited context of tax/price policy will

probably involve the abolition of financial repression. Should that be precluded, there remains the second-best type of policy recommendations such as those contained in the specific optimal-tax framework developed in this paper. A useful benchmark case is one where repression exists and outright subsidization of savings is not feasible. In that case, there are grounds for arguing for a consumption as opposed to an income tax.

Third, the precise magnitude of the optimal tax rates depends on the empirical evaluation of the relevant price elasticities. Given the data inadequacies in most developing countries, the existing empirical literature can only indicate that financial savings may be price sensitive. It cannot afford useful point estimates of the relevant price elasticities.

Fourth, one must recognize that the existence of financial repression in many developing countries has macroeconomic implications. This modifies the optimal tax results. Specifically, the macroeconomic circumstances in the absence of financial reform call for a flexible tax policy.

Fifth, evaluated against all of the above, the recommendations of supply-side economists appear not so much to be wrong as to be inflexible to local conditions. There are occasions where the recommendations are appropriate, but, as a blanket solution to savings problems in developing countries, they are deficient because they do not allow for the heterogeneity of developing country conditions.

APPENDIX

Price Elasticity of Financial Savings in Developing Countries

Tables 1 and 2 document the extent of financial repression in a sample of developing countries. The data presented in Table 2 are used in regression equations presented below testing the sensitivity of components of financial savings to changes in interest rates. The selected countries for the regression equations are Ghana, Jamaica, Korea, and Singapore. The definition and sources for the data used in the regression variables are as follows.

1. Dependent variables

Real Money plus Quasi-Money (M). This variable is obtained by deflating nominal money plus quasi-money by the consumer price index. For Singapore, the variable includes deposits held at financial institutions other than commercial banks and post office savings deposits. The source is the International Monetary Fund, International Financial Statistics Yearbook, 1983. The relevant series are designated by 35ℓ and 64, respectively.

Real Quasi-Money (M*). This variable is defined analogously to the alternative above with series 35 replacing series 35ℓ. Data for Singapore is corrected as above.

2. Independent variables

Real Rate of Return (R). This variable consisted of correcting the nominal rate of return (i) in the sample countries for expected inflation, (π). The nominal rates of return for the selected countries are defined as follows.

Ghana

Deposit rate on six-month deposits at commercial banks. Source: Bank of Ghana, Accra, various annual reports.

Jamaica

Deposit rate on time deposits held for more than six months but less than nine months at commercial banks. Source: Economic and Social Survey: Jamaica, prepared by the National Planning Agency, various issues.

Korea

Deposit rate on six-month time deposits. Source: Korea Statistical Yearbook, Bureau of Statistics, various issues. Data for 1980, 1981 were obtained from the most recent International Monetary Fund, Recent Economic Developments.

APPENDIX

Table 1. Estimated Real Rates of Interest on Savings Deposits

Country	Real Interest Rate	Year	Source
India	-0.30	1969	Chandavarkar (1971)
Malaysia	4.50	1969	Chandavarkar (1971)
Malaysia	2.30	1981	IMF (1983)
Argentina	-56.80	1976	Galbis (1979 a)
Argentina	11.85	1981	IMF (1983)
Brazil	-1.10	1974	Galbis (1979 a)
Brazil	-11.50	1981	IMF (1983)
Ecuador	-1.50	1976	Galbis (1979 a)
Guatemala	-1.50	1976	Galbis (1979 a)
Mexico	-3.50	1976	Galbis (1979 a)
Peru	-22.80	1976	Galbis (1979 a)
Venezuela	0.30	1976	Galbis (1979 a)
Ghana	-43.20	1981	IMF (1983)
Korea	6.00	1981	IMF (1983)
Turkey	14.40	1981	IMF (1983)

Sources: As cited in the bibliography. The real interest rate estimates credited to the IMF (1983) study are derived estimates. For that case, the real rate of interest was estimated to be $r = (1+i)/(1+\pi)-1$ where r is the real rate of interest, i the corresponding nominal rate, and π is the expected rate of inflation where this was assumed to equal the actual rate of inflation recorded in the relevant year.

Table 2. Nominal (i) and Real (r) Interest Rates on Time Deposits

(In percent)

Year	Ghana		Jamaica		Korea		Singapore	
	i	r	i	r	i	r	i	r
1954	...	...	...	...	7.0	-22.2	...	...
1955	...	...	...	...	10.0	-34.6	...	...
1956	...	...	...	...	10.0	-9.5	...	...
1957	...	...	...	...	10.0	-10.0	...	...
1958	...	...	...	...	10.0	14.1	...	...
1959	...	...	...	...	9.0	5.0	...	...
1960	...	...	...	...	8.0	-2.6	...	...
1961	...	...	...	...	10.0	1.7	...	...
1962	...	...	...	...	12.0	5.6	...	...
1963	...	...	3.50	1.6	12.0	-6.7	...	...
1964	...	...	3.00	1.1	12.0	-13.7	...	...
1965	2.500	-19.0	4.00	1.1	25.0	10.8	...	...
1966	2.630	-9.4	4.25	2.3	30.0	15.9	...	...
1967	3.000	11.7	4.25	1.3	30.0	17.2	...	...
1968	2.830	-4.9	4.50	-1.3	27.6	14.9	5.75	4.9
1969	3.250	-3.7	4.40	-1.7	23.5	9.9	5.75	6.0
1970	2.830	-0.2	6.00	-1.6	22.8	12.2	5.75	5.5
1971	7.750	-1.5	7.00	1.6	22.0	12.3	5.75	3.7
1972	7.750	-2.2	6.00	0.6	15.0	1.1	5.25	3.3
1973	6.750	-9.2	8.00	-8.2	12.6	5.3	7.00	-15.3
1974	5.500	-10.7	10.50	-13.1	15.0	-19.1	8.00	-11.8
1975	7.825	-17.0	9.00	-7.1	15.0	-9.1	4.96	2.2
1976	7.825	-30.9	10.00	0.1	15.5	2.9	4.34	6.5
1977	7.852	-50.2	8.00	-3.2	16.0	6.4	4.98	1.5
1978	7.825	-37.7	7.00	-20.7	16.0	3.9	5.55	0.8
1979	12.375	-27.2	7.00	-16.9	18.6	-0.2	7.40	3.2
1980	12.375	-25.1	9.00	-14.2	22.0	-12.2	10.92	2.2
1981	12.375	-48.1	9.00	-3.1	16.5	-3.2	8.40	0.2
1982	19.250	-2.5	9.00	2.1	8.0	3.2	6.55	2.6

Source: As cited in the Appendix.

APPENDIX

Singapore

Deposit rate on six-month deposits. Source: Yearbook of Statistics, Department of Statistics, Singapore, various issues.

Where a change in the institutionally mandated rate occurred within a calendar year, an average rate for that year is presented. Expected inflation is gauged by actual changes in the annual rate of inflation as measured by series 64 in the International Monetary Fund, International Financial Statistics Yearbook, 1983. The formula employed is $R = (1+i)/(1+\pi)-1$ and the data used are presented in Table 2.

3. Real income

This is defined as real gross domestic product. Source: International Monetary Fund, International Financial Statistics Yearbook, 1983. For Ghana, Jamaica, and Singapore, the estimates for 1982 were obtained from the most recent relevant International Monetary Fund, Recent Economic Developments.

4. Dummy for financial reform

A dummy variable (D) is included for the case of Korea to accommodate the financial reforms of 1965. It adopts a value of zero prior to 1965 and unity thereafter.

The most important regression results are the following.

Ghana

$$\underset{}{LnM} = \underset{(-2.01)}{-3.26} + \underset{(0.20)}{0.33LnY} + \underset{(9.81)}{0.57Ln(1+R)} + \underset{(22.8)}{1.10LnM_{-1}} \qquad (A1)$$

$F = 268.7$ h-statistic $= -1.188$ $\overline{R}^2$ (E-Based) $= 0.958$
Period: 1966-82

Jamaica

$$\underset{}{LnM} = \underset{(0.45)}{1.09} - \underset{(-0.38)}{0.13LnY} + \underset{(4.99)}{1.00Ln(1+R)} + \underset{(6.73)}{1.03LnM_{-1}} \qquad (A2)$$

$F = 117.9$ h-statistic $= 0.75$ $\overline{R}^2 = 0.951$ Period: 1964-82

Korea

$$\underset{}{LnM} = \underset{(-1.13)}{-1.83} + \underset{(1.28)}{0.25LnY} + \underset{(2.90)}{0.52Ln(1+R)} + \underset{(8.38)}{0.78LnM_{-1}} + \underset{(3.04)}{0.25D} \qquad (A3)$$

$F = 1{,}216.0$ h-statistic $= 0.63$ $\overline{R}^2 = 0.99$ Period: 1955-82

Singapore

$$\underset{(-0.34)}{LnM = 0.05} + \underset{(0.009)}{0.002LnY} + \underset{(7.68)}{1.15Ln(1+R)} + \underset{(6.28)}{1.00LnM_{-1}} \qquad (A4)$$

F = 556.9 h-statistic = -0.330 $\overline{R}^2$ = 0.99 Period: 1969-82

where the t-ratios are in parentheses, F refers to the F-test, the h-statistic is a test for autocorrelation which accommodates lagged values of the dependent variables among the regressors (Durbin (1970)), 1/ and $\overline{R}^2$ refers to adjusted R^2. Note that, in the equation for Ghana, because of the presence of autocorrelation, the Cochrane-Orcutt correction has already been applied--accordingly, the cited adjusted R^2 are error rather than regression based.

Ghana

$$\underset{(-1.23)}{LnM^* = -4.41} + \underset{(1.29)}{0.60LnY} + \underset{(7.01)}{0.81Ln(1+R)} + \underset{(12.12)}{0.93LnM^*_{-1}} \qquad (A5)$$

F = 123.6 h-statistic = -0.775 $\overline{R}^2$ (E-Based) = 0.905

Jamaica

$$\underset{(0.74)}{LnM^* = 2.38} + \underset{(0.28)}{0.12LnY} + \underset{(3.63)}{0.99Ln(1+R)} + \underset{(2.95)}{0.54LnM^*_{-1}} \qquad (A6)$$

F = 9.39 h-statistic = 0.704 $\overline{R}^2$ (E-Based) = 0.91

Korea

$$\underset{(-1.12)}{LnM^* = -2.10} + \underset{(1.47)}{0.37LnY} + \underset{(2.47)}{1.12Ln(1+R)} + \underset{(7.96)}{0.76LnM^*_{-1}} + \underset{(2.45)}{0.47D} \qquad (A7)$$

F = 870.3 h-statistic = -1.070 $\overline{R}^2$ (E-Based) = 0.983

Singapore

$$\underset{(-1.00)}{LnM^* = -0.755} + \underset{(0.82)}{0.200LnY} + \underset{(3.30)}{0.999Ln(1+R)} + \underset{(4.48)}{0.88LnM^*_{-1}} \qquad (A8)$$

F = 221.6 h-statistic = -1.61 $\overline{R}^2$ (E-Based) = 0.958

All countries have been corrected for autocorrelation.

1/ For the 95 percent level of confidence, the critical value of this statistic is $\pm$ 1.645 (Rao and Miller (1971)).

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