THE INFLUENCE OF TAX MIX AND TAX POLICY ON SAVINGS AND CAPITAL FORMATION IN DEVELOPING ECONOMIES: A SURVEY

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This paper surveys the existing theoretical and empirical literature on the relationship between taxes and economic growth, with special reference to developing economies. It reports on studies of tax mix and tax policies and their influence on savings and capital formation. These studies are divided into those adopting a positive approach (empirical studies) and those that discuss tax reform issues following a normative approach. Although there are no universal laws (valid for all countries at all times) concerning the influence of the tax mix and tax policies on a nation's savings and growth, there are some inferences that can be drawn from the studies that are discussed here.

Taxation, in its various forms, affects the ability and willingness of an individual to work, save and invest. These effects vary, depending on the base of the tax, the rate structure of the tax and the level of the tax burden. Several studies have shown that the structure of taxation can have a major influence on the real sector and that taxation policy can therefore be an important tool for promoting saving, capital formation and economic growth. This applies to both developed and developing economies, although there are significant differences in the tax mix and tax structure between countries at different levels of economic development.

In this paper the theoretical and empirical literature on the influence of taxation on savings and capital formation is surveyed, with special reference to developing economies. The first section looks at the theoretical and empirical linkages between savings and its major determinants – income, the interest rate and other factors. This is followed by a section dealing with the determinants of investment. The next section covers the empirical literature on the relationship between tax, savings and capital formation. Tax reform studies are examined in the penultimate section of the paper.

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I. DETERMINANTS OF SAVINGS/CONSUMPTION

Income

There has been an interesting evolution in the specification of the consumption/savings function (see table 1). Keynes (1936) dealt with a consumption function that had current income as the sole determinant of consumption. Later developments treated consumption as determined by relative income (Duesenberry, 1949) and permanent income (Friedman, 1957). Ando and Modigliani (1963) regarded consumption as a function of lifetime income, rather than current income. According to the life-cycle or permanent income framework of Hall (1978), changes in income, the rate of interest, income tax and the inflation rate will only affect lifetime income (and hence consumption and savings) if the changes are unanticipated and are not already incorporated in the estimation of lifetime/permanent income.

Hall's hypothesis can be criticized on the grounds that even if a consumer knows with certainty that his income will double in the following year, s/he will not be able to increase current consumption owing to liquidity constraints. Several studies – e.g. Flavin (1981), Deaton (1987), Gyimah-Brempong and Traynor (1996) – do not support Hall's hypothesis. They argue that consumption is highly sensitive to predictable changes in income and therefore the distinction between anticipated and unanticipated changes in income is unwarranted. The coefficients of income and wealth are more or less the same for the surprise-only hypothesis and the traditional formulation. They show that anticipated changes in income affect current consumption and, hence, policy variables influence savings behaviour.

Some studies, such as Denison (1958) and David and Scadding (1974), have claimed that gross private savings were a stable function of income (GNP) in the United States of America during the post-war years. During the period 1948-1956, the average level of the gross private savings rate (GPSR) equalled the GPSR for 1929, which was considered to be the full employment year. Since the year-to-year variability in the GPSR was very small, Denison (1958) came to the conclusion that changes in the tax system, or other changes in the real after-tax rate of return to capital, did not affect GPSR.

These studies employed simple Keynesian and Duesenberry-type regression equations explaining gross private savings rate (S) in terms of the independent variable GNP (Y) or ΔGNP (the difference between the previous peak and current levels of aggregate income). The equations used by them were:

$$S_t/Y_t = a + b\ Y_t \qquad (1)$$

$$S_t/Y_t = a + b\ \Delta Y_t \qquad (2)$$

David and Scadding (1974) used the United States Commerce Department's revision of the national accounts to estimate the model for the various periods 1898-

1916, 1921-1940 and 1948-1964. The value of the coefficient for GNP in the first equation was found to be around 0.15.

Boskin (1978) criticized the savings function of Denison (1958) and David and Scadding (1974) on the grounds that the savings ratio should be calculated with respect to disposable income and not with respect to GNP. Most theories of consumer behaviour relate savings to disposable income. Boskin had shown that the savings rate out of private net-of-tax income had grown by more than 50 per cent during the period 1929-1969, which is the same period examined by David and Scadding.

The rate of interest

Most of the above studies neglected the role of interest rates – specifically, the real after-tax rate of return on savings – as an independent influence on savings and consumption.

Boskin (1978) estimated the following private consumption function:

$$LGC_t = -3.8 + 0.56\ LGYd_t + 0.18\ LGYd_{t-1} + 0.28\ LGW_{t-1} - 0.003\ LGU_t - 1.07\ R_t \qquad (3)$$

where LGC is the natural logarithm of real per capita private consumption, Yd is disposable private income, W is wealth, U is the unemployment rate and R is the real after-tax return on capital. Boskin used Christensen and Jorgenson's (1973) nominal after-tax rate-of-return data and price data to estimate the real after-tax rate of return. According to Boskin, there is a positive real rate-of-return effect, with the estimated interest elasticity of savings approximately equal to one quarter. Also, the implied income elasticity of savings exceeds one.

With the inclusion of the inflation rate and using post-war data (excluding the war period in the time-series data 1929-1969), the regression equation estimated was:

$$LGC_t = -3.85 + 0.62\ LGYd_t + 0.007\ LGYd_{t-1} + 0.72\ LGW_{t-1} - 0.003\ LGU_t - 2.08\ R_t + 0.07\ \pi_t \qquad (4)$$

The relationship between interest rates and aggregate savings involves a number of complex problems such as separating out the income and substitution effects of interest rate changes, quantifying the role of expectations and planning horizons in saving decisions (Mikesell and Zinser, 1973). The effect of taxation on savings, through the interest rate channel, is theoretically ambiguous because an increase in the interest rate creates both a substitution effect and an income effect. The strengths of these two effects determine the sign and magnitude of the interest elasticity. Gylfason (1993) presents a detailed investigation of the effect of interest rates on saving and examines many of the empirical studies on this topic. The results of some of these studies are summarized in table 2.

Table 1. Consumption/savings as a function of income

Study	*Functional form*
Absolute-income hypothesis (Keynes, 1936)	$C_t = a + bY_t$ C_t – consumption expenditure b – marginal propensity to consume (less than 1)
Relative-income hypothesis (Duesenberry, 1949)	$S_t / Y_t = a + bY_t / Y_0$ S_t – aggregate real per capita savings Y_t – aggregate real per capita income Y_0 – last highest real per capita income Long-term saving propensity is constant.
Permanent-income hypothesis (Friedman, 1957)	$C_p = K(u, I)\, Y_p$ Assuming that permanent income depends upon past and present income and assigning weights which decline geometrically, the consumption function reduces to $C_t = (1-\lambda)KY_t + \lambda C_{t-1} + \varepsilon_t - \varepsilon_{t-1}$ This is similar to the distributed-lag model in independent variables.
Life-cycle hypothesis (Ando and Modigliani, 1963)	$C_t = \alpha_1 Y_{Lt} + \alpha_2 Y^e_{Lt} + \alpha_3 A_{t-1}$ C_t – aggregate optimal consumption A_{t-1} – net worth Y_{Lt} – aggregate non-property income Y^e_{Lt} – aggregate expected non-property income $\alpha_1, \alpha_2, \alpha_3$ – constants
Rational-expectations hypothesis (Hall, 1978; Hall and Mishkin, 1982; and others)	The basic function is $C_t = \alpha C_{t-1}^{1/\sigma} + \mu_t$, Their studies point out that consumption follows a random walk and only consumption lagged one period will have a non-zero coefficient in a regression equation. Their finding is that anticipated income does not have any predictive power.
Reformulated life-cycle hypothesis (Deaton, 1987; Gupta, 1987; Lahiri, 1989; Deaton, 1992; Fry, 1996; Gyimah-Brempong and Traynor, 1996)	The distinction between anticipated and unanticipated changes in income is unwarranted. Deaton's (1987) function is $\Delta LGC_t = \phi + a_0\, LGC_{t-1} + b_1\, LGY_{t-1} + b_2\, ELGY_t + b_3(LGY_t - E\, LGY_t) + d_1\, E\, LGW_t + d_2\,(LGW_t - E\, LGW_t) + e_0 t + \mu_t$ The coefficients of income and wealth are more or less the same for the surprise-only hypothesis and the traditional formulation. These studies postulate that the national savings rate is directly related to the growth rate and levels of real GDP.

Table 2. Empirical studies showing a positive response of savings to changes in interest rates

Study	*∂s/∂r*	*Country*	*Period*
Wright (1967)	0.5	United States	1897-1959
Heien (1972)	4.4	United States	1948-1965
Juster and Wachtel (1972)	0.7	United States	1954-1972
Boskin (1978)	0.4	United States	1929-1969
Fry (1978)	0.2	7 LDCs	1962-1972
Summers (1981)	4.5	calibrated	
Evans, O.J (1983)	1.0	calibrated	
Mankiw and others (1985)	0.5	United States	1950-1981
Barro (1992)	0.6	10 developed countries	1957-1990
Gylfason (1993)	0.7	United States	1953-1977
Stein and Song (1998)	1.7	United States	1974-1991

Source: Table 2 is adapted from table 1 in Gylfason (1993, p. 519).
Note: LDCs refers to developing countries.

The interest rate that Boskin (1978) used was the difference between the nominal rate of interest and the expected inflation rate. The estimated inflation rate was estimated from an adaptive expectation model of price expectations. The elasticity of savings varies with the particular measure of the expected rate of inflation and the sample period. However, most studies (table 2) have shown that there is a significant positive interest elasticity of savings for the United States economy in spite of varied definitions of price expectations and different sample periods.

The interest elasticities estimated by Summers (1981), Heien (1972) and Stein and Song (1998) are much higher than that estimated by Boskin (1978). All 11 studies listed in table 2 find that the interest elasticity of savings is greater than zero. The interest elasticity of savings varies between 0.2 and 4.5. The equations estimated in most of the studies were based on an inter-temporal choice framework.

In contrast, the proponents of the life-cycle or permanent-income hypothesis of consumption postulate that stationary economies with different real interest rates will reveal no relationship between the real interest rates and the rate of growth of consumption, since the rate of growth of consumption is always zero.

Studies which have found zero interest elasticity of savings for the United States economy include: Blinder (1975, 1981), Howrey and Hymans (1978), Mankiw (1981), Carlino (1982), Friend and Hasbrouck (1983), Blinder and Deaton (1985), Baum (1988) and Campbell and Mankiw (1989, 1991).

The findings of Friend and Hasbrouck (1983) did not support Boskin's findings of a negative-return effect on consumption. Their function, using a similar specification

for the same time period studied by Boskin, showed a positive-return effect on consumption.

$$LGC_t = -0.51 + 0.43\ LGYd_t + 0.15\ LGYd_{t-1} + 0.31\ LGW_t - 0.003\ LGU_t + 1.39\ R_t + 1.43\ \pi_t \quad (5)$$

The after-tax rate of interest, variable "R", is computed as the average yield on municipal bonds minus the expected annual inflation. Unlike Boskin, Friend and Hasbrouck found that there is no definitive result for the effect of taxation on savings based on the interest elasticity of savings.

A similar study conducted by Giovannini (1983) for seven selected developing countries yielded the same result of zero interest elasticity. For further details, see Gylfason (1993). The results of a study by Liu and Woo (1994) showed that the coefficient of the interest rate variable was negative for a cross-section study of 19 countries, comprising 17 OECD countries for the period 1975-1985.

These findings show that there is no consensus on the effect of the rate of interest on savings. It should be noted, however, that most of the quantitative studies of the effect of interest rates on savings deal only with changes in pre-tax nominal or real interest rates. Very few studies, including those of Boskin (1978) and Summers (1981), have investigated the relationship between private savings and the after-tax rate of interest.

Other factors

Pesaran and Evans (1984) estimated aggregate savings in the United Kingdom of Great Britain and Northern Ireland, using the change in consumer prices and capital gains and losses as the chief determinants of savings function. Their results showed that, for United Kingdom data over the period 1953-1981, variations in the savings ratio are mainly explained by capital gains and losses on shares.

Some studies, such as Kotlikoff (1984), Lahiri (1989) and Faruqee and Husain (1998), have identified a demographic factor (i.e., age structure) as an important variable in determining savings behaviour. It was observed that the ratio of working-age population to total population, along with per capita private disposable income, explained some of the changes in private savings in Asian countries.

In an open economy, it is not only tax policy and price variables that affect private savings, but also trade variables (such as the export-to-GNP ratio that measures export potential, the terms of trade and others). Lee (1971) clearly demonstrated in his study of 28 countries (comprising 20 developing and 8 developed countries, over the period 1951-1967) that the level of domestic savings in most countries tends to vary systematically with exports. In an economy with under-full employment, increased export demand would lead to increased output, which eventually would lead to an increase in savings (Genberg and Swoboda, 1992).

The Harberger-Laursen-Metzler effect claims that deterioration in the terms of trade reduces saving for a given level of output. Obstfeld (1982) challenged this effect. In this regard, it is crucial to distinguish between temporary and permanent terms-of-trade deterioration. A temporary terms-of-trade deterioration would lead to a fall in real income and eventually reduce savings, but the result would be contrary if the trade deterioration is a permanent one.

Tuan and Ng (1998) investigated the long-run relationship between trade performance and growth in GDP, using the cointegration technique, for the period 1961-1995 in Hong Kong. The cointegration results indicated that there is a linear long-run relationship between GDP, domestic exports and re-exports. It suggested that a unit change in real domestic exports and real re-exports would result in a 0.7 per cent and 0.2 per cent increase, respectively, in real GDP.

Apart from the above-mentioned factors, there are other factors such as the structure of the economy and the nature of consumer preferences that influence the savings relationship. The influences of those other factors are ignored in this study.

II. DETERMINANTS OF INVESTMENT

Having reviewed the determinants of the savings function in the previous section, this section examines the factors that influence investment. In both Keynesian and classical analysis, investment is treated as a function of the rate of interest. Lower interest rates induce greater investment, *ceteris paribus*. Investment is also related to expected change in output. The "acceleration principle" encapsulates this relationship:

$$I_t = \nu(Y_t - Y_{t-1}), \qquad (6)$$

where I_t denotes real net investment and Y_t denotes real output. The coefficient ν is the "acceleration coefficient" and is positive.

The neoclassical investment model has its basis in the marginal conditions proposed by Fisher (1930). Here, the level of investment is determined by the user cost of capital. Although, theoretically, the simple neoclassical model is highly plausible, empirically it has generally been disappointing. Since it has failed to explain changes in investment, economists have devoted their attention to incorporating more realistic assumptions.

Jorgenson (1963) and others have expressed the desired capital stock (K^*_t) as a function of the real rate of return on capital (rr_t), the opportunity cost of capital or real after-tax rate of interest (r_t), and a constraining wealth variable (w^*_t):

$$K^*_t = f(rr_t, r_t, w^*_t) \qquad (7)$$

Here, the real after-tax rate of interest (r_t) is the nominal rate of interest (n_t) less the capital gains tax rate (u_t) on the nominal interest rate plus the expected rate of inflation (π_t):

$$r_t = n_t - u_t\, n_t - \pi_t \quad (8)$$

The real rate of return on capital (rr_t) is derived from the profit-maximizing equality for capital services, which is the difference between the real value of the marginal product of capital and the real cost of current depreciation:

$$rr_t = vmpk_t/q_{t-1} - dq_t/q_{t-1}, \quad (9)$$

where $vmpk_t$ is the value of the marginal product of capital, d is the depreciation rate and q_t is the acquisition price of depreciated capital. The reduced form of the investment function adopted by Hall and Jorgenson (1967) was later amended by various economists, such as Hosek and Zahn (1984). Their specification of the net investment function is:

$$(I/W^*)_t = \alpha_1 a_1 \Delta rr_t - \alpha_1 a_2\, \Delta R_t + (I/W^*)b_{t-1} + e_t, \quad (10)$$

where I is the net investment, W* is the wealth variable, $\alpha_1 = 1 - b$ is the first coefficient in the desired capital stock coefficient, where the desired capital stock $K^*_t = K(rr_t, R_t, W^*)$. Net investment is a distributed-lag function of a weighted average of past changes in desired capital stock, a_1 and a_2 are parameters, Δrr_t and ΔR_t represent the real after-tax rate of return on capital and the real after-tax rate of interest, respectively, and e is the random error term.

Eisner and Nadiri (1968) and Eisner (1969) criticized Jorgenson's model on the basis that the elasticity of substitution is not close to one but close to zero. In such a case, net investment cannot be explained by the user cost of capital but by the simple acceleration principle. Nevertheless, the neoclassical model developed by Jorgenson and others has remained one of the standard models for studying investment decisions.

The next school of thought based its explanation of investment decisions on Tobin's Q theory of investment and the view that net investment depends on the market value of capital relative to its replacement cost. Hayashi (1982b) incorporated adjustment costs and tax parameters into the Q framework. The Q formulation gives more importance to the relationship between investment and the net profitability of investing capital.

Models based on the Q representation of firms' investment behaviour dominated the empirical research in the 1980s. This approach was preferred to the user cost of capital because it was easier to observe the market value of capital relative to its replacement cost. Unfortunately, the Q models did not perform well, empirically, in explaining either the longitudinal or time-series changes in investment.

In recent years, Auerbach and Hassett (1992) and Downs (1992) have expressed investment in terms of both the user cost of capital and an average Tobin's Q under certain conditions. They incorporate adjustment costs into the model and the

relationship between investment and user cost is derived from the steady-state average user cost and a root of the linearized difference equation in capital stock. For further details, refer to Hassett and Hubbard (1996).

Tax and investment

The effect of taxes on investment has long been recognized as important. However, consensus on how to measure these effects has been elusive. The traditional capital stock adjustment models assume that the capital stock is homogeneous and that the optimum level of investment is obtained where marginal cost equals marginal revenue. A more realistic view sees capital as quite heterogeneous.

The "putty-clay" model assumes a fixed capital-labour ratio *ex post* and the *ex ante* production function of an economy takes a form similar to the one adopted by Boskin (1978). This is a CES production function with Harrod-neutral technological progress:

$$Y_t = \gamma[K_t^{-\rho} + (E_L L_t)^{-\rho}]^{-1/\rho}, \quad (11)$$

where Y is the output, K is the capital input, L is the labour input, t is time, $E_L = E_L(0)e^{-\lambda t}$, λ is the exponential labour-augmenting rate and the elasticity of substitution, σ, is $1/(1+\rho)$.

Expressing the above equation in a log linear form and rearranging the above production function we get:

$$\log (wL/y) = c + (1 - \sigma) \log w + (\sigma - 1)\lambda t, \quad (12)$$

where c is a constant and w is the wage rate.

Boskin (1978) used the CES production function to examine the effect of taxation on output; however, his study did not measure the effect of taxes on business investment using either the net-return model or the return-over-cost model. These models capture the influence of tax variables on investment in a more accurate manner.

Feldstein (1982) proposed the hypothesis that there is a negative relationship between business investment and taxes; that is, an increase in taxes on earnings tends to discourage investment. The three alternative models proposed by him were: (a) net rate of return, (b) return over cost and (c) a neoclassical model. Feldstein gave the basic net-rate-of-return model as:

$$I_t/Y_t = a_0 + a_1 RN_{t-1} + a_2 UCAP_{t-1} + \mu_t, \quad (13)$$

where I_t is the real net fixed non-residential investment, Y_t is the real gross national product, RN_{t-1} is the lagged value of the real after-tax rate of return on capital income, which is the product of the real pre-tax return on capital (R_t) and one minus the effective tax rate on that return (i.e., $RN_t = (1 - ETR_t) \times R_t$), and $UCAP_{t-1}$ is the lagged value of capacity utilization.

The estimated basic result is shown in equation (14):

$$I_t/Y_t = -0.014 + 0.459\ RN_{t-1} + 0.028\ UCAP_{t-1} + 0.29\ \mu_{t-1} \quad (14)$$
$$\qquad\qquad (0.095) \qquad (0.025) \qquad (0.25)$$

The figures shown in parentheses are the standard errors. There is no serial correlation, and the goodness of fit is 75 per cent for the simple specification estimated for the period 1954-1978 for the United States economy.

The investment and rate-of-return-over-cost model estimated investment as a function of the difference between the potential and actual cost of funds (MPNR – COF) and the capacity utilization (UCAP). The estimated coefficients for the lagged values of MPNR – COF and UCAP variables were + 0.316 and + 0.073, respectively. These coefficients were statistically significant. Finally, using the neoclassical model, Feldstein explained the two important ways by which inflation affects the annual cost of capital services. Inflation affects the real net cost of funds and the present value of depreciation. Mis-specifying the cost of capital series by failing to represent precisely the effect of inflation reduces the explanatory power of the model. Inflation is an important influencing factor in examining the effect of taxation on investment.

Chirinko (1987) criticized the net-rate-of-return model of Feldstein (1982) on the ground that "net revaluations to capital" had been omitted, resulting in under-specification of the model. Feldstein (1987) defended his model on the grounds that his model works well with the data set used by Chirinko and the variable "net revaluations to capital" is not relevant since his accrued capital gains are not a relevant determinant, unlike the anticipated capital gains. Feldstein further argued that Chirinko's modification of "net revaluations to capital" introduced statistical noise and increased its standard error, thus resulting in the coefficient being biased towards zero. It should be noted that Feldstein's model is based on the assumption that the prices of capital goods would change in such a manner as to eliminate anticipated capital gains, when markets for capital assets are efficient.

Employing Feldstein's (1982) and Chirinko's (1987) models to capture the effect of taxation on investment, Jha and Wadhwa (1990) estimated similar equations for the Indian economy for the period 1960-1980. Equation (15) is based on Feldstein's specification and equation (16) is based on Chirinko's specification. Jha and Wadhwa's results for the Indian economy are:

$$I_t/Y_t = -1.19(10^{-3}) + 3.12(10^{-4})\ RN_{t-1} + 1.17(10^{-5})\ UCAP_{t-1} \quad (15)$$
$$\qquad\qquad \{6.6(10^{-4})\} \quad \{7.6(10^{-5})\} \qquad \{6.4(10^{-6})\}$$

$$I_t/Y_t = -1.25(10^{-3}) + 3.12(10^{-4})\ RNNR_{t-1} + 1.24(10^{-5})\ UCAP_{t-1} \quad (16)$$
$$\qquad\qquad \{7.2(10^{-4})\} \quad \{7.87(10^{-5})\} \qquad \{7.16(10^{-6})\}$$

Jha and Wadhwa stated that although the rate-of-return variables in Feldstein's equation (15) and Chirinko's equation (16) are statistically significant, Feldstein's model performed better than Chirinko's model for the Indian data set. However, it is difficult to derive such a conclusion with the limited data set of 20 years and the simple statistical tools (for example, Restricted F Tests) employed by this study. It is better to use more appropriate tests, such as tests for nested models to determine the superiority of Feldstein's equation over Chirinko's.

Bernheim and Shoven (1987) claim that discriminatory treatment of capital income is one of the reasons for the poor performance of investment in the United States in the 1970s and 1980s, compared with Japan, the United Kingdom and the Federal Republic of Germany. A central finding of their study is that tax differences and domestic credit market conditions play a crucial role in determining the cost of capital between countries.

The ideal rates of return corresponding to riskless, freely traded securities in each country are government bonds (Bernheim and Shoven 1987). The bond rate of interest provides the nominal rate of interest, and the real rate of interest is the difference between the nominal rate and the expected inflation rate, $r^*(t) = i(t) - \pi(t)$. The average *ex ante* real return is measured as the average of the *ex post* return over some long sample period. For their analysis, Bernheim and Shoven used the consumer price index series to generate the inflationary process for the countries under examination. They observed that the real interest rates were extremely low, possibly negative, during the 1970s. (Despite the fact that actual real rates were slightly negative, they used a positive real rate of 2 per cent. The negative real rate is unsuitable for the King-Fullerton methodology adopted by them in their paper.)

The King-Fullerton methodology defines three rates of return on investment: p, r and s. The pre-tax rate of return is represented by the variable p, r represents the after-corporate-tax rate of return and s represents the post-corporate-and-personal-tax rate of return. That is, p is the gross of tax rate of return of the investment, r is the real interest rate and s is the net return earned by the ultimate investor. The difference between p and s is the tax wedge and $(p - s)/p$ is the effective marginal rate on new investments. If "p" is fixed, as in the King-Fullerton case, at say 10 per cent, then the after-tax rate of return, the tax wedge and the effective tax rate can be estimated. Bernheim and Shoven also consider some fixed "r" cases, where they assume that the real interest rate is 5 per cent for all investments and use the tax code to determine both "p" and "s" and the effective tax rates.

For debt-financed investments, the King-Fullerton methodology uses the conventional method of estimating the after-corporate tax interest rate, $i(1 - Ct)$, where i is the nominal interest rate and Ct is the corporation income tax rate. The problem arises when determining the appropriate discount rate for equity-financed investments. One view is that a dollar after corporate tax is less than a dollar on the stock market because dividend taxes have to be paid to get it to shareholders. This is referred to as

the "trapped-equity" hypothesis and it implies that a dollar of retained earnings will be capitalized in the market as one minus the tax rate on dividends over one minus the effective tax rate on accrued capital gains (1 – dividend tax/1 – capital gains tax). Table 3 gives the cost of capital calculated at the interest and inflation rates for the 1980s, using 1985 tax codes for the United States, the United Kingdom, the Federal Republic of Germany and Japan.

Table 3. Bernheim and Shoven's estimated cost of capital

	United States	*United Kingdom*	*FRG*	*Japan*
Cost of capital	5.48	3.56	4.39	2.76
Post-tax real rate of return for capital	2.24	1.28	0.70	1.80
Tax wedge for capital	3.24	2.28	3.69	0.96
Cost of equity capital	7.03	3.81	5.48	4.22
Post-tax real rate of return on equity	1.89	1.33	0.00	1.71
Tax wedge for equity capital	5.14	2.48	5.48	2.51
Real rate of interest	5.00	3.50	3.50	2.50

Source: Bernheim, D.B. and J.B. Shoven, 1987.

Shoven and Topper (1992) came to a similar conclusion – that the cost of capital and the cost of equity capital were much higher in the United States in 1988 compared with Canada and Japan. The study confirmed that the Japanese have a large cost of capital advantage relative to both Canada and the United States. However, these studies capture a stylized version of each of the tax codes because they do not include the many industry-specific tax rules from the Tax Reform Acts. Also, these models use only three types of assets – machinery, buildings and inventories – whereas tax laws specify depreciation and investment incentives at a much more disaggregated level.

While examining the benefits of investment tax incentives, Goolsbee (1998) pointed out that much of the gain from these incentives does not go to the investing firms. It is the capital suppliers who gain through higher prices. The study revealed that a 10 per cent investment tax credit increases equipment prices by 3.5 per cent to 7 per cent in the United States economy. These increases in price last for several years and the prices are highest for assets with large order backlogs or low import competition. In several cases, the wages of these capital goods workers also rise. However, there is no consensus among economists regarding the effect of tax incentives on promoting investment.

III. THE EMPIRICAL LITERATURE ON TAX SAVINGS AND CAPITAL FORMATION

Several economists have studied the ideal or appropriate taxation mix and tax policy to promote saving and capital formation. Jenkins (1989) and Marsden (1990) argue that lower taxes stimulate growth by increasing the incentive to save and invest. Jenkins (1989) compared the tax system of Sri Lanka prior to 1977 with the system after 1977. The Sri Lankan tax rates prior to 1977 were quite high, but were ineffective in raising adequate revenue. The change in government in 1977 saw a number of changes in tax structure that shifted the focus in the fiscal system from direct taxes to indirect taxes. As a result of these changes, gross capital formation increased substantially from an average of 14.5 per cent of GDP in 1976-1977 to an average of 28.9 per cent during the period 1978-1982. The growth in real GDP also averaged 5.5 per cent during 1978-1985, compared with 2.8 per cent for the period 1971-1977. The tax changes of the 1980s gradually transformed the tax system into one more conducive to capital accumulation and growth.

An empirical study conducted by Marsden (1990), based on a cross-sectional analysis of 20 countries, has thrown some light on the effect of tax on the growth rate of the economy. The countries were split into pairs, with each pair having similar per capita income, but different levels of taxation. The selected countries were compared on the basis of lower and higher levels of taxation and their influence on growth rates over the period 1970-1979. In all cases, the countries that imposed a lower effective average tax burden on their populations achieved substantially higher rates of GDP growth than did their more highly taxed counterparts. The average annual rate of growth of GDP was 7.3 per cent in the low-tax group and 1.1 per cent in the high-tax group. The average tax/GDP ratio in the low-tax group increased from 13.3 per cent in 1970 to 15.2 per cent in 1979, while it rose from 21 per cent to 23.9 per cent in the high-tax group during the same period. Moreover, fiscal incentives provided by low-tax countries shifted resources from less productive to more productive sectors, thus raising the overall efficiency of resource utilization.

Tanzi and Shome (1992) examined the tax regimes in eight Asian economies (Hong Kong, China; Republic of Korea; Singapore; Thailand; Philippines; Malaysia; Taiwan Province of China; and Indonesia). Among other things, they looked at the five most successful economies to see if there were any uniformities in tax mix and tax policy which might help to explain their faster growth. They found none. Singapore and Taiwan Province of China had made good use of property taxes. Taxes in general were very low in Hong Kong, China. Taiwan Province of China had kept its tax rates much higher than Hong Kong, China, but through selective tax incentives it had encouraged investment in desired areas (high-technology industries). The authors concluded that the beneficial effects of tax incentives in the Republic of Korea, Singapore and Taiwan Province of China were dependent on other supporting factors.

Similar tax incentives provided in the Philippines had not yielded the desired results owing to such factors as corruption or rent-seeking activities.

Trela and Whalley (1992) employed a general-equilibrium model to evaluate the Republic of Korea's "outward-oriented growth strategy" over the period 1962-1982. They concluded, among other things, that pro-growth tax policies (direct tax reductions and indirect tax exemptions) had made a discernible contribution to the Republic of Korea's economic growth over that period. This contribution was quantified and estimated to be 0.54 per cent per annum.

Fitzgerald (1993), while examining the factors that influence private savings in Australia, argued that taxation of corporations influences business savings, and it is the business savings that dominate private savings in Australia. Household savings play a minor role, with the savings ratio of the household sector being 2 per cent in the 1990s. However, in developing countries like India, where the savings ratio of the household sector was around 19 per cent in the 1990s, personal income tax policies can play a major role in determining household savings.

While estimating the savings determinants in Colombia, Cardenas and Escobar (1998) pointed out that much of the reduction in Colombian private savings during the period 1970-1994 was due to rises in taxation. Tax revenue as a percentage of GNP was used to measure the influence of taxation on private savings determinants. This coefficient was found to be negative (-0.58) and statistically significant. The other variables that influenced private savings were urbanization and age dependency.

Recently, Dahan and Hercowitz (1998) carried out an empirical study of the Israeli economy which displayed a large variability in both the national savings rate and tax rates during the period 1960-1994. The large variability of the income tax rate and the small open Israeli economy clearly showed that savings are sensitive to shocks. The percentage change in the rate of savings resulting from changes in the income tax rate was estimated to be -0.29.

Studies by Monsingh (1998b) and Kerr and Monsingh (1998a, 1998b) reveal an inverse relationship between direct tax per capita and savings per capita and thus capital formation in India. The following specification was used to examine this relationship.

$$S = b_0 S_{t-1} + b_1 \Delta Y_t + b_2 \Delta RT_t + b_3 \Delta DT_t + b_4 \Delta P_t, \qquad (17)$$

where S = private savings per capita;
Y = per capita income;
RT = after-tax rate of interest[1], $RT = R(1 - t_d)$;

[1] The after-tax rate of interest is computed as the Bombay money market rate minus the money market rate times the marginal direct tax ratio.

t_d = the marginal direct tax ratio[2];
DT = direct tax per capita;
P = price expectations.

This specification is based on the models adopted by Hosek and Zahn (1984a), Deaton (1987), Lahiri (1989) and Cardenas and Escobar (1998). Table 4 gives the results for the error-correction model estimated for equation 17, based on cointegrating VAR(2). The error-correction term is negative and is highly significant. Diagnostic tests, such as the test of residual serial correlation, correct functional form, normality test, test for heteroscedasticity were carried out, as suggested by McAleer (1994). The ECM model is reasonably good and passes these diagnostic tests.

Table 4. ECM for savings estimated by OLS based on cointegrating VAR(2)

Regressor	*Coefficient*	*Standard error*	*T-ratio[Prob]*
dLGS1	.0623	.1309	.4761[.637]
dLGY1	-1.0238	.3142	-3.2584[.002]
dLGDT1	-.4138	.1913	-2.1633[.037]
dRT1	.0108	.0086	1.2552[.218]
dP1	-.0128	.0046	-2.7532[.009]
ecm1(-1)	-.1772	.0305	- 5.8051[.000]

Source: Kerr and Monsingh (1998a).
Notes: Dependent variable is dLGS.
41 observations used for estimation from 1952 to 1992.
List of additional temporary variables created:
dLGS = LGS – LGS(-1)
dLGS1 = LGS(-1) – LGS(-2)
dLGY1 = LGY(-1) – LGY(-2)
dLGDT1 = LGDT(-1) – LGDT(-2)
dRT1 = RT(-1) – RT(-2)
dP1 = P(-1) – P(-2)
ecm1 = 1.0000*LGS – .091158*LGY – 2.1870*LGDT
+ .076004*RT + .0010239*P

[2] The marginal direct tax ratio attempts to measure the combined influence of the marginal rates of personal income tax, corporate income tax, wealth tax and other direct taxes on savings. This variable is based on a marginal aggregate tax rate, first used by Christ (1968), which was defined as "the derivative of aggregate tax receipts with respect to aggregate income." In Kerr and Monsingh (1998a), aggregate direct tax receipts were used to compute the marginal direct tax ratio. The variable marginal direct tax ratio is merely the increment in direct tax revenue divided by the increment in gross domestic product at factor cost multiplied by 100. This variable is computed primarily to measure the realized direct tax rate, since owing to large-scale tax evasion and avoidance the rates of income tax may not reveal the true picture.

The sign of direct tax per capita is as expected and is statistically significant. This result is as predicted by the supply-side economists and tax experts – that tax variables have a negative effect on savings. The price variable shows a negative relationship with savings, explaining the phenomenon of the higher cost of saving. However, the sign of the income variable was not as expected.

The time-series analysis of the Indian economy showed that a 1 per cent change in the direct tax per capita led to a decline of 0.41 per cent in the savings per capita in India during the period 1952-1992. Further, studies using pooled time-series/cross-section data for South Asian and East Asian economies (Kerr and Monsingh 1998a, 1998b) reveal that the tax-mix variable is an important variable and that there is an inverse relationship between changes in direct tax and capital formation. The results of these studies show that there is a significant negative relationship between the tax-mix variable and savings and capital formation.

IV. TAX REFORM STUDIES AND PROPOSALS

Tax reforms introduced in developing countries build on the large-scale research activities of indigenous and foreign researchers and organizations such as the World Bank and the International Monetary Fund. Some of the prominent tax reform experts who have worked for developing countries are Musgrave and Richman (1964), Kaldor (1956, 1980), Gillis (1989a, 1989b), Goode (1990), Shoup (1990), Ahmad and Stern (1991), Tanzi (1991) and Chelliah (1960, 1993). The most important body which has furnished short- and long-term technical assistance in fiscal reform is the Fiscal Affairs Department of IMF.

There are sometimes conflicting factors that are in operation and these may be borne in mind when proposing any taxation reform (Kerr 1995; Kerr and Monsingh 1998a). Some of these are:

- the effects on the work/leisure and consumption/saving choice differ for different taxes and different shifts in the tax mix;
- the costs of administering a tax vary significantly between taxes;
- the costs of compliance vary from tax to tax;
- the scope for avoidance and evasion is different for different taxes;
- some taxes are more transparent (visible) than others;
- some tax bases have greater revenue potential than others (greater income-elasticity of the tax base);
- some taxes are more equitable than others;
- countries differ in their industrial mix, degree of exposure to the international economy, stage of economic development, and so on.

Gillis (1989b) notes that the need for taxation reform arises from the fact that Governments have been unable to finance the growing public expenditure through

tax revenue. A growing imbalance between fiscal revenue and expenditure has given rise to the need for tax reform. The experiences of various tax reform programmes suggest that successful tax reform requires fundamental changes in the tax system, in both its structure and administration. Piecemeal changes in tax bases and rates are not adequate. The elements in the tax system that need most attention in developing economies are tax administration and tax compliance.

Harberger (1990a) formulated several principles of taxation that can be applied to developing countries:

- Commodity taxation in the form of value-added taxation of the consumption type is superior to other forms of taxation such as a general sales tax or turnover tax since it avoids double taxation.
- Uniform tariffs at a moderate rate are better than the high-tariff structure found in some of the developing countries.
- Capital taxation results in a movement of capital from the home country to abroad, leading to less domestic capital to cooperate with the local labour force. This results in a lower level of real wage.
- Integration of corporate income tax with personal income tax for domestic residents of the home country is essential to avoid flight of capital.

It is evident from Harberger's principles that rationalization and simplification of direct taxes are necessary to promote capital formation.

After examining the tax reform measures in developing economies over the past few decades, Goode (1990) claimed that a series of incremental improvements in tax systems is better than a once and for all comprehensive reform. This is so because the tax problems are highly complex, objectives are conflicting and tax administration is generally weak. Optimal taxation is difficult to achieve in these economies (Goode 1990, Tanzi 1991, Tanzi and Zee 2000). Moreover, optimal tax theory is of little practical use, since it has not suggested the overall tax burden for any economy in a dynamic setting. These studies are "rather abstract and highly model-dependent" (Tanzi and Zee 2000: 6).

Ahmad and Stern (1991) used a combination of positive and normative approaches to examine the optimal tax structure for developing countries. Indirect tax reform is the primary concern of developing economies, since more than 80 per cent of tax revenue is obtained from indirect taxation in economies such as India and Pakistan. The authors also attempted to estimate optimal direct tax in these two economies. Their study used a model for shadow price calculations developed by Little and Mirrlees, because a computable general equilibrium model requires more parameters to estimate than the model for shadow prices. With respect to indirect tax reform, they advocate a move towards value-added tax. The poorer households would

gain more compared with richer households by this movement. VAT would bring about both equity and economy in tax administration.

For the Indian economy, Thimmaiah (1984) identified basic problems relating to the structure of income taxation and savings. Income tax not only distorts different types of savings but also the consumption-savings choice with a bias against savings. Thimmaiah argued that there is an urgent need to correct these distortions either through indexation of the income tax base or through a tax on direct personal consumption or an indirect tax on sales. A direct tax on personal consumption would be similar to personal income tax, since different marginal rates of tax would be levied on those with different levels of consumption as different rates of income tax are levied on different income.

The introduction of a comprehensive personal expenditure tax has been suggested by Kaldor (1956, 1980), Meade (1978) and others. Kaldor made recommendations for tax reform in various developing countries such as India (1956), Sri Lanka (1958), Mexico (1960), Turkey (1962), the Islamic Republic of Iran (1966) and Venezuela (1976) (see Kaldor 1980a, 1980b). He proposed a system of direct personal taxation based on the simultaneous application of a number of criteria such as income, disposable wealth, capital gains, gifts and personal expenditure, to be administered jointly on the basis of a single comprehensive return that would have an important self-checking feature for tax evasion.

Meade (1978) argued that a move in the direction of expenditure tax gives the maximum opportunity for entrepreneurial development and, at the same time, imposes a very high tax on conspicuous consumption, including expenditure out of capital resources. The rates of tax may be higher under an expenditure tax regime, and this means that the marginal rate of tax on earnings spent on present consumption will be higher. Nevertheless, this would be offset by the reduction in the marginal rate of tax on present earnings that is used to finance future consumption. The Meade report also recommended a shift from the existing corporation tax to the direction of a flow-of-funds base. Similar to the personal expenditure tax, where the rate of return on savings is not taxed if the proceeds are not spent on consumption, the flow-of-funds corporation tax does not tax the rate of return on new capital investment if the proceeds are reinvested in the corporate sector.

Using a general equilibrium framework, Shoven and Whalley (1992) examined a variety of tax policy options for the United States economy. Their model evaluates the possibility of changing the country's federal personal income tax to a progressive consumption tax. It considers eight different rate structures while adopting the consumption tax. The results of the study showed an economic gain of $1,431.6 billion for a pure consumption tax with integration, compared with $236.8 billion for a pure income tax with integration. These two proposals, however, eliminate corporate income tax completely. Shoven and Whalley failed to examine the effect of their tax proposals on different sections of the society.

Studies such as Auerbach and Kotlikoff (1987) and Altig and others (1997) also use a general equilibrium model to compare the equity, efficiency and macroeconomic effects of fundamental tax reform. Their model predicts a significant long-run economic gain in the form of an increase in output of 11 per cent if the current United States federal tax system is replaced with a "proportional consumption tax". The younger of the middle- and upper-middle-income classes would gain substantially in the long run, while the older generations would lose around 4 per cent of their full-time earnings.

Their "flat tax" proposal modifies the basic consumption tax by exempting housing wealth from taxation, providing a large wage-tax deduction and giving older generations transition relief. This makes all members of society better off, with an output gain of 3.6 per cent. The "X-tax", which combines both the consumption tax and progressive wage tax, makes all sections of the society better off in the long run and also increases output by 7.5 per cent. In the short run, this tax benefits all sections of society, except the rich older generations on whose wealth an implicit tax is imposed. The economy grows at a faster rate under the consumption tax regime since it aids capital formation.

Kotrappa (1996), following the studies of Meade (1978) and Thimmaiah (1984), proposed a "cash flow-based tax system" for India, having a broader base and a lower tax rate that is conducive to capital formation. The existing corporate income tax in India raises the cost of equity capital. This has led to a greater demand for debt capital by the corporate sector, which has not been forthcoming owing to erosion in the value of investment provided by the lenders. It is the financial institutions that try to fill this gap. The vast potential demand for equities remains largely untapped owing to the private corporate sector's unwillingness to issue an optimum level of equity capital needed for capital formation. The risk capital will be forthcoming only when there is an integration of corporate and individual income tax and there is no double taxation of savings.

In summary, from the empirical literature and tax reform studies it seems that there are no universal laws that can be discovered concerning the influence of the tax mix and tax policies on a country's economic growth and development. Appropriate tax mix and policies differ from one economy to another, depending upon the economic, social and political circumstances of the country. Nevertheless, there are several studies and results that can be drawn upon to reach some conclusions about the influence here. Table 5 summarizes some of these studies.

Table 5. Studies on the effect of tax on savings and capital formation

Study	*Results*
Denison (1958)	The gross private savings rate (GPSR) is a stable function of GNP and changes in the tax system or other changes in the real after-tax rate of return to capital do not affect the GPSR.
David and Scadding (1974)	The gross private savings rate is constant and taxes cannot affect savings behaviour, either through a reduction in private income or a reduction in a real rate of return on capital.
Boskin (1978)	The savings function of Denison (1958) and David and Scadding (1974) was criticized on the ground that the savings rate out of private net-of-tax income grew by more than 50 per cent during the period 1929-1969 (the same period examined by David and Scadding). Boskin pointed out that taxes would result in a decline in savings by decreasing the net return to savings.
Evans, M.K. (1983); Canto, Joines and Laffer (1983)	There is a close relationship between tax rates, revenues and productivity. Taxation is identified as one of the policy instruments to accomplish the task of stimulating capital formation. If the tax rate increases above or decreases below the optimum rate, the tax revenue declines and so does productivity. The optimum rate which produces the desired revenue and the desired national product is determined by the electorate and its ability and willingness to pay tax in a democratic system.
Mathur (1985)	Income taxation has a significant effect on household savings through disposable income and interest rate channels. Reduction in income tax rates would induce higher household savings by shifting the household budget constraint and changing the slope in favour of savings.
Carrol and Summers (1987)	Tax incentives play an important role in influencing the aggregate level of personal savings. Tax exemption for savings that takes the form of superannuation has a positive impact on total savings.
Jenkins (1989)	Tax reform in Sri Lanka after the change in government in 1977 shifted the focus in the fiscal system from direct taxes to indirect taxes. As a result of these changes, gross capital formation increased substantially from an average of 14.5 per cent of GDP in 1976-1977 to an average of 28.9 per cent during the period 1978-1982.
Marsden (1990)	A cross-section analysis of 20 selected countries was compared on the basis of similar per capita income with different tax rates. For example, Singapore was compared with New Zealand, which has similar per capita income but higher levels of taxation, Japan with Sweden, and so on. In all cases, the countries that imposed a lower effective average tax burden on their populations achieved substantially higher rates of GDP growth than did their more highly-taxed counterparts.

Table 5. *(continued)*

Study	*Results*
Harberger (1990)	Tax credits are implemented to stimulate investment. The investment tax credit on the machine or other physical assets tends to subsidize depreciation, thus artificially biasing investors in the direction of choosing short-lived assets. The investment tax credit would artificially turn a socially wasteful investment into a privately profitable one. Many countries have imposed statutory minima on the lives of the assets to reduce the bias. One important way is to provide incentives to the net income generated by the assets covered.
Ahmad and Stern (1991)	Direct tax reduces productive investment and thereby reduces capital formation and growth. However, their main concern was indirect tax reform, since 80 per cent of the tax revenue raised by developing economies is from indirect taxes.
Tanzi and Shome (1992)	A study of tax regimes in eight Asian economies (Hong Kong, China; Republic of Korea; Singapore; Thailand; Philippines; Malaysia; Taiwan Province of China; and Indonesia) revealed that the beneficial effects of tax incentives in the Republic of Korea, Singapore and Taiwan Province of China were dependent on other supporting factors. The tax rate in Hong Kong, China, was comparatively lower and is one of the factors responsible for a high growth rate in that economy.
Trela and Whalley (1992)	Pro-growth tax policies (direct tax reductions and indirect tax exemptions) made a discernible contribution to the Republic of Korea's economic growth over the period 1962-1982. The general-equilibrium model, using the "outward-oriented growth strategy", estimated the increase in output due to pro-growth tax policies to be 0.54 per cent per annum.
Bernheim and Shoven (1987), Shoven and Topper (1992) and Taylor (1993),	The current income tax system is inefficient, since it discriminates against savings. These studies recommend replacing the current corporate income tax with a consumption-based, cash-flow approach to tax that exempts savings and investment from taxation. This system removes tax-related differences between the costs of debt and equity financing.
Kerr and Monsingh (1998a, 1998b) and Monsingh (1998a, 1999b)	These studies reveal that direct tax is one of the many variables that affect savings and capital formation, and reduction in direct tax rates has boosted the growth of the Indian economy. Tax policy can promote growth by increasing the rate of savings in the economy. Tax on expenditure would discourage non-productive consumption and promote capital formation.
Tanzi and Zee (2000)	Optimal tax models are of no practical use to developing economies. Tax theory shows that the direction of causation tends to run from development to tax levels rather than the other way around. Tanzi and Zee feel that tax incentives may not promote sustained development but lead to unnecessary distortions. These distortions encourage "rent-seeking activities."

V. CONCLUSION AND LESSONS FOR DEVELOPING ECONOMIES

This paper has surveyed a range of studies into the relationship between direct taxation and economic growth. While there has not been unanimity on the issue, most of the empirical studies reveal an inverse relationship between the level of direct taxation and the rate of savings and capital formation.

The tax reform literature also broadly supports the need to reform the tax structure in developing nations. Personal and corporate income taxes are biased against savings and capital formation. It is important to avoid heavy reliance on direct taxation in an increasingly global world economy, where capital and skilled labour are internationally mobile. To this end, many proponents have argued for a change in the tax mix, away from the taxation of income towards the taxation of consumption.

Several studies have proposed that a personal direct expenditure tax base replace the personal income tax base. Other tax reformers have argued that less reliance be placed on direct taxation of income and more on indirect taxation via broad-based consumption taxes. Another way in which income can be taxed less and consumption expenditure more is to afford personal income tax relief or exemption to that part of income (interest, dividends, etc.) earned through savings, thereby avoiding the double taxation of income inherent in the present personal income tax base.

This paper has only examined taxation in so far as it affects savings and capital formation and thus economic growth. There are, of course, many other effects of taxation and many other goals of taxation policy, not the least of which are the equity aspects and considerations. We have not attempted, here, to examine these and other important tax issues.

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