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The Effects of Taxation on Labor Supply, Savings, and Investment
in Developing Countries: A Survey of the Empirical Literature

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I. Introduction

This paper aims to summarize the available empirical estimates of the impact of a number of direct tax instruments on labor supply, investment, and savings in developing countries with a view to determining whether supply-side policies are relevant for such countries. Theoretical contributions are also discussed to the extent that they elucidate the empirical results.

Given that the concern is over the applicability of supply-side policies to developing countries, some discussion of what is meant by the concept "supply-side policy" is appropriate. As the term has come to be used in the context of developed economies and, in particular, in the context of the United States, it has, in general, referred to certain changes in tax policy--particularly those pertaining to corporate and personal income taxes--that are viewed as likely to stimulate domestic savings, investment, and labor supply. It has also come to refer more specifically to the views of those who believe that the responses of the various relevant agents to relative price changes are so elastic that tax rates can be reduced without any loss in tax revenue. It should be noted, however, that the views of these elasticity optimists are not unanimously accepted (Blinder (1981), Hausman (1981)).

Supply-side policies, as they apply to developing countries, must be defined more broadly. First, the role of government as an agent for savings and capital formation is more important in developing countries. How should the government perform this role? Second, there is some concern over the implications of changes in tax rates for tax revenue but this concern is overshadowed by the belief that the judicious use of tax policies (for example, tax incentives) will lead to an acceleration in growth rates. This emphasis on rates of economic growth immediately suggests that the applicability of supply-side concepts depends on income effects in addition to relative price effects. In particular, the availability of adequate savings in a developing country will depend not only on the interest elasticity of savings behavior but also on the marginal propensity to save.

Third, as noted above, supply-side analysis of developed countries concentrates on the role of direct taxes, both corporate and personal, on income. In developing countries, although these taxes can be of importance, it would be unwise to ignore other commonly used tax instruments. Many developing countries rely heavily on trade taxes both as a source of revenue and as an instrument of protection. Presumably, these taxes also have implications for the workings of the labor and capital markets in these countries. Further, even though the broad range of existing taxes offers considerable scope for the implementation of tax based supply-side policies, the efficacy of such policies may nonetheless be quite limited. Thus, many economists believe that developing countries suffer from structural problems that cannot be greatly alleviated by tinkering with tax rates.

It should be stated at the outset that, although this survey attempts to accommodate the above-mentioned reservations to the supply-side approach, it cannot claim to be a comprehensive evaluation of the empirical significance for the supply-side either of taxes other than direct taxes or of structural flaws. It will conclude, however, that while reform of direct tax structures in developing countries in some cases would appear to be useful it may well be the case that alternative reform strategies are preferable.

Before proceeding to a consideration of specific contributions, a comment on the quality of much of the empirical work is appropriate. The time-series data available for developing countries is well known to be deficient. As a result, much of the empirical work uses data that typically consist of aggregate macroeconomic quantities. Such studies are of limited value, particularly for evaluating microeconomic tax reform proposals. Further, the cross-section analyses abstract from the great heterogeneity of the countries selected. It is a suspect strategy to proceed as if the data sources are observations on a typical country, ignoring the possibility of income-type effects associated with the level of development. Thus, taking tax systems as an example, it has been shown that cross-country differences can be large and, what is more important for regression analysis, systematic (Martin and Lewis (1956), Williamson (1961), Hinrichs (1965), Tanzi (1982, 1983), and Abizadeh and Wyckoff (1982)). ^{1/}

The implications of tax policy for labor supply, saving, and investment are discussed in Sections II, III, and IV below.

II. Labor Supply

1. Theoretical background

When evaluating the implications of tax policy for the labor market, the traditional approach has been to estimate the elasticity of labor supply with respect to real wage changes. The view has been that, given the assumption that factor taxes are borne where they are

^{1/} It should be noted that, in the case of consumer analysis within a country, the discrepancies between cross-section and time-series results are frequently resolved by arguing that cross-section observations include those who are experiencing transitory income blips (Friedman (1957) and Ando and Modigliani (1963)). Such a device, which permits the assumption of a typical consumer, does not carry over to countries with structural differences.

levied, 1/ such an elasticity estimate will indicate labor supply responses to tax changes. The major problem, as perceived by this traditional approach, is that economic theory provides little guidance on the magnitude of the elasticity since the Slutsky equation permits an ambiguous result. 2/

This view, that all the implications of the taxation of labor supply can be so easily evaluated, can be challenged on a number of accounts. First, and most obviously, in most frameworks the incidence of a tax on labor income and the elasticity of labor supply are directly related. The more elastic the supply of labor, the less the net wage received by labor will change and the greater will be the effect of the introduction of the tax on other factor and goods markets. Second, as pointed out by Hausman (1983), the simple Slutsky equation may not apply because of the presence of nonlabor income and nonlinear (i.e., nonproportional) tax structures. This has a number of implications. The existence of nonlabor income makes the nature of the tax instruments important. Is it a wage tax or an income tax? Further, the nature of the income effect associated with tax changes becomes more complicated--indeed, Hausman (1983) suggests that the interaction between typical nonproportional tax systems and earnings functions produces an income effect over and above the conventional Slutsky term where this effect may well be the source of the backward-bending labor supply curve found in so many empirical studies.

The widespread use of nonproportional tax systems has a further serious implication. There is a possibility, particularly if there are positive transfer receipts at low-income levels, that the individual budget set is nonconvex, with the concomitant potential outcome of multiple equilibria. In graphical terms, this means that there is the possibility of a budget line with multiple kinks being tangent to the consumer's indifference curve at more than one point. Accordingly, in order to predict accurately the impact of taxation on labor supply in those circumstances, one would have to know the typical individual's entire preference structure (Hausman (1983)).

1/ As is traditional, unless otherwise stated, it is assumed that whatever revenue is raised is spent in a neutral fashion. There is, therefore, no need to take account of whether there are changes in net wages, and hence, labor supply effects, because of government expenditures.

2/ In the absence of taxation, the relevant Slutsky equation is,

$$\frac{\partial L}{\partial w} = \left(\frac{\partial L}{\partial w} \right) \bar{u} + \frac{L \partial L}{\partial M}$$

where L refers to labor supply, w to the wage rate, and M to income. \bar{u} refers to the fact that the first term on the right-hand side is compensated. This is the substitution effect and is known to be positive. The second term is the income effect. Given that leisure is conventionally assumed to be normal ($\partial L / \partial M < 0$), the net effect of an increase in the wage rate on a consumer's labor supply is ambiguous (c.f., Atkinson and Stiglitz (1980)).

The above observations refer to all labor supply analyses, irrespective of whether they pertain to developed or developing countries. A third challenge to the view that tax policy analysis of the labor market can be reduced to a simple aggregate elasticity estimate of labor supply is most relevant in the case of developing countries. It is contained implicitly in the component of development literature that characterizes rural labor markets as frequently being noncompetitive. Wages are assumed to be institutionally set with the resultant outcome of persistent underemployment and unemployment of labor (e.g., Lewis (1954), Ranis and Fei (1961), and Sen (1966)). If this framework is accurate, then the incidence of a general tax on labor income may be dramatically altered. Instead of facing an inelastic supply of labor in the aggregate, where this implies that labor will bear a general factor tax levied on its earnings, labor supply to the economy is now infinitely elastic. The incidence of a wage/income tax then depends on the institutional mechanisms in place and, in particular, on what happens to the net wage. More important, this nonneoclassical framework suggests that the net effect of tax policy will be determined on the demand side. If there remains an excess supply of labor after the tax has been absorbed, then any change that occurs in employment will be because of changes in demand.

Finally, it should be noted that, as far as developing countries are concerned, the focus is on the labor supply behavior of urban households, as rural household incomes are taxed little if at all by means of direct taxes such as the income tax.

As pointed out at the beginning of this section, it is often assumed that the incidence of an income/wage tax is such that it is borne by labor. In the short run, this may well be an accurate assumption. It is worth noting, however, that, in the very long run, circumstances may be quite different. Indeed, following Feldstein (1974a, 1974b), if one uses a traditional neoclassical growth model to gauge long-run incidence effects, then the critical factor in determining the impact of a tax is whether it affects aggregate savings by changing the propensity to save. Feldstein shows that, within the context of his model for the case of wage tax, the steady-state equilibrium is completely independent of the extent to which the supply of labor responds to the net wage. The intuition is clear. In the long run in that type of model, labor affects output growth through the rate of population growth rather than through the labor participation rate. Accordingly, when assessing the impact of a wage/income tax, account must be taken of how the revenue raised is spent--in particular, is aggregate savings, and therefore the rate of capital formation, unaltered? (Note that the Feldstein approach relaxes the assumption that tax revenue is neutrally spent.) This implies that, if the full menu of supply-side effects associated with wage taxes are to be appreciated, it is not enough to consider only the elasticity of labor supply. We will return to this point later when the behavior of savings is examined.

The above discussion has also implicitly assumed that the only taxes on labor income are broad-based wage or income taxes. More specific taxes such as taxes (subsidies) on the use of a factor in an industry or on the price of the given output are also possible. In a neoclassical context, these taxes have general-equilibrium effects that occur as a result of differing capital labor ratios and elasticities of substitution across industries and demand effects precipitated by alterations in the distribution of income. Such effects make it difficult to analyze the incidence of these taxes, as evidenced by Harberger (1962), Mieszkowski (1969), McLure (1975), and Vandendorpe and Friedlaender (1976). In the case of developing countries, the authors typically have some modified two-sector model in the background. Notable examples of contributions in this area are afforded by Ahluwalia (1973) and Bird (1982). For example, Ahluwalia analyzes the implications of tax incentives for employment within the framework of a two-sector surplus labor economy. In this context, mention should also be made of Gandhi (1981), who discusses the efficacy of investment incentives for increasing employment. It should be noted that these papers focus on the creation of a demand for labor rather than on the definition of circumstances in which supply would be forthcoming.

2. Empirical evidence: urban workers

Unfortunately, even for the case of the aggregate labor supply elasticity of urban workers, the available empirical literature has little to offer. What direct evidence there is suggests that, at least for Africa, the aggregate supply curve for labor for the exchange economy as a whole is positively sloped (Berg (1961)). This view is in marked contrast to the earlier presumption that African labor supply functions were backward sloping. The two views are not contradictory. Thus, using data drawn from the copper belt of Africa and from Kenya, respectively, Miracle and Fetter (1970) and Miracle (1976) argue that the earlier observations of backward-sloping supply curves are consistent with conventional microeconomic theory when account is taken of the costs associated with working at that time. In particular, these two papers document that, in the early part of the twentieth century, the risk of dying from a disease while at work in an urban area was considerable. It was not surprising, therefore, that the income effect associated with an increase in the wage rate tended to outweigh the substitution effect. The more recent findings of a positive labor supply response to increases in wages may then be ascribed at least in part to a reduction in the costs associated with urban employment and, in particular, to an improvement in health conditions. (For example, Miracle and Fetter (1970) point to evidence which suggests that, in 1911, the annual death rate among Africans in Elisabethville was 24 percent per annum and that this high death rate was due to a variety of diseases.)

Although the remainder of the empirical literature does not directly provide estimates on the labor supply behavior of urban workers, by documenting other aspects of the labor markets of developing countries, it does provide some useful indirect evidence.

One component of that literature considers the economics of urbanization. This component can be further subdivided into studies that examine the determinants of migration and studies that document the migrant experience in urban locations. Both streams are surveyed by Yap (1977). The consensus of this literature is that migration flows do respond to economic incentives in selecting employment locations. To take two recent examples, Schultz (1982), working with Venezuelan data, concluded that the elasticity of the migration rate with respect to destination wages ranges from 1.4 to 2.9. This result is analogous to that discovered by Fields (1982) for the case of Colombia.

Migrants appear not only to gain by moving to cities but to do so more rapidly than had been assumed hitherto. For example, in a paper on the experience of migrants in Brazil, Yap (1976) argues that the evidence indicates that migrants are, within a short period of time, indistinguishable from the urban born as far as income and employment patterns are concerned.

The contributions on the experiences of migrants are closely related to studies estimating the earnings functions of urban workers in general. The picture that emerges is one of earnings being a function of objective measures such as a skill level (years of schooling) (e.g., House and Rempel (1976)). Further, turning to the earnings functions that have been estimated for urban workers in the informal sectors of developing countries' economies, there is growing evidence that these sectors also respond to market forces and that, in particular, they afford the workers they employ a higher real income than had generally been believed to be the case (Teilhet-Waldorf and Waldorf (1983)). This observation is of interest in its own right in that proponents of the Harris-Todaro framework view this sector as affording low living standards, given its presumed role of permitting migrants to queue up for employment in the modern sector (Fields (1975)).

The literature on statutory minimum wages also provides some indirect evidence on the behavior of labor supply. Irrespective of the motivation for introducing a floor to wages (Starr (1981)), the effects of such a floor are of interest. In a study of the introduction of a minimum wage in Tanganyika in 1963, Chesworth (1967) noted that employment among the categories of workers covered by labor enumeration fell by 14.3 percent between 1962 and 1963. Unfortunately, given the potential for disequilibrium in developing country labor markets, it is impossible to discern whether this observation is recording a movement along the demand curve or the supply curve of labor. There is, however, some additional evidence. As pointed out by Watanabe (1976), minimum wage floors in developing countries are frequently set at a relatively high level, which leads to widespread cheating. This suggests that, in these countries, there are well-defined demand and supply schedules for labor.

3. Empirical evidence: rural workers

Literature examining the behavior of rural labor markets is of interest not only because of the further insight it provides into the labor supply behavior of urban workers but also because rural labor may itself be affected by indirect taxes such as taxes on international trade. The relevant literature is large and varied. For example, in a paper estimating labor supply functions in peasant agriculture on the basis of a data set collected from some 4,900 rural households, Bardhan (1979a) finds evidence against the existence of the horizontal supply curve of labor predicted by the Lewis framework. In particular, he finds, "The wage response of labor supply seems to be significantly positive for the set of agricultural laborers and small cultivators, and also for that of women in the usual labor force. The wage response is not significant for total labor supply for the set of cultivators of all size groups taken together." (p. 81). The author concludes that labor supply decisions are determined by factors other than the wage rate, that is, the labor supply function is inelastic. Hansen (1969), working with data drawn from rural Egypt, concludes that the evidence is consistent with a competitive framework and that, in particular, there is a strong positive correlation between rural wages and hours worked per day during the year for males, females, and children. Rosenzweig (1980) also tested the assumption of competitive labor markets using household survey data collected in India. He concludes that, "Empirical results based on micro-data from rural India stratified by sex and landholding status were generally supportive of the neoclassical framework suggesting that the annual number of days and wage of employment observed for individuals in rural India is mainly supply rather than demand determined, as implied by competitive models." (p. 53). Finally, in a related demonstration of the thesis that rural wage levels in developing countries are not exogenously determined, Rosenzweig (1978) observed the existence of a negative correlation between rural wage levels and a measure of landholding inequality. His data consisted of a survey of more than 5,000 households in India. 1/

4. Assessment

The above contributions afford some indirect support to those who argue that supply-side considerations have a role in the determination of the equilibrium wage. However, although they maintain that there is a well-defined labor supply function, it appears not to be very elastic. Further, in view of the other reservations mentioned above, until some assumptions are made concerning the aggregate structure of all the taxes on labor income, little can be said about the supply-side implications of tax changes.

1/ Further evidence on the endogeneity of wages can be found in Bardhan (1979b) and Sumner (1981).

It should be further noted that this research does not demonstrate the superiority of simple tax-based policies over alternative measures. A distinguishing feature of developing countries is the degree to which their markets appear to be distorted. There is a growing body of literature that explicitly addresses these imperfections and accordingly raises alternative policy prescriptions. This literature begins with the observation that interlocking factor markets are observed in many rural communities where these may be, at least in part, an economic response to market imperfections. To be more specific, the cost of hiring and supervising labor leads landowners to seek land-lease contracts. In addition, given that the intensity and quality of labor input is difficult to monitor, landowners tend to prefer sharecropping (i.e., risk-sharing) arrangements. Finally, capital markets are not complete in the sense that, because of information costs, many farmers do not have ready access to them. Landlords tend to fill this gap by providing loans, using the tenancy contract itself as collateral. This framework suggests that there are a series of nontax measures whereby the government by its intervention could induce output increases. Examples are the creation of futures markets and/or commodity price stabilization programs. ^{1/} This literature is extensively discussed in Bardhan (1980, 1983), Newberry and Stiglitz (1981), and Braverman and Stiglitz (1982).

Although, nontax policies of this type afford some possibility for output increases, they should be viewed as being primarily one-shot efforts. That is, they ensure that the existing stock of factors is more efficiently employed but do not affect the long-run rate of growth. ^{2/}

Even though the gains that would result from removing labor market distortions may be primarily static rather than dynamic, this is not to say that they are necessarily negligible. Some empirical work exists in which estimates of the welfare gains associated with the removal of distortions are presented. For example, Harberger (1959) concluded that, for Chile, the total cost of both product and factor market distortions was between 9 percent and 15 percent of gross national product. Not all studies, however, are as optimistic about the potential welfare gains. In a more recent study in which they examine the effect of wage

^{1/} It should be emphasized that the value of these measures lies solely in their increasing the efficiency of the market system. No account is taken of the equity implications either of the sharecropping arrangements or of the government policy measures. As pointed out by Braverman and Stiglitz (1982), interlinking markets can, but need not, increase the utility of both landlords and tenants since such arrangements unambiguously shift the utility possibilities schedule outward.

^{2/} This assertion has to be modified to the extent that devices such as price stabilization systems alter savings behavior. For a discussion of these possibilities, see Newberry and Stiglitz (1981).

differentials between different industrial sectors in Colombia, Dougherty and Selowsky (1973) conclude that the output effects associated with those differentials are relatively insignificant. The methodology of that paper was to ascribe unexplained wage variations to distortions where the latter are presumably due to many factors. However, as pointed out by de Melo (1977), their approach was a partial-equilibrium one in that they held product and factor prices fixed. For his part, reconsidering the case of removing labor market distortions in Colombia in a general-equilibrium context, de Melo (1977) finds the potential gains to be significant.

We turn now to consider how tax policies affect savings and investment.

III. Savings Behavior

1. Theoretical background

The theoretical microeconomic literature on how savings behavior is affected by tax policy has tended to concentrate on the issue of how various tax instruments affect the net rate of interest. The presumption is that, once the incidence of a tax has been determined, all that remains is to calculate the interest elasticity of savings. In this, the relevant literature parallels that in which the effects of taxes on labor supply are discussed. The most important theoretical issues associated with the taxation of savings are summarized in Sandmo (forthcoming).

As pointed out in the introduction, the supply-side perspective as it applies to developing countries should also be concerned with the question of savings behavior in countries experiencing growth, that is, how does aggregate savings respond to increases in income? A substantial theoretical literature exists on this subject. This literature was the outcome of an attempt to reconcile early empirical work undertaken in developed countries in which it emerged that cross-section data indicated the existence of a nonproportional relationship between consumption and income, while time series data suggested that the relationship is proportional. The best known reconciliation (the permanent-income hypothesis) of these two observations can be reduced to the argument that the cross-section regressions tend to estimate short-run consumption functions, while the time series regressions estimate the analogous long-run function (Ando and Modigliani (1963), Modigliani and Brumberg (1954), and Friedman (1957)). From a development perspective, the long-run function is most relevant. Should the proportional relation hold for developing countries, it implies that the income elasticity of savings would be unity--with economic growth, the share of output devoted to savings would remain constant, everything else being held equal.

The above macroeconomic debate took place in the absence of tax considerations. When taxes are accommodated in this framework, as they are, for example, in Feldstein (1974a, 1974b), the crucial link is viewed as being how the redistribution of income from the private sector to the government affects aggregate savings. If the government's marginal propensity to save exceeds that of the private sector, the net effect of an increase in taxation with a concomitant increase in government expenditures is an increase in capital formation.

Having summarized the salient features of the existing literature on savings behavior, it should be recognized that, just as in the case of labor-market behavior, there are difficulties in uncritically applying the analysis to developing countries. Indeed, the situation in many developing countries is such that the efficacy of tax-based savings incentives programs may be questioned. Issues associated with the mobilization and deployment of domestic savings are often viewed as being central. Financial institutions may not be well developed (e.g., Miracle, Miracle, and Cohen (1980)). Further, the exchange rate and domestic climate may be such as to encourage capital flight.

Finally, it has often been pointed out (e.g., Galbis (1979a)) that, in many developing countries, interest rates are often set at artificially low rates. This has resulted in a large literature in which it is argued that such an institutional constraint will result in financial repression. Thus, with the incentive for financial savings being greatly weakened (Galbis (1979b), World Development Report (1983)), it is argued that the reduced supply of such savings requires the introduction of rationing mechanisms as far as investment is concerned. The work of Shaw (1973) and McKinnon (1973) is perhaps the best known. More recent contributions have refined their original work. Spellman (1976) attempts to introduce the role of financial intermediation into a one-sector growth model; Vogel and Buser (1976) argue that the degree of financial repression is sensitive to changes in risk as well as to changes in the mean return to financial investments; Van Wijnbergen (1983) examines the implications of relaxing McKinnon's assumption that the alternative investment opportunity to financial assets consists of "unproductive assets" by allowing for curbmarket funds, where these have been documented to be of considerable empirical importance (e.g., Wai (1977)). Finally, Galbis (1981) raises the question that, in a second-best world, it may not be optimal for interest rates to be market determined.

2. Empirical evidence

Much of the empirical development economics literature on savings behavior has not addressed the issue of the interest elasticity of savings. Data availability is a major reason for this. As Mikesell and Zinser (1973) point out in their survey, data on savings are inaccurate by the very nature of their method of calculation, that is,

savings figures are frequently obtained residually. As a result, it is quite conceivable, for example, that the result obtained by Krishna and Raychaudhuri (1982) for India of a marginal propensity to save out of permanent income exceeding that out of transitory income--an unexpected outcome--is the product of inaccurate data. Further, given the widespread use of interest rate ceilings, it is not clear what should be the appropriate choice of a rate of return variable. As a result of all of these difficulties, many of the empirical results should be approached with great caution. So as to emphasize that the difficulties are genuine, it should be noted that Williamson (1968) found interest rates to have an insignificant impact on savings in India, while Gupta (1970), using a different data set, found that, for some specifications, they had a significant positive effect. (Some of the statistical and conceptual difficulties associated with measuring saving (and investment) in India are discussed in Gothoskar and Venkatachalam (1979).)

Instead, a large proportion of the available empirical research has been concerned more with the macroeconomic issues raised above. Thus, a major effort has been made to estimate consumption functions for developing countries. Various hypotheses are tested. In particular, the life cycle model is frequently tested, as is the hypothesis that savings rates increase with income levels. Many of the early contributions have been exhaustively surveyed elsewhere (Mikesell and Zinser (1973) and Snyder (1974)). An example of a superior contribution to this literature is afforded by Landau (1971). Also notable is Leff and Sato (1975), in which a simultaneous equations model of aggregate saving is developed. Other examples of recent additions to this literature are Song (1981) and McDonald (1983). The consensus of this literature is that some relationship between saving and income does exist and, further, that some versions of the life cycle/permanent income hypotheses are appropriate. More specifically, McDonald (1983), in his study of savings behavior in Latin America, found that the income elasticities of consumption were, with a few exceptions, in the range of 0.7 to 1.1. This lends some support to the hypothesis that the proportionality result of the permanent-income framework applies to developing countries. Of course, it also implies that, as countries develop, there is no particular tendency for the savings rate to increase.

The empirical work also shows that there are other important determinants of savings, where these include demographic factors (e.g., dependency rates and age distribution (Bilsborrow (1979)), occupation, income distribution, life span (Ram and Schultz (1979)), and the urban-rural distinction). Note that to the extent that growth affects these variables, savings rates will change. Further, to the extent that income distributions can be altered by tax policy (Goode (1961)), that provides a potential lever for government intervention. The policy might prove to be unpalatable, however, since the presumption is that the government would have to distribute income from the poor (low propensity to save) to the rich (high propensity to save).

A large number of papers examine the impact of the growth in the government sector on aggregate savings. These papers constitute the empirical analogue of Feldstein's (1974a, 1974b) theoretical contributions, although it must be emphasized that the concept of government savings is particularly difficult to pin down. The relevant papers have concentrated on evaluating the "Please effect," where this can take either a strong or a weak form (Please (1967, 1970)). The strong form maintains that aggregate savings will decline with the growth of the share of tax revenues in gross domestic product (GDP), whereas the weak form contends that under such circumstances aggregate savings may increase but not by much. Papers in which this and related hypotheses are tested include those by Bhatia (1967), Morss (1968), Thimmaiah (1977), and Tahari (1979). The consensus of this literature seems to be that the Please effect is not valid. Bhatia concludes that aggregate savings increase quite sharply on the basis of a cross-sectional study of 20 African countries--for every 1 percent increase in the tax-GDP ratio, private consumption declined by 0.21 percent of GDP while public consumption increased by 0.05 percent of GDP. Morss, using data drawn from a cross-section of 46 developing countries, felt confident in rejecting the Please effect. Tahari reached a similar conclusion. Thimmaiah, using time-series data from India, could not reject the weak form of the Please effect. On the other hand, Landau (1971) did find evidence to support the Please effect in the case of Latin American countries.

There is also a significant body of literature that attempts to evaluate the empirical significance of the financial repression which is presumed to be an inevitable outcome of institutionally setting interest rates at artificially low rates. The consensus is that financial repression does exist and can be a severe drag on economic development. For example, in a recent paper by the Research Department of the International Monetary Fund (IMF (1983)), the authors concluded that there is good prima facie evidence to support the assertion that countries with positive real rates of interest experience a higher rate of growth than that enjoyed by countries in which the real rate of interest is negative. Fry (1980b) finds that savings are affected positively by the real deposit rate of interest. He argues that his estimates of savings and growth functions are such as to allow him to conclude that the cost of financial repression is around one half a percentage point in growth forgone for every percentage point by which the real rate falls below the equilibrium rate. In another paper, Fry (1978) finds further evidence of the importance of financial repression. He concludes that the specific transmission mechanism proposed by Shaw (1973) appears to fit the facts better than that proposed by McKinnon (1973). In particular, McKinnon's twin assumptions to the effect that investments are lumpy and entirely self-financed which, taken together, imply that potential investors must accumulate money balances prior to investing, leads to the testable hypothesis that money and physical capital are complements. This hypothesis is not sustained by the data. Shaw's

alternative approach, which assumes that investors are not constrained to self-finance because of the emergence of noninstitutional markets in response to financial repression, does receive support. Other papers, in which it is argued that financial repression can be important, are Chandavarkar (1971) and Vogel and Buser (1976). Also noteworthy are two papers by Fry (1980a) and Leff and Sato (1980), in which it is pointed out that artificially low interest rates affect not only long-term growth rates but also short-term macroeconomic adjustment processes.

All of the above suggests that, even though aggregate savings may not be very interest sensitive, the allocation of that aggregate between conventional financial assets and alternatives such as curbside funds and works of art is indeed responsive to economic incentives. Presumably, this responsiveness extends to the behavior of asset holders as they determine their portfolio allocations within the category of conventional financial assets. There is, unfortunately, little empirical work addressing this issue. An exception is a paper by Bürkner (1982), in which he concludes on the basis of financial data collected for the Philippines, that investors in the Philippines react to relative changes in rates of return just as their counterparts do in developed countries.

3. Assessment

To the extent that the empirical literature on savings behavior addresses the concerns of supply-side economists, it does so in its evaluation of the financial repression hypotheses of Shaw and McKinnon. While the empirical work in this area demonstrates that savings may be sensitive to changes in interest rates and, therefore, are also sensitive to changes in tax policy, it also raises the issue of whether savings-based tax incentives represent the most profitable reform route for countries to pursue. Specifically, the distortion to savings decisions implied by the existence of financial repression may be far larger than that associated with the fact that interest income is subject to income tax. To place the relative magnitudes of these distortions in some context, consider that, for Ghana during the late 1970s, official market interest rates on savings deposits rarely exceeded 10 percent, while the rate of inflation was frequently in the neighborhood of 100 percent.

As for the remainder of the empirical literature, most of it is concerned with macroeconomic aggregates rather than supply-side issues. In particular, inadequate attention has been devoted to the question of whether aggregate savings, as opposed to its components, is affected by the type of tax structure. Is a consumption-based tax preferable to an income-based tax, for example, as argued by Due (1976)? This is an important issue since it raises the possibility that the substantial reliance of developing countries on broad-based consumption taxes may have been conducive to savings. As an aside on this, it is interesting

to note that Tahari (1979) has found on the basis of his cross-section work that (private) savings behavior appears to be stimulated more by direct than indirect taxation! While theoretically possible, too much store should not be placed on this somewhat surprising conclusion given the heterogeneous nature of the countries in his sample and the aggregative nature of his regression results. Besides, the net effect of government's actions on aggregate savings depends on the manner of disposition of the tax revenues.

As is well known, aggregate savings do not necessarily equal gross investment for any single country. Thus, for a given country, investments can be made by domestic or foreign investors. Further, since this survey is concerned with results which have implications for supply-side policies, the term "investment" is interpreted here in a restricted sense as referring to those increments in the stock of a nation's capital which result in increases in market output. Investment in works of art, etc., are accordingly excluded. Given this potential difference between savings and investment and given that there exists a wide range of specifically targeted tax instruments, for example, those aimed at manufacturing and tourism investment, we turn now to consider investment behavior as a separate topic.

IV. Investment Behavior

1. Theoretical background

The theory of how investment behavior responds to changes in tax policy has been heavily influenced by the neoclassical framework established by Jorgenson (1963). The most important conclusions of the literature can be found in Hall and Jorgenson (1971), Stiglitz (1973), King (1975), Flemming (1976), and Atkinson and Stiglitz (1980). For our purposes, it is important to note the observation that attempting to gauge the impact of tax policy on the cost of capital (and, therefore, on the rate of investment) by concentrating on the corporate tax rate is misleading. In many countries, the corporate tax structure interacts with the personal tax system and, further, the specific provisions of the corporate tax are of critical importance. On the latter point, the corporate tax will not affect the cost of capital if companies are allowed to make deductions against their tax liabilities that accurately reflect the contribution of capital to the production process. For example, in the context of the U.S. tax system, there are two approaches to ensuring that the tax system would be neutral with respect to the cost of capital. First, if the corporation uses debt finance on the margin and if debt interest is deductible and depreciation allowances accurately measure the value of the capital used up (a difficult quantity to measure in an inflationary environment), then increases in the corporate tax rate will leave the cost of capital unaffected. The

alternative approach, easier to implement administratively, would disallow interest deductions and replace depreciation allowances with expensing. The two approaches are equivalent in present value terms. ^{1/}

The above literature refers to the effects of taxes in a world without risk. There is, however, an additional body of work which relaxes this constraint and allows for the existence of risk. The emphasis has been on the role of the government as a risk-sharer through its tax instruments. The question of interest has been whether taxation encourages more or less risk taking. The answer depends on factors such as the degree of investor risk aversion and the extent of loss-offset provisions (c.f., Atkinson and Stiglitz (1980)). It should be noted, with respect to the latter, that the present value of loss-offset provisions are of greatest relevance--the fact that many countries permit full loss-offset for an indefinite period in nominal terms does not take account of the cost associated with the postponement of the tax benefits.

When one turns to consider that part of the theoretical literature concerned with developing country issues, one finds that it differs from the papers cited above in a couple of important respects. First, given the variety of developing country experiences, it is more concerned with the multitude of direct tax structures in existence (c.f., Lent (1967), Usher (1977)). Many of these tax structures employ devices not commonly used in developed countries. For example, Agell (1982) shows how tax holidays can be accommodated with the neoclassical cost of capital model.

Second, there is a belief that the neoclassical model may not apply readily to developing countries. Capital markets are imperfect. Therefore, financial policy and, in particular, policies concerning dividend/retained earnings behavior, are no longer irrelevant to aggregate investment behavior. More important, the structure of a country's system of financial intermediation can be significant. Thus, as pointed out in the previous section, the fact that interest rates are maintained at an artificially low level in some countries could well lead to financial disintermediation with the result that the demand for investment funds must be met by rationing. This manifestation of financial repression raises the possibility that investment may increase with interest rates as a result of an increase in available savings.

^{1/} It must be recognized that, in practice, the two systems may not be equivalent. Thus, for example, start-up companies will not in general have the profits against which they can deduct their investment expenditures. While it is true that these companies can be compensated by allowing them to carry their expensing allowances forward, for equivalence to be maintained, these carry-forward provisions would have to be indexed for inflation and the real rate of return.

Third, and related to the possibility that financial repression may imply that investment behavior is quantity rather than price constrained, is the argument that the growth performance of some countries (where this is influenced by their investment efforts) may be limited by the availability of foreign exchange. This possibility, commonly referred to as the two-gap hypothesis, is discussed by McKinnon (1964) among others.

Fourth, recognition of the fact that aggregate investment consists of a number of components in addition to private domestic investment has stimulated research. Attention has been devoted to the determinants of foreign direct investment and foreign aid. To what do these capital flows respond? It is clear, for example, that if a complete explanation of how taxes affect private foreign investment flows is to be determined, the interactions of differing national tax systems must be taken into account. For example, Hartman (1981a) considers how U.S. foreign direct investment might be influenced by U.S. tax policies. An important element of the current U.S. tax structure is that income from foreign sources is liable to taxation only on repatriation, which implies that firms should finance foreign investment out of foreign earnings to the greatest extent possible. Work in this area is still at an early stage.

Fifth, at this macroeconomic level, there has been concern over the degree of complementarity/substitutability between the components of aggregate investment. In particular, are capital inflows a substitute for domestic saving and investment? Thus, Chenery and Strout (1966) viewed all capital inflows as net addition to a developing country's capital stock, whereas Weisskopf (1972b) viewed such inflows as being a substitute for domestic savings. Papanek (1972) argued for an intermediate position. There has also been concern over the impact of public investment on private investment.

Finally, as mentioned in the introduction, investment behavior can be influenced by taxes and distortions other than direct income-based taxes. Notable among these other instruments are trade taxes/marketing boards and agricultural price support systems. While these devices may be introduced for a number of reasons (e.g., with a view to levying an optimum export tax whereby a country exploits its market power in world markets (Corden (1974))), they can frequently have unintended effects, particularly at the level of individual industries.

2. Empirical evidence

The available empirical work reflects the bias mentioned above against the neoclassical framework. For example, Bilsborrow (1977) tests an eclectic theory of investment behavior that allows for variables representing the internal financial structure of the firm. He finds, using data drawn from Colombia, that accelerator effects, cash flow effects, balance sheet risk variables, and, most notably, the

availability of foreign exchange were important determinants of investment flows. However, the rate of return to investors can still be an important determinant of investment behavior. In her study of the inflationary process in India, Ahluwalia (1979) found that the interest elasticity of private investment exceeded two, which would suggest that a tax policy aimed at altering the rate of return could be stimulative. In contrast to this result, the papers cited earlier, in which the financial repression hypotheses are evaluated, find--almost as a corollary to the existence of artificially low interest rates--that investment is quantity constrained by rationing. For example, Fry (1978) finds for his sample of countries that an increase in the real rate of interest has a positive effect on growth. Related to this is the work of Thirlwall (1974), who discovered, for his global sample of countries, that inflation exercises a positive influence on investment, but on further examination found that, if the sample is limited to developing countries, this influence is negative. If the role of the inflation variable for the case of developing countries is interpreted as its being a proxy for the degree of financial repression, then the sign of the effect is understandable. Further, this result is similar to one reported in Ebrill (1984), a companion paper to this study. It should be noted that, to the extent that these effects are important, they reduce the effectiveness of tax incentive programs for investment.

More neoclassical in nature is the work of Lim (1983). He concentrates on the specifics of the investment incentive programs in peninsula Malaysia, calling attention, in particular, to the role of generous tax holidays that tend to be awarded on an indiscriminate basis. He finds that there is some evidence of investor reactions to these incentives--there is some tendency for both capital intensity and utilization rates to increase.

The empirical literature evaluating the two-gap hypothesis, that is, the argument that growth prospects are often constrained by the availability of foreign exchange, is inconclusive. Weisskopf (1972a) and Blomqvist (1976) cast some doubt on this argument. On the other hand, for the case of Sudan, Wynn (1980) finds some evidence to support it. All authors agree, however, that testing the hypothesis is particularly difficult since, given the accounting identity between the excess of imports over exports and the corresponding excess of savings over investment, it is not easy to identify ex post the true constraint on a country's development.

There is little empirical work on the determinants of foreign investment flows. Hartman (1981b) finds that U.S. aggregate foreign direct investment does, in fact, respond to changes in tax policy. In particular, it is influenced negatively and quite strongly by the after-tax rate of return to domestic investment. As further evidence of the sensitivity of foreign investment flows to economic variables, Hartman (1982) shows that foreign investment flows into the United States

respond to changes in U.S. tax policy. However, when one considers the experience of developing countries, there are fewer grounds for optimism over the ability of tax policies to attract investment flows. Lim (1983) finds in his work on a cross-section of 27 developing countries that the presence of natural resources and a proven record of economic performance were far more important than fiscal incentives in attracting such flows. Although they do not consider the impact of tax incentives per se, Root and Ahmed (1979) corroborate Lim's results for nonextractive industries in that they find that those countries that have attracted the most foreign investment have substantial urbanization, relatively advanced infrastructures, and so on. As an aside, it goes without saying that the other component of foreign capital flows mentioned above, namely, foreign aid, does not respond to changes in tax policy.

The issue of whether capital inflows are a substitute for domestic saving and investment has been examined empirically by Papanek (1973), Stoneman (1975), and Gupta and Islam (1983), among others. Given their careful empirical methodology, Gupta and Islam's (1983) work would appear to be the most interesting. They find, after decomposing aggregate capital inflows, that foreign aid had a more negative impact on savings than foreign investment, although these effects never appeared to be very large. In a related paper looking at the other side of this issue, Feldstein and Horioka (1980) show that, for the developed countries, international differences in savings rates correspond to almost equal differences in domestic investment rates, again suggesting, as do Gupta and Islam (1983) in the context of developing countries, that domestic savings are the most important determinant of domestic investment.

Sundararajan and Thakur (1980), using data collected on India and Korea, test a modified neoclassical framework to see the impact of public investment on private investment. Simulations show that, in India, increases in public investment initially lead to substantial crowding out of private investment with a weak reversal of this tendency occurring in subsequent periods. In Korea, in marked contrast, there is evidence of a strong complementarity between public and private investment. Wai and Wong (1982), using data drawn from a number of countries, found evidence of financial crowding out in some countries (Malaysia and Mexico). Further, on the subject of financial structure, they find that, in the case of Korea, retained earnings play a less important role than credit availability in determining investment flows, that is, again the financial structure is important.

The allocation effects of various trade taxes and price support systems have been extensively evaluated in the literature. The thrust of the work has been to estimate the relevant supply elasticities for the commodities whose prices are affected, thereby providing additional insight into the degree to which investment changes in response to changes in incentives.

Most of the papers are concerned with agricultural commodities. Booth (1980) in her consideration of the role of export taxes in ASEAN countries points out that Thailand's export tax on rice, levied at a fairly high rate in the 1970s, has led many producers to shift out of rice production. While the resultant production distortion is a cost to the economy, it does indicate that Thai farmers respond to economic circumstances. ^{1/} Further evidence of the sensitivity of agricultural interests to government intervention can be found in Tolley, Thomas, and Wong (1982). They cite, for example, the fact that Korea attained self-sufficiency in rice production during the 1970s, a period in which the Government's farm purchase price increased by more than 70 percent in real terms. (They argue that a supply elasticity of 0.3 is appropriate for this case.) Finally, mention should be made of Tanzi (1976), who shows that the export tax levied by Haiti on its coffee exports has had a major negative impact on production.

Intervention in agricultural markets need not take as explicit a form as a price support. Marketing boards, which sell a country's product at a different (usually higher) price than that which it pays to domestic suppliers, are indirectly performing the role of an export tax. In his discussion of the case of the Cocoa Marketing Board in Ghana, Leith (1974) cites evidence which suggests that the short-run supply elasticities for cocoa are of the order of 0.15 to 0.20, while the corresponding long-run elasticities range from 0.71 to 1.0.

The above results draw on a large body of research in which agricultural supply response to price changes in general is evaluated. Much of this literature, a good recent example of which is Dowling and Jessadachatr (1979), is surveyed in Askari and Cummings (1977). The short-run and long-run supply elasticities (the latter are particularly important for perennials) of previous researchers are tabulated. The authors comment that there is an enormous range of elasticity estimates where, disturbingly, this range occurs not only across commodities but also within commodities. It is also notable that the majority of the long-run elasticity estimates cited are less than unity. This implies that substantial price incentives are needed to stimulate increases in output.

^{1/} As an aside, it should be noted that, even though the export tax distorts Thailand's production, there could be a net benefit to the economy. Thailand has market power in the world rice market and the net effect of the export tax with its concomitant reduction in the supply of rice is for Thailand to get a higher price for its rice exports than previously (c.f., Tolley, Thomas, and Wong (1982)).

3. Assessment

All of the above implies that investors do react to economic incentives and that, therefore, a tax based policy of incentives could have some role to play. However, the empirical results above also suggest that investment is influenced by a broad range of factors. These run the range from the existence of capital market imperfections due to financial repression as evidenced by the role of liquidity effects, to the existence of other distortions such as those associated with price support systems and marketing boards. The fact that Askari and Cummings (1977) reported such a broad range of supply elasticities may be due not to the vagaries of the econometric techniques employed but rather to the differing circumstances that farmers in different countries experience. For example, is the market for inputs free or regulated? If regulated, the observed supply elasticity might be lower.

All of this implies that it is very difficult to predict the effect of discrete changes in policy and, further, raises the possibility that the most productive route to increasing output may lie in the direction of removing existing impediments rather than of introducing tax based incentives.

V. Conclusions

Although the empirical literature examining the impact of tax policy on labor supply, savings, and investment leaves much to be desired, it nonetheless appears that changes in tax policies will have some effects. The behavior of these aggregates appears, however, to be determined as much by other elements such as the sophistication of financial intermediaries and the completeness of capital markets. Given the existence of widespread market failure in many developing countries, the impact of changes in tax policies may be quite difficult to predict as the costs associated with such changes are potentially large. This is not to deny that there may be circumstances in which most would agree on what would constitute useful tax reforms. The reduction of large export taxes comes to mind in this respect. However, it may be the case that a more promising supply-side approach might be one that also aims at alleviating the most obvious sources of market failure. This fact seems to have been appreciated by researchers who examine the economics of sharecropping structures and interlinked factor markets.

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