

ISSN 0015-1955

VOLKSKAS LIMITED

(REGISTERED COMMERCIAL BANK)

Head Office: PRETORIA, South Africa

FINANCE & TRADE

REVIEW

Vol. XIV No. 1 Published Biannually June, 1980

TABLE OF CONTENTS

ARTICLES	Page
1. Some issues in South African personal income tax reform	1
2. A Proposed method to quantify the possibleT impact pf alternative sectoral economic de velop- ment strategies on certain souo-economlc objectives	13

SOME ISSUES IN SOUTH AFRICAN PERSONAL
INCOME TAX REFORM

R. I. MIRRILEES

J. A. DOCKEU:

1. Introduction

Over the past few years considerable attention has been given to reforming the South African tax structure. Within this overall structure, many of the more contentious issues involve the personal income tax, and particularly the proper definition of its base. It is reasonable to expect that future reform in this area will follow the pattern in Western countries, where there is widespread agreement that current income tax structures can be improved by broadening their bases. This consensus is prompted by considerations of equity, and recent pronouncements by the South African revenue authorities also reveal concern with this goal of taxation. However, it is a well-established

tenet of economic theory that there is often a trade-off between equity and economic efficiency, and broadening the tax base could lower efficiency, particularly in a developing economy such as South Africa.

Ideally tax reform should aim to bring the prevailing tax structure more into line with some normative ideal, in which the trade-off between equity and efficiency is suitably resolved. Only by reference to a norm of this nature can each individual reform be properly designed and evaluated. Unfortunately as soon as a trade-off is involved no best choice is apparent, and there is a risk that proposals for tax reform will follow overseas trends without due regard to South African circumstances. On the other hand, proposals may be met by objections from interested parties that are empirically unfounded but intuitively plausible. We believe that the establishment of some normative target for tax reform in South Africa is a prerequisite to resolving these issues and an attempt has been made here to examine the features of an "ideal" personal income tax base and the extent to which a broad tax base is equitable and efficient.

Before we can continue, more precise definitions of the concepts equity and efficiency are needed. Equity is usually defined as the equal treatment of taxpayers in equal positions (horizontal equity) and suitable discrimination between taxpayers in unequal positions (vertical equity); the efficiency criterion demands that taxation should alter the market-determined allocation of resources as little as possible.

Overseas literature has tried to unify these two criteria coherently and take institutional constraints into account. This has resulted in a concept known as the comprehensive tax base. The overall thrust of this concept is to make the term income as wide as is administratively feasible for tax purposes, thus subjecting as many sources as possible to tax. (Department of Economics, UNISA, Pretoria.)

1) In this article we examine only the tax base, ignoring the other dimensions of the overall tax structure

a tax unit, assessment period, and progressivity. Many of the arguments that are often put forward

as constraints on reforms to the base originate in these other dimensions, (see, for example, Blum &

Kalven (1963)), but we believe that features of the other dimensions should not be accepted as

necessary constraints on tax base definition, and have generally ignored them.

2) In addition to equity and efficiency, simplicity is often put forward as a target of tax reform. but we

feel that it is more appropriately viewed as a constraint on the degree to which the equity and

efficiency principles can be followed, and consequently do not discuss it in detail.

of pet Nullllli economic potter to taxation as possible. The intuitite appeal of this definition

lies in the fact that if all sources of income are included in the tax base less room exists

for horizontal inequities and unintended resource misallocation will be reduced. It is to these issues that the ensuing discussion directs itself.

1 "W equityweflieieney tradcvnff in tax thmr)

An ideal tax base must balance equity against efficiency, but the two main branches of tax theory, ET and OT take different positions on this issue.

Advocates of equitable taxation place primary importance on horizontal equity and therefore insist that the tax base be broadened as far as possible within administrative

feasible limits. The starting point for their "ideal" income tax base is the Simons definition according to which income is seen as consumption plus increase in net wealth. Because of the constraints imposed by economic, political and administrative institutions, this ideal is unattainable. A derivative of the Simons definition of income

called the comprehensive tax base (CTB). has therefore been devised that is claimed to be the most equitable tax base possible?) The CTB-concept will lead to individuals with equal income being taxed equally, regardless of the source of this income or the use to which it is put. All possible sources of income should therefore be included in the tax base. but specific proposals as to what "income" should include differ, depending on the degree to which institutional constraints are considered binding. Among the suggestions are that:

(a) capital gains, gifts, and bequests should be treated as ordinary income, whether realized or not. provided that allowance is made for averaging and loss offset;

(b) corporate source income should be integrated into the individual income tax base. whether or not distribution occurs. which implies that a separate corporate income tax should be abolished;

(c) all imputed income, such as for instance housewives services, should be included in the tax base; and

(d) income should be defined in real terms, which calls for an adjustment for inflation.

Unfortunately although the CTB is specifically designed to meet the equity criterion. it fails to provide for the equal treatment of equals" unless equality is

interpreted in a rather narrow sense. As Feldstein (1976b) has shown, for horizontal equity to be meaningful one must assume that all individuals have the same tastes (identical utility functions) and differ only insofar as they possess different amounts of

a single homogeneous type of ability (single income source).7) As soon as it is recognized

that tastes differ and that different sources of income exist (such as labour income and

income from capital) horizontal equity is impossible and a "comprehensive" tax base cannot be unambiguously defined. Ambiguity leads to arbitrary distinctions and choices. and arbitrary distinctions and exemptions are the essence of horizontal inequity. The CTB therefore cannot claim to be equitable. In the real world where tastes and income sources differ complete equity is impossible.

In contrast to the supporters of ET. the proponents of optimal taxation theory consider the equity aspects of taxation to be secondary. and their primary concern is We follow Musgrave (1977) in distinguishing between equitable taxation theory (ET) and optimal

taxation theory (OT).

4) Stiglitz (1938),

5! Discussions of the CTB can be found in Mirrlees in Bittker et al. (1968). Goodhart (1976), Hatcher (1976).

(WW) and Klein (1976).

We are concerned here mainly with the horizontal dimension of equity. The vertical dimension is

less attractive - the latter base than by other facets of the total tax structure.

For example. individuals are assumed to derive differing levels of satisfaction from leisure, the

income which does not tax leisure - cannot be equitable.

t)

s.

with the economic efficiency of a tax system)) Although these theorists have provided useful insights they have so far been unable to apply their principles to complex real-world tax problems. They define efficiency by reference to Pareto optimality, but in these terms the only efficient tax is a head tax that cannot be avoided by a change in behaviour. By this criterion a comprehensive income tax is obviously inefficient, but a head tax is unacceptable on equity grounds as it totally overlooks the ability-to-pay principle. We would then find that neither ET nor OT with the equity-efficiency trade-off in any manner that is wholly convincing or suited to the requirements of practical tax reform?) and that this is at least partly due to the impractical terms in which especially

the latter variant is defined.

If absolute horizontal equity is unattainable, and an efficient tax (head tax) unacceptable, various possible tax bases and rate structures with different combinations of horizontal equity and efficiency can be viewed as competing alternatives. The CTB is only one of these, but it does have great value as a starting point for evaluating tax policy. Feldstein's criticism that the CTB cannot lead to horizontal equity¹⁰) can be interpreted as an attack on the traditional definition of equity in terms of equality rather than on the equity concept itself. Not only is some intuitive notion of equity widely supported, but evidence exists that when an income tax structure is perceived to be inequitable, taxpayer resistance and consequent erosion of the revenue yield can result. If the traditional definition of equity is discredited because it is unattainable

it should be redefined in more practical terms and not simply relegated to a lesser role in tax reform. In attempting a redefinition of this nature, it is helpful to recall that fairness may well be a better synonym for equity in this context than equality has proved to be. It is in this regard that the CTB proves attractive. It exhibits what we may term *perceived equity*¹¹ and while we stress the vagueness of this concept it cannot easily be dismissed. The CTB consequently forms the point of departure for the ensuing discussion, where we will concern ourselves mainly with exceptions that could or should be made before the CTB is adopted as a suitable norm of tax reform in South Africa.

3. Horizontal equity

The horizontal equity of the CTB has been questioned because the concept ignores, firstly, individual differences in tastes and endowments, and, secondly, the consumption of public goods. We have already pointed out that horizontal equity as it is normally interpreted cannot be achieved. Nevertheless, this criticism overlooks income's role as a proxy for personal welfare. A proxy variable such as income is needed because personal welfare, which is the true variable to be taxed,¹²) is unobservable and hence not measurable. If such factors as tastes, abilities and the satisfaction derived from work and available leisure were amenable to measurement, welfare could be taxed

8) See Bradford & Rosen (1976). and Sandmo (1976).

9) See Musgrave (1976).

10) Feldstein (1976b).

11) For a study of taxpayer resistance in Israel, see Ben-Porath & Bruno (1977). Vogel (1974) discusses the Swedish experience.

12) Apart from income, two alternative proxies for personal welfare are wealth and expenditure (consumption). We have concentrated on the income tax because of its universal popularity and the

maxim that "an old tax is a good tax". A wealth tax is, in any case, usually considered to be a

complement to the income tax rather than a substitute. An expenditure tax may be preferred to an

income tax on efficiency grounds, since under the former income from capital is not taxed, but an

income tax is preferable on equity grounds. The expenditure tax has the added disadvantage that it

is more expensive to administer, and less suited to developing countries such as South Africa (as

demonstrated by the experience of India and Ceylon) See Kelley (1970).

13) Despite occasional attempts to revive it, the benefit principle does not command sufficient support

as an alternative to the ability-to-pay principle to detain us here.

directly; to suggest that the proxy variable embrace features that cannot be included in the true variable is futile. The makeshift nature of the surrogate tax base must be acknowledged, and the definition of equity applied to it must be consistent with this limitation. It is consequently quite legitimate to apply the requirement of ltequal treatment of equalstl only to measurable economic power, and theexclusion of tastes, endowments, psychic income, or leisure does not weaken the validity of equity as a goal of income taxation, or of a tax base that excludes these factors as anormative target of reform.

The exclusion of public goods from the tax base has also been seen by some com-mentators as a source of inequity. A taxpayerls consumption of public goods contributes to his welfare in a manner completely analogous to private goods. It has consequently been argued that income must be defined to include this consumptionm In the case of many public sector activities, this reasoning would simply constitute a plea for the benefit principle of taxation, which we have dismissed as inappropriate. The benefits that can be legitimately excluded from the tax base on these grounds include those derive d

from the basic function of government, pure public goods characterized by nonappro-priability, and the so-called merit goods that society desires should be made available to all persons as a matter of principle. The benefits in other areas of government activi ty

are less general, but we must assume that such activities are only undertaken after the appropriate analysis of benefits and costs. If, in addition, user charges cannot be levie d

to finance particular activities, the inclusion of the benefits of these activities in th e defini-

tion of income is likely to be undesirable or simply infeasible. Fortunately, any resulta nt

inequity is likely to be insignificant, as the negotiation that is so essential to the po litical

process will tend to apportion the beneflts rather widely over the taxpaying population.

The legitimate limits on the definition of the tax base that we have discussed thus

far dealt with income as a surrogate for welfare. In addition to this role as proxy, inco me

is related to welfare in another way, because it is one of the latterls major constituent s.

This dual relationship blurs issues of income definition. because there is a temptation to tax a persons income regardless of whether or not it contributes to his welfare.

Personal tax structures have always excluded subsistence-level income groups from their attentions, and devoted particular consideration totaxpayersl non-discretionary expenses, such as necessary medical expenditures. This suggests that the proper target of dillerentiated taxation is not simply welfare, but rather ttsurplus" welfare over and above some socially desirable minimum. Clearly. welfare stems from net rather than gmss income, but is the dillierenee between these two aggregates determined solely by

the ttexpenses of earning income"? We believe that it is not. Income that is translated directly into an expenditure that the taxpayer cannot avoid does not appear to add to his t'welfzirell in the sense that the latter concept has when visualized as an appropria te

tax base. On this interpretation, non-discretionary expenses should be excluded from the tax base in the same way as the income-earning expenses usually catered for.

. _ Turning to discretionary expenses. i.e. expenditures which are willingly incurred, it is customary to permit Hsocially desirable" expenditures as offsets against tax liabil ity.

The objections most frequently raised to this procedure point to the progressive nature of the implicit government subsidy to taxpayers. and the failure to weigh these indirect publicexpenditures against the direct ones provided for by the fiscal budget. As these tw o

objections can be met where necessary by substituting tax credits for exemptions and compiling a tax expenditure budget for public scrutiny, there seems to be little remainin g

ObjCCll0ll to exploiting the convenience of the tax system to distribute these benefits.

14) See, for example, Aaron (1069). and Breton (1969).

To summarize, a definition of the personal income tax base that departs from the basic Simons (definition of income by ignoring (illiquidities, tastes and endowments, and excluding the consumption of public goods, is nevertheless compatible with the horizontal equity criterion interpreted in a less strict sense than usual. This criterion is also not necessarily infringed by the exclusion of non-discretionary expenses or socially desirable discretionary expenses.

The discussion thus clearly reflects the development of the "I'll" concept in the literature.

As yet, nothing explicit has been said about the relation between efficiency and the "Hi" and we turn now to a discussion of whether efficiency considerations should be allowed to erode this tax base.

4. Efficiency

All taxes other than a flat tax distort personal behaviour and are therefore inefficient. The efficiency criterion consequently requires rate structures to be devised that

minimize the effect of taxes on the supply of factors of production the supply-side disincentive effect.

The CTB has the advantage in this regard of spreading the tax burden as broadly as possible. A given amount of revenue can thus be collected with lower marginal tax rates than would be possible with a narrower base. If the supply elasticities of different

factors of production were equal, the (income) could consequently be expected to minimize (disincentive). But, of course, it is quite likely that these elasticities will differ.

An economically efficient tax system set to collect a given amount of revenue would then require that the (different) sources of income be identified, their supply elasticities determined, and the least effect on their supply imposed by taxing the inelastic sources at higher rates than the elastic sources."') The two major factors of production are labour and capital.

The question is therefore how to treat income from capital and labour respectively for income tax purposes.

4.1 Income from labour

An income tax reduces the net wage rate. This generates an income effect which increases work effort and a substitution effect which decreases work effort. A positively sloping supply curve implies that the substitution effect dominates while a backward sloping supply curve implies that the income effect dominates. The net effect will depend on how the taxpayers subject to the various income scales react. In general those at the upper end of the income scale have more flexibility in deciding the number of hours to be worked, but are motivated less by changes in net wages as other factors such as prestige and interest in work may dominate. Employees at the lower end of the scale have less flexibility in their work effort response but also face lower marginal rates.

The participation of married women as secondary income earners in the labour force is generally more wage elastic than that of primary income earners. Inadequate child care deductions and high marginal rates under joint returns lower the incentive to work. On efficiency grounds, based purely on the supply elasticity of labour, it would therefore be better to tax secondary earners at lower rates than primary earners. The equity argument, however, with special reference to the family unit, (15) It is clear that a proportional tax rate structure would have less disincentive effect than a progressive

one because the usual negative substitution effect is determined by marginal rates; while the income

effect is determined by average rates,

(16) Baumol and Bradford (1970).

(17) The substitution effect depends on the marginal rate of tax whereas the income effect depends on the

average rate. The marginal rate determines the net wage at the margin and (hence) the amount of

leisure for a unit addition to leisure.

may contradict this. The issue of the tax rate to be applied to married women is. however, part of the broader question of the appropriate tax unit. With the exception of the case of working wives, empirical studies on work effort have been unable to find clear evidence of disincentive effects. These studies have included the higher income groups, and these are the people likely to be most affected by increases in the tax base. The first major study by Breakwell surveyed 306 self-employed accountants and solicitors in England. Of these 77 per cent claimed that their work effort was not affected by taxation, while 13 per cent reported disincentive effects and 10 per cent incentive effects. This study was followed up in 1968 when 70 per cent claimed no effect. 18.9 per cent disincentive effects and 11.2 per cent positive incentive effects. These results hardly point to substantial disincentive effects for higher income groups. The results from studies of the lower and middle income brackets also indicate little influence of marginal tax rates on work effort. The available evidence consequently supports the view that the elasticity of the labour supply curve may be very low, and therefore the influence of taxation on labour supply should be minimal.

4.2 Income from capital

It would seem that this source of income can be less easily dealt with than was the case of labour income. This is so not only because income from capital takes various forms, but also because some forms of capital income are taxed partially under a different tax structure, namely, the corporate income tax system. In South Africa, additional problems arise because capital gains are not taxable and some forms of savings are treated more favourably than others.

The taxation of income from capital distorts the choice between present and future consumption. Most worrying is the fact that full taxation of income from capital might reduce the savings rate. In any developing country capital is a scarce resource and favourable treatment of capital income can be seen as part of a development policy.

The savings rate does not influence the long-run steady growth rate but it does influence the level of income. Over the short-run however the growth rate will accelerate above the long-run equilibrium rate as the economy moves from a lower to a higher savings rate. A more pragmatic view would be that the long-run is a series of short periods and in that sense increases in the savings rate do influence growth rates. It is significant that a survey of South African firms revealed that the availability of capital was considered to be a greater restraint on expansion than its cost.

It might thus be argued, on efficiency grounds, that only labour income should be taxed or, equivalently, that consumption should be used as a tax base. The arguments against the consumption tax base are mainly based on equity grounds (Breakwell 1974).

19)

20)

Fields and Stanbury (1971).

Everybody claims to know of people who have cut down on work effort due to high marginal rates.

Although one cannot deny that these cases exist they must in the light of available evidence be

considered the exception to the rule.

For a review of the empirical studies on this topic, see Institute for Fiscal Studies (1973) p. 24. and

Brown and Levin (1974).

This issue is discussed in most standard macro-economic texts,

Brown (1975).

The desirability and feasibility of a graduated consumption or expenditure tax is discussed in

Institute for Fiscal Studies (1978),

25)
26)
37)
28)
29)

because the exclusion of interest income from the tax base gives favourable treatment to the more wealthy. This is so because interest income accrues disproportionately to the wealthy. Feldstein (1978) also shows that it is only under a special condition that a tax on labour income will be efficient. This special condition is that the choice (marginal rate of substitution) between present and future consumption must be independent of the quantity of leisure consumed. This condition will seldom be met in practice.

Based on these arguments it would seem that no justification exists for excluding income from capital from the tax base. This income might, however, be subjected to more favourable treatment than labour income, but such treatment must be based solely on efficiency grounds and justified by empirical evidence that the favourable treatment does stimulate additional saving. Unfortunately, the available empirical evidence is ambiguous on this point, and the issues involved LIFO complex. Saving can be stimulated by a variety of policies, which vary in their influence on equity. The problem is to predict the effect of alternative policy packages accurately. While qualitative analyses of tax effects on saving abound, quantitative analyses are scarce and their results are inconclusive.

In 1978, South African gross domestic savings amounted to R10 539 million and consisted of private savings worth R1 866 million, company savings of R2 063 million, government savings of R1037 million and depreciation allowances of R5 573 million. As far as the personal income tax is concerned private savings are the major component to consider. Private savings however only constitute 18 per cent of the gross domestic savings. Income from private savings consists mainly of the proceeds of savings accounts with deposit-taking organizations such as building societies and commercial banks, and the Post Office Savings Deposits, defence bonus bonds, institutional savings such as life insurance and annuities and dividend receipts.

In terms of the previously stated efficiency principle, the optimal taxation of these sources of capital income requires a knowledge of their supply elasticities. One should therefore know the interest elasticity of household savings. The traditional view, known as 'Denison's Law', assumes that the savings rate is essentially constant and unaffected by changes in the tax system or other changes in the real after-tax rate of return on capital. This view has lately increasingly been challenged. Since an income tax both decreases the after-tax rate of return on capital and transfers resources from the private to the public sector, the national savings rate and capital-labour ratio can be affected. If saving increases positively with increases in the rate of return, and the public propensity to save falls short of the private propensity to save, an income tax will retard capital accumulation. In a capital-scarce economy this might have considerable efficiency effects. In the long-run it would seem that if the supply elasticity of saving is greater

than that of labour, a case can be made on efficiency grounds for a lower tax rate. For a comprehensive discussion of these issues, see Musgrave and Lipton (1970).

See Hall R. E. and Jorgenson D. W. Application of the Hotelling rule to the depletion of non-renewable resources. *Journal of Political Economy* 79 (1971).

Fromm (1971) for a list of references.

See for example the studies in Fromm (1971).

Boskin (1978).

Franzsen (1979) suggests that the investment incentive provided by the tax system may serve to stimulate capital intensity in the South African economy. It seems reasonable to believe

that favouring capital income relative to labour income in the personal tax structure could have similar repercussions by making capital acquisition cheaper. On the other hand, studies by Broms

(1975) reveals that the factor-price ratio has little influence on capital intensity in the South African economy because local technology is largely imported.

on the former. This view can be tempered if it is felt that interest income accrues mainly to the wealthy, in which case the effective tax rate on Interest income can be increased as one moves upward on the income scale (through the use of diminishing exemption levels).

A second issue in the taxation of income from capital as far as the income tax is concerned is the influence of the differential treatment of sources of capital income on resource allocation. Under the South African tax laws most interest income is taxable, although subscription shares and special indefinite-period shares in Building Societies are tax exempt; interest on savings with the Post Office is fully or partially exempt; and interest from Defence Bonus Bonds, 8 per cent and 7 per cent Treasury Bonds. Premium Bonds. second series Premium Bonds and 6 per cent Treasury Bonds (conversion issues) is tax exempt. Premiums on life insurance policies are subject to an abatement, and contributions to pension funds and annuities are tax exempt on payment, while lump-sum benefits received under these schemes upon retirement are also treated favourably.

Clearly, treating these income sources more favourably than other forms of saving must have allocational effects and therefore efficiency costs. It is also evident that these forms of savings are considered socially desirable. No clear evaluation of this aspect is possible unless some sort of implicit or explicit cost-benefit calculation is made of the various alternative means of obtaining the desired objectives.

4.2.1 Taxation of dividends

30)

31)

This is an area of considerable controversy since corporate profits are taxed in the hands of companies while the profits distributed to the individual shareholder are again taxable. In a sense, the argument of double taxation in this case is a valid one.³¹⁾ In South Africa this argument is countered by allowing (at least) a 33% per cent deduction of personal dividend income to compensate for its taxation at the corporate level. A further benefit that must be kept in mind is that the capital appreciation of shares is not taxed.

Some authorities feel so strongly about the double taxation argument that they would prefer to tax all corporate income as if it were in the hands of the shareholders. Using this procedure, this source of revenue can be taxed at the same rate as other sources. The integration of the personal and company income taxes has been extensively debated in the literature on the Comprehensive Tax Base, where the conclusion has usually been that integration is essential for equity purposes. Equity in this context is determined by the complex relationship between the normal personal tax, the company tax, and the capital gains tax.

If the issue is simplified by assuming that capital gains are treated correctly (we discuss this issue below) and complemented by a retained profits tax, then the attractiveness of integration will depend on the position taken on the equity-efficiency trade-off. In advocating integration, the CTB proponents are led by principles of equity: as we have pointed out above, however, this literature is generally less sympathetic to the efficiency criterion than we believe is warranted. The extent and significance of the inefficiency introduced by these measures is a subject for empirical

analysis. Both supply and demand conditions need to be examined and this lies outside the

scope of this article. But it is no longer adequate to assume - as we can at the aggregate level -

that supply must be stimulated. The appropriate frame of analysis is income taxation with in the

context of the entire capital market. If incentives for saving are to be allowed at all, they should

be focused on the most interest elastic types of desirable saving.

An opposing argument is that a separate company tax is justified because the benefits of the incorporated

form of business undertaking are conferred and protected by the state.

in South Africa. If we are prepared to tax income from capital at preferential rates, integration becomes less attractive.

In 1969, the Franzsen Commission rejected integration on the grounds of administrative feasibility, but it is likely that administrative capacity will have changed over the intervening 10 years. A more significant argument is that integration will not permit the abolition of the company income tax, which will still be required in order to prevent widespread opportunities for tax avoidance. The advantage of integration is thus merely that it allows better synchronization between the rates at which capital and other income is taxed than is possible with the present system, but this is hardly a pressing matter if we are prepared to accept the argument based on efficiency grounds and tax capital income more leniently anyway. Integration does not, therefore, appear at present to offer benefits warranting the requisite investment of additional administrative resources. It would entail a radical change of tax laws and, if necessary, the issue of double taxation can be more easily relieved by devising appropriate schemes for exempting a portion of dividend income from tax liability.

4.2.2 Capital gains taxation

Since taxpaying capacity is measured by consumption plus additions to wealth, all capital gains, whether expected or unexpected, realized or unrealized, regular or fluctuating, should be part of the tax base. From an equity point of view there can be no objection to this statement. With no capital gains tax there exists a strong motive to receive capital income in preference to operating profits in the form of dividends or interest. This incentive will increase as one moves into higher tax brackets. Different tax liabilities will result at given levels of income, and vertical equity will be affected because tax progressivity will also be influenced.

In implementing the equity principle where capital gains are concerned, one is confronted by two issues: That of realized gains³²⁾ and that of unrealized gains. Realized gains should be taxed at ordinary rates; to cater for the volatility that might apply to this income source an averaging procedure could be used.³³⁾

The taxation of unrealized gains is problematical, as it might imply a tax liability which cannot be paid because the individual lacks the necessary cash. On equity grounds this source cannot be exempted since it represents an increase in economic capacity. The taxation of only realized gains would be unfair and inefficient, and discourage the selling and re-investment of assets in the so-called locked-in effect. No locked-in effect would occur if accurate annual evaluation of assets were possible. Some assets, such as quoted shares, are amenable to periodic evaluation while others, such as works of art, are not. The most direct way out of this problem is to tax accrued gains at the time of death or upon transfer if they were realized at that time. If averaging is allowed for, the locked-in effect would be reduced greatly.

The case for taxing capital gains rests heavily on the equity principle. Are there efficiency arguments that point towards not taxing capital gains? Clearly if not taxing capital gains results in an increase in risk-taking and risk-taking in turn leads to higher rates of return, a higher growth rate will result. This is by no means an unchallenged point of view³⁴⁾. Furthermore, even if increased growth were substantial, the exemption of capital gains from the tax base would be a very

32) Gains which result from the sale of assets other than those held in the ordinary conduct of business,

33) Some adjustment procedure for inflation will also be needed. See Brinner (1973).

34) Feldstein (1969).

arbitrary way of stimulating it. Many forms of capital gains are also unconnected with economic growth: Activities such as land speculation, buying art. coins. precious stones, etcetera are examples. One could devise more direct and effective incentive measures to enhance the risking of investment in new products and processes which are essential for growth.

5. Tax reform in W

The South African tax system is well established and its advantages as well as disadvantages are institutionalized. In these Circumstances it is difficult to talk about aspects of optimal tax design as such and the question of tax reform is much more important. One is therefore more concerned with the movement from an existing situation towards a preferred system. No formal derivation of the optimal speed or path of adjustment will be discussed here¹) and we will concentrate instead on the more practical

aspects. It must be realized that frequent fundamental changes in tax structure (or threat of such action) increase uncertainty. and will thus obviously influence economic efficiency. The expectation of future tax change distorts current behaviour without even the offsetting benefit to the government of an increase in tax revenue. The general rule as far as tax changes are concerned is therefore that they should be kept to a minimum, thereby also keeping uncertainty to a minimum.

A different kind of horizontal inequity also occurs with tax changes. On the basis of existing laws, individuals make commitments that cannot be changed costlessly. If they are forced to sell assets due to a tax change capital losses might be incurred. and individuals

who were equally well off before a tax change may not be so after the change. Many examples of this come to mind. A sudden taxation of housing subsidies will imply a capital loss. The sudden introduction of a capital gains tax will affect share prices detrimentally: such a measure will imply an unfair capital loss for people who happen to hold their wealth in this form rather than in other assets. In perfectly operating markets and in the long-term. apparent tax advantages are offset by differences in wage rates or asset values. But in the short run a change in tax rules will affect different individuals differently. Optimal tax reform would therefore require a balancing of this kind of horizontal inequity against increases in efficiency and the unequal treatment of equals" kind of equity.

The obvious. but at the same time most difficult to implement. way of dealing with losses occasioned by legislative changes would be to compensate the losers. Fringe benefit taxation can be dealt with in this way. Arbitrary losses due to tax law changes can

also be avoided by enacting the changes with delayed effective dates. The delayed effective dates might be fairly far into the future (say. 10 years). In this way arbitrary losses can be reduced. The postponement of tax law change will lower the present value of an individual's capital losses. The taxation of capital gains, for instance will cause capital losses but these will be reduced by the postponement of the effective date and people will have ample time to adjust their actions and redirect their flow of resources in the required direction.

6. Conclusion

. This article set out to examine the merits of a tax base that is as broad as possible. since it has been argued that this will best serve the equity criterion. Equity. it was seen.

is an ambiguous concept, especially it touches different areas and more than one income source are concerned. Furthermore. equity is not the only criterion for the evaluation of a tax system. A comprehensive discussion of the relationship between tax reform and tax design. see Feldstein

1) a .

3(1) See Guesnerie (1977).

system. Efficiency must be considered and the efficiency criterion does not necessarily imply that different sources of income be taxed at the same rate. A trade-off between efficiency and equity must therefore be acknowledged. Any tax change will have to be dealt with via a cost-benefit approach: implicitly or explicitly one will have to decide whether the gain in terms of, for example, equity is enough to compensate for the loss in efficiency.

Finally, the influence of a changing tax law on individuals in different positions was considered. It is clear that frequent tax law changes are counter-productive. If, after careful evaluation, it is decided that laws must be changed, this should be done gradually

so that those affected have enough time to adjust to the new conditions.

Our analysis has certain implications for the South African income tax system. In terms of efforts to broaden the tax base the South African authorities must be commended on their performance over the last two years. The substitution of credits in place of deductions is a significant improvement on the previous regressive nature of the treatment of non-discretionary expenses. Of even greater significance are the moves currently being envisaged to include fringe benefits in the tax base. This inclusion clearly implies greater

equity, while based on our analysis its efficiency effects in terms of reducing work effort are likely to be negligible. One must however point out that any legislative changes of this magnitude should not be introduced immediately. It would be preferable to enact the envisaged legislation with an effective date that lies in the future. This will allow the

gradual adjustment of remuneration packages in accordance with such legislation.

While the present tax base shows numerous departures from the rigid comprehensive tax base (CTB) — mainly with regard to imputed income, gifts and inheritances — we find these departures to be relatively benign. Especially with respect to imputed income, the measurement and administrative problems might be of such a nature that inequities caused by these exclusions from the base cannot be eliminated.

A major exception to the generally satisfactory nature of the current tax base is the treatment of income from capital. We have discussed the need for empirical evidence in order to judge the need for the more lenient treatment of income from capital for efficiency reasons. In the absence of unambiguous evidence on this matter, we are inclined

to feel that in the case of a developing country such as South Africa priority should be given to capital accumulation and that lenient treatment should therefore be continued. However, the current pattern of this treatment seems dubious. The total exemption of capital gains in particular seems to be unwarranted on equity grounds and also to have questionable allocation (efficiency) effects. Specific proposals as to how this shortcoming

should be eliminated are not considered here. Here we concentrated on the individual income tax and consideration of the overall treatment of the taxation of income from capital lies outside this framework, as it is only with reference to the total capital market

that it can be evaluated. It is however felt that any drastic changes should once again be enacted with a postponed effective date (perhaps as long as 10 years) in order to minimize capital losses by market participants who will thereby be able to adjust to the proposed changes.

REFERENCES

AARON, H. 1969. What is a comprehensive tax base anyway? National Tax Journal. Vol. 22. No. 4, p. 543-549.

BAUHOL, W. J. and BRADFORD, D. 1970. Optimal departures from marginal cost pricing. American Economic Review, Vol. 60(1). 265-283.

BEX-PORATH, Y. 8: BRUNO, M. 1977. The political economy of a tax reform. International Tax and Finance, Vol. 7, p. 205-307.

BITTKER, B. 1: CALVIN, C. O., MUSGRAVE, R. A. & PINKNEY, J. A. 1968. A comprehensive microeconomic

debate. Branford, Conn: Federal Tax Press.

BLUM, W. J. & KALVEN, H. 1963. The uneasy case for progressive taxation. Chicago: University of Chicago Press.

BOSKIN, M. J. (1978) Taxation, saving and the rate of interest. *Journal of Political Economy*, Vol. 86, p. 53-527.

BRADFORD, J. F. & ROSEN, H. S. 1976. The optimal taxation of commodities and income. *American Economic Review*, Vol. 66, No. 2, p. 94-101.

BREAR, G. F. The incidence and economic effects of taxation, in Blinder, A.S., et al. 1974. *The Economics of Public Finance*. Washington D.C.: Brookings.

BRINNFELDER, R. E. 1973. Inflation, deferral, and the neutral taxation of capital gains. *National Tax Journal*, Vol. 24, p. 123-130.

BRIANTON, A. 1969. Some problems of major tax reforms. *National Tax Journal*, Vol. 22, No. 1, p. 154-163.

BROWN, R. P. C. 1975. *The determinants of changes in capital intensity in the South African manufacturing sector*. Unpublished M. Com. dissertation. University of Natal.

BROWN, C. V. and LEVIN, E. 1974. The effects of income taxation on overtime: The results of a national survey. *The Economic Journal*, Vol. 84, p. 833-848.

FELDSTEIN, M. 1976a. Compensation in tax reform. *National Tax Journal*, Vol. 29, No. 2, p. 123-130.

FELDSTEIN, M. 1976b. On the theory of tax reform. *Journal of Public Economics*, Vol. 6, p. 77-104.

FELDSTEIN, M. 1975. The welfare cost of capital income taxation. *Journal of Political Economy*, Vol. 86, p. 529-551.

FIELDS, D. B. & STANBURY, W. T. 1971. Income taxes and incentives to work: Some additional empirical evidence. *American Economic Review*, Vol. 61, p. 435-443.

FRANZSEN, D. G. 1979. *Aansporing van investering en besparing door middel van belastinguitgaves*. Survey of Economics and Econometrics, No. 6, p. 3-9.

FROMM, G. 1971. Tax incentives and capital spending. Washington DC: Brookings.

GOODE, R. 1976. The individual income tax. Washington D.C.: Brookings.

GUESNERIE, R. 1977. On the direction of tax reform. *Journal of Public Economics*, Vol. 7, p. 179-202.

HARBERGER, A. C. 1969. In defence of Carter: a personal over-view. *National Tax Journal*, Vol. 22, No. 1, p. 14-177.

INSTITUTE FOR FISCAL STUDIES. 1978. The structure and reform of direct taxation, (Meade Report.) London: George Allen & Unwin.

KELLEY, P. L. 1970. Is an expenditure tax feasible? *National Tax Journal*, Vol. 23, No. 3, p. 237-253.

KLEIBER, W. A. 1976. Policy analysis of the federal income tax: text and readings. Mineola, New York: The Foundation Press.

MUSCHAYLZ, R. A. 1963. Effects of tax policy on private capital formation. Commission of Money and Credit. Fiscal and monetary management policies. Englewood Cliffs, N.J.: Prentice-Hall.

MUSGRAVE, R. A. 1976. ET, OT and SBT. *Journal of Public Economics*, Vol. 6, p. 3-16.

SANDMO, A. 1976. Optimal taxation. *Journal of Public Economics*, Vol. 6, p. 37-54.

S.A. Reserve Bank, Quarterly Bulletin. Pretoria.

SIMONS, H. C. 1938. *Personal income taxation*. Chicago: University of Chicago Press.

VANFEL, J. 1974. Taxation and public opinion in Sweden: an interpretation of recent survey data. *National Tax Journal*, Vol. 27, No. 4, p. 499-513.

A PROPOSED METHOD TO QUANTIFY THE POSSIBLE
IMPACT OF ALTERNATIVE SECTORAL ECONOMIC
DEVELOPMENT STRATEGIES ON CERTAIN
SOCIO-ECONOMIC OBJECTIVES

D. Mullins and CF. Scheepers;k

The appropriateness of alternative economic strategies can be properly assessed only if they can be evaluated in terms of whether the various economic objectives that are implied by such strategies and that are implicitly or explicitly embodied in a country's

overall economic policy are realised or not. In view of the multiplicity of national economic objectives which there may be in a mixed economy and for which government is basically responsible, there is usually no single economic strategy that has an absolute advantage over others in regard to the achievement of all economic objectives. This is the old and well-known policy problem: in the economic field the pursuit of certain objectives often militates against achievement of others, especially in the short term. The necessity for a properly founded strategy and for certain policy objectives and policy priorities to be based on such a strategy speaks for itself in a situation of limited

national resources. Until now researchers have devoted a great deal of attention to the development of macro-economic models by means of which the effects of alternative policy strategies can be quantified. In this way it has been possible to test the efficacy of

certain measures for the achievement of stated objectives.

Relatively little research has been done to date on the reconcilability of specific overall economic policy objectives with the ability of the various sectors in the economy to give effect to them. In the nature of things this is a far broader subject and far more

difficult to embody in a quantifiable form or model. The introduction of the input-output table by W. Leontief¹⁾ was an important breakthrough in the endeavour to develop such an analytical instrument since it not only reflects the technical relationships of raw

materials and production factors in the production process quantitatively but also reflects the inter-dependence of the various sectors within the economic system. The input-output table in its formal or mathematical form accordingly opened the way for sectoral analyses within the framework of the national accounts. Not only does this table in both its original and its technical coefficient form provide a detailed picture of

the economic structure of a country, but in its model form it can be used to quantify important economic relationships at the sectoral level in such a way that they can be reconciled with the macroanalyses conducted by means of econometric models.

Both authors are attached to the Economic Planning Branch of the Office of the Prime Minister,

Private Bag X455, Pretoria, 0001. The contents of this article are the responsibility of the authors

and do not necessarily represent the views of their employer. The authors would like to thank

Mr. C. van der Merwe and Miss A. S. Ferreim for their contribution to the article.

1) Leontief, W. L.: "Quantitative Input and Output Relations in the Economic System of the United

States", The Review of Economics and Statistics, Vol. XVIII, August 1936. pp 105-125.

Apart from the Economic Development Programme for the Republic of South Africa which was the first attempt in South Africa to use the input-output model for purposes of analysis, various other research projects using this model have been launched since. For example, T. A. du Plessis¹ and C. F. Scheepers² used the model for divergent reasons to establish certain growth determinants in the South African economy. The former quantified various growth factors to demonstrate how they were manifested at the sectoral level. Scheepers on the other hand used the method to determine the total effect the import replacement process which has been and still is a very important source of growth in South Africa had on the balance of payments by, in particular, highlighting the direct import leakage element as well as the indirect effect on imports. Other studies in which the input-output model was used are those of S. J. P. Du Plessis³ and D. Mullins⁴.

TABLE 1 --THE INPUT-OUTPUT TABLEU

Outputs 1 Intermediate Final demzmd/ Total
demand/outputs outputs gross outputs

Inputs i l j m 1 (i (3 i s 1 15

g / Xii .Yii Xim C1 Gt 1 ii i SI 1 E1 Xi

a i . i . 1

5 1 QUADRANT 1 1 QUADRANT II i

4) i _ _ t 1

.E i I. X11 .ij .Yim i (1 ! 01 i Ii 1 Si 1 Ei i X1

'0 1 1 i

Q) t . i 1

E i

23 t i

E 1 H i an an xnm i C11 1 On In 1 L n 1 En i X11

A 1 W _ 1 7, , , i, _ _ 7 Ae,A 7 W iv, L i 7

i 1 1

m i W W1 W j Wm WC W(W 1 W x 1 Vt/h hV

E4 T Ti Tj Tm T(i Tu Ti Ts i T1 T

r- t 1

:3 P i P1 Pj Pm Pp I P(. P1 J P8 1 PE 1 P

E ; i i i i 1

E ! M M1 Mj Mm j MC MG 1 MI 1 Ms 1 ME i M

i t 1

QUADRANT III 1 QUADRANT IV

Total 3 t 1 1 1

Gross 1 X1 X1 Xm C 1 G 1 1 s 1 E 1 2

Inputs 1 1 t

i i i I

where:

X ,: (Xij) W: intermediate production How matrix (transaction table with .m
the sales of sector 1' t0 sectorj); 1

with i : 1 n

j : I m

4i : Ci #57 Gi Wt 11 4r Si 1 E1 "7 sales ofsector i to final demand: 2

with Ci 2 final sales /Outputs of sector 1' to households:

G; it- current purchases /inputs by government from sector 1':

li w-r that part of total gross fixed investment produced by sector i (N.B.: this is
not a fixed investment in sector 1' itself) or. in other Words. sales /outputs
by the various industrial sectors that are regarded as capital goods;

Si i change in the inventory levels throughout the economy of the products of
sector 1' during the period to which the table relates:

1) The input-output table as set out here symbolically dichrs from the available South Af
rican input-

output tabla in that imports are shown as a row vector zmd not as a negative final demand
com-

ponent. For the reasons why the South African ianit-output tables cannot be used for this
study

in their normal form and also for the method folloxxed in converting the Iziblcs. see Mul
lins. 1):.

Op cit. pp 904);

15

E_1 2 exports of sector 1':
 m
 X_i .; Z (x_{ij} Jr F_1) :2 total production /outputs of sector i ; 3
 $j::1$ ' . '
 Y_j 'lr M_j :: W_j 74A T_j P_j M_j : purchases by sector j of primary inputs
 and intermediate imports; 4
 where Y_j :: W_1 -!- T_j 7-1- P_j
 with W_j remuneration of employees in sector j ;
 T_j 2 net indirect tax paid by sector j ;
 P_j gross operating surplus (before tax) of sector j ;
 M_j - , intermediate imports by sector j ;
 H
 X_i 2 (x_i ; Y_j jfe M_i) gross inputs of sector j ; 5
 '21 m
 According to equation 3. however, X_j (ifi j) also equals 2 (X_{ij} -1- F_1)
 $1:1$
 n m
 X (X_{11} ole Y_j __I_ M_i) '7: E (X_{11} 4' h)
 $1':1$ 11:1
 Gross inputs/production ,: Gross outputs /production.
 1.1 Direct linkage
 The activities of a sector j have a direct effective on sector i . where the latter is
 linked to the former in its production process as the supplier of inputs in the form of
 raw materials and/or services. The extent to which any sector will be affected by the lev
 el
 of production activities in seetor j will depend. on the one hand. on whether j makes any
 use at all of intermediary inputs and, on the other. on the structure of the demand for
 intermediate inputs purchased, e.g. whether this demand is concentrated on one specific
 product or is spread over a wide range of such inputs. The causes of a specific input
 structure are not easy to determine. although it can be stated with a fair degree of cert
 ainty
 that technological factors, the size of the market, labourr'capital cost ratios and so fo
 rth
 are of decisive importance in this connection. The total interaction, that is to say view
 ed
 from both the input and the output side. of industries can be summarised in the so-
 culled transaction table of the input-output table (see equation I.) From this it is also
 possible to deduce a so-ealled technical eoemcient matrix which summarises the structure
 of this interaction quantitatively as viewed from the input side. The technical coefficie
 nt
 matrix (viewed according to columns) then represents the economic-technical input
 structure determined by the production processes of various sectors. For a specific
 sector j the direct intermediate inputs from other sectors are expressed quantitatively
 as follows in relation to sector j 's own total production:
 X_{ij}
 $7_$ (In- Where ($1'$ 1 n): 6
 X_i
 with $.Y_{ij}$ purchases by sector j from sector i :
 $X_{,-}$ total outputs /production of sector $_$ /:
 . By dividing each elentent in each column of the transaction table by its correspond-
 ing production, new matrix A containing technical coeliicients is obtained;
 16

The elements of the Leontief inverse matrix have great value for economic analysis, like the elements of the technical coefficient matrix. The inverse of the technical coefficient matrix, $(I - A)^{-1}$, is expressed as follows:

```
r11 rlm
. . n
7'11 . rim (1 1
- (i z 1 . m)
ruj rum ..... 8
```

Each element m of this Leontief inverse matrix viewed on a columnar basis provides a quantitative criterion for the total backward linkage, i.e. the total direct and indirect

inputs required by specific sectors from other sectors to make a production increase of one round or one unit possible. This criterion is known as the industry multiplier and has great potential for analytical purposes which are dealt with in more detail below.

1.3 The Industry Multiplier Concept

The simplest industry multiplier that can now be calculated directly, deduced from equation 8, is the so-called production or output multiplier. This industry multiplier is equal to the direct and indirect impact on production throughout the economy following a unit change in the physical production level of a particular sector. The multiplier for a particular industry (say j) can be calculated as follows:

Output multiplier for sector j : 2 rij : 9
with $r11$ as in equation 8.

As has been said, the fact that the input-output table is linked with the national accounts as well as with other important economic magnitudes makes it possible to determine a wide variety of direct relationships between them. What was dealt with above, for instance, was intersectoral production relationships. It is relatively easy to expand the sectoral multiplier concept from, say, the production level to, for instance, labour or income on the basis of the relationships that there are between production and these economic magnitudes on a sectoral basis.

Certain of these relationships are already clear from the analysis of quadrant III of the input-output table (Table I) and also from equations 1-6 where the purchases of certain primary inputs bear a direct relationship to total purchases or production value for the industry. With the aid of this direct relationship between primary inputs, raw materials, imports etc. and production per sector the technical input coefficient matrix

can be used via the ordinary Leontief inverse in terms of production by means of a simple cross-multiplication step so that the direct and indirect impact on these magnitudes of changing production levels in specific sectors can be quantified. In multiplier terms, this is

1) The development of industry multipliers is based mainly on the pioneering work of Moore, F. J.

and Petersen, J. W.: "Regional Analysis: An interindustry model of Utah", The Review of Economics and Statistics

Vol. XXXVIII November 1955, pp 368-383, and the later contributions by Hirsch,

W. Z.: "Interindustry Relations of a Metropolitan Area", The Review of Economics and Statistics,

Vol. XII, November 1959, pp 360-369, and Miernyk, W. H.: Impact of the Space Programme on

a Local Economy, West Virginia University Library Press, Morgantown, 1967, pp 104-117.

means that it is possible to establish what the total effect on the demand for primary inputs, imports etc. will be if a specific sector's production increases by say one unit or

R1, regardless of course of what caused the initial increase in production. Later in the explanation of the model it will be shown how certain exogenous changes in the final demand can be linked to the multipliers as primary growth determinants with special reference to the process of import replacement and export promotion. As an illustration, the calculation of three kinds of industry multipliers is shown below, namely:

industry income,

industry employment, and

industry capital multipliers.

(a) Industry income multiplier for sector j

n Y1
: 2 r1; 10
1'21 Xi

where:

r1, - 2 an element in the Leontief inverse;

Yi 2 Wi -i- T; -'r P1 2 an element in the row vector of the added value vector;

Xi 2 outputs /production of sector 1';

and the industry income leakage multiplier for sector j

n Y1
: 1 2- Zrij. ; 11
1'21 X

(b) Industry employment multiplier for sector j

n I);
:- 2 r1; .--; 12
1'21 Xi

where:

rjj 2 an element in the Leontief inverse;

b1 2 net incremental change in labour in sector i ;

X1 2 production /Outputs of sector 1';

(0) Industry capital multiplier for sector j

11 k1
-. E r11 .#; 13
it1 Xi

where:

m 2 an element in the Leontief inverse;

k1 2 net incremental change in capital in sector i :

Xi 2 production /outputs change in sector 1'.

1) The multipliers shown here are average ratios. The use of mean ratios is acceptable in comparative-

statistical analysis but may cause problems in dynamic analysis. For instance, so far as the incme

and capital multipliers are concerned, it is necessary to use incremental ratios when short to medium

term projections are made of the course of economic developments at a sectorial level. This is at

any rate the simplest method of allowing for dynamic elements in the economic growth process

the multipliers.

2. The Model

As has been said. it is now possible. after determining the industry multiplier relationship in terms of the input-output model, to link it with the various growth stimulants deriving from the final demand so that its effect on, for example, economic growth in general but also the sectoral structure can be determined quantitatively. This method or model is fundamental to the Economic Development Programme for South Africa. which is based on the assumption that a certain final sectoral demand structure for goods and services will result in a particular sectoral supply structure of goods and

services as well as a certain demand for labour and capital. The basic national accounts equation or identity on which the model is based is as shown in equation 7, namely:

$$X = (I - A)^{-1} \cdot F$$
 14

where:

F : final demand vector.

In this form, therefore, it is not a closed model but is nevertheless capable of quantifying the effect of alternative development strategies on the economy on a partial basis and of bringing out the expected contributions of sectors to economic objectives by means of multipliers!

The main assumptions underlying the model are that it reflects a situation of equilibrium in the economy in which the existing production capacity is fully utilised and that there is a given comparative situation vis-à-vis other countries. The model can now be used, for instance, to estimate how a given amount of capital can be used in the various sectors of the economy to maximise certain economic objectives such as employment, the generation of income, etc. The method used to quantify the effect on the various economic objectives is, first, to determine what change there will be in the production of the various Sectors (equation 15.) if a specific industrial strategy. e.g. export

promotion or import replacement, is followed and this. in turn. leads to the available capital being allocated to the various sectors in a particular way. and not necessarily to all sectors.

15

Production change : $\Delta x_i = \sum_j (a_{ij} / (1 - a_{ii})) \cdot \Delta x_j$ 15

where:

a_{ij} :

a_{ij} : capital/yield ratio of sector i :

x_i

x_i

and $\sum_j (a_{ij} / (1 - a_{ii})) \cdot x_j$ (total capital available for investment)

x_j

(x_j where $j = 1, \dots, n$. is a vector of capital expenditure allocated according to sectors in the light of the particular strategy chosen, ie. whether the objectives are to be achieved

through import replacement or export promotion or both. For purposes of definition this vector is accepted as given. In practice there are various methods of calculating such

it vector. (This is discussed in detail in section 3.2) It is also important to note that this

method does not mean that the initial investment effect on the economy is also taken into account. The results of the model relate only to the effect on the economy of the operation of businesses within certain sectors. If it is intended to quantify the initial impact of investment too. more information about the capital structure of each sector will have to be collected.

1) It is possible to construct the model in a closed form. but at great deal of additional research in

this connection is required. In particular, It will be necessary to link a macro-growth model func-

tion to the input-output table to make the input-output table more dynamic.

The second step in the calculation is to determine what the effect of the production changes in the various sectors. as calculated in equation 15.. will be on income (equation

16.), imports (equation 17.) and employment (equation 18.) in total.

m-in "7:53:11)1 Y1

lncomc change :: Z ng : E ((Em .-). A_Xj); 16

j: 12:1 i:-1 Xi

mgn mg." II VI

Income leakage effect ,: Z ('i-er ____ . 4le W 2; ((1 ._,(2. m. -)). Lv.X,-);. . . . 17

j':1 j :1 irrl Xi

mgrz mgn n bi

Employment change 2 E Abj : Z ((E ru._). AXj); 18

j: jzl 2'21 X1

3. Practical application of the model in respect of South Africa

The problem of the optimisation of scarce production factors vis-h-vix various economic objectives may be approached from two policy points of view. The first is that a policy involving more direct intervention by the authorities is assumed and that direct control is applied to the development of the various sectors of the national economy. To a large extent the principles of the market mechanism are discarded since high priority is given in the development strategy by government to certain sectors which, according to certain norms, can realise particular economic objectives more efficiently than others so that they are blatantly favoured over other sectors. The second

possible approach, which accords better with practices in a Western economy, is to follow a policy involving more indirect intervention by government in the operation of the economic system. This approach is far more general and is not aimed so much at specific sectors; the market mechanism is allowed to exercise the function of selection itself so that scarce production factors are channelled to specific applications to achieve certain economic objectives. The sectoral development pattern that flows from this is not therefore the product of a deliberate sectoral development policy, but merely a consequence.

3.1 Sectoral multiplier analysis in respect of South Africa

We proceed now to estimating the possible impact of the changes in production levels in the various sectors on certain national economic objectives in accordance with the theory of industry multipliers as set forth in section 1.3. For purposes of this article

the results are discussed only on the basis of major sectors¹).

The most important information is presented in Table 22). This table shows, among other things, how additions to the capital supply and the labour force in the various major sectors of the economy lead to additional production and the generation of income as well as the degree of backward interaction resulting from the expansion of production in the various sectors and specifically the degree of dependence on imported goods and services. Columns 1 to 3 of Table 2 contain the traditional incremental capital

income and labour production ratios, that is to say the ratios that apply if the interdependence of the various sectors of the economy is left out of account. Column 3 shows, for example, the extent to which the labour requirements of a particular sector increase as the result of a unit increase in the production of the sector concerned.

1) Department of Statistics: Input-Output Tables. 1975, Report No. 097716703, Government Printer,

Pretoria, 1977, was used as the basis for the calculations. , a .

2) Appendix I shows, on exactly the same basis as Table 2, incremental relationships for the sub

sectors of the economy.

TABLE 2: MAJOR SECTOR MULTIPLIERS FOR THE SOUTH AFRICAN ECONOMY

Seem r

Manufacturing)

Electricity, gas and waterlf

Constructionl)

C ommercel)

cation

Services

Incre- ,

mentaI 1

capital

yield ratio

(Direct)

gCapital ' ,

BASED ON THE 1975 PRODUCTION STRUCTL

2

Incre-

mental

income

yield rati

(Direct)

x; GDP

0

3

Incre-

mental

labour

yield ratio

(Direct)

ALabour

4

C apital

Yield

ACapita

Indirect)

multiplier

(Direct &

5

Income

Yield

1

Indirect)

muItiplier

A Income

(Direct &

6

Import

leakage

yield

multiplier

Almports

(Direct &

I ndirecl)

RE

7

Labour

' yield

multiplier

ALabour

(Direct &

Indirect)

8

Income

capital ,

multiplier

A Income

(Direct -1

Indirect)"

9

Import

leakage
capital
multiplier
5; Imports
(Direct #1-
Indirect)
10,
Labour
capital
multiplier
A Labour
(Direct _;
Indirect)
f, Produc-
tion 1
Per unit 1
A Produc-
tion
Pcr unit
0,634
A Produc-
tion
Persons
per R1
million
1351
a
A Produc
non
Per unit
tion
Per unit
0,863
- A Produc-
A Produc-
non
i
1
Per unit
0.137 1
A Produc-
tion
Persons
per R1
million
178,2
, ACapital
' (Direct 11-
Indirect)
1
Per unit I
0.602
gCapital
(Direct 41
Indirect)
Per unit
ACapitaI
' (Direct 4
Indirect)
Persons
per R1
milli'on
124,4
0.159
0,988
0,732
0,255
0,613
0,346
0,582
0,805

0,677
63,7
489
a
60,9
162,9
133,8
35,5
145,7
0,907
0,004
0,91 1
0,804
0,902
0,924
0,938
1) The multipliers in columns 8 to 10 represent the weighted average multipliers for
cannot be deduced directly from columns 4 to 7. The total production of each sect
0,076
0,062
93,1
110,9
99,8
251,6
195,4
54,0
196,2
0,008
0,128
0,039
0,021
0,008
60,4
60,8

the various sectors making up a particular major sector and
or was used to weight the calculations of these multipliers.

These ratios are of course needed for estimates of the direct as well as the indirect effects of a unit increase in the production of a particular sector on specific economic magnitudes, that is the effect on all the sectors of the economy through the linkage of sectors, using the technical as well as the Leontief matrices (columns 4 to 7). As has been explicated theoretically, these ratios are the so-called industry multipliers (see equations 9# 13). Column 4 shows, for example, the extent to which the capital supply of a particular sector and all the other sectors interacting with it backwards, whether directly or indirectly, will have to increase if its production increases by one unit. If it is assumed that capital is a relatively scarce production factor in South Africa at this stage, the multipliers can be manipulated further to identify sectors which, according to these ratios, will optimise the application of capital in relation to the stated objectives of employment, income generation, dependence on other countries, etc. (columns 8 to 10 of Table 2). In calculating the multipliers the direct and indirect effect in both the numerators and the denominators of the ratios concerned are taken into account. For example, the multipliers in column 10 show the extent to which employment in the economy as a whole will increase if the production of a particular sector is expanded to the degree that an increase of R1 million (direct or indirect) results in the production capacity. This effect naturally depends largely on the degree of backward linkage of the sector whose production expands. The effect that such expansions of production capacity may have directly on the production levels of the sectors that have to supply the necessary additional capital goods and/or on imports of capital goods, as well as indirectly through linkage, however, was not brought into account at this stage of the calculation. As has been stated, detailed information which is not yet available would be required for this.

Because of this shortcoming the multipliers in Table 2 will understate the actual ultimate effect on the economy as a whole of production increases and expansions of capacity.

Apart from the above-mentioned shortcomings, the multipliers presented in Table 2 and in Appendix 1 are also subject to other limitations, of which the following are perhaps the most important. In the first place, the standard incremental ratios in columns 1 to 3 of Table 2 were used as basis in calculating the various sectoral multipliers. These ratios may naturally be affected by various short-term factors such as the state of the business cycle so that they may be subject to great fluctuations from year to year which makes it risky to use the ratios for one particular year for analytical purposes. In an effort to solve this problem the ratios in the first 3 columns of the table were calculated by means of production functions appropriate to data which mostly covers the period from 1960 to 1975. The ratios concerned therefore in fact represent the average of these ratios as they applied over the period mentioned as a whole. It has also already been pointed out that the average capital and labour yield ratios, as well as the technical input structures, undergo structural changes over the longer term, and the same is naturally true of marginal ratios, although these may perhaps be more susceptible to structural trends: To the extent to which these ratios will be affected by structural trends in the future, that is to say not only so far as the absolute magnitude of the multipliers is concerned but also their relative magnitude, the results of this exercise will be inaccurate.

In the final analysis, it is extremely difficult in studies based on the input-output model, to have regard also to the possible effect of changes in the production structure on the distribution of personal incomes, savings etc.. and therefore on economic growth and employment over the longer term. To resolve this problem it will in all probability be necessary to make use of a relatively large closed econometric model incorporating the input-output model. No such model is yet available for the South African economy and it is probable that none will be available for a considerable time.

Despite these shortcomings in the multipliers as presented in Table 2 (columns 4 - 10) the fact that certain indirect effects have been taken into account and that they are deduced from the application of capital nevertheless makes them an instrument with which the possible effect of changes in the sectoral production levels on the total demand for capital, labour and imported goods can be measured instead of the ordinary incremental ratios often used for this purpose (columns 1 - 3, Table 2). Provided that the shortcomings referred to above will not have a substantial effect on the various multipliers, at least not so far as their relative values are concerned, certain useful deductions

can therefore be made from Table 2.

Purely from the point of view of capital utilisation, it seems as if at this stage it would not be in South Africa's interests to develop its industrial sector at all costs, especially not when its income generating ability is compared with that of the primary sector. According to the figures in column 8 of Table 2 considerably more income is generated per unit increase in the capital supply in the primary sectors of the economy than in the manufacturing sector while there is no substantial difference between these two sectors in regard to the creation of additional employment opportunities (column 10). In agriculture, however, considerably more employment is created per unit increase in the capital supply than in the other two sectors. It should also be taken into account that employment in agriculture cannot always be considered fully economically active. From this it must also be deduced that any development strategy in South Africa will, in the first place, have to be aimed at developing the primary sectors to the full extent allowed by demand and cost factors and the availability of natural resources under present or expected conditions.

In fact, in view of the relatively big difference in size between the income-capital multipliers concerned in the primary and secondary sectors it seems even as if, from this point of view, it might be to South Africa's benefit to exploit even marginal opportunities

in the primary sectors rather than placing too much emphasis on industrial development as such. Naturally this is not to say that there are no individual sectors in the industrial

sector in which capital in terms of the creation of income and employment opportunities, cannot be better utilised than in the primary sectors (see Appendix I). More attention will be devoted to this matter later.

In regard to the position of manufacturing relative to the other sectors, excluding the primary sectors, it is interesting to note that, apart from construction in the case of

the creation of income and commerce and construction in the case of the creation of employment opportunities, capital utilisation is better in manufacturing than in all the other non-primary sectors. However, there is a high degree of interdependence between the manufacturing sector and the other non-primary sectors of the economy so that there cannot be any question of developing the industrial sector at the expense of the other non-primary sectors over the longer term.

From column 9 of Table 2 it is also clear that, as might be expected, the expansion programmes initiated in manufacturing show far greater import leakage than the expansion programmes initiated in the primary sectors. In fact, according to the multipliers concerned the manufacturing sector has the greatest import leakage of all the sectors distinguished in Table 2. In the light of the fact that, as has already been pointed out, expansion programmes initiated in the manufacturing sector also produce considerably less income (i.e. added value per unit of final product destined either for domestic consumption or for export) per unit of capital invested than expansion programmes, initiated in the primary sector it will not lie to South Africa's advantage from a balance

of payments point of view either to promote exports of industrial products at the expense of, for example, primary products. But attention must be drawn again to the fact that the greater direct and indirect imports of capital goods that may accompany such expansion

sion programmes have not been taken into account in these multipliers. The deduction above may be invalid if the expansion programmes initiated in the manufacturing sector have a smaller import leakage in respect of capital goods than those in the primary sector. It is doubtful whether this is a real possibility, however, especially if one bears in mind that strictly speaking only the import content of that portion of the additional capital goods used up in the production processes over a period of one year, i.e. the import content of the additional annual depreciation that will result from the expansion programmes, should be taken into account.

3.2 Sectoral content of a general development policy and strategy

As has been said, it is assumed, when one talks of a general economic development policy, that certain policy measures (fiscal, monetary, protective, etc.) are applied which,

although they are not always aimed directly at influencing particular sectors, do eventually have such an effect on the sectoral development pattern that certain national objectives will be achieved or not. Probably the best illustration of this approach is to be

found in the most recent Economic Development Programme for the Republic of South Africa. In this programme an indication is given of the sectoral development pattern that will have to form the foundation to ensure that the economy grows at an average of 4,5 per cent per annum over the longer term after certain general policy adjustments have been made. An attempt will now be made to show how the model can be used to conduct certain tests in order to determine whether the effect of certain general policy adjustments on the sectoral development pattern can be reconciled with the achievement of certain national objectives given the limited capital resources available to us.

For such a test it was found practical to use the 8th Economic Development Programme (EDP)'3) as a criterion to establish whether alternative — perhaps more efficient — allocations of capital to sectors could have taken place that would have served objectives such as economic growth, employment, strengthening the current account of the balance of payments and reducing South Africa's dependence of foreign trade and capital more effectively. It was established to what extent employment, the GDP and imports and exports envisaged in 1981 in the EDP would differ if R1 000 million were allocated to individual industrial sectors in four different ways.

In regard to these four different sectoral allocation structures it can be assumed that they were the result of a specific development strategy. In the case of Strategy 1, for instance, the aim of the sectoral application of available capital (R1 000 million) is to promote economic growth to the maximum, so that economic growth will be stimulated in all the high-capital saving industrial sectors, i.e. sectors with income-capital multipliers

that are higher than those for the country as a whole, at the expense of the remaining sectors. It was assumed therefore that R1 000 million more would be invested in the "high-capital saving" sectors and R1 000 million less in the other sectors than was envisaged in the EDP. The reallocation of this R1 000 million took place in such a way that the production of the various sectors initially, i.e. before the effect of the increase or decrease

in investment had completely worked through in the economy, increased or decreased by the same percentages, depending on whether a particular sector was a capital saving sector or not.

In the case of Strategy 2, i.e. the strategy aimed at maximising provision of employment, exactly the same procedure was followed and in this case it was further assumed that the policy measures would result in the attainment of the so-called labour intensive multiplier of the ECUIIUIHN Atixisci in the Prime Minister's Commission on the Development of the Economy, 1974, p. 14.

Republika 0/ South Africa 1978-1987. Volume 1. Government Printer, 1979.

3) Office of the Economic Adviser to the Prime Minister: Long-term Development Strategy, 1979, p. 1.

Republic of South Africa 1976-1981, Published 1977. The 1st EDP. Volume II. 1st ed. was not yet

available when this article was written

sectors taking place at the expense of growth in the other sectors. The so-called labour intensive sectors were selected in the same way as those selected for the growth strategy

In Strategy 3, in which the emphasis is on import replacement, the point of departure was that the contribution of a sector to import replacement would be determined by the relative quantity of the products of the sector concerned imported at present, 1.6. in relation to total imports of manufactured products. So far as the expansion of production capacity to replace imports is concerned, it was therefore assumed that imports would decline proportionally on a sectoral basis. An additional amount of R1 000 million in investment funds was allocated to the various industrial sectors in such a way that the production of the various sectors initially increased to the same extent as imports declined

on a sectoral basis. It should be remembered that, because of the linkage between industries, total production eventually increased more than imports declined. Furthermore, since a part of the products of all sectors is still imported, this also meant that the R1 000 million was allocated to all the industrial sectors.

Because, as in the previous cases, the attention in this last strategy is concentrated on the implications of a reallocation of investment funds at the sectoral level within the

framework of the overall availability of funds as determined in the EDP, investment in the remaining sectors within the industrial sector had to be reduced by an amount of R1 000 million in some way. For this purpose the basic assumption was that the level of the domestic demand as well as its structure could not be modified and that further import replacement would therefore have to take place at the expense of exports. The relative contribution of the various industrial sectors to total exports of industrial products was therefore used as the basis for the reduction of investment in the various industrial sectors by a total of R1 000 million.

In the case of Strategy 4 it was assumed that further export promotion would necessarily have to take place at the expense of import replacement. The procedure followed was exactly the same as in the case of Strategy 3.

Before the quantitative results of the four strategies are discussed, it is important to realise that the method used has several shortcomings which have a negative effect on the quality of the results and their interpretation. The fact that the input-output model

is not closed, for instance, has important implications for Strategy 1, in which the so-called capital saving industrial sectors are given preference over the remaining sectors. It must be realised that such an approach assumes without more ado that the demand structure in the economy will adapt itself to this adjustment to make it possible for production in certain sectors to increase. In the case of Strategies 3 and 4 the problem is

somewhat smaller since scarce production factors are allocated alternatively to import replacement and export promotion, and this is considerably closer to reality. The impact of various strategies on the structure of capital formation, consumer spending and even public sector spending can, as has been stated, not be incorporated in the model. Despite this partial approach, the exercise does provide important information on the sectoral structure of South Africa which may be important in the formulation and perhaps the application of an economic development policy in all its facets.

The quantitative results of these four alternative industrial strategies aimed at promoting employment, economic growth and the strengthening of the current account of the balance of payments are shown in Table 3 and are discussed briefly below.

Table 3 shows that both Strategies 1 and 2 have a fairly substantial positive effect on employment as well as on economic growth and the current account of the balance of payments. It also appears that there is not much to choose between these two strategies

in terms of their contributions to the four objectives. Although Strategy 1 has a somewhat

greater positive effect on economic growth and the current account of the balance of

TABLE 3: ALTERNATIVE STRATEGIES FOR ECONOMIC DEVELOPMENT

Type of strategy

R1 000 million of
capital

(1975 prices)

I Maximisation

of growth

(GDP)

II Maximisation

of

employment

III with objective

import replace-

ment as

against export

promotion

Employ-

ment

(Persons)

78 470

Absolute contribution in regard to the various

Growth

(GDP)

(R million)

R309

payments

(R million)

objectives

Dependence on other countries

Balance

of Exports 1

1

71

Increase 1

Imports

(R million) 1(Rmillion)

Decrease

(R million)

Net Employ-

ment

(Persons)

Increase

R309 4,- R233

Increase I

_R74

Decrease

-1&R161 4 0,60%,

Growth

rate of the

Economic-

ally Active

Population

increases

from 2,7 0/,

to 2,80%

per annum

Increase 10,69 %

R261 %R164

Decrease

A_R97

Decrease

Growth

rate of the

Economic-

ally Active

Population

increases

from 2,7 70

to 2,82%

per annum

-1 R67
Decrease
4R82 -R479

1
4 1
1
I
1
1
1
1
t
1
1

WAR397
Insignifi-
WR876 cant
Growth
(GDP)
(R million)
-.L 089 %

Growth
rate of the
GDP
increases
from5 %to
5,16 % per
annum
t 0,76 %
Growth
rate of the
GDP

increases
f romS %to
5,13 % per
annum
40,23 %
Growth
rate of
the GDP
decreases
fromS (f/oto
4,96 0/0 per
annum

Percentage change in regard to the various objectives, measured
in terms of the Control Group_EDP for the programming
period, 1975-1981

Balance
of
payments
(R million)
44,40 %
decrease in
the deficit
on the
current ac-
count of the
balance of
payments
at 1975 con-
stant prices
37,5 %
decrease in
the deficit
on the cur-
rent ac-
count of the
balance of
payments
at 1975 con-
stant prices
11,78 %

decrease in
the deficit
on the cur-
rent ac-
count of the
balance of
payments
at
1975 con-
stant prices
Dependence on other countries
Exports Imports Net
(R million) (R million) (R million)
3,81 %
increase in
the de-
pendence
on exports
(excluding
gold)
0,86 %
decrease in
the de-
pendence
on imports
1,09 33
increase in
the de-
pendence
on other
countries
(excluding
1 gold)
1,13 %
decrease in
the de-
pendence
on imports
2,66 "A
increase in
the de-
pendence
on exports
(excluding
gold)
0,45 %
increase in
the de-
pendence
on other
countries
(excluding
gold)
7,76 %
increase in
the de-
pcndence
on exports
(excluding ,
gold) 1
4,62 %
decrease in
the de-
pendence
on imports
5,93 ()3
decrease in
the de-
pendence
on other
countries

(excluding
I 801d)
, : J
W

payments. Strategy 2, according to the estimates, makes a somewhat large contribution to increasing employment. Since the reduction of unemployment is probably more important at this stage than a somewhat higher growth rate, the emphasis should therefore be placed more on Strategy 2 from a policy point of view. It must, however, be pointed out that especially Strategy 1 indicates that export sectors make the most important contribution to the growth objective and at the same time produce a substantial employment effect too. This also indicates that if both the growth and employment objectives are to be attained the import replacement projects will have to be approached with great care. This will be confirmed when Strategies 3 and 4 are dealt with. So far as Strategies 3 and 4 are concerned, it is necessary to point out although the implications of Strategy 4 are not specifically shown in Table 3 these implications can be deduced directly from the implications of Strategy 3 by merely changing the signs relating to the latter. From this table it will then be seen that, in contrast with the first two strategies, Strategies 3 and 4 have almost no effect on employment in comparison with the control strategy in the EDP and only a very small effect on economic growth and the state of the current account of the balance of payments. Strategy 3, that is to say the promotion of import replacement at the expense of exports should, however, as is to be expected, reduce South Africa's net dependence on foreign trade considerably whereas Strategy 4, that is the promotion of exports at the expense of import replacement, will have just the opposite effect. Given the present structure of imports and exports, it seems therefore as if, from the point of view of employment and economic growth, it will not be to South Africa's advantage if it were to be decided for strategic reasons, namely to reduce the country's dependence on foreign trade, to push on with import replacement at all costs. Purely from an economic point of view, therefore, an exaggerated pursuit of strategic objectives by means of an import replacement policy will not necessarily be to South Africa's benefit over the longer term. In fact, in the discussion of Strategy 2 it has already been pointed out that South Africa could improve its position in regard to employment, economic growth and the strengthening of the current account of the balance of payments if the emphasis in the country's economic development policy were placed on promotion of exports of labour intensive products. If a choice has to be made between Development Strategies 2 and 3, therefore, the reduced dependence on foreign markets and products in the case of Strategy 3, which will, however, be linked to lower growth and employment, have to be weighed up very carefully against the advantages that Strategy 2 may have in terms of employment, economic growth and the state of the current account of the balance of payments over the long term. Another very important conclusion in the study is that the results of Strategy 4 in comparison with Strategies 1 and 2 indicate that especially for the pursuit of the employment and growth objectives through an export promotion policy, some form of discrimination in favour of those industrial sectors showing the highest labour/capital multipliers will definitely be needed. It may even be that the sectors concerned are sectors that have not yet substantially entered the export market. Further investigation in this connection will naturally be needed before more definite conclusions can be drawn.

4. Conclusion

The main aim of this article was to give a broad indication of a certain use of the input-output model for analytical and policy planning purposes. The fact that it extends to a sectoral basis and, moreover, that it quantitatively expresses the interdependence of sectors, makes it very suitable as an instrument for the quantification of the possible effects of alternative economic development strategies so that their effective contributions to stated objectives can be evaluated more accurately. It must be stressed again that this approach is certainly not so sophisticated that it will eliminate or make obsolete

other criteria and methods. Nor, for instance, does it provide a basis for the formulation and application of a rigoristic or enforceable industrial policy. The fact the method of quantification lies within the framework of macro-economic analysis and the supply and demand relationships of the sectors does, however, give it an advantage in that, in the first place, it can provide a complete picture of the possible effects on the economy of certain policy changes while, in the second place, because it is linked to and reconcilable with macro-economic analysis, it forces the researcher to subject the logic of the assumptions he makes as well as the results ultimately obtained to strict tests. In conclusion, the possible use of this method for policy planning and implementation must be mentioned. As has been stated, this model certainly provides further guidelines to be followed when the country's economic development policy is formulated and implemented with a view to achieving the stated national objectives. It should be realised that government policy exercises an influence on the ultimate development of the country's economic structure within the market system in a wide variety of ways and at many levels. If the national objectives in the economic, social and strategic fields are known, however, and given the limited ability of the country to attain these objectives, a broad policy strategy such as that presented in the latest EDP can be drawn up by means of the macro-econometric models. This broad policy framework can then be supplemented by the sectoral guidelines described above since they are completely reconcilable with the macro-analysis. This should not, however, result in specific sectors being selected for special treatment and preference. It merely provides additional criteria for the assessment of the effectiveness of policy instruments that are to be used to achieve certain objectives.

APPENDIX 1:

SECTORAL MULTIPLIERS BASED ON THE 1975 PRODUCTION STRUCTURE

La our multipliers Income multiphcrs

1: Labour A Labour A Income A Income A Capital

1 (Direct 41- (Direct 2; (Direct 4,. (Direct 3,, (Direct 4-
1 Indirect) Indirect) Indirect) Indirect) Indirect)

Sector , -1 . , -

A Capital A Pro- ACapital A Pro- L, Pro-

, (Direct -E duction (Direct ,9, duction duction

1 Indirect) Indirect)

1 Units per Units per 1

1Rlmillion R1 million

Sectors with both Clothing 1 183,7 215,7 1 0,63 0,74 1,17

labour/capital and Footwear 176,6 244,9 1 0,56 0,78 1,39

income leapitul ConstructionU 168,0 251,6 0,54 0,80 1,53

multipliers higher ; Leather products 141,8 261,0 0,41 0,75 , 1,84

than the coitres- Agriculture 1

ponding multipliers forestry and fishing 1 124,4 178,2 0,60 0,86 1 1,43

for the country as Furniture 1 112,9 226,1 0,40 0,80 , 2,00

whole Textiles1) 100,1 164,7 , 0,43 0,71 1 1,64

Wood 92,5 188,8 ' 0,39 0,80 2,04

Electrical '

machinery1) 89,1 142,8 0,48 0,78 1,61

Food 88,8 175,2 0,41 0,80 1,97

. Machinery1) 78,4 128,6 0,45 0,74 1,64

- Rubber products') 74,3 128,7 0,40 0,69 1,74

Metal products1) 73,8 132,5 0,44 0,78 1,80

Printing and 72,0 128,0 0,46 0,82 1,78

Other mining1) 71,5 134,2 0,45 0,85 1,88

Sectors with i

labour leapital 1

multipliers higher Transport

than the corres- , equipment1) 83,5 134,5 1 0,36 1 0,58 1,64

ponding multipliers i ,

for the country as '

whole

Sectors with i '

income Kcapital ,

multipliers higher 1 Gold and uranium

than the corrcs- exploitation 1 54,5 70,7 0,72 ,94 1,30

ponding multipliers , ,

for the country as 21

whole , 1

Sectors with both Wholesale and i

labour /C;lpital retail trade 68,6 195,4 0,31 0,90 2,87

and income /capit;11 Other manufac- ,

multipliers lower turing industries 64,0 1 1 10,6 0,40 0,70 1,73

than the corres- Non-metalhc

ponding multipliers mineral produclsU 50,5 1 18,6 0,34 0,81 2,35

for the country as a Paper1) 49,5 .11 1,0 1 0,33 0,73 1 2,25

whole Beverages and 1

tobacco 45,2 133,8 0,27 0,81 2,96

Basic metalsH 42,5 98,1 0,34 0,78 2,31

Chemicals1) 37,1 61,2 0,34 0,5-1 1,64

Miscellaneous

services 24,5 196,2 0,12 0,94 8,01

Transport and

communication 15,0 54,0 0,26 0,92 3,61

Electricity, gas and

water 8,7 99,8 0,08 0,91 11,51

1) The multipliers in columns 1 and 3 represent average multipliers for the various subse
ctors making

up a particular sector and cannot be (1

of each subsector was used to weight the calculations of these multipliers.

30

educcd directly from columns 2, 4 and 5. The total production

FINANCE & TRADE REVIEW is mainly intended to promote a wider knowledge overseas of economic conditions in South Africa. The views expressed by individual contributors to this publication do not necessarily represent those of the management of the Bank. Communications regarding this Review should be addressed to:
Economic Division, VOLKSKAS LIMITED.
PO. Box 578, PRETORIA. 0001.

The same department will gladly supply relevant information and assistance on matters in regard to trade with the Republic Of South Africa.

The information contained in this publication may be reproduced in whole or in part, provided that acknowledgement is made to Volkskas Limited: Finance & Trade Review.

PERSKOR-JHB A26943

