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A CGE SIMULATION OF A FLAT TAX AS A POSSIBILITY FOR TAX REFORM IN SOUTH AFRICA

L. GREYLING, L. BONGA-BONGA & M. PEROLD

ABSTRACT
During recent years, there has been widespread interest in South Africa for the so-called “flat tax” systems that appear to have been implemented successfully in Eastern Europe. This paper applied a CGE modelling technique to compare the performance of the South African economy in case alternative tax systems, namely the progressive and the flat tax systems, are applied. The counterfactual situation whose effects are tested in this paper is a 10% decrease in the VAT rate consistent with some popular call for the reduction of the degree of the regressiveness of VAT. The key performances of the South African economy are assessed in terms of economic growth, the welfare of households, equity and employment. On the basis of this empirical investigation the flat tax has a slight edge over the current progressive system.

INTRODUCTION
In recent times, there has been much interest in the so-called “flat tax” as a policy alternative to progressive taxation. The key feature of a flat tax is that there is a single tax rate on all personal income above a certain exemption level (Keen, Kim and Varsano, 2006). Supporters of flat tax systems claim that it would have significant advantages over progressive taxation, and several flat tax models have been proposed (Hall and Rabuska, 1995). Furthermore, thirteen countries have, so far, implemented a flat tax with a great deal of success (for a detailed review of the experiences of these countries, see Grecu, 2004).

The main advantages of a flat tax are twofold: firstly, it is much simpler than progressive taxation, leading its proponents to claim that tax returns under a flat tax could be completed on the back of a postcard (Hall and Rabushka, 1995; Forbes, 2005). A simpler tax system would save taxpayers time and money, and, therefore, reduce compliance costs and improve administrative efficiency. Secondly, a flat tax is predicted to stimulate economic growth through its effects on labour supply and incentives to save and invest (Hall and Rabushka, 1995; Armey, 1996; Forbes, 2005). Because the marginal tax rate on all income above a given exemption level would be the same under a flat tax, the familiar substitution effect of a tax would be eliminated. As a result, the flat tax would improve incentives to work, because there would be no distortions arising from a high marginal rate.

On the other hand, economists generally justify progressive taxation on the grounds that it is more equitable than proportional taxation – it is claimed that most of the tax burden ought to be placed on the highest income earners, as the confiscation of a certain amount of income represents a smaller sacrifice on their part than the loss of the same amount of income by a low-income earner (Blum and Kalven, 1953). Thus, even if a flat tax would achieve the goals of simplicity, administrative efficiency and economic growth, it fails on redistributive grounds, as a disproportionate percentage of the tax burden is borne by those with low incomes. However, it may nevertheless be justified to adopt a flat tax, provided the positive effects outweigh the disadvantages.
In this paper, we investigate the possibility of implementing a version of the flat tax in South Africa using the computerised general equilibrium (hereafter abbreviated as CGE) technique. This will be done by comparing the effect of an economic shock (that is, a 10% decrease in the VAT rate) on both the current, progressive system in South Africa and a hypothetical flat tax model that will be simulated using the CGE approach.

The paper begins with section 2 that provides a brief discussion of the most important justifications for adopting a progressive tax and how they may be criticised, as well as an outline of the arguments for a flat tax. Section 3 provides information on the tax reforms undergone in South Africa after the change to a democratic dispensation. Section 3 presents the data and the CGE methodology for the analysis. Section 4 discusses the simulation used in the study. Section 5 interprets the results of the simulations and section 6 concludes the study.

THE CHOICE BETWEEN PROGRESSIVE AND FLAT TAXATION

In their detailed review of the traditional arguments for progressive taxation, Blum and Kalven (1953) divide them into four main categories, namely benefit theory, the argument from stability, sacrifice theories and the equality argument. This section will provide a brief overview of each of these arguments, showing that they are not ultimately convincing. Following this discussion, the three types of arguments for the flat tax – namely, political responsibility, simplicity and economic incentives (as identified by Blum and Kalven, 1953) – will be considered.

Arguments for progressive taxation

The first argument for progressive taxation comes from benefit theory, which states that taxpayers ought to pay taxes in proportion to the benefits they receive from the government. Hobbes (1651: 184) provides one of the first statements of the benefit principle, saying that the equal imposition of a tax depends “not on the [e]quality of riches but on the [e]quality of the debt, that every man oweth to the Commonwealth for his defence”.

This leads us to the justification of progressive taxation. Since those with the highest incomes have the most to lose if the state does not protect them, they ought to contribute the most in taxes. Tax, according to this theory, is a type of insurance premium paid to the state for the protection of one’s property and earning power – as the rich own more, their premiums should be the highest. Furthermore, wealthy entrepreneurs require the labour of skilled workers and a good infrastructure for their profits. As a result, they depend on the state to provide education for the workforce and to maintain and upgrade infrastructure; therefore, they ought to pay more for these benefits than other citizens who depend on the government in a lesser degree. In this way, “every man payeth equally for what he useth” (Hobbes, 1651: 184).

This principle has been questioned extensively, however. Mill (1852) provides an important criticism, claiming that all citizens benefit equally from government spending in most cases. For instance, everyone in the country benefits equally from government spending on national defence, as the entire nation is protected by the army. If citizens receive equal benefits, they ought to pay equally – in this way, the benefit principle actually leads to proportional taxation. Furthermore, since the lowest income earners are often those who are least able to afford services such as private health care and education, the benefit principle might even be said to support regressive taxation, since the poor will make the greatest use of government services
and should, therefore, pay the most (Mill, 1863; Seligman, 1908). Thus, as Seligman (1908) notes, “this defence of progressive taxation is not very strong”.

Progressive taxation has also been defended on the grounds of stability. It is claimed that the effects of economic shocks such as depressions are minimised under a progressive tax system, because taxpayers are shifted from one bracket to another (Blum and Kalven, 1953). During a recession, the wages of workers may have to be reduced, moving them into a lower tax bracket. In this new bracket, they are taxed at a lower marginal rate and are, therefore, able to retain more of their income – and this reduces the impact of the recession on their income. The opposite would occur during a boom and, as such, aggregate consumption will remain relatively constant despite macroeconomic shocks. Progressive taxation therefore acts as an automatic stabiliser in the economy.

The ability of progressive taxation to act as an automatic stabiliser is seen to be relatively unimportant, however. Blum and Kalven (1953: 34) note that it is “a part time case”, applicable only in a recession – instead, the state can stimulate the economy by other, more effective means. Mishan and Dicks-Mireaux (1958) attempt to measure to what extent tax rates affect inflation. They conclude that “[b]uilt-in stability is built small into the system, not large” (Mishan and Dicks-Mireaux, 1958: 604), and the stabilising effects of a passive fiscal policy that maintains expenditure and progressive rate structure constant are found to be “disappointing”. Thus other means of achieving stability may be more effective than progressive taxation and this argument is unconvincing.

The third argument for progressive taxation stems from the view that, since taxes impose a sacrifice on taxpayers, the state should ensure that the sacrifice is as small as possible (Carver, 1904). This so-called “sacrifice theory” leads to progressive taxation because the confiscation of one unit of income from a low-income earner entails a much greater sacrifice than the confiscation of the same unit of income from someone with a higher income (Edgeworth, 1897): therefore, if the state needs two units of income, it ought to confiscate both of these from the high-income earner. As progressive taxation achieves the goal of minimising sacrifice best, it ought to be implemented, according to this theory.

There are different variants of the sacrifice theory, distinguished by Fagan (1938); however, he notes that all of them make the same assumptions. Of these, the most important are that the marginal utility of money declines as income increases (Fagan, 1938) and that it is possible to measure sacrifices and to compare them for different taxpayers – “[t]o speak of aggregate sacrifice or satisfaction... implies that satisfactions are... capable of being summed” (Pigou, 1947: 41). Neither of these assumptions is unobjectionable.

The other assumption, that the marginal utility of money declines as income increases, has received considerable attention in the literature. Chapman (1913) provides a detailed theoretical critique of this assumption, explaining that is more realistic to hold that there are some points of discontinuity in the marginal utility of money curve. Cohen Stuart (1889) notes that, even if the marginal utility of money declines with income, this does not automatically entails progressive taxation. Instead, one needs to know what the precise shape of the utility of money curve is. Cohen Stuart’s investigation shows that, while some declining utility curves justify progressive taxation, there are just as many other possible declining curves that justify proportional and even regressive taxation – in fact, progressive taxation is justified only if the utility curve is a rectangular hyperbola.
Some other theorists have attempted to derive the true shape of the utility curve mathematically, but their results have not been convincing. Pigou (1947) claims that it is impossible to determine the exact shape of the curve, while Preinreich (1948) notes that there are a number of difficulties associated with this problem and that all the practical attempts to solve it have, so far, been unsatisfactory. Harrod’s (1930) investigation shows the curve to be steeper than a rectangular hyperbola, but Fagan (1938) questions the assumptions that he uses in arriving at this result. Thus it is by no means obvious that the curve is indeed declining, as is maintained by sacrifice theorists.

It has been shown that two of the key assumptions of sacrifice theory are dubious and controversial. Fagan (1938) lists several further assumptions of this theory and also calls them into question. The defence of progressive taxation on the grounds that it minimises disutility does therefore not appear to be convincing.

The final argument, that is, the one from equality, is probably the most satisfactory justification for progressive taxation. It stems from the view that economic differences between citizens need to be redressed by transferring wealth from the rich to the poor. This view is advanced by, among others, Marx and Engels (1848), Wagner (1883) and Lyons (1969) and it is claimed that progressive taxation is desirable because of its effectiveness in redistributing wealth – the wealthy are taxed at the highest marginal rates, and this tax revenue is then redistributed to the poor through government expenditure. Such an argument seems especially valid for a country like South Africa, with its history of racial discrimination and preferential treatment.

The main objection to this type of argument is that a progressive rate is unfair because it penalises some “people for having worked harder and saved more” than others and that it is, therefore, “a tax on industry and economy” (Mill, 1852: 371). There may, then, be no incentive to be productive or to save if marginal tax rates increase with income. Economic agents may decide to work less, master simpler trades and spend more time at leisure as a result of increasing marginal tax rates – this is detrimental to economic growth.

Rawls’ (1971) “difference principle” summarises the issue well – he claims that a certain level of inequality is acceptable if society as a whole is better with these inequalities than it would be without them. Many of the arguments for the flat tax rest on this principle. While supporters of the flat tax accept that progressive taxation is the best system for achieving equality, they argue that everyone would be better off under a flat tax despite the inequalities. Aaberge, Colombino and Strøm (2004) liken the redistribution to the division of a cake, and, using their analogy, it may be that, although the progressive system would result in a more equal distribution of the slices, the cake itself would be bigger under a flat rate.

It seems, therefore, as though this is the most important argument for progressive taxation – that it is able to reduce inequalities through its redistributive characteristics. The supporter of a flat tax must, therefore, show that the other advantages of his system will outweigh the costs to equality. We will see how this may be done in the next subsection.

**Arguments for a flat tax**

The first type of argument for a flat tax is based on what may be called political responsibility. Blum and Kalven (1953: 19) point out that progressive taxation is irresponsible because “higher surtax rates are almost certain to apply only to a minority of voters”. This means that the
majority (low-income earners) are able to vote on and set the high tax rates that the minority pay. According to Blum and Kalven (1953: 19), this is unfair because “[n]o majority... can pass fairly or responsibly on an issue so infected with its own immediate self-interest.”

A flat tax supporter, Armey (1996), summarises the arguments from political responsibility well. He claims that a flat tax is the fairest system because it treats everyone the same, avoiding the problem of having “fallible politicians decide, for their own reasons, which groups should render more or less of their earnings to the government” (Armey, 1996: 100). Instead, the flat tax does not discriminate between any economic group or agent, setting a single, objectively determined rate.

This kind of argument for a flat tax seems to have little force, however. As Blum and Kalven note, any system of majority rule will encounter this type of problem. There will always be those who disagree with a decision taken by the majority, and this is a logical and necessary consequence of a democracy, which is “superior to any other principle for resolving group decisions” (Blum and Kalven, 1953: 19). The advantages of a free and fair decision-making process will surely outweigh the relatively small disadvantage of the majority’s “getting its own way”. Besides, it may be said that the view of the majority best reflects the desires and wishes of the society and that there is nothing unfair in submitting to their suggestions.

A more convincing argument is that the flat tax is extremely simple compared with the progressive system. Advocates of a flat tax often claim that their tax return could be completed on a postcard (Hall and Rabushka, 1995; Forbes, 2005). This would save taxpayers hours of unproductive time spent completing complicated forms and finding ways in which to take advantage of tax loopholes (Blum and Kalven, 1953).

Studies have found that, although the majority of citizens regard progressive taxation as an inherently fair system (Porcano, 1984), few understand its complexity in practice (Roberts, Hite and Bradley, 1994). Edwards (2006) provides a detailed explanation of how a complicated tax system might impose costs on society – there are, among others, additional compliance costs in understanding the tax code and completing a complicated form; and there are also increased opportunities for tax evasion and avoidance if a tax system has many loopholes and deductions.

Several studies show that the administrative and compliance costs of a progressive system are indeed large in the United States (Slemrod and Sorum, 1984; Blumenthal and Slemrod 1992; Kaplow, 1994). The South African system also lends itself to abuse, as taxpayers can reduce tax liability by “taking advantage of loopholes in the Income Tax Act” (Jordaan, Boonzaier and Troost, 1988: 1). One strategy to reduce tax liability, which Gelfand (1958: 105) calls “fractioned income”, exploits the weaknesses of the progressive system. In short, “fractioned income” involves one or both of two tactics: either “splitting income among related entities or deferring income to another period when the marginal tax rate is expected to be lower” (Gelfand, 1958: 105).

A proponent of a flat-rate tax system would argue that fractioning income is entirely due to the progressive nature of the current tax system. Under a flat system, all taxable units will be taxed equally, so no income-splitting would have to occur. Furthermore, there is no need to defer income to another financial year because all levels of income are taxed at the same flat rate. It is likely to be those citizens with the highest incomes who are best able to exploit the complexity of the tax system, as they are the ones who can afford to employ tax specialists.
Bankman and Griffith (1987) provide a detailed critique of these arguments and claim that they are flawed. One important point that they make is that deferral of income would probably occur under any tax system, because deferral provides benefits to individuals (and losses to the state) due to the time value of money. Although a progressive rate structure may increase the advantages of deferral, it is “valuable independent of the rate structure” (Bankman and Griffith, 1987: 1937). Thus the argument from simplicity, though quite powerful, is not indubitable.

The final argument for a flat tax is that it creates better economic incentives than a progressive system. Supporters of this view claim that progressive taxation provides disincentives to work and impediments to capital formation. This therefore reduces labour supply and inhibits production and economic growth. The flat tax, on the other hand, will not encounter these difficulties as each additional unit of income earned is subject to the same marginal tax rate as the others, thereby eliminating the disincentive to work. Blum and Kalven (1953) explain that these disincentives are typically caused by two factors.

The first such factor is that “a minority of the population” who are “likely to be of special importance economically” will be subject to disproportionately high taxes (Blum and Kalven, 1953: 21). In short, a progressive tax will curtail the production of precisely those individuals who are able to put capital to the best use, having the resources needed for productive investment opportunities.

The second factor that Blum and Kalven identify is that accelerating marginal tax rates will reduce work effort. This is because workers are likely to think in terms of costs and benefits when deciding how much time and effort to expend on their labour. With progressive taxation, the ratio of rewards to costs decreases with higher levels of income, so workers supply less labour than they would under a flat tax system.

This trade-off is studied in detail in Browning and Johnson (1984: 175), who find that “income redistribution is not a socially costless endeavour”. They find that the costs of reducing income inequality through redistribution are “surprisingly high” (Browning and Johnson, 1984: 201), and note that their investigation considers only the effects of redistribution on labour supply, ignoring other possible costs such as the administrative and compliance costs discussed previously. Auerbach, Kotlikoff and Skinner (1981: 2) find that even a small degree of progression “imposes a very large efficiency cost” in comparison with an equal-revenue proportional tax. Thus there may be an argument against progression in terms of inefficiency.

Several scholars have attempted to demonstrate the effect of progressive taxation on the labour supply. In an early study, Break (1957) interviews 306 solicitors and accountants in London, selected at random, asking them questions to determine to what extent progressive taxation affects their economic decisions. The results indicate that the progressive nature of the tax does not appear to play an important role in the respondents’ decisions to supply labour.

This result is confirmed by several empirical studies. In a comprehensive survey of 21 studies that attempt to estimate the compensated elasticity of the labour supply, Bankman and Griffith (1987: 1923) find that these estimates “cluster around a reasonably narrow range”. Most of the studies put the compensated elasticity of the labour supply for males, which Bankman and Griffith recognise as the main wage-earner group, between 0.1 and 0.3. These figures imply that a 10% decline in wages because of a progressive income tax will be translated into a decrease in labour supply of between 1% and 3%, which is relatively small. From this,
Bankman and Griffith (1987: 1924) conclude that work is “conditioned more by social forces” than by wages – therefore, the predicted disincentive effect of progressive taxation does not appear to be large.

Later studies mirror these findings. Using a detailed econometric analysis, Triest (1990) reaches the conclusion that the labour supply of men is invariant to changes in tax rates. Moffitt and Wilhelm (1998) estimate the effect of the 1996 American Tax Reform Act, which significantly reduced marginal tax rates for the wealthy, on the labour supply of high-income men. They find that there is no responsiveness to this reduction.

In his survey of the literature, Feldstein (1995) also states that the majority of earlier studies find that the working hours of men are not responsive to changes in tax rates. However, Feldstein adds the important warning that labour supply should not be seen as being identical with hours worked. Instead, “the amount of ‘lab[o]ur’ that an individual supplies depends also on the intensity of work effort, the nature of the occupation, the assumption of risk and responsibility” and similar factors (Feldstein, 1995: 5).

Importantly, several of the studies show that the labour supply of women is responsive to changes in tax rates. Hausman and Ruud (1984) point out that, especially among married couples, labour supply behaviour is very different among women than among men. Bankman and Griffith (1987) find that twelve of the fourteen studies that they review estimate the compensated elasticity of labour supply of women above or near 1. Later studies by Triest (1990) and Feldstein (1995) confirm this result, though Triest claims that his conclusion depends critically on the method used to estimate the labour supply function.

Thus the disincentive effect of progressive taxation on the labour does not appear to be as large as expected. Other studies find that progressive taxation causes disincentives to save (Engen and Gale, 1997) or to become an entrepreneur (Cullen and Gordon, 2002). It may also lead to capital flight (Bakija and Slemrod, 2004; Kirchhof, 2005) to low-tax economies. However, it is essential to note that these disincentive effects may be the result of high tax rates, rather than progressive ones: a gradually progressive tax system with low rates might be preferable to a proportional system with one, high rate. The discussion of the arguments for and against a flat tax show, nevertheless, that this system should be given due attention as a policy alternative to the system of progressive taxation. This is the background and theoretical justification for the empirical analysis that is to follow in the next section.

**TAX REFORM AFTER DEMOCRACY**

Any analysis of the South African economy must note the important structural break that occurred in 1994, when the nation changed from a separatist state ruled by the minority to a true democracy. After the first democratic election, a new constitution was written and some of the tax changes reflect the non-discriminatory nature of the new South Africa. Specifically, all distinctions between genders and married or unmarried persons were removed as these were seen as discriminatory; thereby all natural persons became taxable according to the same progressive scale (Meyerowitz, 2003).

The Katz Commission was appointed to advise policy-makers on the tax structure of post-apartheid South Africa, and it released nine reports from 1994 to 1999 (Black et al, 2003). Improving tax administration and collection and reducing inequalities were the main goals of this
commission, according to Black et al (2003), and several of its recommendations were introduced in the next few years.

Important changes resulting from the Katz Commission included the establishment of the South African Revenue Service (SARS) as an independent government department, the introduction of capital gains tax, taxes on interest and other income of the retirement fund industry and VAT on gambling and financial services, as well as the change from a source-based income tax to a residence-based one (Black et al, 2003). Furthermore, the number of brackets was reduced to six, with lower rates (Black et al, 2003). The more important changes will be discussed in greater detail in this section.

The granting of autonomy to the South African Revenue Service in 1997 indeed resulted in improved administration and tax collection (Manuel, 2002; Pama, 2004). According to Pama (2004), the years before 1994 saw an immense shortage of staff employed in tax agencies, with more staff employed at London’s Heathrow airport alone than in the over 70 points of entry into South Africa. Collections were also burdensome, as each of the four former homelands (Ciskei, Transkei, Bophutatswana and Venda) had their own tax administration (Aaron and Slemrod, 1999).

However, since the independence of SARS, it has consistently been able to exceed estimated tax collections, which resulted in tax relief of about R73 billion and increased revenue of R57 billion in additional collections between 1995 and 2004 (Pama, 2004). This has led Trevor Manuel (2002: 4) to state that the Katz “Commission’s recommendation of an autonomous SARS will be remembered as [its] most visionary contribution to the fiscal stabilisation effort.”

One of the main challenges facing post-apartheid South Africa is reducing its tremendous degree of inequality, according to Aaron and Slemrod (1999). They point out that South Africa has one of the highest Gini coefficients in the world, and that any plausible tax system must address the problem of inequality. This challenge is recognised by the ANC, which seems to favour a policy of redistribution; however, some would argue that the inequalities are so great that they cannot be countered by redistribution alone and that growth policies should take priority (Arnold, 1992).

Trevor Manuel (2002) points out that there have indeed been reforms that are geared towards economic growth, with the Secondary Tax on Companies being decreased from 25% to 12.5% in 1996 and the standard tax on businesses being reduced from 35% to 30% in 1999. These changes are in line with the view that investment should be stimulated through lower tax rates, rather than other “selective tax incentives” that could cause economic distortions (Manuel, 2002: 5).

Since the year 2000, the state has had the “distinct purpose of aggressively broadening the tax base” (Manuel, 2002: 5), thereby capturing more income in the tax net and reducing overall tax rates. The first base-broadening measure was the introduction of the tax on capital gains in 2001 (Manuel, 2002). Because it is usually the wealthy which are able to receive capital gains, this step is also redistributive in nature (Manuel, 2002).

Two further points about this tax are worth noting. Firstly, it was set at a competitive rate with generous exemptions (Manuel, 2002). This would prevent capital flight to lower-tax countries.

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1 The Secondary Tax on Companies is a tax on dividends paid out to shareholders, which is levied on companies in addition to the ordinary corporate tax.
which is considered by Aaron and Slemrod (1999) to be a threat menacing the new South Africa. Manuel (2002) notes that the taxation of capital gains is common practice worldwide, so it was plausible for South Africa to introduce it too.

Secondly, since tax advisors had previously spent unproductive time finding ways of reducing tax burdens by reclassifying income earned under normal means as non-taxable capital gains income (Manuel, 2002). Adopting a tax on capital gains would thereby reduce the incidence of tax avoidance through these means. Furthermore, there is the argument that gains from disposals of assets are “economic profits just like ordinary revenue”, so that it is only fair to tax them as well if other income is taxed (Manuel, 2002: 5).

Shortly after capital gains tax was introduced, South Africa also changed its system from a source-based one to a residence-based one in 2001, thereby broadening the tax base even further (Manuel, 2002). Under the new system, South Africans are taxed on income earned overseas in addition to that earned within the borders of the country. Once again, this change means that the incentives for tax avoidance by earning income elsewhere disappear, resulting in reduced capital outflows. Furthermore, the tax also appears to be redistributive, as it is generally the wealthy who have the ability to earn income abroad.

Manuel (2002) notes several other important changes in the South African system. There have been reforms in the way South African owned foreign subsidiary companies are taxed, as well as the reduction of “harmful tax practices” such as tax incentives to attract foreign direct investment (Manuel, 2002: 8). Many public enterprises have been privatised, excise duties on soft drinks have been removed (Manuel, 2002) and it appears as though South Africans are beginning to develop a sense that it is important to pay taxes (Pama, 2004). The year 2007 has also seen an attempt by SARS to simplify the tax system further, using a redesigned tax form.

The changes to the South African tax system have been many. As Aaron and Slemrod (1999: 6) note, the Katz Commission undertook a sweeping reform of the country’s tax structure, and its “reports reflect a tremendous amount of work”. They also highlight some shortcomings of the commission, though, notably that there is little quantitative evidence to support its recommendations.

A member of the Katz Commission, Judge Davis, also highlights some areas that still require reform (Surtees, 2001). He claims that, despite the commission’s commitment to simplicity, the tax system has become more complex. The taxation of retirement funds also requires attention, because it is acting as a disincentive to invest; and other, non-tax incentives for investment ought to be created in order to grow the economy. Furthermore, the tax system could be made to be more competitive globally, and some new challenges facing the tax authorities are establishing common taxes for the African Union, policing tax havens and, in an effort to move with technology, creating tax systems for internet commerce (Surtees, 2001).

Vivian (2006) also criticises the Katz Commission, arguing that it has not achieved its goal of equality by demonstrating that its results are vastly different to those that would indicate equality as understood by the classical economists. However, the effects of the Katz Commission and the tax reforms of the 1990s appear to be more positive than negative, with a great deal of tax relief and improved simplicity, lower incidence of tax avoidance and more efficient revenue collection than ever before (Pama, 2004).
CGE METHODOLOGY AND THE DATA

The study compares the effects of a given shock (here a reduction in the value added tax (VAT)) on the South African economy when the flat tax or the progressive tax system is applied. A CGE model is used for this end. The CGE model in this study is calibrated from the 2003 social accounting matrix (SAM) provided by Quantec. The key characteristic of this SAM is that it distinguishes between 43 different production activities. Each activity is allowed to produce different commodities. There are 43 commodities in total. The government commodities and services are aggregated to one product class. The 2003 SAM also distinguishes between three different labour groups and capital as factors of production, as well as 14 different households. The household groups are divided into ten income categories with the upper deciles further divided into five different categories.

The CGE model

The CGE model from which simulations were conducted in this study is mainly based on the model developed by Thurlow and Van Seventer (2002), which was adapted from a standard CGE model developed by Lofgren *et al* (2001) and the International Food Policy Research Institute (IFPRI). The model follows the neoclassical-structuralist approach and the set of equations are consistent with the SAM disaggregation of commodities, activities, factors and institutions as represented in the 2003 SAM.

As far as the modelling of different economic agents is concerned, the decision to maximise profit by producers is made with the choice between factors of production governed by a constant elasticity of substitution (CES). At the top level of activities, factors and intermediate inputs are combined using the Leontief specification. The constant elasticity of transformation (CET) function is used to represent the substitution possibilities between production of the domestic and the foreign market, hence differentiating between exported and domestic goods.

Furthermore, the model allows for substitution possibilities between imported and domestic goods under a CES Armington specification. As far as households are concerned, the model uses the linear expenditure system to capture the utility maximisation of households in consuming different commodities, given their incomes. The utility function is represented by the Stone-Geary function that allows for subsistence consumption expenditure. It is further assumed that commodities consumed by households and other economic agents are composite commodities constituted of domestically produced and imported commodities. Government receives income by imposing different types of taxes. The government expenditure is derived from the consumption of different commodities and from the transfer to households. Government saves if income is greater than expenditure and dissaves if the opposite occurs. All prices in the model are relative to a chosen *numéraire*. The consumer price index (CPI) is the chosen *numéraire* in the model, which makes the model purely real and as a result, the overall level of prices is not included in the model. While all parameters in this model are obtained by calibration from the 2003 SAM, all the elasticities are obtained from the CGE model of Thurlow and Van Seventer (2002). A static CGE is justified on the grounds that what we need in this study is to assess the performance of each of the tax systems on the areas of interest such as equity, economic growth and employment (mainly of unskilled labour).
Changes to the standard model

The important change to the standard model occurs when modelling the effect of economic shocks on the South African economy when it is assumed that a fictional flat tax rate is applied. The introduction of the flat tax rate leads to direct tax rate becoming an exogenous rather than an endogenous variable in the model. Contrary to the model developed by IFPRI, that allows only the direct tax by institutions (personal and corporate taxes) to vary endogenously and therefore be the automatic source for financing many of the government spending programmes, this study transforms import tax from being a parameter or exogenous variable to becoming an endogenous variable in the government closure. With the balanced budget government closure used in this study, import tax rates are adjusted endogenously to generate a fixed level of government savings. An import tax scaling factor is then introduced in the model to scale the base-year import tax rate in order to clear the government balance. It is worth noting that this study constructs the revenue-neutral flat tax rate directly from the SAM. The average flat tax rate is obtained by dividing the sum of income tax paid by households by the total income of households.

As far as other closures are concerned for the factor market skilled labour, semi-skilled labour and capital are fully employed. Unskilled labours are partially unemployed. Investment-driven saving is used for investment-saving closure as one of the objectives of the study consists in finding which tax reform would be capable of generating necessary private saving to finance the fixed real investment quantity. As far as the rest of the world closure is concerned, the free-floating exchange rate system in South Africa permits the rule of fixing foreign savings while allowing for a flexible exchange rate.

THE COUNTERFACTUAL SITUATION

The counterfactual situation whose effects will be tested in this model is a 10% decrease in the VAT rate, that is, from 14% to 12.6%. We will compare the effect of this decrease for both the fictional flat tax and the current progressive tax system. This section will explain why the decrease in the VAT rate, in particular, was chosen for this simulation, as well as how it is modelled using the CGE technique.

The primary reason for cutting the VAT rate in this study is that it could be used to achieve the goals of the Accelerated and Shared Growth Initiative of South Africa (hereafter abbreviated as ASGISA) policy statement. ASGISA is a government policy that began in 2005, with the aim of achieving certain “ambitious public goals for growth and sharing of growth” (Presidency of South Africa, 2006). Its key aims are to reduce poverty and unemployment, to stimulate economic growth and to encourage investment, especially amongst small and medium enterprises (Presidency of South Africa, 2006).

It may be argued that a decrease in VAT could achieve some of the objectives of ASGISA. Firstly, a reduced VAT rate leaves consumers who purchase products on which VAT is levied, with more disposable income, thereby somewhat reducing poverty. Of course, it may be replied that the poorest of the poor do not pay any VAT at all, so that a reduced VAT rate would make no difference to their poverty. However, the VAT cut will nonetheless affect many consumers in South Africa positively, so it may be justified. Secondly, it may be argued that much of the increased disposable income available to citizens will be saved. Higher savings rates mean
that more money is available to be channelled into profitable investment projects through the banking system, thereby contributing toward the goal of increased investment.

Thirdly, one may claim that the decrease in VAT will raise the demand for goods on which VAT is levied. This increased demand may be translated into greater production by firms, which could require more labour, thereby reducing unemployment somewhat. The flat tax is also predicted to increase labour supply through incentive effects. Combining these two effects on the labour market with the possible increased investment that could take place means that GDP will increase through greater production. This achieves the goal of economic growth.

A further reason for cutting the VAT rate in this study is that it is deemed to be regressive by most economists. Reducing a regressive tax should be beneficial for poor households who already benefit from non-zero rated goods. Thus a decline in VAT should, ceteris paribus, bring about greater equity between citizens of a state. It is recalled that the flat tax has been criticised on equity grounds, and that the most successful theoretical argument for progressive taxation was found to be the argument that it brings about greater equality through redistributive effects than a flat tax does. Because the flat tax is therefore predicted to increase inequality, it is reasonable to adopt a policy measure that could, to a certain extent, counteract this effect while achieving the ASGISA goals.

One final question needs to be addressed – why has the decrease in VAT specifically been chosen to be 10%? The answer is that a 10% reduction is both simple to model and reasonably small, so that not too much revenue is lost in indirect taxes to make this a serious shortcoming of the model. Obviously, the VAT rate could have been reduced by any other percentage, and it may well be a worthwhile study to investigate the effects of different VAT cuts on both tax systems. Once again, however, this exercise is left for further research.

Now that the choice of counterfactual situation has been elaborated and defended, it remains to discuss, briefly, how the CGE technique actually models the 10% decline in VAT. It must be noted that the SAM used in this study does not have a specific item for VAT on its own. Instead, it has a variable called “commodity tax” that the study used as a suitable proxy for VAT. To model the decrease in VAT, we run a simulation where the commodity tax is set at 90% of its value in the benchmark model, for both the progressive system and for the flat tax.

The areas of interest

When evaluating the results we need to be explicit about which indicators will be considered; that is, which of the hundreds of variables in the model are important for the purposes of this study. The study evaluates the results in line with some of the main objectives of the growth, employment and redistribution (GEAR) policy and its offspring ASGISA policy. These objectives are: increase in economic growth, employment and fair redistribution of income. The effects on the saving rate of households and investment share of total absorption or gross domestic expenditure (GDE), as contributors of economic growth, will also be evaluated.

The CGE model does not have the means to test whether or not a tax is simple, so this aspect of the debate cannot be considered here. Whether a tax system is to be recommended, however, can be assessed from its effect on certain variables. This is not a limitation of the model, therefore, since it is obvious that the flat tax, which requires only one calculation for tax liability, must necessarily be simpler than the complex progressive system by its very nature.
The equity aspect of the tax reform will be assessed through a constructed Gini coefficient. Following Creedy (2001), the coefficient is constructed using the following formula:

\[
Gini\ Coefficient = 1 + \frac{1}{N} - \frac{2}{N^2} \sum_{i=1}^{N} (N + 1 - i) \frac{Y_i}{\bar{Y}}
\]  

(1)

(where \(N\) is the number of households; \(Y\) is the household income arranged in ascending order; \(\bar{Y}\) is the mean income of households)

The Gini coefficient shows the degree of inequality in a frequency distribution such as personal incomes (Bannock, Baxter and Davis, 1998: 176). This coefficient can take a value between 0 and 1, where 0 represents perfect equality while 1 means absolute inequality. We would expect inequality to increase following the implementation of a flat tax, *ceteris paribus*, so the predicted result is a rise in the Gini coefficient.

Economic growth can be measured by the change in GDP. Since a flat tax is predicted to be growth-inducing, we would expect the effect on GDP to be positive. Furthermore, the flat tax is purported to raise GDP through its incentive effects on the labour supply and on savings rates. The effect on saving may be measured by the change in the marginal propensity to save (hereafter abbreviated as the MPS). As we plan the change in the MPS, the saving-investment closure is investment-driven where in order to generate savings that equal the cost of investment in the base-year savings rates of selected nongovernment institutions are multiplied by a scalar.

As for the effect on labour supply or employment, it must be remembered that the chosen macroclosure rule for this model assumes that there is full employment in the highly-skilled and skilled sectors of the economy, with all the unemployment occurring as unskilled labour. Thus the investigation will consider the effect of the changes on unskilled labour supply only, and the change is predicted to be positive.

Examining the effect on unskilled labour supply seems to be appropriate for the South African economy. The country is characterised by high levels of unemployment; which coexists with a shortage of skilled labour. Thus a model which assumes full employment in the skilled and highly-skilled sector while allowing for unemployment in the unskilled sector seems to be an adequate reflection of the current situation in South Africa.

The areas of interest that have been identified in this section may be summarised in Table 1 below. This table lists the various areas of interest together with the indicators that will be used to quantify them, as well as an indication of the predicted results for the two simulations.
Table 1: Predicted results of the simulation

<table>
<thead>
<tr>
<th>Area of interest</th>
<th>Indicator for measurement</th>
<th>Predicted direction of change</th>
<th>Progressive tax</th>
<th>Flat tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equality</td>
<td>Gini coefficient</td>
<td>Decrease</td>
<td>Increase</td>
<td></td>
</tr>
<tr>
<td>Economic growth</td>
<td>Change in GDP</td>
<td>Small increase</td>
<td>Large increase</td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td>MPS</td>
<td>Small increase</td>
<td>Large increase</td>
<td></td>
</tr>
<tr>
<td>Incentive to work</td>
<td>Change in labour supply (unskilled)</td>
<td>Small increase</td>
<td>Large increase</td>
<td></td>
</tr>
<tr>
<td>Investment share of total absorption</td>
<td>Investment share of GDE</td>
<td>Small increase</td>
<td>Large increase</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Own construct

RESULTS OF THE SIMULATION

This section analyses the results of the CGE simulation. For each indicator, the results are presented in the form of a table, enabling a visual comparison between the effects of a cut in VAT on both tax systems. This is followed by an interpretation and evaluation of the results in each case.

The Gini coefficient

The comparison of the Gini coefficients for a flat tax and the progressive system are shown in Table 2 below. It must be noted that the Gini coefficient of the benchmark economy is 0.609.

Table 2: Comparison of Gini coefficients of the two tax systems

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Progressive tax</th>
<th>Flat tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini coefficient</td>
<td>0.608</td>
<td>0.611</td>
</tr>
<tr>
<td>Percentage change in Gini coefficient</td>
<td>-0.117%</td>
<td>0.345%</td>
</tr>
</tbody>
</table>

**Source:** Own calculations

From the second column in Table 2, the Gini coefficient dropped from 0.609 to 0.608 for the progressive tax system in the case of a 10% cut in the VAT rate. This is equivalent to a 0.117% decrease in the Gini coefficient. Therefore it seems as though a cut in the VAT rate will reduce inequalities in the South African economy as it is now, *ceteris paribus*. Economic theory supports this result. As far as the flat tax goes, Table 2 indicates that the Gini coefficient increased by 0.345% to 0.611. This means that inequalities in the economy have become greater, and is also consistent with our predictions. The flat tax that has been modelled in this case applies to all incomes, thus the poor, who previously paid no tax, are now being taxed at the same rate as rich people. This should be translated by an increase in inequality.
Furthermore, the introduction of the flat tax represents a significant tax cut for the high-income earners who were previously subject to a high marginal tax rate. For the highest income bracket, the marginal tax rate has declined from 40% to 11.1%, which means that these people are better off financially than before. Thus, since the flat tax appears to benefit the wealthy and disadvantages the poor (at least in terms of tax liability), it must certainly increase the Gini coefficient. This result is therefore consistent with our expectations and backed by sound economic reasoning.

The change in GDP

Table 3 shows the effects on GDP (measured in real prices) of the change in VAT on the two tax systems. Several other macroeconomic indicators are also presented in this table, listed in the first column. The second column shows what the values of these indicators were for the benchmark data set. Column three and five show the counterfactual equilibria for the progressive tax and the flat tax respectively. The percentage change from the benchmark to the counterfactual situation is given in the columns marked “(A)” and “(B)”, where “(A)” refers to the change for the progressive tax and “(B)” to the change for the flat tax. Finally, the rightmost column shows the difference between the two systems, by subtracting the percentage change in the progressive system from that of the flat tax system.

Table 3: Comparison of changes in GDP of the two tax systems

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Base</th>
<th>Progressive level</th>
<th>% change (A)</th>
<th>Flat level</th>
<th>% change (B)</th>
<th>Difference (B - A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross domestic expenditure</td>
<td>1230.999</td>
<td>1231.616</td>
<td>0.050%</td>
<td>1233.744</td>
<td>0.223%</td>
<td>0.173%</td>
</tr>
<tr>
<td>Private consumption</td>
<td>786.316</td>
<td>786.933</td>
<td>0.078%</td>
<td>789.061</td>
<td>0.349%</td>
<td>0.271%</td>
</tr>
<tr>
<td>Government consumption</td>
<td>239.053</td>
<td>239.053</td>
<td>0%</td>
<td>239.053</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Exports</td>
<td>339.826</td>
<td>340.027</td>
<td>0.059%</td>
<td>340.932</td>
<td>0.325%</td>
<td>0.266%</td>
</tr>
<tr>
<td>Imports</td>
<td>-319.357</td>
<td>-319.558</td>
<td>0.063%</td>
<td>-320.463</td>
<td>0.346%</td>
<td>0.283%</td>
</tr>
<tr>
<td>GDP at market prices</td>
<td>1251.468</td>
<td>1252.085</td>
<td>0.049%</td>
<td>1254.213</td>
<td>0.219%</td>
<td>0.17%</td>
</tr>
<tr>
<td>GDP at factor cost</td>
<td>1111.066</td>
<td>1111.366</td>
<td>0.027%</td>
<td>1112.417</td>
<td>0.122%</td>
<td>0.095%</td>
</tr>
</tbody>
</table>

Source: Own calculations

The results of this simulation may be interpreted as follows: for a start, it is clear from Table 3 that a cut in the VAT rate will increase both gross domestic expenditure and household consumption for both the progressive tax system and the flat tax. This is likely to be due to the fact that consumers will demand more goods because of their reduced prices. These changes are conducive to economic growth.

Table 3 also indicates that the counterfactual situation will have no effect on government consumption. However, this is due to the macroclosure rules that have been chosen. We also note that both exports and imports will increase following the cut in the VAT rate. The values in Table 3 show that there is a negative change in imports, but it must be understood that the base
is negative (at -319.357) as this represents money leaving the country. Therefore a negative change in the value of imports means that they have increased relative to the benchmark. Increased imports and exports imply greater economic activity, which is also indicative of economic growth. It must be noted that imports change more than exports for both tax systems (0.063% and 0.346% against 0.059% and 0.325%). This suggests that a depreciation of the rand is to be expected in the counterfactual situation, because relatively more is imported than exported after the policy change. Table 3 also shows that GDP has increased in the counterfactual situation for both cases. This confirms the prediction that a decline in the VAT rate is growth-inducing, primarily through increased aggregate demand for goods and services, whose prices have been reduced.

Comparing the figures for the two tax systems leads to a valuable conclusion. In each case, the percentage change in the variables is significantly greater for the flat tax system than it is for the progressive system. For instance, the change in GDP at market prices is around 4.47 times greater for the flat tax than for the progressive tax (0.219% as opposed to 0.049%). This seems to imply that there is indeed a significant growth benefit to adopting a flat tax – the rightmost column shows that the changes are dramatically greater for the flat tax than for the progressive tax in each case.

These effects are likely to be attained because of the incentive effects that the flat tax will have on savings and the labour supply (all of which are supported from the results in the following subsections). The high-income earners, who benefit enormously from a cut in their tax rate, will use their additional disposable income for profitable investment opportunities, or save it to make it available to others. As such, the flat tax rewards risk-taking and entrepreneurship, because the successful entrepreneur is able to retain and re-invest a greater share of profits than before.

The conclusions that may be reached from the analysis of Table 3 are threefold: firstly, that the cut in the VAT rate will result in economic growth, ceteris paribus; secondly, that the growth effects will be much greater if this policy is implemented with a flat tax than with the current, progressive system; and thirdly, that this policy change is likely to cause a depreciation in the rand because it will increase imports relatively more than exports (to be discussed).

**The savings rate**

Table 4 below is a comparison of the changes in the marginal propensity to save under the two tax systems following the cut in the VAT rate. It is important to note that according to the investment-saving macroclosure used in this study the rates of saving (MPS) of selected institutions are multiplied by a scalar in order to generate saving that is equal to total investment. The performance of each tax system, in terms of savings and investment, is assessed with reference to the size of the scalar.
Table 4: Comparison of the marginal propensity to save for the two tax systems

<table>
<thead>
<tr>
<th>Indicator</th>
<th>% change (progressive)</th>
<th>% change (flat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprises</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – first decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – second decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – third decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – fourth decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – fifth decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – sixth decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – seventh decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – eighth decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – ninth decile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – 90th to 92nd percentile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – 92nd to 94th percentile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – 94th to 96th percentile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
<tr>
<td>Households – 96th to 100th percentile</td>
<td>0.164</td>
<td>21.637</td>
</tr>
</tbody>
</table>

Source: Own calculations

The table shows disaggregated data for households, where the first decile represents the poorest households and the 98th to 100th percentile represents the wealthiest households. The saving rate of enterprises is represented in the second row. It is shown from Table 4 that in the case of progressive tax system saving rates are multiplied by 0.164% in order to generate the level of saving that equals to the cost of investment bundle. The saving rate is higher for flat tax rate at 21.637%. In addition to Table 4, Table 5 shows that the investment share of absorption is higher (1.382%) in the case of flat tax than the progressive tax system (0.618%).

Table 5: Comparison of investment share of absorption of the two tax systems

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Progressive tax (A)</th>
<th>Flat tax (B)</th>
<th>Difference (B – A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in investment share of absorption (%)</td>
<td>0.618%</td>
<td>1.382%</td>
<td>0.764%</td>
</tr>
</tbody>
</table>

Source: Own calculations

The labour supply

Table 6 shows the likely effects of the 10% reduction in VAT on labour supply for the two tax systems. It must be recalled that this model assumes that there is unemployment only in the unskilled sector of the economy, and the table therefore shows only the predicted change in this sector.
Table 6: Comparison of changes in labour supply of the two tax systems

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Progressive tax (A)</th>
<th>Flat tax (B)</th>
<th>Difference (B – A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in unskilled labour supply (%)</td>
<td>0.524%</td>
<td>2.468%</td>
<td>1.944%</td>
</tr>
</tbody>
</table>

**Source:** Own calculations

The results show that the cut in the VAT rate will increase the supply of unskilled labour by 0.524% if the tax system is progressive and by 2.468% if a flat tax is in operation. This is certainly due to the increased demand for the outputs of production (see Table 3) – firms will demand more labour to meet this increased demand, and households will supply more labour in response.

Notably, however, the increase in labour supply is roughly five times as much for the flat tax as it is for the progressive tax. Thus there does seem to be a significant incentive effect associated with the flat tax – those who are content to be unemployed under a progressive system with high marginal rates may find it worth their while to work if a flat tax is in operation. This is consistent with our expectations and is based on sound economic theory. We may therefore conclude that a flat tax could be better at reducing unemployment through its incentives to work than progressive taxation, and this must be seen as an advantage of the flat tax.

**CONCLUSIONS**

By and large, the empirical investigation into the flat tax has yielded results that are consistent with economic theory. To summarise the findings of this paper, a scorecard for the two tax systems is provided in Table 6. The various economic objectives are listed on the left, and a tick is placed in the column of the tax system that seems to achieve these objectives most effectively. In the bottom row, the final score is shown for each tax system:

Table 6: Scorecard for the two systems

<table>
<thead>
<tr>
<th>Objective</th>
<th>Progressive tax</th>
<th>Flat tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Effect on economic growth</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Effect on savings</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Effect on labour supply</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Effect investment share of absorption</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Total score</strong></td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

**Source:** Own construct

On the basis of some of the main objectives of the GEAR policy, it seems as though the flat tax has a slight edge over the progressive system, achieving four of the objectives more effectively than its opponent. However, the objective of equity may carry greater weight than the other
objectives, especially in South Africa, and this might count decisively in favour of progressive taxation. What the empirical analysis does show, nevertheless, is that the flat tax indeed has enough advantages over progressive tax that it ought to be taken more seriously by policy makers than it has been in the past.

Further studies need to be done using flat tax systems that are constructed differently, perhaps using exemption levels for poor households to make the flat tax system more equitable. This investigation is merely a starting point for further research on the advantages and disadvantages of the flat tax system in South Africa.
REFERENCES


MACROECONOMIC CONVERGENCE IN SACU: A PANEL UNIT-ROOT TEST ANALYSIS

A. KABUNDI & R. MALEKE

ABSTRACT
This study uses annual data for five SACU members over the period 1991-2005 to investigate the evidence for convergence in macroeconomic variables. The paper uses Panel unit-root tests to measure the degree as well as the pace of convergence. The results show evidence that the SACU countries have reached a reasonable level of convergence on specific macroeconomic variables. This can be attributed to common economic policies and institutional features. It is also evident that the countries that are members of the CMA show a higher convergence rate than non-members. As far as monetary policy is concerned, a high degree of convergence has been achieved in SACU as most of members have pegged their currencies to the South African Rand. However, the results show little convergence on fiscal policies.

INTRODUCTION

In 1910, the Southern African Customs Union (SACU) was established between South Africa and the separate associated states, i.e. Botswana, Lesotho and Swaziland, which makes it one of the oldest customs unions to be formed. SACU was established in order to maintain the free interchange of goods between the member countries. It was also established to encourage economic development and diversification, especially in the less-advanced member countries (Lesotho and Swaziland); and also to provide to all members equitable benefits originating from international trade (Antkiewicz and Whalley, 2006).

The four SACU member countries, excluding Botswana, have also formed the Common Monetary Area, where they have pegged their national currencies to the South African rand. Nevertheless, Botswana’s currency is linked to the rand via the currency basket, where the rand weighs around 60 to 70% (Grandes, 2003). Now that the SACU member states have gone so far in terms of monetary integration, it is of great interest to find out if there is macroeconomic convergence within this region. This paper seeks to evaluate the degree of convergence that exists within SACU and to determine what degree of convergence is necessary for policymakers to achieve their objectives.

In recent years there has been an increase in the interest surrounding convergence. A large body of empirical work has been devoted to whether regions, especially countries, are becoming more similar in terms of their macroeconomic fundamentals (see, for instance, Kocenda, 2001; Mutoti and Kihangire, 2006; Cunado and Perez de Gracia, 2006; and Rossouw, 2006). This paper seeks to make a contribution to the debate on the matter by investigating empirically whether there is macroeconomic convergence in SACU whereby smaller and more backward countries grow towards the more advanced countries through the diffusion of technical progress, and whereby the poorer countries learn and copy from the richer ones. According to Kaitila (2004), the poorer countries have some advantage over wealthier ones in economic growth as they are in a position to learn from the past experience of the richer
countries and thereby acquire new technologies that will facilitate their productivity and material welfare. However, as the process proceeds, Kaitila (2004) argues that those poor countries will need to become innovative themselves; hence the speed of convergence can be expected to eventually slow down. In addition, output convergence will only occur if the fastest growing economies slow down so that the others can catch-up. All this is a result of globalisation of the world economy, which has added new impetus to regional integration. More and more countries around the world are collaborating within various forms of regional groupings in order to expand markets.

In this paper the analysis is based on a set of data involving five countries, which are at various levels of development – with South Africa in the lead. The analysis incorporates the panel unit root test as an econometric tool.

The paper uses annual data of the selected macroeconomic variables, from 1991 to 2005. However, owing to difficulties in finding data for debt to GDP, analysis is done on the four countries excluding Namibia, and the data used spans 1994 to 2002.

The findings suggest that there is a strong evidence of macroeconomic convergence in the region for the period under investigation. It is found that the countries have reached significant convergence on inflation, exchange rates, GDP growth rates and interest rates. As far as debt to GDP is concerned, no convergence is detected and this can be attributed to lack of fiscal discipline in some of the member countries. Furthermore, countries appear to be converging fastest on inflation rates, and these are followed by interest rates. The convergence process appears to be the slowest in respect of exchange rates.

In addition, greater convergence is found among the countries that are members of the Common Monetary Area, i.e. South Africa, Namibia, Lesotho, and Swaziland, implying that the peg that exists is playing a crucial role in ensuring that the countries are following the same path, especially in exchange rates. For other variables, convergence is a result of the large amount of trade in the region.

Macroeconomic convergence is a necessary precondition for all countries intending to join the currency union. According to Obwona (2004), these preconditions are put in place as the means of screening out those countries that might impose costs on other countries after the currency union has been formed. Therefore, the aim to ensure that macroeconomic policies are harmonised is mainly to create the same culture for the future currency union members. It means central banks in those particular countries must have loose some of their independence in order to focus on price stability of the region as a whole. The reason for this would be to prepare for the formation of one central bank for all member countries which will require a certain level of price stability in the region. In addition, governments in the region should show signs of fiscal discipline by limiting budget deficits to a strict minimum and hence, this would ensure that the governments are more responsible.

According to Bezuidenhout (2003), the convergence hypothesis declares that all countries must ensure that their levels of output, economic development and macroeconomic behaviour are closely linked to one another. Furthermore, the macroeconomic behaviour must be mainly concerned with economic structure. Taking this as a point of departure, the countries entering monetary integration would agree on the convergence criteria, whereby they set standards for themselves and also come up with a date by which the criteria should have been met. The
reason for this is to make sure that the member states develop sound and common macroeconomic policies. Committing to anti-inflationary policies and fiscal stability will form the basis for macroeconomic convergence (Mutoti and Kihangire, 2006).

However, in the case of SACU the countries have not decided on the convergence criteria which they are committed to. Therefore, for this study, the convergence criteria that will be used will be more like those for SADC. The reason for this stand is the fact that all SACU members are also members of SADC; therefore these criteria are applicable to them.

**KEY FACTORS UNDERLYING CONVERGENCE**

The key macroeconomic factors that form the core of convergence analysis for SACU will include: inflation and interest rates, government debt (as a percentage of GDP), GDP growth rates (annual growth rates) and exchange rates.

**Inflation and interest rates**

These factors are required to converge before deeper monetary integration can be formed because convergence in inflation and interest rates will prepare the central banks to focus on the whole region instead of paying attention to their own countries when setting monetary policies (Obwona, 2004). Deeper integration will be more beneficial if inflation rates are already moderately co-moving between the countries.

Similarly, interest rate co-movement is necessary as it determines the degree of financial integration among the countries. It also evaluates the similarities of monetary policy stance between the countries. Thus, a high degree of convergence mean that the cost of adopting a common monetary policy will be lower (Dorrucci, Firpo, Fratzcher and Mongelli, 2004). However, inflation might converge, but at an early stage of integration, interest rates might not converge, as monetary authorities will be using this monetary tool (interest rates) to achieve the convergence of inflation.

**Exchange rates**

Exchange rate stability is often regarded as crucial for trade integration. Inordinate variations in exchange rates are a threat on the credibility of integration agreements. Thus, exchange rate stabilisation is taken as an effective tool to contain the political pressure against further trade integration, because misaligned exchange rates lead to unfair competition if one partner trades with the undervalued currency. Furthermore, volatile exchange rates heighten transaction costs (Fiess, 2007). Thus, the terms of trade should display minimal fluctuations between countries planning to share a single currency. Low variability in exchange rates and stable currencies will reduce the cost of acquiring a common currency (Dorrucci, Firpo, Fratzcher and Mongelli, 2004).

**Debt to GDP**

The future members of the union must ensure that their public finances are sustainable, and they can only show willingness in this regard by adhering to the requirement of less than 60% of the GDP (which is the SADC requirement). If this is not met, there would be negative effects on the other members of the union (Obwona, 2004). Adherence to this criterion is an indication of
the fiscal discipline necessary for regional integration. Furthermore, African countries are known to have corrupt leaders who confuse the state resources with their own, and hence borrow money from international institutions for their own use. As Mongelli (2005) suggests, convergence in this variable is necessary as a hefty debt relative to GDP will lead to monetary externalities across the currency union. This will then pose a threat to other possible members since a currency union might mean financing such debts. It places a burden on other countries, especially those that initially had stable currencies.

**GDP growth rates**

According to Kabundi and Loots (2007), convergence can be assessed through synchronization of business cycles, as an understanding of business cycle convergence can explain the extent of economic crisis or benefits across the region. Besides, the degree of business cycle synchronization could be of significant value if countries are considering regional policy coordination. According to Artis and Zhang (2001 and 2002), a high level of synchronization of the business cycle between two countries shows that the business cycle in each country is driven largely by common external shocks. Furthermore, it could be an indication that the economies of the two countries are highly interdependent. Therefore, a high degree of business cycle synchronization will lead to lower costs in pursuing common policies and deepening integration.

Fiess (2007) did an analysis of business cycle synchronization between Central America and the United States. The results show that information about the level of the business cycle co-movement provided additional information that reveals the need for independent fiscal and monetary policy. Fiess asserts that similar business cycles and common shocks make macroeconomic convergence an ultimate goal.

As is indicated in the report by the committee of central bank governors in SADC (2002), economic convergence should be achieved around a higher level of economic growth so that in the long run the countries can catch up economically with the developed economies (McCarthy, 2002). This is expected to converge so as to ensure that no burden is placed on one or few other countries. Cheung and Pascual (2004) assert that the country-specific factors play a role in macroeconomic convergence; specific factors can either lead to convergence or divergence. They argue that if countries are differently endowed, it is likely that such countries' outputs will not converge over time. To be able to understand why there are such major differences in the standard of living in different countries, one has to understand why long-term growth rates diverge so much between countries.

Holmes (2000) and Mutoti and Kihangire (2006) stipulate that convergence in macroeconomic policies will facilitate output convergence. This will hence ensure that similar macroeconomic fundamentals trends are generated. As far as the convergence criteria are concerned, the countries intending to participate in the monetary union must not only aim at achieving convergence for a particular period of time; they must ensure that it is sustainable. Countries must also be aware of the fact that the criteria are one package: they cannot meet one criterion and do without the other – all the factors that form part of the convergence criteria must be satisfied (Rossouw, 2006).

The key macroeconomic factors that form the core of convergence analysis for SACU will include: inflation and interest rates, government debt (as a percentage of GDP), GDP growth
rates (annual growth rates) and exchange rates. These five macroeconomic factors form the core of the analysis of convergence for SACU in this paper.

The various studies undertaken to date have focused mainly on the political and economic constraints on integration in Africa. Other studies refer to the overlapping of regionalism as one of the obstacles in the way of deeper integration. The purpose of this study is not to contradict these views but to extend the investigation by means of determining empirically the level of macroeconomic convergence that exists within the union using panel unit root tests. These tests give more consistent results compared to time-series and cross-section analysis. Many studies done on SACU are qualitative, thus by incorporating panel unit root tests, reliable results will be obtained and policy-makers will be able to use the results to come up with suitable policies. According to Beine and Coulombe (2007), the problem with time-series data emerges when one is confronted by strong multicollinearity among explanatory variables. It can be very awkward to get the precise estimates of the course of the dynamic adjustment process from time-series data.

However, panel unit root analysis has both cross-section and time-series characteristics; hence, the cross-section dimension ensures that the problem of multicollinearity is reduced, while the time-series dimension disentangles the short-term from the long-term effects. Panel unit root analysis is robust and is appropriate for convergence analysis. This method has been used by Kocenda (2001) in assessing the degree of integration in Europe.

**METHODOLOGY**

Convergence among countries on the key economic variables may be tested using several methods. However, the panel-based unit root tests advanced by Quah (1994) and Levin and Lin (2002) have been used by most researchers. In contrast, this paper adopts a panel unit root advocated by Im, Pesaran, and Shin (2003). It tests the null hypothesis of non-stationarity for a variable detected in a panel. Basically, it performs the augmented Dickey-Fuller (1979) test for each cross-sectional observation. Then, with the assumption that each individual cross-section is independent, the results are combined using a large sample distribution of t-statistics to investigate the null on the panel as a whole.

The IPS test has an advantage over the above-mentioned tests as it provides greater flexibility. Under the alternative hypothesis, the IPS panel unit root test allows the autoregressive coefficient ($\beta$) to vary across countries while, for instance, Levin and Lin (2002) assume the autoregressive coefficient to be homogeneous across countries (Im, Pesaran, and Shin, 2003; and Maddala and Wu, 1999).

Two macroeconomic variables converge if their long-run forecasts are the same over time (Bernard and Durlauf, 1996). It means that differential variables of these countries are stationary. Let $y_{it}$ be the variable of country $i$ and $y^*_i$ the corresponding variable of the benchmark country. The no-convergence hypothesis is:

$$H_0 : x_{it} = (y_{it} - y^*_i) = I(1)$$  \hspace{1cm} (1)$$

(where $i = 1, \ldots, N$, with $N$ as the total number of countries included, excluding the benchmark, and $I(1)$ refers to a unit root process)
Following Im-Pesaran-Shin, consider a sample of \( N \) cross-sections (i.e. the countries) observed over time periods \( T \). The IPS test is based on the regression equation:

\[
\Delta x_{i,t} = \alpha_i + \gamma_i t + \phi_i x_{i,t-1} + \sum_{j=1}^{k-1} \beta_{i,j} \Delta x_{i,t-j} + \varepsilon_{i,t}
\]  

(2)

(where \( t = 1, \ldots, T \) is the trend component of IPS test)

The convergence measure adopted is based on the following relationship, which describes the dynamics of the differentials of the respective variables in a panel setting.

One could also use the regional benchmark, instead of a country benchmark. For example, South Africa can be used as the benchmark of SACU, in which case the convergence of variables will be relative to South Africa. The second case is to use the regional average as a benchmark, i.e. \( \bar{y}_t = \frac{1}{N} \sum_{i=1}^{N} y_{i,t} \). The no-convergence hypothesis, therefore becomes:

\[
H_0 : x_{i,t} = (y_{i,t} - \bar{y}_t) = I(1)
\]  

(3)

When the separate ADF regressions have been estimated, the average \( t \)-statistics for \( \phi_i \) from the individual ADF regressions \( t_{ii}(p_i) \) are then adjusted to get the desired test statistics to ensure that distribution of the \( t \) statistic (\( t \)-bar statistic as per the IPS test) does not diverge under the null hypothesis as the number of countries increases, i.e.

\[
t_{NT} = \left[ \sum_{i=1}^{N} t_{ii}(p_i) \right] / N
\]  

(4)

In cases where the lag order is always zero \( p_i = 0 \ (for \ all \ i) \), simulated critical values for \( t_{NT} \) are provided in the Im-Pesaran-Shin (2003) for different numbers of cross-sections \( N \), series \( T \), and for the equations containing either intercepts, or intercepts and linear trends. In more general cases where the lag order may be non-zero for some cross-sections, Im, Pesaran, and Shin show that a properly standardized \( t_{NT} \) has an asymptotic standard normal distribution:

\[
W_{INT} = \frac{\sqrt{N}(t_{NT} - N^{-1} \sum_{i=1}^{N} E(t_{iT}(p_i)))}{\sqrt{N^{-1} \sum_{i=1}^{N} \text{var}(t_{iT}(p_i))}} \rightarrow \text{N (0,1)}
\]  

(5)

The Im-Pesaran-Shin test is a way of combining the evidence on the unit root hypothesis from \( N \) unit root tests performed on \( N \) cross-section units. The test assumption is that \( T \) is the same for all cross-section units and hence \( E(t_{iT}) \) and \( V(t_{iT}) \), which stand for the mean and variance respectively, are the same for all \( i \), so the IPS test is applied only for balanced panel data.
Once calculated, the estimated \( \phi \left( \sum_{i=1}^{N} \phi_i \right) \) provides an indication of the speed of convergence within a group of countries. When \( \phi \) is statistically significant and approaches unity, the rate of convergence declines. The speed of convergence is determined by calculating the half-life, which is the number of periods it takes to divide the gap into half. The half-life is derived and used in Ben-David (1993, 1996). It is therefore given by \( \frac{\ln(0.5)}{\ln(\phi)} \). The lower the half-life measure, the higher is the speed of convergence to the benchmark, meaning it takes less time for macroeconomic variables to converge.

**DATA AND EMPIRICAL ANALYSIS**

All data are obtained from the World Development Indicators. A simpler analysis for convergence is undertaken so as to determine the extent to which the growth rates, inflation rates, interest rates, exchange rates and debt as a percentage of GDP for SACU countries move together. The figures listed in appendix A1 show the potential convergence of the SACU member states. The movements are more obvious between some variables than others. Thus, as much as one can suspect convergence between these countries, one can hardly state by how much these countries converge. Since the graphical representation is not a reliable measure to assess the degree of comovement of macroeconomic variables, the next deals with the second approach, namely, bivariate correlation coefficients.

**Bivariate analysis: Correlations**

The overall correlation results (see details in Appendix A2) depict that, to a degree, some variables are co-moving. For example, low coefficients of GDP growth rates indicate less synchronicity of output growth in the region. Botswana and Namibia are the countries that are less related to the rest, while Lesotho, Swaziland, and South Africa display positive, but low correlation coefficients. Inflation and interest rates are the variables with relatively high correlation coefficients. The South African inflation rate is highly correlated with inflation rates of other countries. On the other hand, inflation in Swaziland seems to be the least synchronized of the region. Looking at the interest rates figures, we can conclude that monetary policies are more or less synchronized, with an average correlation coefficient of 80%. However, Botswana depicts negative values, which does not necessarily indicate lack of co-movement, instead the correct interpretation is probably that its policy is lagging compared to most SACU members. Exchange rate figures reflect the pegging system of CMA countries to the South African currency. Yet, the exchange rate of Botswana, the only none CMA member, shows high correlation (98%) with the rand. Similar to the previous section, correlation coefficients only give an indication of average relationships that can exist and cannot be relied on fully. The next section provides an analysis of means and standard deviations of the same variables across SACU members.

**Descriptive statistics**

Table 1 below provides summary statistics based on data for 1991 (the initial period) and 2005 (the most recent period for this analysis). In 1991, regional growth rates were on average 3.175%. All countries except South Africa experienced positive growth rates. The negative growth witnessed in South Africa was the result of political uncertainty after the liberation of
political prisoners. The growth rates decreased for all countries in 2005 except for South Africa whose growth rate increased drastically from a negative value in 1991 to a value higher than the regional average. However, Botswana's growth rate remained remarkably stable over the years even though the value was slightly lower in 2005. The inflation rates however, were very high (double digits) for all countries except for Swaziland whose inflation rate was below the average and was already a single digit. By 2005 all the countries had already achieved the single digit target set by SADC for 2008. There has been a slight change in the exchange rates since 1991. The pula however, still remained stronger than the rand (the working currency in the CMA).

Table 7: Key economic indicators of SACU countries, 1991 and 2005

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BWA</td>
<td>7.4</td>
<td>6.2</td>
<td>12.6</td>
<td>8.6</td>
<td>0.7</td>
<td>1.63</td>
<td>11.83</td>
<td>15.74</td>
</tr>
<tr>
<td>LSO</td>
<td>3.7</td>
<td>3.1</td>
<td>17.3</td>
<td>7.8</td>
<td>1.02</td>
<td>1.85</td>
<td>20</td>
<td>11.72</td>
</tr>
<tr>
<td>NAM</td>
<td>5.5</td>
<td>3.5</td>
<td>11.9</td>
<td>4.1</td>
<td>1.02</td>
<td>1.85</td>
<td>23.36</td>
<td>10.61</td>
</tr>
<tr>
<td>SWZ</td>
<td>2.6</td>
<td>1.9</td>
<td>8.9</td>
<td>4.8</td>
<td>1.02</td>
<td>1.85</td>
<td>16.02</td>
<td>10.63</td>
</tr>
<tr>
<td>RSA</td>
<td>-1</td>
<td>4.9</td>
<td>15.6</td>
<td>3.4</td>
<td>1.02</td>
<td>1.85</td>
<td>20.25</td>
<td>10.5</td>
</tr>
</tbody>
</table>


Source: Own calculations
Note: There are no calculations for debt to GDP since there was no data available for 1991 and 2005

In terms of interest rates, only Botswana and Swaziland had interest rates that were below the average; while all the other countries' interest rates were above the average. However, in 2005; all the other countries had managed to reduce their interest to the levels below the average except for Botswana whose interest rates were 15.74% while the region averaged 11.84%. The information displayed in the table shows large differences in macroeconomic performance in the region but most gaps were reduced by 2005.

Table 8: The mean and standard deviation

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>(2.426) (2.878) (0.374) (1.193) (2.937)</td>
<td>6.08 (9.72 1.32 14.75 11.24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesotho</td>
<td>(2.977) (4.051) (0.413) (2.452) (6.12)</td>
<td>3.15 (9.23 1.63 16.70 76.10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Namibial (2.457) (3.524) (0.413) (17.07 (3.6) *)</td>
<td>4.2 (8.94 1.63)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swaziland (0.721) (2.945) (0.413) (2.686) (4.529)</td>
<td>2.73 (8.29 1.63 15.45 21.37)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>(2.028) (3.651) (0.413) (3.699) (2.477)</td>
<td>2.48 (7.71 1.63 16.2 18.79)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Own calculations
Note: Values in parenthesis are standard deviations - * means data not available - Debt was analysed for period 1994 to 2002
Table 2 reveals country-specific values of the mean and standard deviations of macroeconomic variables under investigation for the period 1991 to 2005. Standard deviation, as a measure of dispersion, is used in this paper as a preliminary measure to assess the volatility. If both standard deviation and the mean are decreasing, it means the countries are converging and variables are less volatile. Looking at the averages for all countries, South Africa has been growing slower than the rest of the countries, followed by Swaziland. Botswana and Namibia were the fastest growing economies, with Botswana leading the pack. On average, Botswana recorded the highest inflation rate in the region followed by Lesotho. On the other hand, South Africa has the lowest mean inflation rate. Botswana’s mean exchange rate was lower than the rest of the countries (CMA members). Since Lesotho, Namibia, Swaziland and South Africa are members of the CMA; their mean exchange rate was the same. Table 2 also shows less variability of short-term interest rates across countries. This is a positive sign for a common currency area. Linking this with single digit inflation, it can be stated that the region is on the right direction in terms of a synchronized monetary policy. Nevertheless, the mean debt to GDP was the highest in Lesotho (above the 2008 target of 60% of GDP). Apart from Lesotho, the region as a whole shows sign of fiscal discipline, which seems rare in Africa. Most African leaders use government resources for self enrichment at the expense of the population at large.

In terms of spread, Lesotho displays the highest variability in GDP growth, inflation and the debt to GDP ratio. Swaziland, followed by South Africa has the lowest GDP growth volatility, meaning they have been increasing steadily. Inflation variability is low in Botswana and Swaziland, while Namibia and South Africa score relatively high inflation variability. In terms of exchange rates, the volatility is low in general, but in Botswana the volatility is even lower than the CMA countries. Furthermore, Botswana also displays the lowest interest rate volatility, while Swaziland and Namibia and South Africa are very close together; with South Africa recording the highest. The higher interest volatility in South Africa can be attributed to higher exchange rates and inflation volatility during the Asian crisis. In addition, the adoption of the floating currency regime has been accompanied by higher volatility in the exchange rates.

In summary, the above analysis reveals that inflation and interest rates are very low in the recent years as compared to those of 1990s. The volatility has also reduced significantly implying convergence towards the lower levels. Finally, it is clear from Table 2 that fiscal deficits for Lesotho have stood at high levels, thus the country has to work hard to contain its fiscal deficits.

**Panel unit root test**

The panel unit root test of Im, Pesaran and Shin (2003) is employed to investigate the countries to determine how different they are in various macroeconomic variables. The aim is to determine whether they tend towards the SACU average and also towards South Africa, which is once again used as a point of reference. Above all, the aim is to assess if the differences are decreasing or increasing. As indicated in the previous section, the panel unit root results tend to give better and more conclusive results than the results obtained from the graphical representation and correlations. The differentials were computed as the difference between an individual variable and its average for the whole group at time \( t \). Those differentials were then pooled for all the countries in the group. It is important to remember in this section that in terms of the construction of the test, if \( \phi \) is statistically significant and tend towards zero, then the convergence effect is stronger. By contrast, the convergence effect is non-existent if \( \phi \) is statistically significant but approaches unity.
Convergence towards the benchmark

This section assesses convergence of macroeconomic variables using equation (1), i.e. treating South Africa as a benchmark. The panel unit root test on GDP growth shows that there is no convergence towards the benchmark at 5%. This confirms the findings of the analysis conducted with correlation coefficient. The probability is 0.0721 while the coefficient of convergence is 0.55055. Since the graphical representation showed Lesotho to be not really co-moving with the other countries, it was decided to exclude it from the analysis and determine whether or not the rest of the group is converging. The new result reveals some degree of convergence among the countries. The probability and the coefficient of convergence are 0.0424 and 0.49871, respectively. The speed of convergence towards South Africa (excluding Lesotho) is 0.996287, which appears to be very slow.

Table 4: Benchmark

<table>
<thead>
<tr>
<th>Series</th>
<th>β</th>
<th>p-value</th>
<th>Half-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange rates</td>
<td>0.47</td>
<td>0.14 *</td>
<td></td>
</tr>
<tr>
<td>Inflation rates</td>
<td>0.09</td>
<td>0.00</td>
<td>0.29</td>
</tr>
<tr>
<td>GDP growth</td>
<td>0.55</td>
<td>0.07 *</td>
<td></td>
</tr>
<tr>
<td>Interest rates</td>
<td>0.23</td>
<td>0.00</td>
<td>0.47</td>
</tr>
<tr>
<td>Debt</td>
<td>0.88</td>
<td>0.29 *</td>
<td></td>
</tr>
</tbody>
</table>

Source: Own calculations
* means half-life could not be calculated as there was no convergence (nonstationary series)

With inflation, the IPS shows that the difference between inflation rates in the region and the South African benchmark is stationary at 5% (p-value of 0) and the convergence coefficient is 0.09. The speed of convergence is therefore 0.29, which is low. These results confirm the results obtained from the graphical and the correlation analyses. Graphically all the countries’ inflation rates appeared to be highly synchronised with those of South Africa. Correlation analysis also showed high co-movements between the countries and South Africa. It is also clear from the descriptive statistics that inflation in the region has been decreasing, where in 2005 all members have achieved a single digit inflation rate. Similarly, the p-value of interest rates of 0 indicates the difference between interest rates of SACU and South Africa is stationary. Meaning, the interest rates of SACU members are converging towards South African rates. Moreover, there is relatively rapid convergence, as their speed of convergence is 0.47. This can be attributed to monetary policy cooperation that exists within the CMA. In order to maintain the peg, CMA countries follow South African policy very closely, and they are bound to have interest rates that are moving along with those of South Africa. This again confirms above results from correlation coefficients, graphical representation, and descriptive statistics.

In terms of exchange rates, the test results show no evidence of convergence towards South Africa. This is in conflict with the results obtained from the graphical representation and the correlation matrix. The reason for this is that, for all the members of the CMA, the exchange rates are already the same as those for the benchmark. Hence, the new variable created (difference between exchange rates of member states and South Africa) is zero. This then leaves only data for Botswana to be used to test for convergence. Hence, the sample size is too limited to get reliable results from IPS test.
Finally, IPS test of debt to GDP ratio with p-value of 0.29 indicates that the created variable is non-stationary, and hence there is evidence of non-convergence of debt to GDP ratio. This result reveals that there are still drastic differences in the fiscal position between the SACU member countries. Given the results from the graphical analysis, it is possible that Lesotho has distorted the results obtained from the panel unit root test. However, Lesotho could not be eliminated from this analysis given that Namibia is not included at the first place because of data availability. Hence, by removing Lesotho from the analysis and leaving only the other three countries, the results obtained would be misleading; there would be a problem of degrees of freedom.

Convergence towards SACU average

Looking at the GDP growth rate, the panel unit root test shows that there is convergence towards the average. The probability is 0, meaning the countries' business cycles are synchronized. With half-life of 0.61, we can conclude again that the path of convergence is very slow as this value is closer to one. This result is in line with the above analysis, that is, there is indeed evidence of synchronization of GDP growth, but SACU members are converging at a slow pace.

Table 5: SACU aggregate

<table>
<thead>
<tr>
<th>Series</th>
<th>β</th>
<th>p-value</th>
<th>Half-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange rates</td>
<td>0.47</td>
<td>0.01</td>
<td>0.92</td>
</tr>
<tr>
<td>Inflation rates</td>
<td>0.13</td>
<td>0.00</td>
<td>0.34</td>
</tr>
<tr>
<td>GDP growth</td>
<td>0.32</td>
<td>0.00</td>
<td>0.61</td>
</tr>
<tr>
<td>Interest rates</td>
<td>0.60</td>
<td>0.08</td>
<td>*</td>
</tr>
<tr>
<td>Debt</td>
<td>0.92</td>
<td>0.42</td>
<td>*</td>
</tr>
</tbody>
</table>

Source: Own calculations

* means half-life could not be calculated as there was no convergence (nonstationary series)

The panel unit root test performed on inflation, shows co-movement of individual country inflation rates towards the regional inflation rates. With South Africa as the benchmark, the speed of convergence of the region is slow. This time, inflation records half-life of 0.33 compared to 0.29, previously. However, the results (p-value of 0.08) of IPS on interest rates indicate non-stationarity or no convergence at 5%. Following the results obtained from bivariate correlation, we exclude Botswana from the panel, as it scored lower and had negative correlation coefficients. Leaving CMA members only, IPS test results show signs of synchronization of interest rates. Thus, this result reinforces the hypothesis that the peg system followed by CMA members contributes to a larger extent to harmonisation of monetary policy of these members.

The result obtained from the IPS test (p-value of 0) on exchange rates show evidence of convergence amongst the group. The speed of convergence of 0.92 implies an extremely slow convergence. Again, as mentioned above, since the other three countries have pegged their currencies to the South African rand, we will have three series are exactly the same. Therefore, one must be cautious when analyzing such results. The speed of convergence is 0.92. This value is too close to one, and therefore implies a very slow convergence. According to the IPS result, debt to GDP ratio is non-stationary, and hence it is not converging. This supports the results of the test performed using South Africa as the regional benchmark.
Finally, it appears that convergence is occurring faster on inflation than any other macroeconomic variable as the half-lives are the smallest on inflation than on others. This high convergence in inflation rates is brought about by the amount of trade that exists among the countries. Inflation is then followed by interest rates. This slow convergence is also evitable, as in CMA countries the central banks are actively using interest rates as monetary policy instruments. Furthermore, GDP growth rates seem to be converging faster than exchange rates even though convergence is quite slow. As mentioned above, the results on exchange rates are not a true reflection of what is actually happening, as there was limited data. Lastly, the countries are not converging at all in terms of debt to GDP. The non-existence of convergence in this case is because the countries still have independent fiscal policies: therefore nothing is really forcing them to follow the same fiscal policy.

It appears from the graphical representation, correlation matrices as well as from econometric analysis that there is some degree of convergence in SACU – with the remarkable exception of Botswana, where convergence is present in virtually none of the spheres. The possible reasons for the above results would include the following: the existence of a currency union; the smaller countries forfeited, through the peg, autonomous monetary policies and opted for more consistent policies with South African monetary policy, free trade between members, similarities in macroeconomic policies and transfers from South Africa to other members under an enhanced customs revenue formula. The joint null hypothesis of non-stationarity was rejected for most variables. The IPS statistic has p-values that are less than 0.05, which are well above 5% or 10% levels. Therefore, the application of the IPS test shows there is some evidence for convergence found in most series.

In summary, all the findings (obtained from all the measures) assist in the conceptualisation of the main results of this paper. Macroeconomic convergence exists among the SACU member countries. It is also evident that the countries that are members of the CMA show a dramatically higher convergence rate. As far as monetary policy is concerned, a high degree of convergence has been achieved in SACU. However, the same cannot exactly be said for fiscal convergence. There is still a long way for the countries to go in order to achieve the same level of convergence on fiscal policies.

CONCLUSIONS

This paper assesses empirically the convergence of macroeconomic variables among SACU members over the period 1991 to 2005. The results obtained from bivariate correlation coefficients, descriptive statistics, and IPS panel unit root tests show a relatively weak and slow convergence of GDP growth rates. Inflation and interest rates are the variables that show a relatively high degree of synchronization, with a somewhat high speed of convergence. This can be attributed to the dominance of South Africa in the region. In addition, except Botswana, all other members have their currencies pegged to the South African rand. It also means that South African monetary policy is followed closely in the region. Hence, there is a high degree of harmonisation of monetary policy among member states. However, the debt to GDP ratio scores the lowest in terms of co-movement, with Lesotho being an outlier. It indicates that, unlike monetary policy, fiscal policy is still far from reaching consensus. The lack of fiscal discipline is one of the greatest challenges that the region is facing before engaging into a prospect of a common currency area.
REFERENCES


Appendix A1: Graphical representation

Figure 1: GDP growth rate

Figure 2: Inflation rate

Figure 3: Interest rate

Figure 4: Exchange rates

Figure 5: Debt to GDP
Figure 6: Debt to GDP excluding Lesotho

Appendix A2: Bivariate correlation coefficients

Appendix A2.1 GDP growth

<table>
<thead>
<tr>
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<th>South Africa</th>
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Appendix A2.2 Inflation

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<td>Lesotho</td>
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Appendix A2.3 Interest rates

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### Appendix A2.4 Exchange rates

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### Appendix A2.1 Debt to GDP

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A CGE ANALYSIS OF FISCAL POLICY IN SOUTH AFRICA

L. BONGA-BONGA, G. VAN ZYL & L. GREYLING

ABSTRACT
The aim of this paper is to uncover which method of financing an increase in social services expenditure would guarantee economic growth while assuring that government operates within a balanced-budget constraint. It will also assess whether fiscal policy (that aims at fiscal discipline) could improve the rate of economic growth when a particular tax is used to finance social services expenditure. The SVAR models applied in this study used two types of restrictions – the contemporaneous and the long-run (Blanchard and Quah) restriction. In the Blanchard and Quah restriction structural shocks are identified under two different categories, namely the Keynesian and Neo-classical types of restriction. The findings of the paper were almost the same for all the restrictions. It was found that, contrary to the endogenous growth theory prediction, education expenditure in South Africa does not stimulate economic growth.

INTRODUCTION
The aim of this paper is to uncover which method of financing an increase in social services expenditure would guarantee economic growth while assuring that government operates within a balanced-budget constraint. It is assumed here that social services expenditure guarantees income redistribution. The paper will also provide an empirical perspective to the question whether the fiscal policy stance in South Africa (which aims at a balanced-budget constraint) should provide sound conditions for economic growth and income redistribution. It will also assess whether fiscal policy (that aims at fiscal discipline) could improve the rate of economic growth when a particular tax is used to finance social services expenditure. The findings of this paper may settle an important controversial debate in South Africa on the role of fiscal policy, through fiscal discipline, to provide an incentive for economic growth and income redistribution.

METHODOLOGY AND DATA
As regards the methodology adopted in this paper, the impulse response function (IRF) obtained from the SVAR analysis will be used to assess firstly whether social expenditure shocks affect economic shocks positively or negatively. Secondly, the response of economic growth to taxation shocks will be analysed in order to determine which tax-financing method of social services expenditure is distortionary and which one is pro growth. This is an important point as it could suggest the appropriate method for financing an increase in social services expenditure in South Africa. Thirdly, in assuming the element of fiscal discipline (hereafter referred to as government balanced-budget constraint), the extent of output response to taxation shocks will be compared to the extent of output growth to social services expenditure shocks. This should determine the net value of the balanced-budget multiplier for each type of tax that finances social services expenditure.

The balanced-budget multiplier will be used to determine the net effect of the combined effects of government expenditure (hereafter referred to as social services expenditure) and taxation on output growth. With the balanced-budget multiplier, the multiplier effect on income of an
increase in government expenditure, matched exactly by an increase in taxation, will lead to a situation where the balance of the government’s budget remains unchanged. The most challenging debate in public finance has been to discover the appropriate tax that could finance an increase in government expenditure. A consensus has been reached that the lump sum tax has no excess burden, and therefore it is a non-distortionary tax. Therefore, the balanced-budget multiplier is unity when the lump sum tax is used to finance an increase in government expenditure (Rosen, 1995:307).

The empirical analysis, the results of which are presented in this section, aims at assessing the response of economic growth to social services expenditure and taxation shocks. Using the impulse response function (IRF) obtained from the SVAR forecast, the paper evaluates whether social services expenditure financed by a specific tax is pro or anti economic growth. The effects of the following taxes (used as sources for financing social services expenditure) on economic growth are assessed in the context of the balanced-budget multiplier: personal income tax (PERS), value-added tax (VAT), skill development tax (SKILL) and company tax (COMP). The social services expenditure this study analyses is education expenditure (EDU).

The data were obtained from “The statement of national revenue, expenditure and borrowing” of the National Treasury of South Africa. The National Treasury releases monthly figures of the national revenue and expenditure related to the receipt and requisition from the exchequer account. The data are presented monthly for the period 2000 to 2006. The SVAR analysis used in this paper considers two types of restrictions, namely contemporaneous and long-run restrictions.

THE SVAR MODEL WITH CONTEMPORANEOUS RESTRICTIONS

To model the contemporaneous correlation between the variables in the SVAR system, a set of restrictions was applied to the relationship between the reduced-form and the structural innovation. These restrictions need to have economic meaning to infer an economic interpretation from the coefficients of the impulse response function. The type of contemporaneous restrictions applied is explained below.

As regards the methodology of the empirical analysis, the SVAR analysis was conducted from four different vectors. Each vector comprised one of the tax forms, education expenditure and economic growth. The IRF obtained from the SVAR analysis within each vector would provide the answer to the question of how to determine the magnitude of the response of economic growth to education expenditure and specific taxation shocks. The net effect of the balanced-budget incidence on output was deduced by comparing the extent of the response of economic growth to taxation shocks, as well as to education expenditure shocks.

In the first SVAR model it was assumed that an increase in expenditure on education was financed by an increase in the rate of the skill development levy. The skill development levy was introduced to develop and improve the skills of people in the work place, with specific focus on improving the employment prospects of previously disadvantaged persons through education and training (Finnemore 1999:158).

By using a contemporaneous restriction, the dynamics of fiscal shocks were assessed under the assumption that an increase in education spending was financed by an increase in the rate of the skill development levy.
Contemporaneous identification: The first vector

The first vector in the SVAR analysis comprised the following variables: skill development tax (SKILL), education expenditure (EDU) and economic growth (GROWTH). With this first vector, the aim of the analysis was to assess whether education expenditure financed by skill development tax would lead to economic growth.

The vector of the time series was expressed as $X_t = (\text{GROWTH}, \text{SKILL}, \text{EDU})$. As said earlier, data with regard to EDU and SKILL were obtained from the 'Statement of national revenue, expenditure and borrowing', released monthly by the National Treasury. Data with regard to economic growth (GROWTH) were obtained from the Industrial Production Index. The Industrial Production Index was used as a proxy for real GDP to keep up with monthly data. The data on industrial production were obtained from the quarterly bulletin of the South African Reserve Bank (SARB).

As far as contemporaneous restrictions are concerned, the essential issue was just-identifying the shocks, especially the fiscal shock. In identifying fiscal shocks, Blanchard and Perotti (1999) stated that there are no institutional reasons to believe that aggregate expenditure or any of the spending components will react automatically to changes in economic activity. This paper concurred with the restriction that government expenditure does not automatically respond to changes in output and that education expenditure therefore is exogenous. The study nevertheless assumed that tax revenue is contemporaneously affected by output as part of the discretionary fiscal policy. Although fiscal policy is no longer used as an instrument for stabilisation policies in the South African context, it is not uncommon to link the unexpected increase in revenue for excise tax to, for example, an unexpected increase in domestic production. Economic activity or output, however, is assumed to be influenced by the two fiscal variable shocks, namely skill tax and education expenditure. In terms of the relationship between fundamental innovation ($u_{\text{GROWTH}}, u_{\text{SKILL}}, u_{\text{EDU}}$) and structural shocks ($e_{\text{GROWTH}}, e_{\text{SKILL}}, e_{\text{EDU}}$), and from what has been discussed above, the contemporaneous restrictions can be illustrated in the matrix form as follows:

\[
\begin{pmatrix}
1 & A_{12} & A_{13} \\
A_{21} & 1 & 0 \\
0 & 0 & 1
\end{pmatrix}
\begin{pmatrix}
e_{\text{GROWTH}} \\
e_{\text{SKILL}} \\
e_{\text{EDU}}
\end{pmatrix}
= \begin{pmatrix}
B_{11} & 0 & 0 \\
0 & B_{22} & 0 \\
0 & 0 & B_{33}
\end{pmatrix}
\begin{pmatrix}
u_{\text{GROWTH}} \\
u_{\text{SKILL}} \\
u_{\text{EDU}}
\end{pmatrix}
\]

The estimation of the SVAR is made in two steps: In the first step the unrestricted VAR(2) is estimated. Although some of the variables have a unit root (see Appendix A for the unit root test of all the series), the estimation procedure will still be correct as suggested by Sims (1986). In the second step the above restrictions are considered while estimating the coefficients A and B. These coefficients will assist in obtaining the impulse responses in a general SVAR model.

Table 1 provides the estimation of the A-B model by means of maximum likelihood estimator with the just-identifying restrictions as explained above. All coefficients are statistically significant, except $A_{12}$ and $A_{21}$. These coefficients serve to compute the impulse response function to assess the dynamics of different shocks. The effects of structural shocks are assessed through the impulse response functions as illustrated in figure 1.
**Table 1: Estimation of the structural parameters**

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<th>Structural VAR Estimates</th>
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<td>Sample (adjusted): 2000M06 2005M04</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Convergence achieved after 12 iterations</td>
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<td></td>
<td></td>
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<tr>
<td>Structural VAR is just-identified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model: $\text{Ae} = \text{Bu}$ where $\text{E}[\text{uu'}]=I$</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Restriction Type: short-run pattern matrix</td>
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<table>
<thead>
<tr>
<th>Coefficient</th>
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<th>Prob.</th>
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<td>0.777120</td>
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<tr>
<td>A12</td>
<td>0.326951</td>
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<td>-0.027955</td>
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<td>-2.594272</td>
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<td>B11</td>
<td>0.069827</td>
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<td>4.729250</td>
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<td>B22</td>
<td>0.123865</td>
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<tr>
<td>B33</td>
<td>0.970214</td>
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<td>10.86278</td>
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Source: Own calculations

Figure 1 illustrates the responses of skill levy, education expenditure and economic growth to different shocks emanating from these variables. Using 95% confidence intervals obtained from Hall’s bootstrap method using 2000 replications, the following is clear from Figure 1: skill development tax is neutral as far as output growth is concerned (see SKILL $\rightarrow$ GROWTH). This means that if the government increases tax revenue from skill levies to finance an increase in education expenditure, this tax revenue shock would be neutral as far as output is concerned for most of the periods.

The coefficients of the IRF are positive and statistically significant, especially for the first two periods (months), but in general, the effect is neutral. The response of output growth to education spending is neutral (see EDU $\rightarrow$ GROWTH). In period 2, for example, one standard deviation in education expenditure leads to a change in economic growth by -0.0002 standard deviation. This figure must be approximated to zero. This shows that the increase in education expenditure in general is neutral as far as economic growth is concerned. The net effect of skill tax revenue and education expenditure shocks are neutral.
Figure 1: Response of output and fiscal shocks to shocks from variables in the first vector

Source: Constructed from SVAR estimation

The impulse response functions reveal that the tax on skill development shocks is more persistent (SKILL → SKILL) compared to output and education spending shocks. This simply means that skill tax shocks take time before fading away.

Another important finding from Figure 1 is that skill development tax increases as education spending increases. This may reveal that the fiscal regime at work in South Africa is from government spending to taxes, meaning that taxes adjust to the level of spending and not other way round. These findings are consistent with the principles of the medium-term expenditure framework explained above. In conclusion, the balanced-budget multiplier, consistent with education expenditure financed by skill levies, is neutral or zero as far as the change of output is concerned.
Contemporaneous identification: The second vector

The second vector comprised value-added tax, education expenditure and economic growth. It is represented as follows:

\[ X_T = \begin{bmatrix} \text{GROWTH} \\ \text{VAT} \\ \text{EDU} \end{bmatrix} \]

The same contemporaneous restrictions applied for identification in the first vector were also applied in the second vector. It is important to note that the same restrictions were applied to all four vectors. The problem statement with regard to this second vector was constructed in the following manner: Would education expenditure financed by increasing revenue from VAT provide an impetus for economic growth?

Figure 2: Response of output and fiscal shocks to shocks from variables in the second vector

Source: Constructed from SVAR estimation
The matrix of identification for the contemporaneous restrictions is as follows:

\[
\begin{bmatrix}
1 & A12 & A13 \\
A21 & 1 & 0 \\
0 & 0 & 1 \\
\end{bmatrix}
\begin{bmatrix}
e_{GROWTH} \\
e_{VAT} \\
e_{EDU} \\
\end{bmatrix}
= 
\begin{bmatrix}
B11 & 0 & 0 \\
0 & B22 & 0 \\
0 & 0 & B33 \\
\end{bmatrix}
\begin{bmatrix}
u_{GROWTH} \\
u_{VAT} \\
u_{EDU} \\
\end{bmatrix}
\]

The impulse response functions illustrated in Figure 2 can be interpreted in the following manner: The impact of an increase in education expenditure is on average neutral as far as economic growth is concerned. The increase in revenue from VAT raises the level of economic growth slightly; but the effect is so insignificant that the impact of the increase in revenue from VAT can be assumed neutral.

It can be concluded, like in the first vector, that the balanced-budget multiplier of an increase in education expenditure financed by revenue from VAT is zero.

**Contemporaneous identification: Third vector**

The third vector comprised personal income tax, education expenditure and economic growth. It is represented as follows:

\[
X_T = 
\begin{bmatrix}
GROWTH \\
PERS \\
EDU \\
\end{bmatrix}
\]

The same contemporaneous restrictions were once again applied for identification. The problem statement for the third vector was the following: How can the increase in income from personal income tax be used to finance the increase in education expenditure?

The matrix of identification for the contemporaneous restrictions is as follows:

\[
\begin{bmatrix}
1 & A12 & A13 \\
A21 & 1 & 0 \\
0 & 0 & 1 \\
\end{bmatrix}
\begin{bmatrix}
e_{GROWTH} \\
e_{PERS} \\
e_{EDU} \\
\end{bmatrix}
= 
\begin{bmatrix}
B11 & 0 & 0 \\
0 & B22 & 0 \\
0 & 0 & B33 \\
\end{bmatrix}
\begin{bmatrix}
u_{GROWTH} \\
u_{PERS} \\
u_{EDU} \\
\end{bmatrix}
\]

The results of the IRF as illustrated in Figure 3 show that the impact of the increase in revenue from personal income tax is relatively stronger compared to the previous cases. On average, however, the effect of the increase in revenue from personal income tax on economic growth is still neutral. One can therefore conclude that, compared to the other cases, revenue from personal income tax may be the leading indicator of economic growth due to its influence on the supply and demand side of the economy. The insignificant effect of the response of output from tax revenue and education expenditure shocks shows that the balanced-budget multiplier continued to be zero.
The fourth vector comprised company tax, education expenditure and economic growth. The evaluation of the balanced-budget multiplier of an increase in education expenditure financed by the increase in company tax was assessed in terms of the net effect on output of company tax and education expenditure shocks. It must be noted that this study analysed the effect of the increase in tax revenue and not the effect of an increase in the tax rate. The increase in tax revenue may be due to the increase in the tax rate, but the study did not aim at explaining the reason behind the increase in tax revenue. Figure 4 illustrates results for the fourth vector.
Figure 4: Response of output and fiscal shocks to shocks from variables in the fourth vector

Source: Constructed form SVAR estimation

Restrictions were the same as in the other vectors. Although there were slight short-term differences as far the effects of company tax and education expenditure shocks on economic growth were concerned, the general picture was the same as for the previous vectors where the balanced-budget multiplier was zero.

The long-run (Blanchard and Quah) impulse response functions

It must be noted that this study applied the long-term restriction only to the first vector, which comprised skill tax, education expenditure and economic growth. Contrary to the contemporaneous identification procedure, the Blanchard and Quah technique does not directly associate the structural shocks $e_{GROWTH}$, $e_{SKILL}$, $e_{EDU}$ with the sequences of the endogenous variables $GROWTH$, $SKILL$ and $EDU$, but it considers the latter as pure endogenous variables
and the former as exogenous variables. The Blanchard and Quah technique also assumes that some shocks have temporary effects on certain endogenous variables and other shocks have permanent effects on these variables (Enders, 1995:332).

Three types of shocks were identified in this model, namely the productivity shock $e_{GROWTH}$, and two fiscal shocks $e_{SKILL}$ and $e_{EDU}$. Two types of SVAR models were estimated, based on long-term restrictions: In the first, a Neo-classical type of restriction was introduced. With regard to the neo-classical restriction, it was assumed that productivity shocks are permanent and affect all three endogenous variables, while fiscal shocks are temporary and cannot affect output in the long-term. These restrictions are illustrated in the following matrix form:

$$
\begin{pmatrix}
GROWTH \\
SKILL \\
EDU
\end{pmatrix} =
\begin{pmatrix}
c(1) & 0 & 0 \\
c(2) & c(4) & 0 \\
c(3) & c(5) & c(6)
\end{pmatrix}
\begin{pmatrix}
e_{GROWTH} \\
e_{SKILL} \\
e_{EDU}
\end{pmatrix}
$$

Table 2: Long-term coefficient estimation: Neo-classical model

<table>
<thead>
<tr>
<th>Structural VAR Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample (adjusted): 2000M07 2005M04</td>
</tr>
<tr>
<td>Convergence achieved after 9 iterations</td>
</tr>
<tr>
<td>Structural VAR is just-identified</td>
</tr>
<tr>
<td>Model: $Ae = Bu$ where $E[u'u'] = I$</td>
</tr>
<tr>
<td>Restriction Type: long-term pattern matrix</td>
</tr>
<tr>
<td>Long-term response pattern:</td>
</tr>
<tr>
<td>C(1)</td>
</tr>
<tr>
<td>C(2)</td>
</tr>
<tr>
<td>C(3)</td>
</tr>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>C(1)</td>
</tr>
<tr>
<td>C(2)</td>
</tr>
<tr>
<td>C(3)</td>
</tr>
<tr>
<td>C(4)</td>
</tr>
<tr>
<td>C(5)</td>
</tr>
<tr>
<td>C(6)</td>
</tr>
<tr>
<td>Log likelihood</td>
</tr>
</tbody>
</table>
| Estimated A matrix:
| 1.000000 | 0.000000 | 0.000000 |
| 0.000000 | 1.000000 | 0.000000 |
| 0.000000 | 0.000000 | 1.000000 |
| Estimated B matrix:
| 0.075705 | 0.011235 | 0.001300 |
| -0.021531 | 0.092512 | -0.014110 |
| 0.457589 | 0.265414 | 0.665336 |

Source: SVAR estimation
The estimation of the SVAR coefficients is provided in Table 2 and from these coefficients the impulse response functions of the long-term model were computed and illustrated in Figure 5.

**Figure 5: Impulse response function based on long-term restrictions with neo-classical identification**

**Source:** SVAR estimation

In the second SVAR model the Keynesian type of restriction is introduced, where it is assumed that fiscal shocks have a permanent effect on output variables and that productivity shocks have only a transitory effect on fiscal variables. The restrictions are illustrated in the following matrix:

\[
\begin{pmatrix}
EDU \\
SKILL \\
GROWTH
\end{pmatrix}
= 
\begin{pmatrix}
c(1) & 0 & 0 \\
c(2) & c(4) & 0 \\
c(3) & c(5) & c(6)
\end{pmatrix}
\begin{pmatrix}
e_{EDU} \\
e_{SKILL} \\
e_{GROWTH}
\end{pmatrix}
\]

Table 3 provides the estimation of the coefficients of the Keynesian model and the related impulse response functions are illustrated in Figure 6.
Table 3: Long-term coefficients estimation based on Keynesian identification

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>z-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(1)</td>
<td>0.139688</td>
<td>10.77033</td>
<td>0.0000</td>
</tr>
<tr>
<td>C(2)</td>
<td>0.008914</td>
<td>3.256264</td>
<td>0.0011</td>
</tr>
<tr>
<td>C(3)</td>
<td>0.004813</td>
<td>6.281194</td>
<td>0.0000</td>
</tr>
<tr>
<td>C(4)</td>
<td>0.006008</td>
<td>10.77033</td>
<td>0.0000</td>
</tr>
<tr>
<td>C(5)</td>
<td>-0.003817</td>
<td>-2.378784</td>
<td>0.0174</td>
</tr>
<tr>
<td>C(6)</td>
<td>0.002633</td>
<td>10.77033</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: SVAR estimation

It must be noted that all the variables must be stationary for the Blanchard and Quah technique and that was taken into account when the estimations were made.
All the coefficients in Table 3 are statistically significant, except \( c(2) \) – the response of tax to productivity shocks. The impulse response functions show that fiscal shocks are neutral in the long term, and the balanced budget is neutral in the short term. The same patterns are repeated in Figure 6. However, Figure 6 displays a short-term effect of education expenditure, but the effect vanishes in the long term. The impulse response functions show that some taxes are not distortionary as far as their impact on output is concerned. A fiscal policy that aims at correcting income redistribution and improving economic growth will work if these types of taxes are used to finance any increase in social spending.

It is clear from the impulse response functions that education spending does not have a long-term impact on economic growth in South Africa. To support this view, many authors argue that expenditure in education is directed more towards current expenditure such as teachers’ salaries. Moreover, the dropout rate due to poverty and sickness exacerbates the poor performance of education expenditure. Correcting these imperfections could improve the impact of education on economic growth.
CONCLUSION

This paper provided an econometric solution to the research question, i.e. whether it is possible for the government to simultaneously boost economic growth, apply fiscal discipline and achieve a fair redistribution of resources. The SVAR technique was used to assess the impact of social services expenditure shocks on output growth. The study emphasised education expenditure as a proxy for social services expenditure. Education expenditure was chosen firstly because it is a very important component of social services expenditure in the South African government budget. Secondly, there was evidence that education expenditure, among other components of social services expenditure, should be an important driver of economic growth.

The findings of the paper were almost the same for all the restrictions. It was found that, contrary to the endogenous growth theory prediction, education expenditure in South Africa does not stimulate economic growth. Whichever form of tax is used to finance education expenditure, the fact remains that education expenditure is neutral as far as its impact on the growth of output is concerned. The reasons for the neutral relationship between education expenditure and economic growth observed in this paper may be twofold. The first reason may be that education expenditure does not translate into human capital potential in South Africa because of inadequacy in allocating resources in education, dropout rates of students, and inadequacy of the education system. The second reason may be purely statistical. With the econometric tool used, the impulse response function in this study was applied to a period of almost two years. It might be applicable for a follow-up study to introduce CGE modelling as an alternative empirical tool.
REFERENCES


APPENDIX A

Null Hypothesis: EDU has a unit root  
Exogenous: Constant  
Lag Length: 11 (Automatic based on SIC, MAXLAG=11)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-0.002673</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-3.528515</td>
</tr>
<tr>
<td>5% level</td>
<td>-2.904198</td>
</tr>
<tr>
<td>10% level</td>
<td>-2.589562</td>
</tr>
</tbody>
</table>

Note: The null hypothesis is not rejected; the series has a unit root.

Null Hypothesis: COMP has a unit root  
Exogenous: Constant  
Lag Length: 11 (Automatic based on SIC, MAXLAG=11)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>1.661317</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-3.528515</td>
</tr>
<tr>
<td>5% level</td>
<td>-2.904198</td>
</tr>
<tr>
<td>10% level</td>
<td>-2.589562</td>
</tr>
</tbody>
</table>

Note: The null hypothesis is not rejected; the series has a unit root.

Null Hypothesis: PERS has a unit root  
Exogenous: Constant  
Lag Length: 11 (Automatic based on SIC, MAXLAG=11)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>4.108596</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-3.528515</td>
</tr>
<tr>
<td>5% level</td>
<td>-2.904198</td>
</tr>
<tr>
<td>10% level</td>
<td>-2.589562</td>
</tr>
</tbody>
</table>


Note: The null hypothesis is rejected, the series is stationary.
EMERGING MARKETS AND THE USA SUBPRIME CRISIS

E. CONTOGIANNIS & J. SCHOEMAN

ABSTRACT

The current subprime crisis has got its roots in three different crises, namely a basic credit shock, leverage and reliance on short term funding. The uncertainties to the global outlook as a result of the US subprime crisis have caused a general repricing of risk which is reflected in measures such as implied equity risk premiums, currency volatilities and emerging market bond spreads. The tendency for spreads to widen is a reflection of both an uncertain global outlook and selling pressures of investors that have suffered losses concentrated in the subprime area. It becomes clear that financial distress is a result of both domestic and external factors that contribute to the dramatic deterioration in sentiment by foreign and domestic investors. South Africa, like most other emerging economies have created a sound macroeconomic environment underpinned by sound fiscal and monetary policy. The accumulation of reserves and the restructuring of foreign debt have reduced external vulnerability significantly during the last couple of years. The question therefore remains – why is South Africa affected so severely by the subprime crisis. The widening and deepening of the liquidity crisis, forced major central banks to inject more liquidity, widen the type of collateral accepted, cut interest rates and in the case of the US Federal Reserve Banks, extend the type of borrowers to have access to the discount window to broker-dealers that function as primary dealers.

INTRODUCTION

The USA subprime crisis has been spreading turmoil in the global financial markets over a year by now. Global risk appetite has fallen leading to a general widening in risk spreads. So far most of the losses relating to the subprime crisis have been in mature economies while the impact has been limited in emerging markets. The widening of credit spreads is a reflection of both an uncertain global outlook as well as selling pressures that developed as investors cut positions across all segments of the global market (IIF 2007).

Tett (2007) states that the financial markets have spent most of this decade operating with a short-term view that has focused mainly on the future while ignoring the past. This view was shared by Keynes (1936: 147-151) where he argued that effectively the existing market valuation, however arrived at, is assumed to be correct in relation to our existing knowledge of the facts. This valuation will have an influence on the yield of investments. Changes in the yield will be as a result of new forthcoming information. Keynes further argued that the market is in fact inefficient since our current information about the market is not sufficient to base forecasts of future values. An investor can thus encourage himself that the only risk he runs is that of a genuine change in events over the short-term. Thus, an investor can become trapped in the illusion that investments become reasonably safe over the short-term and over a succession of short periods.
DIMENSIONS OF THE CURRENT CRISIS

According to research done by JP Morgan (2008), the current crisis has got its roots in three different crises, namely a basic credit shock, leverage and reliance on short term funding.

The crisis started as a basic credit shock in a narrow market segment, the US sub-prime market (sub prime mortgages in the US is only about 8% of the total household mortgages, and in US dollar terms, it constitutes about 12% of the US$10 trillion mortgages outstanding), and is infecting numerous asset classes (Wee, 2007).

The sub prime crisis started as a problem in the lower credit quality section of the USA market and was triggered by a combination of rising borrowing cost and falling house prices. The impact in the US mortgage market was amplified by the rise in leverage, mainly by hedge funds, in the financial system. Hedge funds control more assets than the capital they receive and can leverage their borrowing using derivatives (JP Morgan, 2008:2)

Leverage by commercial banks on the other hand, is regulated under international agreements such as Basil I and II (Bank for International Settlements in Basil). Banks therefore securitize loans in order to gain earnings leverage. In order to achieve maximum leverage, banks use tranches in between debt and equity. A multi-tranched funding mechanism consists of three levels, namely, senior, mezzanine and junior. The risk emanates from how these tranches are funded. The purpose of these tranches is to cater for different types of investors and the “slicing and dicing” of risks and cash flows, creates economic value to the extent that matches the investors’ objectives, that is, those investors who are constrained to invest in high grade assets will buy senior and mezzanine levels while investors with high risk tolerance, will buy junior levels of mortgages (JP Morgan, 2008:4-7).

In order to create higher returns, in a declining yield environment, the securities were provided with guarantees from mono line insurance companies, permitting the security to be sold as AAA paper. The main problem was that these mono line insurance companies funded themselves with short-dated instruments. With the emergence of the negative credit shock, the combination of illiquid assets, lack of transparency on asset values and maturity transformation created a run on banks and a subsequent liquidity squeeze (JP Morgan, 2008:8).

Thus, after a sharp drop in the prices and market liquidity of all mortgage-backed securities, an equally sharp increase in the price of risk and in spreads and the drying up of the issuance of all mortgage backed securities, contagion extended to the short-term end of the financial markets (Spaventa 2007:1).

THE US MORTGAGE CRISIS AND EMERGING MARKETS

The uncertainties to the global outlook as a result of the US subprime crisis have caused a general reprising of risk which is reflected in measures such as implied equity risk premiums, currency volatilities and emerging market bond spreads. The tendency for spreads to widen is a reflection of both an uncertain global outlook and selling pressures of investors that have suffered losses concentrated in the subprime area (IIF 2007:2)

A USA economic slowdown is expected to have a more limited impact on the performance of emerging markets, reflecting more favourable economic fundamentals in emerging markets.
The resilience of emerging markets shows that there are increasing signs that emerging markets are decoupling from the USA economy. The fundamental factors that support this view are:

(i) Emerging markets are less vulnerable to external shocks as a result of improved government and maturing political systems, institutional and regulatory frameworks;
(ii) Rich natural resource endowments and many countries such as Brazil, Chile, Russia and oil-rich Middle East, benefited from favourable terms of trade relating to the commodity boom;
(iii) Improving financial ratios as a result of foreign liability management which resulted in lower foreign debt ratios:
(iv) Increasing level of official reserves;
(v) Large external account surpluses;
(vi) Sound fiscal management that promotes higher growth rates;
(vii) The development of domestic capital markets that decreased the reliance on foreign funding sources;
(viii) General improved investor perceptions reflected by the number of investment grade countries by the leading rating agencies.

Thus, only those countries with high short term external financing needs and those who are perceived less transparent by investors are at risk of a sudden capital withdrawal. This risk in perception stems from the experience in previous financial crises.

COMMON FACTORS IN FINANCIAL CRISES AND THEIR RELEVANCE TO THE CURRENT CRISIS

The domestic and external factors that contributed to the dramatic deterioration in sentiment by foreign and domestic investors in the previous financial distress episodes listed below were investigated:

(i) Exchange Rate Mechanism (ERM) of the European Monetary System in 1992-1993;
(iii) The Asian crisis of 1998;
(iv) Russian crisis 1998;
(v) Brazilian crisis 1999;
(vi) Latin American crisis (Argentina, Brazil, Uruguay 2001-2003); and

At this point of the crisis, it seems that external factors are dominant in the deterioration of sentiment towards emerging markets. External factors that could be isolated from the above crisis include:

(i) A common factor in most financial crisis according to Brunnermeier and Pedersen (2007) is that of illiquidity. This concept will be discussed in detail in section 4.1;

(ii) International investors had underestimated the risks as they searched for higher yields at a time when investment opportunities appeared less profitable in developed countries;

(iii) Contagion through either financial, trade or political links; and
(iv) Swings in commodity cycles.

From the analysis of JP Morgan (2008), it would seem that liquidity and a mispricing of risk are the dominant factors in the current financial turmoil. Contagion however, is more difficult to assess at this point as the outlook for the world economy is still uncertain. It is however widely perceived that the USA economy is turning into a recession which could have a negative impact on the countries linked by trade with the USA. Commodity cycles seem to be supportive for a majority of emerging markets, as the high prices of oil provides the opportunity to increase official reserves and lead to current account surpluses for those emerging economies that are exporting oil.

Thus concentrating on illiquidity and international investors’ search for higher yields, the following can be concluded:

Global liquidity

A broad measure to test global liquidity is shown in formula 1:

\[
\Gamma = \frac{\% \Delta \kappa}{\% \Delta \nu}
\]  

Where:

\( \Gamma \) = Global liquidity measure

\( \% \Delta \kappa \) = percentage change in US Treasuries held in custody by foreign accounts or banks; and

\( \% \Delta \nu \) = percentage change in the USA Current Account Deficit

Private and official foreigners hold U.S. Treasury securities as a store of wealth and a means to conduct international transactions. Whereas private holders might use the dollars provided by their Treasury assets to purchase imports from the United States or third countries, official holders such as central banks, might use the dollars from their holdings to defend the value of their countries’ currencies in foreign exchange markets. In deciding whether to hold Treasury assets, both official and private investors will consider their own need for dollar denominated assets. (Sobol, 1998: 3).

The 1988 Accord requires internationally active banks in the G10 countries to hold capital equal to at least 8% of a basket of assets measured in different ways according to their riskiness. The definition of capital is set (broadly) in two tiers; Tier 1 being shareholders’ equity and retained earnings and Tier 2 being additional internal and external resources available to the bank. The bank has to hold at least half of its measured capital in Tier 1 form. A portfolio approach is taken to the measure of risk, with assets classified into four buckets (0%, 20%, 50% and 100%) according to the debtor category. This means that some assets (essentially bank holdings of government assets such as Treasury Bills and bonds) have no capital requirement, while claims on banks have a 20% weight, which translates into a capital charge of 1.6% of the value of the claim. However, virtually all claims on the non-bank private sector receive the standard 8% capital requirement (BIS 2001:13).
Also, with regard to on-balance sheet risk charges, the Basel Accord claims on the Organization for Economic Cooperation and Development (OECD) central governments, holdings of US treasury bonds have been assigned a risk rating of zero.

Thus, US treasury bonds held in custody by foreign accounts or banks and the USA Current Account Deficit (which provides additional assets to the global capital markets) increase foreign assets in domestic countries and ultimately, because foreign currency cannot be used as legal tender in a domestic country, it will be sold for domestic currency which ultimately increases liquidity throughout the world. Thus, assuming a zero risk rating for holding US treasury bonds, banks can leverage loans using the bonds as an asset.

To test how this indicator affects global liquidity it can be seen from Figure 1 that every time this indicator has turned negative or close to zero, a corresponding financial crisis emerged.

**Figure 1: Measure for Global Liquidity vs Financial Distress Episodes**

<Diagram showing the relationship between global liquidity and financial distress episodes.>

**Source:** Bloomberg (2008)

**Investors seeking higher yields**

When the global liquidity measure is compared to bond issuance of emerging economies, it is clear from Figure 2, that a positive relationship between non-investment grade (BB and below rated countries) and global liquidity exists. For investment grade (BBB and higher) a negative relationship exists. Low interest rates imply that banks give more loans to borrowers with lower credit score and/or bad credit history. In addition, banks do not seem to price the extra risk they take, thus, increasing higher demand for risky loans (Ioannidou et al.. 2007:2).
As mentioned above, when the global liquidity measure is compared to bond issuance of emerging economies, a positive relationship between non-investment grade (BB and below rated countries) and global liquidity exists. For investment grade (BBB and higher) a negative relationship exists. This relationship shows that in times of abundant liquidity, investors are more willing to take risk and would therefore invest in high yield risky assets (below BBB rated). The consequence of this is that the emerging markets as an asset class, all appreciated in value as can be seen in Figure 3. The correction in the mispricing of risk is evident from August 2007.
As investors re-price risky assets, prices of all sorts of instruments will adjust to new levels. For any given level of risk, financing will be more expensive and will be rationed. The impact on individual countries in the JP Morgan Global Emerging Market Bond Index (EMBIG) can be seen in Figure 4.

From Figure 4 it is evident that Chile (60.2%), Colombia (53%), Poland (57.1%), Russia (54.3%) South Africa (134%), Turkey (53.6%) and Venezuela (58.6%) were most affected by the reprising of risk. In order to assess the countries mostly affected in terms of risk, those countries where the risk spread increased more than 50% were focused on. In order to assess why certain emerging markets risk spreads have increased more than others, the internal/domestic factors need to be taken into consideration. These include:

(i) The prolonged maintenance of pegged exchange rates, in some cases at unsustainable levels, which complicated the response of monetary policies to overheating pressures and which came to be seen as implicit guarantees of exchange value, encouraging external borrowing and leading to excessive exposure to foreign exchange risk in both the financial and corporate sectors.

(ii) A build-up of overheating pressures, evident in large external deficits, inflated property and stock market values.

(iii) The prolonged maintenance of pegged exchange rates, in some cases at unsustainable levels, which complicated the response of monetary policies to overheating pressures...
and which came to be seen as implicit guarantees of exchange value, encouraging external borrowing and leading to excessive exposure to foreign exchange risk in both the financial and corporate sectors.

(iv) A build-up of overheating pressures, evident in large external deficits, inflated property and stock market values.

(v) A lack of enforcement of prudential rules and inadequate supervision of financial systems, coupled with government-directed lending practices that led to a sharp deterioration in the quality of banks' loan portfolios;

(vi) Problems resulting from the limited availability of data and a lack of transparency, both of which hindered market participants from taking a realistic view of economic fundamentals;

(vii) Problems of governance and political uncertainties, which worsened the crisis of confidence, fueled the reluctance of foreign creditors to roll over short-term loans, and led to downward pressures on currencies and stock markets; and

(viii) Excessive short term borrowing and long term lending led to maturity mismatches.

Figure 4: Percentage change in EMBIG Spreads (August 2007 to April 2008)


The discussion of internal factors is based on the information in Tables 1 and 2 below. The countries in Table 1 account for 88 percent of the market capitalization of the Global Emerging Market Bond Index (EMBIG).
### Table 1: Selected Emerging Market Economies

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>17.03</td>
<td>3.3%</td>
<td>4.0%</td>
<td>-1.0%</td>
<td>0.0%</td>
<td>3.5%</td>
<td>4.6%</td>
<td>34.78</td>
<td>10.70</td>
<td>87.19</td>
<td>Independently floating</td>
</tr>
<tr>
<td><strong>Latin America</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>1.88</td>
<td>8.7%</td>
<td>8.5%</td>
<td>2.8%</td>
<td>1.1%</td>
<td>-0.2%</td>
<td>30.0%</td>
<td>5.78</td>
<td>8.72</td>
<td>46.12</td>
<td>Managed floating</td>
</tr>
<tr>
<td>Brazil</td>
<td>17.03</td>
<td>5.4%</td>
<td>3.6%</td>
<td>-0.4%</td>
<td>-2.0%</td>
<td>7.2%</td>
<td>15.1%</td>
<td>35.55</td>
<td>11.44</td>
<td>180.33</td>
<td>Independently floating</td>
</tr>
<tr>
<td>Chile</td>
<td>1.72</td>
<td>5.1%</td>
<td>4.4%</td>
<td>-1.5%</td>
<td>-3.0%</td>
<td>7.0%</td>
<td>2.2%</td>
<td>5.95</td>
<td>2.27</td>
<td>16.84</td>
<td>Independently floating</td>
</tr>
<tr>
<td>Colombia</td>
<td>2.65</td>
<td>7.5%</td>
<td>5.5%</td>
<td>-3.4%</td>
<td>1.2%</td>
<td>3.2%</td>
<td>14.13%</td>
<td>7.68</td>
<td>2.48</td>
<td>20.95</td>
<td>Managed floating</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1.59</td>
<td>1.7%</td>
<td>2.3%</td>
<td>-2.7%</td>
<td>-2.1%</td>
<td>9.6%</td>
<td>2.48</td>
<td>0.93</td>
<td>3.52</td>
<td>3.52</td>
<td>US$ as legal tender</td>
</tr>
<tr>
<td>Peru</td>
<td>2.71</td>
<td>3.9%</td>
<td>1.8%</td>
<td>1.3%</td>
<td>2.5%</td>
<td>2.8%</td>
<td>0.2%</td>
<td>2.77</td>
<td>1.05</td>
<td>24.69</td>
<td>Managed floating</td>
</tr>
<tr>
<td>Venezuela</td>
<td>6.92</td>
<td>8.4%</td>
<td>18.7%</td>
<td>7.8%</td>
<td>-1.7%</td>
<td>10.1%</td>
<td>21.9%</td>
<td>5.68</td>
<td>3.43</td>
<td>36.07</td>
<td>Fixed peg</td>
</tr>
<tr>
<td><strong>Emerging Europe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>1.18</td>
<td>6.5%</td>
<td>2.5%</td>
<td>-3.8%</td>
<td>-1.7%</td>
<td>1.8%</td>
<td>21.4%</td>
<td>44.00</td>
<td>8.71</td>
<td>65.75</td>
<td>Independently floating</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.49</td>
<td>1.3%</td>
<td>8.0%</td>
<td>-5.7%</td>
<td>-5.2%</td>
<td>0.2%</td>
<td>12.0%</td>
<td>49.75</td>
<td>5.73</td>
<td>24.05</td>
<td>Plugged exchange rates within horizontal bands</td>
</tr>
<tr>
<td><strong>Central Europe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Russia</td>
<td>12.31</td>
<td>8.1%</td>
<td>9.9%</td>
<td>5.5%</td>
<td>4.0%</td>
<td>-3.8%</td>
<td>13.6%</td>
<td>69.20</td>
<td>12.98</td>
<td>476.39</td>
<td>Managed floating</td>
</tr>
<tr>
<td>Turkey</td>
<td>7.84</td>
<td>4.7%</td>
<td>8.7%</td>
<td>-6.0%</td>
<td>-1.8%</td>
<td>7.4%</td>
<td>17.4%</td>
<td>56.13</td>
<td>12.11</td>
<td>76.51</td>
<td>Independently floating</td>
</tr>
<tr>
<td><strong>Asia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>2.44</td>
<td>11.4%</td>
<td>6.7%</td>
<td>11.2%</td>
<td>0.6%</td>
<td>-1.3%</td>
<td>59.9%</td>
<td>19.72</td>
<td>8.46</td>
<td>1,534.35</td>
<td>Fixed peg</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.59</td>
<td>6.3%</td>
<td>6.7%</td>
<td>2.5%</td>
<td>-1.3%</td>
<td>-0.3%</td>
<td>26.0%</td>
<td>11.81</td>
<td>5.51</td>
<td>56.92</td>
<td>Managed Floating</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2.86</td>
<td>6.3%</td>
<td>2.0%</td>
<td>14.2%</td>
<td>-3.7%</td>
<td>1.1%</td>
<td>25.4%</td>
<td>7.50</td>
<td>1.69</td>
<td>101.09</td>
<td>Managed floating</td>
</tr>
<tr>
<td>Philippines</td>
<td>6.7</td>
<td>7.3%</td>
<td>2.8%</td>
<td>4.3%</td>
<td>-0.2%</td>
<td>-0.3%</td>
<td>9.8%</td>
<td>6.59</td>
<td>3.06</td>
<td>33.75</td>
<td>Independently floating</td>
</tr>
<tr>
<td><strong>Africa</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>1.54</td>
<td>5.1%</td>
<td>6.5%</td>
<td>-7.6%</td>
<td>0.6%</td>
<td>1.6%</td>
<td>46.4%</td>
<td>5.06</td>
<td>1.43</td>
<td>32.94</td>
<td>Independently floating</td>
</tr>
<tr>
<td>Average</td>
<td>6.0%</td>
<td>6.1%</td>
<td>1.7%</td>
<td>0.0%</td>
<td>0.9%</td>
<td>20.2%</td>
<td>20.73%</td>
<td>5.94</td>
<td>165.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sources:**
1. JP Morgan/ Morgan markets
2. Economist Intelligence Unit
3. IMF: De Facto Classification of Exchange Rate Regimes and Monetary Policy Framework, 2006

In order to test for a lack of enforcement of prudent rules and inadequate supervision of financial systems and problems of governance and political uncertainties, the risk assessment done by the Economist Intelligence Unit were used, specifically concentrating on the ratings for the banking sector, political and economic structure.

### Table 2: Risk assessment of selected emerging markets

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Country</th>
<th>Sovereign</th>
<th>Currency</th>
<th>Banking sector</th>
<th>Political</th>
<th>Economic structure</th>
<th>Country</th>
<th>Spread change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>B</td>
<td>BB</td>
<td>BB</td>
<td>B</td>
<td>B</td>
<td>BB</td>
<td>B</td>
<td>23.70</td>
</tr>
<tr>
<td>Chile</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>AA</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>60.20</td>
</tr>
<tr>
<td>China</td>
<td>BBB</td>
<td>BBB</td>
<td>B</td>
<td>B</td>
<td>BBB</td>
<td>BB</td>
<td>B</td>
<td>105.30</td>
</tr>
<tr>
<td>Colombia</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
<td>53.00</td>
</tr>
<tr>
<td>Ecuador</td>
<td>CCC</td>
<td>B</td>
<td>CCC</td>
<td>C</td>
<td>CCC</td>
<td>CCC</td>
<td>CCC</td>
<td>0.30</td>
</tr>
<tr>
<td>Hungary</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>BB</td>
<td>B</td>
<td>B</td>
<td>38.60</td>
</tr>
<tr>
<td>Philippines</td>
<td>BB</td>
<td>BBB</td>
<td>BB</td>
<td>CCC</td>
<td>B</td>
<td>BB</td>
<td>BB</td>
<td>37.60</td>
</tr>
<tr>
<td>Poland</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
<td>57.10</td>
</tr>
<tr>
<td>Russia</td>
<td>BBB</td>
<td>BB</td>
<td>BB</td>
<td>B</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
<td>54.30</td>
</tr>
<tr>
<td>South Africa</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
<td>A</td>
<td>BB</td>
<td>BBB</td>
<td>BBB</td>
<td>134.20</td>
</tr>
<tr>
<td>Turkey</td>
<td>BB</td>
<td>B</td>
<td>BB</td>
<td>B</td>
<td>BB</td>
<td>BB</td>
<td>B</td>
<td>53.60</td>
</tr>
<tr>
<td>Venezuela</td>
<td>B</td>
<td>CCC</td>
<td>CCC</td>
<td>CCC</td>
<td>B</td>
<td>CCC</td>
<td>B</td>
<td>58.60</td>
</tr>
</tbody>
</table>

**Source:** Economist Intelligence Unit (2008)

When combining Tables 1 and 2, it seems that a combination of the following issues is being perceived as problematic for investors: managed exchange rates, current account balances and...
problems relating to the banking sector, politics, economic structure of the countries and the level of short term foreign debt. The results are shown in table 3.

### Table 3: Assessment for Countries most affected

<table>
<thead>
<tr>
<th>Country</th>
<th>Exchange rate</th>
<th>Current Account Balance (% of GDP)</th>
<th>Short-term debt</th>
<th>Banking sector</th>
<th>Political</th>
<th>Economic structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Fixed Peg</td>
<td>11.2</td>
<td>59.9</td>
<td>B</td>
<td>B</td>
<td>BBB</td>
</tr>
<tr>
<td>Colombia</td>
<td>Managed</td>
<td>-3.4</td>
<td>14.1</td>
<td>BB</td>
<td>BB</td>
<td>BB</td>
</tr>
<tr>
<td>Poland</td>
<td>Floating</td>
<td>-3.8</td>
<td>21.4</td>
<td>BBB</td>
<td>BBB</td>
<td>BBB</td>
</tr>
<tr>
<td>Russia</td>
<td>Managed</td>
<td>5.5</td>
<td>13.6</td>
<td>BB</td>
<td>B</td>
<td>BB</td>
</tr>
<tr>
<td>South Africa</td>
<td>Floating</td>
<td>-7.6</td>
<td>46.4</td>
<td>BBB</td>
<td>A</td>
<td>BB</td>
</tr>
<tr>
<td>Turkey</td>
<td>Floating</td>
<td>-6.0</td>
<td>17.4</td>
<td>BB</td>
<td>B</td>
<td>BB</td>
</tr>
<tr>
<td>Venezuela</td>
<td>Managed</td>
<td>7.8</td>
<td>21.9</td>
<td>CCC</td>
<td>CCC</td>
<td>B</td>
</tr>
</tbody>
</table>

**Source:** Economist Intelligence Unit (2008)

It can be argued that in a world of high capital mobility, a pegged or managed exchange rate signifying a low inflation policy attracts large capital inflows. Such an exchange rate together with a declining inflation, boost the investment environment. The problem however is that real exchange rates vary (as a result of inflation because of external factors, such as high oil and food prices) and can appreciate because of the attraction of capital.

This, in turn, leads to decreasing exports and higher imports which widen the current account deficit and then leads to a worsening investor confidence (Schwartz 2007:2).

**WHY IS SOUTH AFRICA AFFECTED SO SEVERELY BY THE CRISIS?**

The sovereign risk spread of South Africa (as measured by the EMBI+) has increased from an historic low of 50 basis points over the US treasury bonds on 18 May 2007 to a historic high of 307 basis points on 17 March 2008 as shown in Figure 5. This is the widest that South Africa traded since the inclusion in the EMBI in December 2002.

South Africa, like most other emerging economies has created a sound macroeconomic environment underpinned by sound fiscal and monetary policies. The accumulation of reserves and the restructuring of foreign debt have reduced external vulnerability significantly during the last couple of years. The question therefore remains – why is South Africa affected so severely by the subprime crisis.

The current account deficit of 7,3% of GDP compared to an average of a surplus of 1,7% of emerging markets and the high short term debt ratio of 46,4 % (compared to 20,2% of emerging markets) remain areas of vulnerability for South Africa as shown in Table 2. This risk is exacerbated by low FDI levels and therefore a high dependency on portfolio flows to finance this deficit.
High inflation and structural economic problems such as electricity supply problems may have negative implications for economic growth. This could lead to more interest rates increases which have negative implications for Government debt servicing and economic growth.

A further slowdown in global demand and financial market turmoil will put additional pressure on the South African Rand. Tightening global liquidity will sustain the risk of a fall in the currency due to portfolio adjustments by highly leveraged international investors (Economist Intelligence Unit, 2008:3).

Increasing interest rates and high debt relative to disposable income could reduce households debt service capacity and therefore affect the assets of banks (Economist Intelligence Unit, 2008:4).

Other problems include higher borrowing from public entities which may negatively affect debt ratios, especially foreign debt ratios. The strategy of the South African Reserve Bank of buying US dollars when conditions have been conducive in order to accumulate reserves has been perceived as intervention in the foreign exchange market. The pending corruption trial of the President of the ANC has also contributed to a political uncertainty in South Africa.

Credit Default Swaps (CDS) provide insurance against a possible default by a sovereign and are perceived by the market as helpful information on a possible negative rating action.

South Africa’s Credit default swaps spreads, currency and international bond spreads do not reflect the underlying fundamentals of South Africa, given the rapid deterioration in all these indicators as shown in Figure 6. It can be concluded that the market view of South Africa’s
credit fundamentals to be deteriorating, compared to similar rated peer countries such as Mexico, Russia, Thailand and Israel which have increased less than those of South Africa.

**Figure 6: Credit Default Swap (CDS) spreads of South Africa**

![Graph showing CDS spreads of South Africa compared to other countries.](image)

**Source:** Bloomberg (2008)

**THE INVOLVEMENT OF CENTRAL BANKS**

In an interview, George Soros made the following comment: “you can't make any unconditional predictions because it very much depends on how the authorities are going to respond now to the situation. But the situation is definitely much worse than is currently recognized. You have had a general disruption of the financial markets, much more pervasive than any we have had so far. And on top of it, you have the housing crisis, which is likely to get a lot worse than currently anticipated because markets do overshoot. They overshot on the upside and now they are going to overshoot on the downside” (Woodruff and Soros, 2008). This view of policy makers raises another question, that is, whether central banks do the right thing.

The widening and deepening of the liquidity crisis, forced major central banks to inject more liquidity, widen the type of collateral accepted, cut interest rates and, in the case of the US Federal Reserve Bank, extended the type of borrowers to be able to have access to the discount window to broker-dealers that function as primary dealers (JP Morgan, 2008: 11). The question to intervene in a financial crisis by central banks becomes a very difficult one to answer. On the one hand by providing liquidity to the market, central banks are not just helping out financial institutions in need of cash, but also those institutions that have taken excessive risk and deserve to go bankrupt. This implies that reckless institutions may be even more reckless the next time around. But on the other hand, imposing punishment in a time of need may cause an inter-bank market meltdown and as a result of asymmetry of information, clients
of the banks cannot judge the actions of their banks and may cause a lot of innocent bystanders to suffer personal losses (Wyplosz 2007:2-3). All central banks have the responsibility of assuring orderly and functioning financial markets. Should the interbank market dries up, the central banks have no choice but to inject liquidity into the system.

According to Buiter and Sibert (2007:1-6), the mandate for financial stability of central banks as lenders of last resort is to lend freely in times of crisis at a penalty rate against collateral that would be good in normal times but may be impaired in times of crisis. Thus, the central bank has to become a market maker of last resort by accepting a wide range of collateral in repos and in collateral loans and advances at the discount window. A central bank, furthermore, has to accept illiquid private securities as collateral in order to establish a valuation of these securities.

Buiter and Sibert (2007:8), argue that central banks have not been effective in times of financial crisis. Investigating the market collapse of 1987, the Russian default of 1998 and the technology bubble of 2001 where central banks only lowered the short term risk-free interest rate and provided vast amounts of liquidity against high-grade collateral only and nothing against illiquid collateral. They further argue that excessive liquidity is created in high grade instruments and that a smaller amount of liquidity injections is needed if central banks focus on illiquid securities.

Instead of lowering its primary discount rate, the Fed should have created a market by expanding the set of collateral which there is no market price to create a benchmark for valuating illiquid assets. The bailout of the illiquidity should be costly enough that those paying the price will remember it during the next credit boom and this should in theory contain “moral hazard” (Buiter and Sibert 2007:1).

CONCLUSION

The uncertainties to the global outlook as a result of the US subprime crisis have caused a general reprising of risk which is reflected in measures such as implied equity risk premiums, currency volatilities and emerging market bond spreads. The tendency for spreads to widen is a reflection of both an uncertain global outlook and selling pressures of investors that have suffered losses concentrated in the subprime area.

By historic standards, the reprising of emerging market foreign debt is but a small blip which would indicate increasing signs that emerging markets are decoupling from the USA economy. Thus only those countries with high short term external financing needs and those who are perceived less transparent by investors are at risk of a sudden capital withdrawal. This risk in perception stems from the experience in previous financial crises. Investigation of previous financial distress episodes shows that financial distress is a result of both domestic and external factors that contribute to the dramatic deterioration in sentiment by foreign and domestic investors. At this point of the crisis, it is clear that with regard to sentiment towards emerging markets, external factors are dominant.

From the analysis of JP Morgan (2008), it would seem that liquidity and a mispricing of risk are the dominant factors in the current financial turmoil. Contagion however, is more difficult to assess at this point as the outlook for the world economy is still uncertain. It is however widely perceived that the USA economy is turning into a recession which could have a negative impact on those countries linked by trade with the USA. Commodity cycles seem to be supportive for a
majority of emerging markets, as the high price of oil provides the opportunity to increase official reserves and lead to current account surpluses for those emerging economies exporting oil.

As investors re-price risky assets, prices of all sorts of instruments will adjust to new levels. When looking at how emerging markets countries risk spreads have been influenced and a reprising of risk is evident. Risk spreads have increased in all emerging markets but Chile (60,2%), Colombia (53%), Poland (57,1%), Russia (54,3%) South Africa (134%), Turkey (53,6%) and Venezuela (58,6%) were most affected by the reprising of risk.

A combination of the following issues is being perceived as problematic for investors: managed exchange rates, current account balances and problems relating to the banking sector, politics, economic structure of the countries and the level of short term foreign debt.

The sovereign risk spread of South Africa (as measured by the EMBI+) has increased from an historic low of 50 basis points over the US treasury bonds on 18 May 2007 to a historic high of 307 basis points on 17 March 2008. This can be attributed to the current account deficit of 7,3% of GDP and the high short term debt ratio of 46,4 %. High inflation and structural economic problems such electricity supply problems may have negative implications for economic growth.

Other problems include higher borrowing from public entities which may negatively affect debt ratios, especially foreign debt ratios. The strategy of the South African Reserve Bank of buying US dollars when conditions have been conducive in order to accumulate reserves has been perceived as intervention in the foreign exchange market. The pending corruption trial of the President of the ANC has also contributed to political uncertainty in South Africa.

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