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# Exploring the Causes of South African Emigration

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## **ABSTRACT**

This paper examines and explains emigration from South Africa from 1980 to 2000. The paper uses real option theory, the theory of emotions and human capital theory in its analysis. The factors expected to impact on emigration are discussed. These are institutional restrictions on emigration, violence, government redistribution, wages, unemployment and uncertainty. The paper then creates an index of the financial incentive to emigrate and uses this index to show that the main driver of emigration during the period was the real wage rate differential with politics as a secondary cause. It is argued that violence and unemployment probably contributed to the huge increases in emigration experienced during the late 1990's.

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## Introduction

This paper discusses the reasons that South Africans are leaving South Africa and so explains trends in emigration. Little economic analysis or even academic research has been done on the causes of emigration from South Africa. The research that has been done has pointed to numerous causes for emigration. In his book on emigration, Van Rooyen uses largely anecdotal evidence to argue that the major cause of emigration from South Africa is violence (Van Rooyen, 2001). Kaplan argues that political events were historically the major cause of emigration but that economic factors have become increasingly important (a point broadly supported in this paper) (Kaplan, 1998). The Mattes and Richmond paper is extensively discussed in this paper. They point to a range of possible factors that could cause emigration, but their emphasis on the low numbers of people wanting to emigrate<sup>1</sup> (Mattes and Richmond, 2000).

The shortage of previous work in the area means that this paper “starts from the ground up” in its analysis. This paper exclusively looks at the impact of incentives and motivation on emigration.

### Structure of the paper

Structuring the paper was complicated by the fact that emigration is inherently a multifaceted phenomenon with many different issues impacting on the decision. The approach chosen was to present the work in a manner that best enabled the reader to appreciate the argument made. The paper broadly follows a structure whereby factors that are expected to have impacted on emigration over the whole period are discussed first. The paper then moves onto those issues that probably started to impact on emigration during the late 1990’s.

The chapters and sections in this paper are briefly described below:

#### *Chapter 1: Introductory chapter*

This chapter introduces the topic. Its purpose is to clarify data issues and provide the basis for later analysis. This chapter presents evidence on emigration trends and outlines survey evidence of the causes of emigration.

#### *Chapter 2: Theoretical Discussion*

The theoretical chapter introduces the theory required to understand emigration from South Africa. Certain novel theoretical discussions are introduced.

*Section 1:* Section 1 outlines the human capital model of individual decision making about emigration. This chapter introduces real option theory to the emigration literature.

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<sup>1</sup> This is probably the result of the atmosphere in which they wrote their paper. They refer to figures saying that 75% of the skilled intended to emigrate. With this figure as an anchor point emigration is low from South Africa. This says more about the anchor point than the sustainability of emigration from South Africa.

*Section 2:* Section 2 outlines the theory of family and group decision making about emigration.

*Section 3:* Section 3 outlines a theoretical approach to understanding decision making about violence and crime. This chapter introduces certain results from psychiatry and anthropology into economics.

### Chapter 3 Restrictions on emigration

This chapter outlines the causes of the trend in emigration from 1980 to 2000. Immigration is tightly controlled in the destination countries. This chapter outlines the structure of these restrictions and how they have changed during the period under review.

### Chapter 4 Financial and political incentives to emigrate

This chapter presents an index of the financial incentive to emigrate. It shows that emigration follows the index quite closely for the period under review. The discussion includes the following sections:

- Part 1: Index of the financial incentive to emigrate
- Part 2: Using the index to predict emigration
- Part 3: Sensitivity analysis
- Part 4: Implications of the model for the age/emigration profile
- Part 5: The impact of uncertainty during the 1980's and 1990's

This chapter shows the importance of financial incentives to emigration as well as the importance of political events.

### Chapter 5

Chapter 5 discusses the impact of unemployment and crime on emigration. Both are primarily expected to have impacted on emigration in the late 1990's.

*Section 1:* Section 1 discusses the impact of unemployment on emigration during the late 1990's. It shows that unemployment increased across all age groups, races and skill levels. It discusses why this evidence is not contradicted by evidence of a tight labour market for the skilled.

*Section 2:* Section 2 outlines the levels of crime and violence experienced by South African and more particularly skilled South Africans. These results are connected to emigration.

## Chapter 6: Conclusions

*Chapter 6:* Chapter 6 concludes the paper by outlining conclusions drawn in the paper and making predictions about the future nature of emigration.

### Constraints faced in writing the paper

This paper faced numerous data constraints. There is a severe lack of data on emigration which makes econometric analysis difficult if not impossible. There is a lack of information on who emigrates, and where they come from. Furthermore there is a lack of time series data on issues such as skilled wages, skilled unemployment, the incidence of government spending and crime. The result is that this paper is largely data driven. The mode of analysis and the evidence presented are often made in reaction to data problems faced in discussing this issue.

### Lack of prior research

This paper is written in a context in which there are very few broadly accepted reasons for the increase in emigration from South Africa. In light of these issues the paper needs to prove many more basic or preparatory points than would be necessary in a more mature field. This means that the paper often covers issues that the reader may think are self evident. Many readers though would find the arguments contentious.

### Contributions made in this paper

This paper introduces three new arguments. In reaction to the problems experienced doing econometric analysis a **model of the financial aspects** of the emigration decision is presented and used to discuss emigration. This model facilitates an analysis of the age profile of emigration. Furthermore it allows the first use of the real option theory to analyze the emigration decision (real option theory to analyze the migration decision has not occurred in the comprehensive literature review undertaken for this paper). The use of **real option theory** was **crucial** to understanding the impact of political uncertainty on the emigration decision. In particular it overcame a number of seeming paradoxes that inhibited analysis. Thirdly the paper combines **empirical results from anthropology and neuroscience** with the literature on **emotions and evolutionary theory**. Again this discussion allowed a greater understanding of the phenomena discussed as well as the solution of a number of paradoxes. This discussion is new in the sense that it has not appeared in the literature review undertaken for this section of the paper. This means that it is probably new in the economics literature but may also be new in the psychology/psychiatry literature.

### Issues not discussed in this paper

Three issues are not discussed in this paper. The first is the impact of demographic forces on the rate of emigration. The second is the impact of taxation and expenditure on emigration. The third is the impact of income inequality on emigration. All three

are expected to be relevant but space, time and data considerations<sup>2</sup> meant that they have not been included.

The paper begins with a discussion of the available evidence on emigration from South Africa and the reasons for this phenomenon.

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<sup>2</sup> Both taxation and expenditure, and the impact of income inequality were left out of the paper due to the inability to make firm conclusions based on the available data.

## Chapter 1: Introductory Chapter

This chapter introduces the topic. It shows the following:

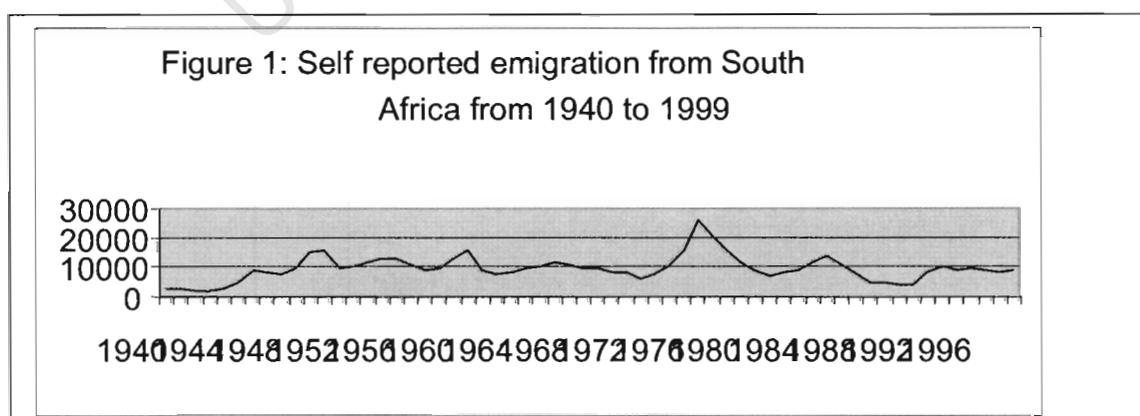
- Trends in emigration from South Africa
- Who is emigrating
- Survey evidence on why people are emigrating

This chapter provides the groundwork for the discussion in the rest of the paper. It shows that emigration in South Africa increased over the late 1990's. It discusses the various reasons that many skilled South Africans are dissatisfied with life in South Africa.

### Emigration trends

There are two sources for time series data on emigration. The first is self reported emigration at border posts (including airports). This data is published by the Central Statistics services. This data suffers from the cost associated with reporting that one expects to emigrate. The cost being that the emigrant has to satisfy the state that they are not leaving behind unpaid debts and the like. Furthermore there is evidence that the data is being collected less accurately over time. The second source of data is the records of *immigration* in the destination countries. These data are less open to the problem of self-reporting since the typical South African emigrant is well educated and wants to enter the formal economy of the destination countries. Such emigrants have a strong positive incentive to report immigration (Kaplan et al. 1999). The Central Statistics Services is expected to be less accurate but shows emigration trends back to the 1940's and includes more detailed information on self declared emigrants. The data from the destination countries is more accurate but is only available back to 1987 for the USA and Canada and 1980 for Australia, New Zealand and the United Kingdom.

The graph below shows self reported emigration from South Africa back to the 1940's.

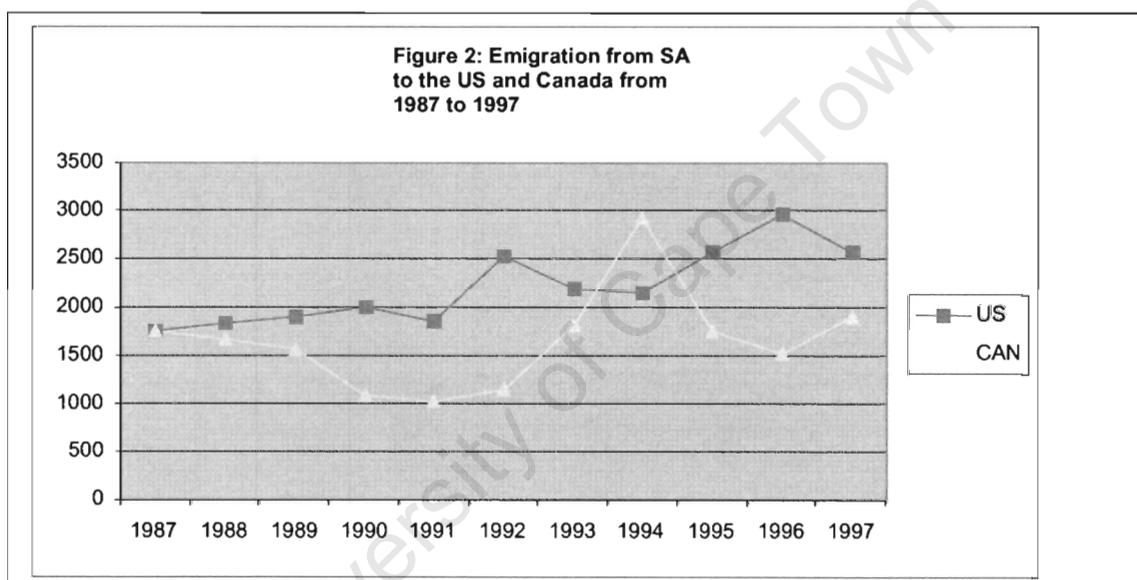


Source: Central Statistics Service

The graph clearly shows peaks after significant political events. The trend suggests that the major political events of the last 50 years have all been associated with peaks in emigration. The imposition of Apartheid in 1948, the Sharpsville massacre and the

banning of the ANC in 1962, the Soweto riots in 1976 and the Rubicon have all been associated with local peaks. Since these figures reflect self reported emigration they may reflect a certain amount of “protest reporting” as emigrants showed their rejection of the state and society. The fact remains though that these figures suggest that the highest level of emigration was experienced during the 1970’s and not the 1990’s as is commonly suggested.

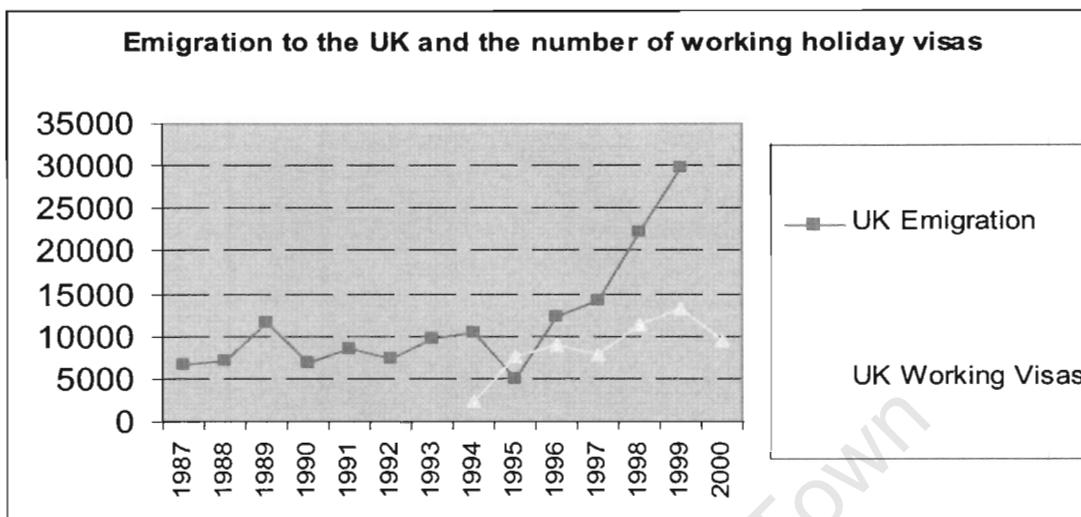
The evidence from the destination countries is more accurate but covers a limited number of years. The self reported emigration figures suggest that the UK, New Zealand, Australia, the United States and Canada absorbed 75 percent of emigrants (Kaplan et al, 1999). Additionally survey evidence suggests that these are the most desirable destinations (Mattes and Richmond, 2000). The graph below shows emigration figures to the US and Canada, the two smallest emigration destinations (Emigration is defined by the UN as an expected stay of two years or more) (Kaplan et al. 1999).



Source (Canada (Kaplan et al, 1999) ), Source for USA (INS service USA)

Trends in emigration to the UK are shown in the graphs below. The first graph shows the number of immigrants to the UK and the number of South Africans going across on working holiday visas (these are not classified as immigrants by UK authorities). The second graph shows the number of South Africans being granted permanent residence in the UK or Grant of Settlement.

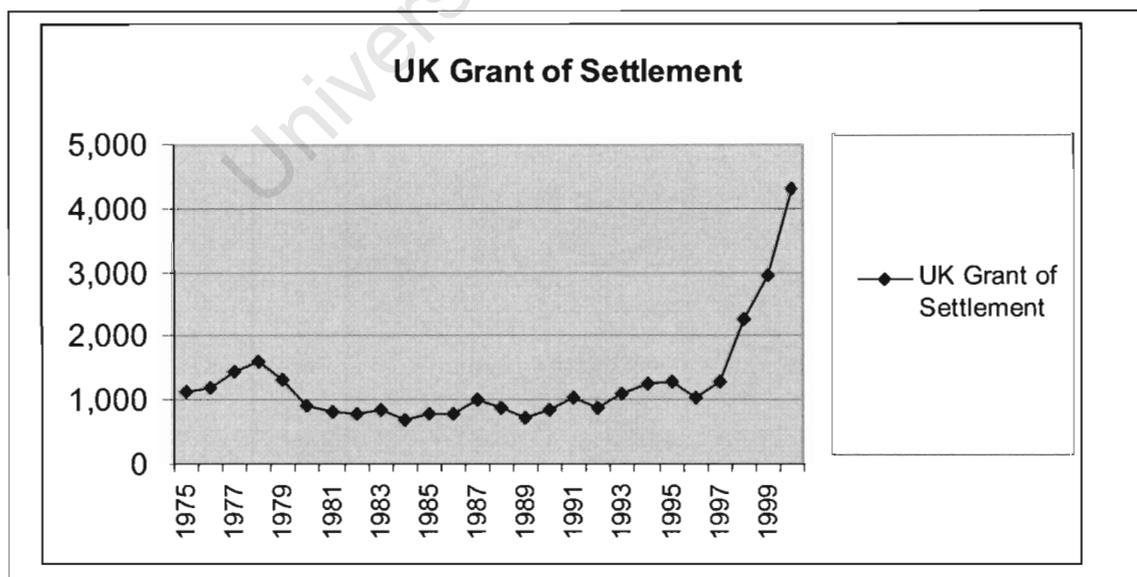
The graph below shows emigration to the UK from 1987 to 1999 (UK immigration authorities) and the number of South Africans going across on working holiday visas (South Africans were only allowed onto the working holiday visa program after 1994 when South African entered the commonwealth):



**Figure 1** The above graph shows the number of South Africans emigrating to the United Kingdom from 1987 to 1999 and the number of South Africans going to England on Working holiday visas. Source (UK Home Office)

The graph above shows a dramatic increase in the number of South Africans emigrating to the UK during the late 1990's.

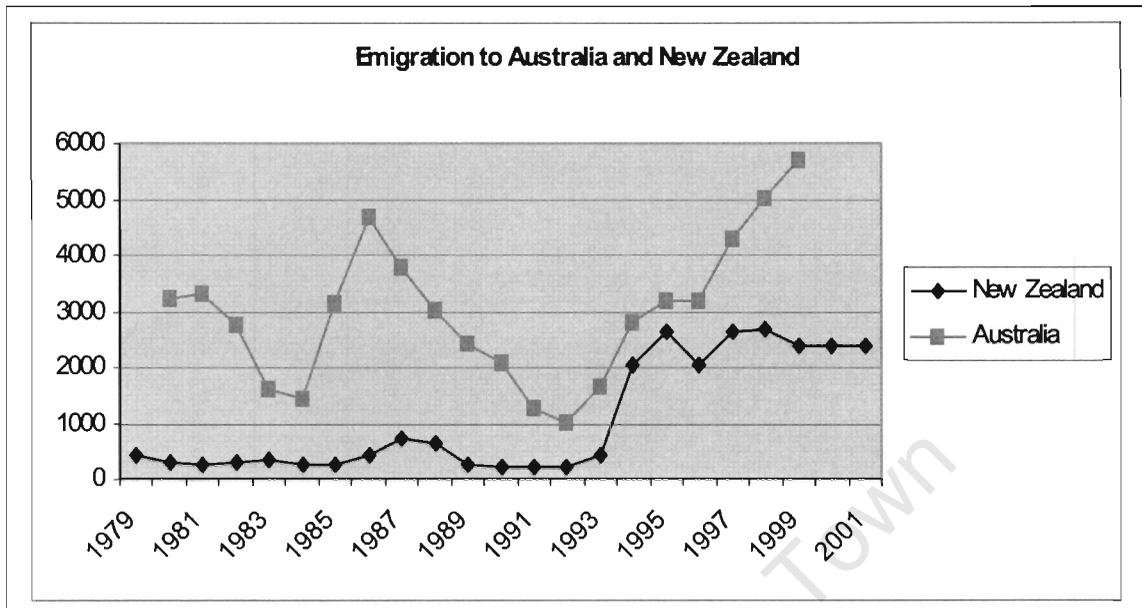
The graph below shows the number of South Africans granted permanent residence in the UK or Grant of Settlement.



**Figure 2** The graph shows the number of South Africans given permanent residence in the UK (Source UK Home Office)

The graph again shows a dramatic increase in the late 1990's.

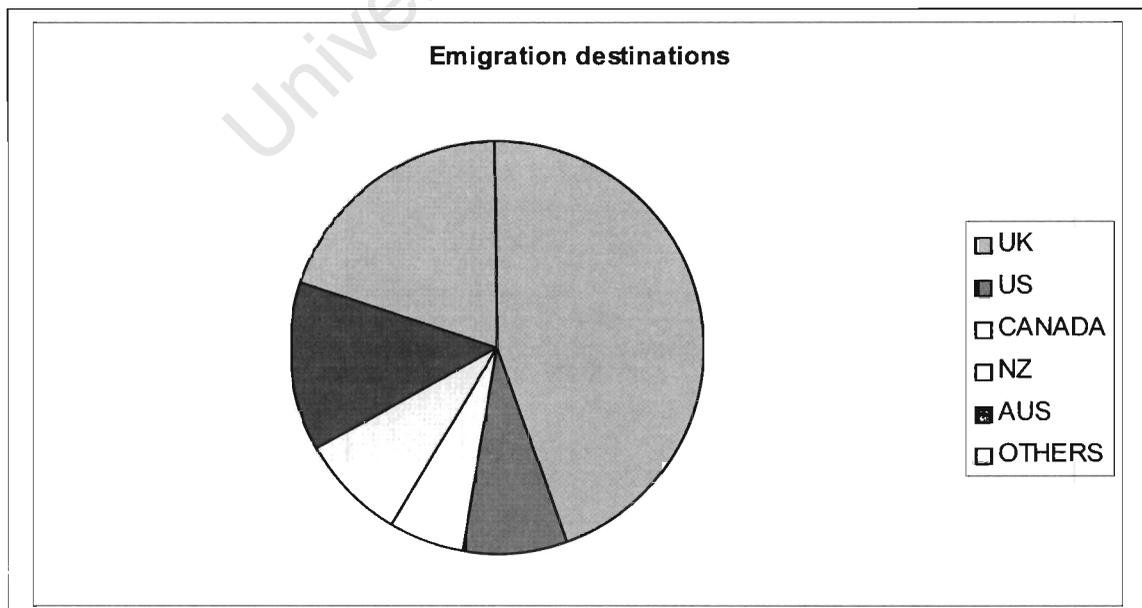
The graph below shows New Zealand and Australian emigration figures from 1980 to 2000 and 2001.



**Figure 3** The above graph shows the number of South Africans emigrating to Australia and New Zealand from 1980 to 2000. Source New Zealand Statistical Services and the Australian Department of Migration and Multicultural Affairs.

The three graphs above clearly demonstrate an increasing rate of emigration from South Africa during the 1990's.

The proportion of emigrants going to the different destination countries in 1997 is shown below: (figures from Kaplan et al, 1999):



**Figure 4** The graph above shows the proportion of South Africans emigrating to the different destination countries. Source: Kaplan et al, 1999

As the graph shows the two destination countries with the highest emigration figures are Australia and the United Kingdom. This paper will evaluate the reasons for emigration to all five major destination countries. Due to data and space constraints at times the paper will narrow its focus to a selection of these destination countries.

Of those emigrating approximately 45% are professionals, 15% are managers and 33% have other qualifications (Kaplan et al, 1999). Thus the emigration trends described above represent a brain drain in the sense that the most educated members of South African Society are leaving. (Kaplan et al, demonstrate that South Africa is experiencing a brain drain in the sense that South Africa has had a net loss in skilled individuals due to migration. The graph below shows the age of profile of self-declared emigrants (Central Statistical Services):

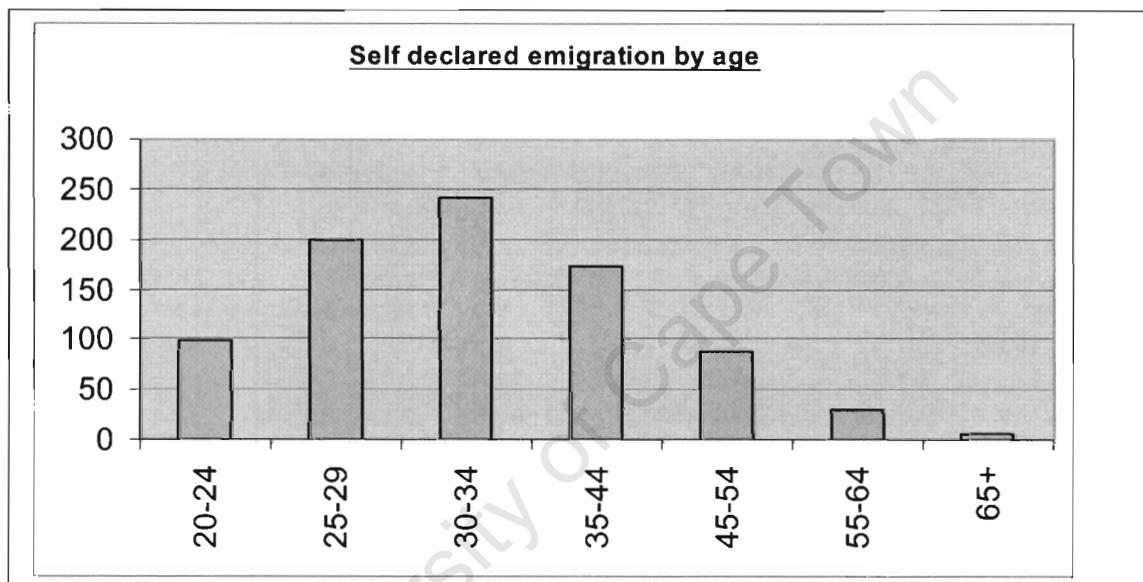


Figure 5 The above graph shows the age profile of self declared emigrants. Source: Central Statistical Services.

The graph shows a typical age/emigration profile. Emigration peaks in the early 30's and drops off with the older age groups. Younger emigrants are less likely to report that they are emigrating therefore one would expect the true age profile to show a younger profile.

### Reasons for emigration

A study by Mattes and Richmond in Crush et al. (2000) surveyed currently employed skilled South Africans on their levels of dissatisfaction with South Africa and their expectations about life in the destination countries. These results are used as a starting point for the analysis and to analyze issues for which there is little alternative evidence. The methodology used will be discussed and then the main results of the survey will be discussed.

### Survey Methodology

The survey reviewed a randomly selected representative sample of skilled South Africans. The definition of a skilled South African was:

1. A South Africa citizen
2. 20 years or older
3. Who has matriculated and possesses a Technikon diploma or university degree
4. Who is currently economically active.

The AMPS survey was used to establish that the size of this skilled population in South Africa is 1.6 million. 4250 telephone calls were made to obtain a representative sample of 725 interviews. The results of the survey are discussed below.

### Survey results

The survey covered a wide range of issues. The ones discussed here are:

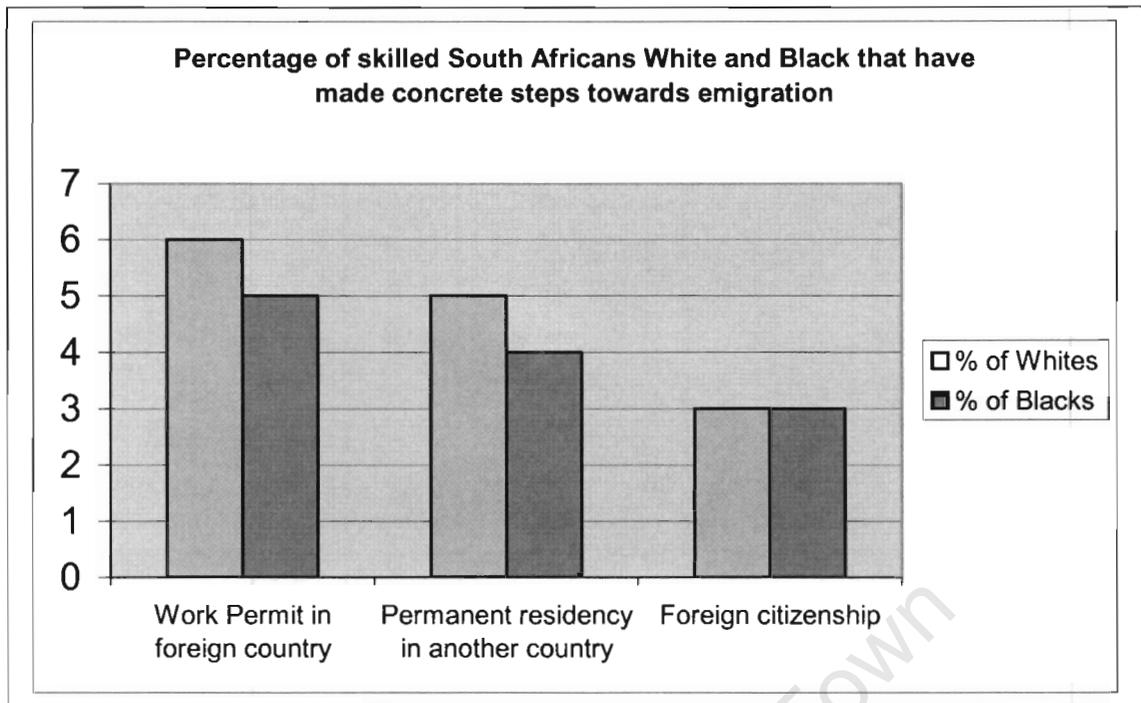
1. Friends and family overseas
2. Steps taken to emigrate
3. Sources of dissatisfaction in comparison to overseas

### Friends and family overseas

Substantial past emigration from South African has lead to South Africans having extensive contacts overseas. Crush reports that 19% of skilled South Africans had a member of their immediate family overseas, 36% had a member of their extended family overseas, 59% had a close friend overseas, 40% knew co-workers who had emigrated and 57% knew someone in their profession that had emigrated. 27% of skilled South Africans are in contact with overseas professional organizations, and 7% are in contact with overseas recruitment agencies. Skilled South Africans main contact with overseas is through friends, acquaintances and family.

### Applications for Emigration documentation

The number of skilled South Africans who are in the process of applying for overseas official documentation is a good measure of how many skilled South Africans are readying themselves to emigrate. The graph below shows the proportion of skilled South Africans who are applying for various sorts of documentation:



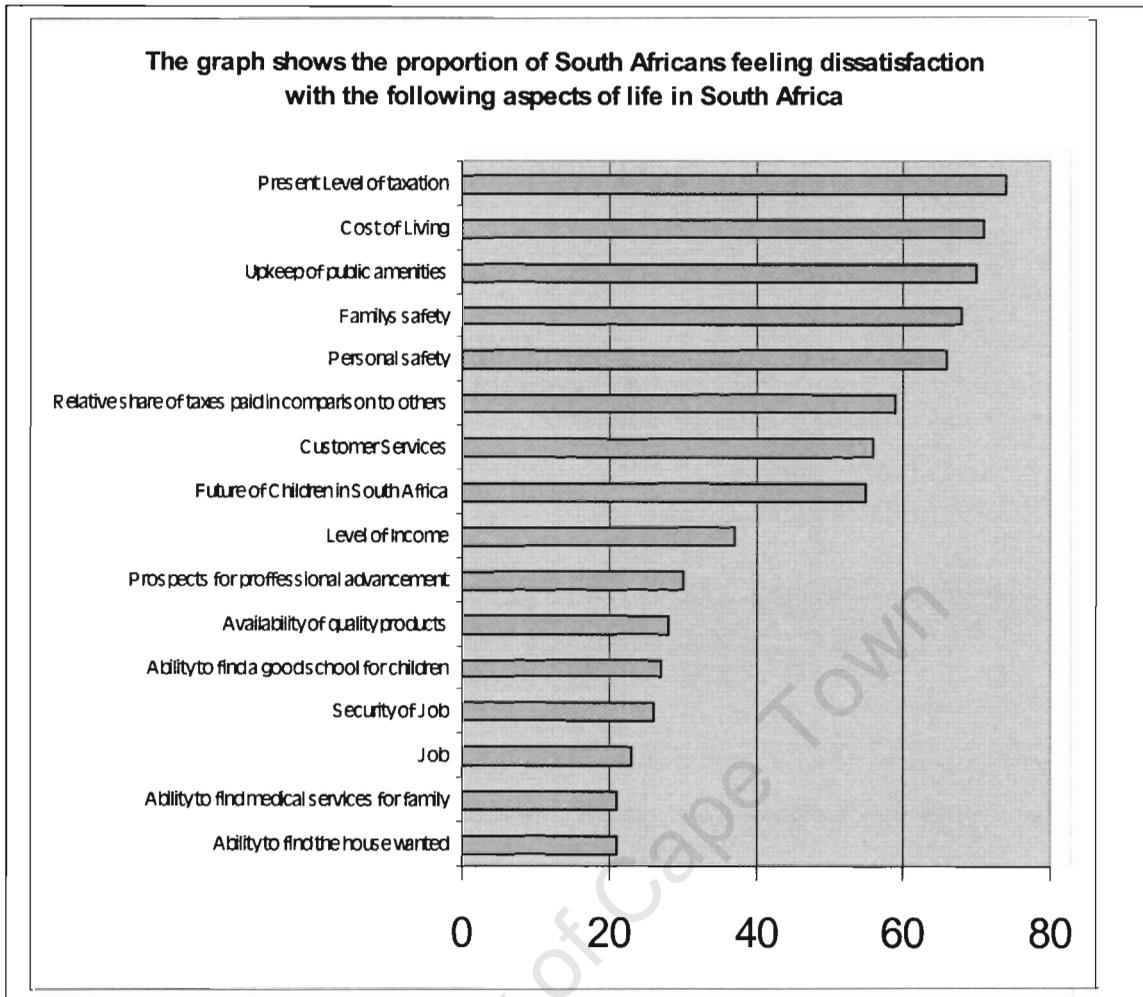
**Figure 6** The proportion of skilled South Africans who have applied for foreign documentation by race group. Source (Mattes and Richmond. 2001)

The graphs demonstrate that there is little difference between the proportion of skilled black and white South Africans emigrating. In numerical terms it implies that approximately 80 000 skilled South Africans are applying for work permits, 64 000 are applying for permanent residency and 48 000 are applying for foreign citizenship.

These numbers are much larger than the actual number of skilled South Africans emigrating. This implies that a substantial proportion of South Africans who have applied to emigrate are not emigrating. Combined with the large numbers of foreign passport holders in South Africa these statistics suggest the possibility of a “emigration pool” who have applied to emigrate but do not actually do so.

Sources of dissatisfaction

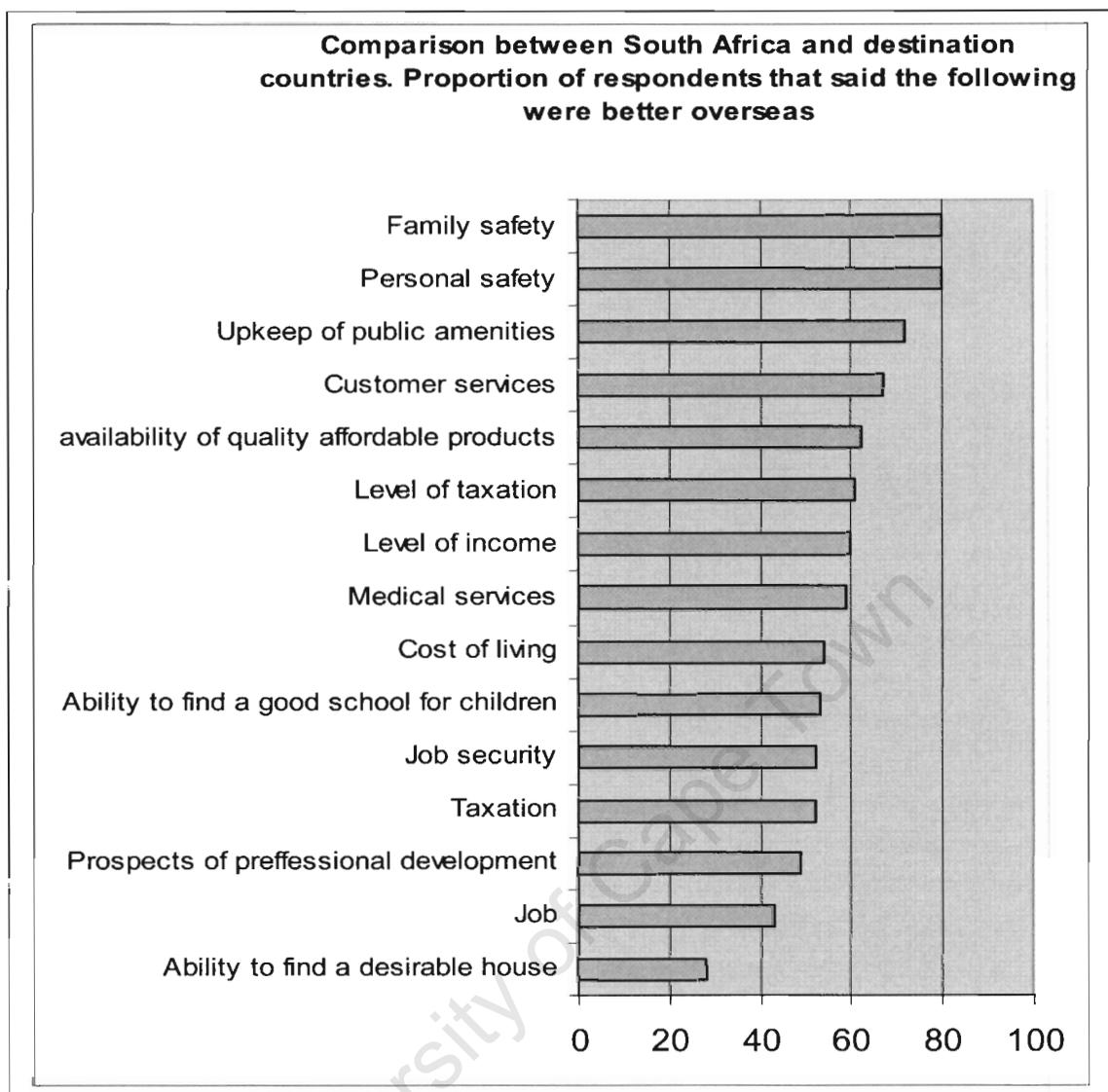
The table below shows skilled South Africans’ reasons for dissatisfaction with life in South Africa:



**Figure 7** The graph above shows the proportion of South Africans that felt dissatisfied with the factors above. Source (Mattes and Richmond, 2001)

The graph reflects high levels of dissatisfaction with many aspects of life in South Africa. Concerns about the real value of incomes are picked up by concerns about cost of living. Other widely held reasons for dissatisfaction include safety and security. Concerns about taxation are paramount. This paper does not discuss the impact of taxation and expenditure. Firstly there are problems working out the incidence of expenditure or taxation. Due to this issue and length considerations this issue is not dealt with in this paper.

The graph below shows how skilled South Africans regard conditions in the destination countries in comparison to South Africa. The graph shows the proportion of respondents who said that life was better overseas with regards to the following criteria.



**Figure 8** The above graphs show the proportion of South Africans that felt the above factors were superior in the destination countries. Source (Mattes and Richmond, 2001)

### Reasons for dissatisfaction with South Africa amongst skilled South Africans

The survey showed that skilled South Africans were dissatisfied with a wide range of issues in South Africa. These can be roughly grouped into three categories. The first is safety and security concerns, the second is government expenditure and taxation and the third is real income issues and job prospects. For instance:

- 80% of skilled South Africans felt that they and their families would be safer and securer in the destination countries.
- 55% of skilled South Africans were dissatisfied with the future of their children in South Africa and 65% of skilled South Africans felt that their children's future would be superior overseas.
- 60% of skilled South Africans felt that incomes were higher overseas
- Over 60% of skilled South Africans were dissatisfied with the cost of living

These issues will be discussed in greater depth in later chapters. The survey results provide justification for the theoretical and empirical approaches taken in this paper (Mattes and Richmond, 2000).

## Chapter 2: Theoretical Chapter

This chapter introduces the theory used in later chapters of the paper. It is divided into three sections:

- Individual decision making
- Family and group decision making
- Fear and its impact on emigration

The theory introduced in this chapter provides the basis for empirical discussions later in the paper.

### Section 1: Individual Decision making

This paper uses the human capital approach. Sjaastad in his 1962 paper introduced the method of analyzing the migration decision as an investment decision (Sjaastad, 1962). This was a departure from previous theory that analyzed migration as a response to differences in relative wage rates. The determinants of the decision can be represented by the equation below:

$$PV_{jk} = \sum ((E_{jt} - E_{kt}) / (1+r)^t) - \sum (C_{jt} - C_{kt}) / (1+r)^t \quad (1)$$

E stands for earnings in source country j and destination country k in time t. C stands for costs in the source and destination countries. r stands for the migrants' discount rate. When the PV of emigrating is greater than zero the person will emigrate.

The migrant invests in the costs of migrating in the hope of receiving a stream of benefits over his lifetime that provides a positive return to the costs. Sjaastad discussed a wide range of incentives and disincentives that the migrant faces.

#### The costs of migration

The costs of migration that Sjaastad discusses include the actual monetary outlay that is necessary to move as well as the opportunity cost of earnings foregone while the migrant moves and searches for a new job. There are also the psychological costs of leaving family, familiar surroundings and people. Traveling to visit family and friends can impose an additional cost of living in the new location.

#### The benefits of migration

The benefits of migration include an increase in the migrant's real earnings stream. This includes benefits from higher lifetime wages, changes in the cost of employment and benefits that the migrant receives in his role as consumer (through differences in the prices of goods that the migrant will consume). Furthermore the migrant faces a positive or negative benefit from his preference for his destination over his former residence. Finally there is the satisfaction or dissatisfaction that the migrant accrues in the process of traveling to his new place of residence. This dissatisfaction includes the dissatisfaction that results from being far away from friends and family (Sjaastad, 1962).

This paper shows a few extensions to Sjaastad's paper. The sections discussed are:

- The impact of real wages
- The impact of unemployment on expected real wages
- The impact of the exchange rate on the benefit from emigrating
- The impact of uncertainty

These will be discussed in turn.

### Real wages and the migration decision

“Differences in net economic advantages, chiefly differences in wages are the main causes of migration” (Hicks, 1932).

The expectation that a migrant will get a higher real wage in the destination country has been a powerful historical driver of international migration. It is widely argued that migration from Europe to the Americas was caused by higher real wages in the New World (Hatton and Williamson, 2001).

### The spending power of the mean real wage

Differences in real wages continue to be the main explanatory variable in much empirical work on migration (for instance see Todaro (1969)). The migrant is interested in the goods and services that the real wage received in the destination location can purchase. When real wages are higher in destination countries this provides a powerful incentive to move to the destination country. The real wage is determined by the actual wage (and associated benefits) as well as the price of the goods and services that the migrant will expect to spend his money on.

### The impact of government taxation and expenditure on emigration

In almost all countries government taxation and expenditure has a large impact on individuals' income levels. The impact of government on the migration decision can be neatly included into Sjaastad's description of the migration decision:

$$PV_{jk} = \sum ((W_{jt} - T_{jt} + B_{jt}) - (W_{kt} - T_{kt} + B_{kt})) / (1+r)^t - \sum (C_{jt} - C_{kt}) / (1+r)^t \quad (2)$$

Where W stands for the before tax wage in countries k and j, T stands for the level of taxation and B stands for the level of benefits that the migrant expects to receive from the state in both countries. C stands for the costs of migration.

The important differential for the migrant the difference between the level of taxation and the level of benefit received. Countries such as Sweden may have high levels of taxation but they also have high levels of government benefits. Whereas a country such as the United States may have low levels of taxation but also lower levels of government benefits.

Research on migration within Canada has shown that differences in levels of spending as well as the composition of government spending induce migration. Higher levels of

per capita spending on health and education were associated with higher levels of in migration. Levels of unemployment benefits also induced migration or retarded it (Day, 1992). Shaw found that fiscal variables were becoming more important in inducing internal Canadian migration in comparison with historically important variables such as wage rates (Shaw, 1986).

Therefore an increase in the difference between taxation by the state and the benefits received from the state can be expected to induce emigration *ceteris paribus*.

### The impact of unemployment on expected real wages

Unemployment impacts on the migrants' decision in two ways. Todaro (1969) discussed the impact of unemployment on the attractiveness of the labor market. Unemployment also impacts on the time it takes for the migrant to integrate or assimilate into the destination labor market.

Todaro in his 1969 paper pointed out that the expected real wage for a migrant in an area needs to be adjusted for the likelihood of finding employment. This is necessary in order to provide a measure of the attractiveness of a given market. To take this into account Todaro suggested that the wage that the migrant expects in the destination country should be multiplied by the probability of finding employment to find out how attractive the labour market is (Todaro, 1969).

$$PV_{jk} = \sum ((p_d \cdot W_{jt} - p_s \cdot W_{kt}) / (1+r)^t - \sum (C_{jt} - C_{kt}) / (1+r)^t) \quad (3)$$

The symbols stand for the following: W (wages in the source and destination country),  $p_d$  (probability of finding employment in the destination country) and  $p_s$  (probability of finding employment in the source country). The rest of the symbols have the same meaning as in the equation described above.

This equation compensates for the fact that areas with high real wages may also have high unemployment rates. For instance during the Great Depression when wages in the rural areas of the United States were lower than in the urban areas, high urban unemployment pushed workers from the urban to the rural areas.

The time a migrant takes to find a job in the destination country is very important to the migration decision. Liquidity constrained migrants have to save in South Africa to finance this period of search in the destination countries. This initial cost of searching for a job could be taken as a once off cost for the migrant.

When job applicants are abundant firms won't have an incentive to search for workers: workers have to seek out the firm. The firm only pays the cost of choosing between the workers "standing in a line" outside their door. When suitable job applicants are scarce the firm has an incentive to bear the cost of searching for workers. When firms are searching for employees the search cost for immigrants (and all prospective job seekers) in the destination country can drop to zero. In extreme cases where firms recruit in South Africa and pay relocation costs they bear the entire pecuniary costs of migration. In this case the costs of emigration for the migrant can fall below zero. Examples of firm based search include the direct recruitment of employees by Microsoft in South Africa and the opportunities for relocation provided

by international firms. Such firms explicitly use the attractiveness of relocation possibilities for potential migrants in their recruitment efforts. Thus tight labour markets are expected to be very attractive for migrants since the costs of emigration are lower.

In summary unemployment enters into the migration decision in two ways. Firstly the expected attractiveness of the labour market as discussed by Todaro includes the probability of employment on an ongoing basis. Secondly unemployment impacts on the cost of searching for the first job in the destination country (Search theory is discussed in greater detail in the next section).

### The impact of the exchange rate on the benefit from emigrating

While a weak currency clearly provides an incentive to the migrant to emigrate, it also makes it more expensive to emigrate. This is shown with the equation below:

$$PV_{\text{emigrating}} = [(W_d((b_{td} + (1 - b_{td}))) - W_s((b_{ts} \times e) + (1 - b_{ts}))) / r - C_d] / e \quad (4)$$

$PV_{\text{emigration}}$  = the present value of emigrating (assumed to be a perpetuity),  $W_d$  is the wage in the destination country,  $W_s$  is the wage earned in the source country,  $b_{ts}$  is the proportion of income spent on tradable goods in the destination country,  $b_{td}$  is the proportion of income spent on tradable goods,  $e$  is a measure of the weakness or strength of the currency in the source country (real exchange rate) and  $C$  is the cost of emigrating.

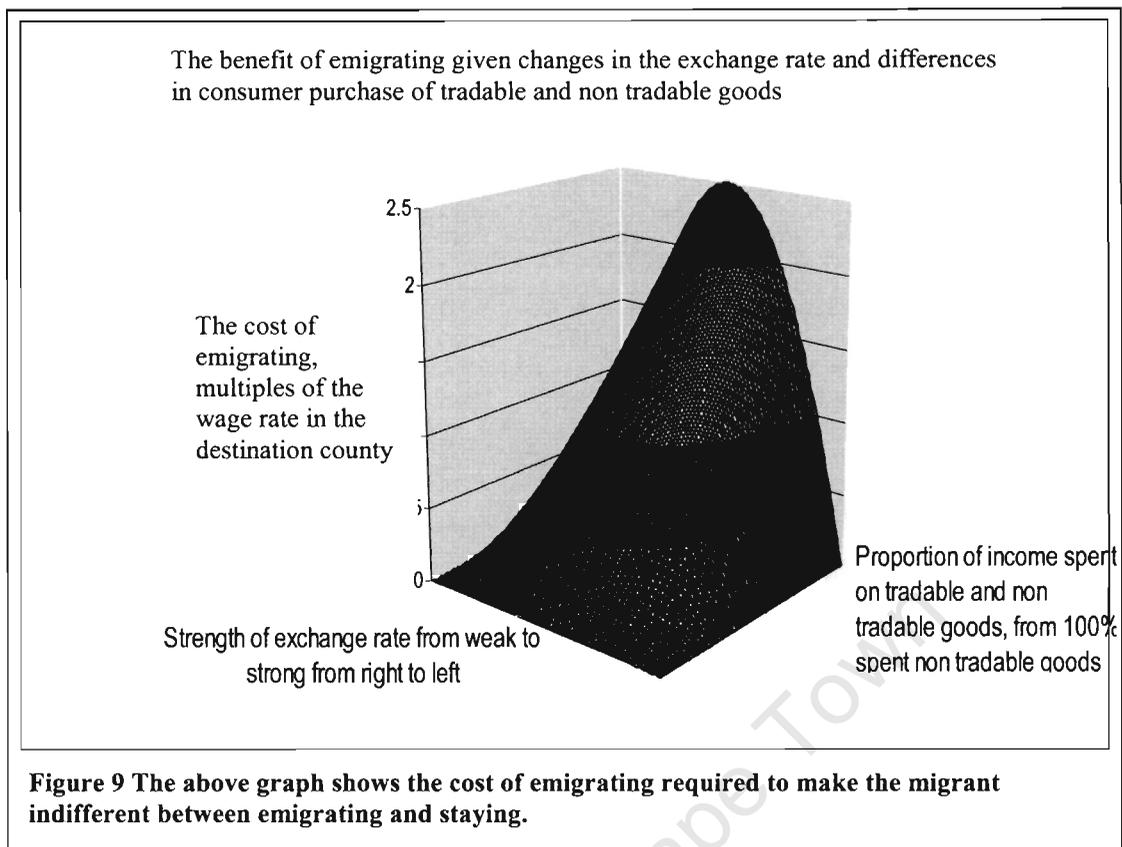
If one solves for the cost of emigrating which makes the migrant indifferent between staying and going you get the following equation:

$$C^* = [(W_d((b_{td} + (1 - b_{td}))) - W_s((b_{ts} \times e) + (1 - b_{ts}))) / r] / [(W_d((b_{td} + (1 - b_{td}))) / e] \quad (5)$$

If one assumes equal wages and that an equal proportion of income is spent on tradable and non tradable goods in the destination and source country. Furthermore if you assume that the cost of emigrating has to be paid for in the destination country, you get the equation below:

$$C^* = [(((b_t + (1 - b_t)) - ((b_t \times e) + (1 - b_{ts}))) / r] / [(((b_t + (1 - b_{td}))) / e] \quad (6)$$

Solving for  $C^*$  given values of  $b_t$  and  $e$  you get the graph below:



The graph essentially shows that the incentive to emigrate increases with a weakening exchange rate and a greater proportion of income spent on tradable goods. If the exchange rate weakens beyond this point the incentive to emigrate falls. This critical point beyond which a depreciation leads to a fall in the incentive to emigrate is discussed further below.

The shape of the graph stems from the fact that the cost of emigrating increases exponentially with a depreciation, whereas the benefit of emigrating increases in a linear fashion.

As the graph shows the incentive to emigrate increases with an weakening in the exchange rate as well as when the income spent on tradable goods increases. At the same time for when the exchange rate weakens past a certain point the incentive to emigrate falls. Thus once one includes the cost of emigrating into the migrants decision a weakening exchange rate has an ambiguous effect on the incentive to emigrate. It can either increase the incentive to emigrate or decrease it depending on how undervalued the real exchange rate is.

#### The impact of assets on the incentive to emigrate

When the migrant emigrates to take advantage of a stronger currency the migrant loses out on the value of savings. Assets such as property lose a substantial proportion of their value because they are less affected by changes in the exchange rate and are more akin to non-tradable than tradable goods. The loss on the spending power of savings and assets can provide a powerful disincentive to emigrate especially for older

people and those who have inherited wealth. This can be shown using a simpler version of the above equation.

$$PV_{\text{emigrating}} = -C/e + (W_{\text{des}} - W_{\text{SA}}e)/r + (eS_{\text{SA}} - S_{\text{SA}}) \quad (7)$$

C is the cost of emigrating, e is the degree to which the source country currency is undervalued, r is the discount rate, S is the extent of savings of the migrant and W is the wage rate in source and destination countries.

$$dPV/de = -W_s/r + C/(e)^2 + S_{\text{SA}} \quad (8)$$

Since the above function is concave<sup>3</sup> the level of e beyond which depreciation drops the incentive to emigrate is described below:

$$e^* = ((r(C + S_{\text{SA}}))/W_s)^{(1/2)} \quad (9)$$

The equation shows that an increase in the cost of emigrating C or an increase in savings S increases e\*. Therefore an increase in the emigrants savings or the cost of emigrating increases the threshold real exchange rate at which a fall in the exchange rate decreases the incentive to emigrate.

A decrease in  $(C + S_{\text{SA}})/W_{\text{SA}}$  increases the level of e at which a depreciation increases the incentive to emigrate. Therefore people who expect to earn wages as opposed to live off savings will be more likely to emigrate as a result of a depreciation of the exchange rate.

Therefore those with more of their wealth in human capital will have a greater incentive to emigrate than those with more of their wealth in assets. This leaves the effect of a depreciation in the currency ambiguous. While a depreciation will increase the incentive to emigrate for younger people and people with a greater proportion of their wealth in human capital it may decrease the incentive to emigrate for older people, and people with less of their wealth in human capital.

While depreciation in the currency increases the value of wages earned in stronger currency countries it also increases the costs of emigrating. These costs can be felt through a fall in the value of assets as well as the actual cost of emigrating (including the cost of job search).

#### The impact of risk and uncertainty on the incentive to emigrate

Risk and uncertainty are important issues in a country such as South Africa. Many popular discussions of emigration have emphasized the impact of risks of different types on people's decision to emigrate. The impact of risk on the incentive to emigrate can be modeled two ways.

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<sup>3</sup>  $d^2PV/de^2 = -2C/e^3$

1. The first and more straightforward is to assume that during risky times future income streams in the riskier country are discounted at a higher rates and so valued less.
2. The second is to model the cost of waiting as a function of uncertainty

The first way is conceptually straightforward and fits neatly into Sjaastad's approach. The second is more complicated and follows from real option theory. This paper will provide a brief introduction to the second approach.

#### A two period model that includes uncertainty

For the most part this paper assumes that migrants have naïve expectations about the future. When they look forward to make the migration investment decision they assume that the future will continue in much the same vein as the present. This section uses a two period model to describe how migrants would react to uncertainty about the future (the framework, real option theory is not limited to such simple models). The theoretical discussion here will provide a brief introduction into the second approach that models the impact of uncertainty on the incentive to wait before emigrating.

#### An irreversible decision

This section assumes that migration involves an irreversible investment decision. While migrants can always return, the high non refundable costs of emigration, as well as the lack of return migration to South Africa, imply that describing the migration decision as irreversible is a reasonable description of many peoples experience. Once the migration decision is irreversible and can be delayed people need to work out when to invest in migrating. As shown below, it is often rational for people to delay the migration decision in period of uncertainty to avoid making a mistake.

This model looks at the present value of investing in migration today, versus waiting for a year (or a defined period) to emigrate. The migrant expects that the incentive to emigrate will rise or fall in the next year (or next period). After that the incentive to emigrate will remain at that high or low level for perpetuity<sup>4</sup> (Dixit and Pindyck, 1994).

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<sup>4</sup> Dixit and Pindyck model investment using this model(Dixit and Pindyck, 1994)

Incentive to emigrate in the first period:

If migration occurs in the first period the benefit from emigrating in the first period is simply a function of the cost of emigrating, the benefit from emigrating this year, and the probability of improvement or deterioration next year. If the migrant cannot wait a year the NPV of emigrating now is described below:

$$NPV = -c + B + q \frac{B + (1+u)B}{1+r} + (1-q) \frac{B - (1+d)B}{1+r} \quad (10)$$

*The cost of emigrating:* The once off cost of emigrating is made up of the Cost (C) of emigrating.

*The benefit from emigrating:* The benefit of emigrating in the first year is B which is equivalent to  $[(E_{d0}-E_{s0})-(c_{d0}-c_{s0})]$ , which is merely Sjaastads description of the emigration decision.

*The probability of a rise or fall of the incentive to emigrate:* The probability of the benefit from emigrating increasing is q, the probability of it falling (1-q).

*The extent of the fall or increase in the benefit (loss) from emigrating:* The benefit from emigrating B,  $(E_{d0}-E_{s0})-(c_{d0}-c_{s0})$ , increases by  $(1+u)$  with probability q, or falls by  $(1-d)$  with probability (1-q).

*The interest rate:* The interest rate is denoted by r.

Incentive to emigrate in the second year

If the migrant waits till the next period, and then cannot delay, the NPV of emigrating is described by the equation below:

$$NPV_1 = -c + \frac{B}{1+r} + q \frac{B + (1+u)B}{(1+r)^2} + (1-q) \frac{B - (1+d)B}{(1+r)^2} \quad (11)$$

This equation describes the incentive to emigrate if the migrant emigrates in the next year. Simplifying and subtracting the benefit from waiting is:

$$NPV_w = -c + \frac{B}{1+r} + q \frac{B + (1+u)B}{(1+r)^2} + (1-q) \frac{B - (1+d)B}{(1+r)^2} - \frac{B}{1+r} \quad (12)$$

The value of emigrating is now the original value less the value of emigrating the next year. In other words if equation 3 is positive the migrant (?) rather wait till the next year to emigrate. Therefore the value of emigrating this year is:



$$B^* = \frac{q(u+d)}{1+r} \left[ \frac{1}{q} \left( \frac{r}{1+r} \right) \right] \quad (15)$$

Here  $B^*$  gives us a measure of the value of  $B$  required to make the migrant indifferent between staying and going. An increase in  $B^*$  is an increase in the incentive to wait, whereas a fall causes a decrease in the incentive to wait (Dixit and Pindyck, 1994).

From equation (4) a number of conclusions can be drawn about optimal migration behavior under uncertainty:

*Only good news matters*<sup>5</sup>: Ceteris paribus good news in the source country would decrease the expected benefit from emigrating. Good news is shown by  $d$ , and it is the only variable to enter into the incentive to wait. Thus good news would delay emigration but bad news would not. The intuition of this is that the benefit from waiting comes from the ability to see if conditions in the source country improve. An increase in the benefit from emigrating does not increase the incentive to wait.

*Uncertainty increases the incentive to wait*: If one sets  $q=d/(u+d)$ , an increase in  $q$  has no impact on the value of equation (1). While a change in  $q$  has no impact on equation (1) it does change the variance in  $B$ . We can see the impact of changing the variables on the incentive to wait in equation (6). An increase in  $d$  with a constant  $q$  leads to an increase in  $B^*$ , and so leads to an increase in the incentive to wait. Therefore an increase in the variation ceteris paribus leads to an increased incentive to wait.

*An increased probability of bad news decreases the incentive to wait*: An increased probability of bad news ( $q$ ) decreases the incentive to wait. Although  $q$  appears in both the numerator and the denominator its impact on the denominator is less than its impact on the numerator (since for most situations  $d$  is less than one). But since  $(1+u)$  does not appear in the equation it is not the extent of bad news (i.e. how bad things will get) but how likely they are to occur ( $q$ ).

#### Implications of the above for the analysis of emigration trends from South Africa

Since  $(u)$ ,  $(d)$  and  $q$  are difficult to quantify it is difficult to test the above results econometrically (this is a general problem with real option theory). The above results through can be used to analyze trends in the underlying data. From the above discussion one would expect the following trends in the data on migration:

- An increase in the amount of goods news about South Africa's future should decrease emigration as people wait to see if conditions improve.
- An increase in mean preserving uncertainty in the future should decrease emigration
- The more likely bad news the greater the incentive to emigrate in the first period.
- The more into or out of the money the decision to emigrate becomes the less impact uncertainty will have on the emigration decision

<sup>5</sup> This reverses the standard result that only *bad news* matters. The reason is that *bad news* for emigration is *good news* for South Africa. So when good news happens less people emigrate, but this of course is a decrease in the value of emigrating!

- Bad news about the future of South Africa that increases  $(1+u)$  without effecting  $q$  will not increase emigration

### Conclusions to risk and uncertainty

Risk and uncertainty are both important to the emigration decision. Using real option model, one was able to come up with interesting insights into the impact of uncertainty on the emigration decision.

### Section 2: The effect of friends and family on the emigration decision

#### The individuals' decision to emigrate

This section has discussed the incentives that the individual has to emigrate. As will be shown in later sections this minimalist approach explains a large proportion of emigration from South Africa.

#### The impact of friends and family

This section discusses the impact on the incentives to emigrate of friends and family. Friends and family have a large impact on the incentives to emigrate. Friends and family increase the real value of income in the source country either directly or through the information they provide. Households made up of more than one person make up a substantial proportion of emigration from South Africa (84% for Australia, (Australian) Department of Migration and Multicultural affairs). Therefore family decision-making is important in either motivating or inhibiting emigration.

#### Family decision making

In his 1978 paper Mincer looked at migration as a decision made by the family rather than a decision made by a single individual. It is presumed that families are less mobile than individuals. Although some economies of scale are conceivable it seems that as a general trend the economies of scale that larger households experience in moving are outweighed by the diseconomies of scale. Demographic Research broadly supports this hypothesis and has shown that especially the presence of school age children inhibits migration (Mincer, 1978).

In his analytical model Mincer abstracts from children and focuses on how the family migration decision is affected if one drops the assumption that one member of the household makes the migration decision. Mincer includes the presence of two members of the household. For convenience they could be a husband and a wife.  $H$  and  $W$  are the returns to the husband and wife of migrating. Both  $H$  and  $W$  include the full stream of costs and benefits from migrating including both monetary and non-monetary costs and benefits.  $W + H = F$  is the return to the family of migrating. The family migrates when  $F$  is greater than zero i.e.  $W+H$  is greater than 0. If  $H$  and  $W$  have the same sign then the presence of the marital partner has no impact on the migration decision of the spouse since they have a similarly positive incentive to move. If  $F$  is positive and so the family calculus points to the family leaving but the signs of  $H$  and  $W$  are different then one member of the family would have stayed

except for the presence of the spouse. The result is a tied mover who migrates despite a private calculus that dictates that they should stay. If  $F$  is negative but one family member would benefit from leaving the family member that would benefit from leaving is a tied stayer. The presence of two members in the migration decision potentially has a dramatic impact on the number of households that migrate.

Mincer gives the example of a population in which 16% of the population have a private calculus that says they should migrate. If one randomly pairs members of that population into couples one finds that less than 50% of the population that previously wanted to migrate still leave. If one relaxes the assumption of random pairing one finds that the migration decision for families is a function of a number of variables. Mincer mentions the following:

When the gains and losses of husbands and wives are perfectly correlated the frequency of migration will not be changed by marital status. For instance in labour market terms spouses in the same field will have very similar employment opportunities from migrating. More importantly one could expect that husbands and wives preferences for the non-pecuniary aspects of the migration destination would be very similar, for instance husbands wives would be expected to have similar preferences for safety and security or climate. If the motivations for emigrating are largely non-pecuniary (for instance safety and security) the expected consensus on non-pecuniary benefits may well largely outweigh differences in labor market outcomes. Thus large non-pecuniary benefits from emigrating would decrease conflicts of interest between partners.

Borjas (1993) extends Mincer's analysis to include the impact of children on the migration decision. However he abstracts from the importance of interaction between the husband and wife by assuming that there is only one parent.

In the absence of children the decision to migrate is a function of relative returns to skill in the source country and the destination country as well as the costs of migration. When children are included into the analysis the parents need to predict the expected incomes of their children in the destination country as compared to their expected incomes in the source country. Since skills are assumed to determine income the parents need to predict the extent to which skills of the current generation are transferred to the next generation. In Borjas model skills are transmitted to the next generation according to Markov equations:

$$v(\text{source country}) = a(\text{source country}) + s(\text{source})v(\text{source country previous period}) + e(\text{source})$$

Skills in the destination country are transmitted in line with the following equation:

$$v(\text{destination country}) = a(\text{destination country}) + s(\text{destination country})v(\text{destination country previous period}) + e(\text{destination})$$

Where  $v$  gives the skill variable for the person in each period,  $s$  represents the level of transfer of skills between generations, and  $e$  is a random variable that represents variation around the mean.  $s$  represents the degree to which a parents skills are correlated to the child's.  $a$  is a constant. Therefore  $s$  determines the extent to which a

society is 'open' or 'closed'. For instance a country such as the United States is regarded as being open which implies that children's skill levels are less correlated with that of their parents (i.e. that there is equality of opportunity) and therefore that the value of  $s$  is quite low. On the other hand  $s$  is large in countries in which it is difficult for children to succeed materially where their parents have not.

First generation workers know that the wages of their children in the next period are described by the earnings distributions:

$$\text{Log } W (\text{source}) = m (\text{source}) + n (\text{source}) \cdot v (\text{source country})$$

$$\text{Log } W (\text{destination}) = m (\text{destination}) + v (\text{destination country})$$

The differences between  $m$  in both countries are the result of the possibility that the source and destination country may have differences in expected economic growth or because assimilation possibilities could affect future earnings opportunities in the destination country.  $n$  stands for the price of skills in the source country.

Using the above model one can make the following inferences. The attraction of the destination country for parents will in part be determined by the degree of openness of the source country. If the source country is closed (parents skills are strongly linked with their children's) and the destination country open (skills of children not linked to their parents), parents with high skills are less likely to migrate on behalf of their children. Therefore one would expect that only high skill parents from open countries would migrate to close countries. Low skill parents from closed economies are more likely to migrate on behalf of their children since their children have a greater chance of gaining skills in a more open economy than the destination country. Furthermore since the income of children is a function of economic growth parents will move on behalf of their children when they expect differences in economic growth between the destination and source country. When parents incorporate their children's welfare it is likely that they dramatically increase how far into the future they look.

Tcha points out that the extent to which parents incorporate their children's earnings into their own migration decision is determined by the level of altruism that parents have for their children (Tcha, 1995). He highlights the possibility that parents may take a loss in terms of their expected income in order that their children may benefit from increased lifetime earnings or utility. An important implication of this is that parents may migrate at a far later stage in life than they may otherwise in order to improve their children's lifetime earnings or utility stream. This effect to some extent counteracts the age effects dampening of migration.

The above theoretical discussions have a number of implications for patterns of migration. Since older migrants are more likely to be married (and so potentially be a tied stayer) this provides a reason that younger people would be more likely to emigrate.

### The impact of friends and family on labour market success and attractiveness

This section looks at the impact of friends and family on labor market success and the attractiveness of emigration. Friends and family decrease the costs of emigration and allow people to respond more easily to relative wage rates and standards of living. Friends and family also increase the standard of living for the emigrant.

### Friends and families impact on the liquidity of the labor market for the migrant

Friends and family impact on the attractiveness of a labor market through the information they provide. This information makes the labour market more attractive and more liquid in the sense that the migrant gains access to more job opportunities. This section will use search theory to discuss the impact of friends and family on job market success.

Nelson (1959) wrote the first influential paper on the importance of information on migration. He wrote his paper before the Stigler (1961) article on search. Before Nelson wrote his classic article in 1959 behavioral models of migration focused exclusively on the real income gains from migration. Nelson emphasized that the information that the migrant had about possible destinations was an important factor in the migration decision Nelson points out that family and friends that have previously migrated to a destination will be important sources of information about the location. Nelsons discussion can be extended with reference to search theory that was introduced by Stigler.

Stigler argued that when information is a scarce resource, workers and firms would take part in a costly search for information about each other. He conceptualized a form of search where given a certain distribution of bids and a cost of taking a sample workers would decide on the optimal sample size of job offers (Stigler 1961). Subsequent theoretical developments since Stigler have modelled the workers decision process as a sequential search for a new job where job offers have to either be accepted or rejected soon after they are made to the worker. This approach results in higher expected lifetime income for workers and also allows for numerous realistic complications such as shopping in real time and learning about the distribution of offers as a part of the shopping process (Mortensen, 1986).

The *job search* process can be conceptualized as a two-sided bargaining game where the worker and the firm bargain over the surplus from the job by engaging in different levels of search. The side with the better outside option spends less time searching and so captures more of the surplus.

Most of the time the firm will have a superior outside option and so will conduct less search. For the firm the type of search with the lowest cost is to find workers through references from their current employees. Holzer showed that for workers (either unemployed or not) searching for a job through friends and family was the most cost effective method of job search (Holzer, 1988). This was found to be especially important when jobs were scarce.

The more demand for workers outstrips supply of workers the more one would expect that the firm would search for workers (Wial, 1991). In this case the firm would search for workers through advertising or working through a job bureau. To the extent that advertising is costly firms would be expected to restrict their advertising to areas in which they expect the highest return in the form of job applicants. In such a situation they could be expected to advertise closer to their location.

Therefore one would expect that the impact of friends and family would be greatest on the job search process during periods when supply of workers outstrips demand such as during a recession. In labour markets characterized by excess supply such as the youth labour market, friends and family would be important for finding a job.

For the migrant the presence of friends and family in the destination country is important because they improve the migrants ability to find a job. Thus an increase in friends and family in the destination labour market makes the labour market more attractive because it improves information flow to the migrant and so makes the destination labour market more liquid for the migrants (easier to find a job and move between jobs).

One would expect friends and family to be especially important when migrants speak a different language to that spoken in the destination country. For most South Africans emigrating the destination countries speak a familiar language. Therefore the impact of friends and family on information flow would not be as dramatic as it would be if South Africans were immigrating to countries that spoke a different language. Obviously the choice of destination countries has much to do with the fact that they speak a familiar language.

The impact of friends and family on job search provides a reason (other than pure discrimination) that migrants find it harder to find employment than locals. This effect noted for all OECD countries (OECD, 2000) but not always true for South African emigrants (Australian Department of Migration and Multicultural Affairs).

As Nelson notes friends and family are important in a social sense. In an expanded definition of the migrants' real income these social benefits of friends and family would be included in a migrants real income. Friends and family in the destination country also lower the financial costs of emigrating. Coming to a conclusion about the relative importance to migration of families and friends as sources of real income and lower costs or as sources of information is very difficult (Nelson, 1959).

The implication of the above discussion is that the more migration into a destination the more likely will be further migration into the destination location. Greenwood, Nelson and others have tested this proposition and have found that past migration into a location is an important determinant of new migration into a location (Greenwood, 1972). The emphasis of this discussion has been on the importance that friends and family in making emigrants more responsive to differences in labor market conditions than they would otherwise be.

### Conclusion

This section has shown numerous ways in which friends and family impact on the incentive to emigrate. South African emigrants are leaving to societies with similar or familiar cultures and the same or familiar one. Thus you would not expect the friends and family effect to be as dramatic as it is when migrants are entering unfamiliar cultures with a different language.

### Section 3: The impact of fear and the emigration decision

Of South Africans emigrating from South Africa 50% report in exit polls that they are leaving because of violent crime. Similarly Mattes and Richardson report that 82% of skilled South Africans are dissatisfied with levels of safety and security in South Africa and 90% feel that overseas countries are safer (Mattes and Richmond, 2000). While it is true that homicide rates increased dramatically during the early 1990's so have many other avoidable causes of death. Aids was a rare disease in 1990. Now, ten years later, it is expected to kill 15% of the South African population. Road accident death rates are comparably high. Why then is so much weight attached to fear of violent crime by those leaving South Africa? This section discusses the emotions to resolve such seeming paradoxes and gain insight into the relationship between crime and emigration.

The analysis in this paper rests on what has been discovered about people's instinctive fear response (mostly in the last ten years). While emotions have been associated in the past in literature and ethics with "irrationality" and "unpredictability" the reverse is in fact true (Elster, 1998). Fear and the other basic emotions are predictable responses to the environment. This is in large part due to their distinctive nature discussed below. Therefore they result in behavior that is rational in the sense that they are consistent. The consistency of emotions makes them a powerful tool for analyzing economic problems in a framework that values models that are reliable across cultures and societies.

Focusing on fear and ignoring the other emotions means that this paper does not provide "a fully specified model" in that emotional responses such as anger are not discussed. The reason for only focusing on fear is twofold. It is the best understood and most studied emotion which means that some of the essential results discussed here have not yet been extended to the other emotions. The second reason is that fear, especially of homicide is the most pertinent to emigration.

This paper will argue that people are worried about violent crime and so would be expected to emigrate as a result because they are more sensitive to homicide than they

are to other causes of death. This sensitivity has a genetic and hence evolutionary basis<sup>6</sup>. Since in the past those people with a genetic predisposition to expend special efforts to protect themselves from violent incidents were more likely to survive and have children than those that did not. Thus people emigrating for this reason are prepared to incur large financial and psychological costs to do so. While this aversion to violent death may (and probably does) have its basis in numerous complex systems in the brain this paper concentrates on the fear system.

The next few sections look at the impact of genetics on the disutility (or discomfort) associated with violent experiences. The next section looks at people's perceptions of how likely they are to be affected by violence.

### Fear

This section demonstrates that the fear reaction is to a certain extent, involuntary. This is shown for the first instant.

People experience fear in response to threatening events or experiences. This fear response results in numerous bodily changes. People experience arousal which is the effect of the production of stress hormones glucocorticoids and adrenaline produced in the adrenal gland. LeDoux (2000) demonstrates that people experience bodily fear responses to threats even when they are not consciously aware of the threat in the cortex. This subconscious fear reaction, processed by the amygdala, distinguishes between different types of threats. People who fear spiders will experience fear (arousal) when faced with a spider even though they are not consciously aware of the spider (Ohman, 2000). People who are conditioned in pavlovian type experiments to fear a particular threat react more strongly to those threats that man would have faced in his evolutionary environment than threats he did not face (Ohman, 2000). In addition the conditioning response to evolutionary type threats takes longer to dissipate. The fact that the fear response has its origin in sub-conscious awareness (the amygdala) as well as other evidence implies that this greater fear response has a genetic origin (Ohman, 2000).

The evolutionary benefits of such instinctive fear responses are clear. Instinctive responses eliminate the need for learning and are quicker than a reasoned response. Man fears snakes, spiders and animals because these were threats that he could avoid in the evolutionary environment. Man has not developed instinctive fears to those threats that were unavoidable such as disease.

It is likely that the greatest threat to survival that man faced in the evolutionary environment was homicide by man. While evidence on the causes of death in the evolutionary environment are scarce the evidence we have about hunter gatherer societies<sup>7</sup> prior to colonial interference suggests that violence rates were

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<sup>6</sup> Arguing that people have a genetic predisposition towards avoiding violence does not imply that everybody has such a predisposition. This predisposition is more developed in some people than in others.

<sup>7</sup> Hunter gatherer life in modern times provides the best available evidence of what the human experience was like in the evolutionary environment. The evolutionary environment usually refers to pre-agricultural human society. Of course the evolution of man's brain can be traced back to the earliest

extraordinarily high. In hunter gatherer societies in the modern era (prior to colonization) homicide rates ranged from 40 per 100 000 for the !Xung Bushmen to 360 per 100 000 for some tribes in New Guinea. Prior to colonization 60% of Eskimo males had killed fellow group members (Knauff, 1987). For comparison the Western Cape with one of the highest murder rates in the world has 60 per 100 000 murders a year, Colombia has 40 and the United States 10. Traditional agricultural communities in Africa as well as modern Western Europe Countries have murder rates ranging between 2 and 5 per 100 000. The high homicide rates in hunter gatherer societies suggest that homicide was a major cause of death in the evolutionary environment. The most detailed study that enables one to compare violent death with other potential causes of death in a hunter gatherer society was done by Knauff (1987) on the Gebusi, a hunter gatherer tribe in New Guinea .

His results were that:

- 33% of the Gebusi died of homicide
- 2% died of accidents
- 13% died of unknown causes
- 2% died of suicide
- 51% died of disease (Knauff, 1987)

This detailed study of the Gebusi combined with the very high homicide rates found in most hunter gatherer societies strongly, implies that the most avoidable cause of death in the evolutionary environment was homicide. Thus one would expect that there would be a widespread and intense instinctive fear of violence in the human population. In many of these societies homicide occurred unpredictably and was against the general flow of life. In other respects these societies were highly peaceful<sup>8</sup>. Mans predisposition to be fearful of violence implies that an experience of violence, which may be entirely vicarious, will result in a high and sustained fear response. It seems likely that man would fear homicide more than any other threat because it was the greatest cause of death in hunter-gatherer society.

The implication of this fear reaction for emigration are discussed in the following sections.

### The direct impact of fear

Fear at its most basic level motivates action. It is well known to induce the flight, fight or freeze response. Fear of violence is no different. People who have experienced violent crime either directly or vicariously<sup>9</sup> will be more motivated to take action than people who have not. Since the fear response to violence will be greater and longer lasting than from other threats to life, people will be highly

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mammals. This longer evolutionary history is less important for this paper since it only compares, accidents, disease and homicide,

<sup>8</sup> These societies had no warfare and visible displays of aggression were frowned upon. Some of the societies had a strong ethic of sharing food and other essentials.

<sup>9</sup> The ability to recreate someone else's experience through a "virtual reality" type recreation of the event in ones owns mind is thought to be a defining characteristic of humanity (Whitehead, 2001). Psychologically there is not difference between ones own experience and one that someone has directly experienced but describes to one. Thus people commonly experience post traumatic stress disorder as a result of other peoples experiences, even when the recounted experiences occurred in a previous generation. A phenomenon observed with the children of holocaust survivors. (Hamber, 1997).

motivated to emigrate, fight, or publicly protest in reaction to fear of homicide<sup>10</sup>. Fear also focuses attention on threats in the environment, thus ensuring a greater ability to avoid such threats. Fear as a motivator and attention manipulator can increase utility since it facilitates collective and individual action to overcome or avoid the threat. Fear also leads to disutility. Anxiety and fear are uncomfortable emotions. In the extreme, fear leads to phobias and contributes to post traumatic stress disorder, both of which are debilitating. It also leads to depression, ill health and insomnia (Ohman, 2000). Thus the impact of psychological injuries from violence are often more serious and sustained than physical injuries.<sup>11</sup>

Thus fear is both a benefit and a cost to the person experiencing the emotion. It motivates action but this increase in motivation comes at the expense of uncomfortable feelings and experiences. Thus people are more motivated and so more able to take the steps that are required to emigrate. At the same time people experience discomfort from living in a violent country such as South Africa which provides an incentive to emigrate.

#### Fears impact on our people's subjective probability estimates of the likelihood of being affected by violence

The probability that a particular individual will be directly or indirectly affected by violence is unknown. Furthermore since violence affects different people differently the potential effect of violence on a particular individual is also unknown. How do people compute the likelihood that they themselves will be subjected to violent crime and what the effect of that violence will be on them when they do not know the probability of this happening? According to Kahneman and Tversky, 1982 they do this by trying to remember similar incidents<sup>12</sup>. Because fear impacts on memory, it also affects the subjective assessment of the likelihood of being affected by violence. The memory retention ability of the hippocampus (a part of the brain that stores declarative memories) is accentuated by medium to low levels<sup>13</sup> of the stress hormones produced by the body's response to fear. Thus fear directly accentuates the creation of these declarative memories. This means that people remember fear inducing experiences far better than those that do not induce fear. Furthermore if a person who describes a frightening incident is visibly frightened the person listening will produce the hormones that facilitate the creation of declarative memories<sup>14</sup> (LeDoux, 2000).

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<sup>10</sup> It is telling that governments seldom run publicity campaigns persuading people to take action against violence whereas publicity campaigns for disease control and traffic safety are common.

<sup>11</sup> This is especially true since the technology of medicine is better at curing physical injuries than mental ones

<sup>12</sup> This is called the availability heuristic and it is referred to widely in the psychological literature. That people work out uncertain events using the availability heuristic has been widely verified in countless experiments (Kahneman and Tversky, 1982).

<sup>13</sup> At high levels of stress hormones (adrenaline and glucocorticoids) the functioning of the hippocampus is undermined to the extent that at sustained levels of these hormones the hippocampus is damaged. Thus the above discussion is limited to medium to low levels of fear.

<sup>14</sup> This occurs through the effect of frightened faces on the amygdala. Subconscious awareness of a frightened face leads to arousal of the amygdala. It is very difficult to hide facial indications of emotions. Thus this effect is genetically determined and thus involuntary (Le Doux, 2000).

Therefore people will have the clearest memories of those incidents which they found the most frightening, especially when the person who related his experience was also frightened and traumatized by the experience.

Thus one would expect people, even those who are not in a permanent state of fear, to overrate the likelihood that a violent incident will affect them. Furthermore they will in all likelihood overestimate the effect (or disutility) such a violent incident would have on them and the people that matter to them.

### Random violence

One intuitively expects that people would be more likely to emigrate due to random homicide rather than other more predictable types of homicide. The above discussion, as well as standard economic theory, supports this intuition.

In economics it is commonly assumed that people are risk averse. One would expect people to be risk averse towards violence for evolutionary reasons. In the evolutionary environment underestimating mortal threats was potentially deadly whereas overestimating them only resulted in the wastage of energy<sup>15</sup>. Thus one would expect the expected disutility from more variable forms of violence to be greater than from less variable threats.

Furthermore random violence which does not have defined place or time would be expected to induce more fear since there are fewer places and times free from danger<sup>16</sup>. The uncomfortable feelings of fear would be ever present, since the threat is ever present.

Thus one can expect people to be highly concerned about a crime such as hijacking which has no fixed time or place (except in the car). Attacks in the home would induce anxiety because people spend a lot of time there.

In conclusion random violence would be expected to result in more disutility for two related reasons. Firstly risk averse individuals would experience more disutility from random homicide. Secondly people will feel greater anxiety due to random homicide since its randomness means that there are more places and times in which it can occur.

### Violent crime versus property crime

The crucial difference between property crime and violent crime is that violent crime is a far more emotional event which causes greater psychological damage. Therefore violent crime is less easily insurable and so cannot be effectively hedged by risk-averse individuals. The above discussion as well as common sense implies that violence would lead to greater disutility than the loss of property. Thus violent property crime would not be feared due to the loss of property but rather due to its violence and the threat of death that this implies.

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<sup>15</sup> Ohman argues that this is the evolutionary reason for Phobias and other such anxiety disorders (Ohman 2000).

<sup>16</sup> The Israelis use this effect when they deliberately assassinate suspected terrorists in the most obscure and unexpected ways possible. This leads to more disutility for terrorists up until their deaths and so increases their punishment.

### Application of this discussion of fear to the theoretical discussions above

Violence and other life threatening situations will result in fear. The experience of fear is an uncomfortable sensation and so threats to life result in a psychological cost. On the other hand fear motivates people to action. These two factors simultaneously impact on the migration decision. The next two sections integrate these two factors into the human capital approach for the individual and for family decision making.

### Impact of on the individuals incentive to emigrate

Fear makes life uncomfortable as well as acting as a motivator. In the sense of an uncomfortable sensation fear of violence is easily integrated into the human capital framework. Fear of violence is a psychological cost that decreases the value of living in South Africa and so increases the incentive to emigrate. Fear as a motivation to take action enters the framework more subtly. One could conjecture that fear enters the decision making process in a number of ways:

- Fear may make people less comfortable, more restive and therefore more responsive to their financial incentives. The intuition of this is that people who are fearful are less likely to enter into a “comfort zone” where they are unresponsive to opportunities for improved living standards that emigration offers. Thus fear lowers the psychological costs of emigrating that stem from “comfort” in the current location.
- Fear may change people's utility functions so that safety and security weigh more heavily in their utility function than previously.

Thus fear at low levels as a motivator and as a psychological cost would increase the person's ability and desire to emigrate. At high levels fear is debilitating and may well inhibit emigration (see Hamber (1997)).

### Impact on group, family decision making

The impact of fear on family and group decision making is more subtle than its impact on people's individual incentive to emigrate. Fear of death impacts on the decision as a psychological cost and on people's motivation.

In the Mincer model of husband and wife decision making it was argued that while one could expect a husband and wife to have different expected wages in the destination country, one could expect them to have similar views about the non-pecuniary benefits/losses from emigrating. As discussed above fear automatically transfers from one person to another and so one would expect a husband and wife to have similar “fearful states” since they automatically “feel each other's fear”. Thus one would expect that a husband and wife to share levels of fear for biological reasons. This increases the likelihood that families or groups will emigrate since it increases the pecuniary benefits from emigrating in an inherently coordinated fashion. This effect works in two ways it increases the likelihood that everyone in the family or groups personal utility calculus will be in favor of emigration. Equivalently by decreasing the proportion of the incentive to emigrate that is made up of factors over

which there could be conflicting incentives, (such as wages), fear decreases the extent to which tied movers “lose” in relation to the gains for those who want to leave.

For evolutionary reasons<sup>17</sup> (and common experience supports) parents are very protective of their children’s safety and security. Thus one would expect that peoples’ affection (or perhaps altruism) for each other to result in parents emigrating to protect their children, and partners emigrating out of a desire to protect each other from harm. Thus one would expect the altruism discussed by Tcha to be particularly intense with regards to safety and security.

Thus fear of crime would act as a coordinating device facilitating group decision making. Since fear is experienced collectively the room for the conflicts of interest that often occur when actions need to be undertaken collectively are diminished or eliminated.

#### Fear and the human capital framework

Therefore fear can be integrated into the human capital framework. It is conjectured here, that fear of violence may well make people *more responsive* to their economic incentives. Since it lower the psychological costs of emigration, increases the desire to find out about alternative areas to live and decreases coordination problems. Fear of course could increase emigration because living in fear is uncomfortable.

#### Conclusion

Thus one would expect that a given level of homicide would lead to more emigration than other causes of death. One would expect more random and more variable sources of violence to cause more fear. Finally one would expect that it is the violent aspect of violent property crime that would lead to emigration. Incorporating fear of crime into the human capital approach is not straightforward since fear impacts on motivation not incentives.

#### Section 4: Conclusion to Chapter 2

The theoretical discussion has isolated a number of factors that are relevant to the migration decision. These factors are listed below and will be discussed in the sections that follow:

- The real spending power of the wage
- Unemployment
- Taxes and benefits
- The exchange rate
- Risk and Uncertainty
- Robbery and homicide
- Family decision making
- Friends

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<sup>17</sup> This is an obvious implication of the expected natural selection of people who protect their children from harm. The murder of children by jealous ex-partners “or husbands” was a large cause of homicide in some hunter gatherer societies (for instance the Xhoi).

The theoretical discussion provides the framework in which the empirical evidence is discussed.

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## Chapter 3 Restrictions on émigration

This chapter looks at the institutional restrictions on immigration into the destination countries. This section concludes that:

1. The institutional restrictions on emigration broadly mirror people's incentives
2. These institutional restrictions were relaxed during the 1990's

### Australia, Canada and New Zealand

Australia, Canada and New Zealand all use the points system in deciding whether or not to allow immigrants into the country. Since their systems are very similar this paper will discuss their migration policy in one section. The United Kingdom and United States do not use the points system although the UK is considering introducing it.

### Current criteria for immigration

The points system provides points for family, skills, age, work experience, language and whether or not a job has been offered in the destination country. Points are also offered for investing capital and opening a business. People who have enough points to enter the country are allowed to immigrate.

The points system results in similar incentives to those already faced for financial reasons. It would seem that just as one would expect financially motivated migrants to maximise their human capital return, the points system destination countries set their criteria for immigration to ensure that they only let in migrants with high levels of future expected earnings.

The points system in practise is less transparent than the above discussion implies. All destination countries allow immigration officials to reject or accept immigrants on the basis of unpublished criteria.

The points system is aimed at allowing skilled immigrants in who have a good chance of success in the destination countries. The points system in many respects mirrors the incentives that migrants already face and that are described in the theoretical discussions above.

### The United Kingdom

#### Criteria for immigration

The United Kingdom has different criteria for different classes of people. It has different criteria for those who are eligible for UK or EU citizenship, for those with a parent who was a UK citizen, for those with a grandparent who was born in the UK and for someone who is a citizen of a Commonwealth country.

#### European Union and UK passport holders

It is estimated that 800 000 South Africans hold British passports. Many more are eligible through parents and grandparents (Van Rooyen, 2001). Furthermore many

South Africans hold European Union passports. South Africans who hold European Union (and obviously United Kingdom passports) are automatically granted work permits in the United Kingdom. For these people there are essentially no restrictions on migration or travel to the United Kingdom. In effect a substantial proportion of skilled South Africans face no institutional restrictions on emigration to the UK.

### South Africans without a British Passport

There are two main interrelated ways that South Africans who do not hold a European Union passport can emigrate to the UK. They can apply for a work permit or come into the country on a working holiday visa. Those South African citizens with a UK grandparent can apply for temporary visas or a four-year work permit. After four years of permanent residence, holders of such a work permit can apply for the permanent right to live in the United Kingdom (Grant of Settlement).

### United States

#### Criteria for immigration

The United States has the most complicated and least transparent immigration policy of all the destination countries. Migrants can enter America:

*Illegally:* illegal immigrants are periodically granted amnesty by acts of congress

*Lottery:* Green cards are granted through lottery

*Employer:* Employers can sponsor migrants with special skills or talents.

*Family:* Most migrants are allowed in on the basis that they have family in the United States

Traders and investors are allowed into the United States as well as refugees (mostly from countries with extensive experience of American involvement such as Vietnam).

The overriding consideration in any application to the United States is the intent of the applicant. US authorities scrutinise and question visa applicants often at great length in order to determine whether the migrant is hiding a revealed intent. The United States immigration authority can refuse entry to migrants (or tourists) at any stage on the basis of unpublished criteria. This is presumably an attempt to stop terrorists and drug dealers from entering the United States (OECD, 2000) and (Van Rooyen, 2001).

Of all the destination countries US immigration policy is the least focused on facilitating skilled immigration. Far more immigrants come in as refugees and through family connections than independently. Thus the US is a difficult destination to enter for South Africans without family connections to enter.

### Policy trends in the destination countries

All the destination countries attempted to increase the number of skilled immigrants into their countries during the 1990s. They have done this while attempting to

decrease the number of family immigrants. The net result is that immigration figures are not an accurate measure of changes in the official position towards skilled immigration.

### Policy trends in point system countries

The policy trends in the point system countries like their policies are broadly similar. All the points system countries have faced a shrinking pool of international immigrants while still having official policies that encourage immigration (Reitz, 1998).

#### Australia

Australia implemented the points system for screening immigrants in 1973 (Reitz, 1998). Immigration to Australia in the skilled and family entry class peaked in the late 1980's. Since then family immigration has steadily fallen whereas skilled immigration has slowly increased during the 1990's (though not coming close to the levels reached in the late 1980's). Thus the Australian government has attempted to increase the number of skilled migrants while inhibiting immigration of family members. It has increased the quota of skilled immigrants by 5000 places and has implemented measures to facilitate the settlement in Australia of foreign graduates of Australian Universities. Australia is also extending its working holiday programme again in an attempt to increase skilled immigration. Thus while skilled migration may not be increasing dramatically, Australian immigration policy has been increasingly focused on facilitating skilled immigration (OECD, 2000).

#### Canada

Canada implemented the points system in 1967 as a way of increasing the skill level of immigrants (Reitz, 1998). Skill based immigration (called economic immigration in Canada) peaked in the mid 1990's but collapsed dramatically in the late 1990's (probably as a result of the East Asian crises, a fact mentioned in chapter 2). Canadian family based immigration peaked in the mid 1990's. Similarly to Australia, Canada has attempted to restrict family based immigration and facilitate skilled-based immigration. Therefore like Australia while immigration has fallen during the late 1990's this has been associated with an increasingly welcoming environment for skilled immigrants (OECD, 2000).

#### New Zealand

New Zealand implemented the points system in 1991, approximately 20 years after Australia and Canada (Statistics New Zealand, 2000). This led to an increase in immigration to New Zealand during the early 1990's. New Zealand economic immigration peaked in the mid 1995 after which English language requirements were imposed on immigrants (a factor unlikely to impact on most South African emigrants). While immigration had fallen below 30 000 immigrants a year by the end of the 1990's the New Zealand's governments target for immigration has remained at 38 000. Thus similar to Canada and Australia a fall in immigration to New Zealand has been associated with increasingly easy entrance for skilled and family based migrants (OECD, 2000). New Zealand citizens gain easier entrance into Australia (the

position of automatic entrance changed in 2001). Since New Zealand citizenship is relatively easy to get there is the possibility that some immigration into New Zealand is motivated by the desire to enter Australia.

While emigration to the points system countries fell in the second half of the 1990's this reflects a fall in the pool of potential immigrants. Immigration policy has been loosened in all the point's system countries in destination countries.

### Trends in United Kingdom immigration policy

Britain started the 1990's with a hostile official position to immigration. This position has relaxed during the 1990's as southern England has been experiencing a tightening of the labour market and increasing skills shortages. Towards the end of the 1990's the UK had increasingly been implementing measures to facilitate further immigration. In line with this trend immigration to the United Kingdom has been growing. From 1995 to 1998 immigration increased from 320 to 401 thousand and working holiday visitors to the UK have increased from 23 200 in 1990 to 40 800 in 1998. The make up of the immigrant flow has changed dramatically. Previously migration to the United Kingdom was heavily biased towards non-working migrants. During the late 1990's there has been a shift towards parity between working and non-working migrants. This reflects a dramatic shift in the type of immigration. In May 2000 the UK government announced a fast-track permit system would be introduced in order to speed up the recruitment of workers by firms that were experiencing skills shortages. Migrants could apply for a work permit on their own behalf instead of it being required that a firm apply on their behalf. The UK government was also implementing measures to make it easier for foreign graduates of UK Universities to stay on after graduation (OECD, 2000).

The United Kingdom is opening its doors to skilled immigration. While the UK started the 1990's with policy hostile to immigration by the end of the 1990's it was increasingly moving towards the more "open door" policy that the points system countries use.

### Trends in immigration policy in the United States

From 1992 to 1998 the number of employment-based visas into the United States increased from 54 thousand to 140 thousand. The family of the skilled migrant takes up a large number of these visas and so during the 1990's only 5% of immigration into the United States was for employment purposes (as opposed to refugees and family based migrants). There has been increasing pressure to increase the number of H1-B visas for highly skilled workers. The annual quota of these visas has been increased from 115 to 200 thousand from 2000 to 2001 (OECD, 2000). Although family and refugees dominate immigration to the United States there have been increasing quotas for skilled and employment based immigrants.

US migration has become increasingly aimed at allowing in skilled immigrants. It is still heavily weighted towards family immigration.

## Conclusion

This chapter has shown that:

1. Immigration policy is broadly in line with the incentives discussed in the theoretical chapters
2. The destination countries were opening their borders to skilled immigrants during the 1990's.

Therefore the institutional requirements were facilitating increased emigration from South Africa during the 1990's.

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## Chapter 4 Quantative analysis of real income and political events

This section develops an index or model reflecting the financial incentive to emigrate. The motivation for the index is fourfold.

1. The lack of data makes econometric analysis difficult and the results sensitive<sup>18</sup>. Given the expected and experienced problems with econometric analysis the index was created as a measure of the importance of financial incentives in the emigration decision. Thus the index provides a measure of the importance of financial incentives versus other causes such as violence.
2. Secondly the index is used in combination with real options theory to analyze the impact of South African political uncertainty during the period under review.
3. The third reason is that the index can be used to analyze factors such as the age profile of emigrants to certain countries and other implications of the theoretical section.

This section is divided in to the following sections:

- Outline of the index
- Implications of the index for emigration rates
- Sensitivity analysis on the index
- Implications of the index for the age profile of emigrants and other issues
- Impact of political uncertainty on emigration, using the index as a benchmark

### Use of average wages

The model uses average manufacturing wages in its analysis. Although other measures could also have been used such as GDP per capita and GNI per capita wages, of which manufacturing wages are the most available, were thought to be the most appropriate for understanding skilled emigration. Using manufacturing wages implicitly excludes the return to productivity from the analysis. Return to productivity is discussed in Appendix 1 the discussion is inconclusive.

### The Human Capital Model

The following model attempts to explicitly model the benefit or cost from emigration to the four most important destination countries, USA, New Zealand, Australia and the United Kingdom. The discussion is derived from the theoretical discussion.

The incentive to emigrate due to wages is shown below:

$$PV_{wages} = \sum (\beta_d((e_d/P_d) \times p_d \times W_d) + (1 - \beta_d)(e \times p_{sa} \times W_d)) / (1 + r_d)^t - \sum (\beta_{SA}((e_{SA}/P_{SA}) \times W_{SA} (1 - \beta_{SA})(e_{SA} \times W_{SA})) / (1 + r_{SA})^t \dots \dots \dots (16)$$

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<sup>18</sup> The author has done extensive econometric testing using panel data methods. The only significant variable found was unemployment. Forty series from the World Bank and IMF data bases were tested.

Where:

$\beta_d$  and  $\beta_{SA}$  are the proportion of wages spent on non-tradable goods in the destination country and South Africa

$(1-\beta_d)$  and  $(1-\beta_{SA})$  are the proportions spent on tradable goods for the destination country and South Africa

$W_d$  and  $W_{SA}$  is the wage expected to be earned in the destination country and South Africa

$p_d$  and  $p_{sa}$  are the probability of finding employment in the destination country.

$e_d$  and  $e_{SA}$  is the exchange rate in the destination country and South Africa where  $e =$  Dollar/Local currency

$P_d$  and  $P_{SA}$  are the price levels in South Africa and the destination country

$+r_d$  and  $+r_{SA}$  are the interest rates that migrants use to discount future wages

$t$  is the expected number of years that the migrant expects to continue working.

The incentive to emigrate from the effect of emigration on the migrants stock of savings is shown below:

$$S_{incentive} = (S_{SA} \times ((e_d/P_d)) - (S_{SA} \times ((e_{SA}/P_{SA}))) \dots \dots \dots (17)$$

Where:

$S_{SA}$  is the stock of savings that the potential migrant has in South Africa

The cost of searching in the destination country is shown below (including cost of searching in the destination country and the cost of not earning an income in South Africa):

$$C_{search} = ((t_s \times (\delta W_d)) \times (e_d/P_d)) / (1-r_{sa})^{t_s} + (t_s \times (W_{SA})) \times (e_{SA}/P_{SA}) / (1-r_{SA})^{t_s} \dots \dots (18)$$

$t_s$  is the expected time it takes to find a job in the destination country

$\delta$  is the fraction of the cost of the real wage that searching in the destination country costs

The following equation is the present value of emigrating to the destination country:

$$PV_{emigration} = (\sum (\beta_d ((e_d/P_d) \times W_d) + (1-\beta_d) (e \times W_d)) / (1+r_d)^t - \sum (\beta_{SA} ((e_{SA}/P_{SA}) \times W_{SA} (1-\beta_{SA}) (e_{SA} \times W_{SA})) / (1+r_{SA})^t) - ((t_s \times (\delta W_d)) \times (e_d/P_d)) / (1-r_{sa})^{t_s} - (t_s \times (W_{SA})) \times (e_{SA}/P_{SA}) / (1-r_{SA})^{t_s} - (S_{SA} \times ((e_d/P_d)) + (S_{SA} \times ((e_{SA}/P_{SA}))) \dots \dots (19)$$

(Equation 19) is subject to the following condition:

$$(S_{SA} \times (e_{SA})) \geq ((t_s \times (\delta W_d)) \times (e_d)) \quad (20)$$

The right hand term is the cost of searching for a job in the destination country. This is assumed to be a function of the wage in the destination country. The left hand term is the value of South African savings in the destination countries. The migrant is assumed to be liquidity constrained. Since borrowing in South Africa to finance emigration is subject to substantial transaction costs this is not an unreasonable assumption.

In the model below expected emigration from South Africa is worked out using the equation below:

The present value of emigrating is worked out for all ages from 22 to 65. All positive present values are then added to work out the incentive to emigrate across all age groups.

$$\begin{aligned} \text{Expected emigration} = & \text{Expected emigration} (\sum (\sum (\beta_d ((e_d/P_d) \times W_d) + (1 - \\ & \beta_d) (e \times W_d)) / (1+r_d)^t - \sum (\beta_{SA} ((e_{SA}/P_{SA}) \times W_{SA} (1 - \beta_{SA}) (e_{SA} \times W_{SA})) / (1+r_{SA})^t) - \\ & ((t_s \times (\delta W_d)) \times (e_d/P_d)) / (1-r_{sa})^{ts} - (t_s \times (W_{SA})) \times (e_{SA}/P_{SA}) / (1-r_{SA})^{ts} - \\ & (S_{SA} \times ((e_d/P_d)) + (S_{SA} \times ((e_{SA}/P_{SA}))) \dots \dots \dots \text{(Equation 5)} \end{aligned}$$

Subject to:

$$(S_{SA} \times (e_{SA})) \geq ((t_s \times (\delta W_d)) \times (e_d)) \quad (22)$$

Excel formula

The above equations are put into Excel to work out the PV of emigrating for migrants from the age of 22 (the assumed beginning of their working life) to 65 (the assumed age of retirement). These PV amounts are then used to create an index of the financial incentives to emigrate. The assumptions made as well as the source of the data is shown below:

Wages

The migrant is assumed to expect to earn the average wage in the manufacturing sector in the destination country and South Africa. The figures used in the model are:

- Manufacturing wages in the destination country (Annual). (Source, UNDP)
- Manufacturing wages in SA, (Source, UNDP)

Discounting of future earnings stream

The migrant is assumed to discount future earnings streams by the real interest rate earned on government debt. The interest earned on government debt is taken since it is a measure (however incomplete) of financial markets' future expectation of government stability, and so provides a measure of the importance. The interest rate on government debt is taken from the IMF.

### Savings rate in South Africa

The migrant is assumed to save a constant proportion of wages. These savings are assumed to appreciate at the same rate as the real wage increases. Therefore this is a reasonable approximation for savings that are invested in non-tradable, durable goods that have high resale value. The typical example would be housing. People are assumed to save 20% of income.

### Proportion of income spent on imports

The proportion of income spent on tradable and non-tradable goods is assumed to be a constant proportion of income and the same in both countries. Although one would expect some substitution given a change in the exchange rate this substitution effect is not included. The earnings spent on tradable goods are valued using a PPP measure and the earnings spent on non-tradable goods are valued using US Dollars.

### Exchange rate valuations

Comparisons between the value of wages in South Africa and the destination country are worked out using international exchange rates and the World Bank Purchasing Power Parity measures. The purchasing power parity measures convert the currency into their value in the constant US dollars (1975). World bank Purchasing power measures are used.

### Expected chance of employment in South Africa and the destination country as well as the expected period of search

The probability of employment in South Africa and the destination country is expected to be  $(1 - (\text{unemployment rate}/100))$ .

### The expected time it takes to search for a job in the destination country

It is assumed that there is a cost to searching for a job in the destination country. This cost is assumed to be a function of the level of wages in the destination country. Since wages are taken to be a good proxy for the cost of non-tradable goods such as housing and transport. The time it takes to find a job in the destination country is taken to be a function of the unemployment rate in the destination country. The higher the unemployment rate the longer it will take to find a job in the destination country.

The explicit cost of emigration is assumed to be search costs in the destination country. These are assumed to be a function of the unemployment rate. In the index below job search is assumed to take the same percentage of a year as the unemployment rate (i.e. a 5% unemployment rate implies that 5% of a year will be spent searching). The emigrant gives wages that could have been earned in South Africa.

There were problems finding data for New Zealand unemployment before 1985. This means that the financial incentive index can only go back to 1985 for New Zealand. The time series used for South Africa did not have data after 1997. Unemployment for

these two years were extrapolated from previous years data. The method is shown in Appendix 2. The data was from WEFA.

Migrants are assumed to be liquidity constrained so that if at the beginning of the year they do not have enough money to support themselves for the required for job search in the destination country they have to wait another year to save up more money. Many countries make it a requirement to get a visa that the migrant takes enough money to support job search.

### Weighting of different variables

Different variables into the model can be weighted using weightings. Weightings are included in the model so that the model can be calibrated and it allows the relative importance of different variables to be evaluated through a sensitivity analysis.

The model was initially calibrated at 30% of income spent on tradable goods and 70% spent on non-tradable goods. Furthermore the interest rate is weighted at 10%. As shown in the sensitivity analysis these weightings achieve the best fit.

In an ordinary least squares model the weightings of the different variables are inherently worked out by solving the equations<sup>19</sup>. This index uses a similar technique except the weightings are worked out through a sensitivity analysis.

The weightings allow one to strip out certain aspects of the index and so simplify it. For instance the index includes a period of search in the destination country. The weightings allow one to remove this period of search and see how it affects the behavior of the index. In this way one is able to evaluate the importance of every aspect of the model to the index's fit with the series.

### Output from the excel model

The Excel formulas work out the present value of immigrating into the destination countries for all ages from 22 to 65. This output from 1975 to 1999 for all ages is shown below.

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<sup>19</sup> Econometric results proved to be highly sensitive and in cases seemingly spurious. Fixed and Random effects models were used.

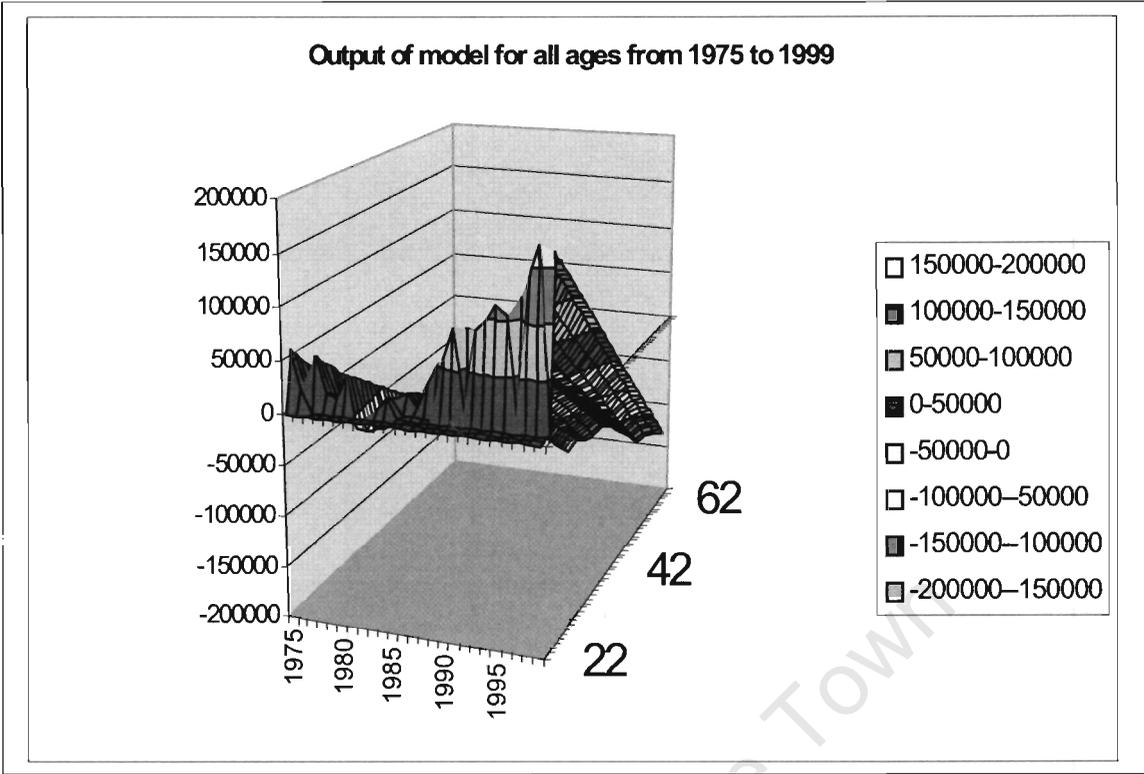


Figure 10 The graph shows the incentive to emigrate from South Africa to the UK at all ages from 22 to 65 covering the period from 1975 to 1999 in 1975 US Dollar (PPP)

The graph below shows the incentive to emigrate in 1999 from 22 to 65 for the UK.

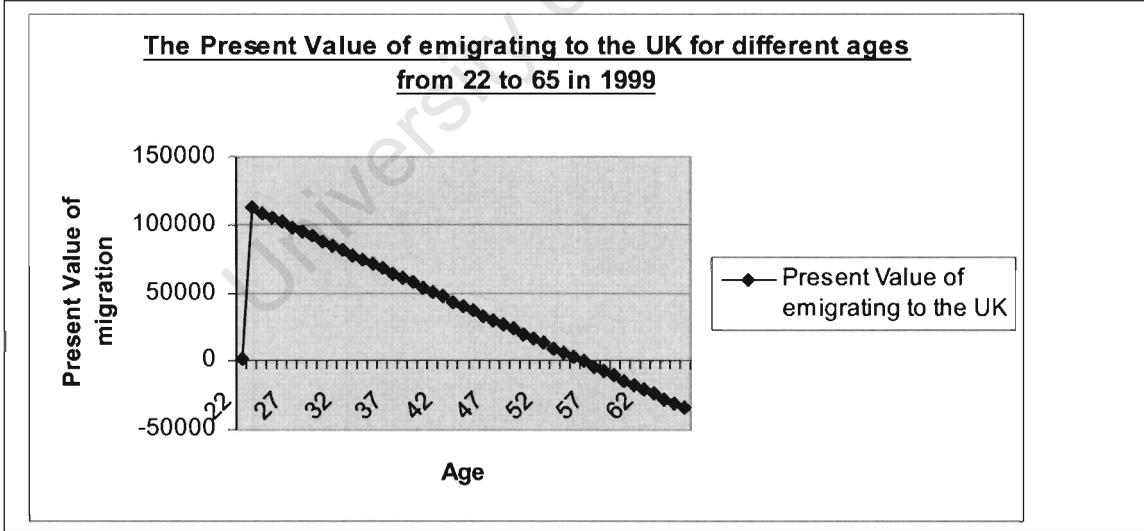


Figure 11 The graph shows the initial period in which migrants need to save money in order to emigrate (in this case a year) as well as the cost of emigrating at older ages. It also shows that the incentive to emigrate is greater for younger workers.

Emigration index

The emigration index is worked out by adding all the present values of emigrating for all ages from 22 to 65. Thus it works out the balance of incentives across all ages. Figure 12 shows all the values if positive and negative values are used. Figure 13

shows the value of the index if only positive incentives to emigrate are summed. Using positive present values makes more economic sense. People are not expected to emigrate in response to negative financial incentives. Therefore only positive financial incentives should result in emigration. Thus by adding positive financial incentives one models the financial incentives that one expects people to be responding to and emigrating as a result of. By ignoring the negative incentives one is taking out financial disincentives that would not be causing emigration in the first place.

Figure 14 shows the sum of all incentives to emigrate including both positive and negative returns from emigrating.

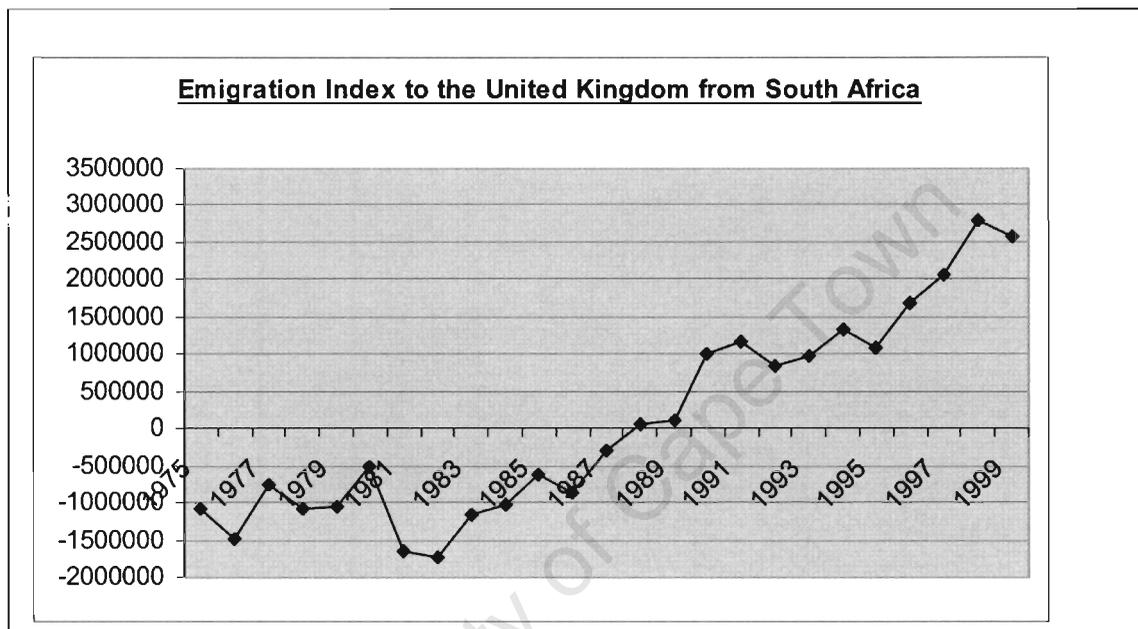
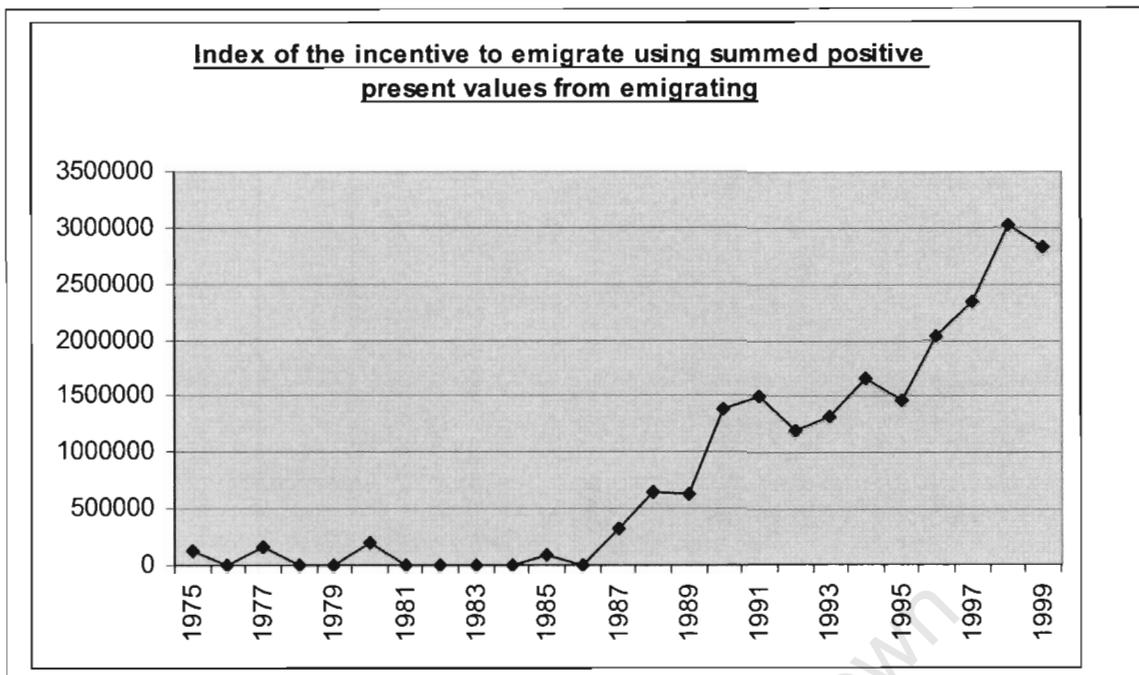


Figure 12 The graph above shows that emigration index that includes both positive and negative present values, becomes positive in the late 1980's.

Figure 15 shows the summed positive incentives to emigrate.



**Figure 13** The graph above shows the summed present values from emigrating. Similarly to the above graph it only results in a positive value in the late 1980's.

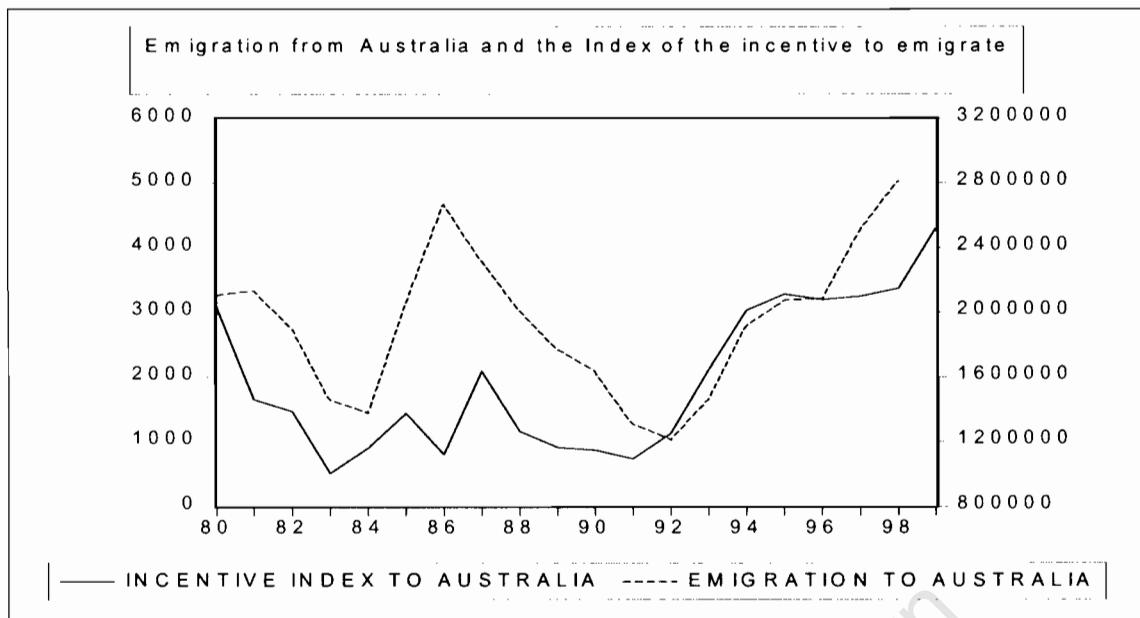
The two versions of the index result in similar trends. Both show a large increase in the incentive to emigrate after the late 1980's. The analysis below uses the second measure.

Section 2: Using the index to predict emigration

The index below is used to predict emigration from South Africa for four of the major destination countries, the UK, USA, New Zealand and Australia.

Australia

Figure 16 shows the incentive to emigrate to Australia (solid line) and emigration to Australia from South Africa (dotted line). The left axis shows emigration numbers, the right the financial incentive to emigrate.

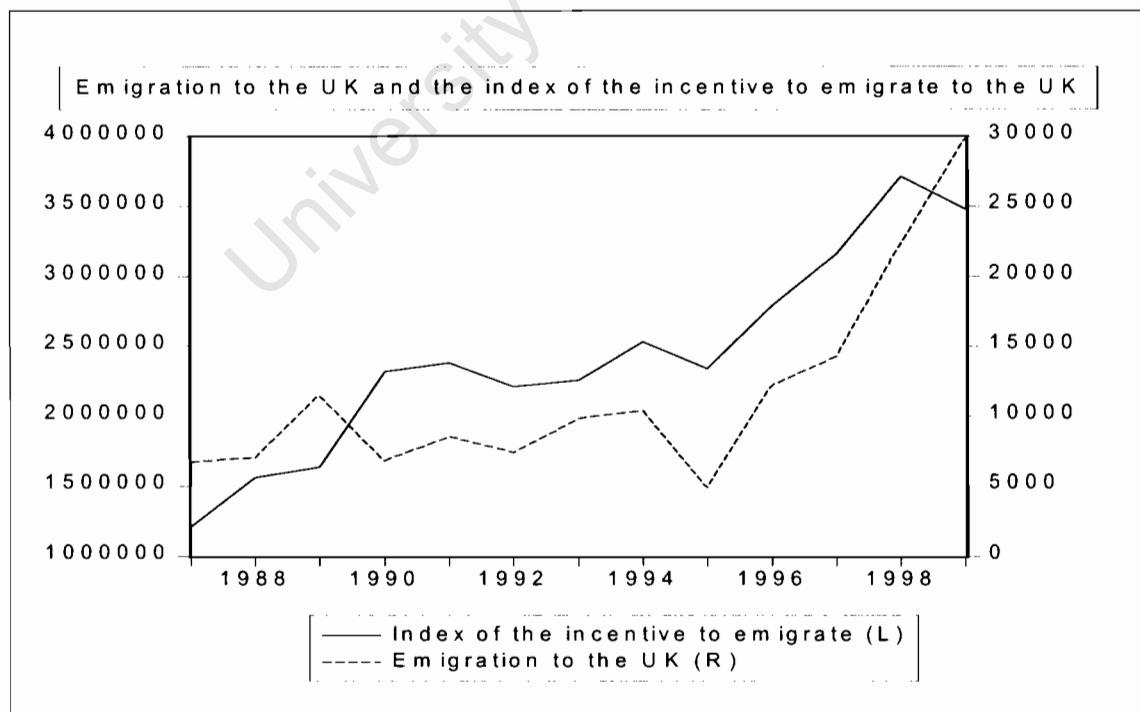


**Figure 14** The graph above shows the incentive index to emigrate to Australia (on the right axis) and actual emigration to Australia (left hand axis) have a similar trend.

The graph strongly suggests a close relationship between the incentive to emigrate to Australia and levels of emigration.

### United Kingdom

Figure 17 shows the incentive to emigrate to the UK (solid line) and actual emigration to the UK (dotted line).

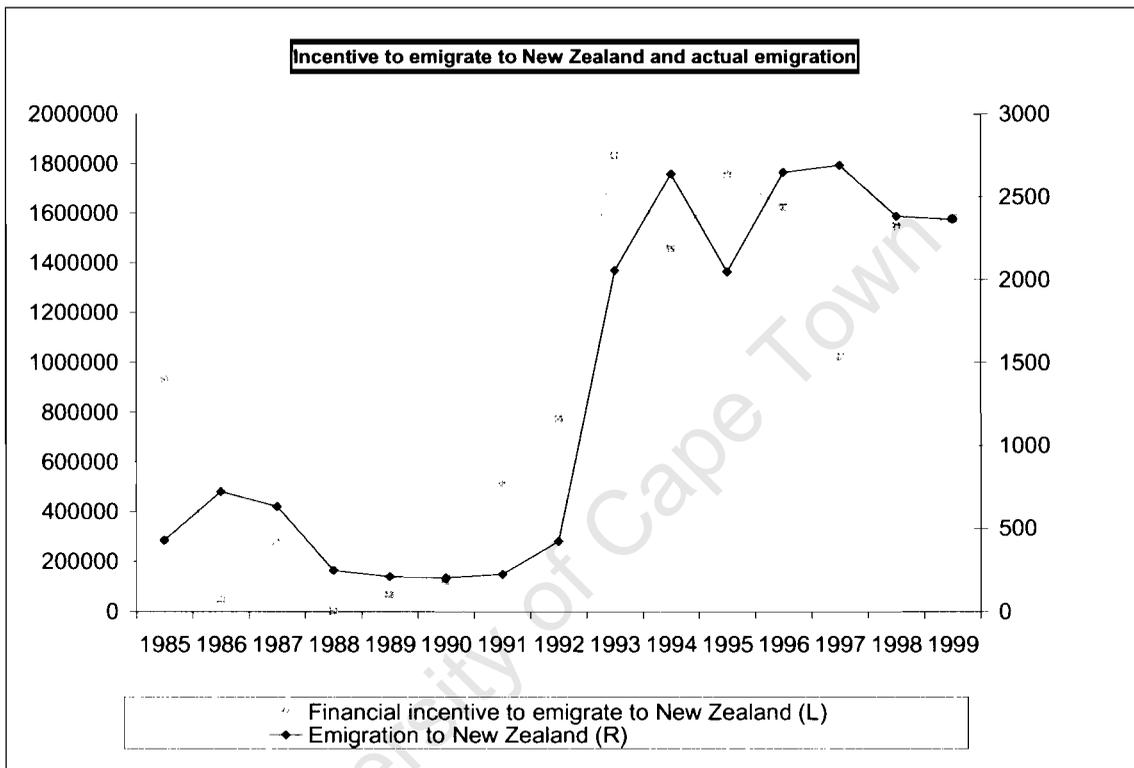


**Figure 15** The graph shows that there was a relatively close relationship between the incentive to emigrate to the UK and actual emigration to the UK.

The graph shows a similarly strong relationship between the emigration index and actual emigration. Interestingly emigration to the UK continued during the late 1990's despite a fall in the incentive to emigrate

New Zealand

Figure 18 shows the incentive to emigrate index to New Zealand. The incentive to emigrate is the solid line whereas actual emigration to New Zealand is shown with a dotted line.

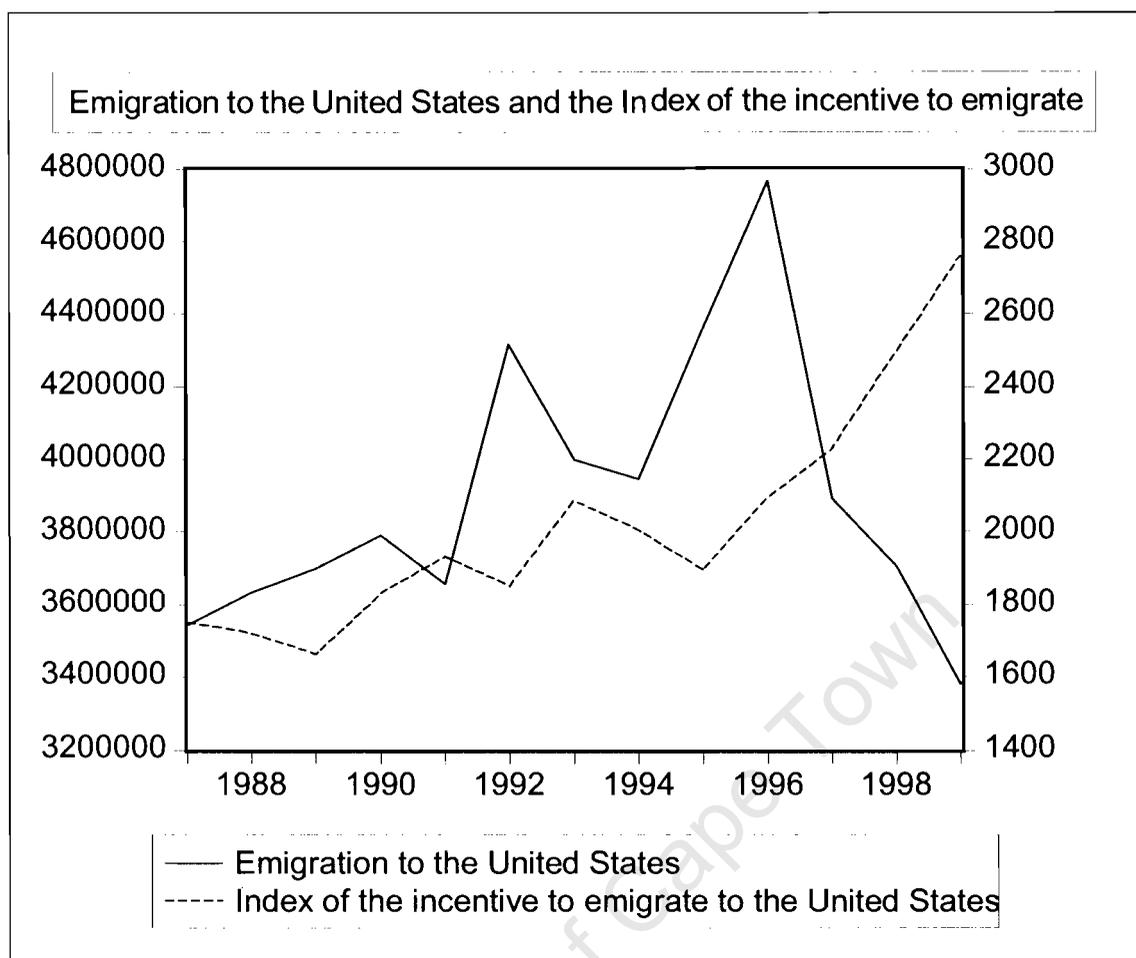


**Figure 16** The graph shows a reasonably strong relationship between the incentive to emigrate to New Zealand and actual emigration.

The graph shows a stronger relationship between emigration and the incentive to emigrate during the 1990's than during the 1980's. The sharp increase in emigration to New Zealand that followed the dramatic increase in the incentive to emigrate coincided with the relaxing of emigration controls. So while South Africans seem to have been responding to their incentives, the lowering of emigration controls allowed South Africans to take advantage of these incentives in a way that they could not do during the 1980's. Emigration to New Zealand changes in the incentive to emigrate by one year.

United States of America

The graph below shows emigration to the United States (the solid line) and the incentive to emigrate index (dotted line).



**Figure 17** The above graph shows the incentive to emigrate index (left hand axis) and actual emigration to the United States (right hand axis). The graph shows emigration leading the incentive to emigrate by one year up until 1997.

The link between the incentives to emigrate to the USA and actual emigration to the USA is the weakest of all the countries. While emigration to the USA seems to be leading the incentive to emigrate (this may be due to different reporting periods for the USA INS and the World Bank), emigration to the USA drops dramatically in the late 1990's whereas the incentive to emigrate rises. The generally weak relationship between USA emigration and the incentive to emigrate may well be related to the USA's obscure and inconsistent immigration rules. Thus while the USA is the most favored emigration destination (Mattes and Richmond, 2000) it is the second smallest destination country for South African emigrants.

#### The impact of financial incentives to emigrate

The figures above show that emigration to the destination countries seems to have strongly followed the index of the incentive to emigrate to these countries.. The following patterns are notable:

- Emigration to the most important destination countries the UK and Australia followed the index closely
- Emigration to New Zealand followed the incentive to emigrate more closely after the relaxation of immigration restrictions

- Emigration to the USA seems to be an anomaly, emigration leads the incentive to emigrate and emigration dropped dramatically to the USA during the late 1990's. This was a period in which emigration to the other destination countries was increasing and the incentive to emigrate was increasing.

The next section does sensitivity analysis to determine which aspects of the model are determining the close fit noted above between the incentive to emigrate and actual emigration.

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### Section 3: Sensitivity analysis

This section does a sensitivity analysis on the index to determine what aspects of the model are driving the model. Only the model for the UK and Australia are tested. The aspects of the index tested are:

1. the impact of interest rates
2. the impact of savings
3. the impact of the upfront search costs in the destination country
4. wage rates
5. unemployment rates
6. the impact of the proportion of income spent on tradable goods

These aspects are analyzed in turn.

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## The impact of interest rates

Interest rates are tested from a 100% weighting down to a 0% weighting. A 0% weighting eliminates interest rates from the model. Figure 20 shows how this impacts on the index.

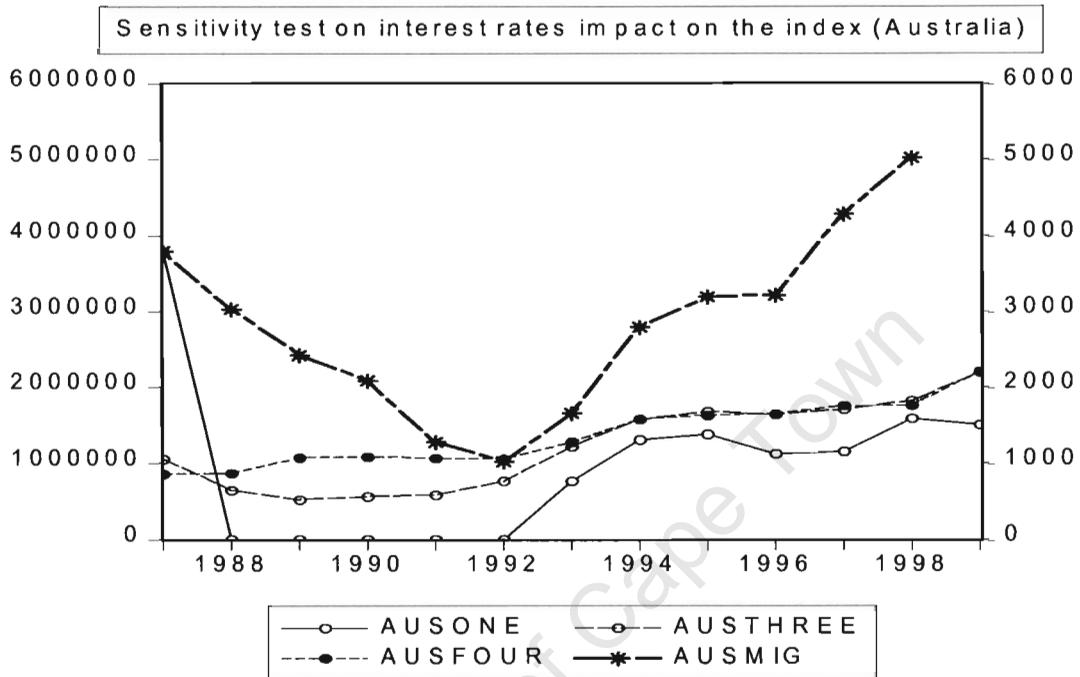


Figure 18 The graph shows the impact of changing the weight on interest rates in the index

|          | Key                                    |
|----------|--|
| ausone   | All weightings at 100%                 |
| austwo   | Interest rate weighted at 50% of value |
| austhree | Interest rate weighted at 10% of value |
| ausfour  | Interest rate weighted at 0% of value  |
| ausmig   | Emigration to Australia                |

The graph show that an interest weighting of 100% decreases the fit of the model. While a weighting of 0% seems to fit less well than a weighting of 10% they are both a close fit to the emigration series. Figure 21 shows the same procedure for the UK series.

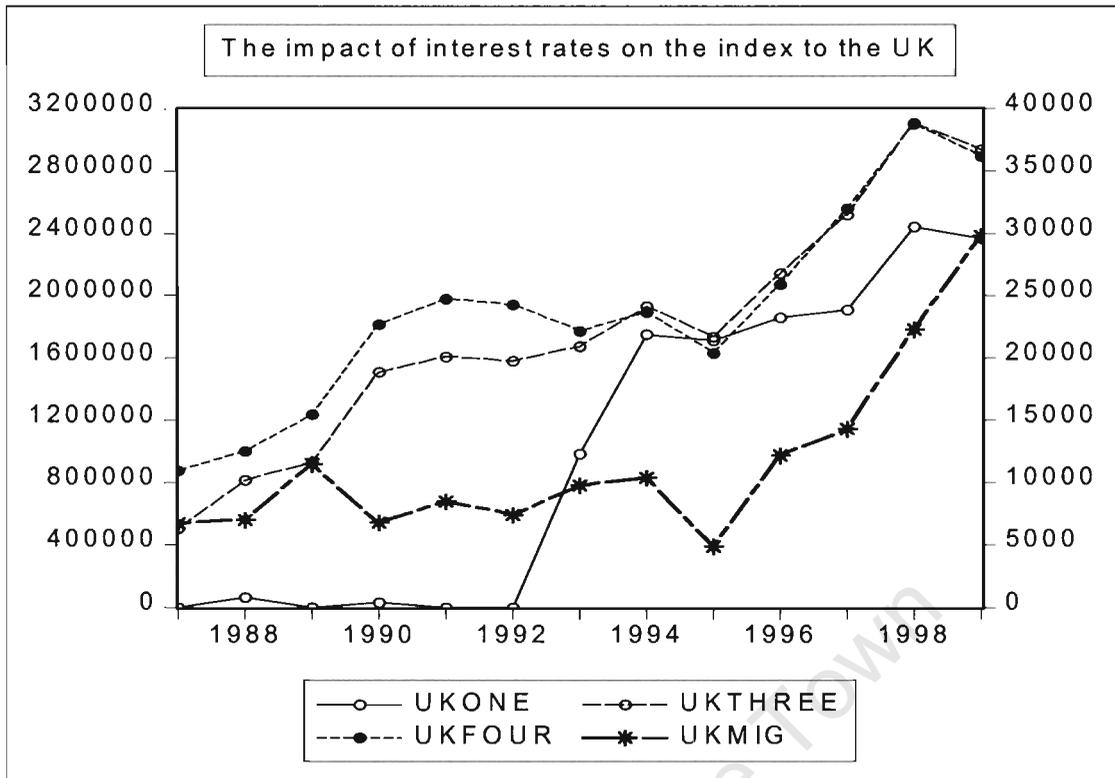


Figure 19 This graph shows the impact of the index of changing interest rates for the index to the UK

| KEY     |  |
|---------|--|
| UKONE   | All weightings at 100%                 |
| UKTWO   | Interest rate weighted at 50% of value |
| UKTHREE | Interest rate weighted at 10% of value |
| UKFOUR  | Interest rate weighted at 0% of value  |
| UKMIG   | Emigration to the UK                   |

The results for the UK series are very similar to those for the Australian series. A weighting of 100% eliminates the fit with the index with emigration. A weighting of 10% improves the fit only slightly over a weighting of 0%.

#### Impact of interest rates on the index

Interest rates are not driving the model. If one weights the interest rate at 0% and so eliminates interest rates from the model the index still has a reasonable fit with the migration series. Although a low weighting which is greater than zero does increase the indexes fit with the migration series a 100% weighting eliminates this fit. This does not imply that migrants do not use a discount factor but rather that they are as responsive to the yield on government debt as the model would imply.

#### The impact of savings on the index

Savings have a slight impact on the index. At low weightings on savings the model calculates that people cannot afford to emigrate (and so they have to spend more years saving). This effect is small. Higher levels of savings merely decrease the incentive to emigrate. This effect is due to the impact of the weakness of the South African Rand.

Therefore an increase in the weightings on savings has almost no impact on the trend in the index.

The impact of the upfront search costs in the destination country

The period of search has little impact on the trend of the index. Changing the weighting on the search costs merely changes the level of the index without changing its trend. Therefore the period of search has almost on impact of the trend.

The impact of unemployment on the index

The graphs below show the impact of changing the weighting on unemployment on the fit of the model. Figure 22 shows the impact on the index for Australia:

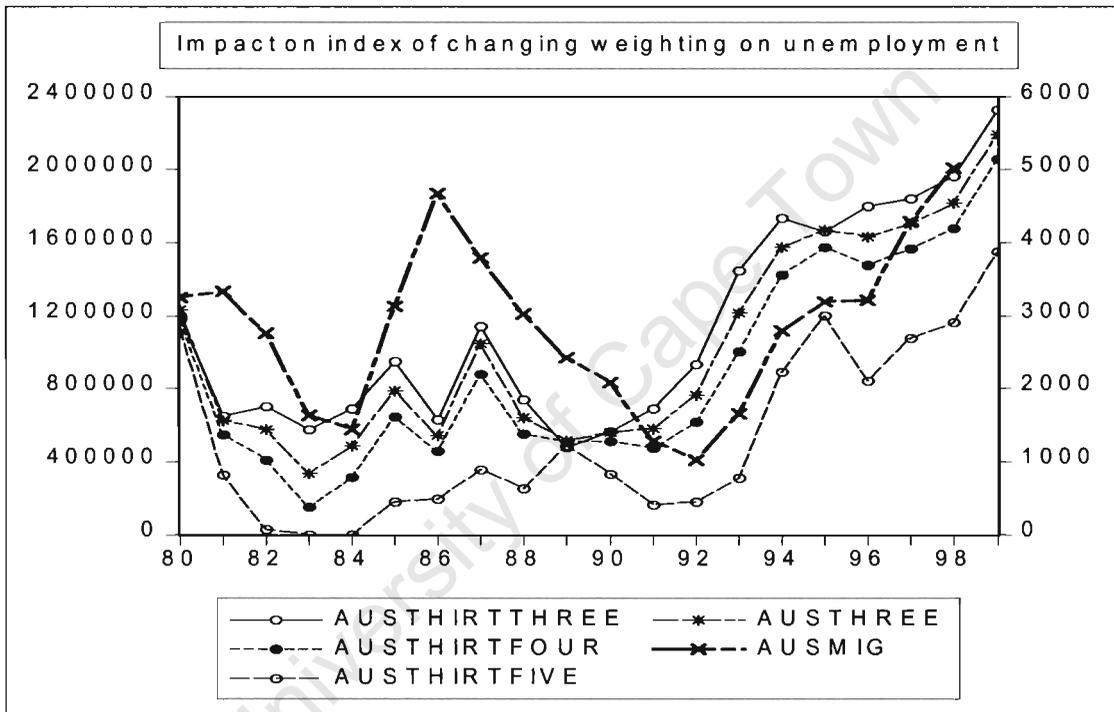
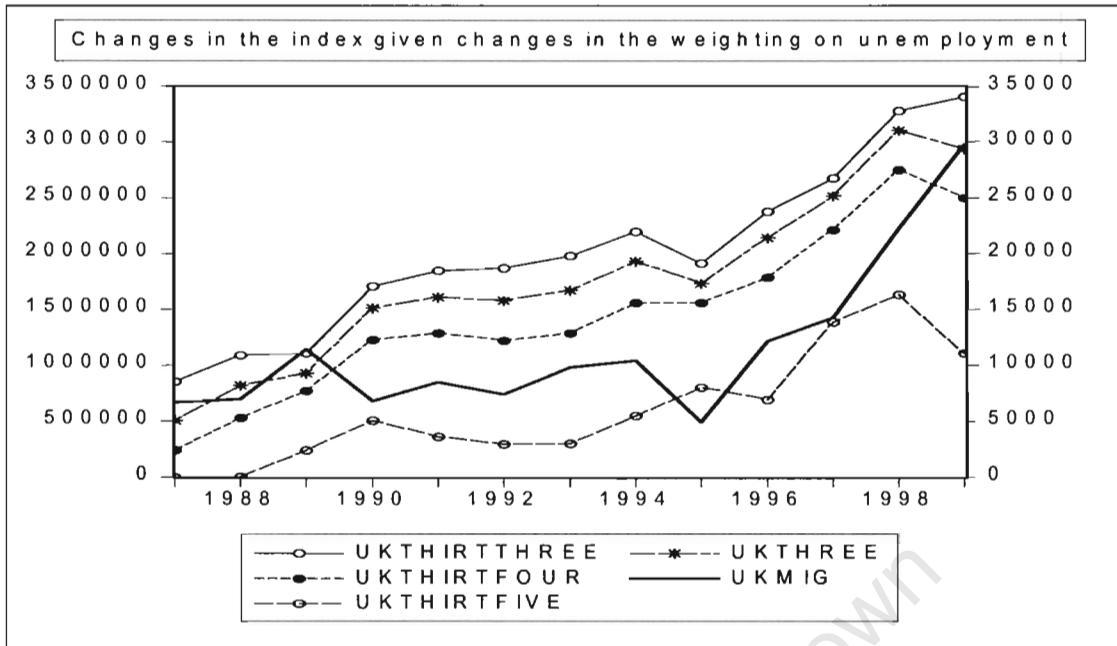


Figure 20 The graph shows the impact of changes in the weightings on unemployment one the index

| KEY  |  |
|--|--|
| AUSTHIRTTHREE                                    | Unemployment weighted at 0%                      |
| AUSTHREE   | Unemployment weighted at 100%                    |
| AUSTHIRTFOUR                                     | Unemployment weighted at 200%                    |
| AUSTHIRTFIVE                                     | Everything at, r at 0.1 and unemployment at 600% |
| AUSMIG   | Emigration from South Africa to Australia        |
| All weightings at 100% bar interest rates at 10% |  |

Figure 22 shows that increasing the weighting on unemployment decreases the fit of the index with emigration. Therefore increasing the impact of unemployment 6 times causes the index fit to dramatically deteriorate. On the other hand eliminating unemployment from the index decreases the fit with emigration slightly mainly during the early 1980s and mid 1990's. Figure 23 shows the impact of changing the weighting on unemployment on the index to the UK:



**Figure 21** The above graph shows the impact on the UK index of changing the weighting on unemployment

| KEY  |   |
|--|---|
| UKTHIRTTTHREE                                    | Unemployment weighted at 0%               |
| UKTHREE  | Unemployment weighted at 100%             |
| UKTHIRTFOUR                                      | Unemployment weighted at 200%             |
| UKTHIRTFIVE                                      | Unemployment weighted at 600%             |
| AUSMIG   | Emigration from South Africa to Australia |
| All weightings at 100% bar interest rates at 10% |   |

The graph shows a trend to the Australian index. If unemployment is highly weighted the index loses its fit with the emigration series. If the unemployment is eliminated from the series there is still a strong fit but the index fit is less close than it was previously.

#### The impact of unemployment on the index to emigrate

The analysis suggests that the main driver of the model is wages not unemployment. Including unemployment in the model does improve the index fit with emigration. This is in line with (Fallon and Lucas, 1998) who argue that skilled unemployment was minimal in the early 1990's. While there is no reason to believe that skilled unemployment was a serious issue before then, there is evidence that skilled unemployment has increased over the late 1990's. This issue is discussed in greater detail in the next chapter.

#### The impact of the weightings on wages converted into dollars versus the weighting on the wage converted into purchasing power dollars

The above analysis assumes that 30% of income is valued in dollars and 70% valued in purchasing power parity terms. This section measures the impact of this assumption on the fit of the index with emigration rates. Figure 24 shows the impact of changing these weightings on the index to Australia:

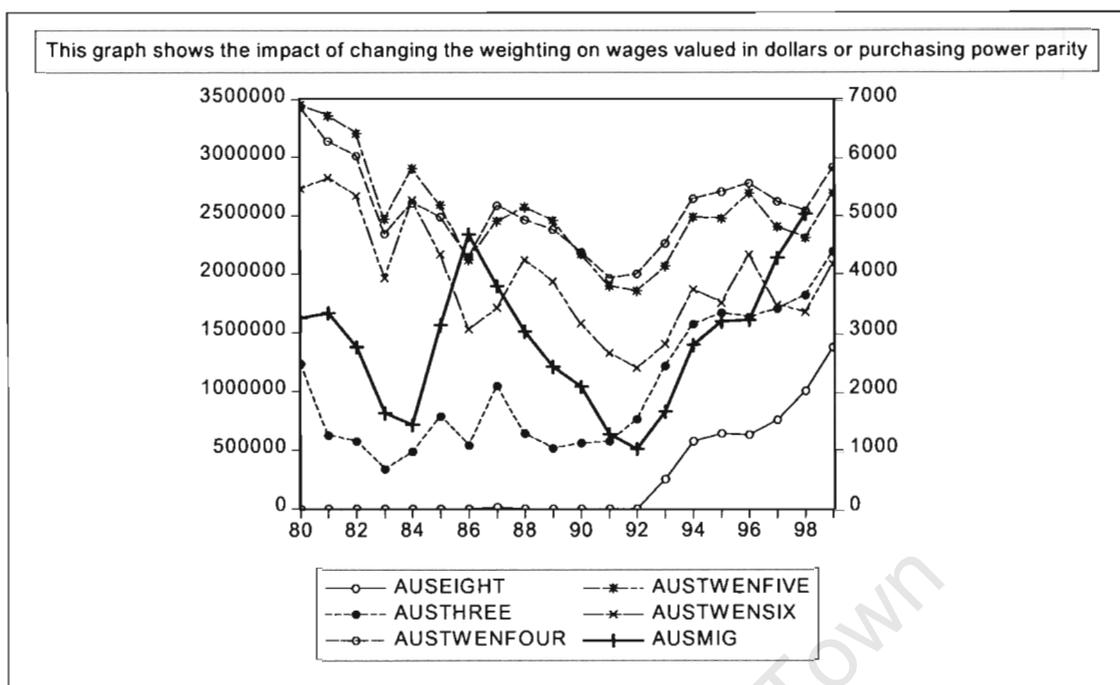


Figure 22 The above graph shows the impact of changing the weighting on dollar versus purchasing power parity measures on the index for Australia

|             | KEY  |
|-------------|--|
| AUSTHREE    | 30% weighting on dollar income, 70% weighting on purchasing power parity |
| AUSEIGHT    | 0% weighting on dollar income, 100% weighting on purchasing power parity |
| AUSTWENFOUR | 60% weighting on dollar income, 40% weighting on purchasing power parity |
| AUSTWENFIVE | 80% weighting on dollar income, 20% weighting on purchasing power parity |
| AUSTWENSIX  | 100% weighting on dollar income, 0% weighting on purchasing power parity |
| AUSMIG      | Emigration to Australia  |

The graph shows that increasing the weighting on dollar wages decreases the fit of the index. On the other hand taking dollar wages out of the index takes the index to zero for the whole period under before 1992, a period in which there was substantial emigration. Therefore the combination of the purchasing power measure and the dollar denominated measure create the best fit. Figure 25 repeats the procedure for the UK.

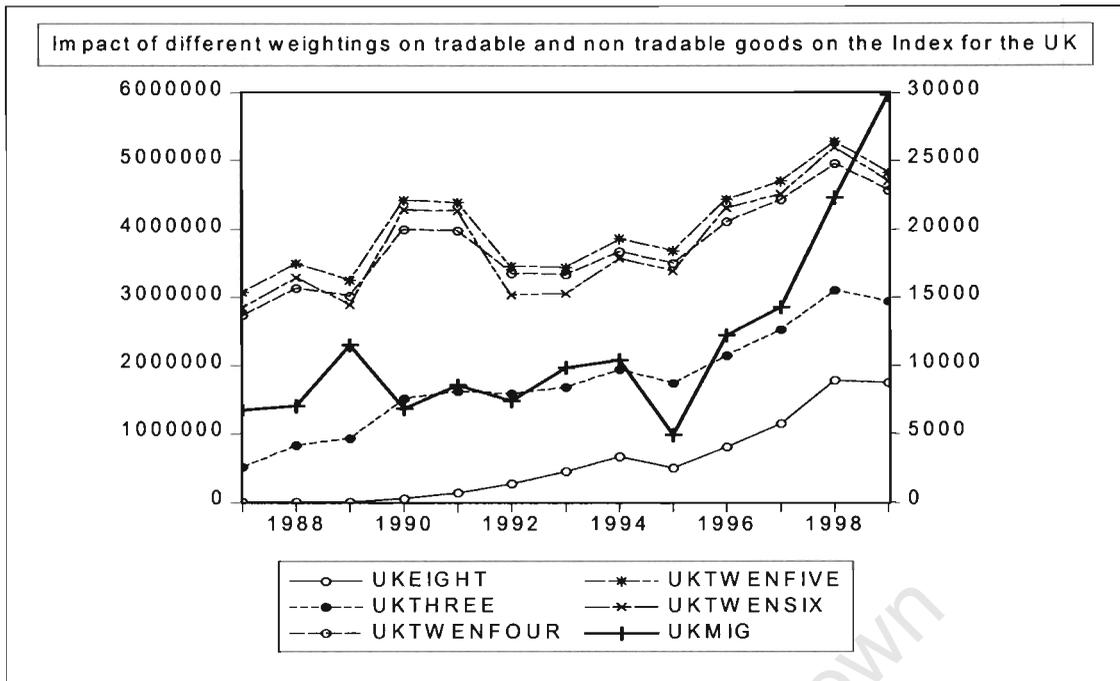


Figure 23 The graph above shows the impact on the index to the UK of changing the weighting on wages denominated in dollars versus purchasing power parity

|            | KEY  |
|------------|--|
| UKTHREE    | 30% weighting on dollar income, 70% weighting on purchasing power parity |
| UKEIGHT    | 0% weighting on dollar income, 100% weighting on purchasing power parity |
| UKTWENFOUR | 60% weighting on dollar income, 40% weighting on purchasing power parity |
| UKTWENFIVE | 80% weighting on dollar income, 20% weighting on purchasing power parity |
| UKTWENSIX  | 100% weighting on dollar income, 0% weighting on purchasing power parity |
| UKMIG      | Emigration to Australia  |

The graph shows that again similarly to Australia dollar denominated wages do not provide a good fit with the series on emigration. Again completely weighting wages takes away the incentive to emigrate before the mid 1990's. Again with the UK weighting both dollar and purchasing power parity result in the best fit with emigration to the UK.

#### The impact on dollar earnings versus purchasing power parity earnings

The graphs above suggest that wage differentials in purchasing power parity terms drive the fit between the index and actual emigration. Without some weighting on dollar denominated earnings the index would be in the red for the whole of the 1980's and early 1990's. Therefore some combination of the two effects seems to be driving emigration.

#### Results of the sensitivity study

The sensitivity analysis has suggested the following:

- Wages, especially when valued in purchasing power terms are the driver of the index's fit with emigration

- Unemployment and interest rates improve the fit of the index but are dispensable
- Savings and the period of search have no impact on the fit of the model

Therefore the sensitivity analysis suggest that the higher purchasing power of wage rates in the destination countries is the primary cause of trends in emigration from South Africa.

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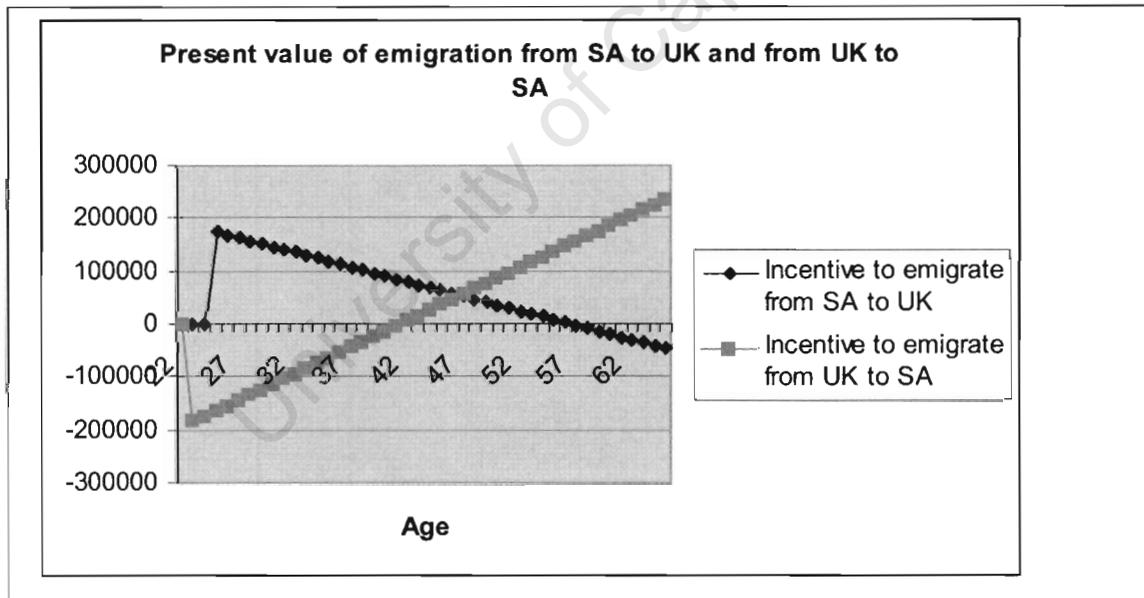
#### Section 4: Implications of the model for age/emigration profile

Since the model explicitly models the relationships between incentives to emigrate and the age of the migrant it can be used in qualitative analysis of the age profile of emigrants. The impact of the exchange rate on short-term emigration to the UK is shown.

#### Short-term emigration to the UK

With the increase in the number of South Africans going on working holidays there has been discussion on the possibility that these South Africans will return to South Africa after a period of one or two years overseas. People have suggested that emigrants have a financial incentive to go to the UK and then return to spend in South Africa to spend their UK generated savings. Obviously these savings are worth far more in South Africa due to the weak exchange rate. While one would expect people to have a *non-pecuniary incentives* to return, such as the lure of family, friends and familiar places the argument made here is that they do not have a *financial incentive* to return.

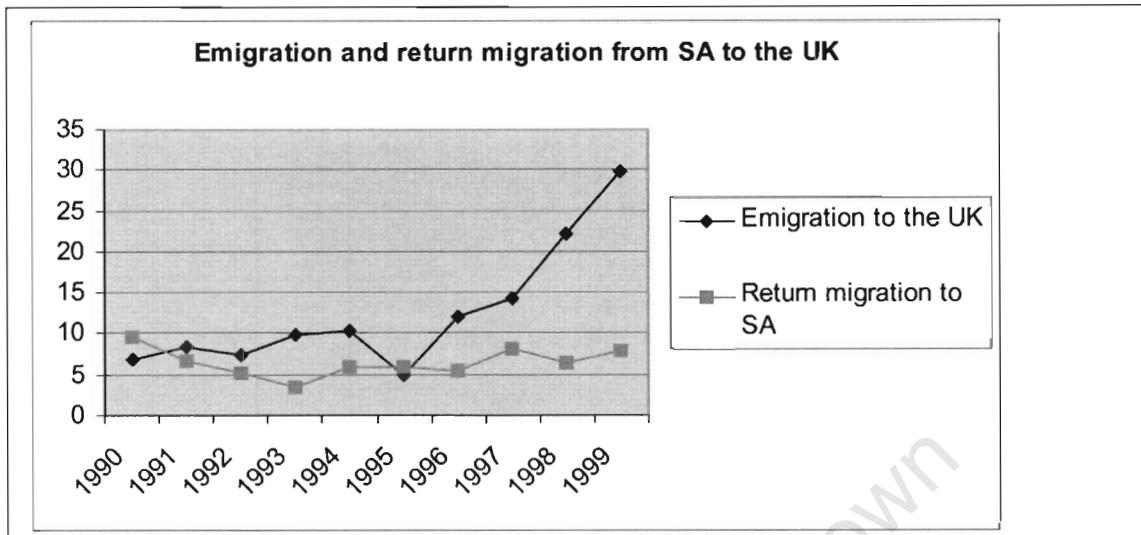
Figure 26 explores the migrant's incentives. The graph shows the incentive to migrate from SA to UK (top line at younger ages) and then it also shows the incentive to emigrate back from the UK to SA (higher line at older ages).



**Figure 24** The graph shows a falling present value to emigrate to the UK and an increasing present value from emigrating back from the UK to SA.

The graph shows the increasing incentive to return to SA with age due to the benefit from the increased value in savings. Since this incentive increases till retirement there seems no reason why South Africans should return till they retire. The longer the migrant takes to return to South Africa the higher their payoff. In other words a migrant with a purely financially determined utility function will maximize utility by emigrating to the UK at the earliest possible time and return to SA at the latest possible time. In fact as the graph above shows an emigrant that returns to SA makes

a substantial loss from doing so. This result is supported by the graph below that shows the relationship between emigration to the UK and return migration back to SA by South African citizens.



**Figure 25** The graph shows emigration from SA to UK and from the UK to SA. Little relationship between the trends is evident.

The graph shows no clear relationship between emigration to the UK and return migration back to South Africa. This supports the suggestion of the model that emigrants to the UK would not return in the short term since they have an incentive to put off return migration till they are older. As people spend longer in the UK, one would expect the attraction of home, and friends and family in SA to decrease as they form new friendships, create families and familiarize themselves with their surroundings. Therefore one would expect that with time in the UK the financial incentive to delay return migration would increasingly outweigh the non pecuniary incentives.

As the migrant settles into life in the UK factors such as friends and family would increasingly provide an incentive to stay in the UK *and not return* to South Africa. This raises the interesting possibility that migrants will never in fact return<sup>20</sup>.

<sup>20</sup> One intuitively expects friends, family and surroundings to become more important as people get older. Thus one would not expect people to return in their old age.

## Section 5: The impact of politics on uncertainty during the 1980's and 1990's

This section provides a brief description of the expected impact of political uncertainty on emigration from South Africa from 1980 to 1990. It uses real option theory to analyze the impact of a series of political events on emigration from South Africa. Real option theory incorporates uncertainty about the future into the human capital framework. In this framework migrants decide whether or not to emigrate based on their current incentives as well as their expectations about the future. When migrants are *in the money* they would emigrate but they are worried that they will make an essentially irreversible mistake, so they may delay their decision.

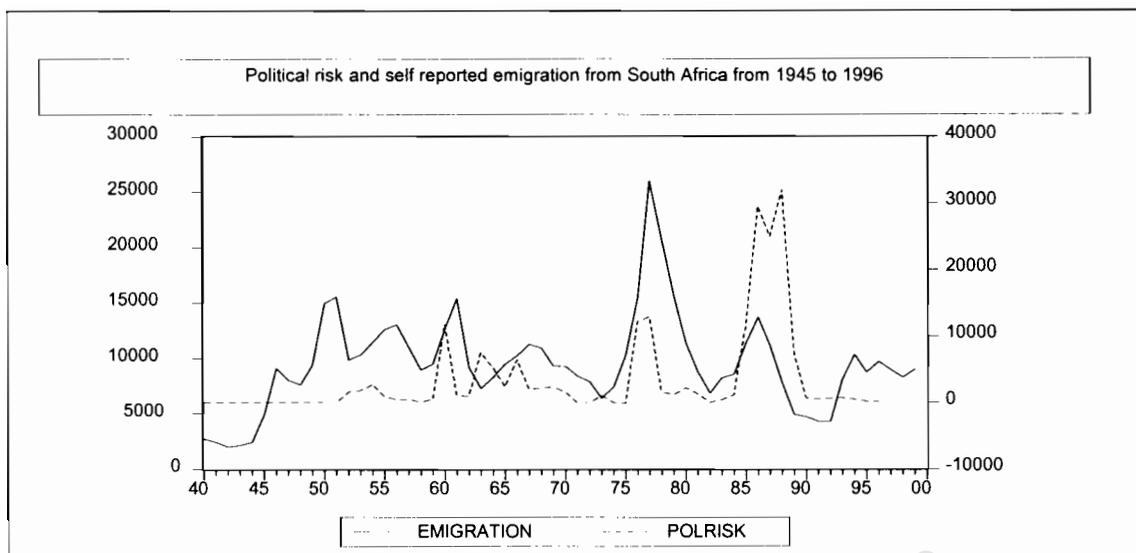
This section uses this framework to make predications about the impact of political events on emigration rates. Two preliminary issues are discussed. The first is the number of people who are in the money at any one time. The second is the impact of political uncertainty in the past.

### The number of South Africans who are in the money

The number of people who could emigrate but do not because they are worried about the future could be an insignificant number making the impact of real option theory minimal. We can proxy how large this group is through the widely noted phenomena that government threats or attempts to restrict emigration, increase emigration. A likely reason for this phenomenon is that people would emigrate but for the value they place on waiting. Governments threats to impose taxes decrease the value of waiting or take the value of waiting away (by prohibiting emigration or restricting it). Thus people's reactions to government threats to restrict emigration can be taken as a measure of the number of people who are in the money, i.e. would emigrate but are waiting to see if conditions improve. In the case of South Africa 6% of skilled South Africans said that government attempts to restrict emigration would hasten their exit (Mattes and Richmond, 2000). The implication being that 90 000 South Africans in 1999 were in the money. This is a large enough group of people to impact on trends in emigration.

### The impact of political events on emigration over the last 50 years

Changes in political risk has played a significant role in emigration over the last 60 years, as the graph below shows. An index of political uncertainty for South Africa over the last 30 years is shown below with levels of self reported emigration:



**Figure 26** The above graph shows self reported emigration combined with a political risk index. Source (Fedderke et al, 2001)

Figure 28 strongly suggests that there was a strong correlation between certain periods of political risk and emigration. Political risk though has declined in the 1990's while destination countries report that emigration has been increasing. Reasons for this include the limits of the political risk index as well as some reasons brought out by the discussion below.

Real option theory and political uncertainty

As discussed in the theoretical section the main values in the real option model of emigration are not directly observable. Therefore this section discusses how these variables would be expected to change over the period. This section emphasizes on uncertainty in South Africa since politics in the destination countries is stable enough to be ignored.

The equation below is taken from the theoretical discussion.

$$B^* = \frac{q + r}{1 + r} \left[ \frac{1 + d}{1 + r} \left( \frac{1 + r}{1 + d} \right)^{\frac{1}{q}} \right] \quad (\text{equation 6 from the theoretical discussion on uncertainty (Dixit and Pindyck, 1994)}).$$

The symbols are discussed in greater depth in the theoretical discussion.

$B^*$  gives us a measure of the value of B (benefit from emigrating) required to make the migrant indifferent between staying and going

q is the probability of an increase in B in the next period

(1-q) is the probability of a decrease in B (improvement in SA conditions)

(1-d) is the extent of a decrease in B Therefore a fall in (1-d) implies an improvement in South Africa. An increase in (1-d) implies a deterioration in South Africa.

| <u>Year</u>      | <u>Event</u>   | <u>Impact on q and d (see theoretical section)</u>   | <u>Impact on emigration</u>  |
|------------------|--|--|--|
| 1984             | Township uprising  | The probability of violent revolution increased (increase in q)  | Speed up emigration  |
| 1985             | Township uprisings continue<br>Rubicon speech and debt repudiation.<br>Imposition of the state of emergency                | These events increased the value of (1-d), increased the value of q  | Resulted in speeding up of emigration  |
| 1986             | Township uprising  | Further increase in q  | Further speed up of emigration   |
| End of 1989-1990 | FW gives reform speech.<br>Release of ANC leaders, Unbanning of the ANC. Cessation of the armed struggle                   | Increase in value of improvement in SA, fall in the value of (1-d), and increase in probability of improvement (1-q)           | Slow down emigration as future may improve   |
| 1992             | Referendum endorses  | Fall in expectations of white revolution, so a fall in (1-d), combined with a fall in probability of deterioration (fall in q) | Increased delay in emigration decisions  |
| 1992-1994        | Increasing political violence, ANC followers killed at Boiphatong, international recognition of political violence         | Increase in expectation of a violent future, an increase in q. Increase in (1-d)   | A acceleration in emigration decisions   |
| 1994             | Peaceful Election and success of sporting teams (1995). Policy of reconciliation. The start of the end of the IFP/ANC war. | A fall in (1-d) (expectations of an improvement in SA), fall in q as 1994 ended many peoples worries about emigration          | Dramatic delay in emigration   |
| 1996-1999        | End of Government of national unity.<br>Adoption of constitution   | Increase in (1-d), increase in (1-q), fall in uncertainty  | Acceleration of emigration as optimism ends and uncertainty about the future decreases |

**Table 2 Political events that would have impacted on expectations of the future** *Source (Waldmeir, 1997)*

This brief analysis implies the following:

Period A: a speeding up of emigration from 1984-1986

Period B: a slowdown from 1989 to 1992

Period C: speeding up from 1992 to 1994

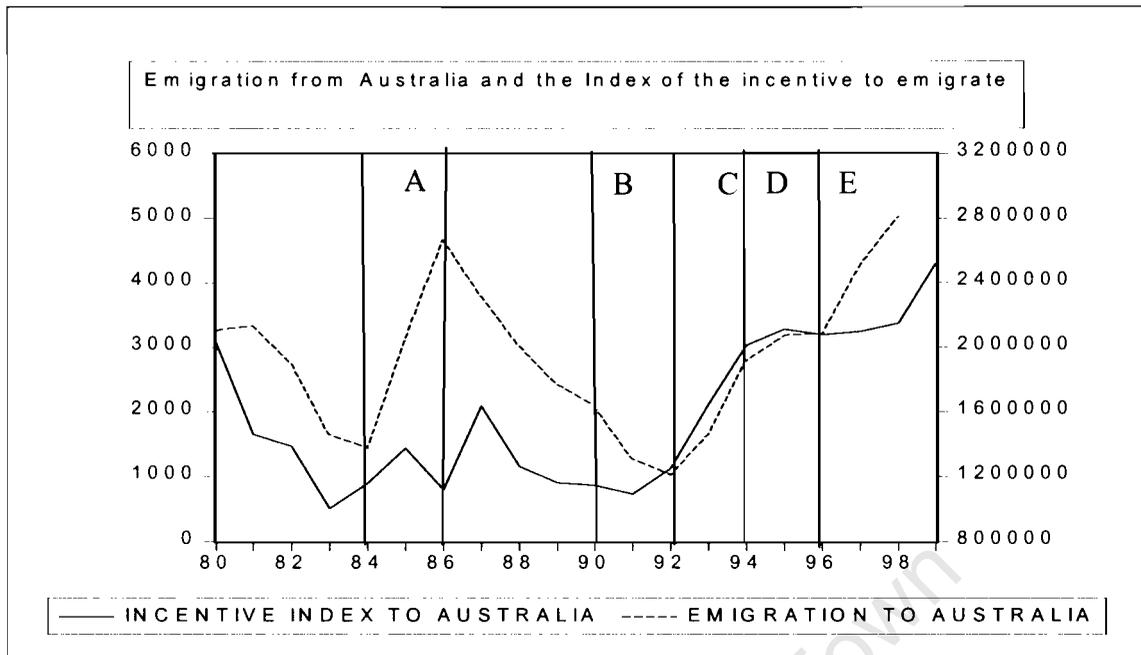
Period D: a slowdown between 1994-1996

Period E: an acceleration after 1996

Evidence for this will be discussed in relation to the graphs showing the incentive to emigrate to the UK and Australia.

Evidence for Australia.

Figure 29 again shows the incentive to emigrate to Australia (dotted line) and emigration to Australia from South Africa (solid line).



**Figure 27** The graph above shows the incentive index to emigrate to Australia and actual emigration to Australia have a similar trend.

*Period A: (an acceleration in emigration expected)* The graph shows that as expected from 1984 to 1986 emigration to Australia increased.

*Period B: (a slowdown from 1989 to 1992)* The graph shows that as expected emigration slowed down from 1990 to 1992.

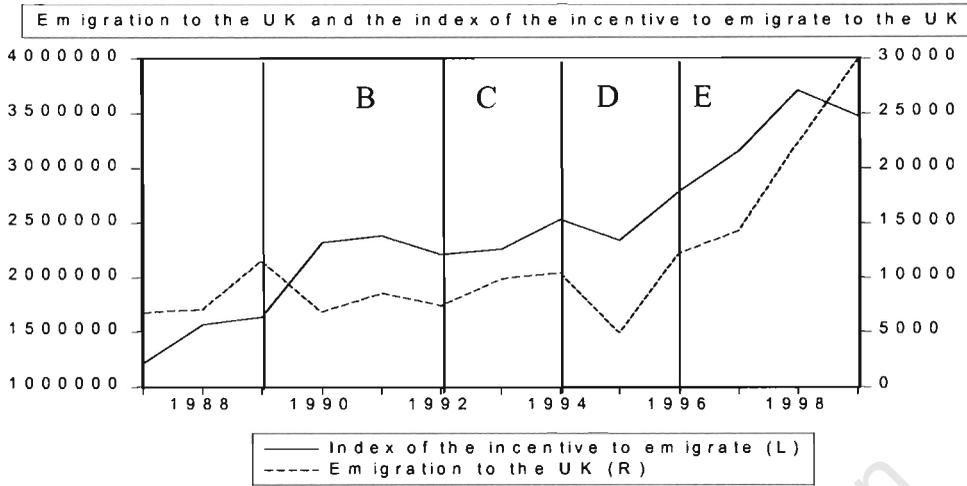
*Period C: (speeding up from 1992 to 1994)* The graph shows an increase in emigration. But this coincided with a large increase in the incentive to emigrate.

*Period D: (a slowdown between 1994-1996),* Again the graph shows a slowdown in the increase in the emigration rate, but again this coincided with a decrease in the incentive to emigrate.

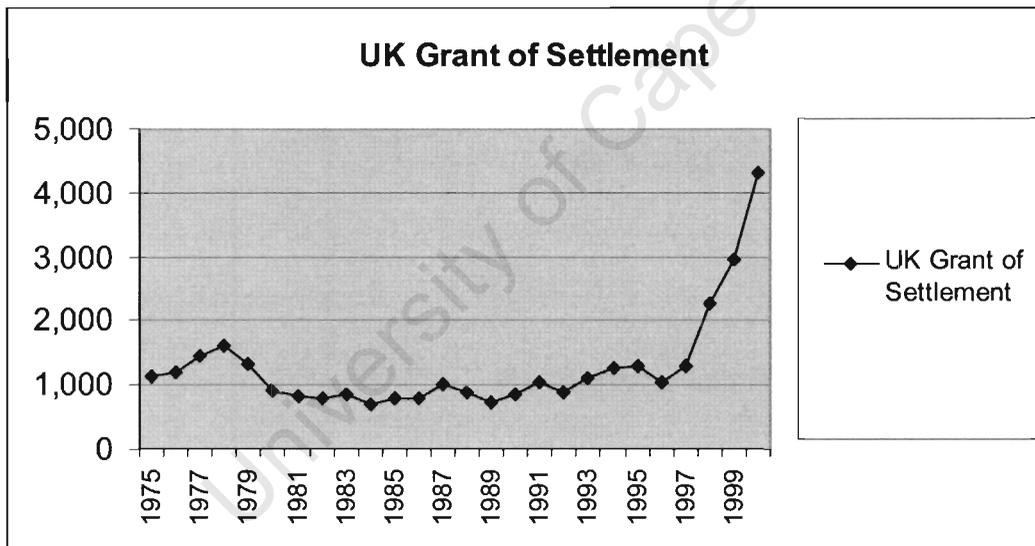
*Period E: (an acceleration in emigration)* Despite the slowdown in the increase in the incentive to emigrate, emigration during the period increased. It seems unlikely that a fall in uncertainty caused this dramatic rise after 1996.

Emigration to Australia was strongly effected by political uncertainty during the mid 1980's. During the rest of the period emigration seems to predominantly following financial incentives.

The United Kingdom



**Figure 28** The graph shows that there was a relatively close relationship between the incentive to emigrate to the UK and actual emigration to the UK..



**Figure 29** This graph shows permanent emigration to the UK (granted after a minimum of four years in the UK). While providing a rough measure of emigration rates it shows no increase in emigration to the UK during the 1980's.

*Period A: (an acceleration from 1984 to 1986)* From the Grant of Settlement data emigration to the UK did not increase during the 1980's.

*Period B: (a slowdown from 1989 to 1992)* The graph shows that as expected emigration slowed down from 1989 to 1992. Despite an increased financial incentive to emigrate.

*Period C: (speeding up from 1992 to 1994)* The graph shows an increase in emigration. But this coincided with a mild increase in the incentive to emigrate.

*Period D: (a slowdown between 1994-1996),* Again the graph shows a dramatic fall in the emigration rate to its lowest level over the period. While this did coincide with a

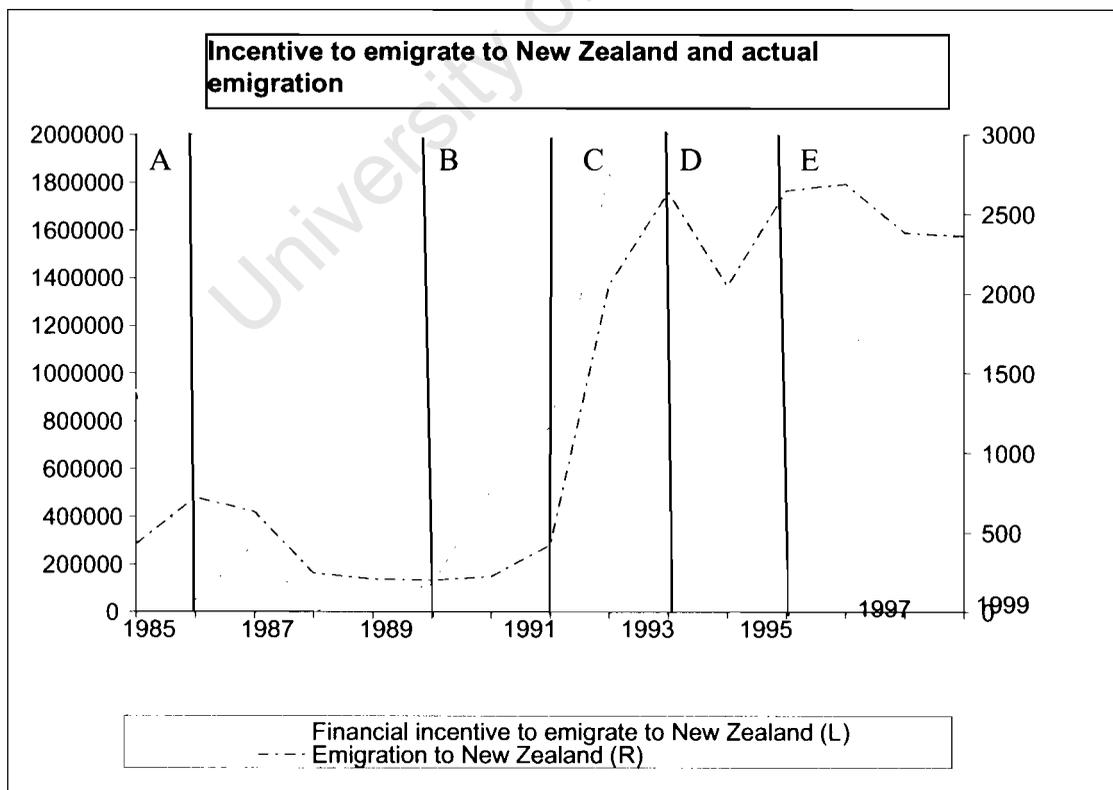
fall in the financial incentive to emigrate it the fall in emigration was far more dramatic than the fall in the incentive to emigrate.

*Period E: (an acceleration in emigration)* Emigration increased during the period, but this coincided with an increase in the financial incentive to emigrate. Again the increase in the emigration was dramatic (tripling in three years) given the comparatively mild increase in the financial incentive to emigrate (a increase of a third).

Emigration to the UK seems to have been more strongly affected by uncertainty than emigration to Australia. For instance emigration to the UK reached its lowest level of the period after 1994, during the post election honeymoon period. Real option theory would suggest that the reason seems to be that the incentive to emigrate to the UK was still only mildly in the money during and up to the mid 1990's. Therefore uncertainty would have had a greater impact on the level of emigration. As figure 31 demonstrates towards the end of the 1990's the incentive to emigrate increasingly went into the money thus decreasing the expected impact of uncertainty. Emigration to the UK therefore started its inexorable increase in much the same pattern as emigration to the Australia did in the early part of the 1990's.

### New Zealand

Figure 32 shows the incentive to emigrate index to New Zealand. The incentive to emigrate is the solid line whereas actual emigration to New Zealand is shown with a dotted line.



**Figure 30** The graph shows a reasonably strong relationship between the incentive to emigrate to New Zealand and actual emigration.

*Period A: (an acceleration from 1984 to 1986)* Emigration to New Zealand increased during the period, despite falls in the financial incentive to emigrate to New Zealand.

*Period B: (a slowdown from 1989 to 1992)* The graph shows that as expected emigration increased very mildly during the period despite a dramatic increase in the incentive to emigrate. Strict immigration requirement may well have dampened emigration during this period.

*Period C: (speeding up from 1992 to 1994)* The graph shows an increase in emigration. This coincided with a massive increase in the incentive to emigrate and a lowering of immigration controls into New Zealand.

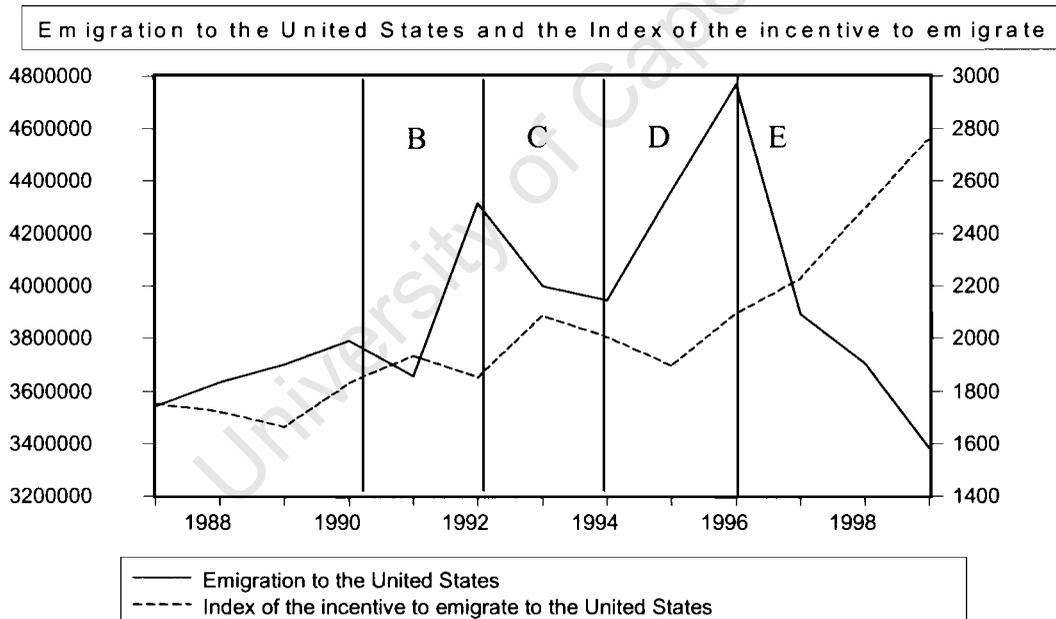
*Period D: (a slowdown between 1994-1996),* The graph shows a fall in the emigration during the period. This coincided with an increase in the incentive to emigrate.

*Period E: (an acceleration in emigration)* Emigration mildly declined during the period. This follows a decline in the financial incentive to emigrate.

The table shows that emigration to New Zealand broadly followed expectations. The exception being period E in which emigration declined when an acceleration was expected.

### United States

Figure 33 shows emigration to the United States.



**Figure 31 Emigration to the United States**

*Period B: (a slowdown from 1989 to 1992)* The graph shows that contrary to expectation emigration to the United States increased during the period.

*Period C: (speeding up from 1992 to 1994)* The graph shows that again contrary to expectations emigration increased.

*Period D: (a slowdown between 1994-1996),* The graph shows a rise in emigration during the period..

*Period E: (an acceleration in emigration)* Emigration declined dramatically during the period.

As the table notes, political events seem to have little consistent impact on emigration to the USA. Therefore emigration trends to the USA remain an enigma. The most likely explanation is the opaqueness of USA immigration policy. USA immigration policy is highly weighted towards family immigration which is probably less responsive to financial incentives and political events.

### Emigration and political events

Table 3 shows the period in which emigration reacted as expected to political events. The table shows periods in which emigration reacted as expected to politics but not to financial incentives. These periods are called POLITICS, and the cells are colored white. The periods in which emigration reacted as expected to the financial incentives but not as expected to politics are called FINANCIAL, and the cell is again colored white. The periods in which both politics and financial correctly expected emigration to move in a certain direction are called BOTH and the cells are colored light grey. Periods in which both political incentives and financial incentives correctly predicted that emigration would move in a certain direction but one effect seems more likely to be correct are called BOTH/(POLITICS OR FINANCIAL) depending on which effect seems to have been greater, and the cells are colored darker grey. Periods in which neither financial incentives nor political events correctly predicted the direction of emigration are called NEITHER and colored black.

| This table shows whether emigration to the countries was in line with expectations, given the political events of the time and in line with the expectations of the financial model |               |  |                |         |
|---|---------------|--|----------------|---------|
|   | UK            | Australia                                | New Zealand    | USA     |
| Period A  | n/a           | POLITICS                                 | POLITICS       | n/a     |
| Period B  | POLITICS      | POLITICS                                 | FINANCIAL      | NEITHER |
| Period C  | BOTH/POLITICS | BOTH/FINANCIAL                           | BOTH/FINANCIAL | NEITHER |
| Period D  | BOTH/POLITICS | BOTH                                     | POLITICS       | NEITHER |
| Period E  | BOTH          | POLITICS PROBABLY<br>NEITHER (see below) | FINANCIAL      | NEITHER |

**Table 3 Causes of emigration, political versus financial factors (1980-2000)**

The table shows that emigration reacted as expected in most cases. Politics seems to have been more important in the 1980's and early 1990's.

The table shows the emigration seems to have reacted more to politics during the 1980's and early 1990's. Towards the end of the 1990's financial incentives seem to have become more important to emigration. The USA is notable for the complete lack of success of politics or financial incentives to predict emigration.

## Political events and emigration to Australia and the UK

This section has shown the importance of political events to emigration to Australia, and the UK. Politics seems to have had different impacts on emigration to certain countries at different times. The following period are notable:

*Mid 1980's:* For instance during the 1980's political events lead to a dramatic increase in emigration to Australia and no impact on emigration to the UK.

*Early 1990's to mid 1990's:* During this period the roles reversed. Australia shows the least reaction to political events, the UK is the most sensitive.

This inconsistency can partly be explained by changes in immigration policy as mentioned above. A more theoretical reason comes from Real option theory.

*Mid 1980's:* During the mid 1980's the UK was far out of the money (see Figure 14 and 15 for an indication). Therefore political events did not push people into emigrating there. Australia on the other hand was into the money and so emigration to Australia spiked as peoples expectations about the future in South Africa fell causing people accelerate their emigration decision and so go.

*Mid to early 1990's:* During this period emigration to the UK was further into the money. Therefore emigration to the UK was highly responsive to emigration. On the other hand Australia was too far into the money for uncertainty to impact on the emigration decision. Therefore emigration to Australia showed little response to political uncertainty during the period.

The incentive to emigrate to the UK was higher than it was for Australia for the 1990's. Furthermore emigration rates to the UK are for the most part higher than they are to Australia. Australia is the preferred destination over the UK for employed skilled South Africans (measured by Mattes and Richmond). Thus while the UK maybe far further into the money for some such as the recently graduated, for the skilled and employed, Australia is further into the money than the UK. This would make sense given Australia's similarity to South Africa and weaker exchange rate. Thus for the group immigrating into Australia, Australia was further into the money than the UK was for the group emigrating there.

### Real option theory

This discussion has showed that real option theory can be used to gain interesting insights into emigration from South Africa. While the validity of real option theory is not tested here (it seldom is econometrically) its ability to help the analyst explain migration behavior is demonstrated.

### Conclusion to Chapter 4

This chapter has shown the following:

1. Real wages are the main cause of trends in emigration but that unemployment *may* also have contributed during the period.

2. Political events have played a large role in emigration. This effect has occurred around the trend determined by financial incentives
3. Immigration restrictions have played an important role in restricting emigration in the past especially for the USA and for New Zealand

Neither the index nor political events provide an adequate explanation for the dramatic increase in emigration during the late 1990's. The next chapter presents a range of factors that could have increased emigration during the late 1990's.

University of Cape Town

## Chapter 5 Alternative explanations for emigration during the late 1990s

The above analysis did not adequately explain the dramatic increase in emigration during the late 1990's, whereas other periods were reasonable well explained. This points to the possibility that during the late 1990's new factors started to impact on emigration. This chapter outlines a range of factors that could have increased emigration during the late 1990's. While it was government policy to redistribute income during the late 1990's quantifying the impact of this is very difficult and this was left out of this section (Nattras and Seekings, 2001). This is an important area of future research. The chapter is divided into two sections:

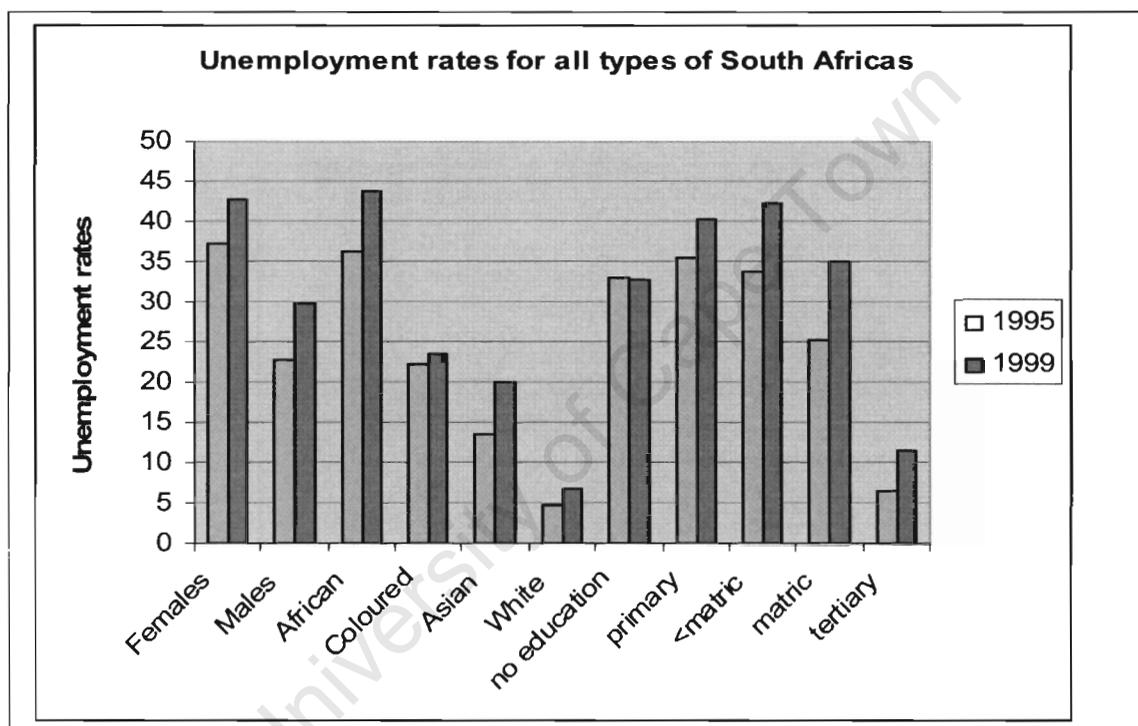
Section 1: outlines the possible impact of unemployment on emigration.

Section 2: outlines the impact of crime and violence on emigration.

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## Employment, unemployment and migration in South Africa

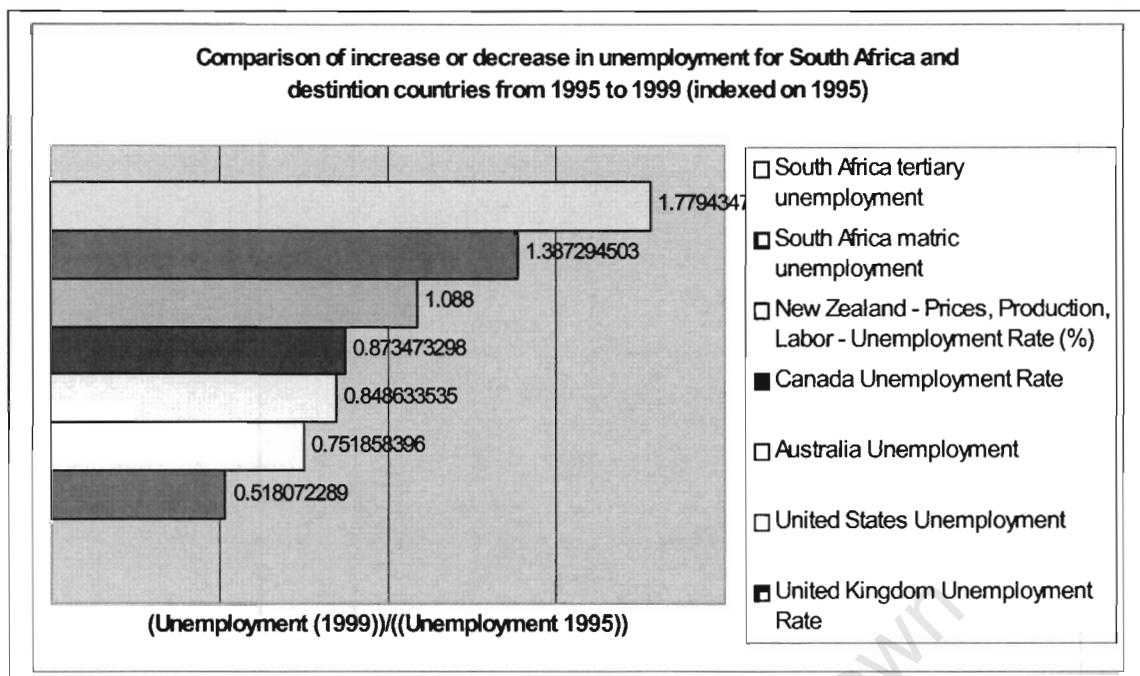
The theoretical section suggested that unemployment could be a major cause of emigration. But Fallon and Lucas demonstrate that during the early 1990's unemployment amongst the skilled in South Africa was low (Fallon and Lucas, 1998). The conclusion could be drawn that unemployment is therefore not a driver of emigration from South Africa. This is supported by the above analysis that showed that unemployment was of secondary importance to emigration over the period 1980 to 2000. This section presents evidence that skilled unemployment increased during the late 1990's. Fortunately for this period there is detailed information for South African unemployment across different categories of workers. It will then discuss a World Bank study which at first glance implies that the skilled labor market is very tight.



**Figure 32** The above graph shows the unemployment rates for all types of South Africans. (Source, October Household Survey)

The graph shows an increase in unemployment for all racial groups, education levels and both sexes

The graph below shows that South African unemployment increased dramatically whereas most of the destination countries experienced dramatic falls in unemployment during the late 1990's.



**Figure 33** The graph above shows the proportionate increase in unemployment from 1995 to 1999 (Source October Household Survey and the WDI).

The above graphs show a dramatic increase in unemployment across all race groups, education levels and sexes. In the destination countries in this period there was a dramatic fall in unemployment.

#### Shortage of Skilled workers?

The above results suggest that unemployment rates across all races and education levels have been increasing in South Africa. A World Bank paper “Constraints to Growth and Employment in South Africa” (Chandra et al, 2001) seemingly contradicts these findings. It found an acute shortage of high skilled workers amongst large and small firms. Of large firms 82% had acute problems finding skilled employees such as managers and professionals and similarly amongst small firms 30-45% struggled to find skilled workers. In other words the very skills that Kaplan et al. (1999) found emigrants possessed (Chapter 1) were the skills that firms are having trouble finding.

Combined with the World Bank study this suggests that unemployment is unlikely to be a reason motivating emigration since the skilled labour market tight in South Africa. The World Bank survey provides the probable answer to this paradox. 75% of firms preferred to hire workers with relevant work experience whereas only 15% of firms preferred to hire workers with tertiary education. Human resource managers rated tertiary educated workers without experience as only weakly employable. On the other hand only 30-40% of large firms and only 10-20% of small firms undertook training. This is despite 82% of large firms reporting a shortage of skills and 30-45% of small firms reporting a shortage of skills.

Therefore the reason for the skills shortage seems to be unwillingness on the side of employers to hire without the relevant work experience or to train them. For the

possible reasons for this are discussed below. The result of this is a very rigid labour market where there is little capacity for workers to acquire needed skills required by the market. This leads to unemployment and so emigration. Therefore the skills shortage does not demonstrate that unemployment is inconsequential for tertiary educated South Africans.

#### Conclusion on employment and unemployment

In conclusion unemployment in South Africa for all education levels and all racial groups has increased in the last five years of the 1990's. This needs to be contrasted with falls in unemployment in the destination countries. Therefore 54% of skilled South Africans are correct to in their view that job prospects are superior overseas (Mattes and Richmond, 2000) and (Chapter 1). Increases in unemployment in all likelihood fall more heavily on the young. Furthermore the young that do not have experience are regarded as only weakly employable despite tertiary education. Therefore it is possible that the young emigrate to receive necessary work experience to enable them to work in South Africa (none the less, as discussed earlier, evidence suggests that they are not returning). These trends in unemployment and employment would provide a powerful incentive for South Africans to migrate to the destination countries.

## Section 2: Comparison between crime and violence in South African and the destination countries

This section explores differences in crime and violence between South Africa and the destination countries. Crime surveys and some police statistics show that South Africa has higher property and violent crime rates than the destination countries but comparable crime rates to similar developing countries<sup>21</sup> (Louw et al. 1998), (Human Development report, 2000). This paper will show that while on many crime categories South Africa has comparable levels of crime to other countries, South African crime is coloured by very high rates of homicide. As discussed above one would expect from a biological perspective that the threat of death would massively amplify the distastefulness and fear endangered by any criminal act. Thus one can concentrate on both the level of crime as well as the expected chance of death experienced by victims. The first section will place South African crime rates and the nature of South African crime in an international context. This section shows that South African crime is uniquely high and violent. The second section briefly compares crime in SA with crime in the UK and Australia. The third section discusses trends in South African crime since the early 1990's.

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<sup>21</sup> Measuring crime is fraught with similar measurement problems to migration. Crime is measured through crime reported to the police (useful for more serious crime and time series data) and victim surveys (more accurate especially for less serious crimes but not as many years are available or countries). The data discussed in this paper refer to police reports or surveys depending on availability and expected accuracy.

Murder in South Africa compared to the destination countries

South Africa has high levels of murder. In Johannesburg 10% of whites, 10% of Asians and 70% of blacks report that someone in their family was murdered in the last four years<sup>22</sup> (Louw et al. 1998). Victim surveys in the destination countries do not even ask about murder. The graph below shows that homicide rates in SA are high compared to the destination countries.

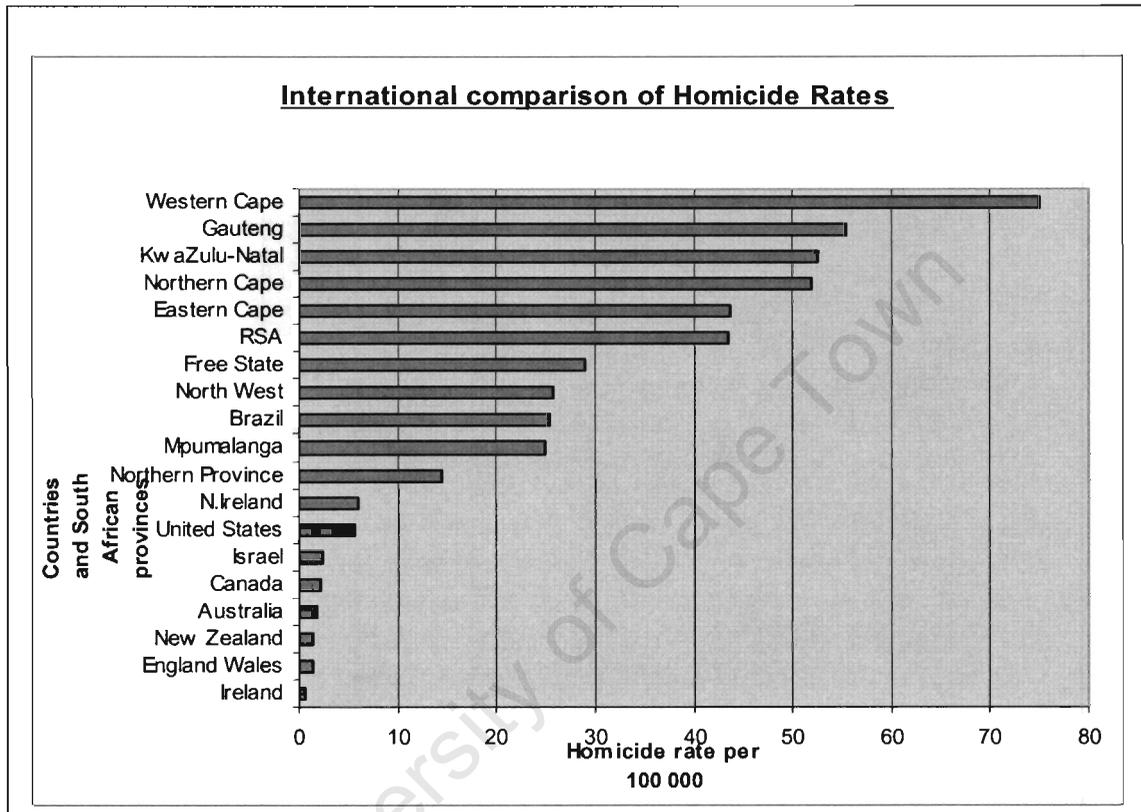


Figure 34 Murder rates per 100 000 for South Africa and homicide (includes manslaughter) for the destination countries. Source (FBI Uniform Crime Reports) and South African police services.

Clearly homicide is far higher in South Africa than it is in the destination countries. Within South Africa violent crime is highest amongst middle income earners (Shoenteich et al. 2001) (Louw et al. 1998) but there are no statistics specifically measuring homicide rates amongst the educated population. Working out how many homicides occur in the skilled population is difficult since the police do not release the areas that police stations cover (nor do they release figures from before 1994, a problem for times series). Given this restraint a rough estimate of murder rates in areas with a high proportion of educated people can be worked out<sup>23</sup>. Using a method described in the appendix the average homicide rate per 100 000 people was worked out for 23 highly educated areas. The average homicide rate per 100 000 was 61.4. This is slightly above the national average for South Africa but far higher than the

<sup>23</sup> The workings for these numbers are contained in the appendix.

murder rate in the destination countries. This figure is 30 times that found in UK, Australia, Canada and New Zealand and 6 times the homicide rate in the USA.

In Johannesburg 60% of murders are committed by strangers compared to 10% in Australia and 20% in the UK (Louw, 1998) (AIC, 2001) and (Patsy, 1999). One would assume that the proportion of stranger murders is higher for the educated since they are more at risk of property crime (as will be discussed later). Given this even if one assumes that 60% of homicides on the educated are by strangers nationally, then the stranger homicide rate for the educated in South Africa is 36 per 100 000. This rate is 100 times the stranger homicide rate in Australia and 128 times the stranger homicide rate in the UK<sup>24</sup>. In these countries only a tiny proportion of homicides are by strangers (10 a year in Australia).

In conclusion homicide in South Africa for both the educated and uneducated is far higher than in the destination countries. In particular homicide by strangers is estimated to be a massive 100 to 130 times higher in South Africa than it is in the UK and Australia. Since stranger homicide is expected to be the most random form of homicide it will result in the greatest disutility. Furthermore the resulting fear would provide an impetus to action that would result in high levels of emigration.

#### Robbery and violent theft

Thirty percent of residents of the suburbs had experienced a robbery or mugging in the last three years in Johannesburg. In Cape Town 13% of residents had been robbed or mugged in the previous three years. In the UK this figure was 3%. Property crime is higher in wealthy areas (Brown, 2001) as well falling disproportionately on the wealthy (Schonteich et al, 2001). Violent crime is highest in the 48000 to 96 000 income brackets (Schonteich et al, 2001). Thus the well educated are disproportionately affected by robbery and burglary.

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<sup>24</sup> Homicide rates in educated areas in SA and in the UK and Australia have mildly declined since 1996. The number of homicides in the educated areas has declined from 448 to 415 from 1996 to 2000.

The graph below compares South African violent robbery rate with Australia and other countries:

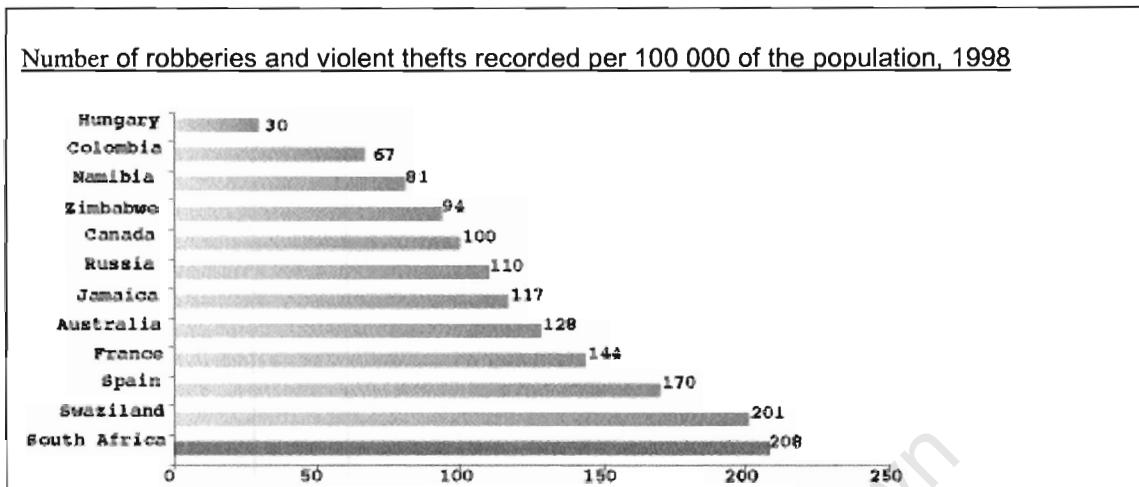


Figure 35 Number of robberies and violent thefts and robberies per 100 000 of the population (police reports), 1998, Table taken from (Masuku, 2001)

The graph shows that while South Africa has the highest number of robberies and violent thefts its rates are comparable to some European countries as well as some destination countries. The difference is that in Australia few robberies end in homicide. Only 10% of murders occur in conjunction with other crimes (most homicides are by friends and family). In South Africa on the other hand murder is highly correlated with the number of robberies and thefts (and general level of crime)<sup>25</sup>. Thus robberies in South Africa are far more likely to result in death.

#### Historical crime trends in South Africa

Migration has accelerated during the 1990's (Chapter 1); if crime was a cause of this trend one would expect to have been increasing as well. Crime levels in South Africa did start to increase in the late 1980's and accelerated in the early 1990's. Murder increased from approximately 8000 in 1987 to approximately 18 000 by 1993<sup>26</sup> (Luiz, 2001). But unlike migration rates, murder rates levelled off in the late 1990's and in fact experienced a mild decline generally and in the educated areas. The number of violent robberies though increased from 40 to 56 000 during the late 1990's (and from 2795 to 4284 in the educated areas discussed above). Murder and robbery rates have been in decline in the destination countries over the 1990's but these rates are so low when compared to South Africa that they are unlikely to be a factor in emigration.

The theoretical overview discussed previously provides three possible reasons that a sudden increase murder rates in the early 1990's followed by a stable yet high murder rate in the late 1990's would result in an increase in emigration over the whole period.

<sup>25</sup> John Luiz shows this using time series from 1960 to 1993 (Luiz, 2001)

<sup>26</sup> Crime rates from before 1994 are not released by the police services so figures are read off a graph. Crime levels before 1994 do not include crime in the homelands and so are not comparable with post 1994 levels.

People directly impacted on by violence may well take time before they leave. They may need time to recover from the trauma (Hamber et al, 1997), furthermore since a violent incident occurs unexpectedly people may take longer to leave because they are less well prepared for emigration in terms of emigration papers and so on. Thus people directly struck by violence would probably only emigrate with a substantial lag<sup>27</sup>. leading to emigration rates increasing long after violence rates have stabilized.

Peoples available (easily remembered) incidences of murder will be increasing long after murder rates have stabilised as they hear about more and more people who have been killed. Thus their subjective probability estimates of being a victim of homicide will also be increasing<sup>28</sup>.

Thirdly and more subtly people instinctively feel the emotion of fear experienced by others since people feel fear in response to the fearful faces of others. In a family and amongst friends this means that if one member becomes fearful the whole group feels fear (to a greater or lesser extent). Thus the whole group is motivated by a commonly experienced fear to take some action<sup>29</sup>. As the experience of homicide spread through the population it would increase fear in the population and thus motivate increasingly large groups of people to emigrate because homicide overcomes the disparate economic incentives found in any heterogenous group of people.

Thus stable homicide rates during the late 1990's could be consistent with acceleration in emigration during this same period. One would expect that if current trends continue, homicide would play a decreasing role in peoples incentive to emigrate as peoples subjective probability estimates and levels of fear fall into line with the high yet stable homicide rate.

### Migration and fear of homicide

South Africa has a level of stranger murder that is at least an order of magnitude greater than the destination countries, probably a hundred times greater. The result is that skilled living in South Africa have a powerful incentive to emigrate and are given the motivation to do so by fear. Although murder rates have not been increasing during the late 1990's the theory of violence means that the dramatic increase in the early 1990's would take time to feed into people level of fear and their subjective probability estimates. Thus stable murder rates could quite easily be a factor in an accelerating emigration rate during the late 1990's. The government<sup>30</sup> does not release crime statistics from before 1994 and so one can not do time series econometrics to

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<sup>27</sup> One would not expect the same lag with economic or political events because they occur far more slowly than violent events. Political and economic events give emigrants far more time to prepare to emigrate than violence does.

<sup>28</sup> This assumes that memories fade at a slower rate than the new instances of homicide are heard about.

<sup>29</sup> In a society with little voice (such as SA) emigration may be the cheapest action that any group of people can take and so the only obvious response to the experience of homicide. Some may doubt that SA has little voice but the government's hostile reaction to democratic action against criminal violence such as protests and pleas for the reintroduction of the death penalty imply that the cost of changing government policy is very high. A case in point is the government's reaction to a Portuguese community march in Pretoria. In this case the governments reaction was so hostile the Portuguese government intervened to avert a government backlash against the Portuguese community in SA.

<sup>30</sup> The police information service is very helpful when providing post 1994 statistics, though these statistics are only provided by police station level from 1996.

measure the impact of homicide on emigration. At the same time the indirect way that people come up with their estimates of crime levels means that these figures may not be related to people's perceptions about the actual level of homicide.

### Conclusion to Chapter 5

This chapter showed that a range of factors could have caused the dramatic increase in emigration in the late 1990's, These include stable yet high homicide rates during the late 1990's, an across the board increase in unemployment.

#### *Age profile of emigrants*

This discussion has provided evidence that violence and unemployment probably effect different age groups.

It is likely that violence affects older people's emigration more, since homicide is related to property crime. Furthermore many older people will have experience that is highly demanded on the job market. Therefore they are unlikely, as a whole, to emigrate as a result of unemployment.

Younger people on the other hand have less property and so are less likely to be effected by homicide. Furthermore they are more likely to be unemployed since they are less likely to have the experience that employers find so important to hiring decisions. Therefore younger emigrants are more likely to emigrate due to unemployment than violence.

#### *The emphasis on violence by other authors in the field*

This analysis provides an indication, why violence is argued to be the main cause of emigration by authors such as Van Rooyen (Van Rooyen, 2001). Since violence impacts on older emigrants, analysis that relies largely on anecdotal evidence, as Van Rooyen does, will be far more likely to emphasize violence. Violence impacts on older people who have more contacts in the community and who are more likely to report that they are emigrating at the border. Thus they are better known than recent graduates who emigrate to find jobs.

## Chapter 6: Concluding chapter

This paper has explained emigration from South Africa from 1980 to 2000. The conclusion will first briefly describe the results from the different sections in the paper.

Chapter 1: showed that emigration from South Africa has been increasing during the late 1990's and has probably reached a historical peak. Furthermore it showed that South Africans were dissatisfied with a range of issues in South Africa. These included real incomes, violence, the future and government expenditure and taxation. This chapter provided for the rest of the paper that analyzed these factors in turn.

Chapter 2: provided the theoretical basis for the papers discussion.

Chapter 3 showed that immigration restrictions into the destination countries were relaxed during the 1990's. In particular New Zealand introduced the points system during the early 1990's. It was shown that immigration regulations in the US made it the most difficult country for South Africans to enter.

Chapter 4, Sections 2 and 3: showed that real wages were the primary driver of trends in emigration from South Africa from 1980 to 2000. It also showed places in which declining immigration restrictions could have increased emigration.

Chapter 4, Section 5: showed that emigration had responded in the past to political events. It also showed that some of the increase during the late 1990's could have been caused by a decrease in uncertainty about the future.

Chapter 5, Section 1: showed that unemployment had increased during the late 1990's across the board. The analysis showed that there may be an emigration trap developing as a result of experienced people emigrating.

Chapter 5, Section 2: showed that South African experienced a unique combination of violent robbery and homicide. The result is that skilled South Africans experience an unparalleled level of random homicide by strangers. Homicide increased dramatically during the early 1990's but then stabilized and declined slightly during the late 1990's. Thus while increasing homicide is a very likely reason for emigration during the late 1990's it's impact on emigration should decline during the new century.

### *In conclusion*

While Chapter 4 showed that the increase in emigration during the late 1990's had been contributed to by financial incentives (Chapter 4, section 2 and 3) and political events (Chapter 4, section 5) the dramatic increases experienced in Australia and the UK probably could not be explained purely by these factors. Therefore it is likely that violence (Chapter 5, section 2) and unemployment (Chapter 5, Section 1) all contributed to the dramatic increases in emigration. Furthermore it is likely that opening borders in the destination countries (Chapter 3) also contributed to the increase during the late 1990's.

This paper has shown the often overlooked importance of financial incentives to trends in emigration and provided a framework with which the effect of political events could be understood. It does not though exclude the possibility that violence and unemployment impacted on emigration during the late 1990's. Proving this will require further research.

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## Appendix 1

### Homicide amongst the educated in South Africa

A non representative sample of police stations was taken for Pretoria, Cape Town and Johannesburg. Police stations with below average murder rates were chosen from (Louw, 2001). This was Only Police stations in suburbs that the census explicitly covered were included (22 police stations were excluded for this reason). The census sometimes splits suburbs up or registers the data under different suburbs. The police stations that were in suburbs with high education levels were chosen (5 stations were excluded because the occurred in suburbs with low levels of education). This left 24 stations in suburbs with proportion of educated ranging from 13% to 30%. The table below shows the suburbs used and the proportion of the population that has tertiary education.

|                | Proportion of population with tertiary education |
|----------------|--|
| Johannesburg   |  |
| Parkview       | 30.76079005                                      |
| Linden         | 24.54144416                                      |
| Sandringham    | 21.60493827                                      |
| Norwood        | 25.15438452                                      |
| Rosebank       | 20.21803766                                      |
| Bramely        | 18.18845873                                      |
| Sandton        | 23.04147465                                      |
| Cape Town      |  |
| Rondebosch     | 0.361615309                                      |
| Kirstenhof     | 0.24674221                                       |
| Diep River     | 0.208453016                                      |
| Lansdowne      | 0.138831933                                      |
| Claremont      | 0.325689743                                      |
| Mowbray        | 0.311120727                                      |
| Simonstown     | 0.138801694                                      |
| Sea Point      | 0.241072342                                      |
| Camps Bay      | 0.320920044                                      |
| Pretoria       |  |
| Brooklyn       | 32.97844716                                      |
| Garsfontein    | 29.31898186                                      |
| Sinoville      | 19.54988747                                      |
| Pretoria North | 10.40737437                                      |
| Wonderboom     | 24.42407146                                      |
| Villieria      | 16.66990291                                      |
| Silverton      | 13.96319018                                      |

**Table 4 Proportion of population with tertiary education in suburbs reviewed**

The table below shows the number of murders and manslaughters for these suburbs:

|                | Proportion of population with tertiary education |               |                     |
|----------------|--|---------------|---------------------|
| Johannesburg   |  | Murder (1996) | Manslaughter (1996) |
| Parkview       | 30.76079005                                      | 8             | 4                   |
| Linden         | 24.54144416                                      | 16            | 15                  |
| Sandringham    | 21.60493827                                      | 6             | 13                  |
| Norwood        | 25.15438452                                      | 14            | 14                  |
| Rosebank       | 20.21803766                                      | 4             | 8                   |
| Bramely        | 18.18845873                                      | 21            | 20                  |
| Sandton        | 23.04147465                                      | 27            | 45                  |
| Cape Town      |  |               |                     |
| Rondebosch     | 0.361615309                                      | 2             | 3                   |
| Kirstenhof     | 0.24674221                                       | 9             | 7                   |
| Diep River     | 0.208453016                                      | 2             | 6                   |
| Lansdowne      | 0.138831933                                      | 10            | 7                   |
| Claremont      | 0.325689743                                      | 2             | 11                  |
| Mowbray        | 0.311120727                                      | 3             | 9                   |
| Simonstown     | 0.138801694                                      | 3             | 2                   |
| Sea Point      | 0.241072342                                      | 13            | 13                  |
| Camps Bay      | 0.320920044                                      | 1             | 2                   |
| Pretoria       |  |               |                     |
| Brooklyn       | 32.97844716                                      | 8             | 20                  |
| Garsfontein    | 29.31898186                                      | 4             | 11                  |
| Sinoville      | 19.54988747                                      | 4             | 20                  |
| Pretoria North | 10.40737437                                      | 6             | 9                   |
| Wonderboom     | 24.42407146                                      | 4             | 11                  |
| Villieria      | 16.66990291                                      | 7             | 9                   |
| Silverton      | 13.96319018                                      | 7             | 8                   |

**Table 5 Numbers of murders and manslaughters in suburbs with a highly educated population**

The table below shows the estimated population per station (Population of JHB/number of police stations), the resulting homicide rate per 100 000 and the estimated stranger murder rate.

| Johannesburg   | Average population per station in JHB       | Homicides per 100 000 | Stranger homicide per 100000 |
|----------------|---|-----------------------|------------------------------|
| Parkview       | 36228.2381                                  | 33.123333             | 19.874                       |
| Linden         | 36228.2381                                  | 85.568611             | 51.34117                     |
| Sandringham    | 36228.2381                                  | 52.445277             | 31.46717                     |
| Norwood        | 36228.2381                                  | 77.287777             | 46.37267                     |
| Rosebank       | 36228.2381                                  | 33.123333             | 19.874                       |
| Bramely        | 36228.2381                                  | 113.17139             | 67.90283                     |
| Sandton        | 36228.2381                                  | 198.74                | 119.244                      |
| Cape Town      | Average population per station in Cape Town |                       |                              |
| Rondebosch     | 24726.82143                                 | 20.220957             | 12.13257                     |
| Kirstenhof     | 24726.82143                                 | 64.707063             | 38.82424                     |
| Diep River     | 24726.82143                                 | 32.353532             | 19.41212                     |
| Lansdowne      | 24726.82143                                 | 68.751255             | 41.25075                     |
| Claremont      | 24726.82143                                 | 52.574489             | 31.54469                     |
| Mowbray        | 24726.82143                                 | 48.530297             | 29.11818                     |
| Simonstown     | 24726.82143                                 | 20.220957             | 12.13257                     |
| Sea Point      | 24726.82143                                 | 105.14898             | 63.08939                     |
| Camps Bay      | 24726.82143                                 | 12.132574             | 7.279545                     |
| Pretoria       | Average population in Pretoria              |                       |                              |
| Brooklyn       | 32326.16129                                 | 86.617151             | 51.97029                     |
| Garsfontein    | 32326.16129                                 | 46.402045             | 27.84123                     |
| Sinoville      | 32326.16129                                 | 74.243272             | 44.54596                     |
| Pretoria North | 32326.16129                                 | 46.402045             | 27.84123                     |
| Wonderboom     | 32326.16129                                 | 46.402045             | 27.84123                     |
| Villieria      | 32326.16129                                 | 49.495515             | 29.69731                     |
| Silverton      | 32326.16129                                 | 46.402045             | 27.84123                     |

**Table 6 Homicide rate per 100 000 for suburbs with a high proportion of educated people**

How reliable are those estimates of the homicide rates?

Obviously when a figure is unexpectedly high and based on level upon level of proxies one is unsure about the validity of the results. Population per police station is reassuringly similar for all three cities. Similarly murder rates between the cities support anecdotal evidence that Johannesburg has the highest homicide rate followed by Pretoria and Cape Town. As discussed in the text one expects the proportion of stranger homicides for the educated to be far higher than 60%. So the stranger homicide rates are probably under estimated.

Survey evidence mentioned in the text suggests that 2.5% of White and Asian families (fathers, mothers, sisters, brothers, grandparents, aunts and uncles) in Johannesburg experience murder in any year, where white and Asian are proxies for educated (again this is an underestimation because many families experience more than one homicide). This was put in a table to estimate how large a particular family had to be to be in line with the homicide rates per 100 000 worked out above (The calculation was 2.5%/(percentage of homicides in the suburb). The table is shown below for Johannesburg:

| Johannesburg | Homicides per 100 000 | Family Size |
|--------------|-----------------------|-------------|
| Parkview     | 33.12333              | 75.4755     |
| Linden       | 85.56861              | 29.21632    |
| Sandringham  | 52.44528              | 47.66873    |
| Norwood      | 77.28778              | 32.34664    |
| Rosebank     | 33.12333              | 75.4755     |
| Bramely      | 113.1714              | 22.09039    |
| Sandton      | 198.74                | 12.57925    |

**Table 7 Derived family size for JHB suburbs**

The table above shows that the family size estimates are too large for most suburbs. Thus the homicide rates may be too low rather than too high.

### Conclusion

Therefore while the above homicide figures are very high, and thus suspicious. The approach used as well as other evidence from surveys suggests that the figures are more likely to be underestimated than overestimated.

### Appendix 2

Due to the short period for which unemployment data was available a moving average (MA) technique was used. Two types of MA technique were used.

The first was a MA on actual levels. The formula for predicting Unemployment (X) in time (t) with a three year moving average is shown below:

$$X_t = (X_3 + X_2 + X_1) / 3$$

This shows a moving average over three years. The results for this and a six year moving average are shown.

The second MA used was a moving average on percentage changes (called MA on growth). The formula for predicting X with a three MA using this formula is shown below:

$$X_t = (1 + ((X_4 + X_3) / X_4) / 3 + ((X_3 + X_2) / X_3) + ((X_2 + X_1) / X_2) / 3) \times X_1$$

A three year, a four year, a five year and a six year MA using this formula is presented below.

The graph below shows the performance of all six MA's presented at predicting unemployment one year in advance for the whole time series. These predictions are compared to actual unemployment rates to indicate how effective the different techniques are.

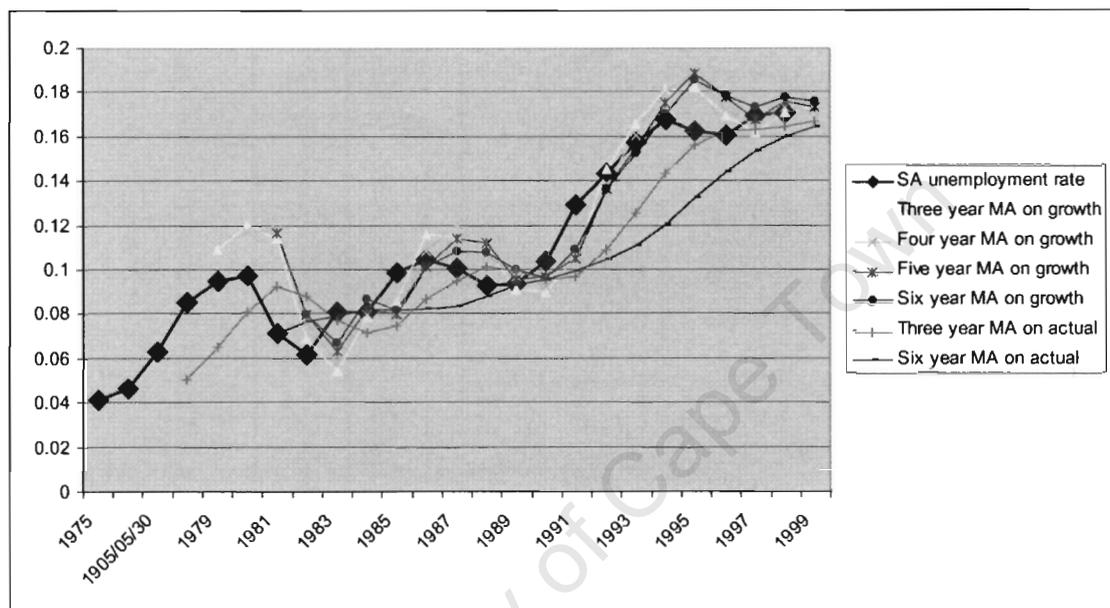


Figure 36 The effectiveness of different forecasting techniques

The graph shows that the best fit with actual unemployment rates is from the three and four year MA on growth. The paper uses a four year MA on growth to make the predictions for the missing data points. The results are roughly in line with unemployment changes from the October Household Survey.

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