Actuarial Demand in South Africa

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Abstract

One of the key thrusts of the Actuarial Society of South Africa’s strategic plan is to establish diversity in actuarial demography. It is the aim that the membership profile of the actuarial profession increasingly reflects the demographic profile of the country. Irrespective of this, it is essential for the survival of a profession to consider how it has evolved, and how changes in the environment in which it operates may impact on demand for its’ services in future.

Actuarial demand in South Africa has grown significantly in the last few years, resulting from economic development and growth in the services sector, as well as changes in the environment in which qualified actuaries and actuarial students work. These include, for example, regulatory, social and technological developments, as well as demographic changes. The demand for products and services offered by companies that actuaries and actuarial students work for is also strongly linked to the ‘human development’ of a nation. The more educated, healthy, and wealthy the population of a country, the higher the expected demand for actuaries and actuarial students in that country.

South Africa suffers from a number of challenges such as a poorly educated workforce, resulting in high levels of unemployment and skills shortages, and poor socio-economic conditions for a large majority of the population, resulting in high levels of crime and the emigration of skilled workers – a negative spiral. These are all interrelated and all impact on economic growth and on actuarial demand. While deterioration in these conditions negatively impact actuarial demand, global developments such as international accounting standards and Solvency II is creating more demand. At the same time, the emigration of actuarial students and qualified actuaries creates shortages and a much tighter actuarial resource market.

This paper covers the current demographics of the membership of the Actuarial Society of South Africa, the factors impacting actuarial demand, the results of research performed among South African employers of actuarial resources and finally, the models developed for projecting future demand.
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1. INTRODUCTION

The purpose of this paper is to consider the demand for actuarial resources in South Africa. This includes a study of the factors influencing demand and the development of models to project future actuarial demand. This paper should be read together with the paper on actuarial supply in South Africa, written by Nalen Naidoo.

Knowing whether there will be a future demand for actuarial services gives an indication of job security and may assist actuaries and actuarial students to do career planning. It should help them in identifying what skills they need to develop to ensure their offerings remain relevant, attractive and competitive. Knowing the number of actuarial resources that is likely to be required in future will also help employers and the industry to determine appropriate strategies for ensuring that the supply of resources meets the expected demand.

Employers in the financial services industry in South Africa are required to meet the requirements of the Financial Sector Charter. This includes minimum targets for black and female employees at different levels of management. In line with this, one of the key thrusts of the Actuarial Society of South Africa’s strategic plan is to establish diversity in actuarial demography. It is the aim that the membership profile of the actuarial profession should increasingly reflect the demographic profile of the country. Information on the expected availability of actuaries by gender and ethnic group will assist in measuring the expected progress towards this goal. This study should also assist employers of actuarial resources in developing appropriate strategies to ensure they meet their targets.

Irrespective of the specific application above, it is essential for the survival of a profession to consider how it has evolved, and how changes in the environment in which it operates may impact on demand and supply for their services in future. It is also useful to consider the specific areas or fields of work in which actuaries have been involved, to consider how these are changing and may change in future and hence what strategies need to be put in place to ensure the services that actuaries can offer remain available and relevant.

The following section will set out the current demographics of the membership of the Actuarial Society of South Africa as well as some history. In Section 3 the factors impacting actuarial demand will be considered. Section 4 considers the results of research performed among South African employers of actuarial resources and Section 5 discusses the models developed for projecting future demand.
Acknowledgements

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Myself and Nalen Naidoo have received financial assistance from the Actuarial Society of South Africa for our research on actuarial supply and demand in South Africa. However, I take full responsibility for any views expressed or errors remaining in this paper.
2. ACTUARIAL DEMOGRAPHY IN SOUTH AFRICA

The figure below shows the change in the membership of the Actuarial Society of South Africa from 1981 to 2007.

*Figure 1: History of membership of the Actuarial Society of South Africa*

![Chart showing membership change](chart.png)

The number of Fellows (qualified actuaries) has grown at an average rate of 5.4% over the period from 1981 to 2007, while the number of students has grown at 10.9% p.a. on average. The average growth rates from 1995 to 2007 were 7.0% p.a. and 11.5% p.a. for Fellows and students respectively. This compares to growth rates in the UK (Institute and Faculty) membership (which includes most South African members) of 4% p.a. and 7% p.a. respectively for Fellows and students over the period from 1995 to 2004 (Pomery & Brown, 2005). This furthermore compares to growth rates in the membership of the Institute of Actuaries of Australia of 5% p.a. for Fellows and 6% p.a. for students from 1992 to 2005 (Stevenson, 2006). Growth of actuarial supply in South Africa, especially students, has therefore been higher than in other countries.

The split between Fellows and students in South Africa compared as follows with UK and Australian membership:

*Table 1: Proportional split of actuarial resources per country between Fellows and students*

<table>
<thead>
<tr>
<th></th>
<th>Fellows</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa (2007)</td>
<td>38%</td>
<td>62%</td>
</tr>
<tr>
<td>United Kingdom (2004)</td>
<td>47%</td>
<td>53%</td>
</tr>
<tr>
<td>Australia (2005)</td>
<td>47%</td>
<td>53%</td>
</tr>
</tbody>
</table>
As a result of the higher rate of growth in the number of South African students compared to that in the UK and Australia, students represent a higher proportion of total membership in South Africa. Note that UK membership includes South African actuaries and students (7% of UK membership work in South Africa, according to Pomery & Brown (2005)), so that the actual proportion of UK Fellows, excluding South Africans, is higher than indicated. A total of 28% of UK members are not working in the UK and 23% of Australian members work outside of Australia. Approximately 10% of South African Fellows work outside of South Africa, according to the Actuarial Society of South Africa (2007).

The distribution of Fellows of the Actuarial Society of South Africa (2006) by gender and race is shown in the following figure.

*Figure 2: Split of members of the Actuarial Society of South Africa in 2006 between gender and racial groups*

In 2006, 86% of the Fellows in South Africa were male and 14% female. This compares to 83% and 17% males and females respectively in the UK (Pomery & Brown, 2005).

Of all the Fellows in 2006, 92% were white, compared to 9% of the general population (Statistics South Africa, 2007). Statistics on the racial composition of the profession is not available for other countries.
3. FACTORS IMPACTING ACTUARIAL DEMAND

In attempting to project the future demand for actuarial resources in South Africa, it is useful to consider the factors that have impacted on demand in the past, both globally and in South Africa, and to consider how these are changing and may change in future. The factors that have been identified and are discussed in this section are:

- Macro-economic factors;
- Changes in the financial environment;
- Expansion of the role of actuaries into ‘wider fields’; and
- Other factors such as the image of the profession and competition and demand from other professions.

3.1 Macro-economic factors

3.1.1 Gross Domestic Product and economic growth

“There is a clear relationship between economic growth and the amount of life insurance bought as well as the type of insurance product bought. As a market place becomes more sophisticated in its financial awareness and needs, so the insurance companies respond with more complex products to fill this demand.” Traverso (2005)

A country’s Gross Domestic Product (GDP) is a measure of the aggregate output of its economy, or, stated differently, a measure of the quantity of goods and services produced in a year. Economic growth, or growth in GDP from year to year, is a measure of the success of a country’s economy (Roux, 2005).

The growth in real GDP per capita allows for the impact of inflation as well as for population growth. Positive growth in real GDP per capita would be expected to result in reduced unemployment rates (and vice versa) and in improved wealth of the country’s population. This, in turn, should result in increased spending on insurance, increased savings and thus an increased demand for wealth-management products and services. A higher demand for insurance and savings products should result in more opportunities for actuaries in companies that offer these products, and therefore an increase in the demand for actuarial expertise.

From 1996 to 2007, real GDP in South Africa grew by 3,7% p.a. on average, while population growth was 1,5% p.a., resulting in real GDP per capita growth of 2,1% p.a. on average over this ten–year period (Statistics South Africa, 2008b). One could therefore have expected an increase in the number of actuarial resources employed in South Africa of at least 2% p.a. since 1996. The overall increase in the total number of actuarial resources over the period from 1995 to 2007 was 9,5% p.a. (7% p.a. for qualified actuaries and 11,5% p.a. for students), far in excess of real GDP per capita growth. One of the reasons for the higher growth in actuarial demand is the changing structure of the South African economy from primary-based (agriculture and mining) to one dominated by knowledge-based (services) industries, as discussed in the next section.
3.1.2 Economic development

South Africa has undergone tremendous social and economic change over the past half-century. The figure below illustrates how the contribution to GDP by the primary sector (agriculture and mining) as a percentage of total GDP has decreased over the past 47 years while the contribution by the tertiary sector has increased.

*Figure 3: History of the changes in the contribution of primary, secondary and tertiary sectors as a percentage of total GDP in South Africa*

![Graph showing the percentage of GDP contributed by primary, secondary, and tertiary sectors from 1960 to 2007. The primary sector contribution went from 46% in 1960 to 8% in 2007, while the tertiary sector contribution increased from 31% to 65%.](image)


The contribution by the primary sector has steadily reduced from 30% of GDP in 1960 to only 8% in 2007. The contribution by the tertiary sector has increased from 46% of total GDP in 1960 to 68% in 2007. The contribution by Financial and Business Services, a sub-sector of the tertiary sector, has increased from 13% of GDP in 1960 to 23% in 2007 (Roux, 2005 and Statistics South Africa, 2008b).

The movement away from primary and secondary industries to tertiary or services industries means that the demand for high-level staff grows much faster than for production workers and labourers. Within the particular sectors there is also a move away from unskilled and semi-skilled occupations to those requiring higher skill levels because of technological innovation (Kibuuka, 1998: 3).

In terms of the proportion that the services (tertiary) sector contributes to GDP, South Africa (68%) compares reasonably well with industrialised countries such as the US (79%), UK (73%), Australia (70%) and Canada (69%). However, GDP (at Purchasing Power Parity) per capita in South Africa (USD10 600) is much lower than in these countries (between USD33 000 and USD46 000) (World Factbook, 2007). Hence, in absolute terms, the services sector in South Africa is significantly smaller than in countries such as the UK, US, Australia and Japan.
Finance, real estate and business services form part of the tertiary sector. Figure 4 illustrates the growth from 1993 to 2006 (at constant 2000 prices), in primary sector GDP, secondary sector GDP, tertiary sector GDP excluding Finance, real estate and business services, and separately, growth in Finance, real estate and business services.

**Figure 4: Growth in different sectors of GDP from 1993 to 2007**

While the tertiary sector GDP excluding finance, real estate and business services increased by an average annual rate of 3.6% from 1993 to 2007, the growth in Finance, real estate and business services was 5.5% p.a.

According to a report by the South African Cities Network (SACN)\(^1\) published in May 2004, the financial and business services sector was the most important driver of jobs growth in the country’s major cities. While this sector contributed only 5% of employment across the nine major cities\(^2\) in 1970, it increased more than 1600% over the 30 years to 2000 (around 28% p.a.), to the fourth largest sector by employment (SACN, 2004).

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\(^1\) The South African Cities Network (SACN) is a non-profit organisation established in October 2002 with multiple purposes, among which are the promotion of good governance of cities, the study and analysis of the challenges facing South African cities, and the promotion of a share-learning partnership between cities. The SACN does not represent the cities, but is rather a knowledge management and information body that works for their benefit. The cities contribute to SACN, with additional funding from government and foreign donors. The SACN released a report "State of the Cities Report 2004" in May 2004 which analyses key trends that affect the cities, how these trends are likely to evolve over time and what challenges and opportunities will arise.

\(^2\) The nine cities are Cape Town, Johannesburg, Tswane, Eharhuleni, eThekwini, Msundizi, Mangaung, Nelson Mandela and Buffalo City
3.1.3 Actuarial density

Gribble (2006) estimated the number of actuaries required globally to meet a measure of demand. He used GDP as a measure of economic scale and growth and, by implication, as an indication of the need or opportunity for actuaries. He then defines ‘actuarial density’ as the number of actuaries divided by GDP (in US$ billions), in order to assess the current and future need for actuaries.

Gribble assumed that, for the ‘Common Law’ group (including the US, UK, Canada, Australia and South Africa), actuarial supply meets demand and he used the (weighted average) actuarial density of this group (0.1804%) to derive the demand (or shortage of supply) for actuaries worldwide. There were 42,800 qualified actuaries worldwide as at the end of 2005, translating into a worldwide actuarial density of 0.1047%. Gribble therefore determined that the total worldwide demand, based on 2005 figures, was around 73,800 (42,800 \times \frac{0.1804}{0.1047}), which translates into a shortage of supply of around 31,000 qualified actuaries.

Gribble reached the conclusion that there was a significant shortage in the supply of actuaries relative to demand globally and that “a rapid and sustained growth in the profession is needed to meet the demand”. Gribble states “there is a need for increased capacity and expertise in financial services, particularly in developing countries”.

Applying the same methodology to determine the total demand for qualified actuaries in South Africa (based on 2005 numbers, as per Gribble), it is found that about 1,052 qualified actuaries were required, compared to the 690 available qualified actuaries (a shortage of around 50%):

\[ 690 \times \frac{0.1817\%}{0.1174\%} = 1,052 \]

(Note that 0.1817% is the weighted average actuarial density of the US, UK, Canada and Australia i.e. excluding South Africa and 0.1174% is the actuarial density for South Africa).

If the target for South Africa were based on the UK actuarial density, however, which, at 0.3124%, is significantly higher than in other countries, total demand for actuaries in South Africa (in 2005) comes to 1,836:

\[ 690 \times \frac{0.3124\%}{0.1174\%} = 1,836 \]

(Note that the number of actuaries relates to the number by location and therefore does not double-count actuaries belonging to both the Actuarial Society of South Africa and the UK Actuarial Profession.)

One of the shortfalls of Gribble’s approach is that it is based on the number of qualified actuaries only, and hence ignores the number of actuarial students and Associates. In India, for example, the number of actuarial students and other members (3,558 in 2005) significantly exceeded the number of qualified actuaries (205) (Traverso, 2005) and by ignoring non-qualified actuaries the total shortage may be overstated. Furthermore, it is not clear why the actuarial density in the UK (0.31%) is
significantly higher than in Canada (0.21%), the US (0.13%) and Australia (0.19%),
and also, whether using the average actuarial density for the UK, US, Canada, Australia and South Africa is an appropriate benchmark.

In addition, by comparing the number of actuaries in a country relative to GDP only, no account is taken of differences in other structural factors impacting this demand, such as the level of economic development, economic stability, wealth and income distribution, the size and degree of saturation of the markets, the impact of changes in social factors such as demography, the savings rate, education and risk awareness, the impact of regulatory changes, etc. In South Africa in particular, the high level of unemployment means that only a relatively small portion of the population enjoys the benefits of economic growth and this limits the size of the market. The South African savings rate is also low compared to developed countries and the general awareness of financial risk is poor (Swiss Re, 2004).

At best, Gribble’s application of the measure of actuarial density gives an indication of a long-term target for the demand for qualified actuaries applicable to countries at an advanced stage of development.

One possible way to allow for socio-economic differences between countries is to adjust the figures by the respective countries’ Human Development Index (HDI). The Human Development Index (HDI) is an index developed by Amartya Sen, Mahbub Ul Haq and Sir Richard Jolly (with help from Gustav Ranis and Lord Meghnad Desai) in 1990 under the United Nations Development Programme (UNDP) and is a measure of ‘the ability of individuals within a country to live long, informed and comfortable lives’. The scale of the HDI ranges from zero (indicative of a very low development level) to 1 (indicative of very high level). The HDI is a comparative measure of life expectancy, literacy, education and standard of living (as measured in GDP per capita in US Dollars purchasing power parity (PPPS))

The figure below shows a comparison of the HDI from 1975 to 2005 for a number of countries.

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Note that South Africa’s HDI reduced from the level of 0.745 in 1995 to 0.674 in 2005, after steadily improving from 0.650 in 1975. The more recent reduction is due to the drop in life expectancy resulting from the impact of AIDS (Hughes, 2004). The prevalence of Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) in South Africa is the highest in the world, estimated at an overall rate of 11% for the total population, and 18.8% for adults (ages 15 to 49) in mid-2007 (Statistics South Africa, 2007). It is worth noting that there is a significant difference in the HDI between population groups. In 1996, the HDI was 0.63 for Africans, 0.70 for Coloureds, 0.78 for Indians and 0.86 for Whites (Statistics South Africa, 2001).

Estimating the demand for qualified actuaries in South Africa (in 2005) based on the weighted average actuarial density for the US, the UK, Australia and Canada, but adjusted for the differences in HDIs (weighted by the GDP PPP$ 2006 World Factbook estimate), gives a theoretical demand for actuaries that exceeds the supply by around 9%:

\[
690 \times \left( \frac{(0.1817\%)/(0.1174\%)}{(0.957/0.674)} \right) = 752
\]

Therefore, given the current levels of adult literacy, education, wealth and health in South Africa, and ignoring other factors impacting on the demand for actuarial resources (as discussed in section 3.2), the supply of, and demand for qualified actuaries in South Africa seems to be reasonably well-matched (at least in 2005). If literacy and education levels, life expectancy and wealth of the population improve, the demand for actuaries should increase.

\[^4\]http://en.wikipedia.org/wiki/List_of_countries_by_Human_Development_Index
However, this still considers the number of qualified actuaries only. Projection models allowing for total actuarial resources will be explored in section 5.

### 3.1.4 Insurance penetration and insurance density

A measure used to indicate the level of development of an insurance market is the level of **insurance penetration**, which is defined as insurance premium income as a percentage of GDP. Swiss Re, in Sigma study 5/2004, has developed the concept of the s-curve, which depicts the empirical relationship between the economic development (GDP per capita) of a country and the level of development of its insurance market. “Countries with a higher per capita income tend to spend a higher share of their income on insurance”. In other words, as income rises, the proportion of income spent on insurance increases. This means that insurance premiums grow faster than the underlying economy (Swiss Re, 2004).

The following figure shows a plot for the relationship between insurance penetration and GDP per capita for a number of countries, based on 2004 GDP and population figures.

*Figure 6: Insurance penetration (insurance premiums as percentage of GDP) vs GDP per capita (millions of US$ in 2004)*

Emerging markets generally fall in the bottom-left corner of the figure, i.e. have both low GDP per capita and low insurance penetration, while industrialised countries are above to the far-right. This does not hold true for South Africa, though, which is considered to have an emerging economy. While South Africa’s GDP per capita is in a similar range to that of other emerging economies such as those of India, China, Brazil and Mexico, it has the highest insurance penetration in the world with premiums making up 14% of GDP. This compares with the overall average for...
emerging markets of 4%, and 9% for industrialised countries (Swiss Re, 2004 and 2005). Therefore, while only a relatively small proportion of the South African population participates in the insurance industry, those who do participate, contribute high premium amounts relative to the GDP by international standards.

The **insurance density** of a market is defined as the total insurance premiums divided by the total population of the country. The following figure shows a comparison of the insurance penetration and insurance density of different countries based on premiums, GDP and population in 2004 (Swiss Re, 2005).

*Figure 7: Comparison of insurance penetration and insurance density for different countries*

It can be seen that, while South Africa has a high level of insurance penetration, the relative level of insurance density is relatively low. Therefore, while the insurance sector contributes a significant portion to the size of the economy, only a small portion of the population contributes to, or takes part in, the insurance sector.

This is only true for life insurance, though. While South Africa has the highest insurance penetration for life insurance, its non-life insurance penetration is lower than that of developed countries (Swiss Re, 2005).

This indicates that, given the current economic and socio-economic conditions in South Africa, (e.g. high levels of unemployment and the resulting uneven distribution of wealth) the ‘available’ insurance market is probably close to being saturated, and hence confirm the conclusion in section 3.1.3 that, in the short term, there is unlikely to be a significant immediate shortage of supply of actuaries (ignoring other factors, which will be discussed in section 3.2).
The sections below consider some of the structural economic conditions in South Africa such as unemployment and the skills shortage and the effects these have on the supply of and demand for actuarial resources.

3.1.5 Unemployment and the skills mismatch

Despite the recent economic growth and development in South Africa, there is still a significant level of unemployment on the one hand, and a skills shortage on the other.

This stems from a mismatch between the supply of, and demand for labour in terms of skills. Stated differently, there is a significant gap between the education, skills and expertise required for jobs, and the availability of appropriately qualified workers to fill the available posts. South Africa suffers from structural unemployment due to the fact that the development and education of the workforce did not keep up with the development of the economy from a primary-based economy to a knowledge-based economy (Roux, 2005).


Table 2: Unemployment rates in South Africa

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<th>1997</th>
<th>2002</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed labour force (millions)</td>
<td>A</td>
<td>7,5</td>
<td>11,3</td>
</tr>
<tr>
<td>Unemployed labour force (official definition(^5)) (millions)</td>
<td>B</td>
<td>2,3</td>
<td>4,9</td>
</tr>
<tr>
<td>Economically active (Labour force) (millions)</td>
<td>A+B = C</td>
<td>9,8</td>
<td>16,2</td>
</tr>
<tr>
<td>Official unemployment rate</td>
<td>B/C</td>
<td>23%</td>
<td>30%</td>
</tr>
<tr>
<td>Discouraged job seekers (millions)</td>
<td>D</td>
<td>2,4</td>
<td>3,3</td>
</tr>
<tr>
<td>Unemployment rate (expanded definition, i.e. allowing for discouraged job seekers)</td>
<td>(B+D)/(C+D)</td>
<td>38%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Source: Statistics South Africa (2008)

According to the official definition, South Africa had an unemployment rate of 23% in September 2007 (26% in 2006), a decrease from 30% in 2002, after a significant increase since 1997. Allowing for discouraged job-seekers, the rate of unemployment was 35% in 2007 (37% in 2006).

The high unemployment rate and the skills crisis have the following implications for actuarial demand and supply:

- The lack of available skills in South Africa has a negative impact on economic growth and levels of employment, both of which affect the size of the insurance

\(^5\) To be considered ‘unemployed’ according to the ‘official’ definition by Statistics South Africa, one must have been actively seeking work in the month before a survey. Discouraged job seekers are those who desire to work, but who have not been actively looking for work in the month before a survey.
market, which, in turn, impacts on the demand for actuaries. In terms of world competitiveness, South Africa’s ranking has dropped from 38th place out of 55 countries in 2006 to 50th place in 2007 (IMD World Competitiveness Yearbook 2007, 2008).

- Poor socio-economic conditions resulting from high unemployment promote crime, which discourage foreign investment in the country and encourage emigration of skilled workers, with further negative impacts on the economy.
- Actuaries have been identified as one of the professions that are in short supply (see section 3.1.5.2).
- Estimates of supply based on gender and race show a large shortage of black and female actuaries (see Figure 2 in section 2). This hinders transformation efforts in the industry and in the profession. A drive to address these shortages may drive away actuarial resources (or, possibly more likely, new entrants into the market) of the non-preferred race and gender groups to seek positions in other countries. This may create or exacerbate a shortage of supply.

### 3.1.5.1 Reasons for high unemployment and the skills crisis

The reasons for the high level of unemployment and the skills crisis in South Africa include, amongst others (Roux, 2005, Kibuuka & Van Aardt, 1999):

- low economic growth – a growth rate of at least 5% p.a. is needed just to provide jobs for new entrants to the job market;
- high population growth, exacerbated by the impact of (often illegal) immigration of unskilled workers;
- the changing structure of the economy from primary-sector-dominated to services-sector-dominated;
- the substitution of labour for capital;
- a poor education system and poor levels of education; and
- emigration of skilled workers.

Economic growth figures and the structure of the economy have been discussed above. The remainder of this section focuses on education levels in South Africa and the impact of emigration on the demand for and supply of actuaries.

**Education**

There is a direct relationship between the level of education of the labour force and the level of unemployment, as illustrated in the figure below.
Labour force participants with a tertiary education have a significantly higher probability of being employed compared to those that do not. Unemployment rates do not differ significantly for the labour force who completed grade 12 as highest qualification, compared to those with lesser qualification. The rates of unemployment for those who have completed their secondary education (completed grade 12) were lower in 2006 compared to previous years. Note, however, that unemployment is high even for those with a tertiary education, which may indicate that the field of study may not be appropriate, and/or that the quality of higher education is such that it does not equip students with the necessary skills required to find a job.

The 2001 census showed that only 20% of the population 20 years and older had a matriculation certificate (completed grade 12), and 8% had a higher education qualification. In 2006 it was estimated that 23% of the adult population had a matric or equivalent, while 9% had a higher education (matric and a diploma or degree) – a slight improvement on the 2001 numbers (Statistics South Africa, 2006).

Compared to the general population, the picture for the labour force is only slightly better: in 2006 29% had a matriculation certificate, and 13% had a higher education qualification. Note, however, that ‘labour force’ consists of those employed and those unemployed according to the official definition and, as such, excludes discouraged job-seekers (people who are unemployed who did not actively seek work in the month before the survey).

Differences in the skills levels of different population groups pose a significant challenge in reaching equity targets in the workplace. A report by Statistics South Africa (2002) on the South African labour market states that the Black African and
Coloured labour force has the highest percentage of people with no education or with incomplete primary and secondary education.

The following figure shows the percentage of each of the population groups (older than age 20) at different levels of education in 2001.

*Figure 9: Proportions of population groups aged 20 years and older by level of education, in 2001*

<table>
<thead>
<tr>
<th>Group</th>
<th>Less than grade 12</th>
<th>Grade 12</th>
<th>More than grade 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>29%</td>
<td>41%</td>
<td>30%</td>
</tr>
<tr>
<td>Indian</td>
<td>50%</td>
<td>35%</td>
<td>16%</td>
</tr>
<tr>
<td>Coloured</td>
<td>77%</td>
<td>19%</td>
<td>5%</td>
</tr>
<tr>
<td>Black African</td>
<td>78%</td>
<td>17%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: Statistics South Africa Census 2001

In 2001, of the Black African population older than age 20, 78% has not completed secondary education (85% in 1996), 17% had only grade 12 (12% in 1996) and 5% had a tertiary education (3% in 1996). In 2006, of the Black African labour force 25% had grade 12 and 8% had a tertiary education. Looked at from a different angle, of those people in the labour force with a tertiary education in 2001, 46% were Black Africans, 5% Coloured and 6% Indian while 43% were White. The small proportion of Black Africans with a tertiary education is one of the reasons for the poor racial diversification of the actuarial profession.

Based on comparative studies with the rest of Africa, South Africa came last in a selection of twelve African countries and the World Competitiveness Report (2000) lists our education system as the worst in the world (SACN, 2004). A study called ‘the Progress in International Reading Literacy study’, conducted in 40 countries in 2007, showed that almost 80% of South African pupils in grades 4 and 5 did not reach the lowest international benchmark for reading literacy compared to only 6% in the rest of the countries tested\(^6\). A national survey of performance showed that of pupils currently in grade ten, 30% did not achieve the required standard in numeracy and 54% did not achieve the required standard in literacy\(^7\).

\(^6\) News24.com, 2007, SA pupils in literacy shocker:
http://www.news24.com/News24/South_Africa/News/0,,2-7-1442_2229879,00.html

\(^7\) News24.com, Education in crisis mode
Between 1999 and 2004, an average of only 4.4% of matriculants achieved mathematics passes adequate for gaining entry into university to study natural sciences. William Blankley, the Chief Research Manager in the Knowledge Management Group of the Human Sciences Research Council (HSRC), stated that only around a third of black matriculants passed mathematics on higher grade and only a fraction of these would study further in the fields of science and technology. South Africa is therefore not producing highly skilled black people in these fields. There is a failure in the education system to advance science-based careers (Waller, 2006).

According to Sowaga, 2002:

“The stark reality of the shortage of blacks skilled in mathematics and its negative effects on tertiary education and the economy is slowly hitting home”.

According to the Centre for Development and Enterprise (2007):

“The most effective and most enduring way of resolving the skills crisis would be to dramatically improve the education system”.

There are a number of reasons for the poor levels and quality of education in South Africa, including:

- Poor socio-economic conditions and poor level of education of parents. According to the report on ‘the Progress in International Reading Literacy study’, poor literacy was due to the lack of exposure to early-reading literacy activities and less than half of the pupils tested had books at home. Furthermore, if children’s basic needs haven’t been met (such as food and clothing) they are unlikely to be open to learning.
- Quality of educators. According to Roux (2007), 16% of educators in South Africa are either unqualified or under-qualified. In 1999 only half of the country’s maths and science teachers had tertiary qualifications in these subjects.
- Shortage of educators. According to Roux (2005), there is a shortage of between 4 000 and 12 000 mathematics and science educators, and between 18 000 and 21 000 teachers quit teaching every year. This is probably due to poor pay and working conditions.
- Impact of HIV and AIDS. The IMF (2002) projects that of the 13 118 total required teacher training in 2010, 10 273 (78.3%) will relate to required teacher training to replace AIDS victims.

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8 Fin24, 2008, Education in crisis mode
9 News24.com, 2007, SA pupils in literacy shocker:
http://www.news24.com/News24/South_Africa/News/0,,,2-7-1442_2229879,00.html
10 Fin24.com, 2008, Education in crisis mode:
Emigration

The increasing levels of emigration of skilled workers from South Africa has detrimental effects on the economy and socio-economic conditions in the country. This affects both the supply of, and demand for actuarial resources.

In an environment of global skills shortages, particularly in fields such as information technology and the health profession, Africa as a whole is experiencing a serious loss of skills. The International Organisation for Migration (IOM) estimates that since 1990, 20 000 professionals have left Africa every year. According to the United Nations Economic Commission for Africa, the brain drain is “one of the greatest obstacles to Africa’s development” (Waller, 2006). Waller furthermore states:

“In a globalising economy, African markets find it difficult to compete. The free market system of globalisation is making borders increasingly obsolete, facilitating the loss of skilled professionals to richer economies”.

Emigration from South Africa accelerated after the country moved to majority rule in 1994 and its international isolation ended. According to The Economist (2005) some 1,4 million South Africans were thought to be living in Britain alone.

Piliso (2007) writes:

“More and more chartered accountants, actuaries, engineers, quantity surveyors and health professionals are buying one-way tickets to the US, Canada, Britain, Saudi Arabia and even the Grand Cayman Islands”.

The reasons cited for this include better jobs abroad, attractive pay cheques, the crime situation in South Africa and perceptions of falling education standards. A London-based recruitment agent, which specialises in placing actuaries internationally, said there was a huge demand for South African actuaries abroad.

According to Van Rooyen (2007):

“up to 74% of professional people in South Africa have been thinking of emigrating and more than 20% of South Africa’s educated professionals may already have left.”

He furthermore states that each skilled emigrant who leaves the country results in the loss of 10 unskilled jobs, and that emigration has already cost the country R285 billion in the form of the loss of potential contributions to GDP.

A survey by the Southern African Migration Project (SAMP) shows that 78% of the companies participating in the survey before 1994 indicated that emigration had no effect on the availability of skills, 21% said the effect was minimal and 2% that it was significant. In a later survey (conducted in 2001), the figures had changed to 41% (no effect), 26% (minimal) and 33% (significant). The sectors suffering as a result of the emigration of skilled personnel are the computer and high-technology sectors, the industrial sector, the banking and financial sectors, education and the health sector (Leuvennink, 2001).
The following reasons were stated for emigrating or considering emigrating:

- Concerns over personal safety and security (violent crime). According to Van Rooyen (2007) violent crime is the reason why 60% of emigrants are leaving South Africa. He states “violent crime has turned South Africa into an anarchical society with a murder rate equal to the mortality rate of countries involved in war or engaging in civil war”.
- Affirmative action. According to a survey commissioned by the Centre for Development and Enterprise (2007), “The government’s growing emphasis on employment equity is making the skills market far tighter because the most skilled people – whites – are no longer freely employable.” (CDE, 2007).
- Negativity about current economic conditions and little expectation of improvement in the immediate future.
- Problems associated with HIV and AIDS.
- Decline in social conditions including education and health care. According to CDE (2007): “perhaps most significant of all is the fact that private sector employers have grave reservations about the overall quality of our education system at all levels”.
- Poor upkeep of public amenities.
- The cost of living.
- Income levels.
- Levels of taxation.

Mostly Whites and Indians are emigrating, but emigration is not limited to these groups. At the beginning of 2004, the senior partner of a large South African executive recruitment firm announced that the brain drain has started consuming skilled black professionals. “Both the heads of Business Unity SA and the South African Chamber of Business consider the trend extremely worrying and potentially disastrous for the economy” (Waller, 2006).

3.1.5.2  Actuarial skills are scarce in South Africa

A survey of employment, scarce and critical skills in the insurance sector, conducted by Research Focus, Pty Ltd for the Insurance Sector Education and Training Authority (INSETA), was published on 11 July 2006. This survey revealed that of the 36% organisations who tried to recruit employees in 2005, 13% indicated that they found it difficult to recruit suitable candidates for vacant positions. More than 3 000 posts (3,1% of sector employment) across various occupational categories were identified as vacancies that could not be filled due to the scarcity of skills. Of these posts, 70% were for professionals. The report states that the most pressing skills shortages were experienced in respect of actuaries, chartered accountants and other financial professionals such as specialist portfolio investment managers, qualified financial planners and business analysts. The employment agents interviewed also reported a shortage of the higher-level numerical skills required in positions filled by financial analysts, semi-professional and actuarial support staff, and business- and management accountants (INSETA, 2006).

In a publication called GradX, Dingle (2006) states that there is a huge shortage of skills in the fields of chartered accountancy, actuarial sciences, credit analysis, economics, insurance account management and risk analysis.
The Johannesburg City Skills Project has set up the ‘2030-Foundation’ in order to address the mismatch between the city’s demand and supply of key technical and professional skills. The foundation identified the fastest growth sectors in Johannesburg as financial services, IT and telecommunications, transport and auxiliary and business services. Based on research in Johannesburg, there are two categories of high-growth demand for skills. The ‘super-growth’ category denotes skills where there is a greater than 40 percent annual growth requirement; while the ‘high-growth’ category denotes skills categories where there is at least a 15 to 40 percent annual growth requirement. ‘Super-growth occupations’ include computer scientists, computer systems analysts, chartered accountants and computer programmers. ‘High-growth occupations’ include (non-CA) accountants, actuaries, engineers (electrical and chemical) and mathematicians (SACN, 2004).

According to a study on job opportunities released by trade union Solidarity (in December 2006), there is a demand for professionals such as geologists, security specialists, town and regional planners, engineers, agriculture economists, actuaries, risk managers, academics, researchers, veterinarians, doctors and development economists in South Africa (Keating, 2006).

As a result of the skills crisis in South Africa, the South African Department of Home Affairs has issued a list of quota work permits for selected professions (the National Critical Skills list), which means foreign nationals with the required qualifications and experience will be allowed to enter the country without first having to secure employment. The regulations are designed to raise skills levels in the country, as part of the broad government initiative to boost economic growth to 6% by 2010 and reduce poverty and unemployment by half by 2014. Fifty-six occupations have been identified, and the list includes various kinds of engineers, mathematics and science teachers, scientists, IT professionals, actuaries, financial market analysts and risk managers. The permits are issued according to a yearly quota, determined by the National Critical Skills list according to the perceived scarcity of particular skills, based on consultation with the departments of Trade and Industry and Labour. The quotas for actuaries, financial market analysts and risk managers are 500 each (International Marketing Council of South Africa, 2006). In the case of actuaries, this is 62% of the number of qualified actuaries at the end of 2007.
3.2 Changes in the financial environment

The roles of actuaries have evolved with changes in the environment such as regulatory changes, economic changes, social changes, globalisation and technological developments. In this section we consider the changes that have taken place over the past 10 to 15 years and their impact on the roles of, and demand for, actuaries.

3.2.1 The Financial Sector Charter

In South Africa, the financial sector committed itself to the development of a Black Economic Empowerment (BEE) charter in August 2002. This is aimed at addressing racial imbalances and inequalities in the distribution of income. The Financial Sector Charter aims to improve the levels of black participation (black women in particular) in the financial sector, including in high-level skilled positions. This creates a demand for black actuaries, in particular female black actuaries. Note that the definition of ‘black’ includes Black Africans as well as Coloureds and Indians.

While employers in the insurance industry’s commitment to enhance the diversity of the workforce results in a high demand for black actuarial resources, a sufficient supply of suitably qualified black professionals remains a problem. According to ‘The SA Guide to Executive Remuneration and Reward’ conducted annually by Human Capital at Deloitte among a wide range of companies in many sectors, 57% of respondents have experienced difficulties in recruiting suitably qualified and skilled Affirmative Action executives. Moreover, 36% of respondents encountered ‘affirmative auctioning’ i.e. intense recruitment of qualified and experienced black executives, resulting in such executives moving from employer to employer for increasingly higher packages, unrelated to professional ability or productivity and adding to operational costs.

Another objective of the Financial Sector Charter is to improve access to financial services for a larger segment of the population and to improve the national levels of savings and investment, in order to improve economic growth and individual financial security. As a result, a series of simple, low-cost products have been developed, which has provided additional work for pricing and product development actuaries.

3.2.2 Increase in regulatory and governance requirements

Globally the extent of legislation impacting the role of actuaries (and other professionals such as accountants) has been increasing at an accelerating pace. A survey done by the Centre for Financial Services Innovation in association with PricewaterhouseCoopers (PwC, 2007) has identified ‘excessive regulation’ as the main concern of insurance companies worldwide. They state:

“excessive regulation is endangering the industry by loading companies with costs, distracting management and creating barriers to competition and innovation”.

Another survey conducted by PwC among South African insurance companies revealed that South African insurers also find the degree of regulation cumbersome: “The sheer complexity of the regulatory environment is now considered to be the greatest barrier for achieving first rate compliance”. PwC also found that virtually all participants believe that regulatory pressure on financial institutions will increase over the next three years (PwC, 2006).

This was reiterated in a survey by the Centre for Development and Enterprise in South Africa in 2007. They found that the increasingly complex regulatory environment and a generally more competitive global environment placed a greater burden on companies to find new products, innovate, and keep prices down. These were even more troublesome factors to South African companies than the skills shortage (Centre for Development and Enterprise, 2007).

Much of South Africa’s legislation and actuarial guidance notes have been extensively reviewed and expanded in the last few years, giving rise to new requirements for actuaries. Examples of relevant legislation include, inter alia, the Long-term Insurance Act (1998), the Medical Schemes Act (1998), the Short-term Insurance Act (1998), the National Credit Act (2005) and the Collective Investment Schemes Control Act (2003).

One of the purposes of regulation is the protection of all stakeholders in the market against fraud, poor risk management, strategic business failure and poor corporate governance (Sherwood, 2007). In recent years, incidents of fraud, corporate strategy failures, corporate governance and control failures, and the exposure of certain established business practices as being unfair have resulted in changes in legislation and regulatory practices, in an attempt to restore public confidence.

The increase in regulatory requirements, while a concern for insurance companies, has increased the demand for actuaries - both for those working in the industry and for actuaries employed by the regulator - either by their involvement in litigation processes, the development of new regulations and review of existing regulations, or due to the increased need for compliance.

The following are examples of events and developments in South Africa that created additional work for actuaries:

- The failure of Fedsure Life Assurance Limited in 1998 has lead to additional requirements on actuaries such as a detailed and compulsory analysis of surplus by the statutory actuary, the appointment of external actuaries to execute data and system audits, development of asset liability management as an integrated discipline throughout the operational and strategic management and governance of the company, including the separation of shareholder and policyholder funds and appropriate spreading of assets within these funds to prevent over-concentration (Marx and Stander, 2003). In addition, the detrimental impact of this event on public confidence in insurance, and in smoothed bonus products in
particular, has contributed to the need for actuaries to be more transparent about the way that this class of business is managed, and the risks carried by policyholders, creating even more work for actuaries.

- **Early termination values** offered by life offices when retirement annuity policies were made paid-up, terminated or when their premiums were reduced were criticised during 2005 and 2006 by way of rulings by the Pension Fund Adjudicator. These culminated in legislation as Part 5 of the Regulations issued in terms of the Long-term Insurance Act, 1988 (‘Requirements and limitations regarding the values and benefits of policies’) which became effective on 1 December 2006. This created a need for actuaries to perform the investigations and negotiations and to implement the regulations. In addition, the Minister of Finance also committed itself to examine other issues impacting on costs, i.e. commission structures, disclosure standards and consumer education (Dixon, 2006), the results of which are expected to create more work and thus further demand for actuaries.

- **Pension Surplus legislation** was finalised in 2001 following the court ruling in 1999 (in the case of Lorentz vs The Tek Corporation Provident Fund and others) that found that it was unacceptable for employers contributing to defined benefit pension schemes to take contribution holidays when excessive surpluses built up in funds was a result of the fact that exit benefits paid to members who transferred out did not include a pro-rata share of the surplus (Andrew, 1998). At the time, South Africa experienced a widespread conversion of defined benefit retirement funds to defined contribution retirement funds, resulting in a concentration of actuarial surplus within residual defined benefit funds with relatively few members. As a result of the outcome of the court case and concerns by organised labour and member- and pensioner-elected trustees, the reputation of actuaries advising trustees in this regard had been damaged, and this may have reduced demand for pension fund actuaries. Pension fund surplus legislation followed, which provided for the apportionment of any surplus in each fund at the date of the statutory valuation falling between 7 December 2001 and 6 December 2004. It also introduced a statutory minimum exit benefit and a mechanism to ensure that pensioners received fair increases relative to inflation, based on investment returns achieved in the past (Baskir, 2006). This created additional work for actuaries working in this field for a period.

- **‘Secret’ or undisclosed profits** was a further industry practice that came under scrutiny in 2006. This took the form of undisclosed fees earned by pension fund administrators or medical scheme administrators by bulking bank accounts, or interest earned from settlement discounts and profit-share arrangements. Other longstanding practices exposed as unacceptable in 2007 relate to the payment of incentives to pension fund consultants to motivate retirement funds to invest in other products of the insurance company. Many pension fund administrators were penalised by the Financial Services Board and were required to pay compensation (Cameron, 2007). While these had a negative impact on the reputation of actuaries – either directly or indirectly – investigations into companies’ practices created further work for actuaries.
Changes in Tax legislation. The taxation of South African life insurance companies was significantly changed with the introduction of the Four Funds basis in 1993 (Section 29 in the Income Tax Act, 1993), replacing the Sixth Schedule to the Income Tax Act No. 58 of 1962. Further changes were made in 1999 (Section 29 of the Income Tax Act was replaced by Section 29A in the Revenue Laws Amendment Act, 1999). The changes made include changes to the deductibility of expenses, deductibility of transfers between tax funds, and a change in the liability valuation basis from the prescribed valuation basis to the financial soundness valuation method. In 2001, capital gains tax was introduced in the Taxation Laws Amendment Act, 2001 and the act allowed for realised capital gains to be added to the taxable income of life insurers’ funds (Clover, 2007). In the case of pension funds, retirement fund tax was introduced at 17% in 1996 in the Tax on Retirement Fund Act 38 of 1996 on interest and rental income earned on funds’ investments. The rate reached a high of 25% from 1998 to 2002, after which it was gradually reduced to 9% and eventually abolished in the 2007 Budget (Schumann, 2007). The changes to the tax basis of life insurance funds and retirement funds directly impacted the work done by actuaries and thus impacted on actuarial demand.

Increased modelling requirements in respect of embedded investment derivatives (e.g. minimum maturity guarantees, guaranteed annuity options, etc.). This include the development of market-consistent stochastic models to quantify the reserves required to meet the cost of embedded investment derivatives. The need for these arose from a changes in economic conditions as discussed in section 3.2.4.

Elsewhere in the world, the work done by actuaries have been affected by events and developments such as:

Demise of the Equitable Life Assurance Society. The Equitable was taken to court in 1998 (Equitable vs Hyman) over a dispute regarding a decision to apply lower terminal bonus rates to policies with guaranteed annuity options, compared to those without the guarantee. Guaranteed annuity rates (GAR), which were offered to new policies taken out until 1988, exceeded the Equitable’s current annuity rates for the first time in 1993 as a result of falling interest rates in the UK, and again in 1997. The Equitable’s Board approved a “differential final bonus practice to equalise the benefits in GAR and in cash form”, thereby effectively offering lower terminal bonuses to policyholders with GAR’s who opted to take advantage of them, relative to those who did not have the option (Kingston & Clark, 2001). The case was heard at the High Court in 1999 and was appealed. In July 2000 a judgement by the House of Lords was made against the Equitable - it was ruled that the differential terminal bonus was unlawful. As a result, the Equitable was forced to close to new business in 2000 due to financial difficulty relating to insufficient reserves being set aside to meet the guarantees. These events have resulted in a number of changes in the way that the profession is governed, including changes to the disciplinary scheme, introducing a system for peer review, the revalidation of practicing certificates, the establishment of a Professional Oversight Board, enhanced continuing professional development requirements, ethical standards and practice guidance (Kenney, 2007). This increased governance has also rippled through to South
Africa with the development of the Board of Actuarial Standards and also
greater required transparency and focus on the management of with-profits and
smoothed bonus business in South Africa, all of which added to the workloads
of actuaries.

- **The personal pension mis-selling scandal in the UK** created significant
  employment opportunities for actuaries both in the UK and elsewhere in the late
  1990s. This resulted from many investors being encouraged in the late 1980s
  and early 1990s to take transfers from (opt out of) their occupational pension
  schemes and invest in personal pension policies, leaving many of them worse
  off at retirement. Over the next decade, many actuaries were involved in loss
  assessment calculations to determine whether these individuals were in fact
  worse off, in which case insurance companies were obliged to pay
  compensation. This cost the UK insurance industry a total of £15 billion in
  compensation (Kay, 2003). This does not include the additional cost of
  employing actuarial resources, at significantly higher salaries, to perform the
  loss calculations.

- **Mortgage endowment mis-selling in the UK** was a similar event, albeit smaller
  scale. UK policyholders buying houses in the 1990s were encouraged to take out
  endowment policies and make payments into their endowments instead of
  amortising the capital on the mortgages. Policyholders were led to believe that
  the maturity proceeds from the policies were guaranteed to be sufficient to pay
  off the capital on the mortgages. However, various factors (such as the removal
  of tax relief and the change to a low inflation environment) resulted in the
  returns on the endowments being lower than expected, with the result that
  maturity proceeds fell short of the mortgages they were intended to settle. This
  resulted in £4.7 million in fines and £170 million being paid in compensation by
  insurance companies (Elliott, 2006).

- **In the US, the Sarbanes-Oxley Act of 2002** (also known as the ‘Public Company
  Accounting Reform and Investor Protection Act of 2002’) was adopted in
  response to a number of major corporate and accounting scandals, including
  Enron, Tyco International, Peregrine Systems and WorldCom that reduced
  public trust in accounting and reporting practices. The Act covers, amongst
  others, corporate governance, internal control assessment and enhanced
  financial disclosure. While the Act applies to accounting firms in their roles as
  auditors of public companies, this also has implications for actuaries in auditing
  firms and in the companies being audited\(^\text{12}\).

- **US subprime debt crisis.** In late 2006, significant US bank lending to high-risk
  borrowers, combined with a drop in house prices, resulted in increased
  foreclosures and liquidity problems. Banks transferred much of the risk to third
  party investors by way of securitisation (in the form of mortgage-backed
  securities and collateralised debt obligations), spreading the impact to beyond
  banking institutions. During 2007 and 2008 this triggered a global financial
  crisis with stock markets in many countries declining significantly and the

outlook for economic growth adjusted downwards\textsuperscript{13}. According to a report by the International Monetary Fund (IMF), financial regulatory restructuring legislation is likely to follow, requiring improved risk identification and management, improved capitalisation of institutions globally and more disclosure, which would create further opportunities for actuaries.

- **Bankruptcies in Japan.** The Institute of Actuaries of Japan (IAJ) (2002) wrote that seven insurance companies in the country went bankrupt between 1997 and 2001, because of erroneous assumptions on interest rates. When interest rates dropped and stayed at very low levels for years, the long-term nature of life insurance policies spelled financial doom for companies involved. Some of the regulatory changes that followed included more stringent standards for determining solvency margin ratios and the disclosure of ‘fundamental profits’, a basic profit indicator for the operations of life insurance companies. In addition, providers of financial products – including insurance companies – was required by law to explain the market and credit risks of financial products. This created more work for actuaries.

- **Developments in India.** India historically followed a socialist-inspired economic approach with strict government control over private sector participation, foreign trade, and foreign direct investment. However, since the early 1990s, India has gradually opened up its markets through economic reforms and reduced government controls\textsuperscript{14}. As part of the reforms, India’s Insurance Regulatory and Development Authority (IRDA) Act was passed in December 1999. This act and its regulations requires an appointed actuary for life as well as non-life, who has to be a Fellow of the Actuarial Society of India (ASI) and who is responsible for reporting to the IRDA. The Act furthermore sets down specified capital requirements for each line of business (life, general and reinsurance business), strict guidelines for asset and liability management and solvency margin requirements and an increase in disclosure requirements (Traverso, 2005). Traverso (2005) furthermore states:

  “Since the opening of the Insurance market in India to private sector participation in 1999, and the passing of the Insurance Regulatory and Development Authority Act, 1999, there has been a rapid change in the size and structure of the insurance market - not least among these changes is the sudden and accelerated demand for Actuarial expertise.”

According to Darwin Rhodes\textsuperscript{15}, an insurance recruitment company operating in India, the liberalisation of India’s insurance sector has created enormous demand for actuarial and insurance specialists, following the launch of a number of global European and US insurance companies in Mumbai and Delhi, and triple figure growth in the Indian insurance sector.

• **Developments in China.** Similarly, China’s economy during the last quarter century has changed from a centrally planned system that was largely closed to international trade to a more market-oriented economy. China today has a rapidly growing private sector and is a major player in the global economy. Reforms, which started in the late 1970s, include increased autonomy for state enterprises, the foundation of a diversified banking system, the development of stock markets, the rapid growth of the non-state sector, and the opening of the economy to foreign trade and investment. The restructuring of the economy and resulting efficiency gains have contributed to a more than tenfold increase in GDP since 1978, such that in 2006, China’s economy was the second-largest economy in the world after the US (measured on a purchasing power parity (PPP) basis) (World Factbook, 2007).

Swiss Re (2004) identified China and India as the most promising insurance markets with high growth prospects. They expect insurance premiums in these markets to grow by 7.5% per year from 2004 to 2014 resulting from “robust economic growth, increased stability, favourable regulatory developments, as well as new product offerings and distribution channels.” They furthermore expect that supervisory authorities in India and China will continue to realign local regulations, for example those relating to solvency, transparency and corporate governance, to international best practice, and that this will improve confidence in the insurance industry. Developments in India and China create a significant demand for actuaries. Since the actuarial qualification is mobile, the huge shortage in these countries creates opportunities for actuaries worldwide, including South African actuaries.

### 3.2.3 Globalisation

According to Global Education:\(^\text{16}\)

> “Globalisation: the movement of people, goods, capital and ideas due to increased economic integration, which in turn is propelled by increased trade and investment. It is like moving towards living in a borderless world.“

According to Encyclopedia Britannica:\(^\text{17}\)

> “The process by which the experience of everyday life ... is becoming standardized around the world....increasing global connectivity, integration and interdependence in the economic, social, technological, cultural, political, and ecological spheres.”

Globalisation has resulted in:

• More open markets with events in one part of the world having an effect elsewhere (e.g. corporate failures in the UK or US resulting in new regulatory requirements in South Africa). The Society of Actuaries states in their report on a market-place survey (SOA, 2002) that two phenomena have been seen:

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“First, more and more corporations do business in many global regions. Second, the world’s capital market is so interconnected and interdependent that it behaves almost like a single market entity.”

- Convergence of insurance and other financial industries.
- Increased complexity of the financial services environment.
- Greater risk of financial risk events materialising.
- Reducing diversification benefits from investment in international assets and stronger correlations between prices of different assets, which has lead to the development of new products such as credit-based structured products.
- A more competitive environment (a growing proportion of business in a particular country is written by foreign companies or subsidiaries of foreign parents).
- Thinking developed in one country or region being applied elsewhere.
- An increase in demand for highly skilled workers.
- Skills being more mobile (according to CDE (2007), “we are losing human capital to a global market for skills that has become increasingly competitive in recent years”)

Globalisation creates a need for common tools and methodologies. Two areas in which this has already been evident are those of financial reporting (international accounting standards) and in solvency regulation.

Since 2004 there has been a requirement for local companies to comply with International Financial Reporting Standards (IFRS). These requirements aim to address the need for more relevant information in financial statements and include the move toward “fair valuation” of financial assets and liabilities, the explicit measurement of the value of embedded options, and significant additional disclosures. The new reporting requirements had a significant effect on companies’ financial statements and produced a huge additional workload for valuation actuaries. Gutterman (2002) states that “the demands that actuarial reporting of insurance companies present to actuaries are great and growing” and “the actuary’s role is enhanced and expanded”.

The increasingly complex and open global market has also resulted in an increased focus on, and change in, the approach to risk management. Solvency II is a European Union (EU) project started in 2000 for the purpose of reforming prudential regulation of insurance across the EU. Its aim is to ensure adequate policyholder protection in all EU member states. It will mandate levels of capital adequacy for insurers and encourage sound risk management in the EU insurance industry. It will result, among other things, in more efficient use of capital (Sherwood, 2007). The European Community (EC) has issued a draft Solvency II Directive in July 2007, with implementation and enforcement expected to be around 2012. The Solvency II draft directive followed, and was largely based on Basel II, which was published in June 2004. The purpose of Basel II was to create an international regulatory standard relating to risk and capital management requirements applicable to the banking industry.

Solvency II provides for a risk-based approach to capital to be held by insurers, market-based valuations of assets and liabilities and full account to be taken of the
cost of options and guarantees. It requires an enterprise risk management approach of integrated assessment, control and management of risk across the corporate structure. Actuaries could make a significant contribution towards developing enterprise risk management systems.

The new risk-based capital and supervision creates new challenges and opportunities for actuaries. Hillevi Mannonen, President of the International Association of Actuaries, at a seminar on Solvency Management in Life Insurance (April 2007, in Mexico) stated:

“Actuaries possess significant expertise in analyzing and modeling the financial implications of risks. Actuaries have been in key positions in measuring and assessing the insurance liabilities and the need for solvency capital in an insurance company, but also in identifying means for risk mitigation and the efficient use of risk capital” (Mannonen, 2007).

French (2003) states that, as risk management and risk measurement are gaining increasing importance, company management are turning to their actuarial departments to contribute to the understanding of the key drivers of the business and deliver fact-based answers to strategic questions. Actuaries will, however, need to get closer to the field of financial economics to seize these opportunities.

Deloitte (2006), Gutterman (2002), Dumbreck (2006) and the Life Insurance Association of Malaysia (2007) agree that the need to develop enterprise risk management frameworks to optimise capital structures, implement effective controls, improve strategic decision-making and enhance risk-adjusted returns create opportunities for actuaries who are able to provide expert advice in risk identification, assessment, measurement and management.

3.2.4 Changes in the South African economic and business environment

3.2.4.1 Lower inflation levels

Since around the start of the new millennium, the change to an economic environment dominated by lower levels of inflation has brought new challenges and opportunities for actuaries. It has lead to the exposure of high product charges and poor value for money, resulting in the development of ‘new generation’ products with lower charges. Companies also had to consider strategies to improve efficiencies and reduce operating costs. In addition, lower expected investment returns improved the likelihood that investment guarantees offered by companies in the past (of levels in the region of 4% p.a.) may bite. It therefore became necessary for insurance companies to set up appropriate reserves to ensure these guarantees can be met when they become due. In addition, there is more of a need to manage policyholders’ expectations regarding the realistic rates of investment return that can be expected. Benefit illustrations made at times when high inflation rates were prevalent were based on assumptions of high future investment returns and these became unrealistic in an economic environment dominated by lower levels of inflation. The new savings products offered no, or significantly lower, investment guarantees. There is therefore a greater need for customer education and transparency resulting from the consumer in the insurance industry bearing an increasing proportion of the risks (Dixon, 2006).
Furthermore, the change in economic environment has highlighted the need for a regular Financial Condition Report (FCR) regarding the expected future solvency position of a company under different possible future scenarios.

3.2.4.2 Demutualisation

Another significant change in the global insurance environment is the trend for mutual offices to list and become shareholder-owned. Creedon (2007) states that mutual life offices have largely disappeared in UK financial services. This is also the case in South Africa. Norwich was established in 1987 following the demutualisation of Norwich Union Life, and listed in 1995. Two of the largest insurance companies (Sanlam and Old Mutual) have demutualised and listed in 1998 and 1999 respectively.

Apart from the work involved in the demutualisation process itself, shareholder demands for improved return on capital, appropriate reporting of results and the need to balance policyholder and shareholder interests have also created more work and challenges for actuaries.

3.2.4.3 Shorter deadlines

According to French (2003), the dynamics and volatility of the current business environment are placing increasing pressure on actuarial departments of insurance organisations. There is increasing pressure to increase efficiency and accountability, and to produce lean budgets. The accelerated valuation and reporting timelines and increasingly complex accounting and regulatory requirements place more demands on actuaries’ time and resources.

3.2.4.4 Consolidation and rationalisation

Another trend impacting on the number of insurance companies, and which seems to have the effect of reducing the demand for actuaries, is that of consolidation of the insurance industry. In the short-term, however, increased rationalisation creates more work for consulting firms with life insurance practices (Mitchell, 1999).

In South Africa, for example, the former Norwich Life was taken over by Fedsure in the late 1990s. Following the problems at Fedsure, the company was bought by Investec and then sold to Capital Alliance, which in turn was taken over by Liberty. (Cameron, 2004). Lifegro Assurance Limited was merged with Momentum in 1990. Southern Life was merged with Momentum in 1999, and Sage Life Limited was bought by Momentum in 2005. Metropolitan Life acquired Commercial Union’s life assurance and investment management businesses in 1998. Sanlam acquired African Life at the end of 2005 and Channel Life early in 2006. BoE was taken over by Nedcor. Ginsburg, Malan & Carsons, a large firm of employee benefits consultants and actuaries (including 15 qualified actuaries), previously owned by Sedgwick Noble Lowndes in the UK, was acquired by Alexander Forbes in 1999 (Alexander Forbes, 1999). This list is not exhaustive and aims to give just a few examples of consolidation and rationalisation activity in the South African insurance market.
The new owners did not employ all the actuarial resources employed by companies they have bought or taken over. This becomes apparent from the number of actuarial staff employed by the new companies before and after take-over. For example, in 1996 Southern was around the third largest employer of actuaries and actuarial students, before the merger with Momentum in 1999. In 2007 the total actuarial staff employed by Momentum was still below the number employed by Southern in 1996.

In South Africa, there have also been developments on the bancassurance front, with a number of insurance companies forming relationships with banks. Bancassurance presents an opportunity to distribute products cost-effectively using a bank’s existing branch infrastructure; at the same time, it offers banks and insurers the opportunity to cross-sell their respective product ranges into their extensive client bases. According to Symeonidis (2001) convergence between banks and insurers could see the insurance market dominated by bancassurance groups.

“Internationally, consolidation and convergence remain important trends. The line between insurance and banks is becoming increasingly blurred because insurers and banks are transforming themselves into wealth management companies so that they can offer the full range of insurance and banking products.” Symeonidis (2001)

3.2.5 Social and demographic trends

People throughout the world enjoy more freedom and are better informed and aware of their individual rights. With the rise of consumerism, customers are becoming more sophisticated, and no longer accept things in blind faith. Worldwide, fertility rates are declining and life expectancies increase (PwC, 2006). New risks also come to the fore, potentially impacting mortality and sickness rates. All these pose new challenges and opportunities for actuaries, to be discussed in more detail below.

3.2.5.1 Increased consumerism and individualism

Move away from collective products

Up to around the late 1990s with-profits (smoothed bonus) policies on the retail side, and defined benefit funds on the pensions side dominated the insurance industry. However, since then, the worldwide trend was a move away from collective ways of organising affairs and risk pooling, to a greater emphasis on individual rights and responsibilities and therefore individual provision. According to Kibuuka (1998: 4) there has been a move away from ‘mass production’ to ‘personalised production’, where the consumer is seen as an individual with personal tastes that differ from one consumer to the next. This has lead to a decline in the popularity of with-profits savings and final salary schemes (Pomery, 2004).

When, from the late 1990s, an increasing number of final salary schemes were replaced by defined contribution schemes, it was expected to have profound effects for the actuarial profession (Pomery, 2004), and a reduction in demand for actuarial services was predicted. However, Dumbreck (2006) writes in his presidential address to the UK Institute of Actuaries that the actual number of actuaries (Institute and Faculty) in the pensions field has increased by 80% between 1995 and 2005 (6% p.a.),
well above the most optimistic expectations of around a 13% increase over this period (1% p.a.).

According to a discussion paper on the UK Actuarial Profession strategy review in September 2005: “Despite concerns expressed by members, the traditional areas of pensions and life assurance do not show any signs of being in decline yet.” They state that employment in both the life and pensions areas have grown by 7% p.a. between 2000 and 2004. “There is continued demand for actuaries from current employers with no reduction in demand anticipated in the short to medium term, but potentially in the longer term.” (Pomery & Brown, 2005).

Pomery (2004) also states that the move from defined benefit to defined contribution schemes has brought new challenges and opportunities for actuaries, such as the provision of realistic projections of likely outcomes on a range of scenarios, providing generic advice on investment strategy pre-and post retirement, and communicating clearly the uncertainties involved to individuals, rather than to employers and trustees. According to Mitchell (1999) there is an increasing focus on asset consulting and funds management. Similarly, Higgo (2006) states that the demand for the services of actuarial pensions consultants may decline as the liabilities of closed defined benefit schemes run off, but that new opportunities in the field of international benefits consulting are opening up for these consultants. This relates to the pensions and rewards needs of multinationals where the focus is broader and at a more strategic level, “and is much less dependent on what happens to defined benefit schemes in the UK”. Therefore, while the role of actuaries has changed as a result of defined benefit schemes being replaced by defined contribution schemes, this did not seem to result in a reduced demand for the services and expertise of actuaries. On a similar track, Ritchie (2006) states that “the long term risks are the same, it is simply that they are distributed differently in the two schemes. The need for expert measurement, management and communication of those risks remains.”

The need for more cost effective, flexible and transparent products has lead to the redesign of long-term insurance products. In South Africa, universal life products have been replaced by separate risk and savings products. The change in society to one more focused on the individual has made way for unit-linked products, including linked- or living annuities, to replace smoothed bonus and with-profits products. Changes in society have therefore created opportunities for product development and pricing actuaries.

Move towards greater transparency and consumer education

Partly resulting from attempts to improve consumer confidence in the insurance industry following corporate failures such as Fedsure and the Equitable Life and scandals such as poor termination values and the pensions mis-selling saga, and partly due to the change in society away from the ‘paternal ethos in society’ (Pomery & Brown, 2004) to greater individualism, greater freedom and awareness of individual rights, there is a drive for more consumer education, to communicate more and better with customers and to be more transparent, for example, about charges and the way clients’ funds are managed, regarding bonuses and the finances of final salary pension schemes (Pomery, 2004).
The need for greater customer care was bedded down in the Treating Customers Fairly (TCF) initiative in the UK, lead by the Financial Services Authority (FSA). The FSA states that: “The fair treatment of customers is central to consumers having confidence in the financial services industry”, and also that “effective and efficient markets require firms to treat their customers fairly, but they also depend on customers making informed decisions and taking responsibility for those decisions.” The TCF initiative aims to bring about improvement in the information provided to consumers, an increase in the standards of risk management and transparency for consumers in the life insurance industry, and an improvement in the quality of complaint handling by firms (FSA, 2004).

The Association of British Insurers has developed the Customer Impact Scheme in March 2006 in order to help restore customer confidence in the industry. This is a form of self-regulation. It includes the development and promotion of products and services which meet the needs of customers, providing customers with clear information and good service when they buy insurance products, maintaining an appropriate and effective relationship with customers and providing them with good service after they have bought a product (Shaw, 2006).

The increased requirements on firms to communicate more, and more appropriately, with customers, creates both opportunities and challenges for actuaries. One example of the increased disclosure requirements include the drawing up of, and managing the business in accordance to, a document known as the ‘principles and practices of financial management for discretionary participation business’ (PPFM).

3.2.5.2 Social security and pensions reform

Since 2002, a new social security system is being developed in South Africa. According to Dixon (2007) South Africa lacks an integrated social security system, as existing arrangements are fragmented and incomplete, and the private retirement fund industry does not efficiently pool risks and preserve saving for low-income earners (Dixon, 2007). According to Goulding (2007), 75% of people who retire rely on the government pension to survive as they have not saved for their own retirement. A comprehensive social security system should address the particular social problems resulting from the high rate of unemployment and poverty and the high prevalence of HIV and AIDS (Anderson, 2007).

The development of a comprehensive South African social security system creates opportunities for actuaries to influence the development of appropriate models, to calculate the impact of the changes and to provide advice and assistance in the implementation of the new schemes (Jehoma, 2007). Leeman and Dorrington (1995) state that actuaries are well suited to be advisors to Government in seeking to meet social security needs. Actuaries can use their skills to assess the future cost of payments to be made to the elderly, make projections of population statistics needed to estimate future costs and do sensitivity analyses to highlight potential variations in cost estimates.
3.2.5.3 Demographic changes

In industrialised countries, the ageing of the population is a key demographic trend with significant financial consequences. Low birth rates on the one hand, which result in a declining active population, and increasing numbers of pensioners with longer life expectancies, have rendered traditional state-funded pay-as-you-go pension systems and defined benefit social security schemes unviable. Demographic changes create opportunities for actuaries to develop new products and to manage the resulting risks underlying existing products. According to Swiss Re (2005), reforms are likely to shift pension funding and management to the life insurance industry.

3.2.5.4 Pandemics

The potential outbreak of pandemics is a ‘bad news’ event creating opportunities and work for actuaries. According to Hewitt & Woolnough (2006), infectious disease pandemics have historically been the largest causes of excess human mortality, far exceeding those from wars and other disasters. They state:

“While mortality rates have been declining for many decades, the recent SARS (severe acute respiratory syndrome caused by the SARS coronavirus) outbreaks and the still increasing HIV and AIDS pandemic are reminders that epidemics of infectious disease remain as a threat”.

The HIV and AIDS pandemic is particularly relevant for actuaries in South Africa, where prevalence is the highest in the world. Estimated HIV prevalence rates in 2007 were 18.8% for adults aged 15 to 49, and 11.1% for the total population (Statistics South Africa, 2007). This has significantly altered the shape of the mortality curve, and also the demographic profile of the population. According to Waller (2006):

“Statistics South Africa released a report in February 2005 on mortality and cause of death in South Africa between 1997 and 2003. During this time, the mortality rate of adults increased by 62%. Although partly associated with population growth (10% over the period) and improved death notification processes, the proportional increase of deaths in the age group 20 to 49 hints at the toll being exacted by AIDS. Besides deaths of children under the age of four, the mortality rate peaks distinctly at age 34”.

The uncertainty and risk that pandemics create for life and health insurance markets create a need to develop models projecting the spread of disease and possible outcomes, in order to understand the potential impact and assist in determining appropriate levels of capital to hold. AIDS has furthermore caused a significant increase in mortality which affects insurance profit margins, the size of the low-income market and perhaps the demand for funeral insurance products.

Since 1987, a number of actuaries have been involved in developing demographic models for projections of HIV positive and AIDS sick South Africans (Actuarial Society of South Africa, AIDS Committee, 2007). Product development actuaries considered the most appropriate ways to protect life office solvency against this threat, including re-pricing, application of exclusion clauses, testing for HIV and AIDS at underwriting stage and at intervals there-after. Some companies also
developed products specifically for people who are HIV positive. Reserving actuaries determine appropriate contingency reserves to be held against this risk.

3.2.5.5 Catastrophes

Global warming is giving rise to extreme weather conditions such as wind storms, droughts, fires, floods, rising sea levels and water shortages, which has an impact on global insurance markets in the shape of increased liability claims, higher and more volatile costs of insurance, increased cost of capital and potential reputation damage. This creates opportunities for actuaries to find innovative solutions for new insurance needs (Durant & Green, 2007).

Insured losses from natural catastrophes have been increasing since the 1980s, and reached a record high in 2004 (Connor, 2007). The insured property and business interruption losses stemmed mainly from hurricanes in the US and the Caribbean and typhoons in Japan. In addition, the September 11, 2001 terrorist attack in the United States resulted in a significant amount of additional work for insurance professionals, including actuaries. Opportunities for actuaries working in the field of property and casualty insurance and reinsurance, included:

- increased demand for property casualty insurance and catastrophe reinsurance.
- the development of new markets to cover against such risks;
- the development of catastrophe models for adequate insurance pricing; and

3.2.6 Advances in science and technology

Global Education states:

“The digital and information revolution has changed the way the world learns, communicates, does business and treats illnesses.”

Only about 15 years ago, actuarial calculations were mostly done manually, using simplification tools. Technological developments have created a vastly different and extremely fast-changing environment. Actuaries from a previous generation had to adapt to these developments in order for their skills to remain relevant.

The following are implications of technological developments, including increased access to computers and the improvement of computer-ability, increases in technological power, including the speed and power of computation and telecommunication (Society of Actuaries, 2002, PwC, 2006 and Symeonidis, 2001):

- Enhanced ability to develop more complex products and to develop products in shorter times;
- The creation of different needs and methods to meet them;
- Allowing more sophisticated modelling of human behaviour;
- More appropriate reserving, for example for maturity guarantees on unit-linked policies;
- More careful risk management;

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Informing investment strategy for defined benefit funds and, to a lesser extent, for with-profits life funds;
Better integration with banks;
Improved control with less reliance on people;
Easier and faster access to ever-increasing volumes of information and data;
Improved data quality for use in claims and underwriting;
A more sophisticated use of client data, for example data mining;
Major improvements in business processing and customer service;
Better customer relationship management;
Cost savings from efficiency improvements;
Increased speed of delivery; and
New options for marketing and delivering products.

Improved technological ability creates further needs, and thus creates a demand for actuaries who are able to use the available technology.

According to the British Columbia Occupational Outlooks Work Futures handbook (2005) the employment outlook for mathematicians, statisticians and actuaries is directly related to advances in computer applications. The continuing computerisation of the working world is one of the driving forces behind the forecast for employment growth in these occupations. They expect that these fields will provide more application-driven job opportunities, such as financial software development, than is currently the case.

3.3 Expansion of the role of actuaries into ‘wider fields’

Actuaries have traditionally worked in the areas of life insurance and pensions. (Slattery, 2004). Over the last 10 to 15 years, actuaries have increasingly become involved in ‘non-traditional’ fields where opportunities mainly arose as a result of the need for better financial risk management. Actuaries today also work in (Slattery, 2004 and Baldwin, 2005):

- Health insurance;
- Short-term insurance (also referred to as ‘general’ or ‘property and casualty’ insurance);
- Investments and funds management (e.g. real option analysis);
- Banking;
- Social policy;
- Corporate finance e.g. the evaluation of alternative development projects and methods of financing them;
- Quantitative analysis;
- Personal financial planning;
- Enterprise risk management, which involves an integrated assessment, control and management of risk across the corporate structure; and
- Project finance.

The following are further potential areas of involvement for actuaries (Slattery, 2004 and CRUSAP, 2006):
Environmental impact evaluations e.g. estimating the cost to society of a particular event or activity such as the mining of a dangerous substance such as asbestos;

Compensation calculations e.g. determination of an individual’s loss of income following a disability caused by an industrial accident (Slattery, 2004);

Financial engineering;

Behavioural economics; and

In the utilities and resources industries e.g. actuaries advising electricity companies and gas utilities on their corporate business strategies (Mitchell, 1999); and

Demographic modelling for social security and capital projects such as infrastructure developments.

The figure below shows the proportions of qualified actuaries working in the various fields in South Africa, compared to Fellows who are members of the UK and Australian actuarial bodies. Note that the statistics are at different dates, but these proportions are unlikely to vary significantly from year to year.

Figure 10: Split of Fellows by practice area in South Africa (2006), the UK (2004) and Australia (2005)


In South Africa and the UK, life and pensions are still the main practice areas for actuaries. However, general insurance has overtaken pensions as the second largest practice area in Australia, and is regarded as the ‘growth engine’ of the profession (Stevenson, 2005). A smaller proportion of South African actuaries are involved in general insurance – probably reflecting the lower exposure to natural catastrophe risks such as floods, typhoons, cyclones etc. South Africa is also not a central hub for reinsurance companies such as is the case in London. Actuaries specialising in general insurance and reinsurance in international markets deal with a wider variety of risks than in South Africa. In addition to household, motor, property and workers’
compensation insurance, they also deal with environmental and marine insurance, terrorism insurance and other types of liability insurance.

A higher proportion of South African actuaries are involved in health insurance, compared to both the UK and Australia, reflecting the lack of an integrated public health system in South Africa.

In the UK, the number of actuaries working in the fields of life and pensions, have increased by an average annual rate of 7% each from 2000 to 2004, while the number working in general insurance increased by 9% p.a. (Pomery & Brown, 2005).

In Australia, the numbers of actuaries working in general insurance and investments have increased by average annual rates of 15% and 11% respectively between 1992 and 2005, compared to growth rates in life and pensions areas respectively of 4% and 1% p.a. (Stevenson, 2005). According to Rogers (2004) “the complexity of modern general insurance and health needs significant actuarial input to ensure sustainability and profitability of these industries”.

Apart from changes in the fields of employment, there has also been a change in the typical roles of actuaries, with more actuaries being employed by consulting firms. In the UK, the number of UK Fellows employed by consulting firms has grown by 6% p.a. between 2000 and 2004, compared to zero growth in employment of actuaries by insurance and reinsurance companies (Pomery & Brown, 2005).

The main non-traditional fields in which actuaries in South Africa have started to play a role in the last 15 years are discussed below, namely health insurance, general insurance, investments and banking.

3.3.1 Health insurance

In South Africa, the role of actuaries in the health benefits field in particular, has expanded significantly since the early 1990s, mainly driven by the introduction of new legislation. According to Slattery (2004), actuaries have improved the quality of advice available to medical schemes, added value in the design and pricing of medical scheme products, risk identification and management for medical schemes, contributed to valuing post-retirement liabilities, and they have been involved in the design and pricing of the Risk equalisation Fund. The design of sustainable and affordable healthcare financing models remains a challenge for actuaries. According to the National Report of the Actuarial Society of South Africa (2002), for the International Congress of Actuaries 2002, “this makes healthcare financing one of the most exciting and most contentious of practice areas for actuaries at present”.

3.3.2 General insurance

In the general (non-life, or short-term) insurance industry in South Africa actuaries determine the appropriate amount of money to be held in reserves to meet future claims, sometimes many years in the future (Slattery, 2004), as well as set premium rates.
A survey conducted by PricewaterhouseCoopers (PwC, 2006) found that the number of people employed by short-term insurance companies is expected to grow by 21% from 2006 to 2009 (6.6% p.a.). Also, short-term companies believed that shortages existed for underwriting and actuarial skills. The underwriting shortage “continues to be pronounced and the actuarial skill score has increased since a similar survey conducted in 2004” (PWC, 2006).

3.3.3 Investments

Actuaries have traditionally played a role within the fund management functions of life offices or as investment consultants. Functions include advising on an appropriate investment strategy for insurers (or other institutions), taking into account the nature and term of its liabilities.

Recently, however, the number of actuaries working for fund management houses and investment banks in product design and risk management has increased and actuaries are now also involved in the areas of financial risk management, merchant banking and investment banking. Actuaries are involved in asset liability matching and derivative strategies, portfolio optimisation and the field of financial economics, managing investment managers, including manager selection and performance measurement, development of products for institutional and retail investors, risk management, including quantitative control techniques and index construction (Slattery, 2004, and The Actuarial Profession, 2005).

According to Mitchell (1999) derivatives management will play an increasing part in the future role of the actuary. “Actuaries are risk managers and they should also be expert on the practical side of the operation of futures exchanges, including identifying and quantifying risks arising from the purchasing and holding of derivative contracts.”

3.3.4 Banking

Banking activities in which actuaries are involved include profitability projections of lending products, pricing of products and services and designing new products. Mitchell (1999) states that the banking sector promises new opportunities for actuaries, particularly as banks extend their fund management activities and take the appearance of life offices.

Chamberlain (2007) states that there are various areas within banks where actuaries could be involved given their training, including:

- Treasury, i.e. within the investment decision-making process, design of the fund transfer pricing basis and asset-liability matching modelling;
- Credit e.g. as technicians with advanced statistical techniques to design credit-worthiness scorecards and derive probabilities of default; and
- Capital e.g. performing statistical calculations underlying advanced capital bases and modelling the capital impact of management decisions.

The requirement for banks (internationally) to adopt a strict regime of risk measurement and more advanced capital assessment under Basel II, creates a need for more sophisticated models for measuring risk, in order to fulfil ‘use test’
requirements, which creates opportunities for actuaries (Chamberlain, 2007). Franklin & Sherris (2007) state that banking risks and the requirements of Basel II will either result in the emergence of a new profession called quantitative risk analysts or be taken over by actuaries. Although banks’ major risks (credit risk, operational risks and liquidity risk) differ from those of insurance companies (market risk and insurance risk), and the time scales are significantly less, similar approaches may be applied. The areas of actuarial science and finance are converging and actuaries need to acquire finance knowledge.

3.4 Other factors influencing demand

3.4.1 Local education system

The Actuarial Society has recently embarked on a process of developing a local examination system. The purpose is to produce qualified actuaries in South Africa with knowledge of the South African financial environment. During 2008 and 2009 there will be a transition from the current system (where students mainly write UK exams through the Faculty of Actuaries and the Institute of Actuaries) with final implementation in 2010.

A local education system will require local actuaries to be involved in preparing (and maintaining) course material, providing tuition, setting and marking exams, and act as guinea pigs to sit the exams and give feedback to examiners, and this will therefore add to the workload of actuaries in South Africa.

3.4.2 Image of the profession

In 2005, the Society of Actuaries (US) found that “the current actuary ‘brand’ is a key barrier to greater opportunity”. There is a perception that actuaries are “too narrow, too technical and too weak in ‘business savvy’ competencies”. In order to improve the image of the profession, and therefore increase the demand for actuaries, it is necessary to better equip actuaries with additional skills known to be valued by employers (SOA, 2005).

Similar findings were reached by the UK Actuarial Profession (Strategy review, Discussion paper, published in September 2005):

“Customers, as represented by pension trustees and insurance non-executive directors, have a high degree of confidence in actuaries and view them as highly competent, but feel we live to too great an extent in an ‘Ivory Tower’ and need to interface better with the rest of the business community.”

Some of their criticisms are that actuaries have an insufficient understanding of the real world, lack business judgement, have inadequate communication skills, and have a tendency to act as judge and jury. In addition to the need to have much more business understanding and far stronger communication skills, they also need a better ability to work in multi-disciplinary teams.

The Society of Actuaries, in their Market Opportunity research conducted in 2002, found that employers perceive actuaries to demonstrate extraordinary intelligence and analytical thinking skills, perform statistical magic and provide “elegant analyses and
solutions to quantitative problems”. However, actuaries are perceived to fail at trying to translate those elegant, sophisticated solutions into either understandable presentations or practical solutions, and generally lack the creative business savvy skills today’s employers rate equally important to quantitative and risk management skills. Actuaries also demonstrate a deep understanding of one business discipline, risk management and insurance, but limited knowledge and ability when asked to apply their expertise in broader business disciplines (SOA, 2002).

According to Lyn, Palandra & Daykin (2002) actuaries fail to communicate well with non-actuaries. The key is to explain results in the context of assumptions adopted and to convey how sensitive the results are to the dynamics of the actuarial basis. The actuary also needs to explain what information the models are conveying, and the reasons for the recommendations, rather than expecting the client simply to trust the actuary to have drawn the appropriate conclusions. When actuaries can expand their image from one of providing relevant products and services and ensuring security of funds to that of generating wealth, the image would improve. Better communication of options and choice would lead to more trust in, and respect for, the actuary.

Lyn, Palandra & Daykin (2002) furthermore state: “A full appreciation of the profession does not exist in the business community either.” Actuaries are viewed by many merely as ‘number-crunchers’. They are recognised for their technical strengths, but their abilities are viewed by many as narrow in scope. The perception that actuaries cannot provide business solutions stunts the growth of the profession and limits the opportunities for actuaries.

At the 27th International Congress of Actuaries in 2002, Patricia Guinn stated that one of the main challenges facing actuaries is the broadening of business and communication skills, and raising public awareness of the role and value of actuaries. In order to ensure future growth of the profession, actuaries will need to become strategists and advisors, based on a good understanding of clients’ business and financial models. They should also develop their project management skills, working in multi-cultural teams (Guinn, 2002).

3.4.3 Competition and demand from other professions

“When actuaries are recognized as one of the pre-eminent professionals in Enterprise Risk Management (ERM), they will serve in large numbers throughout traditional areas of practice and in responsible positions in the broader financial services arena.”

Society of Actuaries, 2005

Competition from other professions will increase in areas where actuaries can and do provide services. The areas of actuarial science and finance are converging and if actuaries are to seize the opportunities arising from these developments, they need to ensure their knowledge and skills include the appropriate finance knowledge. Two examples are in the area of enterprise risk management, and the area of insurance securitisation. Competition will come from other professions such as financial risk managers, financial engineers, chartered financial analysts and statisticians (CRUSAP, 2006).
Actuarial skills may also become useful in traditional financial fields, particularly with regard to estimating risk and the financial premiums required to justify risk, e.g. in the sub-prime market and in the markets for some of the derivatives developed in recent years.

### 3.4.4 Demand from international markets

According to the South African Department of Labour (2003):

> “International demand for key professionals is placing greater pressure on the local labour market. Thus, local employers are competing with both domestic and international employers for skilled labour.”

The huge increase in demand worldwide, especially from developing markets such as China and India, are also creating opportunities for South African actuaries. It is expected that China and India’s huge economies and population sizes, and rapid industrialisation and globalisation, will result in significant development of the insurance markets. In addition, “liberalisation and deregulation are rendering these de-monopolised markets more accessible and attractive to foreign insurers” (Swiss Re, 2004). With increasing global connectivity of markets, actuarial resources are also becoming more mobile.
4. RESEARCH AMONG ACTUARIAL EMPLOYERS IN SOUTH AFRICA

The actuarial employment market in South Africa has changed significantly in the last few years. An analysis was done of members of the UK Actuarial Profession with employer addresses in South Africa, in 1996 compared to 2007. It became apparent that there was a significantly wider range of employers in 2007 compared to 1996, and the actuarial employment market was significantly less concentrated within a few large companies.

In 1996, 32 companies were identified, 8 of which employed 20 or more actuarial resources. In 2007, the number of companies increased to 107, 10 of which employed 20 or more actuarial resources. (Note that, in both years, around a third of members with South African addresses chose to have their residential address rather than employer address in the membership handbook and these were excluded from the analysis.) The companies employing 20 or more actuarial resources in 1996 employed 55% of total actuarial resources in South Africa (including those for which the employer is unknown), while in 2007, this reduced to 32%. A large number of employers in 2007, who did not exist or employ actuarial resources in 1996, are small consultancies and asset management companies, employing only a handful of actuarial staff each in 2007.

In 1996, the market was much more dominated by a small number of large companies. Large employers such as Southern Life Association, Fedlife, Sage Life and Norwich Life have ‘disappeared’ (refer to section 3.2.4.4 on Consolidation and rationalisation) and employment of actuarial resources by the companies who took them over did not show corresponding increases. In 2007 a significantly higher number of actuaries worked for asset managers, short-term insurance companies or small consultancies, compared to 1996. The number of actuaries employed in these fields per company is relatively small, though.

A questionnaire was sent to a number of employers of actuarial resources in South Africa during October 2007 in order to establish:

- historical actuarial employment growth in different fields, including how the demographics of employed actuarial resources have changed over recent years; and
- what employers’ expectations were regarding their future demand for actuarial resources.

The results of the questionnaire are summarised below.

4.1 Demographics

4.1.1 General

Nine companies responded, employing almost 40% of actuarial resources in South Africa. Respondents consisted of five large life insurance companies, a re-insurer and three consulting firms. About 88% of actuarial resources covered in the study were employed by life insurance companies. The results are therefore more typical of large,
long-term insurance companies and not likely to be representative of the actuarial employment market as a whole.

4.1.2 Split between students and qualified actuaries

Actuarial resources employed by respondents consisted of 56% students and 44% qualified actuaries. However, the split between students and qualified actuaries differed significantly amongst respondents. Differences were consistent over years. For example, where a company tended to a have a significantly higher proportion of qualified actuaries compared to students, this was consistent over several years, which indicates that a high proportion of qualified actuaries relative to students cannot be solely attributed to successful pass rates in more recent years. This is covered in more detail in section 4.1.6.

Both the number of qualified actuaries and students employed increased by an average of 9% p.a. from 2002 to 2007.

4.1.3 Split between males and females

The split between male and female students and qualified actuaries employed by respondents is shown in the figure below.

*Figure 11: Split between male and female students and qualified actuaries*

A higher proportion of employed students are female (30%) compared to the proportion of female qualified actuaries (17%).

4.1.4 Split between racial groups

The split of students between different racial groups, and the change over the last ten years, is shown in the figure below. A detailed split into these separate racial groups
was available for 81% of total students employed by all respondents. Only these are shown below.

**Figure 12: Split of students between racial groups**

Among students, representation by blacks (Black African, Indian and Coloured) has changed from 6% in 1997 to 44% in 2007.

Transformation progress has been slower among qualified actuaries, with currently just more than 7% of qualified actuaries being black, as can be seen in the following figure.

**Figure 13: Split of qualified actuaries between racial groups**
Overall (for students and qualified actuaries combined), 26% of actuarial resources currently employed by the respondents are black compared to 5% ten years ago.

### 4.1.5 Split between practice areas

The split of students and qualified actuaries between practice areas were as follows:

*Table 3: Split of students and qualified actuaries between practice areas*

<table>
<thead>
<tr>
<th></th>
<th>Life</th>
<th>Pensions</th>
<th>Short-term insurance</th>
<th>Health</th>
<th>Investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>69%</td>
<td>23%</td>
<td>1%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Qualified actuaries</td>
<td>65%</td>
<td>18%</td>
<td>1%</td>
<td>3%</td>
<td>12%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>67%</td>
<td>21%</td>
<td>1%</td>
<td>3%</td>
<td>8%</td>
</tr>
</tbody>
</table>

### 4.1.6 Split between experience levels

The split of actuarial resources between different experience levels is shown below.

*Figure 14: Split of actuarial resources between experience levels*

The biggest employed group is actuarial students with one to five years of experience (24%), followed by recently qualified actuaries (21%) and actuarial students with more than five years of experience (19%). Graduates are defined as students in their first year of work after completing their degrees.

The following figure shows how employment of actuarial resources with different experience levels varied between respondents.
Figure 15: Split of actuarial resources between experience levels – comparison of respondents

The split between qualified actuaries compared to students varied significantly between companies. This was the case both for life insurance companies and for consultancies.

4.1.7 Split between practice areas and experience levels

The figure below shows the split between experience levels by practice area.
From the analyses it is evident that:

- The split of employment between students and qualified actuaries is slightly biased towards students for both life (57% are students) and pensions (61% are students).

- Employment in pensions has shown a decreasing trend in terms of the proportion of total employment over the last five years, from 29% to 21%. Note, however, that the sample is biased towards life insurance companies.

- Employment in life insurance as a percentage of total employment has remained fairly flat at 67% over the five years from 2002 to 2007.

- There is a trend of increasing employment of both students and qualified actuaries in investments by the big life insurance companies. Employment in investments as a percentage of total actuarial employment by respondents has increased from 3% to 8% over the five years from 2002 to 2007. Employers are more likely to employ qualified actuaries in investments than students. The average split of actuarial resources employed in investments between students and qualified actuaries is 26% to 74%.

- The opposite is true of employment in healthcare, where the split of resources between students and qualified actuaries is 75% to 25%. Note, however, that this is not representative of healthcare employment by non-life insurance companies.
Consultancies, rather than life insurance companies (with the exception of one respondent) employ actuarial resources in the short-term insurance field. The sample is, however, very small.

4.1.8 Vacancies

The vacancy rate reported (at around the end of 2007) was around 10% - in other words, the number of positions to be filled represented around 10% of the total number of actuarial resources employed. While the sample is small, it gives some indication of the shortage. The biggest demand was for graduates, followed by qualified actuaries with five to ten years post-qualification experience.

Judging from the significant number of advertisements for actuarial jobs during the course of 2008, the current shortage is likely to be even higher.

4.1.9 Reasons for leaving

Of all actuarial resources who left employment during 2006 and 2007, 43% were White, 24% were Black African, 21% Indian and 12% Coloured.

The turnover rate (number who left as a percentage of number employed) is significantly higher for Black Africans, Coloureds and Indians (at around 25%), compared to 7% for Whites.

The following figure shows how the reasons for leaving employment (according to the employers surveyed) differed for actuarial resources of different racial groups.

*Figure 17: Proportion of actuarial resources leaving employment by reason for leaving – comparison of different racial groups*
Overall, emigration was the main reason stated for leaving employment (31% of actuarial resources leaving). This varied according to race and was most significant for White actuarial resources with 41% leaving employment to emigrate. The main reason for Black African, Coloured and Indian actuarial resources leaving employment was better remuneration (26% in each case), followed by emigration (26%, 16% and 24% respectively). Stated differently, of the actuarial resources who left employment as a result of emigration, 58% were White, 20% were Black African, 16% were Indian and 6% Coloured. ‘Other’ reasons include ‘personal reasons’, ‘family’ and ‘becoming a full-time student’.

The fact that a large proportion of Black African, Coloured and Indian actuarial resources leave for better remuneration may be the result of competition between companies for the limited supply of ‘affirmative action’ candidates.

4.2 Expectations regarding future growth in demand

4.2.1 General

Employers were asked how much they expected future demand for actuarial resources to grow. Six of the eight employers said they expected overall growth in demand for actuarial resources to be in the region of 5% to 10% p.a. and two expected growth of less than 5% p.a. The expectations for growth in life insurance were the same as for growth overall, probably because employers largely represented the life insurance industry. Expectations regarding growth in employment in pensions, health insurance, short-term insurance and investments were very diverse and the samples are too small to derive meaningful conclusions.

The weighted average expected growth (weighted by the current number of actuarial resources employed by respondents) ranged from 3,4% p.a. and 8,4% p.a. overall, with a mid-point of 5,9% p.a.

It should be noted that the questionnaires were completed at around the end of 2007. Shortly afterwards, economies worldwide took a downturn, resulting from the credit crisis in the US. In South Africa, events such as rising inflation, interest rate hikes, problems at Eskom, Xenophobia violence etc. all harmed confidence levels and stability in the economy. Judged from the high number of actuarial job advertisements sent out during the first half of 2008, the turnover rate seems to have increased. It is possible that the supply of actuarial resources dropped as a result of increased levels of emigration and as a result, demand increased relative to supply.

4.2.2 Growth in demand for different population groups

The table below shows the number of companies per expected growth range for different population groups.
Table 4: Number of companies by expected growth in demand range for different population groups

<table>
<thead>
<tr>
<th></th>
<th>Decrease</th>
<th>Increase by less than 5% p.a.</th>
<th>Increase by 5% to 10% p.a.</th>
<th>Increase by more than 10% p.a.</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black African</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Coloured</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Indian</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>White</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

The demand for Black African actuarial resources is expected to grow much more than for other population groups. The demand for White actuarial resources is expected to grow the least or to decrease. Again, this is probably driven by employment equity targets and companies’ desire to progress with transformation.

The figure below shows how the ranges of weighted average growth expectations differed between population groups.

Figure 18: Ranges of expected growth rates for different racial groups

Employers expect significantly higher growth rates in the demand for Black African actuarial resources compared to actuarial resources from other population groups. Expected growth in demand is lowest for White actuarial resources.
4.2.3 Growth in demand for different genders

The table below shows how growth expectations differed for male and female actuarial resources.

*Table 5: Number of companies by expected growth in demand for different gender groups*

<table>
<thead>
<tr>
<th></th>
<th>Decrease</th>
<th>Increase by less than 5% p.a.</th>
<th>Increase by 5% to 10% p.a.</th>
<th>Increase by more than 10% p.a.</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Female</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

The expected growth in demand for female actuarial resources tends to be slightly higher than for males (1% p.a. vs 0.3% p.a. on average), probably also driven by the fact that females count towards employment equity targets in the Financial Sector Charter.

4.2.4 Growth in demand for different practice areas

The table below shows how growth expectations differed for actuarial resources working in different practice areas.

*Table 6: Growth in demand for different practice areas*

<table>
<thead>
<tr>
<th></th>
<th>Decrease</th>
<th>Increase by less than 5% p.a.</th>
<th>Increase by 5 to 10% p.a.</th>
<th>Increase by more than 10% p.a.</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life</td>
<td>-</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Pensions</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Short-term</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Health</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Investments</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

- Most companies expect growth in demand in Life insurance and Investments of 5% p.a. or more.
- An equal number of companies expect a decrease or increase in employment in the Pensions area.
- Higher growth rates are expected in demand for actuarial resources in the short-term field.
- The views on employment in Health are less uniform.
5. MODEL FOR PROJECTING FUTURE ACTUARIAL DEMAND

5.1 Description of the model

For the purposes of projecting future demand for actuarial resources in South Africa, it has been assumed that demand will increase with:

- growth in real GDP, adjusted for growth in the Human Development Index (HDI) (referred to as ‘economic factors’); plus
- additional actuarial work volume resulting from the change in the environment in which actuaries work (such as new regulations, changes in accounting standards etc), and from increased demand in wider fields (referred to as ‘environment factors’).

GDP is a measure of the size of the economy and has been discussed in section 3.1. As the size of the economy increases, the demand for products and services that rely on actuarial expertise increases.

The human development index (HDI) is a measure of economic and socio-economic conditions in a country. It is an aggregate index combining indicators of health (life expectancy at birth), wealth or standard of living (GDP per capita, expressed in purchasing power parity) and knowledge (literacy and education). A positive correlation between these factors and the demand for actuarial resources seems likely. For example, the more educated and wealthier the population, the greater the demand for insurance and wealth management products, and therefore the higher the demand for products and services offered by actuaries.

As indicated in section 3.1.3, demand for qualified actuaries in South Africa relative to GDP adjusted for the HDI seems to be roughly in line with the weighted average of GDP adjusted for corresponding HDI of the US, UK, Canada and Australia.

An assumption underlying the model is that, ignoring factors relating to the actuarial work environment, the number of actuarial resources in South Africa as a percentage of GDP (in ZAR at constant 2000 prices), adjusted for HDI, will remain constant. Furthermore, additional demand will result from changes in the environment (and expansion into wider fields), independently from the economic factors. The growth rates have been calculated for total actuarial resources i.e. including both qualified actuaries and actuarial students. It has also been assumed that economic and socio-economic conditions (represented by GDP adjusted for HDI), and environment factors (including expansion into wider fields) explain total growth in actuarial demand in South Africa, and that there are no other factors impacting this demand.

Total growth in actuarial demand has been calculated as follows:

\[
\text{Total growth} = \left(1 + \text{change in GDP}\right) \times \left(1 + \text{change in HDI}\right) - 1 + \text{Increased work volume due to changes in environment}
\]
Over the last ten years or so, actuarial demand has grown by approximately 9% p.a. This is partly a function of real growth in GDP (approximately 3.4% p.a.) and growth in the HDI (negative 1% p.a.), and partly due to additional growth of the financial services industry relative to the total economy (approximately 1.4% p.a.). The balance of just over 5% p.a. can be ascribed to a combination of the additional demands on actuarial resources resulting from the change in environment (such as increased regulatory and accounting requirements), and an increased demand for actuarial services in wider fields.

The following figure illustrates how annual growth in membership of the Actuarial Society of South Africa (as a proxy for demand) has changed as a result of ‘economic’ factors and ‘environment’ factors. It has been assumed that 15% of these members work outside of South Africa (in accordance with information received from the Actuarial Society of South Africa), and that the balance of supply is a realistic proxy for demand in this case.

*Figure 19: Annual growth in actuarial resources working in South Africa explained by economic factors and environment changes*

After 2000, real GDP growth resulted in a higher proportion of total actuarial demand growth, despite the reduction in the HDI (from 0.707 in 2000 to 0.674 in 2005).

Growth in demand due to environment factors was highest during the period from 1996 to 2000, probably reflecting expansion into wider fields.

Since 2000 the proportion of actuarial demand growth explained by economic factors has gradually increased while the proportion explained by environment factors has decreased.
For the purpose of Figure 19, growth in demand due to economic factors was calculated as:

\[
\frac{(GDP \text{ in year } t \times HDI \text{ in year } t)}{(GDP \text{ in year } t-1 \times HDI \text{ in year } t-1)}^{\frac{1}{\text{number of years}}}-1
\]

Total growth in actuarial demand is calculated as:

\[
\frac{(\text{Actuarial demand in year } t \div \text{Actuarial demand in year } t-1)}{\text{number of years}}-1
\]

(Actuarial demand in this case is taken as total membership of the Actuarial Society of South Africa, excluding the 15% that is assumed to work overseas.)

Growth in demand due to environment factors is calculated as:

Total growth in actuarial demand (1) - growth in demand due to economic factors (2)

The data used in these calculations is set out in the following table:

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP (R million) at constant 2000 prices</th>
<th>HDI</th>
<th>Growth in demand due to economic factors</th>
<th>Actuarial demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>711 668</td>
<td>0,731</td>
<td>2,9%</td>
<td>539</td>
</tr>
<tr>
<td>1995</td>
<td>803 710</td>
<td>0,745</td>
<td>1,7%</td>
<td>662</td>
</tr>
<tr>
<td>2000</td>
<td>922 148</td>
<td>0,707</td>
<td>2,9%</td>
<td>1 046</td>
</tr>
<tr>
<td>2005</td>
<td>1 115 817</td>
<td>0,674</td>
<td>5,0%</td>
<td>1 547</td>
</tr>
<tr>
<td>2006</td>
<td>1 171 366</td>
<td>0,674</td>
<td>4,9%</td>
<td>1 678</td>
</tr>
<tr>
<td>2007</td>
<td>1 228 763</td>
<td>0,674</td>
<td></td>
<td>1 809</td>
</tr>
</tbody>
</table>

Source: Statistics South Africa (2007), Wikipedia and Actuarial Society of South Africa

5.2 Assumptions regarding future experience

5.2.1 GDP growth

With regard to GDP, the 2007 National Treasury Budget projected a positive economic outlook with real economic growth projected to average approximately 5% p.a. over the medium term to 2010 (South African Reserve Bank, 2007). The forecast for economic growth for 2008 was revised downwards in March 2008 to 4% following a revision on the basis of the problems with energy supply and the downturn in the global economy. In his 2008 Budget Speech, the minister of Finance, Trevor Manual, stated that while the South African economy has grown at an average rate of 5,1% over the past four years, future GDP growth is expected to average 4,3% p.a. over the medium term. In July 2008, the minister was still confident that the economy could grow by 4% in the calendar year 2008. Expected growth rates for the next few years are 4% for 2008, 4,2% for 2009 and 4,6% for 2010. These estimates
were used for the base case scenario. It was furthermore assumed that the economy will grow at an average rate of 5% p.a. from 2010 to 2020.

As a pessimistic scenario, it has been assumed that the skills crisis worsens (e.g. as a result of increased emigration), that the impact of infrastructure shortages is worse than expected, that foreign investment declines etc. Minister Manual listed these as some of the binding constraints on faster growth. GDP growth of 4% was assumed for 2008, declining to 3.5% and 3% respectively for 2009 and 2010 and to 2% p.a. there-after.

As an optimistic scenario, it has been assumed that the government succeeds in attracting and retaining skilled workers, that education improves substantially in the next few years and that foreign investors flock to South Africa. Under this scenario, it was assumed that the economy will grow at 4% in 2008, 5% in 2009, 6% in 2010 and at 7% p.a. there-after.

5.2.2 Change in HDI

Hughes (2004) has developed a model that produces forecasts for the HDI based on future values for the underlying components of the HDI. Forecasts were done for a base case scenario, as well as for pessimistic and optimistic scenarios. The pessimistic scenario was based on a failure to control HIV and AIDS while the optimistic scenario (‘sustainable development’) assumed increased emphasis on health and education and positive connections to the world economy.

The following figure shows the actual HDI for South Africa since 1980, as well as projected HDIs under the three scenarios. It was assumed that the same trends forecast by Hughes for Sub-Saharan Africa HDI applies to South African HDI.

---

19 Fin24, 2008, Manuel confident of 4% growth
Figure 21: Actual and projected HDI for South Africa under three scenarios

Under the base case scenario, the HDI is expected to improve from 0.674 in 2005 to 0.845 in 2030, while the improvement is expected to be to 0.729 only under the ‘HIV failure’ scenario. Under the ‘sustainability’ scenario, the HDI is projected to improve to 0.912, closer to current HDIs of developed countries.

5.2.3 Change in actuarial work environment

Growth in actuarial demand resulting from changes to regulations, capital and solvency requirements, accounting standards, consumerism, technology etc. is the most difficult to predict. The past is not necessarily a good predictor of the future in this case. At best, certain trends could be extrapolated, although it is not always clear what would be an appropriate period of extrapolation. This assumption is therefore quite subjective.

The survey of South African actuarial employers has shown that employers expect an average growth in demand of between 3.4% p.a. and 8.4% p.a. (average of 5.9% p.a.). It has been assumed that this expectation relates to non-economic factors and this result has therefore been used for the ‘environment’ factor assumption.

Under the base case scenario, it has been assumed that more actuarial work will result from changes in international accounting standards and capital quantification requirements. Actuarial resources will continue to move into wider fields such as investments and general insurance. Demand resulting from the change in environment and move into wider fields will grow at 5.9% p.a. It has been assumed that demand from environmental factors will grow at 3.4% p.a. under the pessimistic scenario, and at 8.4% p.a. under the optimistic scenario. For all three scenarios it has been assumed that this growth will gradually taper down from 2012 to 2020 to half the assumed rate in 2012.
5.3 Projected actuarial demand

Projected growth rates in actuarial demand under the three scenarios are as follows:

*Figure 22: Projected growth in actuarial demand in South Africa under three scenarios*

Under the base case scenario, overall actuarial demand in South Africa is expected to grow at between 10% and 12% p.a. in the next twelve years. Under the pessimistic scenario, growth of 7% p.a. is expected in the next two years, reducing to 6% p.a. for the next four years and 5% p.a. to 2017. Under the optimistic scenario, growth rates of 14% to 15%pa. are expected for the next seven years, reducing gradually to 10% p.a. by 2019.

Total projected growth in demand is split as follows between economic and environmental factors:

**Growth due to economic factors**

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case</td>
<td>4.3%</td>
<td>4.5%</td>
<td>4.9%</td>
<td>6.4%</td>
<td>6.4%</td>
<td>6.4%</td>
<td>6.4%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Pessimistic</td>
<td>4.0%</td>
<td>3.5%</td>
<td>3.0%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Optimistic</td>
<td>4.5%</td>
<td>4.7%</td>
<td>5.1%</td>
<td>6.8%</td>
<td>6.8%</td>
<td>6.8%</td>
<td>6.8%</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

**Growth due to environment factors**

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.4%</td>
<td>5.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Pessimistic</td>
<td>3.4%</td>
<td>3.4%</td>
<td>3.4%</td>
<td>3.4%</td>
<td>3.4%</td>
<td>3.1%</td>
<td>2.9%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Optimistic</td>
<td>8.4%</td>
<td>8.4%</td>
<td>8.4%</td>
<td>8.4%</td>
<td>8.4%</td>
<td>7.7%</td>
<td>7.1%</td>
<td>6.5%</td>
</tr>
</tbody>
</table>
Total growth in actuarial demand

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case</td>
<td>10,2%</td>
<td>10,4%</td>
<td>10,8%</td>
<td>12,3%</td>
<td>12,3%</td>
<td>11,8%</td>
<td>11,3%</td>
<td>10,9%</td>
</tr>
<tr>
<td>Pessimistic</td>
<td>7,4%</td>
<td>6,9%</td>
<td>6,4%</td>
<td>5,8%</td>
<td>5,8%</td>
<td>5,5%</td>
<td>5,2%</td>
<td>5,0%</td>
</tr>
<tr>
<td>Optimistic</td>
<td>12,9%</td>
<td>13,1%</td>
<td>13,5%</td>
<td>15,2%</td>
<td>15,2%</td>
<td>14,5%</td>
<td>13,9%</td>
<td>13,2%</td>
</tr>
</tbody>
</table>

In terms of absolute numbers, projected actuarial demand numbers are as follows under the three scenarios:

*Figure 23: Projected actuarial demand in South Africa under three scenarios*

It is projected that there will be a demand for between 2 200 and 2 600 actuarial resources in 2010, growing to between almost 2 900 and 5 200 in 2015.
6. CONCLUSION

South Africa has a well-developed and globally competitive financial sector, which has grown significantly over the last few decades, resulting in high growth in actuarial demand. However, this sector serves a relatively small portion of the population – the educated and relatively wealthy. There is huge room for improving the quality and level of education of the population, which will positively impact economic growth and reduce socio-economic problems via a reduction in the levels of unemployment, alleviation of the skills crisis, reduction in income inequality and improving wealth of the population as a whole. These should, in turn, result in reduced crime levels and lower levels of emigration of skilled workers, all of which will positively impact economic growth and demand for actuarial services. Actuarial demand resulting from economic and socio-economic factors is expected to grow at around 4% p.a. initially, with the growth rate increasing to around 6.5% p.a. in the next five years.

In the short term, a higher demand will result from changes in international accounting standards and capital quantification requirements. Actuarial resources will continue to move into wider fields such as investments and general insurance. In addition, the development of a local education system will add further demand on actuaries to prepare material, and set and mark exams. Demand resulting from the change in environment and continued expansion of actuaries’ role into wider fields is expected to grow at around 6% p.a. in the next five years. This has been assumed to gradually reduce to around 3% p.a. by 2020.

The demography of actuarial resources in South Africa, both in terms of race and gender, is not representative of that of the overall population. The proportion of qualified actuaries who are Black African is significantly below that of the general population. As a result, there is currently a significant demand for especially Black African qualified actuaries. While the proportion of students who are Black African has risen significantly, it is still below that required to reflect population demographics.
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