RISK SHARING FOR MORTGAGE FINANCE THROUGH DEFAULT INSURANCE FOR LOW-INCOME HOUSEHOLDS IN SOUTH AFRICA.

By

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Submitted in fulfilment of the requirements for the

Degree

Magister Commercii (Financial Management)

In the

Faculty of Economic and Management Sciences

At the

University of Pretoria

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04 May 2015
Pretoria

Abstract

The study explores the business of mortgage default insurance for residential property finance as a potential innovation in the South African housing finance system. The commercial viability (in terms of post-tax earnings) of such an insurance programme, as targeted at the low-income households, is investigated, with a focus on the so-called gap market in the country's housing market ladder.

One highlight of the study is the difficulty of determining an appropriate price for the premium, given no prior historical record of default behaviour in the target market. This leads to a less than ideal resort to a claims pattern (and earnings pattern) from a mature and yet arguably different market in Canada. These so-called international patterns of default behaviour, although perhaps not representative of the local South African situation, have been used in successful first-time MI implementation elsewhere in emerging economies.

The study finds in favour of a profitable, sustainable programme under assumed economic conditions of relatively high mortgage interest rates of 13% pa and higher. Premium under-pricing, however, appears to occur at mortgage rates of 10% pa and lower, rendering the business unworkable over a 9-year forecast period, with persistent annual reported negative earnings for the period.

Keywords

South Africa; residential mortgage finance; default risk; default insurance; gap market; premium price.

Acknowledgements

A sincere word of thanks extends to the following people, for all their varied and invaluable contributions to the completion of this study:

- Professor Daan Gouws, for his seasoned guidance as my supervisor, and his enduring patience;
- My Head of Department, Professor Henco van Schalkwylk, for his untiring encouragement and generous provision of much needed facilities;
- My dear friend, Dr Fraser McNeill, in the Department of Anthropology, for his help in ways academic, social, and otherwise! The debt is eternal!;
- Hilary, for holding off the birth of my dear Liam until the end of the paper, and for her subsequent perseverance through the revisions! Your support was incalculable;
- Siyabonga Gcezengana, of the Johannesburg Securities Exchange, for making completion of this study possible at all!

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CHAPTER 1: INTRODUCTION

Preamble

This study owes its origin to the following pronouncements by the then (May 2010) Minister of Human Settlements in South Africa, Tokyo Sexwale MP, on the issue of access to housing finance by some income groups in the country, collectively labelled the "gap market". In his Budget Vote address to the National Assembly, Cape Town, the minister mentioned a number of issues bearing direct relevance to this study, perhaps the most important of which were the introduction of a guarantee fund and an indication of the intended beneficiaries (Sexwale, 2010):

> "In our recent meeting with all major financial institutions of our country, we have assured them of our commitment to strengthening our own disclosure office and … to examine and, where possible, to ease any onerous reporting procedures without diminishing their compliance in respect of the Act. Secondly, we have a role to play to assist people who *don't* [sic] *qualify for either bank credit or government Reconstruction and Development Programme (RDP) subsidies. This is the so-called gap market.* We have heard their concerns. Consequently, the President announced in his State of the Nation address *the creation of a R1-billion Guarantee Fund* aimed at providing support for people within this market" (own emphasis).

Earlier in that year, on 11 February, President Zuma had announced the setting up of the guarantee fund (Zuma, 2010) as an incentive to the private banking sector to develop suitable products to tackle the housing shortage. One such product, residential mortgage default insurance (MI for short), is the subject of this study. Pulling together the various elements requisite for an MI programme in the context of an emerging economy such as South Africa, the study represents an intelligent speculation about the feasibility (or otherwise) of such a product in the country, with a view to applying it to the gap market issue.

1.1 Background

A concern in the South African housing market is the existence of a "gap" in the housing finance ladder, consisting of households earning above the state subsidy ceiling and at once unable to access mortgage finance. This segment of the population has various labels in housing finance circles in the country – the housing market gap, the housing finance gap, the credit gap, or the gap

market. Throughout this work, "gap market" will be used to refer to this household segment, in line with the minister's choice in the preamble above.

Each of these households, in joint income terms, do not quite satisfy the normal, mainstream bank mortgage lending criteria, and, where they do, the amount for which they qualify turns out insufficient for available market stock. In the budget vote speech referred to in the preceding section, the minister mentioned nurses, teachers, the police, prison warders, and certain blue collar factory and office workers as falling in this category (Sexwale, 2010). It is an interesting question why individuals in arguably stable occupations such as teachers, nurses, and military personnel do not live in formal dwellings. Rust (2006:16) asks why they would make such a choice. Venter (2009:7), on the other hand, ponders why, given that a significant percentage of the "bondable" housing backlog in South Africa comprises households in the monthly income bracket R3 501 – R12 000, the private sector has not sought to exploit this market.

The size of the gap market, in terms of household numbers, is of particular relevance to this study, not only as an indication of the extent of the shortage (or demand), but also because policy volumes are a critical driver of success in an MI programme, as will be discussed more fully in later sections. Statistics South Africa (Stats SA) has been conducting a general household survey annually since 2002. At the time of writing, the surveys relating to the years 2010 and 2011 are available in the form of Statistical Release P0318. The national population figures in these reports indicate aggregate figures of 49.9 million and 50.3 million individuals for the years 2010 and 2011 respectively. The respective figures for the number of households are reported as 14.3 million and 14.8 million, yielding an average individuals per household figure of about 3.5 in 2010 and 3.4 in 2011 (Stats SA, 2010:6-7; 2011:5). Combining these averages with the figure of some 2.6 million individuals mentioned by several authors (Moss, 2009:50; Rust, 2006:12; Venter, 2009:7) as making up the gap market, one arrives at an estimate of some 750 000 households.

For perspective, it needs to be noted that, of the approximately 50 million people in the country at the time of this study (as reported in the two Stats SA surveys in the preceding paragraph), some 13% are indicated as living in informal dwellings. The survey defines an informal dwelling as a makeshift structure not erected according to an approved architectural plan (Stats SA, 2011:51). By simple computation, the suggestion therefore is that the gap market of 750 000 households

represents around 40% of those in informal dwellings. Furthermore, as noted by Melzer (2005:32), because one half of the country's population is under the age of 25 years, and only about 11% over the age of 55 years, it may be expected that household formation will be faster than dissolution. This could result in an expanding gap market, unless counter measures are put in place to address the rising demand for housing in this particular market segment.

MI is a form of credit insurance that protects mortgage lenders (not borrowers) from losses arising from default by borrowers. The basic (and original) term "mortgage insurance", and hence the abbreviation, has led to some confusion in the past, when borrowers (who pay the premium) believed they had some right to benefit upon default (Blood, 2009b:27). This is not the case; MI is a two-party agreement between the lender and the insurance provider. The borrower does not feature in this agreement, and benefits only to the extent that access to finance is expedited through the operation of MI at loan origination.

Put differently, the borrower derives benefit from MI in the form of access to a higher risk loan, requiring less down payment than would otherwise be the case had the lender not been MI protected. To avoid this confusion, some countries have opted to modify the name to "lenders' mortgage insurance" (LMI). The name "mortgage indemnity guarantee", or MIG, is used elsewhere, as, for example, in the United Kingdom (UK). Although still a consideration in South Africa (National Housing Finance Corporation (NHFC), 2014:13), the preferred name locally seems to be "mortgage default insurance", or MDI. This study will avoid any further confusion by using the original term MI.

The idea of MI is not new to the world. Having emerged in the United States of America (USA) in the early 1900s, Joyce and Molesky (2009:32) maintain that MI has led to thriving housing finance markets in as diverse countries as Canada, Israel, Ireland, Italy, Mexico, and Ireland. Blood (2009b:20, 23) notes that MI has been implemented successfully in over 32 countries worldwide. This worldwide acceptance is due to a number of features of MI that set it apart from other insurance products. MI transfers default risk outside the lending (mostly banking in SA) sector, to one or more entities specialised to deal therewith, and solely in existence for the purpose. Consequently, lenders are able to accept lower down payment loans (i.e., higher risk), thus expanding their loan origination envelope to include a larger population segment beyond only

those who have accumulated significant down payments. Furthermore, in times when foreclosures rise, as in economic downturns, MI helps to restore equilibrium between supply and demand, by promoting entry to the market by first time homeowners.

MI can be sponsored privately, or by government. However, the long term nature of, and size of the risk in terms of the initial investment required at inception, are such that one finds private MI entities only in countries with relatively highly developed housing finance systems. As observed by Blood (2009b:20), nearly two-thirds of currently operating MI programmes around the world is government sponsored. This is especially true for emerging market countries, and the case being made for South Africa in this study is thus for an entity initially publicly capitalised.

The respective roles of the various stakeholders will be incorporated. Public sponsorship of such a programme in South Africa will mean involvement of the fiscus, through the National Treasury. Although MI would be a new phenomenon on the national landscape, as an insurance business it would be subject to regulatory approval and oversight by the Financial Services Board (FSB), as is the norm with the rest of the insurance industry. The primary mortgage lenders, i.e., the banks, are themselves a natural (and necessary) ingredient, and their involvement will mean that their regulator, the South African Reserve Bank (SARB), will be a stakeholder too.

Set in the wake of the pronouncement of the R1 billion-guarantee fund mentioned in the preamble, this study proposes a framework under which such an MI programme might operate, incorporating all identifiable stakeholders in the business, including those mentioned in the preceding paragraph. Beginning in the last quarter of 2011, the study sets up a hypothetical MI company whose financial performance is assessed through the use of pro forma financial statements from that date (1 October 2011), for a period of nine years and a quarter, ending 31 December 2020. It is important that the reader note this timing point of reference: the hypothetical company is assumed to commence operations on 1 October 2011. Thus, all assumptions are based on economic conditions prevalent at that time, and projections into what would then have been the future.

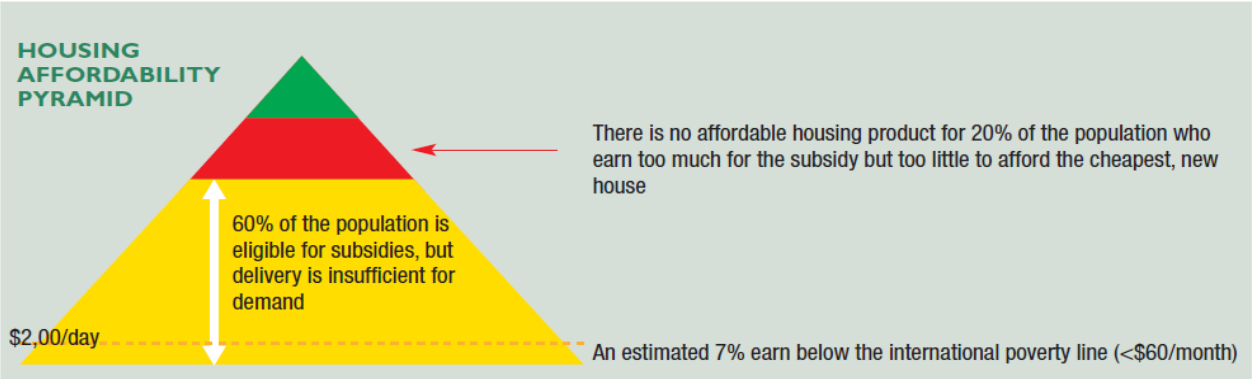
1.2 Problem statement

Since 1994, various housing policy efforts have been made in South Africa to deal with the problem of adequate housing for low-income households. For those deemed the poorest in the

land, state assistance has been provided in the form of the government's Capital Subsidy Scheme (as part of the Reconstruction and Development Programme (RDP)). At the other end of the income spectrum, a mature mortgage finance market exists, and qualifying households are able to acquire residential property through mortgage bonds from the lending institutions in the country.

There exists, however, a household segment in between, comprising those whose joint income levels disqualify them from both state subsidies and private mortgage finance. The question being asked in this study is, given this unique position of earning "too high and too low" at once, is there a commercially viable way to leverage these households' incomes sufficiently to enable them to obtain home ownership through long-term mortgage finance, without coercing lenders into excessive risk taking? Could the lending institutions be provided with enough of an incentive to extend credit to these households without compromising loan-originating standards beyond commercial reason? Is MI a workable innovation in relation to the guarantee fund set aside by the president?

Figure 1.1: The South African gap market



Source: Kihato, 2010:50

Figure 1.1 above is a depiction of the situation of the gap market in the housing finance pyramid in the country. Taken from the 2010 yearbook of the Centre for Affordable Housing Finance in Africa (CAHF), it quantifies the gap market as 20% of the population, a questionable figure, in light of survey data from a general household survey of that year by Stats SA. The survey estimates the total informal settlements population (of which the gap market is but a part) at 13% of the national total for the year 2010, and 12% for the following year (Stats SA, 2010:22; 2011:22). The gap market cannot be bigger than the population segment of which it forms a part. In the rhetoric

of housing finance circles, one comes across inconsistent figures such as these, pointing to a need for scrutiny and caution regarding the accuracy of the size of the gap market. The significance of the size of the gap market, as pointed out in subsection 1.1, will become even more apparent to the reader later on in the study, but especially in chapter 7 of this study, when a simulation requiring estimates of volumes is carried out.

There appear to be difficulties associated with mortgage lending to the gap market. Some evidence of this is to be found in the story of the Financial Sector Charter (FSC), a voluntary charter signed by the country's largest financial institutions in 2003, wherein they committed themselves to extending over R70 billion in development finance over a five-year period beginning 1 January 2004 (Banking Association South Africa (BASA), 2014; Kihato, 2010:50; Eighty20 Consulting, 2010:3). Of this amount, some R42 billion was to be directed at housing finance for the low income market, defined as household with monthly incomes in the range R1 500 – R7 500 at the time of the agreement. The income range, referred to as the FSC target market (not to be confused with the gap market), was to be adjusted for inflation by the consumer price index excluding the mortgage interest rate, or CPIX.

A review of the FSC performance over the commitment period reveals issues of concern. By December 2005, for instance, BASA reported a figure of R16.7 billion as having been extended to the FSC target market. However, Rust (2006:18) observed that only 5% of the target market had had access to mortgage finance, whilst a full 53% did not even qualify for the very product explicitly designed for them. For the five years to the end of 2008, the National Credit Regulator (NCR) found that only 2.7% by rand value (9.8% by volume) of the R44 828 billion in loans to the FSC target market (as reported by the financial institutions) was extended to households earning less than R10 000 per month (Kihato, 2010:50). An obvious question arises here, as to whether the lending did in fact go to the target market. Table 1.1 below shows the relatively low value of mortgage lending to households earning below R15 000 per month, as reported by the NCR for the year 2009 and the first quarter of 2010.

Table 1.1: Mortgages granted - gross monthly income of individuals (rand value)

Level of income	2009-Q1	2009-Q2	2009-Q3	2009-Q4	2010-Q1
<=R10K (R000)	R 386,900	R 430,953	R 496,274	R 489,963	R 386,032
% share of credit granted	2.11%	2.51%	2.86%	2.37%	1.88%
R10.1K-R15K (R000)	R 821,320	R 797,579	R 933,503	R 1,120,491	R 1,063,223
% share of credit granted	4.48%	4.64%	5.38%	5.42%	5.17%
>R15K (R000)	R 17,135,906	R 15,946,543	R 15,907,598	R 19,071,686	R 19,133,547
% share of credit granted	93.41%	92.85%	91.75%	92.21%	92.96%
Total value of mortgages(R000)	**18,344,127**	**17,175,076**	**17,337,375**	**20,682,139**	**20,582,802**

Source: NCR, 2010:7

In contrast to mortgages, however, a different picture is painted by figures relating to credit facilities granted (mostly bank credit cards and overdrafts, as well as store cards), as shown on Table 1.2 below. Whereas Table 1.1 shows an average value for mortgages granted to those earning under R15 000 monthly of just over 7% of the total across the five quarters shown, the corresponding average for credit facilities in Table 1.2 is 52%. The suggestion here is that the low-income households are getting credit for clothing and in the form of credit cards, but not mortgage credit.

Table 1.2: Credit facilities granted - gross monthly income of individuals (rand value)

Agreement	2009-Q1	2009-Q2	2009-Q3	2009-Q4	2010-Q1
<=R10K (R000)	R 2,255,002	R 2,619,678	R 2,335,075	R 2,925,095	R 2,294,711
% share of credit granted	37.02%	41.91%	38.83%	43.26%	33.49%
R10.1K-R15K (R000)	R 781,967	R 764,737	R 814,703	R 859,484	R 875,256
% share of credit granted	12.84%	12.23%	13.55%	12.71%	12.78%
>R15K (R000)	R 3,054,387	R 2,866,955	R 2,864,031	R 2,977,240	R 3,680,975
% share of credit granted	50.14%	45.86%	47.62%	44.03%	53.73%
Total value of credit facilities (R000)	**6,091,356**	**6,251,370**	**6,013,809**	**6,761,819**	**6,850,942**

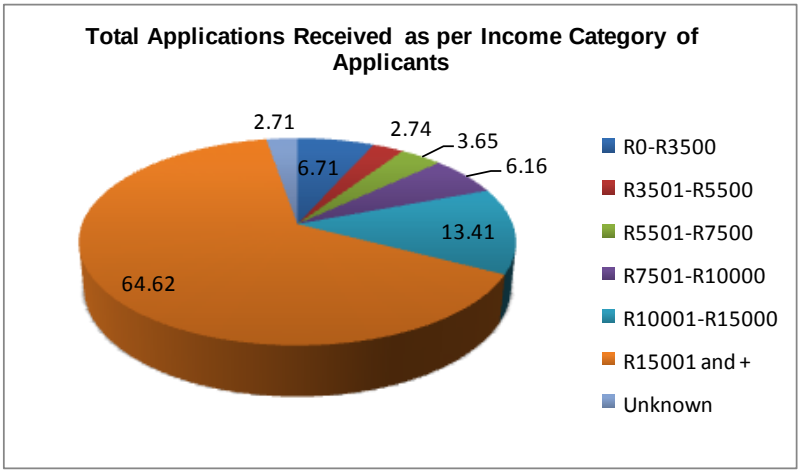
Source: NCR, 2010:12

The Department of Human Settlements' (DHS) chief directorate: housing equity, in terms of the Home Loan and Mortgage Disclosure Act of 2000 (HLAMDA), released its first annual report in 2010, reporting on credit extension figures supplied by the lending institutions as required by the

Act. Implemented retrospectively in 2007, the main purpose of HLAMDA is to promote fair lending practices, seeking to eliminate discrimination in lending patterns on the bases of income, race, or geography (DHS, 2010a:4). Whilst lamenting the poor standard of reporting by the lending institutions, the annual report does note that most of the 1.1 million home loan applications received had come from the upper end of the market (i.e., from those with monthly incomes above R 15 000), and that the approval rate was only 15% (DHS, 2010a:26,28).

The report further notes repayment capacity and a poor credit record as among the main reasons for declined applications. Figure 1.2 below shows the distribution of mortgage loan applications by income level, with over 64% coming from those with monthly incomes above R 15 000 – not quite within the FSC target range to which the commitment was made originally. Is it possible the lending went to the wrong people? Although the exact period covered is not clearly indicated, the annual report does state that the figures relate to the financial year ending 2008/09. It would appear that households targeted by this initiative were in fact missed, and the real reasons need to be isolated if solutions are to be found.

Figure 1.2 Total applications received per income category



Source: DHS, 2010a:12

1.3 Research questions

Although admittedly a complex issue, the problem of providing long-term mortgage finance to households with limited financial capacity, as explored in this study, reduces to a few simple, yet arguably difficult to answer questions:

1. Could MI, as a risk sharing mechanism, provide sufficient incentive to mortgage lenders to exploit the gap market, or at least a portion thereof? Because of MI, would it make commercial sense to the banks and other lending institutions to extend mortgage finance to some (or all) households in the gap market?
2. What are the circumstances, size, nature, and financial capacity of the gap market segment, in terms of housing affordability?
3. What preconditions, economic, regulatory, legal, or political, are necessary for a successful MI operation?
4. How has MI fared internationally, in housing markets both developed and developing? Are there lessons for the local case?
5. Would the two main envisaged role players, government and the financial institutions, be receptive to the idea of MI, at least as a potential innovation?
6. Given a positive answer to Question 1 above, what impact might MI have on the gap market, in terms of the extent to which mortgage finance might be facilitated?

1.4 Research objectives

Pursuant to answering the above questions, the investigation seeks to attain the following objectives:

1 To determine if some households categorised as falling in the gap market could afford MI-insured mortgage finance.

There have been various attempts at explaining the existence of the housing backlog, some of which appear to be rationalisations to fend off criticisms and deny blame. BASA has suggested institutional inadequacies on the part of government, according to Venter (2009:7-10), whilst the government, in turn, has levelled an accusation of reluctance and discrimination based on income level (redlining) at the financial institutions (Department of Human Settlements, 2004:5). For appropriate design of product, therefore, the real reasons need to be established. Additionally, it would be of value to establish the reasons for the apparent ineffectiveness of the Home Loan Guarantee Company (HLGC), which, although unique in purpose and mandate, has sought to play a similar role of risk sharing, and is arguably the closest to MI the country's has seen to date.

2 To establish an estimate of the household income distribution in the gap market, and thus postulate on the proportion that, at least in theory, could constitute an MI target market.

Although the study does not preclude participation in the proposed programme by households outside the gap market, it is important, for product design purposes, to quantify as closely as possible, the magnitude of the target market for which the programme would primarily be structured. Various estimates over the recent past have put the figure anywhere between 600 000 and 850 000 households (Moss, 2009:50; Rust, 2006:12, 22). Of relevance, also, is an indication of joint household income levels (as opposed to income by breadwinner alone) in this segment, to aid in housing stock price selection.

3 To look into South Africa's readiness, in terms of infrastructure and mortgage finance market sophistication, for MI operation:

A hundred years of MI experience has produced a number of "do's and don'ts" relative to its introduction, implementation and management. A number of critical prerequisites for MI success have been identified. For example, as Merrill and Whiteley warn (2003:10), MI is not appropriate for countries whose financial sectors, mortgage markets, and legal infrastructures have not yet reached at least a modest level of sophistication and development. Blood explores the regulatory requirements for MI (2009:20). It is imperative, therefore, to look into whether the local conditions are conducive to MI operation.

4 To investigate international MI experience, and isolate issues of critical importance for successful implementation:

International experience from similar housing markets may offer useful clues to dealing with the problem. Although national profiles and habits may be unique, cross-border replication and adaptation for unique attributes is possible, as was the case with the capital subsidy scheme in Chile (see section 2.2.2) that spread throughout a continent.

5 To establish if, at least in principle, both the government, on the one hand, and the private sector financial institutions, on the other, would be amenable to the idea of an MI programme.

Without government's initial capital for the MI entity, and the lending institutions' participation in the primary mortgage origination business, the envisaged programme could not get off the ground. These are the two key role players, without detracting from the importance of the target beneficiaries themselves, the borrowers, albeit that the latter are not party to the insurance agreement.

6 To construct a hypothetical MI model in South Africa, and derive pro forma financial statements for the hypothesised insurer, extending several years into a future period, based whereon an indication of profitability may be gauged. The possible impact of such an operation on the gap market, in terms of housing finance provision, may simultaneously be assessed.

This represents the main test of the thesis. The results of the model will lead directly to the study's conclusions, indicating the extent to which mortgage finance could be facilitated in the gap market, and what impact the MI programme would have on the backlog therein.

1.5 Thesis statement

Through MI, the main role players in the South African housing finance arena can unite in a sharing of risk effort to address the gap in the housing ladder. In a sentence, the study poses the following thesis statement:

> An appropriately adapted programme of **residential mortgage default insurance**, initially government-sponsored, may provide the requisite **credit enhancement** for the promotion of **access to mortgage finance** in the gap market in South Africa, reducing the **housing backlog** in that segment of households.

MI protects lenders and investors against loss due to borrower default in situations where the home value (net of foreclosure-related costs), recovered at a sale-in-execution, is less than the balance outstanding on the mortgage loan. MI has been operating globally (since the mid-1950s) and in the U.S.A. (since the early 1900s) for two main reasons (Blood, 2001:49):

1. To expand access to home mortgage finance and, therefore, to homeownership by inducing lenders to relax their loan approval standards;
2. To stimulate funds flow from capital markets into the housing and mortgage sector through a reduction in investment risk. This is crucial for secondary market development (i.e., mortgage-backed securities).

It is important to note that with MI, the mortgage lender is the sole beneficiary in the event of default by the borrower. The borrower benefits only to the extent that the loan application is approved where, without MI, and for whatever reason, it would have been declined. However, there is a little more to this benefit of access to the borrower. Depending on the design of the MI product (referred to as the Master Agreement between the lender and the MI provider), where, for instance, the borrower does not have the cash necessary for a downpayment, such a downpayment may not be necessary in the case of an MI product with an LTV (loan-to-value) of 100%. The entire purchase price is advanced to the borrower. Additionally, where the premium payable has not been accumulated in savings by the borrower, the lender may simply incorporate such premium in the principal mortgage loan amount. Furthermore, where monthly mortgage repayments would be onerous to borrowers, a suitable term for the mortgage loan would apply (for example, raising the standard mortgage loan term from 20 to 30 years). This flexibility of terms at loan origination enhances affordability.

In respect of the lender, the benefits accruing derive from reduced credit risk, improved asset quality in terms of the Basel framework (capital relief), with the concomitant increase in liquidity for higher volumes of originations. There will be more said about the Basel Accord (Basel III is due to come into effect on 1 Jan 2019) in later sections of this study. Merrill and Whiteley (2003:13) succinctly enumerate the benefits to the market: MI can be a catalyst for the development of the mortgage market, helping unleash the considerable potential that housing has to offer in economic development. MI promotes better risk management, underwriting standards, improved property appraisal, and encourages streamlined foreclosure processes.

1.6 Delineations and limitations

The study relies almost exclusively on secondary data, and argues for its validity by reference to the nature of the source of the data. Resource limitations have ruled out originally planned

unstructured interviews with the relevant stakeholders. In their place stands the author's personal involvement with a feasibility study by the NHFC in the last quarter of 2010, which included personal engagement with some of the role players, as further discussed in chapter 3.

This study seeks only to investigate the suitability of MI to a particular segment of the housing market in South Africa. It is not an appraisal of the entire housing finance market, nor does it concern the government subsidy programme currently in force.

The study is limited to the primary mortgage origination market and the operation of the MI programme hereto only, and does not concern itself with the secondary market that logically and inevitably follows on. The ramifications and desirability of mortgage-backed securities fall outside the scope of this study.

There are conceivably other ways to assess commercial viability, such as the triple bottom line approach (which brings into account social, environmental, and economic sustainability aspects). This study limits itself to only whether the MI company achieves positive post-tax earnings, and how long it takes to achieve these. There is also an implicit assumption that dividends to the initial investor (National Treasury) will be deferred for as long as it is deemed necessary to allow the new business to attain momentum, especially with regard to accumulated capital reserves.

1.7 List of abbreviations

See Appendix 1

1.8 Assumptions

It will be assumed throughout that there is both intention and will on the part of the housing ministry to implement MI. It is assumed, therefore, that the National Treasury, through the Human Settlements ministry, would provide the initial capitalisation of the MI entity. It is further assumed that suitable land for housing projects would be made available, and that, at least initially, the main bank lending institutions would be amenable to the idea.

Where numerical values are assumed for variables (chapters 4, 5, and 7), these, and a justification for their use, will be explained in the relevant sections.

1.9 Rationale for the study

The main significance of the study lies in the potential for enormous benefit to the national housing finance market inherent in a successful MI programme. In addition to the benefits mentioned in the thesis statement, there is a huge benefit related to the country's capital markets – that of secondary market development. Albeit that this study restricts itself to the primary mortgage market, a well-functioning primary market is not only one of the pre-conditions for secondary market development, but does in fact lead logically and inevitably to it. For example, Porteous (2000:25) carried out a case study on secondary market development in developing countries, and concluded that the pursuit of secondary market development requires the precondition of a mature primary market. MI is a tool with potential to facilitate, rapidly, the development of the primary residential mortgage market.

To the knowledge of the author, South Africa has never embarked on a full-blown MI programme before. However, there have been a number of initiatives aimed at risk sharing in efforts to facilitate housing delivery to the low-income end of the market. Although more detail will be gone into regarding these past (and present) efforts, brief mention is made here, to highlight the different nature of the MI approach.

The MIF (Mortgage Indemnity Fund) was the first institution to arise from the RoU (Record of Understanding) of 1994. It was established in June 1995 as a wholly owned government company to provide banks with indemnity against non-commercial risk (i.e., political risk) at a time when lenders experienced difficulties repossessing properties, mainly owing to political unrest and a breakdown in foreclosure law. It ceased operations in 1998 (it had been set up as a three-year interim measure) without approving a single claim (Tomlinson, 1998:4), having underwritten, at the time, some 140 000 mortgage loans.

The National Urban Reconstruction Agency (NURCHA) was established in May 1995 to facilitate access to finance for subsidy-linked housing projects. It sought to eradicate obstacles to delivery of low-income housing through bridging finance and loan guarantees to developers (Merrill, 2001:59). NURCHA identifies two housing finance market segments: what they call gap housing, consisting of households with joint incomes in the range R3 501 – R15 000, and affordable housing, in the income range R10 000 – R16 000. The former segment, they say, are financed for properties with a price up to R300 000, and the latter for stock in the price range R350 000 –

R500 000, for whom they claim to have provided project finance worth R4.8 billion as of 2014 (DHS, 2014:62).

The National Housing Finance Corporation (NHFC) was established in 1996 as a development finance institution (DFI), with the principal mandate of deepening access to housing finance. Their mission statement mentions innovative finance solutions targeted at the low-income end of the market, and the responsibility of finding an innovative solution for utilising the R1 billion-guarantee fund has been delegated to them. The NHFC have also been operating a subsidy programme called FLISP (finance-linked subsidy programme), aimed at assisting first-time homeowners with a once-off downpayment loan amount once these households have obtained a mortgage loan (NHFC, 2013:3; DHS, 2014:68). In respect of MI, there appears to be a commitment to pursue the initiative, according to the Chairman's review in the 2014 annual report (NHFC, 2014:13). In the same report of the previous year, the chief executive officer (CEO) mentions two unresolved issues, one to do with obtaining an insurance licence from the FSB (the insurance industry regulator), and the other to do with the initial capitalisation by the National Treasury (NHFC, 2013:17). The reader is reminded that the feasibility studies were first undertaken in the years 2009 and 2010, so a period of four years has elapsed since, perhaps indicative of hurdles in the process.

The HLGC (Home Loan Guarantee Company) is arguably the closest to MI that the country's housing market has seen. In fact, this closeness has led some authors to list it as an MI operation, albeit unique (Blood, 2000:54; Merrill & Whiteley, 2003:12). There are crucial differences from MI, however, in the way that the HLGC operates, as will be discussed in the next chapter. Historically, the HLGC underwrote commercial risk to banks, with operations limited to borrowers earning, first, below R7 500 pm, this figure later raised to R14 000 pm with the passage of time. The coverage to lenders was limited to 50% of the purchase price of the property. In its ten years of operation to the year 2000, according to Blood (2001:54), only 50 000 home loans had been guaranteed. The value of guarantees, as of 2001, was R1.8 billion, according to Merrill (2001:58). In light of the size of the housing backlog at the low end of the South African market, these figures do not appear adequate to the challenge.

However, in recent times the HLGC has changed its mode of operation, and now only offers a guarantee product called collateral replacement indemnity (CRI) to mortgage lending banks. The CRI is offered to banks to cover default risk up to a maximum of 30% of the value of the property (or purchase price). For an appropriate annual premium, the banks can purchase the partial cover, thus allowing them to extend mortgage loans to the full 100% value of the property in question, without the requirement for the usual 20% - 30% down payment by the borrower (HLGC, 2014).

There will be more about the HLGC later in the study, but it should be noted that it is not an MI entity proper, as envisaged and defined in this study. It is rather a variant than a formal MI system (CMHC, 2010a:7). First, its range of coverage included, historically, non-mortgage guarantees to housing associations in the "rent-to-buy" market. Second, it offered guarantees based on borrowers' pension and provident funds. Lastly, the mortgage-based guarantee is limited to a partial cover up to a maximum of only 30%. It is for these reasons that one of the research objectives involves looking into the HLGC's apparent limitations in relation to the gap market issue.

1.10 Chapter overview

The next chapter presents an exploration of existing literature on housing finance systems around the world. It traces their evolution over time to present day, and looks at the importance of housing finance in national economies. MI and its use as risk transfer instrument in primary mortgage markets and credit enhancer for secondary markets are covered in section 2.3, whilst section 2.4 catalogues the evolution of housing policy in South Africa since democratisation, and documents the various housing finance initiatives to deal with the plight of the low-income population. Section 2.5 concludes the chapter.

Chapter 3 is the method chapter of the study, describing the overall approach adopted in the study in terms of the research design, and the methodology employed in arriving at the conclusions. The nature, source, and analysis of the data used are presented here. Weaknesses in the research paradigm employed to probe the thesis statement are acknowledged, and suggestions to mitigate them offered.

Chapter 4 attempts to forecast residential mortgage lending rates five years into the future. It explains the statistical technique employed to estimate future mortgage lending volumes for use

as inputs to generate pro-forma financial statements. The analysis of the resulting financial statements will quantify the measures used as criteria for evaluating the hypothetical MI programme's viability as a business.

Chapter 5 deals with the essential design features of an MI programme, with emphasis on the pricing of the premium. Chapter 6 brings in all the key role players in the process, and attempts to summarise the new risk-based regulatory capital requirements adopted by the Financial Services Board (FSB), the regulator and supervisor of the insurance industry in South Africa. A simulated MI programme is presented in chapter 7, where the MI business is evaluated for commercial viability in terms of the criteria set out in the method chapter. Chapter 8 concludes the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The chapter aims to provide an understanding of residential mortgage finance, and how access hereto can be achieved, with emphasis on MI operation and practical issues involved. The route taken is one that gives context to how MI fits in in the overall evolutionary process of housing finance systems, to provide a theoretical rationale for its use in housing markets where conditions are suitable.

The chapter seeks to achieve this context by, first, considering how far housing finance has come in developed nations, and then contrasting this with where housing finance is presently in developing markets. By isolating issues in developing markets hampering mortgage finance development, one is then able to look to experience in the more advanced markets for possible solutions.

When the need for MI has been explained, it is then useful to seek to understand its inner workings, in the context of a country looking to adopt MI for the first time. Because MI has been in existence worldwide for many decades (in the United States of America (US) for over a century), it makes sense for such a country to seek to emulate previous successes and to avoid mistakes that have led to catastrophes in the past. This is the main objective of this chapter.

Given the unique character of individual housing markets, and the need to adapt borrowed practice to local conditions, an appreciation of the peculiarities of the particular local market for which MI is intended is needed. In the present case, the situation in South Africa in terms of market conditions and government policy are studied. In that process, an assessment is possible of the readiness of the South African housing market for MI.

Part of this study will seek to examine the housing finance system in the country, and consider how it compares with finance systems elsewhere in the world, with a particular interest in those countries already operating MI programmes. Successful MI implementation requires adaptation to local conditions (Blood, 2000:49), and specifically those conditions pertinent to housing finance provision, which include, among others, aspects such as property laws and effectiveness of enforcement thereof in terms of foreclosure processes, land availability and the provisioning for

residential purposes, infrastructural capacity of property developers, and of course economic conditions of those requiring housing.

In comparison to most assets, a household's physical residential property is arguably the longest lasting and most important source of wealth. The long-term nature of an investment in residential property sets it apart from other assets in many ways. The purchase or acquisition of a house often commits a household to a debt lasting decades, up to three in well-functioning mortgage finance markets. This poses credit risk to the finance provider unique in terms of both duration and amount, thus requiring risk management standards and tools different from those necessitated by other forms of credit extension. As will be discussed below, housing finance constitute such a large proportion of national economies that its failure can easily bring down a country's financial system. At the same time, however, many constitutions around the world bestow a right to adequate housing and shelter upon their citizens.

Adequate management of the risk associated with mortgage finance imparts such a load of responsibility not only on those extending the credit for financial gain, but also national regulators safeguarding the integrity of their finance systems. A programme of mortgage insurance, which removes the risk of default from the banking sector and places it in specialist hands, has helped many countries achieve high levels of homeownership, and emerging economies globally are beginning to look to MI to address their housing ills. This chapter seeks to establish how MI has fared globally, including what possibilities there may be for South Africa.

The rest of this chapter is organised in four parts, as follows:

Section 2.2 looks at housing finance systems from a global perspective, and considers how they have evolved over time. The role of housing finance in the overall economy is considered, and housing market sizes are compared in terms of the ratio of housing credit to gross domestic product (GDP), and a contrast dawn between developed and emerging markets. Impediments to market development in the latter category of countries are discussed. The last part of this section focuses on emerging economies, and establishes the status of mortgage markets in these countries.

The chapter then turn to residential mortgage default insurance (MI) itself (section 2.3), defines it, and looks at its purpose and potential benefits. Conditions in a housing market necessary for MI to operate successfully are studied (sub-section 2.3.3), before closer attention is given to how MI actually works in practice. The section ends by enumerating some of the lessons gleaned from experience in countries with established MI programmes.

The last section (section 2.4) turns to South Africa, first giving a brief historical account of housing initiatives since 1994, and then focusing on the voluntary financial sector charter (FSC) and its declared commitment providing housing finance credit to the low-income households in the country. The section ends with observations from the recent social contract signed by government and a range of private sector stakeholders in October 2014. Section 2.5 concludes the chapter.

2.2 Housing finance systems – a global perspective

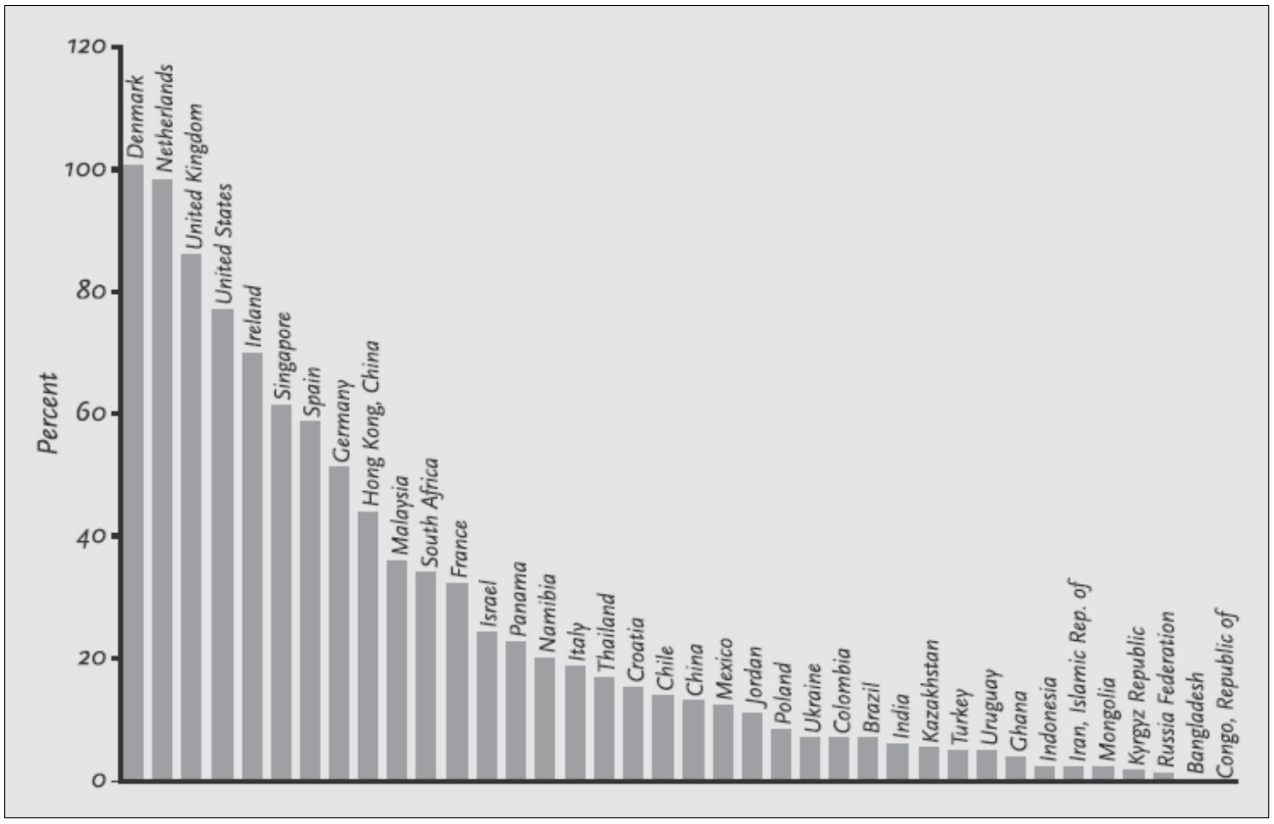
2.2.1 The role of housing finance in the economy

The construction, buying, and selling of residential property are operations that take place within the context of a broader housing finance system, which itself is an integral part of any given economy. Just as national economies vary in size according to national output, so do real estate markets, and, specifically for this study, residential real estate markets. A consideration of a particular market instrument (for example, MI in the current study) aimed at promoting access to housing finance, therefore, must take into account the nature (and capacity) of the particular housing finance system within which such instrument will operate, and by extension, the overall economy of which the system is a component.

That housing investment represents a significant component of national economies, particularly in developed countries, is borne out by the ratio of mortgage debt outstanding to gross national product (GDP). This ratio is depicted in Figure 2.1 below for a number of selected countries, both developed and emerging. At a glance, the pattern that stands out from the figure is the relatively higher ratio in developed countries than in developing ones. Interestingly, too, is that South Africa, an emerging economy, features ahead of France, a developed country. This and other features of the South African macroeconomic situation will be seen in later chapters as supportive of the suggestion for an MI initiative in the country.

Another aspect of the interrelation between housing finance and the aggregate economy relates to unemployment. Because residential property is generally more labour intensive than, say, public infrastructure or commercial real estate (Collier & Venables, 2012:2), a well-functioning housing market has the potential to contribute significantly to an economy's aggregate demand, thus creating job opportunities.

Figure 2.1: Mortgage debt to GDP ratio - selected countries

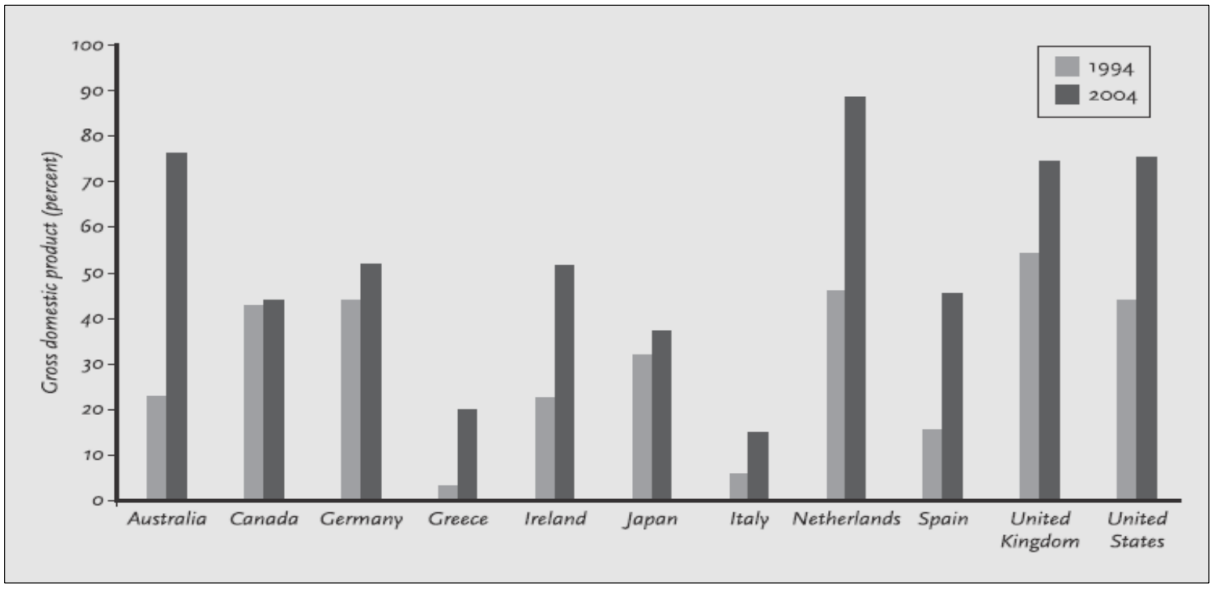


Source: Chiquier & Lea (2009:xxxii)

Other figures paint a more direct picture of housing as an important tangible asset. In the United Kingdom, the total private wealth of households has been estimated at £9 trillion, of which nearly 40% (£3.5 trillion) was in property, mostly housing (Office of National Statistics (ONS), cited in Collier & Venables, 2012:1). Pollock (cited in Nubi, 2010:22) has estimated the total wealth of the world at $44 trillion, with half the figure in real estate. Based on these estimates, Nubi (2010:22) then ventures to estimate that some 30% of total world wealth must be in residential real estate.

It is perhaps more revealing to consider how the mortgage debt/GDP ratios have trended over recent years, for a better insight into housing finance market patterns in various parts of the globe. For this purpose, Figures 2.2 – 2.4 are presented, with Figure 2.4 zooming in on the situation on the African continent.

Figure 2.2: Mortgage debt to GDP ratio - developed countries



Source: Buckley, Chiquier & Lea (2009:2)

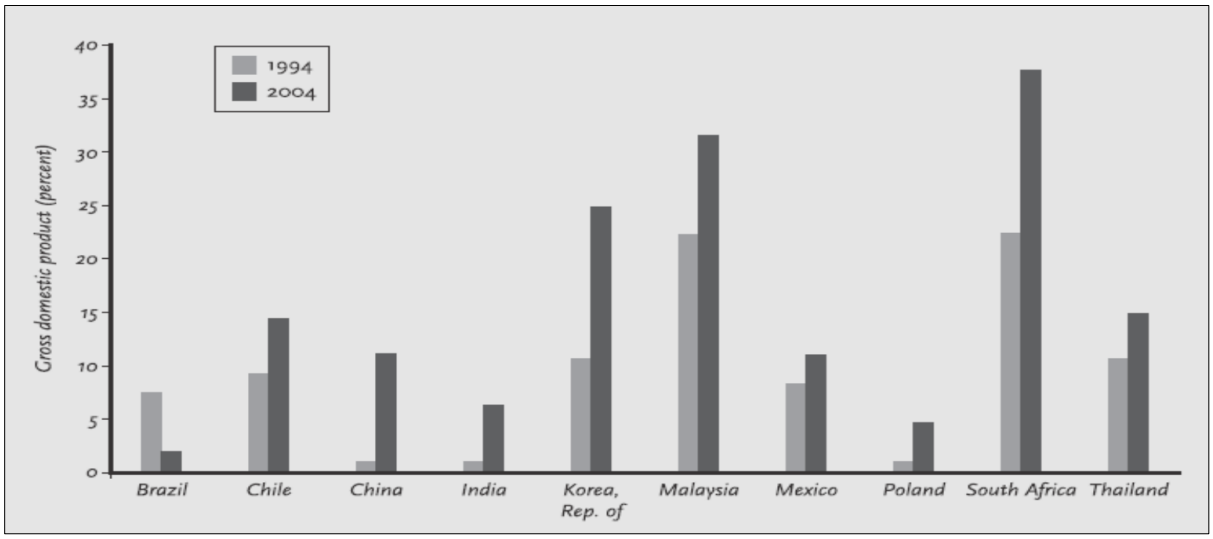
For all the countries shown in Figure 2.2, the ratio increased over the ten-year period, but Australia, Ireland, The Netherlands, and Spain stand out for their more dramatic leaps. Buckley, Chiquier and Lea (2009:2) attribute the rise in the ratio to relatively high economic growth rates in these countries, fuelled by low interest rates.

Although an increasing pattern is also evident for emerging economies (Figure 2.3), a question arises as to why the latter countries' ratios are relatively lower than in their counterparts in the developed regions. An interesting comparison is drawn by Collier and Venables (2012:2-4) between 19th century London and the typical African city today, arguing that the conditions are similar in terms of urban growth rates, migration, and per capita income levels. However, some things happened in London back then that are not happening in Africa in the 21st century.

The authors suggest a number of impediments (what they call vulnerabilities) to well-functioning housing markets in 21st century Africa. A legal system of foreclosure, through which leaseholders

(or homeowners) have enforceable title which can be used as collateral, and landlords (or lenders) have clear legal rights to evict tenants (or repossess defaulted properties) for unpaid rent, is mentioned as a requirement, as well as infrastructure in terms of roads, water and sewage. Buckley *et al*. too (2009:4) suggest weak legal systems with inadequate protection of the interests of lenders as a hindrance to the development of housing finance systems in emerging markets.

Figure 2.3: Mortgage debt to GDP ratio - some emerging markets

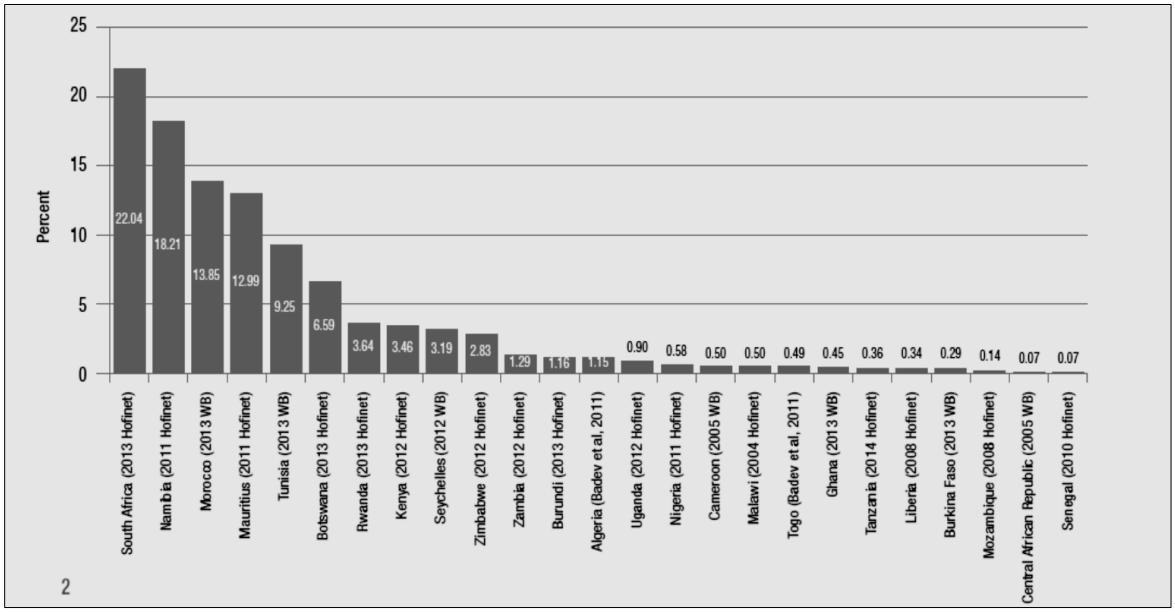


Source: Buckley, Chiquier & Lea (2009:3)

Issues hampering mortgage market development are an important consideration in this study; a housing finance instrument such as MI requires a well-developed and functioning primary mortgage market. It is for this reason that an inquiry is made here into the possible reasons for the seemingly modest levels of mortgage market development in emerging economies. Arguably, MI would fail for the same reasons that mortgage markets have not taken off.

The mortgage debt/GDP ratios shown in Figure 2.4 are testament to a virtually absent mortgage market across Africa, with the exception South Africa, Mauritius, Namibia, Tunisia, and Morocco. These latter countries could represent possible candidates for

Figure 2.4: Mortgage debt to GDP in Africa



Source: CAHF, 2014:2

housing finance innovations of the type under study, provided that other preconditions, as will be discussed in later sections (see chapter 6), are in place.

In general, economic growth by definition must translate into rising household incomes, and increased mortgage affordability. Where, however, macroeconomic instability persists, the risk associated with the provision of long-term funding is increased, and therefore the cost for such funding must rise too. This is especially the case for housing mortgage markets, with long-term investment horizons, and their development and expansion will be impeded under such unfavourable conditions. Chiquier and Lea (2009:xxxiii) point, for instance, to the case of Latin American markets devastated by hyperinflation.

The interrelationship between housing finance and the overall economy can also be viewed from the opposite direction, namely, by appreciating the impact of the macro-economy on housing finance development (as opposed to looking at the significance of the latter in the former). Lamenting the small size of the mortgage market in Ghana, Boamah (2010:28-29) attributes it to the persistently high and unstable rates of inflation and interest. High rates of interest impact negatively on borrower affordability, and an unstable inflation rate imparts uncertainty to the real value of mortgage repayments to the lender over time, and will serve as a disincentive to lending.

Linking of mortgage instruments to inflation (indexing of mortgage rates) is one possible solution for markets in inflationary environments, but advanced risk management is required, as well as prudential regulatory oversight, absent in many emerging economies.

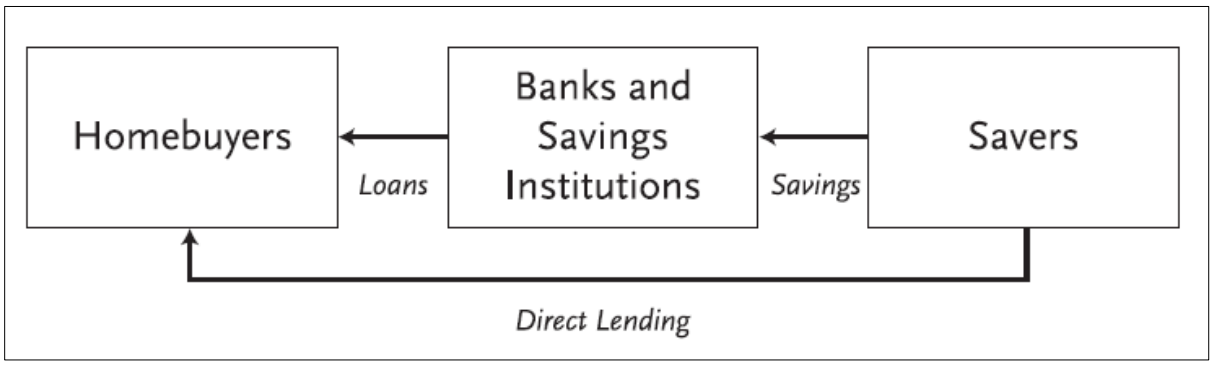
2.2.2 Evolution of housing finance systems

Essentially, a housing finance system mobilises and channels funds from savers to borrowers. A good system will do this cost effectively and affordably. The borrowers may be households wishing to acquire homes, or developers looking to undertake a construction project to produce housing stock. In either case, finance is readily accessible in some but not all markets. In the context of the present study, it is useful to ask how the good systems have developed, and to isolate the constraints faced by those failing to meet the needs of households with wide-ranging income capacities. Are there lessons to be learned across housing markets, or ideas or innovations from some, for adaptation in others?

An exhaustive study of the development of housing finance systems is not the subject matter here, but a brief account will serve to put the status of housing finance markets today into context. In the absence of a formal housing finance system, according to Lea (2009:29-30), households historically had one of two ways (both informal) to achieve homeownership: one was self-financing, through years of accumulating savings, or through the incremental construction route, and the other was direct financing between friends, relatives, or small savings and lending clubs. The *consorcios* of Brazil and the *chonsei* system in South Korea are examples of the latter, still found today, according to the author.

The appearance of depository institutions in the housing finance sector signalled the beginning of formal housing systems. These institutions include specialist housing finance institutions with a primary focus on housing, such as building societies and savings and loans associations (S&Ls), and commercial banks. Building societies and S&Ls, according to Lea (2009:32), dominated housing finance in the English-speaking world throughout the 20th century. Building societies had preferential regulatory treatment in the form of lower capital reserve requirements in the UK in relation to commercial banks, whilst S&Ls in the US enjoyed funding and tax advantages. A key feature of these deposit-taking institutions is that they originate, service, and fund the housing loans themselves, as illustrated below in figure 2.5.

Figure 2.5: Depository and direct lending

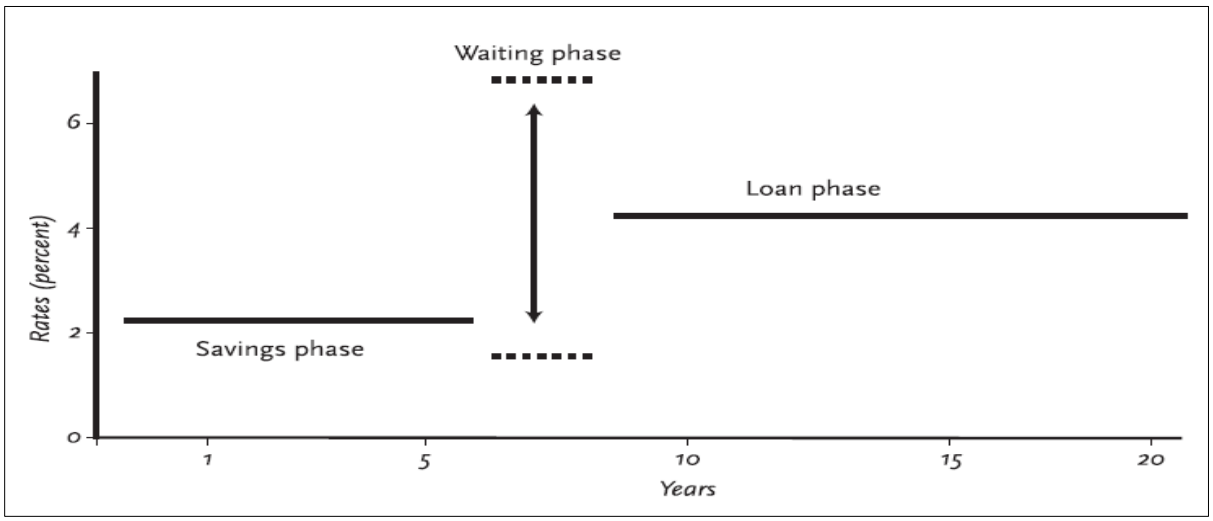


Source: Lea, 2009:31

The principle of operation of these building societies and S&Ls lay in the notion of a contract savings scheme - one of the oldest collective housing finance mechanisms, according to Dübel (2009:215). Potential borrowers agree to save for a specified period in return for the promise of a future housing loan, with the interest rates (on both the savings and the future loan) as well as the term of the loan agreed at the time of signing the contract. There are two main variants of contractual savings schemes (Dübel, 2009:217-218; Lea, 2009:35): the closed system, in which loans granted are funded only by the pool of savings attracted from potential home buyers, and the open system, in which capital market funds may be used as a supplement to fund loans in the event of liquidity shortfalls. The closed system is exemplified by the *Bausparkassen* in Germany and Austria, whereas the open-type system found dominance in France in the form of the *l'Epargne Logement*.

Figure 2.6 shows the basic structure of the contractual savings scheme. The interest rate earned on savings is often below the market rate, but compensation lies in a correspondingly below-market fixed rate on the loan granted. The savings phase not only establishes some borrower equity in the property, but also provides some evidence of borrower capacity to repay the loan, thus reducing the credit risk to the lender. The system is simple, offers a way to mobilise long-term liabilities, and is particularly relevant for emerging markets where credit histories and credit scores might not be readily available.

Figure 2.6: Basic structure of a contractual savings scheme



Source: Dübel, 2009:217

Despite rapid capital market developments around the world, contractual savings schemes continue to exist in one or another form, generating access to housing credit for young and low-income households as an initial mortgage product. However, the problem of macro-economic instability in emerging markets pointed out earlier again rears its head. Dübel (2009:245) points out that an environment with falling interest rates will mean that potential borrowers have little incentive to save at below-market rates to lock in a future lending rate now. Furthermore, the tendency for strong house price growth to coincide with falling interest rates could mean that the initially contracted loan size turns out insufficient to purchase property when the time comes.

Successful European schemes have spread to emerging markets worldwide. In Central and Eastern Europe, contractual savings schemes have been implemented, mostly along the lines of the German and Austrian *Bauspar* model, in the Czech Republic, Slovakia, Hungary, and Slovenia. The closed system has also found its way into India, China, and Russia. The French model, with adaptations, is found in Nicaragua, Peru, Tunisia, and Morocco (Dübel, 2009:222).

The 1980s saw a significant shift in housing finance market share from building societies in the UK to commercial banks. In the US, institutional failure to manage long-term risk led to the demise of the S&Ls, giving way to commercial bank dominance in housing finance (Lea, 2009:32). Financial liberalisation and deregulation in developed countries, with central banks providing both bank liquidity and deposit insurance, and the removal of preferential regulatory treatment previously

accorded building societies meant that commercial banks could enter the housing mortgage market profitably, and in time became market leaders. Although building societies (in the UK) and S&Ls (in the US) remain, Lea (2009:32) makes the point that the former command only about a quarter of the market, and the latter even less.

State-supported or –controlled housing finance institutions (such as state housing banks) that have played a prominent role in the provision of housing finance in the past have also given way to commercial banks in many countries. As noted by Hassler and Renaud (2009:247), policy makers looking to show political will in the face of housing finance deficiencies have often intervened in the housing market through the establishment of state housing banks. However, the authors note an overall track-record of poor performance, both in terms of efficient bank operation and a failure to meet policy objectives. The balance required between social housing goals and viable banking operations has often proven elusive, and the nature of government intervention has been the subject of debate.

In markets with relatively small banking sectors, with mortgage finance infrastructure still in infancy, state housing banks have been established as a matter of policy, as has happened in much of Sub-Saharan Africa (Hassler & Renaud, 2009:250). Countries such as Senegal, Mali, Congo, Gabon, Rwanda, and Namibia have had state housing banks either established or revitalised. That government participation is necessary is beyond question; the debate is whether such banks should be established to serve households under- or un-served by the private market, or should the government focus more on the role of promoter and facilitator, providing the regulatory environment and incentives needed for market expansion.

Evidence suggesting that the state housing bank model has not had success is found in a long list of bailouts and rescue operations in many countries with diverse economies. There have been either downright collapses or costly government bailouts in Algeria (1997), Argentina (1990 – 1993), Brazil (1996 and 2001), Cameroon (2003 - 2004), Colombia (1998), France (1996 – 1999), Indonesia (1997), Ivory Coast (recapitalised twice), Pakistan (2001), Rwanda (2003), Tanzania (1995), and Uruguay (2002), as listed by Hassler and Renaud (2009:251). A permissive attitude towards risk management and operational policy, weak corporate governance, and asset/liability mismatches are cited as among the main reasons these institutions fail (Hassler & Renaud,

2009:251). Notable exceptions of success, according to the authors, are the *BancoEstado* in Chile, and the Government Housing Bank of Thailand, both of which are run on sound commercial principles, and abide by good governance rules.

For many decades, up until the 1970s, the provision of housing in Europe was essentially the responsibility of the State. In the UK, for example, the period 1950 – 1980 saw an annual average of 130 000 homes built for social rent, through a combination of subsidies, grants, and 60-year amortising loans, all on the public balance sheet. The result was a third of the population living in subsidised public housing by the early 1980s, with government expenditure on housing at 5% of total spending. Gradual withdrawal from many welfare services then began, including housing, and by the year 2000 government housing expenditure as a percentage of total spending stood at a mere 1% (Heywood, 2012:4).

The shifting trend away from government toward market provisioning of housing appears a global phenomenon, and has been observed by many authors. In western democracies, Blessing and Gilmour (2011:453) date the beginning of the shift to the 1980s, and Norris and Winston (2011:1) observe it in the Republic of Ireland in the decade leading up to the 2007 – 2008 global financial crisis. Elsewhere, a similar observation has been noted, for instance Smit (2006:1), and Struyk (2009:12).

It is not the case that governments have not a role to play in the business of housing and housing finance, as pointed out in sub-section 2.2.1 above; the importance of housing finance to national economies is too great. Struyk points out two critical functions best suited to governments (2009:13): the first is one of enablement – the creation and maintenance of overall conditions necessary for successful business operation by private lenders; the second function is that governments should play the role of housing market development facilitator, through at least three channels:

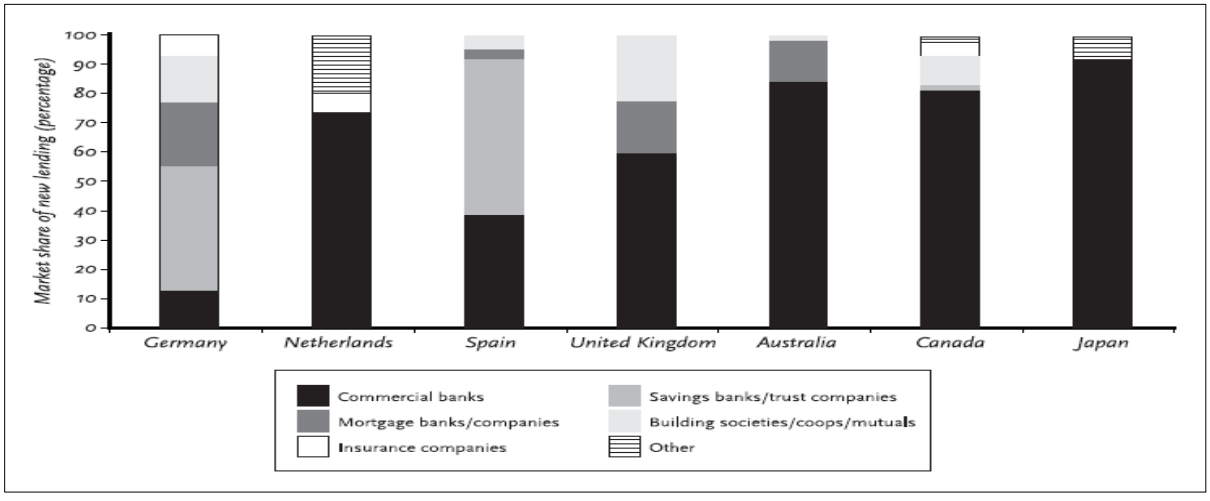
- A legal framework and related supervision for finance institutions, and to impart market confidence to the lending environment;
- To enable risk sharing between government and private lenders, for example through mortgage default insurance, with the government assuming the risk associated with exceptional events such as happens during economic depressions;

- The creation of facilities critical to mortgage market development that are perceived too risky to be undertaken by the private sector, including secondary market facilities and credit rating agencies.

The stage of development of a country's housing finance system does seem to dictate what housing finance product or combination of products is used. Government policy for housing will play a role, too, in the choice of product mix, as will the peculiarities of each nation's markets. However, one trend that does seem to emerge is one of privatisation of housing finance provision, with commercial banks taking on a dominant role given their brand, distribution, and funding advantages.

Figures 2.7 and 2.8 below contrast developed economies with emerging markets respectively, in terms of the relative funding shares of the housing finance markets by different lenders. Figure 2.7 highlights the emerging dominance of the commercial banks as a source of housing finance in developed markets, with all countries except Germany showing a more than 70 percent market share by the banks. Non deposit-taking institutions (such as mortgage banks and mortgage companies) still play some role, however, in Australia and the UK.

Figure 2.7: Market share of different lenders in developed markets

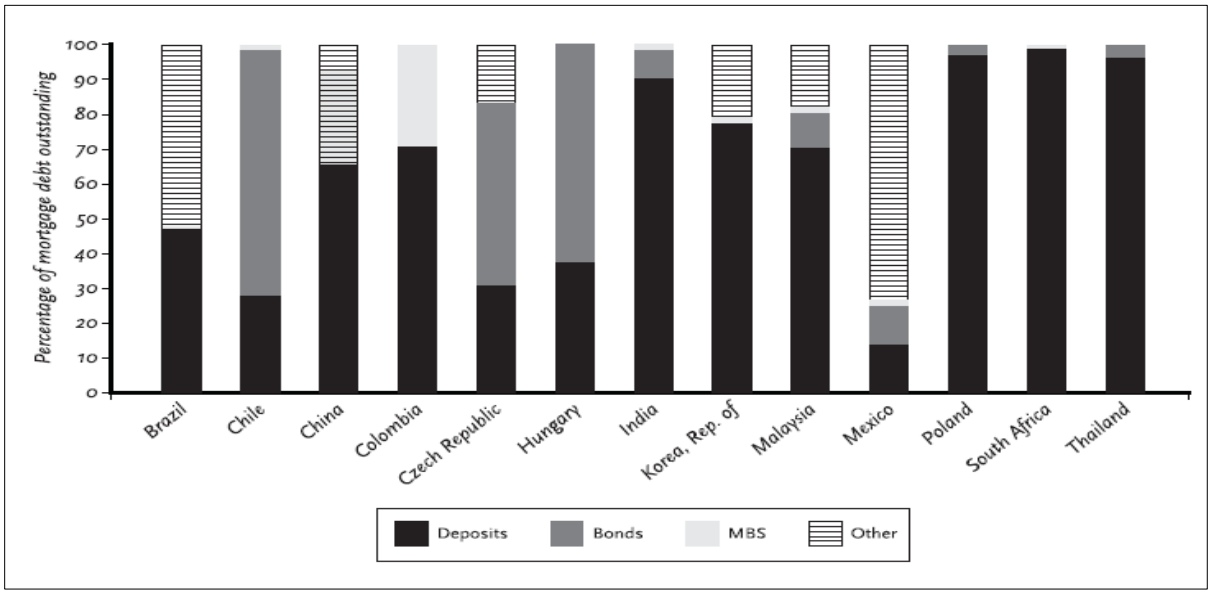


Source: Lea, 2009:37

In figure 2.8, for emerging markets, reference is made to funding share, i.e., share of mortgage debt outstanding, as opposed to market share in the case of the developed markets. Again here, as

labelled "Deposits", commercial banks dominate, except in the cases of Brazil and Mexico. These two countries have large provident fund special operations in their markets. In the case of Brazil, for example, Escrivá (cited in Eloy, 2010:21), laments the relatively minor role played by private banks in residential mortgage credit, and points out that the country shows one of the highest public banks' market share of credit among developing countries, in reference to the virtual monopoly by the state-owned bank, CAIXA. As of 2009, CAIXA accounted for nearly 73% of mortgage loans in the country (Eloy, 2010:21). By 2012, this figure had scarcely changed, at around 70% (Castro, 2012:11).

Figure 2.8: Mortgage lending in emerging markets



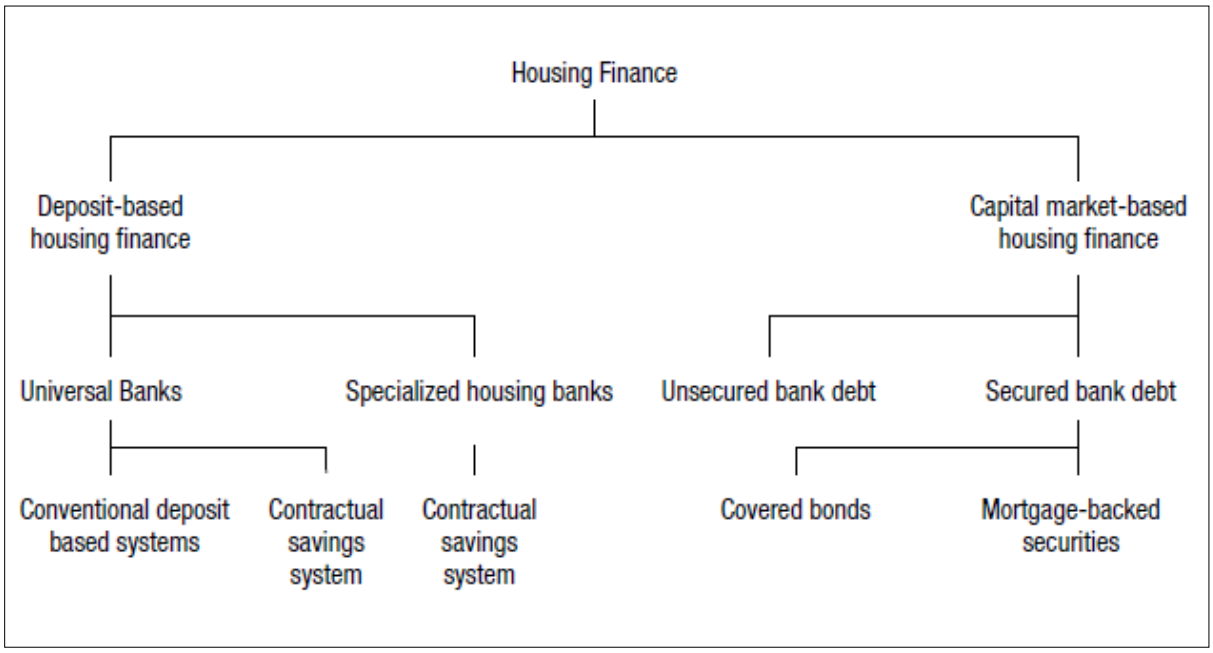
Source: Lea, 2009:38

2.2.3 The state of mortgage markets in emerging economies

The brief account of how global housing finance systems have evolved in the preceding section lends context to the various initiatives and innovations encountered in different countries in attempts to provide housing, with the focus, in a majority of cases, on low- to middle-income household segments. These, indeed, are the population segments to which the very real problem of affordability is relevant. Enhancing access to housing finance to these households is the subject of this study, and MI is considered one innovation (in the context of emerging markets, where it is relatively new) through which that goal can be achieved.

The extent of evolution of housing finance systems is such that mortgage markets exist in emerging economies today, albeit relatively small and shallow in comparison to those in developed markets. As seen in the preceding sections, mortgage credit relative to GDP in emerging economies is far below that found in the developed countries. Figures 2.1 through 2.3 show this clearly. A good question to ask is, apart from this difference of degree, what else is happening in the developed markets that is not in the emerging markets? A very simplistic typology of housing finance sources is depicted in Figure 2.9 below, in which a possible answer may be found.

Figure 2.9: Sourcing housing finance



Source: Weinrich, 2012b:3

Housing finance may emanate either from depository institutions (commercial banks) or from capital markets (wholesale funding). Housing loans are long-term investments; funding such loans through bank deposits of a short-term nature, such as demand deposits, poses a liquidity risk to lenders. Chiquier, Hassler and Lea (2009:295) have noted that primary-market financial institutions are, prudently so, reluctant to provide housing loans due to this liquidity management concern.

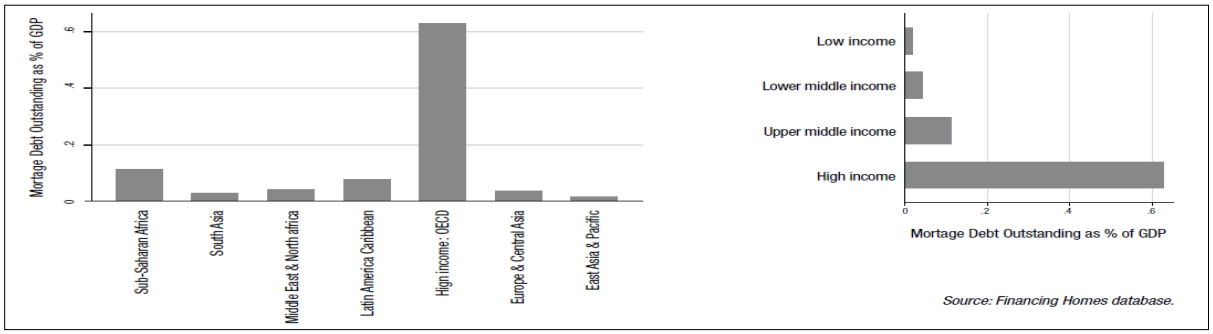
Access to long-term funds, mobilised by institutional investors with long-term liabilities, such as pension and insurance funds, can reduce this liquidity risk. Moreover, such funding can lengthen

the maturity of loans, thus improving affordability, particularly in low-interest environments. Such funding, however, requires developed, well-functioning capital markets, and herein may lie the problem with housing mortgage development in emerging economies. Capital market development in these latter countries lags behind that in the developed markets. In a 62-country study by Warnock and Warnock (cited by Eloy, 2020:18), the authors suggest that shallow secondary markets in Brazil, coupled with a general lack of risk buffers and insurance products are the reason for the country's low ratio of housing finance credit to GDP, at a meagre 5%. Bardhan, Karapandža and Urošević, (2006:9) support this view that that many developing markets are hindered by inefficient legal systems coupled with unclear property rights and a lack of risk transfer mechanisms.

Other impediments to mortgage finance development in emerging economies have been observed. Relative to African countries, for example, issues of unfriendly land laws and tenure security have been raised, as well as inadequate real estate developer capacity, either because developers lack access to finance, or simply because they are absent (Boko, 2011:17; Nubi, 2010:22; Rust, 2012a:6).

The link between a well-functioning primary mortgage market and a secondary (capital) market will be obvious to the reader; the former is a prerequisite for the latter. Where MI comes in, however, may not be so obvious. As will become clearer in the next section, MI plays a pivotal role, in that it helps to expand the primary market (through facilitating access to mortgage finance through risk transfer) whilst it simultaneously promotes the secondary market (as a credit enhancer for securitised mortgage pools).

Figure 2.10: Mortgage market size by region and by income level



Source: Butler *et al.*, 2009:25

Figure 2.10 above depicts the relative sizes of mortgage markets around the world, both by region and by income level. Interesting to note is that Sub-Saharan African countries appear (although in aggregate) to be well ahead of all but the OECD countries (Organisation for Economic Co-operation and Development). Although market size can only be suggestive of, and not imply the level of sophistication requisite for MI operation, it will be seen, in the next section, that countries as disparate as India, Lithuania, the Philippines, Mexico, and Kazakhstan have MI operating in their housing markets.

Despite the more than modest development levels in mortgage finance noted above, there have recently been several encouraging initiatives in African countries, in the context of housing finance promotion. The National Insurance Commission in Ghana has introduced a new credit enhancement tool in the form of Collateral Replacement Indemnity Policy (CRI) targeting the lower- to middle-income mortgage market. The CRI aims to facilitate access to mortgage loans by those households without accumulated savings to afford the deposit needed for a mortgage, but who can demonstrate a capacity to pay over time (Rust, 2012a:6). The Mauritian HFGA-Re (Home Finance Guarantors Africa – Reinsurance) operates along similar lines: whereas a 20% deposit would traditionally be required of the borrower, with the lender providing the remaining 80% as a loan, the CRI guarantees the 20%, such that the lender's "risk to value" stays at 80% even when granting a 100% loan. Borrowers can now access the finance without the need for the deposit.

In Namibia, the Government Institutions Pension Fund has established a housing loan scheme for civil servants which attempts to remove the barrier to finance access: a loan from a third party will be secured by a borrower's pension fund withdrawal benefits as opposed to the property title itself. Until recently, pension-backed lending on the continent was practised only in South Africa (Rust, 2012a:7). Kenya's Retirement Benefits Authority (RBA) has now lifted a previous ban on the use of pension assets as collateral for mortgage loans. Pension funds, by virtue of their long-term nature, are ideal for mortgage lending as durations match closely.

Tanzania, with support from the World Bank, established the Tanzania Mortgage Refinance Company (TMRC) in 2011, a mortgage liquidity facility. A private sector institution owned by banks, the TMRC exists to support bank mortgage lending by refinancing banks' existing portfolios once the portfolios have been on banks' balance sheets for a minimum period of six months

(Melzer, 2011; Rust, 2012a:6). The TMRC was initially capitalised via a loan from the World Bank, and will resort to issuing bonds once the loan has been exhausted. The main function of a liquidity facility is to act as an intermediary between primary lenders and bond markets, thus providing long-term funds on better terms than the lenders would obtain on their own. Uganda and Rwanda are reported to be considering this type of facility (Mutero, 2011:20).

In Morocco, a guarantee scheme known as *Fogarim* had by June 2012 achieved an impressive 80 000 loans to borrowers, and was adding 1200 new borrowers monthly. Morocco's housing shortage has been estimated at some 500 000 units and growing at a rapid 150 000 units per year (Rust, 2012b:6). Covering 70% of the loan value, the scheme seeks to encourage bank lending to households with informal earnings. It requires that the household be a first-time homeowner, and that the loan bear a fixed rate of interest. The property itself is required to be secured by a mortgage.

Access to mortgage finance seems to be a constant theme in Africa. A meeting convened in Kampala, Uganda in late 2011 and organised by the host government, the Nairobi-based UN Habitat, the US government, the US Department of Housing and Urban development, and UN officials deliberated on strategies to promote innovative financing for affordable housing in East Africa. Finance, housing and land ministries from Tanzania, Kenya and Uganda were represented, as well as regional banks (Rust, 2012a:6). All the governments agreed that mortgage finance, regularisation of land laws and security of tenure would be on the forefront of their financial reforms.

A logical part of this study is the development of some framework for assessing whether a country is ready for MI. This is done in the context of South Africa, which evidences the largest mortgage finance/GDP ratio on the African continent. When the question on readiness has been answered, and if the answer is a positive, it ought to be possible to use available market data to simulate an MI programme operation, and make some pronouncement on workability. This is the direction of the study. How well such a programme would operate, and how sustainable it would be, are questions beyond the scope of the study, and in all probability would require more sophisticated forecasting and modelling techniques. In the next section, the nature of MI is explored, as are conditions required for it to work.

2.3 Mortgage default insurance (MI)

2.3.1 MI defined

Mortgage default insurance is a contract that protects mortgage lenders against loss that arises from borrower default. Default losses arise where the realisable value of the foreclosed property is insufficient to extinguish in full the outstanding balance on the borrower's debt at the time of default (Blood, 2001:49; Blood, 2009a:326; Blood, 2009b:20; Klopfer, 2005:9; Merrill & Whiteley, 2003:12). The extent of the borrower's protection will depend on the level of coverage defined and stipulated contractually at the time of signing of the agreement.

There are different names for MI in various parts of the world. In the UK, for example, it is commonly referred to as mortgage indemnity guarantee (MIG) (Klopfer, 2005:11). In India, with an MI programme recently officially registered (18 April 2013) by the Reserve Bank of India (RBI), it is simply called mortgage guarantee (MG) (IMGC, 2014). Elsewhere, names such as mortgage credit insurance, mortgage guarantee insurance, mortgage indemnity insurance, and lenders' mortgage insurance are found (Blood, 2009a:325). As pointed out in sub-section 1.1, some names, such as lenders' mortgage insurance, gained usage out of a need to avoid confusion relating to borrowers' misunderstanding that they, as premium payers, were entitled to some protection or benefit, which is not the case.

The term "default" requires explication. Technically, a single missed payment on a mortgage obligation by a borrower places her in default. Legally, according to Giliberto and Houston (as cited in Quercia & Stegman, 1992:343), default is defined as *"... the transfer of the legal ownership of the property from the borrower to the lender either through the execution of foreclosure proceedings or the acceptance of a deed in lieu of foreclosure*". However, more in line with practice, a borrower who has missed a payment or two is considered merely delinquent, with default commonly occurring at three consecutive periods of missed payments.

A number of unique features set MI apart from other types of insurance lines, such as borrower life or disability insurance, flood or earthquake coverage, fire insurance, title insurance, etc. First, the nature of the hazard covered by MI. Large scale mortgage defaults result directly from national economic downturns, with rising unemployment levels, falling incomes, and falling property prices. Catastrophic losses by mortgage lenders are what MI covers.

Second, the duration of the risk covered is much longer than is the case with, for example, property or vehicle insurance. Mortgage life can last up to 30 years, and MI covers lenders against the risk of default for the full term of the mortgage loan. Lastly, the cycle of the risk insured, which effectively is the same as the economic cycle in a given country (Blood, 2009a:326; Blood, 2009b:20).

2.3.2 Purposes and benefits of MI

As alluded to in the introductory chapter (section 1.9), a well regulated MI programme operating in a housing market that meets certain prerequisite conditions (see the next sub-section) offers enormous potential to a country's housing finance sector, as well as the economy as a whole. In the immediate context of the thesis of the present study, expanded homeownership through increased access to housing mortgage finance previously denied is top of the long list of benefits associated with a successful MI operation. MI achieves this through a number of interconnected, simultaneous effects: mortgage lenders are induced to approve mortgage loans with higher LTVs than would be the case without MI (Merrill & Whiteley, 2003:13). It makes commercial sense to them because the additional credit risk inherent in the lower downpayment loan is borne by someone else – the MI provider. In fact, in cases of a 100% insurance coverage, the total quantum of default risk is removed from the lenders' balance sheet and is borne by the insurer, outside the lending sector.

The higher LTV ratio means that borrowers need lower cash savings to put down a deposit on their home purchases. The result is earlier home acquisition by, for instance, first-time homebuyers, without the need to save for lengthy periods. This acceptance of lower downpayments by lenders helps stimulate availability of mortgage products to a larger population segment, beyond only those with accumulated savings (Investment Information and Credit Rating Agency of India (ICRA), 2013:6; Joyce & Molesky, 2009:32). In addition, perhaps more importantly in this regard, the underwriting envelope widens to include income groups previously excluded, without lenders assuming additional credit risk.

The transfer of risk from the banking sector to specialist mortgage insurers brings with it a hidden benefit in the form of capital relief for lenders. Basel 11 risk-based capital requirements allow for beneficial recognition of certain qualified credit enhancements on assets in the form of reduced

risk weight factors, and so do banking regulators in different countries (Blood, 2009b:24). With MI considered one such credit enhancer, a mortgage loan without MI will generally carry a higher risk weight factor on a lender's balance sheet than one with MI. Thus, with an MI insured mortgage loan portfolio, a bank lender will be required to put aside a lower capital reserve amount than would otherwise be the case. In this way, such a lender enjoys capital relief in that capital is "released" or freed.

The following two tables (Tables 2.1 and 2.2) illustrate how this happens in practice. The India Mortgage Guarantee Corporation (IMGC) operates the country's first MI programme, as mentioned in sub-section 2.3.1 above. Table 2.1 shows how, given the mortgage insurer's AA rating, the banking regulator there, the RBI, allows for a 30% risk weight on a mortgage loan carrying the insurer's cover, resulting in a 1.26% capital release.

Table 2.1: An illustration of capital release calculations in the presence of MI (MG in India)

Risk Weight	100%
Tier 1 capital requirement	6%
Guarantee Cover	30%
Rating of the MGC	AA

		Required capital calculations		Tier 1 capital in relation to loan
A	Tier 1 capital in relation to loan (Without the Guarantee)	Risk Weight x Tier 1 capital	100% x 6%	6.00%
	Tier 1 capital in relation to loan (With the Guarantee)			
B1	Tier 1 capital for guaranteed portion	Guarantee Cover x Risk Weight based on credit rating of MGC x Tier 1 capital	30% x 30% x 6%	0.54%
B2	Tier 1 capital for non guaranteed portion	Non guaranteed part x Risk Weight x Tier 1 capital	70% x 100% x 6%	4.20%
B= B1+B2	Total Tier 1 capital in relation to loan			4.74%
C= A-B	Capital Released			1.26%

Source: ICRA, 2013:8

In Table 2.2, the different amounts of capital released are shown under both Basel I and Basel II capital requirements, at different levels of insurance cover. The main point made is that MI should provide a strong incentive for bank lenders to have their mortgage portfolios MI-covered. Furthermore, the capital so released can be deployed in more lending, leading to improved profitability and a higher return on equity (ROE) as the leveraging increases (ICRA, 2013:6). The

reference to "HFC" in Table 2.2 is to other housing finance companies that treated differently to banks by the Indian local regulator in terms of capital requirements.

Table 2.2: Capital release for 100% risk weight loans with MI of a given rating

		Extent of MG cover	Banks		HFC
			Basel II	Basel III	
A	Capital requirement of the originator without MG	0%	6.00%	9.50%	8.00%
B	Capital requirement of the originator with MG	15%	5.37%	8.50%	7.16%
		30%	4.74%	7.51%	6.32%
		50%	3.90%	6.18%	5.20%
C = A-B	Regulatory capital release	15%	0.63%	1.00%	0.84%
		30%	1.26%	1.99%	1.68%
		50%	2.10%	3.32%	2.80%

Source: ICRA, 2013:9

Yet another benefit offered by MI lies in the cycle of the risk insured against, mentioned in sub-section 2.3.2 above as being no different from that of the aggregate economy. Joyce and Molesky (2009:30) argue that MI can serve as a tool against the phenomenon of pro-cyclicality that has its roots in the banking sector. Pro-cyclicality is a reference to the tendency of banks to fuel unsustainable economic growth during good times through excessive credit extension, and to freeze access to credit during economic downturns. This has the effect of exacerbating the severity of recessions. Because mortgage foreclosures tend to rise during recessions, MI can help restore equilibrium between supply and demand by enabling house purchases by first-time homebuyers at the bottom of the economic cycle.

This, in part, is because mortgage insurers are forced by regulation to build up a special contingency reserve during the good times, for release only after a stipulated period has elapsed. For example, in the US, Mexico, and several other countries, legislation requires 50% of a mortgage insurer's annual earned premium to be set aside in the contingency reserve from the moment a loan is first insured. In the US, each year's contribution is to be maintained for a decade and in Mexico for 12 years (Joyce & Molesky, 2009:33). MI providers are therefore able to write new business at the bottom of a country's economic cycle.

In sub-section 2.2.3, residential mortgage markets in emerging countries were shown to be behind in development compared to their developed countries' counterparts. It was posited there that relatively undeveloped capital markets were a major reason for the disparity. It turns out that MI

can play a significant role in stimulating capital market development (and has done so historically). The common historical sequence, Blood notes (2001:49), has been that MI first expands the primary mortgage market and then, as a by-product of that momentum, helps accelerate the development of the secondary market and MBSs. This acceleration is due the credit enhancing quality imparted by MI to insured loans pooled for securitisation (Tiwari, 2001:57).

Secondary markets and securitisation, as pointed out in the introductory chapter (section 1.6), are beyond the limits of this study, and mention is made here due to the thin line of division between the primary and secondary markets, and their close interrelatedness. Chiquier *et al*., for example (2009:294), observe that over half of all outstanding debt in the US today is accounted for by mortgage related securities., and that these instruments have been issued in almost all European countries, as well as in many Asian and Latin American countries. Thus, to the extent that MI promotes primary market development, leading, in turn, to secondary market activity through securitisation and other derivative innovations may be considered a bonus benefit.

Improved underwriting standards and risk management for the housing finance sector is a benefit attributable to MI recognised by many. MI providers have a strong commercial incentive to ensure that lenders pursue a disciplined approach to their lending practice, because the insurers assume a first-loss position in terms of the long-term risk they retain on their books (Joyce & Molesky, 2009:30; Merrill & Whiteley, 2003:13). Because each loan written and underwritten has to pass through two screens (the lender's and the insurer's), risk is better managed (ICRA, 2013:6). Accuracy of loan documentation is better validated, and borrower ability to repay better assessed.

Another MI benefit can be seen from a banking supervisor's perspective. Through the spreading of risk across individual lending institutions of all sizes, and the promotion of an inflow of funds from outside the banking system, MI helps to reduce financial stress on the banking system. This is especially so in countries where MI is mandated for mortgage loans above a certain LTV ratio threshold, as for instance is the case in the US, Italy, and Canada (Blood, 2009b:24). In Canada, for instance, all mortgage loans above an LTV of 75% are required by legislation to carry MI (Klopfer, 2005:10). Many other countries (for example, Germany, Luxembourg, Spain, and the Netherlands) simply require that mortgage loans with an LTV above some threshold figure carry some form of credit enhancement, and MI is one such credit enhancement (Klopfer, 2002:23). The requirement

for loans to carry MI creates a broad-based pool of risk capital, with cross-subsidisation between lower and higher risk borrowers, thus expanding housing finance availability. All this happens with the comfort of maintaining generally prudent lending standards.

2.3.3 Prerequisite conditions for MI success

The numerous MI benefits outlined above come at a cost. Part of the cost is that the primary housing market must function reasonably well. As Merrill and Whiteley warn (2003:10), MI is not appropriate for those countries whose financial sectors, mortgage markets, and legal infrastructures have not yet reached a modest level of sophistication and development. Conditions prerequisite for an MI programme to operate well fall broadly into (Blood, 2009a:329): (1) Those to do with the primary mortgage market, (2) Those dealing with legal and regulatory aspects, and (3) Conditions to do with information.

How well a primary mortgage market functions will depend on banks' lending and servicing practices, consumers' general attitude to debt repayment and insurance products, and how residential properties themselves are valued or appraised, and the level of taxation imposed thereon. The existence of housing industry associations such as for lenders and builders will usually indicate the presence of mortgage origination standards, and standards dealing will the physical quality of properties in the market.

On the legal and regulatory front, it is important for there to be in place an adequate supervisory and regulatory framework for both the banking and the insurance industries. Long-term solvency is a major concern in these industries, and ongoing supervision and the imposition of capital adequacy requirements help mitigate this risk. Banks, in particular, as Calem and LaCour-Little point out (2004:648), are susceptible to runs owing to their natural asset-liability mismatch, with assets consisting of risky loans often of a long-term duration, and liabilities mainly short-term deposits that can be withdrawn on demand.

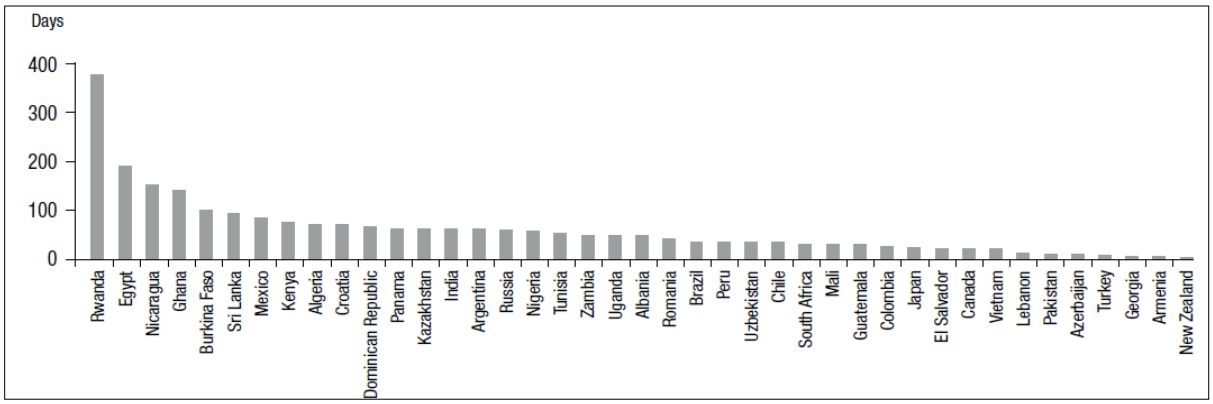
A major judicial factor hampering mortgage market development in many countries relates to property titling and registration efficiency. Interesting results regarding registration and foreclosure delays were obtained by Butler, Kravkova, and Safavian (2009:19-29), in their study of 42 countries. Among the authors' arguments is that these delays explain, at least in part, why mortgage finance amounts to 85% of GDP in New Zealand and only 1% in Egypt. Figure 2.11 and

Figure 2.12 below show the average completion times for registration and foreclosure respectively. For example, it takes three days to register a mortgage and transfer title in New Zealand, four in Georgia, but 193 days in Egypt. In Rwanda, it takes a year.

Registration of a mortgage bestows priority on the mortgage lender over other secured creditors. Inefficiency in the process not only creates a bottleneck in the housing finance system, but also increases the costs of a housing transaction. As an example, registration costs amount to 0.04% of property value in Canada, 0.08% in New Zealand, and 12% in Burkina Faso (Butler *et al.*, 2009:19).

In the event of a loan default, the process of foreclosure enables collateral recovery by the mortgage creditor. A good foreclosure law will strike a balance in protecting the rights of both the creditor and the borrower. However, in some countries, the law gives excessive protection to borrowers, imposing substantial costs to lenders (Butler *et al.*, 2009: 21-22). Lenders pass these costs on to borrowers in the form of higher interest rates or larger required downpayments.

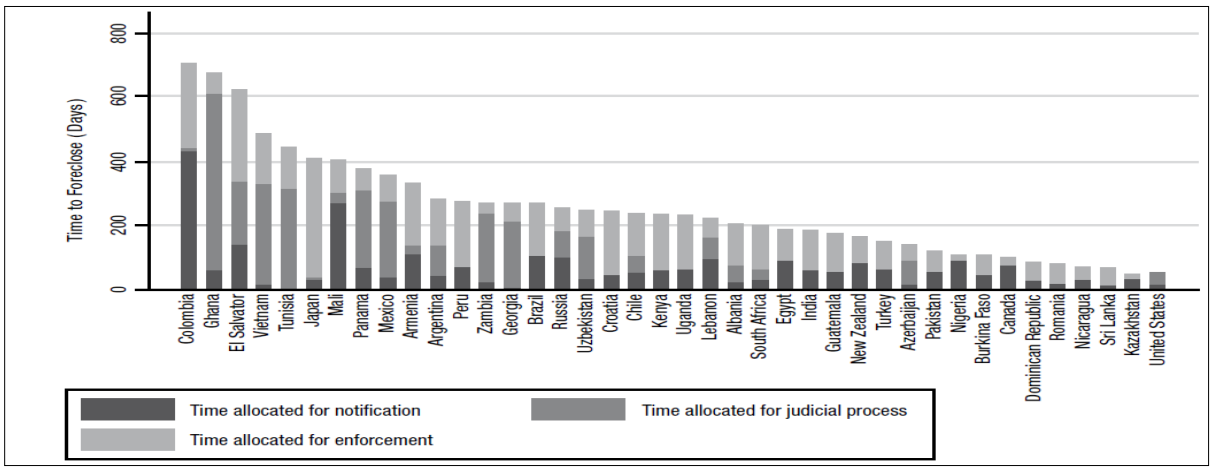
Figure 2.11: Average completion time for registration of a mortgage sale transaction



Source: Butler *et al.*, 2009:20

A faster process will mean lower costs and greater proceeds to the lender from the sale of the home, thus benefiting both lender and borrower. Moreover, it will mean greater tax revenue to the government, and a lower payment claimed from the mortgage insurer – all parties benefit from an efficient foreclosure process.

Figure 2.12: Average completion time for the foreclosure process



Source: Butler *et al*., 2009:23

In the comparative study mentioned above, Butler *et al*. (2009:26) found foreclosure times to vary from 55 days in Kazakhstan and 58 days in the US, to 705 days in Colombia and 706 days in Ghana. The authors suggest that a law allowing for a sale by private treaty (thus doing away with public auction sales) would speed up the foreclosure process, as well as decrease foreclosure costs by up to 6%.

The foreclosure costs faced by lenders are an important consideration in estimating the expected loss resulting from mortgage default. This is so because foreclosure costs bear directly on the amount that lenders may claim from the MI entity following default and sale-in-execution. Several factors affect foreclosure costs (Quercia & Stegman, 1992:364):

- Where there is non-judicial foreclosure, costs are lower. A third party such as a lawyer or a foreclosing service conducts the sale of the foreclosed property. In such cases, lenders can avoid the more costly court-supervised foreclosure.
- Where there is an absence of statutory right of redemption, which allows borrowers to redeem their properties after the foreclosure sale for an amount paid at the sale, costs are also lower.
- Where deficient judgment is allowed, permitting lenders to recover directly against the borrowers' personal assets, costs are also lower.

- Foreclosure costs decrease with shorter foreclosure and redemption periods (i.e., the period of time borrowers have to exercise their right of redemption).

It will be borne in mind that the foreclosure process must run to completion before any claim can be lodged against the MI provider by the mortgage lender. It represents a critical stage in the operation of mortgage insurance, determining not only the timing but also the amount of the payment to be made to settle the resulting claim. However, policy makers address the issue, what remains as a prerequisite for MI to operate well is a streamlined foreclosure procedure.

Conditions that centre on information availability relate to sales prices in the housing market, as well as borrower credit information most commonly provided by credit bureaus. Mortgage portfolio experience and performance are important for the determination of the premium price for the MI product, whereas borrower information is crucial at the mortgage origination stage. Pricing considerations are covered more comprehensively in chapter 5 of the study.

2.3.4 Key programme features

Historically and internationally, one of the most important drivers of home default risk (and loss) has been found to be borrower equity in the property at the time of loan origination. As stated earlier, a proxy for this equity is best expressed in terms of LTV (loan-to-value ratio). The strong positive association between LTV and default probability (and loss severity) is illustrated in Table 2.3 below. This role of LTV as a major determinant of default risk, and therefore expected losses, establishes the first key MI feature to consider when contemplating MI for a housing market (Blood, 2009a:330; Blood, 2009b:21; Quercia & Stegman, 1992:349).

Table 2.3: LTV correlation with default risk and loss

Six-country average* (averages relative to 75-80% LTV which = 1.00)

LTV Ratio	Default Frequency	Loss Severity	Total Loss
60.01-65%	0.62	0.40	0.25
65.01-70%	0.73	0.63	0.46
70.01-75%	0.84	0.83	0.70
75.01-80%	**1.00**	**1.00**	**1.00**
80.01-85%	1.20	1.15	1.39
85.01-90%	1.48	1.29	1.92
90.01-95%	1.88	1.41	2.67
95.01-98%	2.31	1.46	3.40
98.01-100%	2.69	1.52	4.14

*Australia, Germany, the Netherlands, Spain, U.K. and U.S.

Source: Blood, 2009b:21

The international capital regulations in Basel II refer to default probability (DP) and loss given default (LGD) for the two middle columns, multiplication of which yields the expected total loss in the last column. Table 2.3 shows that the dramatic risk increments occur as LTV rises from 80% to 100%.

In general, mortgage lenders extend loans without insurance up to some benchmark level of LTV, beyond which they feel overexposed to loss in the event of default (Blood, 2009a:330). This benchmark level will naturally differ from country to country, and will vary with time. It is necessary, therefore, for MI to cover, at least, this top layer of risk exposure above the lenders' benchmark in order to induce them to raise their LTV.

As mentioned in Sub-section 2.3.2, mortgage-lending regulators in some countries simply mandate MI coverage for all mortgage loans above a specific LTV. Where MI is introduced for the first time, a rule of thumb, according to Blood (2009a:331), is to set the maximum insurable LTV at such a level that it reduces the required borrower downpayment by 50%. This was in fact the case in Hong Kong and Kazakhstan, where the required downpayment was cut in half from 30% to 15% using MI. In Israel, their new MI programme was used to cut the figure in half from 40% to

20%. Logically, if success is demonstrated over time further reductions may be considered, until zero downpayment loans with MI are available.

As can be seen in Table 2.4 below, in countries with established MI programmes, local regulators can allocate increasing minimum risk weight factors as LTV rises for use in computing capital reserve requirements. These weight factors are purely discretionary and

Table 2.4: MI regulatory capital requirements by LTV in some countries

LTV	Australia	Canada	Mexico
70%	0.16%	0.07%	0.14%
75%	0.36%	0.26%	0.40%
80%	0.36%	0.26%	0.88%
85%	0.48%	0.56%	1.81%
90%	0.96%	0.89%	3.56%
95%	2.00%	1.43%	6.71%

Source: Blood, 2009b:21

will depend on local conditions.

The next important MI feature to consider is that of individual loan insurance coverage. MI loan coverage can take one of two forms: complete, 100% coverage of the outstanding loan balance at the time of default, including the interest component, or partial coverage, capping the maximum loss to be covered by the MI provider in the event of loss at some percentage of the total outstanding loan balance at the time of default. Partial coverage, in turn can be one of two types, either quota share cover, or top cover, both of which are offered by India's newly formed MGC (Mortgage Guarantee Corporation – the MI provider), and are illustrated in the following two tables (Table 2.5 and Table 2.6).

Table 2.5: Quota share product - India's MGC

Extent of Loss Cover (A)	15%		30%		50%	
Loss at contract level (B)	20%	40%	20%	40%	20%	40%
Loss borne by the Originator (C = B*(1-A))	17%	34%	14%	28%	10%	20%

Source: ICRA, 2013:4

With the quota share product, contract-level losses are shared on a pro-rata basis between the lender (originator – Table 2.5) and the MI provider, with the maximum claim borne by the insurer capped at some agreed extent of coverage, expressed as a percentage of the outstanding loan balance at the time the lender declares default on a mortgage loan. Because of this sharing of risk, there is no conflict of interests between the lenders and the MGC (ICRA, 2013:4).

Under the top cover product (Table 2.6), as offered by the MGC, the insurer bears the first loss on any contract, with the maximum claim capped at some agreed extent of MI coverage, also expressed as a percentage of the outstanding loan balance at the time of default. Only where total loss exceeds the agreed extent of coverage does the lender bear any loss, equal to the excess (ICRA, 2013: 4-5).

Table 2.6: Top cover product - India's MCG

Extent of Loss Cover (A)	15%		30%		50%	
Loss at contract level (B)	20%	40%	20%	40%	20%	40%
Loss borne by the Originator (C = Max (B-A,0))	5%	25%	0%	10%	0%	0%

Source: ICRA, 2013:5

In designing an MI product, the choice between full and partial coverage is not an easy one to make, due to the issue of moral hazard. The problem is that of adverse selection - given total discretion, and with 100% MI coverage, lenders may want to insure only the highest-risk loans, while retaining the risk associated with good quality, low-LTV mortgage loans on their books. Merrill and Whiteley argue (2003:15) that only partial coverage be given, so that the lender remains with some risk of default, to circumvent the problem. Indeed, this is the route taken by some emerging and transition economies. India, as pointed out, has opted for this, as has

Kazakhstan. Lithuania's newly implemented MI programme had 100% loan coverage in its first year of operation, achieving 1 200 insured loans in just over a year (Trofimovas, 2002:14). However, coverage was reduced to 25% in 2002 (Blood, 2009a:332).

While acknowledging the potential problem, however, Blood (2009a:331-332; 2009b:23) points out successful MI programmes (both public and private) operating on 100% coverage, notably the US's FHA (Federal Housing Authority) programme and Canada's CMHC (Canada Mortgage and Housing Corporation). The adverse selection problem appears not much of a problem in these countries with established MI programmes, many years of experience, and strict lender qualification guidelines to address the issue. However, Merrill and Whiteley do warn that, traditionally, both public and private MI programmes offering full coverage have experienced higher default rates than those with partial coverage (2003:15).

The moral hazard problem does present a dilemma, particularly in the case of a country seeking first-time adoption of MI. On the one hand, there is a desire to instil market confidence in the MI product, as well as the social objective of expanding mortgage availability to include lower income groups. Full coverage (i.e., removing the entire default risk from lenders' books) would seem consistent with these objectives, as lenders would have no immediate commercial objection to extending loans to households previously disqualified on income level grounds. On the other hand, however, an MI provider unprotected from adverse selection would operate in a high-risk environment, with high unit costs and a compromised likelihood of success.

Two ways of dealing with the moral hazard inherent in full coverage insurance have been suggested. One is a regulatory mandate for lenders to use MI on all loans in some defined segment of their portfolio. An example of this is the Dominican Republic, which, for over 50 years, has mandated full MI coverage on all mortgage loans, regardless of LTV. Although run responsibly and fairly successfully, the regulation does add an unnecessary cost to low-LTV loans requiring no MI credit enhancement,, which cost is then passed on to all borrowers (Blood, 2009b:24). The other tool for dealing with adverse selection lies in the use of regulatory capital requirement relief incentives, arguably more agreeable to lenders than the first. This could take the form of lower risk weight factors for all loans in some defined LTV range to encourage origination to a specific target segment of the market.

A third key MI feature is the issue of pricing. This being the subject of chapter 5 of the study, the theoretical aspects are dealt with in that chapter. Two issues deserve mention here, however. First, a consideration of a premium structure must ensure that premium rates are at a level sufficient to cover future losses, assuming economic stress conditions, but at the same time not so high as to impair affordability (Blood, 2009a:332).

Second, in contrast to premium rates for vehicle or property insurance, which the insurer can change annually based on actual experience, the MI premium price is fixed at loan origination for the duration of the entire mortgage loan life. In setting the price, also, the MI provider needs to anticipate future conditions in the mortgage market, which will vary with business cycles. Furthermore, additional to default and prepayment probabilities crucial for price modelling, assumptions are needed about operating costs, recovery values on foreclosed properties in auction, interest and delinquency rates, foreclosure delays, and so forth.

Where a country is adopting MI for the first time, there will be no history of experience and performance data in terms of insured mortgage loans over extended periods. This information being critical for the estimation of default and prepayment probabilities, it can be "borrowed" from databases in countries with a long history of mortgage insurance, such as the US and Canada. Such borrowed data can then be adjusted for current and future expected local market conditions (Merrill & Whiteley, 2003:16).

2.3.5 Some lessons from past experience

It is the case that, given the experience of one MI programme operating in a country at a particular time, whether it is one of success or of failure, something of value can be gleaned for other programmes operating elsewhere at a later time. This is particularly true for start-ups, because lessons can be incorporated in the overall design of the product prior to implementation to avoid similar pitfalls or emulate successes. Unfortunately, for many MI programmes in developing markets, it is too soon to assess success – a programme needs to encounter economic adversity for it to be judged. Nonetheless, some lessons have emanated from countries with mature MI programmes, and Blood (2009a:357-359) enumerates some of them.

In the 1980s, Canada's CMHC (Canada Mortgage and Housing Corporation) MI provider depleted its reserves following two regional recessions, and needed a bailout from the federal treasury. Legislation was then passed, requiring CMHC to be run on sound, commercial insurance principles. This meant higher, actuarially sound premium rates, and more prudent capital reserving.

Also in Canada, a private MI provider in the 1980s suffered severe losses, aggravated by a provincial foreclosure law prohibiting private MI providers from recourse against defaulting borrowers following a claim. Competing public MI providers were exempt from the law. The law has since been abolished, and both private and public MI providers have recourse rights, albeit only on loans with an LTV over 75%.

In the UK, problems with poorly written contracts led to disputes between insurers and lenders in the 1980s. Massive losses following a housing market downturn led to non-payment of claims by MIG providers (mortgage insurance indemnity, as MI is called there). Credibility in the product was lost, and some mortgage lenders went the route of setting up their own captive insurance arms. Although clearer contracts and increased risk sharing in the form of reduced coverage are now in place, weak MI regulation appears to still be a problem in that country.

There has been a suggestion as to why the UK MIG product lost credibility in the episode. In making a case for MI providers to be, and stay monoline, Blood (2009b:23) posits the existence of multiline carriers in the UK at the time of the recession as the cause of the troubles. By "monoline MI" is meant a housing-related insurance programme operated distinctly and separately from all other insuring and non-insuring activities, and regulated as such. Commingling of other insurance lines with MI tends to lead to confusion and a lack of transparency in establishing, for example, claims-paying capacity. As Blood is at pains to make clear (2009b:23), and Klopfer concurs (2005:11), a clear segregation of risk and capital requirement for MI is critical.

Furthermore, the interests of policyholders in other non-MI insurance lines are not well served when their reserves are indistinct from those related to MI. Joyce and Molesky (2009:33) are in agreement with this mono-line requirement for MI providers, offering two reasons. First, in the event of a high incidence of mortgage defaults, multiline carriers could be bankrupted, threatening policyholders of other lines of insurance offered by the carrier. Second, multiline companies will

often not have the requisite specialised focus and expertise required for the long-term nature of the risk associated with MI. The default risk with MI is long-term for the simple reason that one is often looking at mortgage loan terms of twenty-five to thirty years.

The monoline argument for MI is reinforced by two other experiences. The Philippines' public MI programme engaged in construction and development loans, and subsequently suffered excessive losses and required government rescue. Sweden's government MI programme included multi-family rental properties and suffered the same fate (Blood, 2009b:23). This underscores the specialised nature of MI activity, and the need for the accumulated reserves subject to claims by other short-term policyholders to be separate and distinct from those related to MI.

The afore-going are but some of the considerations for any country contemplating MI. Whilst the product offers an extensive array of potential benefits, it can be quite a risky business, more so for countries whose housing markets are relatively undeveloped. As seen in sub-section 2.2.3, however, there are some countries in the developing world with some signs and evidence of MI readiness. South Africa is one of them.

2.4 The case for South Africa

2.4.1 A brief history of policy initiatives since the first democratic election

South Africa's 1994 housing policy laid out a spectrum of measures aimed at facilitating increased access to both bank and non-bank housing finance for the low-income segment of the population. Even before the first democratic government, a broadly consultative forum (National Housing Forum) was set up in 1992 with the objective of negotiating a future housing policy and framework (Huchzermeyer, 2001:304; Merrill, 2001:51). Represented in the negotiations were business, development agencies, organised labour, and the various political parties of the time.

These negotiations culminated in an "accord" reached at a summit in October 1994 convened by the then Minister of Housing, Joe Slovo, the essence of which was a Record of Understanding (RoU) between the state, the major financial institutions, the building industry, and national civic organisations (Huchzermeyer, 2001:304; Tomlinson, 1999:40; Wilkinson, 1998:224).

The RoU entailed a commitment by government to "normalise" the lending environment in the country through enforcement of the rule of law. There had been an almost universal exit by the

financial institutions from the low-cost market because of bond boycotts and difficulties with foreclosures – banks had been unable to repossess properties in township areas. Earlier, in August 1992, The South African National Civic Organisation (SANCO) had called for a bond boycott, which, according to Pillay and Naudé (2006:873), had been largely politically inspired and precipitated by civil disobedience. It is to be noted here that the banks had then only recently entered that market because, up until the late 1980s, black South Africans had been legally prohibited from owning property in the (then) urban areas of the country (Tomlinson, 2006:79). The banks, in turn, agreed to resume extension of mortgage loans to the low-income market, with a target of 150 000 loans in the first three years.

The government, in honour of the RoU agreement, created a number of institutions to help address the concerns of the lending institutions. The first institution to arise from the RoU took the form of the Mortgage Indemnity Fund (MIF), set up by government in 1995 as a three-year interim measure to lessen political risk to lenders (Huchzermeyer, 2001:313; Jones and Datta, 2000:404; Merrill, 2001:57; Tomlinson, 2006:80 Wilkinson, 1998:224). Fully underwritten by the state, the MIF provided a guarantee to accredited lenders in the event that they were unable to repossess their properties through normal legal channels. By the time it was wound up in 1998, the MIF had enabled the financial institutions to underwrite some 140 000 mortgage loans, valued at approximately R10 billion. Of this amount, R4 billion (73 000 loans) had gone to beneficiaries of the government subsidy programme - that is, those earning less than R3 500 pm (Tomlinson, 2006:80).

At that point the government expressed dissatisfaction, claiming that the original target of 150 000 loans should have been for the subsidised low-income sector in its entirety. To this, the banks responded by pointing out the affordability problem in the category (Tomlinson, 2002:12), resulting in something of a standoff on the issue. This, as will be discussed shortly, was to lead to threats by government to resort to US-style legislation (CRA bill – Community Re-investment Act) that would have effectively compelled banks to lend to some sections of the population.

Another institution put in place in terms of the RoU, aimed at dealing with the repossession issue, was Servcon Housing Solutions. A joint venture between government and the Association of Mortgage Lenders (AML), Servcon was launched in June 1995 for the express purpose of

addressing the so-called PIPs (properties-in-possession). These properties had been repossessed by the banks, but had not been foreclosed because of a breakdown of the process of law (Merrill, 2001:58).

The way Servcon sought to achieve this was through the restructuring of defaulting households' loans (including bank buy-backs) and, where necessary, the moving of such households into more affordable homes through subsidised rentals. At about the same time, the National Home Builders Registration Council (NHBRC) was established as a standards authority to address problems relating to shoddy workmanship, thus offering some recourse to households in the event of poorly constructed houses (Moss, 2003; Rust, 2006:6; Tomlinson, 1998:4).

The National Housing Finance Corporation (NHFC) was yet another initiative by government to mobilise housing finance in the low-to-moderate income sector. Established in May 1996 as a development finance institution (DFI), the NHFC was intended to serve as a wholesale financier to mainly non-bank lenders in an effort to help low-income earners unable to afford repayments on mortgage bonds (Huchzermeyer, 2001:313; Merrill, 2001:57; Tomlinson, 2006:82). These non-bank lenders (retail intermediaries) would then extend micro-loans to households for incremental housing improvements.

By the end of 2003, according to Tomlinson (2006:82), the intermediaries funded by the NHFC had provided housing finance to some 209 009 households to the value of R1.46 billion. Rust (cited in Tomlinson, 2006:82), however, has expressed concern about the adequacy of the NHFC's capital base and whether the interest rates on its loans were not too market-related to achieve the scale required for a significant impact on the housing problem. This seems to be borne out by the figures above over a seven-and-a-half year period.

The first decade of the new democracy does suggest problems with housing finance in the low-income sector. For households just outside the eligibility threshold of R3 500 pm, there was little, if any, delivery of houses that they could afford, with many forced to either double up (two families per house) or seek shelter in the informal settlements or inner-city flats (Rust, 2006:9). The Big Four commercial banking groups (ABSA, Standard, RMB and Nedcor) together accounted for nearly 98% of all mortgage lending in the country as at April 2006 (Tomlinson, 2006:82). Their view is that the gap in the housing ladder exists neither as a result of a lack of suitable financial

products, nor due to an unwillingness on their part to make finance available to the low-income sector. They cite a supply shortage problem coupled with inadequate public institutional financial support (Venter, 2009:6).

One issue with the public capital subsidy scheme is that the ceilings defining qualification or eligibility remained static for many years (even though the actual quanta have been adjusted upwards from time to time). For instance, the R3 500 pm ceiling set in 1994 (Table 2.7 below) was still in place in 2009. When adjusted for inflation, this figure amounts to R9 940 pm, or R15 540 pm if one adjusts for the building cost index (Rust, 2006:17; Venter, 2009:8). What this means is that households with the same purchasing power in 2009 as those in 1994 would not qualify for the state subsidy, which could be just what they needed to obtain mortgage finance. The subsidy allocation scheme, which has a sliding scale design, stood as follows as in 1997 (Table 2.7):

Table 2.7: National Housing Subsidy Scheme - 1997

Monthly income band	Subsidy amount (Rand)
0 – 800	15000
801 – 1500	12500
1501 – 2500	9500
2501 - 3500	5000

Source: Figures from DHS, 2014:19

The subsidy amount for the second lowest band was increased from R 12 500 to R15 000 in 1998, then increased again in 1999 to R 16 000, and finally set to R 20 300 in 2002 (DHS, 2014:19). The White Paper on housing of 1994 drove much of the housing policy for the first ten years of democracy, with much focus on the poorest segments of households through free housing subsequently known as RDP houses (from the Reconstruction and Development Programme which was the central economic policy of the early years of democracy).

The White Paper on housing contained several key strategies, two of which are of particular relevance to the study. The one strategy sought to ensure that law enforcement was effective, to lower the perceptions of risk associated with credit provision to the low-income sector that existed at the time. The other strategy consisted in mobilising housing credit from the private

sector specifically targeting households who in principle qualified for mortgage finance (DHS, 2010b:40).

The year 2004 saw cabinet approval of a comprehensive plan for the development of sustainable human settlements, dubbed "Breaking New Ground" (BNG). This represented a significant shift in policy from one concerned merely with housing provision only, to one aimed at the establishment of sustainable human settlements. Coincident with this was the introduction of a new subsidy band, consisting of those with monthly household incomes in the range R3 501 – R7 000 (DHS, 2010b:47).

An unintended consequence of the earlier static subsidy ceilings, as pointed out by Huchzermeyer (2001:314), was that slightly higher incomes would not only disqualify households from the subsidy but, due to inaccessibility to credit, these households would end up with even smaller houses (or no house at all) than the lowest-income beneficiaries. This market distortion would seem counter-intuitive, as one would expect affordability to rise with income level. The Department of Housing was to later recognise this, and introduce inflation linking in their new BNG plan (DHS, 2010b:56).

The 1994 RoU, as mentioned, was wound up in 1998, as had been the original plan, with the government accusing the banks of lending to the wrong sector, and the banks claiming affordability constraints (Merrill, 2001:62). There was a need to explore alternative ways to house those just outside the subsidy ceiling. The feeling among financial institutions was that mortgages were perhaps not the best way to serve the needs of these households, and micro lending with a view to incremental housing (i.e., step-wise house construction as opposed to outright purchase) was suggested (Huchzermeyer, 2001:313; Tomlinson, 1998:6; Tomlinson, 2002:13). Despite the laudable co-operation between the government and the private sector evidenced by the initiatives above, by 1997 it had come to be accepted by both parties that the RoU had not achieved the desired outcomes.

Another option was the use of pension/provident funds, where employers would provide a guarantee for the downpayment backed by employees' retirement benefits. In South Africa, the Pension Funds Act permits the use of retirement funds as guarantees for loan obligations, with the proviso that such loans are for housing purposes (Porteous, 2000:21).

In fact, this use of retirement benefits was the basis for a pilot secondary market project embarked on in April 1999 in an effort to extend broader access to housing finance to the low-income groups. Gateway Home Loans (Pty) Ltd. was formed with the government as the majority shareholder (through NHFC) to pool loans originated by accredited lenders, and to securitise them in repackaged form. The loans themselves (branded "Makhulong Home Loans") were to be secured by borrowers' retirement benefits, with the features in Table 2.8 below contrasted with standard mortgage loans:

Table 2.8: Comparison of Makhulong Home Loan to standard mortgage

	Makhulong-type	*Standard S.A. mortgage*
Maximum Term	8 years/ 12 years	20 years
Interest Rate Type	Fixed/ flexi[4]	Generally variable
Installment to Gross Income	25%/ 27.5%	25-30%
Repayment Via	Payroll deduction from employer	Debit order Payroll deduction Deposit
Collateral	Retirement fund guarantee: minimum 30% Bought in credit insurance for difference	First mortgage bond LTV not limited but extra capital required above 80% LTV

Source: Porteous, 2000:21

As pointed out in Chapter 1 of this study, mortgage-backed securities fall outside the scope of this study. The mention made here of the Gateway initiative is for historical completeness. Interestingly, Porteous (2000:23) concludes that the major constraint in the Gateway project was a lack of sufficient activity in the primary mortgage market in the targeted range, which is the focus of this work. Primary market issues such as product design, origination channels, and credit risk are a vital pre-condition for a secondary market to develop successfully. To mobilise long-term funding for housing in the capital markets through securitisation requires that the underlying assets backing the mortgage securities not only be of good quality, but also that there be sufficient volume growth in the primary market.

2.4.2 A voluntary financial sector charter (FSC)

The termination of the MIF in 1998, with less than successful results to show, led to renewed demands by the trade union movement for stronger government intervention in blending state subsidies with private sector funding. There were calls, even, for a National Housing Bank (Huchzermeyer, 2001:314). This was, it must be borne in mind, against the backdrop of burgeoning informal settlements, rising urbanisation rates and a household formation rate in excess of the rate of housing and service provision.

There were 1.45 million households in informal settlements and backyards in 1996; over a quarter of the households in the country's 9 largest cities lived in informal dwellings; and the perception was that financial institutions were "red lining" inner-city areas and traditional black townships, barring housing investment and sales in these areas (DHS, 2004:4-5).

The government, in light of the afore-going, proposed a new piece of legislation in the form of the Community Re-investment Act Bill (CRA Bill) in 2002. The proposed legislation was modelled on a similar one in the United States, except that it would have compelled, rather than encouraged, financial institutions to set aside a prescribed fraction of their home loan funding for lower- and middle-income households (Merrill, 2001:62; Tomlinson, 2005:33). Through the Home Loan and Mortgage Disclosure Act of 2000, the government could then determine which banks were lending, how much, and where.

In response to the proposed CRA Bill, the financial institutions proposed their own financial sector charter (FSC), committing their industry to providing increased access to financial services for poor households and communities. Through the FSC, the financial institutions determined to inject billions of rand into infrastructure, agricultural development, and low-income housing. To this end, a Housing Task Group had been set up to monitor their performance, and an announcement was made in October 2003.The proposed CRA legislation was then shelved, presumably in deference to the new initiative.

The FSC pledged to release R42 billion into the "affordable housing market" in the first 5 years (i.e., by 2008), targeting those households receiving little or no government subsidy, notably teachers, nurses and the police (Melzer, 2005:5; Landman and Napier, 2010:301). A year and a half later, on 31 March 2005, another signing took place, but this time between the Minister of

Housing and the country's largest four banks, in the form of a memorandum of understanding (MoU). The MoU spelled out that the envisaged target market would consist of those households in the income group R1 500 – R7 500 pm (the charter target market), to be adjusted annually for CPIX (consumer price index excluding mortgage interest rate). Table 2.9 below shows the household income bands that defined the FSC target market segment in the years 2003 through 2007. An indication of the number of households in each income band is also shown, both numerically and as a proportion of the total adult population.

Table 2.9: FSC Income bands and market size each year

YEAR	FSC MARKET SIZE	PERCENTAGE OF ADULTS	INCOME BANDS FROM FSC
2003	9,149,620	34%	R1500, R7500
2004	8,938,811	31%	R1500, R7500
2005	12,098,557	39%	R1600, R7900
2006	12,783,809	41%	R1600, R8200
2007	10,765,943	34%	R1700, R8600

Source: (Moss, 2009:51)

As can be seen in the table, the numbers are increasing in each successive year, somewhat puzzling given claims of overshooting of targets by the financial sector representative in the following paragraphs.

The significance of the R42 billion commitment will be appreciated when compared to the total budget allocation for housing subsidy for 2005/6 of R4.8 billion, less than 9% of the FSC promise. Curiously, though, there were no details furnished on just how the banks intended to go about the process. How did the institutions plan to overcome the hurdles of affordability that had constrained them previously? Had they thought up new products suitable for the Charter target market? The next section will seek to obtain some measure of the performance of the FSC.

2.4.3 Did the FSC achieve its target?

In terms of the MoU, individual financial institutions undertook to furnish the Financial Sector Charter Council (FSCC) with external audit reports of their lending activities in the charter target market to enable monitoring of performance. The reports would include a breakdown of the loans

extended by value, type (mortgage or non-mortgage), household income band, and possibly even purpose (e.g., whether for new houses or for improvements). Moss (2009:47-52) attempted an assessment of the impact of the FSC over the period 2004 – 2008Q3 against the R42 billion target initially set at its inception, and found insufficient detail to establish whether targets were met or not. He wrote (2009:49):

> *"The low-income housing finance component of 2007 FSC report has absolutely no data and information required to assess and measure the impact of the FSC investment to the low-income housing market. It is a very scant report, shoddier than the 2006 Annual Report. When the Banking Association was asked..., the answer given was that that the information is confidential."*

Moss then alleged misreporting, as well as both qualitative and quantitative misinformation. The author concluded that the R43.3 billion over-shooting of the target claimed as of the third quarter of 2008 was misleading, and that on the basis of the available data the FSC could not have made any impact in reducing the housing backlog in the charter market segment (Moss, 2009:51).

In response to Moss's allegations, Venter (2009:5-10), of BASA, responded by describing the argument as shallow and flawed. In his article, Venter maintained that the individual financial institutions would have provided detailed, externally audited, micro level reports to the FSCC. The final reporting format of the FSCC annual reviews, he argued, would have been out of the control of the individual institutions. He also believed, however, that individual institutional achievement scorecards were confidential for competitive reasons. Hence the aggregated nature of the BASA progress reports.

Whilst asserting a commitment on the part of lenders to assist the government in "… *housing the nation …",* he attributed the increase in the housing backlog within the charter market from about 600 000 units in 2004 to approximately 800 000 units by the end of 2008 to a shortage of suitable stock (2009:7).

Venter went on to list a number of institutional framework inadequacies that, he suggested, hindered the exploitation by the private sector of the bondable housing backlog in the country. Among the inadequacies mentioned are both the rand amount of the subsidies and the low

eligibility ceiling, affordability, the capacity of municipalities to process housing development applications speedily (up to three years for developers to obtain regulatory approval), and limited capacity and skills in the construction industry. Land availability in suitable locations, and a general preference by developers to developing in the more profitable middle- to upper-income market segments have also been cited as bottlenecks (BASA, 2008:8).

The tables below (Table 2.10 and Table 2.11) lack the detail necessary to infer the extent of lending to the FSC target market. There is no indication, for example, of how much of the R27.8 billion in mortgages originated up until the third quarter of 2008 (Table 2.10) went to the target segment. However, if only 3% of the FSC target had mortgages as at the end of 2008 (Moss, 2009:51), or only 5% had access thereto as of 2006 (Rust, 2006:18), it would appear to be very little.

The assertion by financial institutions that they had exceeded their R42 billion target would be questionable. Furthermore, if research by the Finmark Trust is anything to go by, 53% of the households in the FSC market do not qualify for mortgage products designed for them. Similarly, looking at Table 2.9, if there really were a meaningful impact, one would ask why the FSC target market size increased from 9 million in 2003 to nearly 11 million in 2007, because one would expect a decrease instead.

Table 2.10: Value of loans originated (2004 - 2008Q3) (R bil)

Period	Mortgage	Fully Guaranteed	Unsecured	Residential Development	Wholesale and Social	Total
2004	7 262	1 013	338	88	658	9 359
2005	6 045	1 083	552	530	828	9 037
2006	6 319	1 181	216	954	1 016	9 686
2007	5 775	795	1 221	1 211	906	9 908
2008Q1	966	136	373	98	71	1 643
2008Q2	772	174	396	287	65	1 694
2008Q3	692	146	305	799	38	1 980
Total	**27 831**	**4 527**	**3 401**	**3 965**	**3 583**	**43 307**

Source: Moss, 2009:50

Table 2.11: Number of loans originated (2004 - 2008Q3)

Period	Mortgage	Fully Guaranteed	Unsecured	Residential Development	Wholesale	Total
2004	57 324	56 106	40 660	2	35 124	189 216
2005	53 159	58 787	51 720	39	45 974	209 679
2006	43 721	59 635	30 736	166	53 677	187 935
2007	55 287	38 212	94 265	88	33 023	220 875
2008Q1	9 235	3 438	26 783	35	1 234	40 725
2008Q2	6 855	6 355	29 878	27	2 321	45 436
2008Q3	6 030	5 515	22 522	16	3 766	37 849
Total	**231 611**	**228 048**	**296 564**	**373**	**175 118**	**931 714**

Source: BASA (Moss, 2009:50)

The question arises, then, as to where the lending went. Again, assuming the lending did occur, since these figures by BASA would have been audited, there is a compelling suggestion that the credit went to the wrong people, that is, the higher-income households outside of the designated market for the charter.

There was an admission on the part of BASA, however, that although the commitment to originate R42 billion in housing finance for lower-income families had been exceeded by some 26%, the financing had largely been allocated to home improvements rather than mortgage loans (BASA, 2008:8). But, if one looks at the FSC's defining income bands, it would appear that a significant proportion of the target segments could not possibly have qualified for subsidy housing, which means they that they would not have had housing to improve on in the first place. In fact, as of 2009, Moss (2009:50) estimated that that an estimated 135 000 new houses would need to be built annually in order to begin to reduce the housing shortage in the gap market.

2.4.4 The social contract – promise of a partnership

October 2014 saw the signing of a revitalised social contract for the Department of Human Settlements. The first came in March 2005. The 2014 social contract represents a partnership between the government and the private sector, and entails a commitment by the signatories to delivery of 1.5 million housing opportunities by the year 2019, at an estimated cost of R250 billion (Crighton, 2014:14).

The signatories to the social contract include mining companies, banks, developers, and other big employers. According to Crighton (2014:14), the initiative will seek to address the country's

housing problem on various fronts, including government subsidies, rental accommodation, upgrading of existing informal settlements, as well as the gap market.

A developer stakeholder, Yusuf Patel, MD of Basil Read Developments (Crighton, 2014:14-16), raised a number of issues of particular interest to this study. The one issue pertains to the need to cut building costs to produce housing units with selling prices in the right range for the targeted market segments. Consistent with findings earlier in this chapter, delays in the approval process in relation to town planning and environmental issues, as well as availability and cost of bulk infrastructure (sewerage, water treatment, roads, etc.) were raised as an impediment. Such delays can add substantially to the cost of the finished product. Affordability of finance was another issue raised, with calls for innovative financing solutions to make monthly repayments cheaper. It is submitted here that MI could be one such innovation.

The figure of 600 000 as a housing backlog in the gap market was quoted, as was an average selling price of R350 000 for a property in this market, requiring a household monthly income of at least R 11 667. Such figures are the kind that aid in the setting up of assumptions for a simulation exercise, as will be seen in chapter 7 of the study.

Following the signing of the social contract, the fifth annual banking summit was held, whose theme was housing delivery (Oberholster, 2014:23-27). Representatives from various stakeholder groups met to discuss possible solutions to the country's housing problem, including BASA, the Housing Development Agency, Centre for Affordable Housing Finance, the National Treasury, and the South African Affordable Residential Developers' Association. At this summit, too, regulatory constraints were mentioned, as well as problems of location and transportation.

The World Economic Forum's Global Competitiveness Report (BASA, 2010:8) ranked South Africa ninth out of 139 countries in the category of financial market development. In the same report, the country was placed 6th for soundness of banks, 2nd for efficacy of corporate boards, and 1st in both categories of auditing and reporting standards and securities exchange regulation. The country does seem to meet many of the prerequisites for MI implementation.

2.5 Conclusion

Mortgage finance markets operate within a housing finance system, and so the chapter began with a global look at housing finance systems and their importance to national economies in aggregate. The useful ratio of mortgage debt to GDP was employed to contrast the relative sizes of housing finance markets in developed countries as against those in emerging and transition markets, showing a clear pattern that in well-developed and sophisticated housing markets mortgage finance in general accounts for a far bigger slice of GDP than is the case in emerging economies.
The chapter then turned to the question of how finance systems evolved historically, and sought to explain the differences in housing market size by outlining the issues hampering mortgage market development in developing countries. Macroeconomic instability and infrastructural inadequacies were isolated as serious impediments, and the need for capital market development to provide the needed long-term funding for such long-term assets as mortgage loans was explained as necessary to address the traditional banking model problem of funding short and lending long.

Sub-section 2.2.3 looked at the state of mortgage markets in emerging economies, noting that although small, in most of these countries the markets were growing. Figure 2.10 depicted a surprise observation that Sub-Saharan Africa was ahead of all but the OECD countries in terms of mortgage debt as a percentage of GDP. Having noted that some countries in Asia, Eastern Europe, and Latin America had implemented MI operations, an implicit suggestion was made that perhaps some countries in Africa could be ready for the product.

The chapter then turned closer to the subject of the study, mortgage default insurance itself. MI was defined, and its purposes and benefits outlined in terms of how it helps expand primary mortgage markets through its risk-sharing mechanism and the incentives accorded to bank lenders in the form of capital requirement relief. MI's role in facilitating secondary market development as a credit-enhancing tool was pointed out too.

The question of whether any country is ready for MI implementation was addressed through a consideration of the numerous prerequisite conditions. Sub-section 2.3.4 then looked closer at MI operation, and sought to provide an understanding of how the instrument works in practice. LTV as a major determinant of default risk was explained, as was the difficult moral hazard problem faced when deciding on just how much risk to transfer out of the banking sector.

It was then pointed out, in sub-section 2.3.5, that it was early days to judge success for many of the newly formed MI programmes in developing nations, and the section on MI concluded with several country-specific lessons learnt on how not to operate MI. In particular, the mono-line argument was advanced, and problems in the UK with that country's relatively weak MI legislation and tendency for a multi-line approach were criticized.

The final section looked at South Africa herself, and began with a brief account of housing policy development since the first democratic elections. The numerous policy initiatives were chronicled, including the voluntary financial sector charter and its large R42 billion commitment. The question of whether the FSC had actually met (or overshot, as claimed) targets was raised, and could not be answered conclusively.

The last sub-section lauded the apparent willingness by government and the private sector to tackle the country's housing problem jointly, as evidenced by the recent signing of the social contract. The impressive ratings commanded by the country's banks, as well as securities exchange's regulatory performance were mentioned finally, with the suggestion that the country does in fact meet many of the conditions required for MI to work. The next chapter turns to the question of how one might go about assessing the feasibility of implementing MI.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The thesis statement in Chapter 1 posits that MI *may* help promote access to mortgage finance among a certain grouping of formally employed South Africans presently unable to acquire residential property, owing mainly to income-level constraints. This chapter aims to provide a framework within which some assessment may be made of the possible impact of MI on the paradoxical situation of the gap market. The framework itself is not tailor made for the gap market, and could in theory be applied to any market segment of interest. It is rather the assumed values, in terms of mortgage borrower characteristics such as, for example, income level, that make it applicable to one and not the other segment.

The goal, as implied in the thesis statement, is an examination of the suitability of MI in South Africa, but only to the extent that the programme might alleviate the plight of the so-called gap market. Suitability, in this context, means, on the one hand, potential borrower affordability and, on the other, insurance provider profitability and sustainability. Both hands must hold - without the one or the other, the MI programme must be rendered unsuitable.

Borrower affordability within the gap market is known, by definition, or at least determinable. Of concern in this study is the other hand, i.e., profitability and sustainability. In the present study, however, focus will be on profitability, further defined to mean, rather simply, positive post-tax earnings. It is granted that a public MI entity (throughout the study, the word “entity” is used synonymously with “company” or “business” or “corporation” – a simple reference to the body formed to run the MI programme as the insurance provider) does not have to pay taxes, but the conservative stance is chosen on purpose, in the interests of prudence.

Simulating a business over a number of successive periods suggests a future-oriented approach. It is, indeed, possible, as noted by, among others, Hofstee (2006:126) and Neville (2007:2), to speculate intelligently about future possibilities based on a scrutiny of present available evidence. Key to such a study is the quality and reliability of such *present available evidence*, upon which conclusions are ultimately pronounced. Sub-section 3.3 below will elaborate on the nature of this evidence as it applies to this study.

The study proposes to conduct an appraisal of a hypothetical company, initially capitalised by the state, but with a view to eventual privatisation at a time in the future when sufficient incentive might have arisen for private sector participation in this market. The purpose of such a MI programme would be to provide a credit enhancing mechanism through which households in the gap market (and by no means excluding those above this market) would access mortgage finance and thus achieve affordable, adequate housing. Section 2.3 in the preceding chapter explains how MI achieves this through the credit risk sharing mechanism and thus the lowering of cash downpayments (i.e., higher LTV loans).

The appraisal of the MI Company is based on financial performance over time and financial position at specific points in time in the future, given a set of three main possible primary scenarios. The scenarios are designed to capture a range of possible macroeconomic conditions in the country several years into the future. They range from *Worst Case*, with pessimistic assumptions in terms of mortgage interest rate and an insurance premium price computed based on a relatively high claims rate, through *Base Case*, constituting what are assumed the most likely values, given current information (as of the year 2011), to *Best Case*, the most optimistic scenario.

Each of these scenarios will then give rise to a set of measures of both financial performance and financial position, all of which will constitute criteria for assessing the viability of such an operation under local conditions. Viability in this context will initially mean, as mentioned above, positive post-tax earnings. Given, at a minimum, that the entity generates a positive return, an evaluation of the sufficiency of such a return can begin, with the basic requirements in mind that reserves will need to be built up, and that the investor will (and should) expect a dividend.

The measures of performance and position derive from an analysis of the pro-forma financial statements generated in each scenario. Specifically, figures of revenues and costs will serve as inputs. Revenue for the MI entity will depend on the pricing of the insurance product in terms of premiums charged, as well as on investment returns from the initial capital injection at start-up. Chapter 5 of the study will deal with the important issue of premium pricing, out of which the three primary scenario assumptions arise. The mortgage loan originator (lender), as the client, remits the premium charged to the MI Company. However, as will be discussed fully in that chapter, the up-front single premium received (covering the entire term of the mortgage loan) is

not recognized as revenue in its entirety upon receipt. It is earned (and taken to income) proportionately with the passage of time depending on a claims pattern.

The investment income stream will depend on yields on government bonds with a maturity similar to that of the mortgage term, as it will be assumed that the MI will be restricted by its covenants (as is the norm in the MI industry – (CMHC, 2010a:15)) to investment classes that are riskless (or near-riskless). The MI Company's investment portfolios will also need to be liquid, for ready cash access to pay claims promptly.

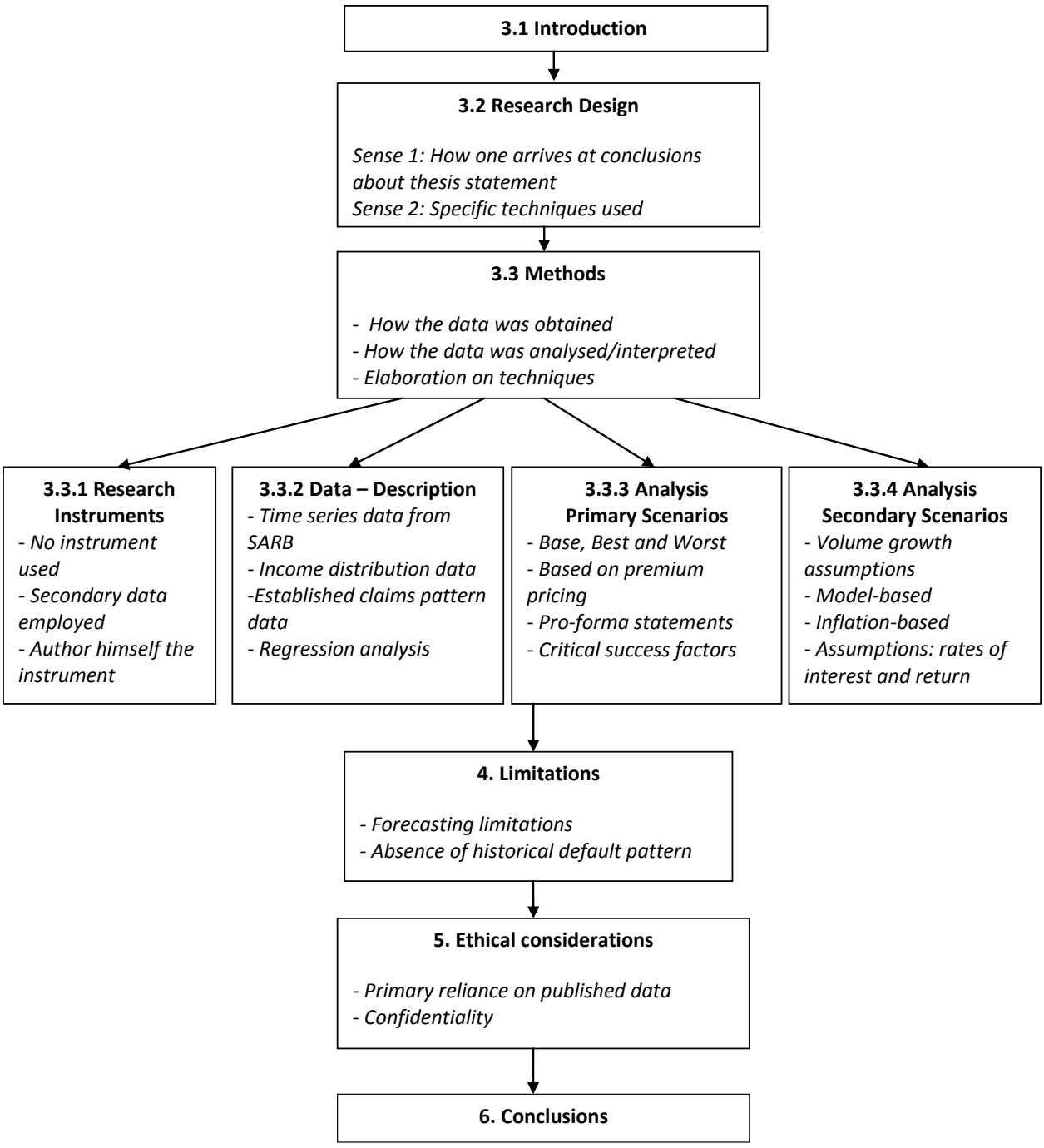
At quarterly intervals, the number and value of mortgage loan originations by the lending institutions in the country are public knowledge. For example, the residential mortgage book as at March 2011 stood at R 769.89 billion (Eighty20 Consulting, 2011:5), representing just under two-thirds of all consumer credit extension in the country. Statistical tables containing these figures appear in every quarterly bulletin of the SARB (South African Reserve Bank). The Financial Sector Charter Council (FSCC) compiles detailed information at a micro level (Venter, 2009:5) in line with the Financial Sector Charter (FSC) agreement of 2003 (Tomlinson, 2005:34) to provide lending patterns in respect of mortgage loans. The Office of Disclosure established by the Department of Housing (now Human Settlements) under the Home Loan and Mortgage Disclosure Act (2000) calls for details of lending figures by the financial institutions (Melzer, 2005:28). This requirement was also agreed to at the inception of the FSC (Moss, 2009:49) in order to enable a breakdown of loans according to income bands of households as well as loan type (mortgage or non-mortgage).

Availability of these mortgage loan origination figures on a historical basis permits a time-series forecast of mortgage lending. The study uses data from January 1997 to December 2009, representing 156 months, to build a classical linear regression model, employing certain time-series national economic variables as leading indicators (explanatory variables).

The results of the regression analysis are used as inputs for an assessment of how the proposed MI business might fare, in terms of initial loan underwriting volumes. For this assessment, a number of assumptions are made, discussed fully in Chapter 5: Premium Pricing and Related Design Features. The data from the SARB and the statistical office (Statistics SA) are considered reliable for the purposes of this investigation, and of sufficient reliability in the context of the research design to use in forecasting future residential mortgage advances.

Figure 3.1 below depicts the layout of the whole of this chapter, organized as follows: the next section outlines the two-legged approach of the study, and explains the philosophy and thought process that lead to the conclusions of the study. A spectrum of decision-making techniques involving risk is discussed, and the weaknesses inherent in the overall research paradigm are acknowledged. Section 3.3 presents a full description of the data used and how they were obtained, and provides a rationale for the techniques applied to analyse the data. Read together with the preceding section, a transparent, logical methodology should emerge. Section 3.4 comments on the limitations of the study, section 3.5 mentions the absence of ethical implications in the study, and section 3.6 concludes.

Figure 3.1: Overall layout of the chapter



Source: Author's construction, adapted from Hofstee (2006:112)

3.2 Research Design

There are at least two senses in which the term *research design* may be used, as indicated in Figure 3.1 above. It may, for instance, be used to refer to the manner in which the researcher comes to a conclusion about the thesis statement (Hofstee, 2006:108), or as a reference to the general techniques themselves, such as, for instance, interviews, a case study, experiment, etc. used in the collection of data. Likewise, according to the same author, *method* may refer to how one considers the thesis statement, or to the general techniques employed in examining the hypothesis posited in the first chapter.

In a similar vein, Greener (2008:10) draws a distinction between *method* and *methodology*, and insists that the former must mean the specific activities designed to generate data, whereas the latter is more about the researcher's attitude and understanding of research, and the strategy chosen to answer the research questions. Guthrie, Parker and Gray (2004:417) agree that the terms mean very different things, that *methods* are the means of data collection and analysis, whereas *methodology* is a reference to the philosophy underlying those methods.

In the current study, research design takes on the meaning of the grand plan of approach to the research topic, and the method is understood to refer to the repertoire of specific activities and steps, undertaken sequentially to impart transparency of logic to the manner in which the thesis statement is probed. This is in line with the view of Jonker and Pennink (2009:22), who use the term *research paradigm* to mean the researcher's view of reality, expressed in a basic approach to conducting the research study, with *method* a reference to the specific steps of action followed in a particular sequence. Based on a set of premises, theoretical considerations and practical conditions, the researcher structures the logic of the research into a research design that justifies whatever pronouncements are made about the research questions posited at the outset.

For the purposes of this study, this entire chapter on methodology will be dedicated to elucidating the structuring of the logic of the study, as well as to the techniques employed in obtaining the "present available evidence" mentioned in the introduction to this chapter. The principal research design adopted in this study is an evaluative research or appraisal - a feasibility investigation regarding the workability of residential mortgage insurance in South Africa. Evaluative research as a research design seeks to arrive at a conclusion about "… the success level of some happening

or intervention", according to Hofstee (2006:126). The introduction of MI to the South African housing finance market is seen in this study as that "happening or intervention", called for by an ever-widening gap market despite current and previous efforts at eradicating it.

3.2.1 Leg 1: Time-series forecasting – Regression Analysis

The question whether MI is suitable for South Africa, or vice versa, requires a consideration of, among others, the size, and nature of the housing finance market, and the regulatory landscape upon which the market operates. Reference hereto was made in Chapter 2 (particularly sub-section 2.3.3). The regulatory regime is appraised qualitatively in Chapter 6 of the paper, having covered the background to it in Chapter 2, where the nature and evolution of the housing market was looked at. For quantifying the residential mortgage market, the statistical technique of classical linear regression analysis is employed in this research.

Regression analysis is used widely in the field of econometrics, and national treasuries and big financial institutions across the globe employ econometricians to develop and refine models aimed at predicting the behaviour of economies. Harrison and Herbohn (2008:38) observe that teams of econometricians will sometimes spend several years validating and refining such models as, for example, those seeking to predict the impact of policy instrument changes (e.g. government spending or interest rates) on the level of economic activity. Highly sophisticated econometric and simulation models are often the result of such labour and effort.

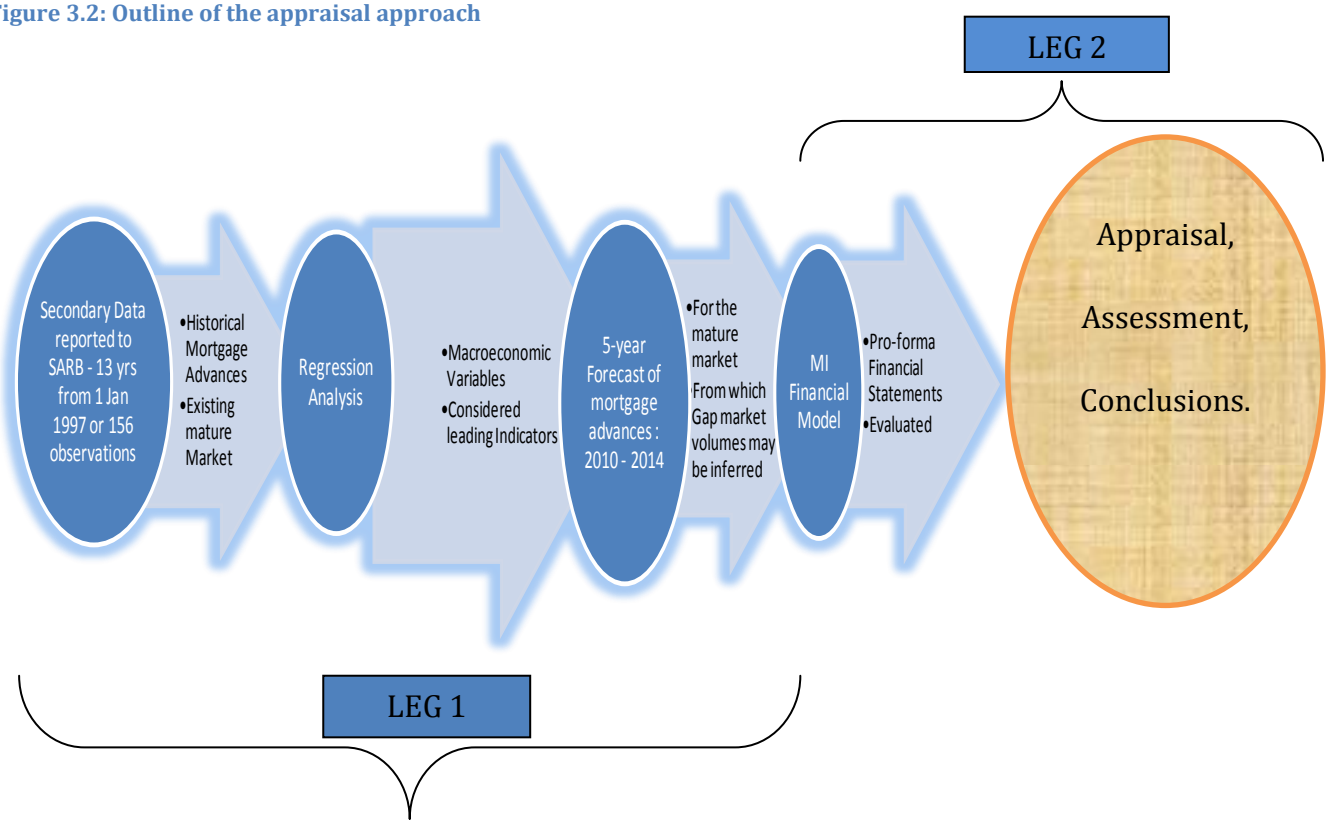
This research dispenses with such sophistication, and uses a simple classical multiple regression model to forecast residential mortgage extension. As economies expand or contract, some time-series variables tend to change ahead of others, heralding some warning about the direction of change to come. Considerable research in Economics has gone into identifying such so-called leading indicators (Harrison & Herbohn, 2008:38), and examples include housing starts, inventories of business firms, retail sales, and new vehicle registrations.

Francis Galton is credited with having first introduced the technique of regression analysis in 1886 (Katircioglu, 2010:2). In his famous paper, "Family Likeness in Stature", Galton found that the average height of children born of parents of a given height tended to "regress" toward the average height in the population as a whole. Regression analysis is concerned with the dependence (or lack thereof) of one variable, *the dependent variable*, on one or more other

variables, called *the independent or explanatory variables*. The first leg in the grand plan of approach involves a forecast of mortgage credit extension, the dependent variable in the study, with a four-year horizon. The estimation of the residential mortgage advance figures for future periods uses the historical time series values supplied by the lending institutions to the SARB. These monthly figures span a period of 13 years dating back to 1 January 1997, yielding an aggregate of 156 data observations. The mortgage lending is regressed on a number of macroeconomic variables considered to have predictive value for residential mortgage credit extension. These variables are the prime rate of lending, new vehicle sales, household credit extension, the M3 money supply measure, the consumer price index, and the overall private sector credit extension.

In the second leg, the study carries out an appraisal (or evaluation) based on the output from pro-forma financial statements projected over the forecast period. The end goal is an assessment of the financial performance and position of the hypothesized MI business entity over a 9-year period, achieved through an analysis of the pro-forma financial statements constructed based on the forecast volume estimates derived from the first leg. Schematically, the overall approach is show in Figure 3.2 as follows:

Figure 3.2: Outline of the appraisal approach



Source: Author's own construction

The secondary data employed (based on which the demand forecasts for mortgage lending are estimated) is considered reliable by virtue of source: The SARB publishes various statistical tables in its *Quarterly Bulletins* from which the relevant data was extracted. The precise nature of the data is described below, under section **3.3 Methods**. Where appropriate, data from Stats SA was used as a crosscheck. These two institutions compile and maintain records of national economic importance, and the study relies on these sources for authenticity and quality of the data used.

The regression model used here pits mortgage lending against a selection of leading indicators (independent or explanatory variables) to establish the degree to which each of the latter variables, individually and in combination, explain (statistically) the former. The reader will remember, at this stage, that regression analysis ought not to be misinterpreted as suggestive of causality. Although methods exist to establish causality, the method as applied here merely picks up, from historical time series patterns, coincident associations between the dependent variable, on the one hand, and the explanatory variables on the other. No attempt is made (nor does it need

to be) to suggest that variations in the explanatory variables cause those in the dependent variable.

Successive elimination of those explanatory variables adjudged insignificant (in a statistical sense) as predictors results in the retention of four of the explanatory variables in the regression model. The retained model suggests that there is a 6-month lag in the relationship. Put another way, variations in the explanatory variables affect mortgage lending a half-year later. The specific model used in forecasting future mortgage lending is the subject of the next chapter.

3.2.2 Leg 2: Traditional investment appraisal

Leg 2 of the methodological approach concerns the generation of pro-forma financial statements and the analysis and interpretation thereof. This phase is thus characterised by decision-making processes under uncertainty. The uncertainty arises not only from the fact that the mortgage origination figures constituting the input bases for revenues and costs in the projected financial statements will be mere forecast estimates, but also from a host of other input variables representing assumed states of the economy at different points in time, as enumerated in Table 3.3.

The reader will remember that among the ultimate goals is a pronouncement regarding the commercial viability of an entity that would be the first of its kind in the country. Viability may be in one of three senses: a) financial viability, a reference to funding ability, b) financial profitability, looking at post-tax earnings, or c) triple-bottom-line performance, which considers performance measures of social and environmental responsibility in addition to financial profits.

In the context of the present study, however, the primary question to answer is whether the MI business entity could self-sustain, in the sense that adequate reserves would be built up in the course of time to meet claims obligations and regulatory capital requirements, and that situations requiring government bailouts, however infrequent, would not arise. At a minimum, therefore, positive post-tax earnings will suffice as an indicator of feasibility. Questions as to the adequacy of returns on capital invested, and any others attempting to measure the degree of success or failure of the business are not the subject of this study.

In essence, the exercise boils down to an appraisal of an investment proposal. The government, through the National Treasury, puts up funding for the initial capitalisation of an MI company; disregarding for a moment the social nature of the project, one then looks at the relevant cash flows over a particular period of time and applies a discounted cash flow analysis (DCF) to assess the project's commercial viability, as defined. However, in contrast to company-level capital budgeting decision making, what is being investigated here is potentially a new national industry, with far-reaching implications for a housing market accounting for over a third of the country's GDP (see, for example, Figure 2.1).

Typically, textbooks on managerial finance and corporate finance espouse the use of net present value and internal rate of return calculations (NPV and IRR) in project or investment proposal appraisals. Students are taught the importance of identifying cash flows relevant to the underlying project being evaluated, and the need for risk adjustments to the discount rate being used where there is uncertainty associated with the cash flows (Ross, Westerfield & Jordan, 2000:318; Gitman, 2010:411). The introduction of risk complicates the appraisal exercise, and leads to the employment of what-if analysis tools such as scenario analysis, sensitivity analysis, simulation, and the more advanced Monte Carlo methods.

3.2.3 Devil's advocacy and dialectical inquiry – decision making under uncertainty

There are many approaches to decision making in situations of uncertainty. Where strictly objective data are scarce, for example, the Delphi Method has been found useful (Harrison & Herbohn, 2008:13). Developed in the 1950s by the Rand Corporation, the technique seeks to elicit opinion on estimates from a panel of experts, without allowing interaction between individuals on the panel. The technique proceeds through a series of rounds of questionnaires, with responses from each round being consolidated and re-presented to the panel, allowing, thus, opinion adjustment at each stage, and continues until there is no further convergence of opinion. It would have been possible, at least in theory, to have convened such a panel for this research study. Panellists could conceivably have included representatives from financial institutions (mortgage lenders), government (national treasury as envisaged sponsor), the FSB (insurance regulator), and so forth.

Another group technique, with much support in the 1980s, is *Devil's Advocate* (or DA). The idea with DA is a deliberate and managed introduction of conflict (or dissent) into the decision making process, to discourage premature consensus (Cosier & Schwenk, 1990:69; Harrison & Herbohn, 2008:13; Katzenstein, 1996:316; Lunenburg, 2012:5-6; Schwenk, 1984:153). Proponents of this approach argue that the notion that meetings and decisions should reflect agreement and consensus inhibits the challenging of assumptions and the consideration of alternatives, detracting from the quality of final decisions taken.

In the same mould as DA is *Dialectical Inquiry* (DI), developed by Mason and Mitroff (Katzenstein, 1996:316; Schwenk, 1984:156), whose idea is to produce the most divergent of solutions in the decision making process, through explicitly identifying the pivotal assumptions providing the foundation for the favoured strategy, and analysing them. Pitting diametrically opposed assumptions and recommendations against one another, the ensuing dialogue should enable the participants to explore the problem's structure and surrounding issues from multiple perspectives. A synthesis then evolves that retains only the surviving, and hopefully superior, solutions.

An important difference between DA and DI is that whereas the former merely requires a critique challenging the key assumptions underlying the dominant strategy, DI requires a formulation of explicit counterplans. Katzenstein (1996: 316-332) conducts an extensive exploration study with the aim of establishing the superior technique between the two, and finds no conclusive evidence in favour of one or the other. What does emerge from his studies, however, is that structured debate does produce higher quality decisions than unstructured approaches such as those involving consensus and expert opinions.

The field of behavioural finance has put forward an interesting proposition relating to strategic decision making, particularly in high stakes situations such as those involving national welfare and national security. The potential for decision failure in such situations must admittedly be minimised. Kahneman and Tversky coined the term *decision frame*, to refer to a decision maker's perception, in terms of gains or losses, of the possible outcomes of a risky decision (Whyte, 1991:24). The proposition is that people generally prefer risky options when choosing between losses, but avoid losses elsewhere. One example of this behaviour is the continued lending of

additional money by Western banks to nation-debtors, in preference to the alternative of cutting off credit and thus incurring sure losses on defaulted previous loans. Another is the tendency for shareholders on securities exchanges to hold on to losing shares longer than they should, in the hope of recouping losses. By minimising framing effects, the incidence of decision failure can be reduced, because people respond differently to losses than to gains.

The current study, in essence, may be viewed, from the primary stakeholders' standpoint at least (government and lending institutions), as ultimately necessitating a decision to be taken as to whether to embark on MI implementation. There is uncertainly in nearly every facet of the process – in the future states of the economy, in the adequacy of the premium price, in the unknown future repayment behaviour of the potential borrowers, and so forth. More specifically, as Chapter 5 will expand on, much of the uncertainty may be encapsulated in two variables: the interest rate environment and house price movements. The two variables, in combination, provide a basis for modelling theoretical default, and lead thence to a theoretically fair premium price for the insurance product.

The study attempts to provide a framework within which, and a platform from which the main stakeholders may seek the final decision about MI implementation. It assumes the role of devil's advocate, in a sense. There will conceivably be those, on either side of the transaction, with the view that MI is not for low-income households. There is a view, for instance, that mortgages are not suitable for Africa's low-income groups; that, even were all those qualifying for mortgages in Africa to be granted access, only a small fraction of the continent's housing finance needs would be served (Kitchin, 2014:3; Rust, & Gavera, 2013:4). Micro-finance with a view to incremental housing construction, and pension-backed loans have been suggested as suitable alternatives to traditional mortgage financing. Whilst this study does not rule out these avenues, it points out that conditions exist in some of the continent's countries for a serious consideration of MI.

3.2.4 An autobiographical note: the researcher's involvement in government deliberations

During the second half of 2010, this researcher was engaged by the NHFC during the first two phases of a study to assess the feasibility of MI implementation in South Africa. Consultants from CMHC had been retained as experts for the purpose, given that country's long history of successful

MI operation, both in their home country and internationally, where they provided assistance in first-time implementation of residential mortgage default insurance programmes.

It was during this time that the author had opportunity to engage in discussions with relevant stakeholders, notably the National Treasury, the Department of Human Settlements, and the main mortgage lending financial institutions. Meetings were held with some research organisations involved in the business of housing finance, such as Finmark Trust and Lighthouse. Much insight into the key issues relative to housing finance provision to the low-income market segment was gained during this time.

This study will rely on scenario analysis to account for the considerable uncertainty inherent in the financial statement figures generated. Group techniques discussed above were not included, for a number of reasons. To begin with, under scrutiny here is a hypothetical entity, so an organisation does not yet exist. However, limited stakeholder opinion was obtained whilst the researcher was in the employ of the NHFC, as mentioned above. It was during this time that opinions from the major banking institutions, the FSB well as from National Treasury were elicited.

A not-so-obvious reason for dispensing with the more sophisticated techniques is that strict accuracy was never intended. The study merely sets out to establish boundary conditions beyond which the MI entity would not be a workable proposition. In this sense, the study takes on an exploratory face, and says, to those against the very idea of MI, with a typical devil's advocate countenance, why not?

3.2.5 Weaknesses

There are, as pointed out in the preceding, more complex ways of forecasting time-series data. No doubt, less forecast error results from the more advanced models, which include autoregressive integrated moving averages (ARIMA models) and the fitting of co-integration models. The simpler regression model used was considered sufficient to yield estimates in respect of future mortgage lending in the housing market. This simplicity, however, comes at the cost of several attendant weaknesses, as discussed below.

The futuristic perspective necessitated by an appraisal of this nature led to the inclusion of a multi-case scenario analysis based, first, on premium price assumptions, and then on varying growth rates in residential mortgage lending volumes over a five-year period starting 2010. This was done to provide both an indication of sensitivity of financial performance over the period, and of the level of confidence regarding the evaluation results.

Inherent in the study, then, is the natural weakness associated with any forecasting activity. It may, however, be argued that such a weakness is par for the course in business planning in general. Another weakness relating to Leg 1 of the research design requires pointing out: the 156 observations (13-year monthly figures) of mortgage credit extended pertain to the existing, mature mortgage market. Households applying for, and being granted mortgages presently, are in a higher income segment than the target market for which the MI product is primarily intended. It is not clear to what extent the gap market will mimic this mature market in terms of default behaviour. Closely related to this shortcoming is the question of penetration rate. Although the gap market size may be estimated, it is another matter to predict take-up interest: at what speed, and in what numbers, will the gap market take up the opportunities offered by MI?

As pointed out in Chapter 2 above, default patterns are crucial to estimating claims patterns, which in turn affect the amount of revenue to be recognised each year. It was necessary, therefore, to assume that lower-income earners value their houses just as much, at a minimum, as their upper-income counterparts, and will thus not exhibit a greater incidence of default, barring some national economic shock that simply disables them to keep up their mortgage payments. Some indication of this similarity in default behaviour and incidence has been observed by the banking institutions (Banking Association South Africa, 2008:12) in respect of the FSC target market segment.

Yet another difficulty relates to the fact that even the mature existing mortgage market would be seeing MI for the first time. There is no prior history upon which to base estimates of future default behaviour in the presence of MI. Yet without such a default pattern there can be no way of establishing a claims pattern necessary not only to ensure an appropriate revenue recognition policy, but also to set aside capital reserves as a provision against expected losses.

The study deals with this complication by "borrowing" a claims pattern from the Office of the Superintendent of Financial Institutions (OSFI) in Canada. This is on the basis that the Canadian regulator has had a long history, through their federal agency the CMHC, of assisting other emerging markets with the process of setting up new MI programmes. This is not unusual; for example, in the process of setting up the MI programme in Kazakhstan, Merrill and Whiteley (2003:16) that the premium model used was based on US mortgage loan experience data, due to the absence of any history in that country. The rationale here is that adjustments will be made with the passage of time, as a mortgage default pattern unique to the country emerges.

3.3 Methods

3.3.1 Research Instruments

The study makes no use of research instruments, given the availability of data as described below. Hofstee (2006:116) makes the point that this by no means detracts from the quality of investigative research such as obtains here. Likewise, Clark (2005:57) believes it acceptable to base a dissertation entirely on secondary data.

In their wish to establish a mortgage loan default insurance company, the NHFC engaged the services of CMHC to assess the feasibility of introducing MI in South Africa. CMHC, as pointed out in Chapter 2, have had much experience, not only in Canada, but also in other countries where they provided assistance in developing an MI business for the first time.

The CMHC delivered a feasibility study to the NHFC in December 2009, where after they were retained to further assist in terms of general requirements for getting the business off the ground. It was at this stage that the author got involved, in the latter half of 2010. This study thus derives much of its *tour de force* from the author's personal involvement with the various deliberations at that stage.

3.3.2 The Data: Description and analysis

The data range for forecasting purposes (i.e., Leg 1) is January 1997 to December 2009. Table 3.1 lists the data and respective sources, with a description there under. A sample of the actual time series data (for the years 1997 through 1999) is included in Appendix 2.

Time series data from the South African Reserve Bank

Table 3.1: Volume Estimate Data Sources

DATA		SOURCE
1	New residential mortgage loans	SARB KB208 (2120M)
2	Household credit extended	SARB KB124 (1505M)
3	New vehicles sold (indices)	SARB KB705 (7067N)
4	Prime overdraft rate of interest	SARB KB129 (1403M)
5	M3 money supply measure	SARB KB125 (1374M)
6	Private sector credit extension	SARB KB124 (1347M)
7	Consumer price indices	SARB KB709 (7170N)

Source: Author's own

New residential mortgage loans

The lending institutions (banks and mutual banks) supply these figures to the central bank. The SARB Quarterly Bulletin (SARB, 2010: S-25) points out that as from October of 1988 only gross amounts are available due to a change in banking regulations. "Gross amount" is defined as mortgage loans granted before deducting the mortgage balances outstanding on the properties purchased. Net amounts would have been ideal for the purposes of this study, as it is the variation in new demand per period that is of interest. In a strict sense, however, even such an amount would not quite equal actual demand, given that the loan application approval rate is hardly ever 100%. For example *ooba*, a leading mortgage bond originator in the country, estimates the effective approval rate as of June 2011 at 63.4%, according to Geffen, ooba's CEO (Property & Money, 2011, para. 4). A further complication is the fact that some applications declined at one institution may be approved at another. For these reasons it would be difficult to find an exact measure of total demand for residential mortgage finance.

Household credit extended

This serves as a measure of household indebtedness. It includes instalment sale credit, leasing finance (excluding unearned finance charges thereon), mortgage advances and other loans and advances. It stands to reason that a high degree of indebtedness should negatively impact on demand for mortgage finance. Thus one would expect a negative coefficient for this variable in a regression analysis model.

Household sector net worth, or wealth, and variations herein are an important determinant of final consumption expenditure in any economy (Kuhn, 2010:66). In turn, this final expenditure directly affects final demand and therefore the GDP. Net worth is simply the difference between total assets and total liabilities.

New vehicle sales

According to the SARB Quarterly Bulletin, the National Association of Automobile Manufacturers of South Africa supplies these figures to the bank (SARB, 2010: S-135). The figures exclude exports. The basic data thus supplied is then transformed into an index by the bank. For this study, the indices used were rebased to the year 2000 (i.e., 2000 = 100). Intuitively one expects that, in an expanding economy, sales of new vehicles would be on the rise, implying a positive correlation between this variable and mortgage finance demand.

Prime overdraft rate of interest

This is the benchmark rate at which private banks lend out to the public, or the lowest rate at which a clearing bank will lend money to its clients on overdraft. In South Africa this figure, for many years now, is arrived at by simply adding 350 basis points to the central bank's official repurchase rate (repo rate). The repo rate is the rate at which the private (sector) banks borrow local currency from the SARB. Alternatively one may look at the repo rate as the agreed price at which the sale of existing securities (financial assets) occurs, coupled with an agreement by the seller to repurchase (buy back) the same securities on a specific future date at the same price. The Monetary Policy Committee of the SARB may adjust this rate periodically (every six weeks) as a tool to help maintain the inflation rate within a set target. The thinking behind including this variable as an explanatory variable is that the higher it gets the more costly mortgage finance should be to households, indicating therefore a negative impact on demand for such finance.

M3 Money supply measure

This represents a broad money supply measure, which is a summation of banknotes and coins in circulation, cheque and transmission deposits, other demand deposits of the domestic private sector, short- and medium-term deposits, and long-term deposits with the monetary sector. In a

contracting economy, this measure declines, and as a result, a positive correlation ought to exist with demand for mortgage finance.

Private sector credit extension

The Quarterly Bulletin (SARB, 2010: S-22) defines this as the sum of investments, bills discounted, leasing finance, instalment sale credit, mortgage loan advances, and other loans and advances. As with household indebtedness, this variable ought to bear an inverse relationship to mortgage demand, for the same reason that a private sector already burdened with debt would not be expected to afford more by way of residential property.

Consumer price index

The CPI is an index of the prices of a representative basket of consumer goods and services. The most common use is to calculate inflation rates. The SARB obtains these figures from Statistics South Africa (Stats SA). A rapidly rising level of prices should have a negative impact on demand, and so a negative coefficient for this variable would be expected in a regression model. In the period under investigation there were three base-year changes as well as and adjustment of the weights assigned to the categories of goods and services in the representative basket. As a result, all the data for this variable had to be adjusted to have a single base year (2000).

Regression Analysis

A spreadsheet program (Excel) was used to run several multiple regressions of housing demand (as represented by mortgage loans extended for residential areas) on the six (6) explanatory variables described above, which in theory should have an influence on demand for housing, at least in respect of directional change. As leading indicators there is an obvious suggestion that there should be a lag in influence between mortgage lending (as proxy for effective housing demand) and its explanatory variables. As a double check, a different package of statistical software, EViews, with superior diagnostic capability, was also employed.

Since the interest lies in elasticities (i.e., percentage changes as opposed to numerical levels), a log-log model in which both the dependent and independent variables were transformed into their respective logarithms (logged) appeared preferable. The CPI figures (consumer price index), as pointed out, were rebased to the year 2000.

The model estimation

The permutations below were examined to establish the amount of lag that appeared most suitable in explaining variations in mortgage demand:

$Y_t = c + M_{1t}X_{1t} + M_{2t}X_{2t} + \cdots + E_t$, i.e. not lagged at all

$Y_t = c + M_{1t}X_{1t-3} + M_{2t}X_{2t-3} + \cdots + E_t$, i.e. lagged 3 months

$Y_t = c + M_{1t}X_{1t-6} + M_{2t}X_{2t-6} + \cdots + E_t$, i.e. lagged 6 months

Where $Y_t =$ Mortgage lending, logged (natural), c = intercept, M_1, M_2 are the variable coefficients, and X_1, $X_2 \ldots X_6$ the independent variables, and E_t the error term.

Explanatory variables with coefficients whose t-values (in absolute terms) were less than the critical t-value at a 5% level of significance were dropped from the regression model as having no explanatory value. These variables were found to be private sector credit extension and the CPI, so that the final model selected was:

Table 3.2: Regression model derived

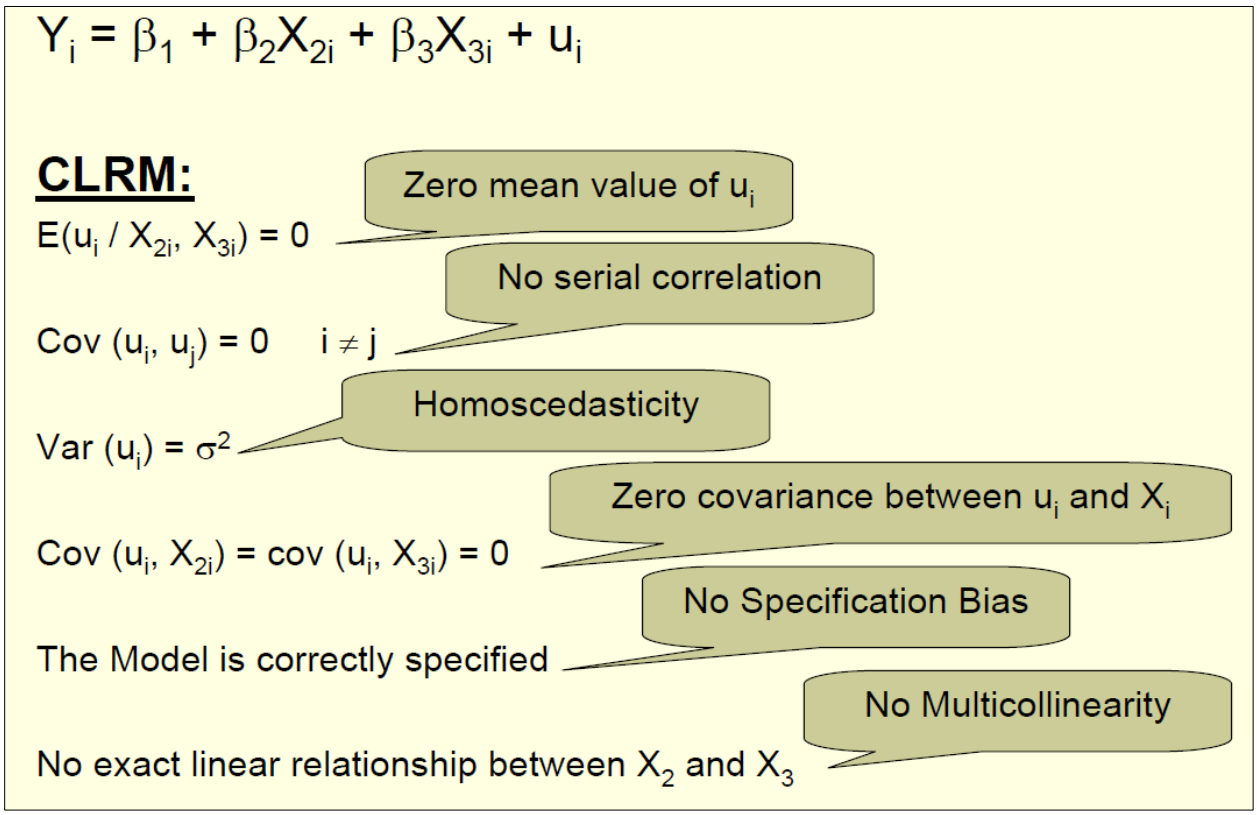
Log-Log, 6-month lag on all variables, PSCE and CPI omitted					
	H/Hold	M3	Vehicles	Prime	constant
Coefficients	-2.117983468	2.536679544	1.185819615	-0.984546254	-0.904418124
Std errors	0.280566701	0.255371569	0.107459734	0.12325563	0.761377888
R^2,se_v	0.946439072	0.198077078	#N/A	#N/A	#N/A
F, df	640.5493241	145	#N/A	#N/A	#N/A
ssreg,ssresid	100.5266039	5.68900669	#N/A	#N/A	#N/A
Adj. R2 =					
F-stat	4.83283E-91				
t critical(5%)	1.976459531				
t critical(10%)	1.655430252				
Observed t	-7.54894811	9.93328879	11.03501349	-7.98784001	-1.187870226
Significant?	YES	YES	YES	YES	NO
Model	ln(Lending) = -2.11798ln(H/Hold) + 2.5367ln(M3) + 1.186ln(Vehicles) - 0.9044ln(Prime)				

Source: Author's own exercise

Model assumptions

The classical linear regression model (CLRM) as employed is premised on the usual normality assumptions, as briefly outlined below:

Figure 3.3: Normality assumptions –classical linear regression model



Source: Katircioglu, 2010: chapter 7

The reader will recall from sub-section 3.2 above (Research Design) that the multi-case scenario approach adopted was designed in part to alleviate the necessity for predictive accuracy in this first leg of the study. Specifically, the figures obtained from the regression model purporting to represent estimates of future residential mortgage demand need not be accurate, since the wide range of possible economic realisations entailed in the scenarios is in place for precisely this purpose – thus fairly large deviations should not detract from the validity of the findings. In addition, as will be evident in the different growth rate assumptions in sub-section 3.3.3 (The Primary Scenarios), any disparities between the estimated mortgage demand estimates and what actually obtains in the future will be catered for.

- The elasticities represented by the variable coefficients are stable over the forecast period. As economies evolve it is conceivable that relationships among macroeconomic variables may change. As the forecasts span a period of five years forward in time, the assumption made here is that there are no significant deviations in the way that the explanatory

variables signal upcoming variations in the demand for mortgages. As an analogy, a ban by law of a commodity might change the relationship between income level and the demand for such a commodity.

- All four variables are 6-month leading indicators to the mortgage lending figure, so the forecast numbers relate to the midpoint of each annual interval.
- The model itself is not mis-specified, i.e. no relevant variables have been omitted. The model selected is by no means considered the best descriptor of mortgage lending demand. There are no doubt more sophisticated and better models in use, for instance, by big conglomerate financial institutions in the business of extending mortgage credit for residential purposes. What is suggested in this study is more a line of thought than a commercial means to amass profits.

As expected all the retained explanatory variables bore the correct-sign coefficients in terms of what reason would suggest. For instance, household indebtedness ought to have a negative impact on the demand for mortgages, hence a negative coefficient for this variable. Similarly, rising purchases of new vehicles would intuitively suggest increased levels of affordability for credit, and this is borne out by the positive coefficient for this variable in the regression model.

Based on the above equation mortgage lending could then be forecast for input into the next leg of the study, the financial model and appraisal. What needs emphasis here is that although the prediction model is part of the thought process in the design of the study, it is by no means core to it. Far more crucial to the outcome of the evaluation are: 1). the speed of uptake of the product, and whether this momentum is sustained into the future, and, 2). the regulatory environment surrounding the operation of the MI business, especially in relation to law enforcement and property rights protection. Without a well- functioning foreclosure process, as pointed out in Chapter 2, it is difficult to conceive of, let alone expect, a successful MI programme.

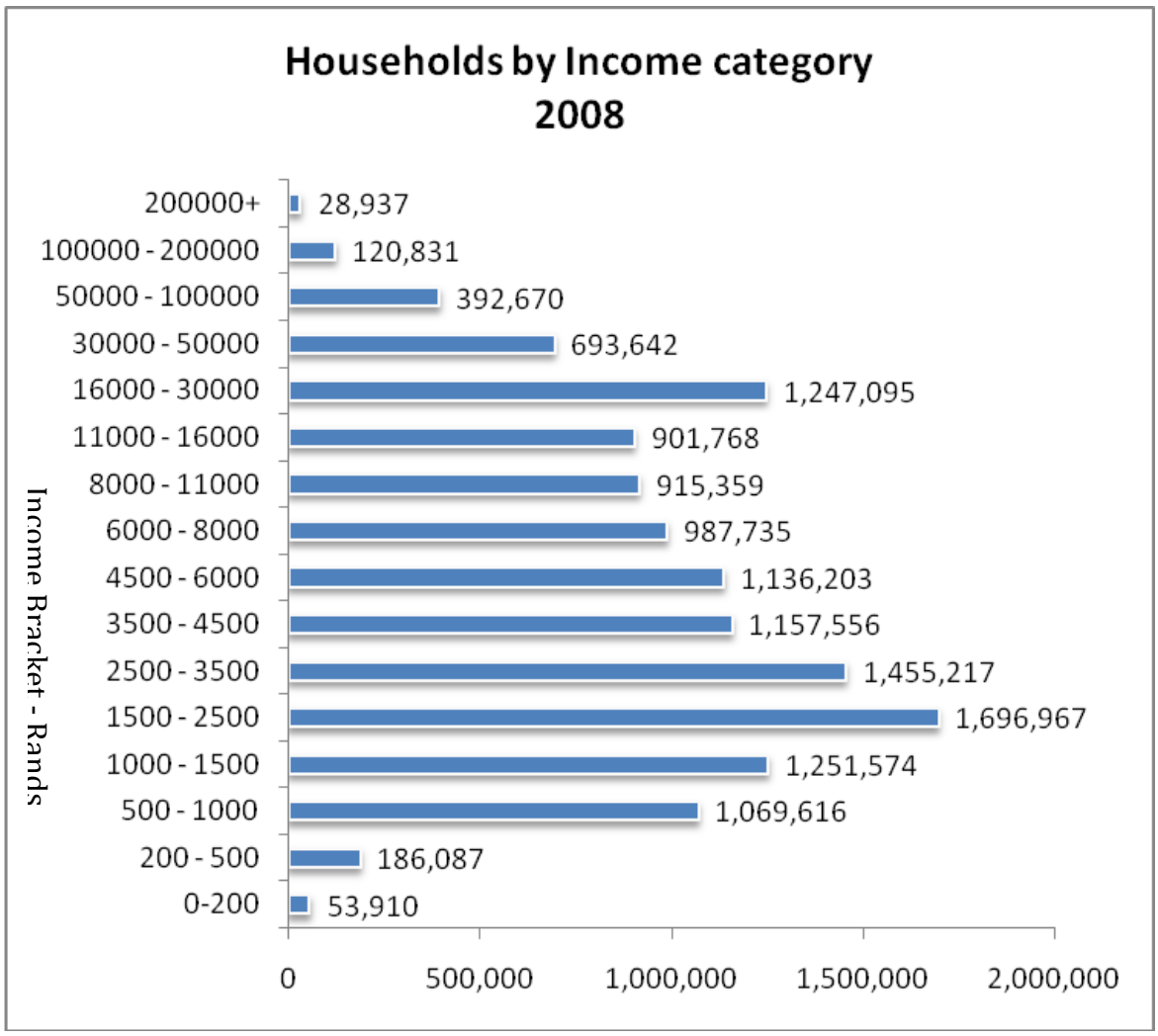
An observation may be made at this stage that, given the proportion of the total mortgage market constituted by the gap market, the accuracy of the forecast is not critical to the appraisal. From start-up, and several years into the future, it is reasonable to expect the MI programme to attract a progressively increasing fraction of the target market. Moreover, not all in the target market are likely to meet the qualifying credit-scoring criteria. What is of import is that the MI programme gathers momentum in terms of volumes underwritten once the business gets underway.

Income Distribution Data

The degree to which MI can facilitate a greater access to mortgage finance in the gap market itself will be a critical success factor. It should be noted here that not all gap market households will afford MI. MI, as pointed out earlier, is not for the poor. Nor would it work for those earning below some level dictated by market conditions. It is intended for households in stable jobs with a capacity for mortgage repayment. It is necessary, then, to quantify the proportion of the gap market that in principle would qualify for MI in order to measure MI success.

The NHFC has over time accumulated gap market data in terms of income segmentation through the commissioning of independent surveys. As a cross-check, Stats SA figures from their periodic Household Income Surveys were used to validate the results of the independent surveys. The gap market distribution by income segment was employed to estimate the volume of potential MI beneficiaries from the target market. The total MI volumes would be expected to exceed this, as higher-income households are not precluded from participation in MI.

Figure 3.4: Gap market size



Source: CMHC, 2010b:29

Figure 3.4 above shows the distribution of incomes by segment based on 2008 data. Key points as they relate to household incomes and MI are as follows:

The gap market, defined as households with incomes ranging from R3,500 per month to R16,000 per month, accounts for 38.3% of total households. This definition is a variable one, however, because it depends on the government's subsidy ceiling for its lower boundary, and market house prices in combination with the banks' lending criteria for its upper boundary. It is obvious that, as subsidy levels rise, so will the bottom of the gap market in terms of income. In addition, were lenders to raise their normal maximum LTV lending limit, the top of the gap market would be absorbed away, thus shrinking the gap range. For the purpose of argument, a

point in time may be picked as a starting reference, so that, for instance, as of 2008, the following gap market distribution would be obtained:

- R11,000-16,000 per month: 6.8%
- R 8,000-11,000 per month: 6.9%
- R6,000-8,000 per month: 7.4%
- R4,500-6,000 per month: 8.5%
- R3,500-4,500 per month: 8.7%

- While not all gap market households would likely qualify for housing loans, even with MI, many would. Over time, on the assumption that MI is initially successful in facilitating access to high ratio loans for gap market households plus other households able to access market finance, MI will be able, gradually, to accommodate tiers of households in lower income brackets. An initial strategy could target the groups on a tiered basis from R8, 000 up, or even R11, 000 up, and then gradually move down the chain to accommodate other households with lower incomes. Doing so with a minimum target income of R8, 000 per month would initially target 14.3% of total households in South Africa, which would constitute reasonable progress toward accommodating more than a third of households in the gap market.

It must be borne in mind that, defining the part of the gap market that MI would target as, for instance, those households with monthly income in the range R8 000 – R16 000, as will be done for the present, does not confine MI operation to this segment. This point is repeated for emphasis, because of its implications. Anyone with a monthly income of up to R100 000 would of course be welcome, so one cannot pin down a target audience for MI at any specific point. What matters is that as many of those earning too high an income to qualify for free subsidised housing are able to access mortgage finance.

The segment of the market with monthly incomes above gap market household incomes accounts for 18.7% of total households. The following distribution shows how a tiering of such households might be feasible as well.

- R16,000-30,000 per month: 9.4%
- R 30,000-50,000 per month: 5.2%
- R50,000-100,000 per month: 3.0%
- R100,000-200,000 per month: 0.9%
- Above R200,000 per month: 0.2%

Claims pattern

A claims curve (or, equivalently, earnings curve) is pivotal in the determination of not only the premium price charged for the insurance product, but also the fraction or premium revenues earned each year of the contract. Given a pool of mortgages originated in a certain year, defaults will occur in an asymmetric pattern over time. A typical default pattern has evolved historically based on international experience, and shows a few defaults in the first few years of a mortgage, the majority in the third to fifth years, and thereafter a declining incidence till termination of the contract.

The fact that a first-time operation is the subject of this study, there is an obvious absence of such a record of default (and hence claims pattern). Even in the mature, existing mortgage market in the country, the data proved hard to obtain. Following practice elsewhere (for example, the Kazakhstan case mentioned above) this study uses a pattern obtained from OSFI in Canada. This pattern is given in Figure 7.4 of chapter 7 of this paper.

3.3.3 Analysis: The Primary Scenarios

Base, Best, and Worst Case Scenarios

The main scenario categories stem from pricing considerations. The price of the insurance product is driven largely by the LTV ratio (as explained in both chapters 2 and 5) and the expected claims (default) rate. The average property price of R 895 000 used for pricing purposes was the value quoted in the financial press as the average house sales price as of February 2010 (for example, ooba, 2012). This value has no relevance in assessing the expected level of business for the MI Company, as it relates to the mid-market level of activity at the time. The values used for gap market purposes are R 300 000 and R 500 000, which are closer to what can reasonably be afforded in this market. At any rate, it is the LTV rather than the actual house price that drives the premium price. The study assumes an LTV of 90% to be the average that can be expected, given

the target market affordability constraints (this ratio will require a downpayment of 10% of the price of the property purchased). Levels of LTV up to 100% are not inconceivable, given appropriate qualifying conditions are met, since that is the whole idea of an MI-insured mortgage loan. The premium price varies from 6.5% of the mortgage loan value in the Base case scenario, through 1.8% for the Best Case, to 7.3% in the Worst Case event.

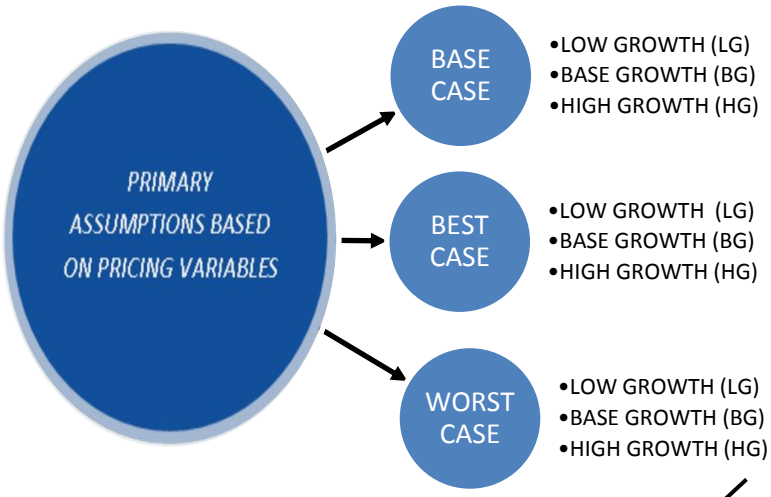
The Base Case scenario is a reference to economic conditions prevailing as of end 2010, with October 1 2011 the envisaged MI start-up date. As of 2010, the average annual mortgage interest rate for the previous 10-year period in the country was roughly 13% (CMHC, 2010b:37). The Base Case is thus the most likely outcome of the three scenarios for purposes of the study. In terms of its assumptions, the Base Case lies in a space between the Best and Worst Case scenarios.

The terms Best and Worst are chosen from the perspective of the prospective home loan borrower. They derive from the fixed mortgage repayment interest rates that the borrower would face. It will be observed, naturally, that the MI Company itself would, as counterparty, be in a position not quite opposite to that of the borrower. A defaulting borrower loses the benefit of the property, precipitating a claims payment by the MI. The two, however, are not legally in a contract. The loan extension is a contract between the lender and the borrower, whereas the insurance contract is as between the lender and the MI Company.

Whilst it is true that a relatively high mortgage repayment interest rate is unfavourable to the borrowing household, the same cannot be said of the MI entity. This is because the high mortgage rate is accompanied by a relatively high premium price, which is a source of revenue to the MI entity. Moreover, whether the higher premium price is favourable to the MI entity or not depends on the actual experience of default, and not the theoretical. It is therefore difficult, without qualification, to determine, ex ante, the relative positions of the role players in the business.

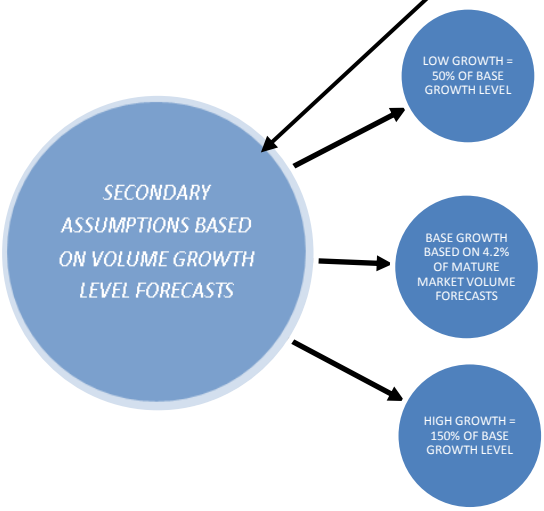
Figures 3.5 – 3.7 below are a categorisation of the primary scenarios, showing how the secondary and subsequent sub-scenarios are obtained. The diagrams should be read together with Table 3.3, which summarizes the numerical values. It should also be noted that the capitalisation values in Table 3.3 are in thousands of Rand (i.e., R500 million and R700 million).

Figure 3.5: The Primary Scenarios based on Premium Pricing



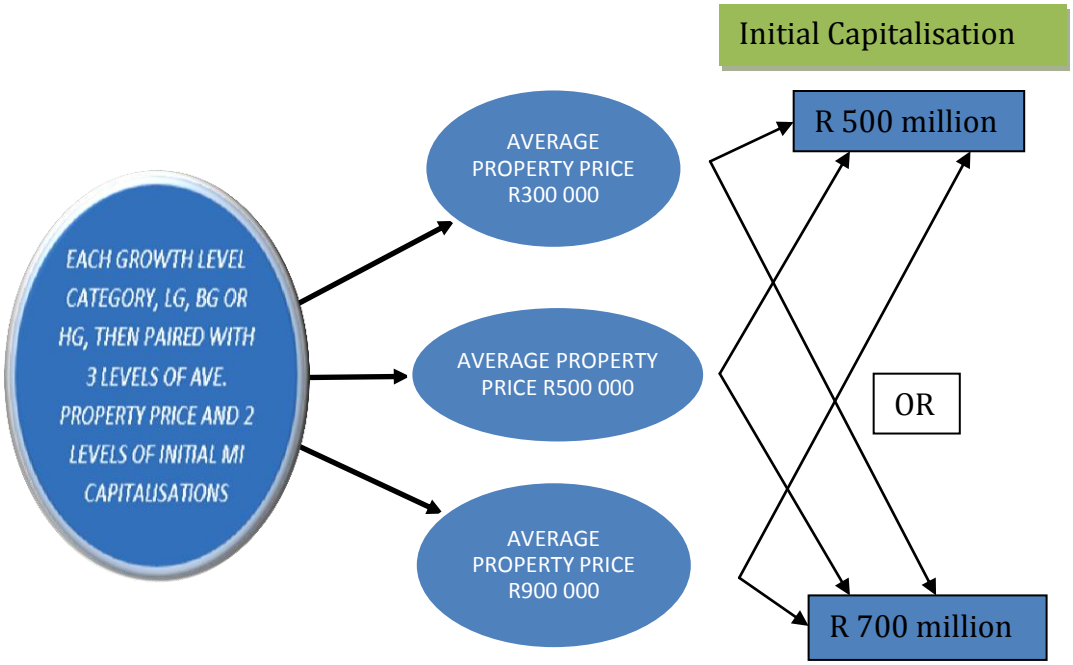
Source: Author's own construction

Figure 3.6: The Secondary Scenarios Based on Loan Volumes



Source: Author's own construction

Figure 3.7: Volume Growth Levels Paired with Property Values and Initial Capitalisation Levels



Source: Author's own construction

The Best Case scenario obtains from a lower premium price of 1.8%, relating to an expected default rate of 5.2% at an annual mortgage interest rate of 10%. It is therefore a more optimistic outlook from the borrower's standpoint than the Base Case. Conceptually, it will be noted, the borrower and the MI Company are on opposite sides of the contract in as far as the premium price levied is concerned (even though the two parties do not actually contract), as evidenced by the lower mortgage rate to the borrower and the lower premium obtained by the MI company.

The Worst Case possibility is characterised by the 300 basis-point higher mortgage rate of 16% pa, as well as the higher claims rate of 9.2%. The premium price for this expected default rate jumps to 7.3% from the 6.5% applicable to the Base Case. As will be seen in the analysis, this higher mortgage rate to the borrower does not necessarily impact adversely on the MI Company. What does, however, is the lower expected return on investment of only 6% as against the 7% obtained in the Base Case.

Table 3.3: Summary of Scenario Categorisation

PRICING ASSUMPTIONS	BASE CASE	BEST CASE	WORST CASE
Property Value - R	**300 000, 500 000, 900 000**	**300 000, 500 000, 900 000**	**300 000, 500 000, 900 000**
Initial Capitalisation	500 000, 700 000	500 000, 700 000	500 000, 700 000
Mortgage Interest Rate - Annual	**13.00%**	**10.00%**	**16.00%**
- Monthly	1.08%	0.83%	1.33%
Rate of Prepayments	**7%**	**7%**	**7%**
# Months for Reporting Default	**3**	**3**	**3**
Maximum # Months Interest on Claim	**15**	**15**	**15**
(also used for when claim is actually paid)			
Recovery from Property Sale	**60%**	**80%**	**50%**
Risk-based Capital Requirement	**7.50%**	**7.5%**	**7.5%**
Expected Return on Capital	**11.5%**	**12.0%**	**8.00%**
Return on Investments	**7.00%**	**10.00%**	**6.00%**
Original LTV	Claim rate	Claim rate	Claim rate
90%	**7.2%**	**5.2%**	**9.2%**
Upfront Premium Price at LTV 90%	6.50%	1.80%	**7.30%**
Administrative Expenses			
Cost of underwriting as a % of Premium	**7.50%**	**7.50%**	**7.50%**
Annual servicing cost as % of Premium	**0.75%**	**0.75%**	**0.75%**
Tax Rates			
corporate income tax rate	**28%**	**28%**	**28%**
VAT	**0%**	**0%**	**0%**
GROWTH ASSUMPTIONS			
Low Growth	50% of Base Growth Level	50% of Base Growth Level	50% of Base Growth Level
Base growth	From Loan Volume Estimates	From Loan Volume Estimates	From Loan Volume Estimates
High growth	150% of base Growth Level	150% of base Growth Level	150% of base Growth Level

Source: Author's own construction

Pro-forma financial statements

This is the second leg of the overall approach in the study. An MI financial model produces a set of pro-forma financial statements, which provide a basis for the appraisal. These statements are:

- Statement of Comprehensive Income
- Statement of Financial Position
- Cash Flow Statement
- Financial Ratios

All these will be projected some 9.25 years into the future, beginning 1 October 2011 and ending 31 December 2020. In order to include a reasonable range of possible outcomes, the study sets up a 3-pronged scenario plan. The three primary scenarios of Base, Best, and Worst Cases are combined with three possible levels of growth paths, three possible house prices, and two possible levels of initial capitalisation, resulting in a total of thirty-six sub scenarios.

Critical Success Factors for MI

The final appraisal outcome turns on several key success factors. Chief among them is solvency and capital adequacy. It is imperative that earnings from premiums be sufficient to allow for a build-up of capital and reserves to ensure long-term sustainability. It is crucial therefore for the premium set to be actuarially sound, given the pattern of claims expected. In addition, the MI Company would need to ensure adequate resources for prompt payment of claims to instil market confidence, at the same meeting operational requirements. Thus, liquidity is a measure to be considered when drawing any conclusions about MI viability.

On the regulatory side, the following requirements would need to be met:

1. **Statutory minimum capital requirements (MCR)**

This is the minimum capital that an MI firm must hold relative to the total mortgage loans insured outstanding, which would be prescribed by the FSB (Financial Services Board) presumably in line with international standards and conforming to Basel regulations. The pricing model described in Chapter 5 incorporates a 4.5% fixed ratio as the MCR.

2. **Contingency Reserves**

The idea of a contingency reserve is an explicit recognition and acceptance that stress periods invariably arise in the normal course of business. To augment the minimum capital required by the regulator above, a portion of premium revenues is to be placed in a segregated reserve account for a minimum specified period. Funds from this account can only be released before the specified time with special regulatory approval.

3. **Loss Reserves**

This account represents a deduction of losses from capital on the liability side of the Statement of Financial Position. Expected losses on insured loans already in default are deducted from capital and recognized as a liability in the Loss Reserve account. A policy would be required to be in place to state the provisioning requirements in the Loss Reserve account for pre-foreclosure, in-foreclosure and post-foreclosure events.

All the above are considered measures of solvency and were the bases for the conclusions as to success or failure of the MI programme. The analysis of the financial statements is the subject of Chapter 7.

3.3.4 Analysis: The Secondary Scenarios

Within the broad primary scenarios are variations that flow logically from a consideration of possible loan volume paths. The study labels these paths Base, Low and High growth levels. Because of the importance of a steady rate of mortgage loan origination and underwriting, it is necessary to consider critical growth levels below which MI might fail. This is also relevant to a determination of MI success in respect of the main goal of housing shortage alleviation in the gap market.

The starting point is the loan volume estimation exercise carried out in chapter 4. In that chapter the existing residential mortgage market in the country provided the historical loan origination values needed for forecasting. Having obtained some idea of the level of future mature market mortgage advances by the major lending institutions, a major difficulty arises regarding gap market activity in relation hereto. The size of the housing backlog in the gap market has been estimated at between 660 000 and 800 000 units (Crighton, 2014:15; Rust, 2006:12; Venter, 2009:7). The question is how much MI can penetrate the backlog in its initial stages. These numbers are crucial for MI success.

The forecast lending volume estimates obtained in chapter 4 (Table 4.2) are reproduced in Table 3.4 below, to link them to the levels actually used in the appraisal in chapter 7. The bottom part of Table 3.4 shows the number of loans achieved each year for the three average property prices assumed (R300 000, R500 000, R900 000), under each of the three growth assumptions of low, base, and high. The average LTV ratio assumed is 90%: thus 90% of R300 000 gives R270 000 as the average mortgage loan amount, 90% of R500 000 gives R450 000, and 90% of R900 000 gives R810 000.

In order to arrive at gap market lending figures, a constant fraction of the mature mortgage market was assumed to be approximated by the ratio of the FSC commitment of R42 billion to the aggregate mortgage advance figure of R1 trillion as shown in Table 3.4 (Opening balance total advances for the year 2009 of R1 002 663 million). This yields the fraction 4.19%. For the year

2011, for example, $241\ 777 \times (42\ 000 \div 1\ 002\ 663) \times 0.25 = 2532$. There are only three months of operation in the first year (October to December 2011), hence the multiplication by 25%. Similarly, $240\ 360 \times (42\ 000 \div 1002\ 663) = 10068$.

The resulting figures, divided by the average mortgage loan amount, yield the number of loans for each year for the Base Case. For example, $(2\ 532 \div 270\ 000) \times 1000\ 000 = 9\ 377$. Multiplying this figure by 50% gives the low-growth figure of 4 689, and multiplying it by 150% gives the high-growth figure of 14 066 for the year 2011, under the property price of R300 000 (or, equivalently, average mortgage loan amount of R270 00).

It will be noted that the model estimates extend out to the end of the year 2014, with business commencing 1 October 2011, thus covering a total of three years and a quarter. Beyond that, it is the author's opinion to err on the side of caution by assuming modest growth rates equalling at most a figure within the inflation rate target range set by the Reserve Bank's Monetary Committee (3% – 6%). The 5% growth rate used to obtain the inflation-based volume estimates in Table 3.4 below above reflects this reasoning. Beyond the year 2014, each successive year's figures are obtained by multiplication of the previous year's figure by the factor 1.05.

Table 3.4: Volume-based Scenarios (lending forecasts copied from Chapter 4, Table 4.2)

HOW THE VOLUME INPUTS WERE OBTAINED

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual lending (Rmil)		174,303											
Forecast lending (Rmil)			194,477	241,777	240,360	234,577	225,553						
O/Balance Total Advances for year (Rmil)		1,002,663											
Forecast Bal for year (excluding mortgage repayments)			1,197,140	1,438,918	1,679,278	1,913,855	2,139,408						
Assuming GAP Housing Demand	FSC REPORT	42000		Model-based trend				Inflation - based increase					
Proportion of GAP in Total Market		4.19%											
GAP MORTGAGE MARKET EACH YEAR (R m)			8146	2532	10068	9826	9448						
								105%	105%	105%	105%	105%	105%
Number of loans each year							Total After 3.25 yrs						
Average mortgage loan amount	270000												
LOW GROWTH				4689	18645	18196	17496	59,027	18,371	19,290	20,254	21,267	22,330	23,447
BASE CASE				9377	37290	36393	34993	118,053	36,742	38,580	40,508	42,534	44,661	46,894
HIGH GROWTH				14066	55935	54589	52489	177,080	55,114	57,869	60,763	63,801	66,991	70,340
Average mortgage loan amount	450000												
LOW GROWTH				2813	11187	10918	10498	35,416	11,023	11,574	12,153	12,760	13,398	14,068
BASE CASE				5626	22374	21836	20996	70,832	22,045	23,148	24,305	25,520	26,796	28,136
HIGH GROWTH				8440	33561	32754	31493	106,248	33,068	34,722	36,458	38,281	40,195	42,204
Average mortgage loan amount	810000												
LOW GROWTH				1563	6215	6065	5832	19,676	6,124	6,430	6,751	7,089	7,443	7,816
BASE CASE				3126	12430	12131	11664	39,351	12,247	12,860	13,503	14,178	14,887	15,631
HIGH GROWTH				4689	18645	18196	17496	59,027	18,371	19,290	20,254	21,267	22,330	23,447

Source: Author's own construction

3.4 Limitations

In estimating the demand model the elasticities represented by the variable coefficients are most likely not stable over the forecast period, so that forecast demand growth rates may not be accurate. In addition, a 4-year period is a long time, in which drastic swings in the economy may occur, rendering the forecasts less than useful in appraisal value. Since, however, the aim is to establish limiting conditions for MI programme success or failure, forecast accuracy is not critical.

The fact that this would be a first-time operation means that there is no history of default behaviour on which to derive a claims curve. This has a serious impact on the pricing of the premium and therefore the revenue recognised as income each period. The fact that a mature, well-functioning mortgage market already exists for upper-income population segments will be

useful in estimating the possible behaviour of the lower-income counterparts in terms of default and prepayment.

3.5 Ethics Considerations

The research relies primarily on published secondary data, and does not involve contact with any subject, human or otherwise. Where unpublished material was consulted, this will be indicated where appropriate, in which cases such material will be available from the author on request. There are therefore no ethical implications in respect of the data gathering process in the study. However, information that arose during the author's involvement with NHFC deemed confidential will be kept as such.

3.6 Conclusion

Uncertainty relating to future macroeconomic conditions is dealt with using three primary scenarios derived from premium pricing differences. This means that the main distinguishing factor between the main scenarios is the expected claims rate, roughly equivalent to the default rate read from the claims pattern obtained from the OSFI of Canada. Having categorized the scenarios based on premium price (which is effectively what a claims rate-based distinction does), three levels of assumed growth rates in mortgage lending, once the MI programme commences operations, further subdivides the scenarios into secondary ones based on volume expectations.

In the secondary scenarios, further combinations are created by matching with different property prices and different values for initial capitalisation. In total then, thirty-six combinations of possible outcomes are obtained, from which the most favourable and the least favourable (from an insurer's standpoint) are isolated.

The various assumptions owing to a lack of history in terms of default behaviour in the low-income segment of households are not seen to detract from the validity of the findings, as the business plan allows for a range of inputs which should indicate levels at which the programme becomes unsuitable for local conditions. The study further deliberately defines viability narrowly as positive post-tax earnings, sustained over the period indicated in Table 3.4.

CHAPTER 4: LOAN VOLUME ESTIMATES

Predict, v. To relate an event that has not occurred, is not occurring and will not occur.

Prophecy, n. The art and practice of selling one's credibility for future delivery.

Ambrose Bierce, "The Enlarged Devil's Dictionary", Doubleday, 1967

4.1 Introduction

A key ingredient for MI success has been found to be volume. It is necessary for a viable MI programme, as with most business enterprises, that the number of mortgages underwritten increase at a sufficient rate from year to year without a concomitant rise in related risk. Blood (2001:55) makes a similar observation in his discussion of the adverse selection problem that the mortgage insurer faces. In taking a futuristic perspective, one then needs to attempt to obtain reasonable forecasts of mortgage origination values that may be expected. This is the aim of the chapter.

Assuming the present to be the end of the year 2010, the goal is to estimate how figures representing credit extension to the residential mortgage market might look in future periods, based on past behaviour. Specifically, the appraisal requires lending rates and variations in these rates into the future. The SARB maintains historical records of these figures by registered financial services providers, and publishes them in its Quarterly Bulletins.

Economic theory suggests a number of macroeconomic variables that may serve as leading indicators to residential mortgage credit extension. Residential property markets, like others, are cyclical, with lending rates tending to fall in recessionary times and to rise during economic booms. There ought, therefore, to be activities in the economy that signal likely market behaviour in advance. These variables, suitably lagged, and in combination, ought to help predict future demand through a regression model. A discussion of one possible model, along with the results, follows below.

The rest of this chapter is organised as follows. Section 4.2 describes the data and the variables used in the regression analysis. Section 4.3 discusses the model formulation, tabulates some of the

trial runs preceding selection of the final model, and discusses the main observations. Section 4.4 presents the results, and section 4.5 concludes.

4.2 The data and the variables

A full description of the data and the variables used in the CLRM analysis was presented in section 3.3 of the preceding chapter.

4.3 The model

The estimating regression model is of the general form:

$$Y_t = c + M_{1t}X_{1t-3n} + M_{2t}X_{2t-3n} + \cdots + E_t, \quad n = 0,1,2,3,4.$$

The permutations below were examined to establish the amount of lag that appeared most suitable in explaining variations in mortgage demand:

$Y_t = c + M_{1t}X_{1t} + M_{2t}X_{2t} + \cdots + E_t$, i.e. not lagged at all, $n = 0$
$Y_t = c + M_{1t}X_{1t-3} + M_{2t}X_{2t-3} + \cdots + E_t$, i.e. lagged 3 months, $n = 1$
$Y_t = c + M_{1t}X_{1t-6} + M_{2t}X_{2t-6} + \cdots + E_t$, i.e. lagged 6 months, $n = 2$

Where $Y_t =$ Mortgage lending, logged (natural), c = intercept, M_1, M_2 are the variable coefficients, and X_1, $X_2 \ldots X_6$ the explanatory variables, E_t the error term, and $3n$ the lag period.

Explanatory variables with coefficients whose t-values (in absolute terms) were less than the critical t-value at the 5% level of significance were dropped from the regression model as having no explanatory value. These variables were found to be Private Sector Credit Extension (PSCE), Consumer Price Index (CPI), and the constant term. Table 4.1 lists some of the regression runs considered before the final model estimate was selected. The regression analysis was carried out on the Microsoft Excel spreadsheet statistical software package.

Salient observations

The following may be gleaned from Table 4.1:

1. In all cases, the coefficient of determination (R^2) is extremely high at 95% - 96%, indicating a strong association between mortgage lending and the explanatory variables in the model.

However, in adjusting R^2 to account for the possibility of too many or redundant variables the figure drops to 90%-93%, still a strong indication.

2. The coefficient for the variable "Private Sector Credit Extension" does not seem statistically significant at all in all cases, suggesting its dropping from the specification.
3. The strongest positive association appears to be that between mortgage lending and new vehicle sales, especially when the latter variable is lagged 3 months, or when it is lagged 6 months with the PSCE variable omitted.
4. Household Credit Extension is fairly strongly negatively related to mortgage lending in all 5 cases, with the negative influence tending to rise with the increase in the time lag.
5. The prime rate appears to play a fairly negative role only in the lagged cases, with the strongest influence at the 6-month lag.
6. The CPI coefficient seems insignificantly different from zero in all but the "not lagged" case, but since there were 3 base-year changes in the sample period, closer scrutiny may be warranted.

The extremely low F-statistic indicates the strong relationship between mortgage lending and the explanatory variables. There appear to be neither autocorrelation nor homoscedasticity problems. However, coefficient stability over long forecast periods was of concern, with the result that the forecasts were limited to a maximum of four years up to 2014). Figures for the years 2015 through 2020 were obtained by assuming a growth factor inflation rate of 5% annually, as pointed out in the previous chapter.

The model as used is applicable to the existing mortgage lending market. The figures are those of mortgage loan advances reported by the lending institutions to the regulator, SARB. Of specific relevance to this study are figures that might be expected from the target gap market. One way is to assume a fraction of the mature market each year as indicative of gap market response to MI, i.e., as an approximation of the number of mortgage loan approvals that would originate from the lenders bearing MI insurance. These are the numbers that the MI Company would have underwritten - the entity's business. The translation of the mature market figures into MI figures is shown in Table 3.4 of the preceding chapter, placed there for continuity and ease of reference.

Table 4.1: Regression Model Estimates

Regression runs

All 6 Variables, NO LAGS

Variable	PSCE	H/Hold	M3	Vehicles	CPI	Prime	const.
Coefficients	-0.214	-1.128	1.143	1.657	1.832	-0.239	-4.048
Std Err	0.477	0.384	0.594	0.127	0.766	0.121	1.132
r^2,se_y	0.967	0.157	#N/A	#N/A	#N/A	#N/A	#N/A
F, df	738.014	149.000	#N/A	#N/A	#N/A	#N/A	#N/A
ssreg,ssresid	109.612	3.688	#N/A	#N/A	#N/A	#N/A	#N/A
F-stat	0.000						
t critical(5%)	1.976						
t critical(10%)	1.655						
Observed t	-0.449	-2.941	1.922	13.079	2.391	-1.976	-3.574
Significant @ 5%	**No**	**Yes**	**No**	**Yes**	**Yes**	**Just!**	**Yes**
Significant @ 10%	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

ln(Lending) = -1.128ln(H/Hold) + 1.143ln(M3) + 1.657ln(Vehicles) - 0.239ln(Prime)-4.0475

5 variables, PSCE omitted, 3-month LAG

Variable	H/Hold	M3	Vehicles	CPI	Prime	const.
Coefficients	-1.527	1.581	1.534	1.050	-0.538	-2.992
Std Err	0.319	0.593	0.100	0.788	0.120	0.908
r2,sev	0.964	0.165	#N/A	#N/A	#N/A	#N/A
F, df	788.909	148.000	#N/A	#N/A	#N/A	#N/A
ssreg,ssresid	106.783	4.007	#N/A	#N/A	#N/A	#N/A
F-stat	0.000					
t critical(5%)	1.976					
t critical(10%)	1.655					
Observed t	-4.789	2.666	15.324	1.332	-4.490	-3.297
Significant @ 5%	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**
Significant @ 10%	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

ln(Lending) = -1.527ln(H/Hold) + 1.581ln(M3) + 1.534ln(Vehicles) - 4.490ln(Prime)-2.992

All variables, 6-month Lag

Variable	PSCE	H/Hold	M3	Vehicles	CPI	Prime	const.
Coefficients	-0.81	-1.63	2.84	1.07	0.11	-1.03	-0.26
Std errors	0.57	0.48	0.72	0.16	0.92	0.15	1.37
r2,sev	0.95	0.19	#N/A	#N/A	#N/A	#N/A	#N/A
F, df	484.26	144.00	#N/A	#N/A	#N/A	#N/A	#N/A
ssreg,ssresid	102.41	5.08	#N/A	#N/A	#N/A	#N/A	#N/A
F-stat	0.00						
t critical(5%)	1.98						
t critical(10%)	1.66						
Observed t	-1.41	-3.39	3.98	6.60	0.12	-6.81	-0.19
Significant @ 5%	**No**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
Significant @ 10%	**No**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

ln(Lending) = -1.628ln(H/Hold) + 2.844ln(M3) + 1.073ln(Vehicles) - 1.032ln(Prime)

4 Variables, PSCE and CPI omitted, 6-month LAG

Variable	H/Hold	M3	Vehicles	Prime	const.
Coefficients	-2.118	2.537	1.186	-0.985	-0.904
Std errors	0.281	0.255	0.107	0.123	0.761
R2,sev	0.946	0.198	#N/A	#N/A	#N/A
F, df	640.549	145.000	#N/A	#N/A	#N/A
ssreg,ssresid	100.527	5.689	#N/A	#N/A	#N/A
Adj. R2 =					
F-stat	0.000				
t critical(5%)	1.976				
t critical(10%)	1.655				
Observed t	-7.549	9.933	11.035	-7.988	-1.188
Significant @ 5%	**YES**	**YES**	**YES**	**YES**	**No**
Significant @ 10%	**YES**	**YES**	**YES**	**YES**	**No**

ln(Lending) = -2.118ln(H/Hold) + 2.537ln(M3) + 1.186ln(Vehicles) - 0.985ln(Prime)

5 Variables, PSCE omitted, 6-month LAG

Variable	H/Hold	M3	Vehicles	CPI	Prime	constant
Coefficients	-2.052	2.541	1.224	-0.138	-0.956	-1.516
Std errors	0.377	0.685	0.122	0.903	0.142	1.045
r2,sev	0.952	0.188	#N/A	#N/A	#N/A	#N/A
F, df	576.803	145.000	#N/A	#N/A	#N/A	#N/A
ssreg,ssresid	102.341	5.145	#N/A	#N/A	#N/A	#N/A
F-stat	0.000					
t critical(5%)	1.976					
t critical(10%)	1.655					
Observed t	-5.445	3.712	10.035	-0.153	-6.731	-1.451
Significant @ 5%	**Signif.**	**Signif.**	**Signif.**	**No**	**YES**	**No**
Significant @ 10%	**YES**	**YES**	**YES**	**YES**	**YES**	**No**

ln(Lending) = -2.052ln(H/Hold) + 2.541ln(M3) + 1.224ln(Vehicles) - -0.956ln(Prime)

Source: Author's own

4.4 Results and projections

In the end, the study selected the case without the variables “PSCE” and “CPI” but still with a 6-month lag of the explanatory variables for loan volume estimation for the first 3.25 years of MI operation, starting 1 October 2011. The estimating model appears in Table 4.2 below.

Summary Results

Table 4.2: Model-based Loan Volume Forecasts

Model	ln(Lending) = -2.01ln(H/Hold) + 2.444ln(M3) + 1.235ln(Vehicles) - 0.943ln(Prime)					
Forecasts	2009	2010	2011	2012	2013	2014
Prime	11.81	10.1	10.69	11.5	12.29	12.5
% Change	**-21.94**	**-14.4793**	**5.841584**	**7.577175**	**6.869565**	**1.708706**
H/hold credit	12,184,230					
% Change	**-3.1**	**2.4**	**3**	**3.8**	**3.5**	**3.7**
M3	23,280,372					
% Change in M3	**5.3**	**5.1**	**12.7**	**12.5**	**9.7**	**9**
Vehicle sales	76117					
% Change	**-25.33**	**14**	**15**	**15.5**	**16**	**16.5**
H/Hold term		6.231	-4.824	-6.03	-7.638	-7.035
M3 term		12.9532	12.4644	31.0388	30.55	23.7068
Vehicles term		-31.2826	17.29	18.525	19.1425	19.76
Prime term		20.68942	13.65394	-5.50861	-7.14528	-6.478
Actual lending (2009)	174,303					
% Change lending		11.57428	38.58434	38.02519	34.90922	29.9538
Forecast (Rmil)		**194,477**	**241,777**	**240,360**	**234,577**	**225,553**
O/Balance (Rmil)	**1,002,663**					
Forecast Bal (Rmil)		**1,197,140**	**1,438,918**	**1,679,278**	**1,913,855**	**2,139,408**

Source: Author's own construction

4.5 Concluding remarks

Although the explanatory variables in the model show significant statistical influence on mortgage lending volumes, it is important to bear in mind that they themselves require forecasting. With the global economy reeling from the effects of the financial crisis of 2007-2008, the timing of the model was such that declines in mortgage advances were forecast for a few years ahead. This shows up in the steady decrease in mortgage credit extension from R 241 777m in 2011 to R 225 553m in 2014, as predicted by the model. This represents an average annual decline of 2.3% for

the period, with, as will be seen in chapter 7, important consequences on the financial performance of the MI Company.

The projected figures for mortgage lending in the table above were used as a guide in estimating volume growth rates in the hypothetical MI Company. Such estimates of growth rates formed the bases for projecting underwriting volumes in the financial model of chapter 7.

CHAPTER 5: PREMIUM PRICING AND RELATED DESIGN FEATURES

5.1 Introduction

At the heart of any MI business lies the matter of the pricing of the insurance premium. On the one hand, an inadequate premium rate will lead to solvency difficulties and a consequent need for a "bailout" by the national treasury and an embarrassing programme shutdown. On the other hand, an excessive premium rate would defeat the very purpose for which the MI programme exists. Blood (2009b:26) suggests that it is a better idea to target premium rate subsidies at specific income groups than to under-price an MI programme, citing Lithuania and Mexico as examples of government-sponsored MI programmes with such subsidies. South Africa's capital subsidy may well be considered for diversion to premium payments in qualifying cases.

The devotion of an entire chapter to the issue of pricing underscores the pivotal role premium rates play in MI operation. The theoretical underpinnings of an MI premium structure, and the various approaches documented in literature are discussed in this chapter. In particular, the problem of arriving at an actuarially sound premium rate in a new market without prior default experience will be dealt with, thus explicating how the particular pricing matrices in this study were arrived at.

That South Africa has many of the elements prerequisite for the introduction of a commercially viable and socially beneficial MI programme is not difficult to establish. Among these elements are a well-developed legal and property registration system, a well regulated lending and financial system, a functioning primary mortgage market, and an established tradition of insurance. The Centre for Affordable Housing Finance in Africa, in its Yearbook 2010 (Kihato, M., 2010:49), refers to the country as the biggest economy in Africa, with a securities exchange that ranks among the top 20 in the world. Notwithstanding the sophisticated banking industry that serves the upper-income segments so well, and the boost to financial access through the FSC of 2003, the fact remains that at least 20% of the population are neither catered for by the government subsidy nor can they access mortgage finance (Banking Association South Africa, 2013:18).

The rest of this chapter is organised as follows. Section 5.2 provides a theoretical background in respect of valuation principles for fixed-rate mortgages (FRMs). The unique MI product is contrasted with other lines of insurance, and a rationale is provided for the need to solve the

fundamental partial differential equation backwards using numerical integration techniques. Section 5.3 discusses the application of the contingent claims model to mortgage valuation, including a critical look at the approach, followed by a summary. Section 5.4 considers the alternative actuarial valuation approach and emphasises the need to determine the unconditional probability of default in quantifying the default risk faced by the insurer. The last part of the section tabulates estimates of the MI prices at different LTV ratios and maturity terms, and sets the stage for Chapter 7 dealing with the actual implementation of the MI product. Section 5.5 concludes the chapter.

5.2 Theoretical considerations

Mortgage default insurance is characterised by a number of unique attributes that set it apart from other forms of insurance. The full contract term of each insured loan (or group of loans) is far longer than, for example, property, or vehicle insurance. Whereas casualty insurance covers a single period, allowing the use of a particular policy in determining the premium to be charged in subsequent periods, MI covers multiple periods (in the specific case of this work up to 25 years or 300 months) with premium rates defined at the origination date (Blood, 2009b:20; Dennis, Kuo, & Yang, 1997:360; Tiwari, 2001:60). Furthermore, the risks of default and prepayment are highly correlated with macroeconomic variables of interest rates, property price movements, and household income. This implies that systemic risk will always remain in mortgage default insurance contracts, and cannot be diversified to a minimum through a combination of geographic locations or segments as is the case with, for example, life insurance.

In particular, the risk of default (claims risk to the insurer) actually diminishes with time as the amortization schedule gradually imparts increasing positive equity in the property to borrowers. The approach to premium price calculation in respect of MI is thus very different from that obtaining in typical hazard or casualty insurance policies, and deserves careful study.

What is required is an actuarially sound premium rate, sufficient to cover both “normal” and “stress level” claims occasioned by a downturn in the aggregate economy, leading to above-normal losses and concentrated claims. A basic principle for a feasible premium structure is that the present value of expected losses for the insurer should at most equal that of the expected premium revenues (Bardhan, Karapandža & Urošević, 2006:10; Buhlmann, 1984:89; Dennis, Kuo

& Yang, 1997:361;). The objective of the insurer is therefore to collect premiums sufficient to cover the expected claim costs as well as to earn economic profit in the form of a return commensurate with the level of risk borne.

There are two obvious sources of uncertainty (and hence risk) inherent in mortgage contracts: house price and term structure of interest rates. At any point in time during the life of the mortgage contract, the borrower can exercise one of three options: (i) to continue with the mortgage repayments, (ii) to prepay the entire mortgage obligation before maturity, or (iii) to default on the contract. The paths followed by the house price and the interest rate will influence all these avenues of action at the disposal of the borrower.

Default involves consideration of the house price. When this price falls, (residential properties are tradable) below the remaining promised payments on the mortgage, the situation places the borrower in a negative equity position. In this situation, the option to default is in-the-money and, from a purely financial standpoint, the payoff in defaulting is positive. Prepayment, on the other hand, involves consideration of the term structure of interest rates. It does so through its dependence on the value of the mortgage contract at any given time, and borrowers will tend to prepay whenever the current market rate of interest falls sufficiently below the mortgage contract rate, a practice commonly known as refinancing.

Considerable literature exists in housing finance on the task of valuing mortgage contracts and the associated mortgage default insurance contracts. The complex nature of mortgage contracts precludes a simple formula for valuing them, prompting a resort to numerical techniques (Azevedo-Pereira, Newton & Paxson, 2002:188; Bardhan, Karapandža & Urošević, 2006:11; Kau & Keenan, 1995:218; Sharp, Newton & Duck, 2008:307). Whilst the concern of this study is a methodology for *valuing MI contracts* to establish a feasible premium structure, the insurance contract is one for *default risk*, which in turn is a component of the mortgage contract. It is necessary, therefore, to value the underlying mortgage itself in order to determine the value of the insurance.

The valuation of the mortgage contract allows a determination of boundary conditions – conditions under which default and prepayment ought to rationally occur for a utility maximizing borrower. A knowledge of these boundary conditions, in turn, leads to a determination of the

probability of default at any given mortgage payment date, which probabilities are required in the process of quantifying the loss exposure faced by the lender (and by extension the insurer).

The numerical solution techniques alluded to in the preceding paragraph generally fall into two categories: those that work forwards in time, and those that work backwards (Azevedo-Pereira, Newton & Paxson, 2002:188; Kau and Keenan, 1995:218; Kau, Keenan, Muller III & Epperson, 1995:6). The main forward pricing technique, according to these authors, is the Monte Carlo method, whilst the so-called finite-difference methods are the main tools in the backward pricing approach.

Drawing on a basic postulate in finance that any asset may be valued in terms of the expected present value of its future stream of benefits, the Monte Carlo method is essentially a simulation exercise. Randomly selected paths of interest rates and house prices are used to determine a series of values for the mortgage in question. Repetitive simulations then yield an average figure that closely approximates the mortgage's value.

There is an obvious problem with this approach though. To arrive at any figure for the value of the mortgage today, given any particular set of paths for the property price and the interest rate, it is necessary to know whether, at any point in the future during the life of the contract, the borrower will terminate (either through default or through prepayment). However, modelling the borrower's future behaviour requires the mortgage values at those points in time. This is precisely what the exercise was set up to determine in the first place. One is unable to determine a price in period t without knowledge of the price in period $t+1$, because the later price determines whether termination of the contract is optimal or not. Thus, Monte Carlo simulations are inappropriate for dealing with mortgage contract valuations.

This then, is where backward pricing techniques come to the rescue. When a borrower faces a choice of termination or continuation at a particular stage during the mortgage contract, the decision is based on future values. Because the backward technique starts at the mortgage maturity date, when the value is obvious (i.e., zero), the future values required for determination of the borrower's decisions will be known by the time each payment date is reached. Continuing the backward reasoning recursively will eventually lead to the present, at which point the actual house price and interest rate are presumably known, thus arriving at the mortgage value at

origination. The value of the contract of insurance against default may be computed similarly, but it must be noted that, due to the complex interaction of the various features of the mortgage contract, it is necessary that both default and prepayment conditions be imposed, since both influence the insurer's liability.

5.3 The valuation framework – fixed-rate mortgage contracts

5.3.1 Mortgages as derivative assets – the contingent claims approach

The seminal work of Black and Scholes (1973:637-654) on the pricing of options and debt securities has found widespread acceptance in the field of mortgage finance. The authors derived a theoretical options-valuation formula based on arbitrage-less conditions and demonstrated the applicability of the formula to corporate liabilities such as common stock, corporate bonds, and warrants. The novelty in the Black-Scholes options-pricing model lay in the determination of an asset's market price without reference whatsoever to either the mean value of the price movements or the individual risk attitudes of market participants. Typical economic reasoning, on the contrary, combines individual preferences on the demand side with production functions on the supply side to arrive at an asset's market price.

A derivative asset's value depends entirely on the variables that determine the value of the underlying asset. It is for this reason that derivative assets are thought of as redundant assets, in the sense that they are not necessary to describe the underlying economy. The option-theoretic approach to mortgage valuation relies principally on the assumption that mortgages are derivative assets, with the physical real estate or house the underlying asset. Even though mortgages depend on the real economy through variations in the house price and interest rate, the mortgages themselves are not necessary to determine the underlying economy (Hendershott & Van Order, 1987:77; Kau & Keenan, 1995:222). Like all debt securities, then, mortgages can be usefully modelled as risk-free assets combined with contingent claims viewed as options.

The application of the continuous-time option-pricing methodology has been the centrepiece of research in mortgage pricing. Hendershott and Van Order (1987:19-55) extended the methodology from valuing mortgages with and without default and prepayment features to the valuation of mortgage insurance contracts. Cunningham and Hendershott (1984:1-23) priced Federal Housing Administration (FHA) default insurance premiums under various assumptions of

house price inflation and variance. The insurance premium is conceptualised as a put option written by FHA and purchased by the borrower for the default protection of the lender. Ambrose, Buttimer, and Capone (1997:314-325) incorporated the costs and benefits associated with the delay between default and foreclosure into the options-pricing model, and thereby claimed increased insight into expected borrower behaviour. These authors concluded that the ability of lenders to impose transaction costs on borrowers in default impacted significantly on the probability of a complete exercise of the foreclosure put option, with policy implications for managing borrower default by lenders.

Another approach adopted in the backward pricing technique is the lattice approach, contended to be easier to understand and to be computationally more efficient than the finite difference methods. Hilliard, Kau, and Slawson Jr. (1998:431-468) apply a bivariate binomial pricing technique to price the prepayment and default options embedded in a fixed-rate mortgage contract simultaneously. Their discrete lattice approach departs from the original continuous-time finite-difference method in a number of ways: first, their model does not limit the underlying house price and interest rate processes to lognormal distributions. Second, their model allows for a correlation between the state variables (i.e., house price and interest rate). Finally, the model uses calculated risk-neutral probabilities rather than probabilities chosen in an *ad hoc* fashion for the lattice nodes. Preceding this work was a model similar in all the assumptions, derived by Kau *et al*. (1995:5-36), except that the latter's numerical technique took the form of explicit finite-difference procedures in solving the resultant PDE (partial differential equation) that must be satisfied by the prepayment and default options. Leung and Sirmans (1990:91-104) use the lattice approach to estimate the value of the default and prepayment options, incorporating refinancing and default costs. Instead of modelling the path of the spot interest rate as a state variable, the authors employ the discount bond price (i.e., zero-coupon bond) of the same maturity as the mortgage. The basis hereof is of course that a mortgage is equivalent to a series of zero coupons ranging in maturity from one month to the full term of the loan. These authors claim their model to be more realistic and more applicable to the real world for accounting for transaction costs involved in the exercise of these options, and boast option value results comparably close to those obtained via the continuous-time integration route of finite-difference methods.

The econometric approach to valuing prepayment and default is an alternative to the options-based methodology, and has been used by numerous researchers, including Von Furstenberg (1969:459-477), Titman and Torous (1989:345-373) and VanderHoff (1996:379-406). Based on empirical data (i.e., historical), it involves the use of regression analysis to relate default and prepayment risk to the terms of financing such as age and maturity term of the loan, borrower income, initial LTV (loan-to value ratio), and even whether the borrower is a first-time buyer or not. The chief drawback of the econometric approach, however, is that microeconomic factors can change quite rapidly in a given market, rendering the regression coefficients far from reality (Chen, Connolly, Tang & Su, 2009:841).

The options-theoretic approach to mortgage valuation follows a simple logic. In fact, the term "option pricing" is something of a misnomer, as Kau and Keenan point out (1995:224), since the contingent claims analysis applies to all derivative assets, not only options. There is a close analogy between a mortgage on a house and an option on a stock. The option available to a borrower to default may be viewed as a put option on the underlying asset, the house. Through default, the borrower disposes of the asset in exchange for a release from the obligation to repay the mortgage loan. Prepayment, on the other hand, may be considered a call option, American because it can be exercised at any time (as opposed to default which is a European-type option in that it is only financially rational when a payment is due) in the life of the mortgage. The prepayment option bestows on the borrower the right to gain the property by extinguishing the mortgage loan obligation. This is what is commonly referred to as refinancing, and will usually occur in situations when the current market rate of interest falls sufficiently below the mortgage contract rate, and borrowers rationally avoid the higher cost associated with their current obligations.

5.3.2 The mortgage contract

The following notation will be useful in describing the mortgage components in the valuation framework to follow:

PV_0 =The initial mortgage balance - the mortgage loan amount at origination;

PV_t = The mortgage balance outstanding after each paymentPt;

Pt = The monthly mortgage payment to extinguish the loan obligation at T;

$A(r,t)$ = The value of the remaining mortgage payments at time t;

$V_B(H,r,t)$ = The value of the mortgage contract to the borrower at time t;

$V_L(H,r,t)$ = The value of the mortgage contract to the lender at time t;

$I(H,r,t)$ = The value of the mortgage default contract at time t;

T =The scheduled mortgage loan term or maturity;

t =Any time into the term of the contract when a payment is due;

i =The mortgage contract effective monthly rate of interest, which determines the monthly payments Pt and the outstanding mortgage balance at any time t into the term of the contract;

$r(t)$ = The spot interest rate at time t, which varies through time. It represents the current term structure of interest rates;

$H(t)$ = The house price at time t;

The state variables and their path processes

The options-based approach for valuing mortgages with prepayment and default has two state variables: the interest rate r, and the value of the underlying house H. Drawing heavily on the existing literature (Azevedo-Pereira, Newton & Paxson, 2002:186; Chen *et al.*, 2009:846; Kau & Keenan, 1995:222; Kau *et al.*, 1995:7), this section describes the economic environment in which these variables evolve over time. The contingent claims model recognises these two variables as the main sources of risk in a mortgage contract. A contract that runs through to maturity, after all, is just a simple annuity with no loss implications for either party.

The term structure

The spot rate r(t) is considered to incorporate all information known at time t about future interest rates. The interest rate process is modelled as a mean-reverting square root diffusion process

$$dr = k(\theta - r)dt + \sigma_r\sqrt{r}dz_r \quad \text{.....5.3.2.1}$$

with the following notation:

k: The speed of adjustment in the mean-reverting process

θ: The long-term mean of the short-term interest rate

σ_r: The instantaneous standard deviation of the spot interest rate

z_r: A standardised Wiener process of the interest rate

A positive slope for the term structure is ensured by $r_0 < \theta$, so that interest rates will converge to the mean value θ in the long run. This reversion to a trend rate mean θ, and the preclusion of negative interest rates are considered desirable properties from a modelling standpoint, allowing the use of just one variable to represent the term structure of interest rates (Kau & Keenan, 1995:231).

The house process

The house price $H(t)$ is treated in the model as a lognormal diffusion process. Recognition is given to the benefits derived by the household from living in the property by deducting the service flow δ from the house value appreciation, serving as a proxy for cash dividends received by the borrower, yielding the equation

$$\frac{dH}{H} = (\mu - \delta)dt + \sigma_H dz_H \quad \text{.....5.3.2.2}$$

with the parameters

μ: The instantaneous rate of house price appreciation;

δ: The service flow provided by the house;

σ_H: The instantaneous standard deviation of returns on the house value;

z_H: A standard Wiener process of the house value.

The correlation between the two processes is given by

$$dz_r(t)dz_H(t) = \rho dt \quad \text{.....5.3.2.3}$$

where ρ is the instantaneous correlation. The assumption that the service flow δ from the house is a constant proportion of the house price raises a criticism: economic reasoning would suggest that the value of the house equal the present value of the expected future service or rental flows, as opposed to the latter being treated as a constant fraction of the current house value. Existing models, however, avoid the difficulty involved in precisely defining these service flows by adopting the model specified above (Azevedo-Pereira, Newton & Paxson, 2002:185-211; Chen *et al*, 2009:840-861; Cunningham & Hendershott, 1984:1-23; Epperson, Kau, Keenan & Muller III, 1985:261-272; Kau & Keenan, 1995:27-244; Titman & Torous, 1989:345-373). Service flows are unknown, as Hendershott points out (1986:507), with the added difficulty of splitting the return on the house into dividends and capital appreciation based on expected future inflation rates in house price a term structure of which does not exist.

Although the evolution of the house price is determined by complexities of the market, including building type, quality, and preferences of buyers, the framework, through arbitrage reasoning, allows the mortgage value to be expressed as a function of the two state variables described above. This relationship takes the form of a partial differential equation (PDE) (Azevedo-Pereira, Newton & Paxson, 2002:187; Chen *et al*., 2009:847) with no analytic closed-form solution, requiring numerical methods of integration as mentioned before. The so-called fundamental PDE is given by

$$\frac{1}{2}H^2{\sigma_H}^2\frac{\sigma^2 V_B}{\partial H^2}+\rho H\sqrt{r}\sigma_H\sigma_r\frac{\partial^2 V_B}{\partial H\partial r}+\frac{1}{2}r{\sigma_r}^2\frac{\partial^2 V_B}{\partial r^2}+k(\theta-r)\frac{\partial V_B}{\partial r}+(r-\delta)H\frac{\partial V_B}{\partial H}+\frac{\partial V_B}{\partial t}-rV_B=0, \qquad \text{5.3.2.4}$$

with V_B the mortgage value. The PDE is solved working backwards from the end of the term of the mortgage contract, identifying points at which termination either through default or through prepayment would be optimal for the borrower.

Components of the mortgage contract

From the perspective of the borrower, the mortgage's value $V_B(H,r,t)$ is represented by the present value of the contractually agreed mortgage payments $A(r,t)$ less the joint right to terminate before maturity $J(H,r,t)$. Premature termination may be either through the exercise of the default option $D(H,r,t)$, or that of the prepayment option $P(H,r,t)$:

$$V_B(H,r,t) = A(r,t) - C(H,r,t) - D(H,r,t) = A(r,t) - J(H,r,t) \text{.....5.3.2.5}$$

The value of the mortgage to the borrower reflects a combination of a liability ($A(r,t)$, referred to as the option-free value) and a long position in the joint option to terminate the contract. The nomenclature (r, H, and t) symbolises the dependence of the relevant variable on the market interest rate, house price and any point in time along the mortgage life respectively. The value of the options depends on the volatilities of both house prices and interest rates as well as on the time to maturity of the mortgage loan (VanderHoff, 1996:383; Chen *et al.*, 2009:844). The co-existence of the two termination options at the disposal of the borrower, and their interaction during the evolution of the mortgage contract complicates the valuation exercise. They are substitutes, and exercise of the one precludes that of the other. Moreover, one cannot be calculated without regard to the other.

The value of the default option is less in the presence of prepayment than in its absence, just as the value of the prepayment option is higher in the absence of default than its presence. With the passage of time, and as each monthly mortgage repayment is made, the value of the joint option diminishes. This underscores the importance of the simultaneous inclusion of both in modelling mortgage contracts.

Of note is that, because the insurance contract has no value to the borrower, it does not feature in equation 5.3.2.1 above. In the event that he defaults, only the lender benefits. In other words, the value of insurance is the difference between the mortgage's value to the lender and its value to the borrower. The value to the lender is thus:

$$V_L(H,r,t) = V_B(H,r,t) + I(H,r,t) \text{.....5.3.2.6}$$

For ease of exposition, the reference to mortgage value will mean the value to the lender $V_B(H,r,t)$ (eq. 1 above), since it explicitly contains the option values of interest. The monthly payments Pt are defined to allow full amortisation of the loan principal and interest at maturity:

$$Pt = \frac{PV_0 i(1+i)^t}{(1+i)^t - 1}$$

which is just the basic annuity representation.

The mortgage balance outstanding after each payment at time t is given by the equation:

$$PV_t = PV_0(1+i)^t - Pt\left[\frac{(1+i)^t-1}{i}\right] \quad \text{.....5.3.2.8}$$

which simplifies to

$$PV_t = PV_0\left[\frac{(1+i)^T-(1+i)^t}{(1+i)^T-1}\right] \quad \text{..... 5.3.2.9}$$

The boundary conditions

In the backward iterative process of solving the partial differential equation, it is necessary to apply both terminal and interior boundary conditions defining points in time when optimal exercise of the options at the disposal of the borrower would occur. The option to default $D(H,r,t)$ is directly affected by the house price; for any house price different from the value of the outstanding debt $A(r,t)$, the borrower either continues with the payments, prepays, or defaults. The value of the prepayment option $C(H,r,t)$, on the other hand, depends on the term structure of interest rates but not directly on the house price, though it is influenced by whatever determines default since the exercise of default renders the value of prepayment zero.

The initial condition at maturity

In the solution of the fundamental PDE (equation 5.3.2.4), valuation begins at maturity, when the contract's value is know from its specifications. At this point in time, the mortgage value, the default option and the prepayment option are all worthless:

$D[r(T),H(T)] = 0,\ V_B[r(T),H(T)] = 0$ and $C[r(T),H(T)] = 0$

The mortgage has been fully amortised, and the options vanish immediately upon the final payment. From this point on, one moves backward until the next payment date is reached, when a new boundary condition is applied. Thus at the second last payment date, and at each subsequent payment date thereafter,

$$A^-(r,t) = A^+(r,t) + Pt \qquad for\ t = 1,2\ldots.(T-1)$$

A^- represents the value of the remaining payments immediately before a payment is made, and A^+ the value immediately after a payment. At all payment dates earlier than maturity, the mortgage value to the borrower is thus:

$$V_B^{-}(H,r,t) = min\big([V_B^{+}(H,r,t) + Pt], H\big) \quad for\ t = 1, 2, \dots, (T-1)$$

The default decision is assumed to be triggered when the value of the mortgage to the borrower (i.e., the borrower's obligation less the joint option to terminate prematurely) exceeds the value of the house. The borrower's liability on its own must be modified to reflect the assets at the borrower's disposal:

$$A(r,t) - [C(H,r,t) + D(H,r,t)] > H$$

Apart from the initial boundary conditions at the maturity of the contract, all other boundaries obtain from consideration of extreme values of the state variables.

Extreme values of the state variables

To see how boundary conditions may be established from examining mortgage contract values at extremities of the state variables, a transformation of the original PDE (equation 5.3.2.4) is necessary so that all the possible values of H and r may be represented on their respective axes (Kau, Keenan, Muller & Epperson, 1992:284; Chen *et al.*, 2009:847).

The house price H is transformed into its logarithmic value in the state space grid, via

$$q = \ln(H)$$

The natural boundaries for H are 0 and ∞, so that the transformation above gives the range for q (-∞, +∞). In practice however, the upper bound for H is finite. For the lower bound, negative log values of the house are ignored, so that the transformed variable is

$q \in [0, ln(\overline{H})]$, where$\overline{H}$ is the house price upper bound.

For the interest rate, the natural boundaries are also 0 and ∞. A common transformation for the interest rate is

$$\gamma = \frac{1}{1 + r\beta}$$

For any $\beta > 0$ the infinite range for r is mapped into a finite range [0, 1] for γ.

Finally, the backward PDE in equation 5.3.2.4 is transformed into a forward equation simply by reversing the time dimension through

$\tau = T - t$. The end result of these transformations is a new function in q, γ and q:

$$\frac{1}{2}{\sigma_H}^2\frac{\sigma^2 V_B}{\partial q^2} + \left(r - \delta - \frac{1}{2}{\delta_H}^2\right)\frac{\partial V_B}{\partial q} + \frac{1}{2}r{\sigma_r}^2\beta^2\gamma^4\frac{\partial^2 V_B}{\partial \gamma^2} + [{\sigma_r}^2\beta^2 r\gamma^3 - \beta\kappa(\theta - r)\gamma^2]\frac{\partial V_B}{\partial r} - \frac{\partial V_B}{\partial \tau} - rV_B = 0,$$ ……5.3.2.4b

representing a 3-dimensional box in the space $[0, T] \times [0, ln(\bar{H})] \times [0,1]$.

The interest rate =0

At an interest rate of zero, the borrower either prepays with certainty (at high house values) or defaults with certainty (at low house values). See below for when both r and H take on extreme values. The mortgage value then becomes

$$V_B[r(t), H(t)] = Min[H(t), PV_t(i, t)]$$

The natural log of the house price = 0

A log value of zero implies $H(t) = 1$. The borrower's mortgage liability cannot exceed the value of the house, and so the rational action by the borrower is to default. The mortgage value then becomes the house value:

$V_B[r(t), H(t)] = H(t) = 1.$

The prepayment option is worthless, and the value of the joint option is simply $J[r(t), H(t)] = A[r(t)] - 1.$

The house value tends to infinity

The default option value tends to zero as the house value tends to infinity. This condition is given by

$$\lim_{H\to\infty} D[r(t), H(t)] = 0$$

As the default option value diminishes, what is left of the joint option is only the prepayment value, so that the mortgage value reduces to

$$\lim_{H\to\infty} V_B[r(t), H(t)] = A[r(t)] - \lim_{H\to\infty} C[r(t), H(t)].$$

High property values, it will be observed, tend to rule out rationally optimal default, resulting in a mortgage contract akin to a default-free mortgage that is still callable (i.e., prepayable). This scenario is of note in that it produces a PDE only in r, with the house value eliminated from the original fundamental PDE. This resultant PDE

$$\frac{\partial V_B}{\partial t} + \frac{1}{2} r {\sigma_r}^2 \frac{\partial^2 V_B}{\partial r^2} + \kappa(\theta - r)\frac{\partial V_B}{\partial r} - rV_B = 0$$

needs to be solved prior to turning to the transformed PDE (equation 5.3.2.4b). At the one extreme, this non-defaultable but callable mortgage contract will tend to zero as the interest rate approaches infinity, because the present value of the promised payments will tend to zero too:

$$\lim_{r\to\infty} A[r(t)] = 0$$

and

$$\lim_{r\to\infty} V_B[r(t), H(t)] = 0$$

At the other extreme, as the interest rate approaches zero prepayment becomes a certainty at high levels of house value, and the mortgage value becomes just the unpaid balance $PV_t(i, t)$.

5.3.3 The insurance contract

Arbitrage

It is useful to view an option as simply a package of possible pay-outs. Since the value of an option derives from that of the underlying asset, the rationale for valuing the option without reference to market forces in terms of risk preferences and attitudes relies on the assumption that all such forces would have gone into setting the price of the underlying asset, the house price in this specific case. To value the derivative asset all needs be done is replicate the pattern of pay-outs associated with it by constructing a portfolio (hedge portfolio) consisting of riskless bonds and the underlying asset itself (Kau & Keenan, 1995:218). The value of such a portfolio will be the sum of the constituent elements, with known prices. By the "law of one price", the option must then have

the same value as that of the hedge portfolio since the two achieve the same outcomes, or else one could arbitrage by taking a long position in the one and a short one in the other.

The valuation framework

The insurance against default that the mortgage contract carries does not form part of the borrower's position, although its value depends on her actions. In other words, the insurance is contractually separate from the package of the house, the mortgage, and the options therein embedded. At once though, the value of the insurance contract depends on the expected behaviour of the package.

Upon default by the borrower, the loss facing the lender is the difference between the total debt owed at the time (i.e., the face value of the loan, $PV_t(i,t)$) and the house value at that time, $H(t)$. To be more precise, because this house value is rarely ever known until a transaction has actually occurred, it is common for an insurance contract to specify a limit of coverage, say a fraction y of the total loss suffered by the lender. This total loss is defined to be the total debt outstanding at the time of default less any recovery through an auction sale. The recovery rate is usually set in advance as part of the insurance contract (Azevedo-Pereira, Newton, & Paxson, 2002:193). For the insurance product envisaged in this study, however, a full 100% cover product would be ideal (initially at any rate) to stimulate full market interest as well as provide maximum incentive to the lending institutions.

The MI premium may be treated either as an upfront lump sum payment or it may be incorporated in the contract rate that determines the monthly mortgage repayments. Although the upfront payment was stated earlier as the preferred choice for MI in South Africa, from a modelling point of view this choice has no consequence since mathematically the contract rate remains the same whether the lender purchases insurance or not.

Whenever the borrower opts to continue payments on the mortgage, the value of insurance simply becomes the future value of insurance. However, upon default, the insurer must pay the lender the difference between the face value of the loan and the value of the house, which latter value is assumed recovered through foreclosure. The lender, however, loses the value of the remaining promised payments (i.e., the outstanding principal balance plus accrued interest).

$$Loss(t) = max\big(0, min(PV_{t-1} - H(t), L_R PV_{t-1})\big)$$

The quantity L_R is known as the loss ratio, which is used commonly in practice to establish a cap on the liability of the insurer in the event of default, and usually takes the form of a fixed percentage of the face value of the loan balance outstanding. The insurance product under study here is one of full cover, so that $L_R = 1$.The terminal conditions for the default insurance are as follows. At loan contract maturity, the value of insurance is either zero if the final payment is made (i.e., default does not occur), or the lesser of the coverage limit Cap and the difference between the house value and the final payment:

$I(H, r, T) = min[PV_t - H(t), Cap]$, if default does not occur, and

$I(H, r, T) = 0$, if default occurs.

At payment dates preceding the final one, the value of insurance just before a payment equals the value just thereafter if default does not occur, and if default occurs, the value equals the lesser of the coverage limit and the difference between the par value of the outstanding mortgage balance and the house value at that particular point:

$I(H, r, t^-) = I(H, r, t^+)$, if default does not occur, and

$I(H, r, t) = min[PV_t - H(t), Cap]$, if default does occur.

At origination of the mortgage contract the value must be the same to the lender as to the borrower, following the principle that voluntarily exchanged assets must be of the same value. Taking into account the upfront lump sum mortgage default insurance premium, the balancing condition at origination must then be:

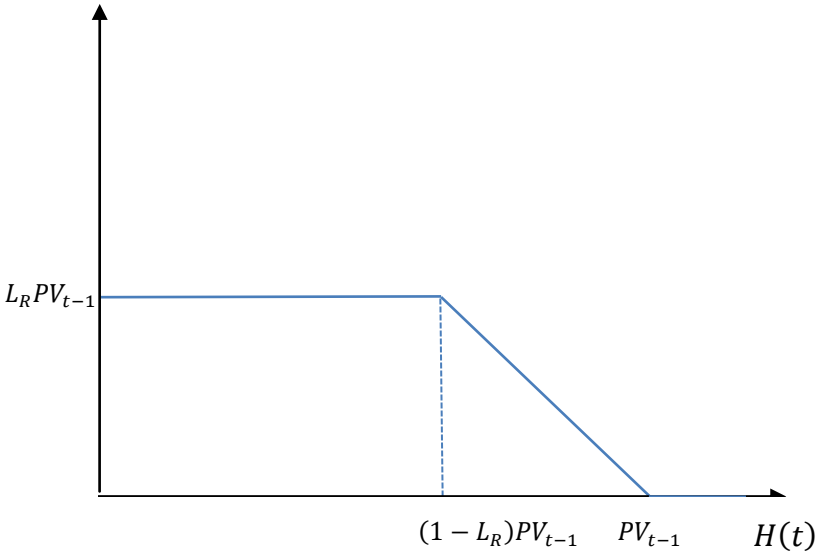
$$PV_0 = V_B(H, r, t, i) + I(H, r, t, i)$$

Where i is the contract rate, $PV_0$the loan amount and I the upfront insurance premium paid. Insurance is therefore a passive asset, except insofar as it influences the mortgage value through the balancing rate. The insurance payoff differs from that of the default option payoff in that it covers the remaining loan balance whereas the default option is deeper in the money the lower the house price falls below the value of the promised payments:

Insurance payoff: $PV_t - H(t)$, Default option payoff: $A(r,t) - H(t)$.

Figure 5.1 below shows the insurance pay-off for different house values at a point of default.

Figure 5.1: The insurance payoff at a point of default for different house values



Source: Own interpretation, adapted from Bardhan, Karapandža, and Urošević, 2006:12

The maximum payoff occurs at a house value in the range zero to the difference between the face value of the unpaid balance and the cap on the insurance cover. Any house value above $(1 - L_R)PV_{t-1}$ yields a payoff linearly decreasing with house value appreciation, until the house value equals the par value of the mortgage balance, when there is no loss and therefore the payoff zero too.

It is important to appreciate that in general the value of default does not equate to the value of its insurance. The market value of the promised payments, $A[r(t)]$, drives the value of default, because the borrower considers this value in making the default decision. The insurance payoff, however, relates to the par value of the mortgage balance. Thus whenever r differs significantly from the contract rate i there will be a divergence between the two. Interestingly, it is the borrower's action, based on the ruling market rate, which triggers the insurance claim. Kau *et al*. (1995:12) mention the possibility that in some cases the lender, and in some the insurer, might profit from influencing the borrower's decision through side payments. Claurettie and Jameson (1990:701-711) examine this agency problem as it relates to the FHA (Federal Housing

Administration) insurance programme. They argue that the insurer suffers losses because of the incentive for lenders to expedite the foreclosure process when the market interest rate is above the mortgage contract rate, and to slow it down when the market rate falls below the contract rate. The model considered here assumes total independence on the part of the borrower.

5.3.4 A critique of the framework

The valuation framework for fixed-rate mortgages (FRMs) outlined above derives from the work by Cox, Ingersoll and Ross on contingent claims analysis (Chen *et al*., 2009:841; Hendershott & Van Order, 1987:77; Kau, Keenan, Muller & Epperson, 1992:281; Kau & Keenan, 1995:222;), which in turn is based on the options-based theory pioneered by Black and Scholes (1973:637-654). The application of the option-theoretic framework to real estate mortgages has been criticised on a number of issues.

Perhaps the most glaring of these, and the one most likely to raise the first eyebrow, is the assumption of optimal exercise of the options embedded in the mortgage. Based on the wealth-maximising principle, the model assumes that borrowers will prepay their mortgages whenever the market interest rate falls below the contract rate, and default when the market value of their obligations (i.e., the mortgage balance) exceeds the house value. Such ruthless behaviour is not observed in practice (Kau, Keenan & Kim, 1994:288; Quercia & Stegman, 1992:369; Sharp, Newton, & Duck, 2008:309; VanderHoff, 1996:379). Mortgage terminations do in fact occur even when the options are out-of-the-money. A household will prepay, for instance, when personal circumstances (i.e., non-financial) compel them to relocate, such as a job change. Similarly, a borrower will default for personal reasons such as loss of income or divorce. These actions, driven by borrower idiosyncrasies, occur regardless of whether the respective options are in-the-money.

Kau and Keenan (1995:226) use the term exogenous (as opposed to endogenous, or optimal terminations that are financially induced) to refer to non-financially induced terminations, and point out the inappropriateness of option-pricing models for determining them. A separate model for exogenous terminations would still be required, however, to determine the extent of their influence on the value of the mortgage contract. The pure options-based valuation framework does not cater for such sub-optimal, non-financial terminations.

An issue closely related to the ruthless exercise problem is the assumption that default is contemporaneous with foreclosure. Often in practice, long periods of delay are encountered between the time of declaration of default and that of the subsequent legal termination of the mortgage contract (and repossession of the property) through the foreclosure process. As an example, Bardhan, Karapandža, and Urošević (2006:16) report an average delay of around 6 months in Denmark, and 3 years in Spain. There are obvious opportunity costs associated with this legal inefficiency from the lender's perspective.

There is evidence, also, of homeowners continuing their mortgage repayments in circumstances involving significant negative equity values in the property, when, as predicted by the model they should have defaulted (Kau, Keenan & Kim, 1994:288). Instead, however, of appealing to the role of transaction costs for an explanation, these authors contend that the delay in exercise has nothing to do with transactions costs. It has to do, they maintain, with the value of the right to default in the future. In other words, the delay in default arises from an expectation of further house value drops in the future, when the option would be deeper-in-the-money.

A number of researchers have sought to demonstrate the relevance of transaction costs in the borrower's decision to default (Ambrose, Buttimer & Capone, 1997:314-325; Bardhan, Karapandža & Urošević, 2006:9-20; Hilliard, Kau & Slawson Jr., 1998:431-468; Vandell & Thibodeau, 1985:292-316). There appears to be consensus, by and large, that for a realistic valuation model these costs need to be incorporated into the framework for quantifying the risk of default in mortgages.

The no-arbitrage assumption that allows the construction of a riskless portfolio to replicate the mortgage contract under valuation is yet another source of contention and discomfort with the model. The notion of a perfect, frictionless capital market in which the underlying asset is actively traded, whilst applicable to equity shares, does not appear suited to the residential real estate market. The suggestion is that there are traders buying and selling houses to profit from small inefficiencies in the mortgage market.

Moreover, whilst one equity share of a company is identical to the next, houses in general are unique, and cannot be substituted one for another. Consider, for instance, an arbitrage strategy that calls for a short position in the underlying. Taking a short position in a unique property the

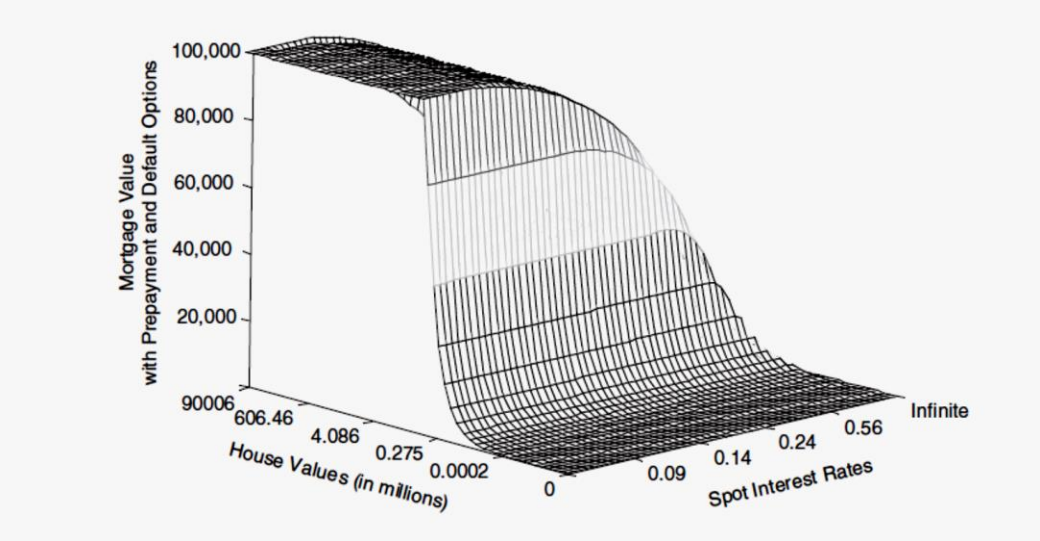
price of which is often only known upon an actual purchase transaction is difficult to construe. Finally, the interacting default and prepayment options embedded in a mortgage are not separable and therefore cannot be traded on their own, as Simon observes (2005:18). The no-arbitrage theory upon which the fundamental PDE for valuing contingent claims is based may thus not apply quite as appropriately to the real estate market as proponents suggest.

5.3.5 Summary of the valuation framework

Figure 5.2 below illustrates the behaviour of the mortgage value from the borrower's perspective (V_B) as a function of the spot interest rate and the underlying house value. At low levels of house value, when the default option is deep-in-the-money, the house price dominates the other factors; the probability of default is a near-certainty, regardless of the level of the spot interest rate. The mortgage value becomes the house value because the borrower almost certainly defaults. Under these circumstances, the relationship between mortgage value and house value is linear and positive.

As the house price rises, its impact on the mortgage value diminishes as the prepayment option assumes a greater role. The reduced house price influence is replaced gradually by a rising interest rate effect, with the mortgage value dropping sizeably with an increasing spot rate. The mortgage value becomes then a decreasing convex function of the interest rate.

Figure 5.2: Mortgage value to the borrower in the [r (t), H (t)] space



Source: Chen *et al.*, 2009:854

However, for relatively low spot rates with the prepayment option becoming more valuable, the mortgage value becomes a decreasing concave function of the interest rate. This behaviour resembles that of a bond with a call feature (Chen *et al.*, 2009:856). A callable bond exhibits positive convexity at high bond yields and negative convexity when the bond yield is low.

It is worth reiterating the main point of the whole exercise in valuing the mortgage: the ultimate goal in this chapter is the determination of a sound and fair premium price for insuring against the risk of default. Not only does one need to quantify the risk insured, but one also needs to know the circumstances under which default is optimal for the borrower acting rationally. The mortgage valuation framework allows a determination of where in the state space default occurs, and aids determine the timing of such default. Default occurs following a consideration of the market value of promised payments relative to the house value. Mortgage valuation is therefore a prerequisite to obtaining the probabilities of default necessary for a quantification of the risk being insured, and thence the price for the premium (Ambrose, Buttimer Jr. & Capone, 1997:317; Kau, Keenan & Kim, 1994:282;).

In concluding this section on the contingent claims approach, it is worth noting that, because of the substitute effect between default and prepayment, an increase in interest rate volatility, σ_r, will increase the incidence of prepayment. Increased prepayment incidence must, by definition, reduce

the incidence of its substitute, default. At the same time, however, the Black-Scholes model asserts that an increase in σ_r will increase the value of options, which includes that of default in this case. As Kau *et al*. point out (1995:18), the value of the default option may increase despite a decrease in the incidence of default. It is therefore the incidence of default, and not the value, that bears a direct relationship with the value of insurance. It is this *value of insurance* that leads to the price thereof.

5.4 Quantifying default risk: an actuarially fair premium price

5.4.1 The relevance of the mortgage valuation framework

The valuation framework discussed in the preceding section (5.3) analyses the borrower's decision process in terms of the prepayment and default options at her disposal. Although the methodology will yield values for the mortgage and the associated options at the various points in time during the term of the contract, the primary objective of this chapter is to establish a price for the insurance premium against the risk of default. Such a price needs to not only be feasible and actuarially sound for a sustainable MI programme, but also fair in the sense that it is neither excessive nor inadequate. In section 5.2 above, the basic premium principle was stated as requiring the present value of expected losses (for the insurer) to at most equal the present value of expected revenues. On the one side of the coin, therefore, losses are expected that result from default, and on the other revenues will primarily be generated from premiums. One can thus pin down the premium by estimating the amount of expected losses.

The expected losses derive from the probability of default, the determination of which is made possible by the mortgage valuation exercise. The [r (t), H (t)] space generated by the valuation framework determines those situations where default is the best wealth-maximising avenue of action for a rational borrower. This follows from the fact that the borrower considers the market value of the unpaid balance relative to the property value in deciding whether to continue the mortgage payments or default. Put differently, it is necessary to value the mortgage and its component options in order to determine the probability of default.

It is to be noted that the value of default (or of the substitute prepayment option) such as obtained from the mortgage valuation process is itself not observable. Far more useful for the investigation at hand (and for a policy maker or insurer in general) is the likelihood that at a given stage during

the contract a borrower will default, and thus trigger a claim by the lender for losses incurred. The rand value of the default option itself, as pointed out above, is not only unobservable, but is also seldom the same as the value of the insurance covering it (see subsection 5.3.3 above). Neither is it particularly useful in helping quantify the risk and therefore the potential losses associated with its exercise.

A range of premium structures exists in markets with developed mortgage finance systems involving MI. Some MI programmes charge upfront premiums with refunds upon prepayment, others annual premiums, with some offering a combination of the two structures (Dennis, Kuo & Yang, 1997:360). The MI programme envisaged for the SA market in this study is one charging a lump sum upfront premium payable at mortgage loan origination.

5.4.2 Determination of the probability of default

The termination boundary regions in the (H, r, t) space obtained from the options-based mortgage valuation framework enable a determination of the conditional probabilities of default associated with the mortgage. One way is to divide the space into one region denoted by Ω, representing the continuation and default regions over the entire life of the mortgage contract, and another denoted by $\delta\Omega$, being the prepayment region. Within the space Ω, the interest lies in those regions D_t where, at each payment date t default is optimal.

The boundary conditions for termination may be summarised as:

$$U(r, H, t) = 1 \quad for \quad (r, H, t) \in D_i$$

$$U(r, H, t) = 0 \quad for \quad (r, H, t) \in \partial\Omega$$

$$U(r, H, T) = 0 \quad for \quad (r, H, T) \in R^{2+} \times T - D_n$$

The equations above merely state that default is certain when the default region is reached (i.e., probability 1) and that the probability is zero in regions of prepayment or continuation of the mortgage.

The goal is to evaluate the probability that the economy takes the borrower into her default region:

$\mu(r,H,t) = P\big((r(t+1),H(t+1),t+1)\big) \in D_t$, for some $t+1 > t$, given $(r(t),H(t),t) = (r,H,t)$.

In other words, $\mu(r,H,t)$ is the probability that default ever occurs beyond the present time t. Stochastic theory (Kau, Keenan & Kim, 1994:282) yields a PDE that is satisfied by such a probability:

$$\frac{1}{2}H^2{\sigma_H}^2\frac{\sigma^2\mu}{\partial H^2} + \rho H\sqrt{r}\sigma_H\sigma_r\frac{\partial^2\mu}{\partial H\partial r} + \frac{1}{2}r{\sigma_r}^2\frac{\partial^2\mu}{\partial r^2} + \gamma(\theta - r)\frac{\partial\mu}{\partial r} + (\alpha - \emptyset)H\frac{\partial\mu}{\partial H} + \frac{\partial\mu}{\partial t} = 0 \quad \text{.....5.3.2.4c}$$

A comparison of the PDE above (eq. 5.3.2.4c) with the fundamental PDE (eq. 5.3.2.4) will reveal that not only does the rV_B term fall away in determining default probabilities, but also that the true processes for the interest rate and the house value are now employed, as against the risk-adjusted processes in the fundamental PDE.

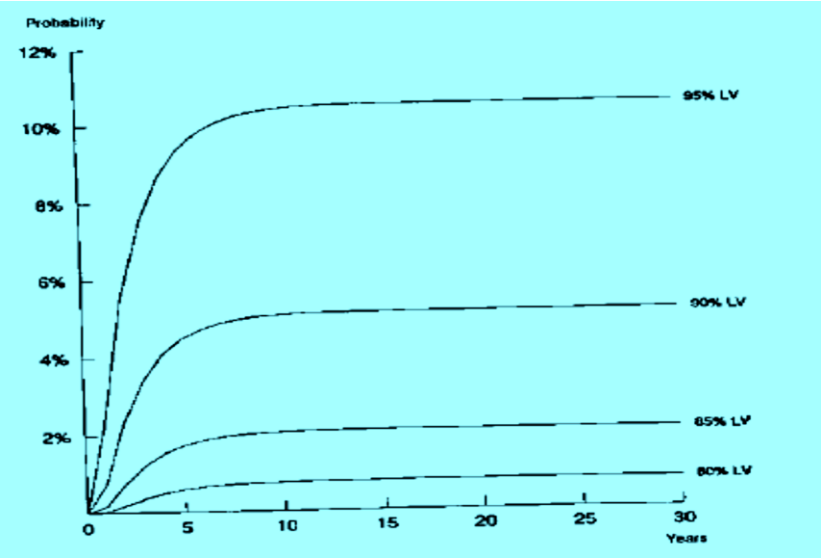
Based on eq. 5.3.2.4, the probabilities conditional on the contract having survived up to any point t may be evaluated, given a set of parameters as below:

Parameter	Used in Fig 5.3
• Term to maturity:	30 yrs
• Contract rate:	9%
• Loan-to-value (LTV):	90%
• Interest rate volatility σ_r:	10%
• House price volatility σ_H:	10%
• Correlation coefficient between the state variables ρ:	0
• House service flow or rental flow $\emptyset$:	8.5%
• Steady-state spot rate θ:	10%
• Expected return on housing assets α:	12%
• Spot interest rate $r(0)$:	8%
• Mean reversion coefficient γ:	25%

Figure 5.3 below depicts default probabilities for different LTV ratios for a 30-year FRM, using parameter values as indicated above. At, for example, $t = 10$, the depicted probability is the

probability at mortgage origination of the loan that default occurs within the first ten years. The positive relationship between LTV and default risk is highlighted. Additionally, the probability of default tends to peak within the first five years of the mortgage, where after it trails off as the loan is paid down and the borrower accumulates positive equity in the property and default becomes less likely.

Figure 5.3: Cumulative default probabilities for different LTV's



Source: Kau, Keenan & Kim, 1994:285

It is important to clarify at this point the distinction between conditional and unconditional probabilities. The Basel II framework on minimum regulatory capital (Edwards, 2004:14; Qi & Yang, 2009:788) requirements defines, as a measure of credit risk, the quantity EL $(expected\ loss) = \ PD * EAD * LGD,$ with

$PD = the\ Unconditional\ probability\ of\ default, EAD = the\ exposure\ at\ default,$ and $LGD = the\ loss\ given\ default.$ PD is the unconditional probability of a counterparty going into default. EAD is simply the total amount owed the lender at the time of default, and LGD (or loss severity) is the fraction of the exposure that the lender stands to lose on default.

The unconditional probability of default is the probability that, given all information currently available, default will occur before some horizon. In contrast, the conditional probability is a reference to the default probability given knowledge of the realised value of the risk factors at the

horizon. Put differently, the average of the conditional probabilities across all possible realisations of the systematic risk factors will yield the unconditional probability (Capozza, Kazarian & Thompson, 1996:359; Gordy, 2003:203). Conditional probabilities are fundamental, therefore, because not only are they employed in theoretical models, but also because one easily obtains the unconditional probability from the conditional via integration of the risk factors, in this particular case the state variables $r(t)\ and\ H(t)$.

5.4.3 The actuarial approach: an alternative for premium pricing

Mortgage termination rates (through default or prepayment) may, of course, be estimated based on historical experience. This approach is ideally suited to well developed markets with a sufficiently long history of mortgage default insurance and readily available data. The implicit assumption in such studies is that past experience can predict future behaviour reliably. Cunningham and Capone, Ambrose and Capone, and Deng and Calhoun have conducted such research (Dennis, Kuo & Yang, 1997:359).

Starting with the premise that $\boldsymbol{EAR_{T-1} = (1+q)EAL_T}$, which is the equilibrium condition for a lender that the present value of accumulated revenue equal the present value of the accumulated expected losses, and adding a gross profit margin for the lender of $100q\%$, it is possible to derive a premium price for the insurance product to be purchased. Defining the conditional default and prepayment rates respectively as $\boldsymbol{d_t}$ and $\boldsymbol{p_t}$, where each is the probability of default or prepayment at time t conditional on there having been no default or prepayment prior to that time, it follows from definition that the probability of staying current (i.e., the probability of neither defaulting nor prepaying at time t) may be written $\boldsymbol{c_t = 1 - d_t - p_t, t \in T}$. The unconditional probability of defaulting at time t is then given by: $\boldsymbol{P_d(t) = \pi_1 \pi_2 \dots \pi_{t-1} d_t}$.

When the applicable insurance premium consists of a single, upfront lump sum payment at origination, one needs only focus on the present value of the accumulated expected losses, such that:

$$EAL_t = EL_1 + EL_2 + \cdots + EL_t$$

And the present value of the expected loss to the lender from the present to time t is:

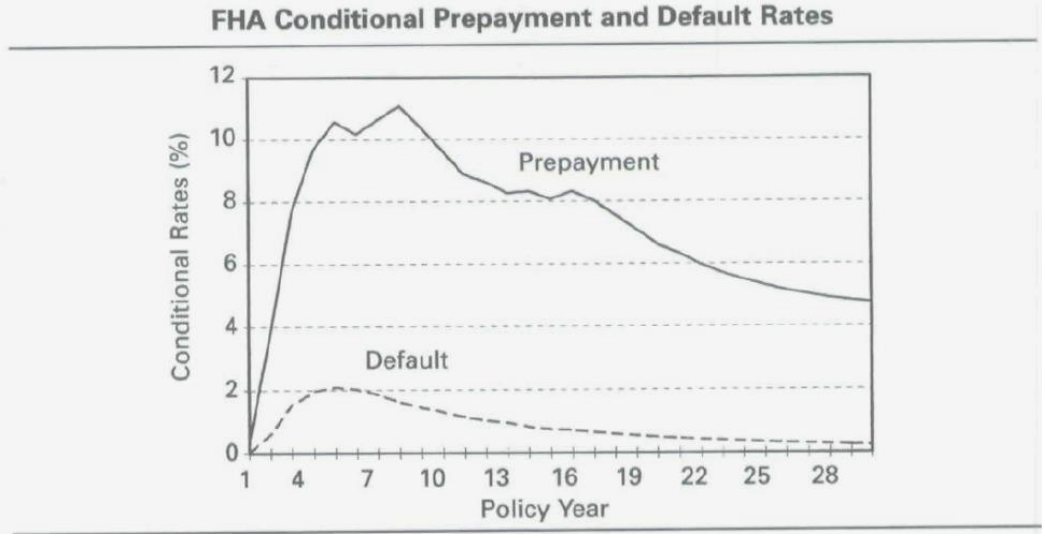
$$EL_t = c_1 c_2 \dots c_{t-1} d_t \, L_R PV_{t-1} R^{-t}$$

With L_R = the loss ratio or loss severity as defined before, PV_{t-1} is the face value of the loan one payment period before time t, R is the ruling spot rate at time t and the rest as above. The lump sum premium to be collected at mortgage origination is then

$P_m = (1+q)AFP$, with the actuarially fair premium price $AFP = EAL_t$.

As pointed out above, this approach requires historical data for calibration. Using FHA experience data published by Price Waterhouse LLP, Dennis, Kuo and Yang (1997:369) obtained the termination rates as shown in Figure 5.4 below:

Figure 5.4: Conditional Prepayment and Default Rates



Source: Dennis, Kuo & Yang, 1997:369

The rates are estimated by taking simple averages across all thirty-year FRMs for each policy year. Again, as seen in Figure 5.4 above, the default rate appears to peak around year 5 of the mortgage contract, with the likelihood of default almost disappearing in the last years of the contract.

The timing of default is important for at least two reasons. First, since expected losses are discounted to the present in computing the total expected accumulated losses (i.e., EAL_t), the actuarially fair price AFP , and hence the premium price P_m is directly affected by how far into the contract the discounting begins (i.e., how large t is). Second, from a revenue recognition viewpoint, the default or claims pattern impacts on how much of the upfront premium received,

which in effect is revenue received in advance and therefore a liability, reports to income in any given reporting period.

5.4.4 An improved technique for emerging economies

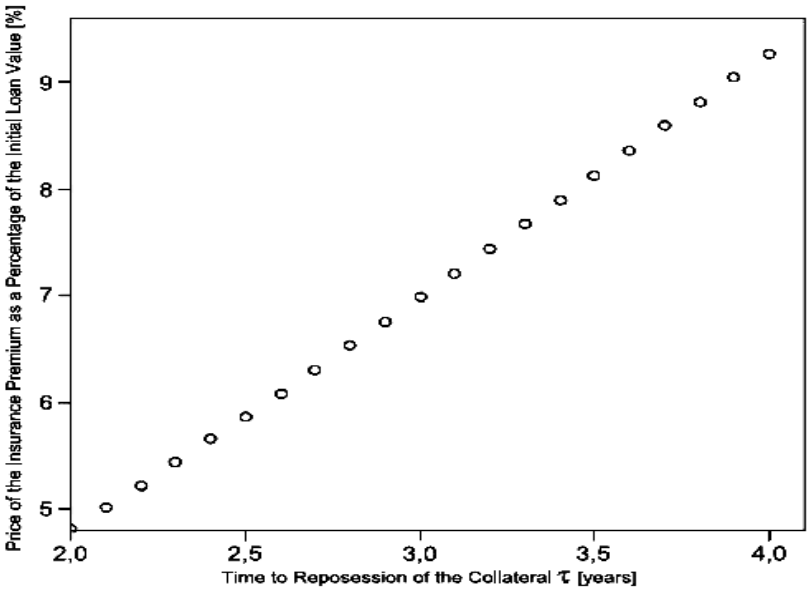
It makes intuitive sense to expect costs arising from the exercise of the default option to affect the borrower's decision to default, given that the option is in-the-money. Empirical evidence indicates that borrowers do not typically default as soon as they reach a position of negative equity in the property (Kau, Keenan & Kim, 1994:287-288). These authors do not appeal to transaction costs as explaining the delay in exercise, and maintain that it is the anticipation of further house value drops that explains the borrower behaviour. Notwithstanding their argument however, others (Ambrose, Buttimer & Capone, 1997:314-325; Bardhan, Karapandža & Urošević, 2006:9-20; Cunningham & Hendershott, 1984:4; VanderHoff, 1996:379-406) have included transaction costs in their models of borrower default behaviour.

In addition to transaction costs, there is recognition that there is a time lapse between default declaration and foreclosure, when the final settlement occurs and the lender obtains repossession of the foreclosed property. This time delay can often last several years, during which time the borrower enjoys "free" rent. During this time, the lender faces the opportunity cost of lending the outstanding balance PV_{t-1} to a paying borrower, for which the insurer must compensate her through the claim procedure. At the same time though, the insurer's loss is partially offset by the fact that the claim by the lender is postponed by the delay τ.

Bardhan, Karapandža and Urošević (2006:9-20) develop an options-based method for the valuation of MI contracts in emerging market economies that specifically addresses the issue of unavailability of historical data typically employed by actuarial approaches to premium pricing. In addition, their model gives due recognition to the costly delays suffered by lenders in realising collateral property values from default to foreclosure completion. Such legal inefficiency is not only common in emerging economies, but has been found in developed countries adopting MI for the first time. As an instance, this delay, measured as the expected time to repossession, has been reported to be around 3 years in Spain, compared with, for example, 6 months in Denmark. The cost of legal inefficiency has a direct bearing on premium price and by extension on affordability.

Bardhan, Karapandža and Urošević (2006:9-20) found the relationship between expected time to repossession and premium price for Serbia, an emerging economy, as in Figure 5.5 below:

Figure 5.5: The influence of delay in repossession of the collateral on MI premium price in Serbia



Source: Bardhan, Karapandža and Urošević, 2006:18

Two other features of the model add to its appeal as a candidate for the South African scene. First, the model drops the interest rate state variable and uses only the house price process, based on evidence by Hendershott and Van Order (1987:19-55) that premium price is not very sensitive to interest rate volatility. Second, the present value of the expected loss to the insurer, conditional on default occurring at time t (EL_t) is represented in the model as the value of a portfolio of two put options with strike prices $K_1 = PV_{t-1},\ K_2 = (1 - L_R)PV_{t-1}$. A long position is taken in the put with K_1 and a short position in the one with K_2 (see Figure 5.1). Mathematically,

$$EL_t \equiv e^{-rt}E\big(Loss(t)\big) = e^{-rt}E(\max(K_1 - H(t), 0)) - e^{-rt}E(\max(K_2 - H(t), 0))$$

$K_1 = PV_{t-1}, K_2 = (1 - L_R)PV_{t-1}$

This is because the loss to the insurer defined earlier, i.e.,

$Loss(t) = max\big(0, min(PV_{t-1} - H(t), L_R PV_{t-1})\big)$

gives rise to the identity

$$max\big(0, min(PV_{t-1} - H(t), L_R PV_{t-1})\big)$$

$$\equiv max(K_1 - H(t), 0) - max(K_2 - H(t), 0)$$

The present value of the expected loss can then be expressed in terms of the value of the portfolio of the put options, using standard option-pricing formulae:

$EL_t \equiv Put(K_1, t) - Put(K_2, t)$

$Put(K_i, t) = K_i e^{-rt} N\big(-d_2(K_i)\big) - H(0) e^{-st} N\big(-d_1(K_i)\big)$

$d_{1(K_i)} = \frac{ln\left(\frac{H(0)}{K_i}\right) + \left(r - s + \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}, d_2(K_i) = d_1(K_i) - \sigma\sqrt{t}, \qquad i = 1,2$

The actuarially fair premium price (without consideration of legal inefficiency costs) is then given by:

$$AFP = \sum_{t=1}^{T} P_d(t)\, EL(t)$$

with the unconditional probability of defaulting at time t, $P_d(t)$, as defined in Dennis, Kuo and Yang in the preceding subsection.

The incorporation of the additional cost to the lender and the offsetting gain enjoyed by the insurer due to the inefficiency delay necessitate a modification of the above equations as follows:

$Loss(t + \tau) = max\big(K_1^l - H(t + \tau), 0\big) - max\big(K_2^l - H(t + \tau), 0\big)$, this being the insurer's liability before the offsetting gain from postponement of the payment of the claim, with the new strike prices (c = the interest rate representing the opportunity cost to the lender, and τ = the time delay)

$K_1^l = (1 + c)^\tau PV_{t-1}$, $K_2^l = (1 - L_R)(1 + c)^\tau PV_{t-1}$, and the net loss to the insurer being

$NEL_t = e^{-r(t+\tau)} E\big(loss(t + \tau)\big) - e^{-r(t+\tau)} E\big(Gain(t + \tau)\big)$

$= \big[Put\big(K_1^l, t + \tau\big) - Put\big(K_2^l, t + \tau\big)\big] - [Put(K_1, t) - Put(K_2, t)]$, so that the MI premium is

$P_m = (1 + q)AFP.$

The premium price charged consists therefore, of a gross profit on an actuarially fair premium price. The AFP is the premium price that equates the present value of expected losses to the present value of expected revenues, yielding a net present value of zero.

5.4.5 Numerical results for South Africa

Based on the afore-going valuation principles price estimates are tabulated below (Table 5.6) for the South African MI entity. Given that there is no established pattern of default behaviour in the gap market targeted, the theoretical valuation models provide a starting point for estimating the cost (to the borrower, that is) of the insurance product being introduced. In due course, with the benefit of actual default experience adjustments can be made in accordance with observed borrower behaviour and forecast economic direction.

In light of the uncertainty regarding possible default outcomes, a three-case scenario attempts to evaluate the impact of a range of assumption values on the pricing. Table 5.1 below summarises the scenarios. The conservative case represents the base case scenario that is informed by economic conditions current as at 2010. Complete coverage of the rest of the scenarios is presented in chapter 3. Other analyses pertaining to the possible performance of the MI programme in the country will be found in Chapter 7.

Table 5.1: Pricing Assumptions

PRICING ASSUMPTIONS	CONSERVATIVE CASE	BEST CASE	WORST CASE
Property Value	**895 000**	**895 000**	**895 000**
Mortgage Interest Rate - Annual	**13.00%**	**10.00%**	**16.00%**
- Monthly	1.08%	0.83%	1.33%
Rate of Prepayments	**7%**	**7%**	**7%**
# Months for Reporting Default	**3**	**3**	**3**
Maximum # Months Interest on Claim	**15**	**15**	**15**
(also used for when claim is actually paid)			
Recovery from Property Sale	**60%**	**80%**	**50%**
Risk-based Capital Requirement	**7.50%**	**7.5%**	**7.5%**
Expected Return on Capital	**11.5%**	**12.0%**	**8.00%**
Return on Investments	**7.00%**	**10.00%**	**6.00%**
Type of Product Model			
LTV when coverage terminates	**0%**	**0%**	**0%**
declining coverage with LTV	**0**	**0**	**0**
Original LTV	Claim rate	Claim rate	Claim rate
75%	**3.8%**	**1.8%**	**5.8%**
80%	**4.1%**	**2.1%**	**6.1%**
85%	**6.7%**	**4.7%**	**8.7%**
90%	**7.2%**	**5.2%**	**9.2%**
95%	**10.0%**	**8.0%**	**12.0%**
Earnings and Claims Pattern:	(1 to 4)	(1 to 4)	(1 to 4)
10	**1**	**1**	**1**
15	**2**	**2**	**2**
20	**3**	**3**	**3**
25	**4**	**4**	**4**
Administrative Expenses			
Cost of underwriting as a % of Premium	**7.50%**	**7.50%**	**7.50%**
Annual servicing cost as % of Premium	**0.94%**	**0.94%**	**0.94%**
Tax Rates			
corporate income tax rate	**28%**	**28%**	**28%**
VAT	**14%**	**14%**	**14%**

Source: Author's construction, source data: CMHC, 2010b:40-41

The MI prices for the conservative case in Table 5.2 below are expressed (as all premium prices are in this study) as a percentage of the original mortgage loan amount. The accompanying chart shows how these prices increase with increasing LTV, consistent with an expectation of higher risk at higher loan-to-value ratios. In addition, the longer the maturity term of the loan the higher the probability of premature mortgage termination either through prepayment or through default, hence the higher the price of the insurance.

A maximum mortgage term of 25 years is proposed for the programme. At 95% LTV for this maturity, the MI price increases nearly 300% from the Best Case price of 2.37% to the Worst

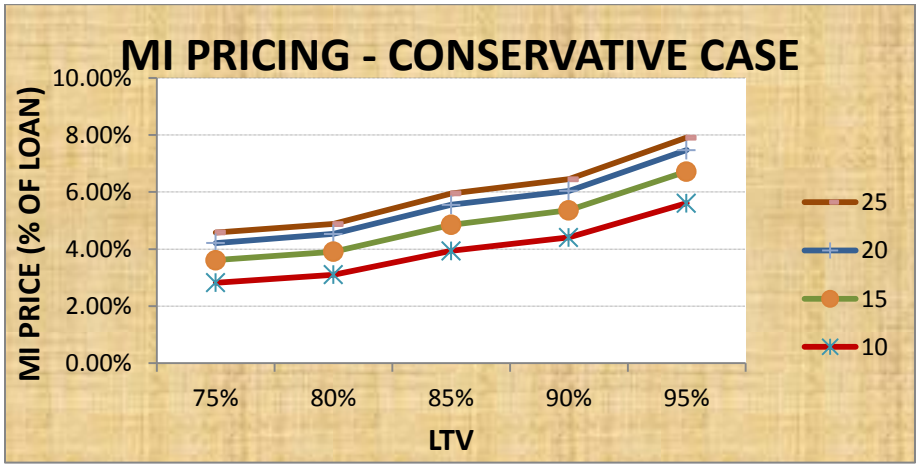
Case's 9.38% - a four-fold increase. In between lies the Conservative Case's 7.91% price. It will be borne in mind that this represents a single, upfront premium payment that insures the lender against default risk for the entire duration of the mortgage contract.

Table 5.2: The Pricing Grid for the Conservative Case Scenario

PRICING GRID 100% COVER CONSERVATIVE CASE				
	Mortgage Term in Years			
LTV	10	15	20	25
75%	2.82%	3.61%	4.21%	4.58%
80%	3.10%	3.91%	4.53%	4.88%
85%	3.94%	4.85%	5.55%	5.95%
90%	4.41%	5.36%	6.04%	6.45%
95%	5.61%	6.72%	7.47%	7.91%

Source: CMHC, 2010a:40

Figure 5.6: Price Variation with LTV and Mortgage Term – Conservative Case



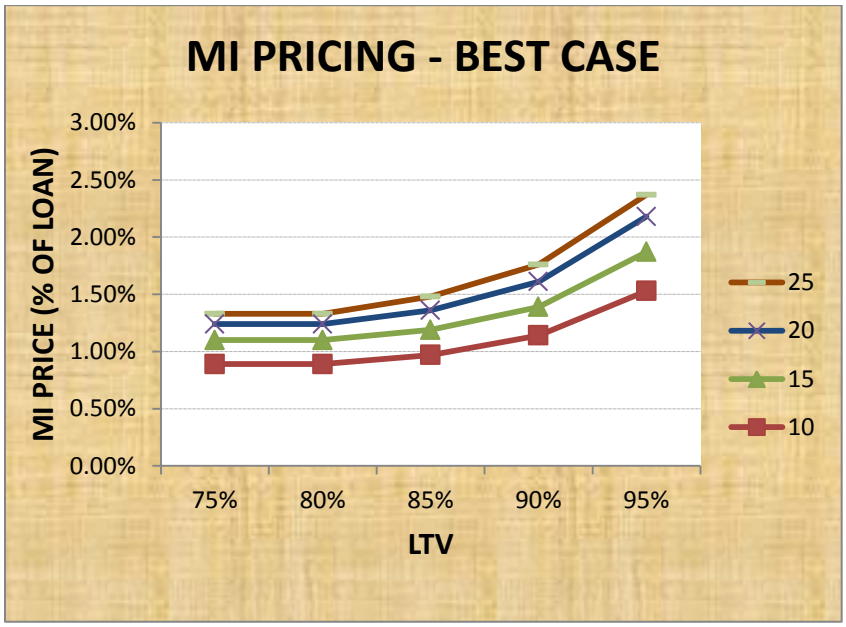
Source: Author's own construction

Table 5.3: The pricing Grid for the Best Case Scenario

PRICING GRID 100% COVER - BEST CASE SCENARIO				
	Mortgage Term in Years			
LTV	10	15	20	25
75%	0.89%	1.10%	1.24%	1.33%
80%	0.89%	1.10%	1.24%	1.33%
85%	0.97%	1.19%	1.36%	1.48%
90%	1.14%	1.39%	1.61%	1.76%
95%	1.53%	1.87%	2.18%	2.37%

Source: CMHC, 2010a:40

Figure 5.7: Price Variation with LTV and Mortgage Term - Best Case



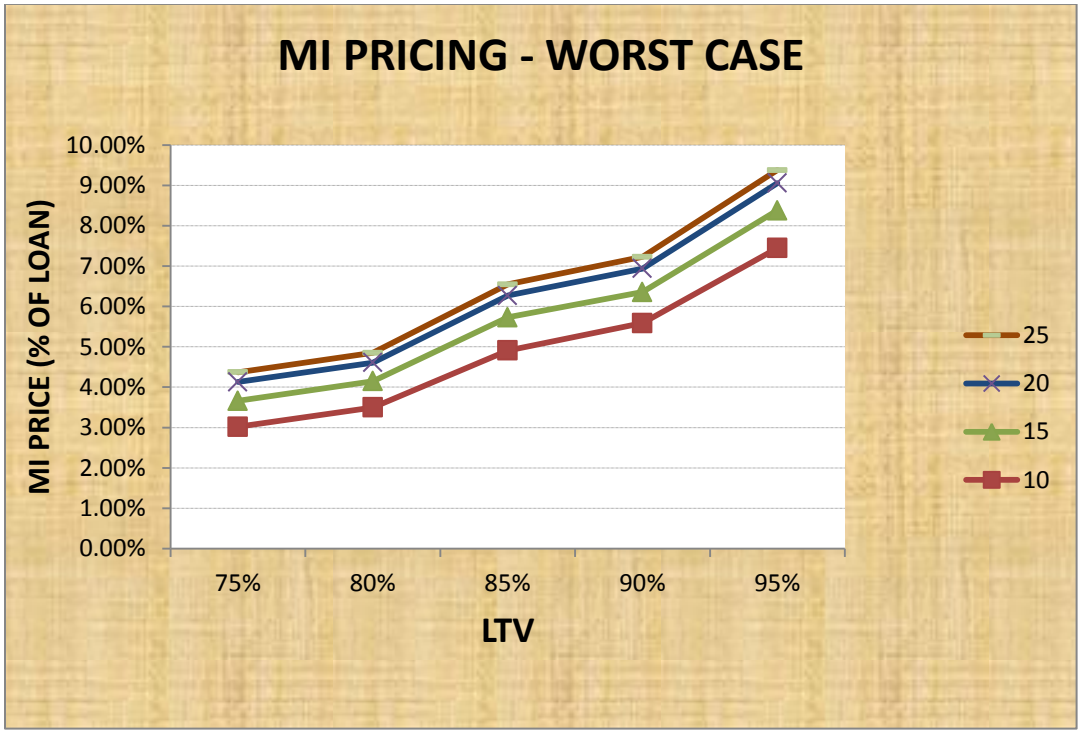
Source: Author's construction

Table 5.4: The Pricing Grid for the Worst Case Scenario

PRICING GRID 100% COVER WORST CASE				
	Mortgage Term in Years			
LTV	10	15	20	25
75%	3.02%	3.66%	4.13%	4.37%
80%	3.50%	4.15%	4.61%	4.85%
85%	4.91%	5.73%	6.27%	6.55%
90%	5.59%	6.36%	6.94%	7.23%
95%	7.45%	8.38%	9.06%	9.38%

Source: CMHC, 2010a:40

Figure 5.8: Pricing Variation with LTV and Mortgage Term - Worst Case Scenario



Source: Author's construction

5.5 Conclusion

The preceding sections have focused on ways to arrive at a price for the MI offering that is not only commercially sound but also fair from the consumer's perspective. It would make no sense to charge an exorbitant price for a product with a social mission such as the one envisaged here. An inadequate price, on the other hand, would lead to failure of the enterprise, with subsequent embarrassing bailout measures from the national treasury, and an incalculable damage to business confidence relative to the whole notion of default insurance.

Despite availability of historical default patterns in markets with developed mortgage insurance, the pricing of the insurance contract is a challenge. The task is even harder in countries seeking to adopt mortgage default insurance for the first time. One way to deal with the issue of lack of historical default experience is to look to those markets that do have the data, and employ the method of comparables (Bardhan, Karapandža & Urošević, 2006:17). Both the FHA in the United States and the OSFI in Canada have over fifty years' worth of actuarial experience with mortgage default insurance. It may be reasonable to assume that similar income bracket households would behave in like fashion in respect of mortgage default. An adjustment factor for known risk differences can always be used.

In practice, one does not encounter bankers spending their time solving partial differential equations. Neither does an average borrower keep a constant eye on interest rates and property price movements with a view to exercising either the default or the prepayment option when these are sufficiently in the money for wealth maximization. Such sophistication, assumed by the valuation theoretics, is not consistent with reality. Nonetheless, the logic in the valuation approaches presented above forms the basis for a starting point in estimating the price to charge in the various LTV categories, consistent with international practice. The specific shortcomings of the valuation models were discussed. Of particular relevance is the absence of past patterns of default on which to base predictions of claims patterns in an emerging economy embarking on the MI programme for the first time.

Given the indicative prices tabulated above, in combination with the volume projections of Chapter 4, the next step is a construction of pro-forma financial statements to aid an appraisal of the possible financial performance of the envisaged company. This will be the subject matter of

Chapter 7. In the next chapter, the regulatory environment in which the company will operate is considered, along with the roles to be played by the various stakeholders in the business of financing mortgages.

CHAPTER 6: KEY ROLE PLAYERS

6.1 Introduction

A consideration of the environment in which the new MI Company will operate is necessary for a reasonable attempt to assess how it might fare. Feasibility in terms of generalities of country characteristics having been proposed, it is important to look at how specific operational requirements might impinge on the opportunities identified to make a case for MI. Challenges anticipated are less of a hurdle when confronted. The fact that MI in South Africa is a completely new industry is itself a daunting prospect, but the upside of this novelty is that precedents are available from which to draw lessons. The timing of the MI introduction, too, in the wake of arguably one of the worst global financial troubles, means that the various role players in the enterprise will be on full alert to many of the pitfalls associated with mortgage lending markets in the immediate past.

The new regulatory landscape emerging, following the global financial crisis of 2007-2008, will bear on MI from nearly all directions. This is because the business at once involves insurance, banking, central banking, and property markets. On the banking front, the new Basel III framework effectively increases the amount of capital the banks are required (or credit institutions in general) to hold to meet global liquidity standards (Weinrich, 2012a:9). Regulators and legislators alike are especially keen to impose restrictions in the mortgage lending markets for the benefit of consumers. On the insurance front, the FSB (Financial Services Board) has been swift to introduce risk-based assessment criteria relative to capital adequacy retirements in line with international trends. Against the backdrop of these revolutionary changes in regulatory standards, this chapter seeks to outline the role of the various players in the birth, and subsequent incubation, of the proposed MI Company, and the legislative environment under which it is likely to grow as a business.

The rest of the chapter is structured as follows. Section 6.2 explains the role of the government wholly-owned NHFC (National Housing Finance Corporation) under whose ambit the MI initiative lies. Section 6.3 attempts to summarise the new solvency requirement framework imposed by the country's regulator for the insurance industry, the FSB, in the form of the Financial Condition Reporting (FCR) framework. Section 6.4 follows with a look at the role of the SARB (the country's

central bank, regulator and supervisor of the banking institutions), and how the institution will play the vital role of providing an incentive to the banking institutions to participate in the new business. Section 6.5 brings in the National Treasury from whom the funding will come to capitalise the MI Company. The main mortgage lenders, the banks, are discussed in Section 6.6, whilst Sections 6.7 and 6.8 make a brief reference to non-banking institutions and housing construction developers respectively. Section 6.9 concludes the chapter.

6.2 Government (through NHFC)

The NHFC has the mandate for administering and managing the guarantee fund announced by the Minister of Human Settlements on 21 April 2010. In the Chairman's Report in the NHFC Annual Report 2012, Professor Katz mentions '…significant progress…" as having been made with regards to the establishment of the MI Company, including ongoing negotiations with the banking community regarding product structure, pricing, and other operational issues (NHFC, 2012:18). In the same report, the CEO (Samson Moraba) mentions a figure of R715 million as having been indicated by the National Treasury for capitalisation of the MI company, and suggests that "…a wide range of banks and non-banking financial institutions…" will be involved in the partnership (NHFC, 2012:26).

Although the initial sponsorship for the MI Company will be from government, the argument presented in this study is for either eventual privatization, or for a multi-player industry with public-private partnerships. Such must be the case if competition and innovation are to be encouraged. Nonetheless, given the initial government sponsorship, it is conceivable that the programme will, at least initially, contain a strong social component in line with the broader public housing policy. The social targeting of the programme benefits will mean exclusion of high-end luxury housing, for example. This regulatory discrimination commonly takes the form of an upper limit in terms of house price or loan amount, and in some cases household income. It would not be peculiar to South Africa, as can be seen with public-run MI programmes elsewhere, in Table 6.1 below. The table results from a survey by Blood (2009b:27) for the World Bank in 2005. The reference to the South African MI is to the HLGC (Home Loan Guarantee Company), which is not strictly appropriate since this entity, as argued in chapter 2, is not a proper mortgage default insurance operation.

Table 6.1: MI programmes with Social Targets

Socially Targeted Public MI Programs
Regulatory Limits in Selected Countries

Country	Type of Limit	Country	Type of Limit
Algeria	Loan amount	The Netherlands	Home price
Belgium	Income Home price	The Philippines	Income Home price
France	Income	South Africa	Loan amount
Kazakhstan	Loan amount	Sweden	Loan amount
Hong Kong	Loan amount	USA (federal)	Loan amount
Lithuania Mali	Loan amount Home Price	USA (state – MA)	Income Home Price Loan amount

Source: Blood, 2009b:27

Apart from the funding for initial capitalisation and ensuring social targeting of benefits, a few other issues involve government directly. During the initial periods of business, it is important that the government, as the sole shareholder, forgo investment returns by way of a dividend. A carefully drawn dividend policy is necessary to allow the MI Company sufficient time to build up capital and reserves, without its solvency being jeopardized by government raiding. In addition, in facilitating high-LTV loans to the target gap market, it is crucial that only those able to afford home ownership are allowed to qualify. An MI programme insuring loans by borrowers with unstable or insufficient incomes is certain to fail. Prudent, commercially sound underwriting standards will need to be agreed upon with the selected lending participants to avoid losses for the MI Company that would ultimately diminish rather than enhance access to mortgage finance.

6.3 The Financial Services Board (FSB)

In South Africa, the regulatory authority for licensing and supervision in respect of insurance companies is the Financial Services Board (FSB). The MI company will therefore be required to report to the FSB for supervisory purposes. Such reporting will include audited annual financial statements, with the further requirement that such auditor be approved by the FSB. Legislation provides for a distinction between long-term and short-term insurers, and separate regulatory frameworks apply accordingly. Even though the MI insurance product would span a potential 25-year period, the FSB has indicated that the MI entity would be classified as a short-term insurer (CMHC, 2010b:13). For this reason, it is appropriate to consider the short-term regulatory guidelines in planning the incorporation of the MI company.

The risks associated with MI are rather unique in terms of both duration of exposure and the extent to which government policy impacts on mortgage portfolio performance. A country's economy may experience several cycles in the twenty-five or thirty years during which a default insurance policy is in force. A central mission of MI's is to guard against massive foreclosures precipitated by large declines in property values and widespread borrower defaults during troughs in economic cycles. These aspects set MI apart from other forms of insurance, requiring a carefully thought out regulatory scheme on the part of an MI regulator. It is therefore relevant to consider some of the key principles to form part of the regulator's armoury in safeguarding the stability of a country's financial system vis-à-vis potential threats emanating from the tri-partite operations of Borrower-Bank-MI.

It may well be argued, in this instance, that, given government's sponsorship in capitalising the programme start-up, it would be in the state's self-interest (taxpayer and consumer protection) for robust capital and reserving requirements to be put in place to promote the success of the initiative. Indeed, such prudence and strong oversight would be in line with the social aspect of the MI programme to the extent that it seeks to alleviate housing shortage in the primary target segment of the nation's workforce. Some of the key regulatory principles are highlighted below.

6.3.1 Solvency

Foremost on the list of issues in respect of MI regulation is the matter of adequate capital reserves. The insurer will need to establish, over time, adequate capital reserves relative to the potential risk of default and loss severity from catastrophic events that can trigger losses on mortgage loan exposures. The capital adequacy requirement (CAR) is of utmost importance to the viability of the MI programme. Reserves need to be built up during the "good" times to ensure sufficient claims-paying capacity in the event of catastrophic losses sustained by lenders. For MI, in contrast to other insurance lines, the reserve requirement must relate directly to the programme's total risk exposure (Blood, 2009b:21). A programme's total risk exposure is defined as the product of the aggregate outstanding loan balance insured and the coverage percentage. This means that, for 100% cover, as is envisaged for South Africa, a statutory minimum reserve requirement of, say, 2% (as is the case with the FHA programme in the USA) would translate into a total reserve requirement of R2 mil on a total balance outstanding of R100 mil in loans insured. A question that requires careful thought is just how much is adequate. From a regulatory standpoint, some

statistical level of sufficiency must be set as an industry guideline, whether it be 50%, 75% or 99% sufficiency, depending on how strict the regulator is regarding averting failure.

The setting of statutory minimum capital ratios will be a challenge for South Africa, without the benefit of default loss experience. However, as with premium pricing, it would not be inappropriate to look to the relatively more advanced markets with established MI programmes (such as Canada, Australia, and the USA, for example) in designing these measures. There is widespread acceptance of LTV as a major determinant of default (Blood, 2009b:23; Calem & LaCour-Little, 2004:650; Klopfer, 2002:23). This is borne out by the application of increased capital factors to successively higher LTV loans by many regulators in countries with a history of MI experience. Table 6.2 below depicts how these factors are applied in the three countries of Mexico, Canada, and Australia.

Table 6.2: MI regulatory capital factors by LTV

MI regulatory capital by LTV ratio

LTV	Australia	Canada	Mexico
70%	0.16%	0.07%	0.14%
75%	0.36%	0.26%	0.40%
80%	0.36%	0.26%	0.88%
85%	0.48%	0.56%	1.81%
90%	0.96%	0.89%	3.56%
95%	2.00%	1.43%	6.71%

Source: Genworth Financial

Source: Blood, 2009:21

The tendency for losses incurred to rise with LTV is further underscored by Table 6.3 below, in which the figures for Probability of Default (default frequency) and the Loss Given Default (LGD = loss severity) were averaged across six countries with established MI operations. The last column, Total Loss, is just a product of the first two columns. Klopfer (2002:25), writing at a time when Basel II had only been proposed, tabulates similar results in demonstrating private investor use of LTV default probabilities reported by rating agencies as a relative measure of risk in secondary mortgage markets. As seen in Table 6.2 above, some countries have implemented variable

regulatory capital requirements, providing for higher capital with increasing LTV, because of the positive correlation between default frequency and LTV.

An alternative available to the FSB in establishing minimum capital ratios is "stress-test" modelling popular with investment rating agencies. The FSB in fact does recognise five of these international credit rating agencies – Standard & Poor's, Moody's, AM Best, Fitch, and Global Credit Ratings (FSB, 2007:55). The modelling attempts to establish claims-paying capacity during periods of simulated "above-normal" defaults, claims, and losses. Moody's Depression stress test, for example, covers a simulated 10-year period in which house prices are allowed to decline by 10 percent country-wide in years 2 through 5, followed by an annual growth rate of 3 percent in each of the last 5 years (Capone, 2001:377). The test, of course, asks the question whether an insurance fund's reserves would be adequate to pay claims in such a scenario.

Table 6.3: Averages of Default Probability, Loss Given Default, and Total Loss across six countries

Relative levels of expected default frequency, loss severity, and total loss
Six-country average* (averages relative to 75-80% LTV which = 1.00)

LTV Ratio	Default Frequency	Loss Severity	Total Loss
60.01-65%	0.62	0.40	0.25
65.01-70%	0.73	0.63	0.46
70.01-75%	0.84	0.83	0.70
75.01-80%	**1.00**	**1.00**	**1.00**
80.01-85%	1.20	1.15	1.39
85.01-90%	1.48	1.29	1.92
90.01-95%	1.88	1.41	2.67
95.01-98%	2.31	1.46	3.40
98.01-100%	2.69	1.52	4.14

*Australia, Germany, the Netherlands, Spain, U.K. and U.S.
Source: Fitch IBCA Ratings

Source: Blood, 2009:21

6.3.2 The Financial Condition Reporting Framework (FCR)

In April 2005, the FBS appointed Deloitte and Insight ABC (Stipp & Isaacson, 2005:4) to calibrate a new method of statutory financial reporting for South Africa, called Financial Condition Reporting (FCR). The aim of the FCR was the construction of a formula appropriate for use as a basis for solvency requirement calculation for the short-term insurance industry. Based on data from

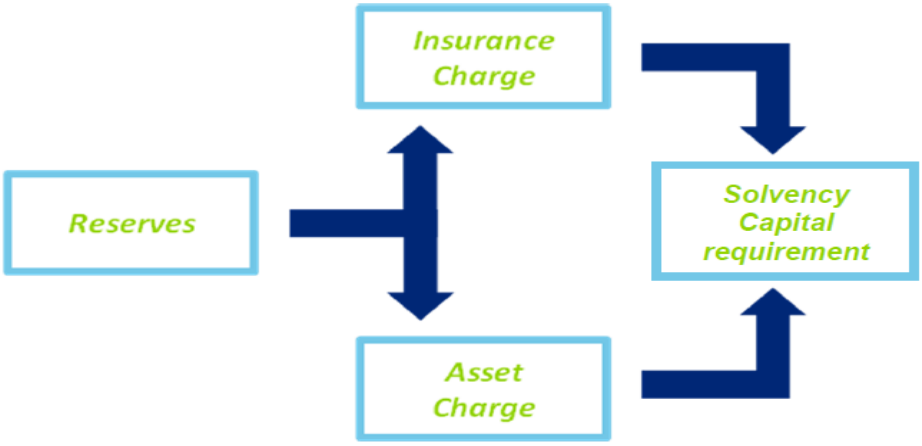
statutory annual reports by existing companies, the formula is in line with international developments and the principles established by the International Actuarial Association (IAA). The FCR lays down the methods to use in calculating both the insurer's liabilities and Capital Adequacy Requirement (CAR). This is consistent with the FSB's goal of adopting a risk-based regulatory approach in line with international practice. In this regard, it is to be noted that Basel II is effective in South Africa (CMHC, 2010a:18), and the proposed Basel III, due for implementation in 2019, will no doubt apply too.

The FCR is an acknowledgement by the FSB (and other regulators elsewhere, e.g. the USA, the UK, Canada, Australia and Germany) that the previous method of applying a constant percentage of net written premium to arrive at a capital requirement did not accurately reflect the considerably higher risks faced by smaller companies, and lower risks faced by larger companies. Adopting a total balance sheet approach, the main principles of the FCR are:

- The valuation of assets at fair value, with such assets as art deemed inadmissible for solvency requirement purposes;
- The allocation of a certain proportion of assets to insurance liabilities, which liabilities (or reserves) consist of
    - a) Claims reserves, comprising IBNR and OCR (Incurred-But-Not-Reported and Outstanding Claims Reported respectively)
    - b) Premium reserves, comprising UPR and URR (Unearned Premium Reserve and Unexpired Risk Reserve respectively)
- That a prescribed margin be added to the insurance liabilities up to the 75^{th} percentile. The 75% percentile level means that the capital requirement would be sufficient to protect the company against insolvency in three out of four times.
- The Total Required Capital equals the Minimum Required Capital plus the Prescribed Margin: $TCR = MCR + PM$

Below is an overview of the overall approach envisaged by the FSB sub-committee on FCR, highlighting the main components of the framework (Figure 6.1):

Figure 6.1: The FCR Solvency Capital Requirement Components



Source: Deloitte & Insight ABC, 2009:10

Owing to the critical importance of the regulatory environment in which the MI company would operate to the appraisal of its performance in the next chapter, a brief description of the four main components of the FCR model (as shown in Figure 6.1 above) follows hereunder.

Reserves

The model splits insurance reserves (or liabilities) into two categories: claims reserves and premium reserves. In turn, claims reserves are a summation of Outstanding Claims Recorded (OCR) and Incurred-But-Not-Recorded Claims (IBNR). An individual entity is expected to arrive at its own best estimate of the OCR figure, whereas the IBNR is obtained by multiplying the Earned Premium for the year by a factor based on a percentage of claims outstanding at year-end. The capital charge deriving from premium reserves will be based on the Unearned Premium Reserve (UPR) and, in some cases, the Unexpired Risk Reserve (URR), which is an additional reserve an entity sets aside in the event that its own best estimate indicates that its premiums are inadequate. From this leg of the model then, a capital charge requirement is obtained by grossing up the aggregate charge from the sub-legs to a 75% level of sufficiency using a Prescribed Margin (PM).

Insurance Capital Charge (ICC)

There are two main risks underlying the capital charge from the insurance leg. Underwriting Risk, which is forward-looking in that it represents the risk that the premium earned in a future period will be insufficient to cover the claims arising in that period, and the backward-looking Reserving Risk measure, which is the risk that claims incurred in a past period exceed the anticipated (and therefore reserved for) claims in that period.

The Reserving Risk is perhaps best explained by its traditional measure, the Reserve Ratio, which is computed as:

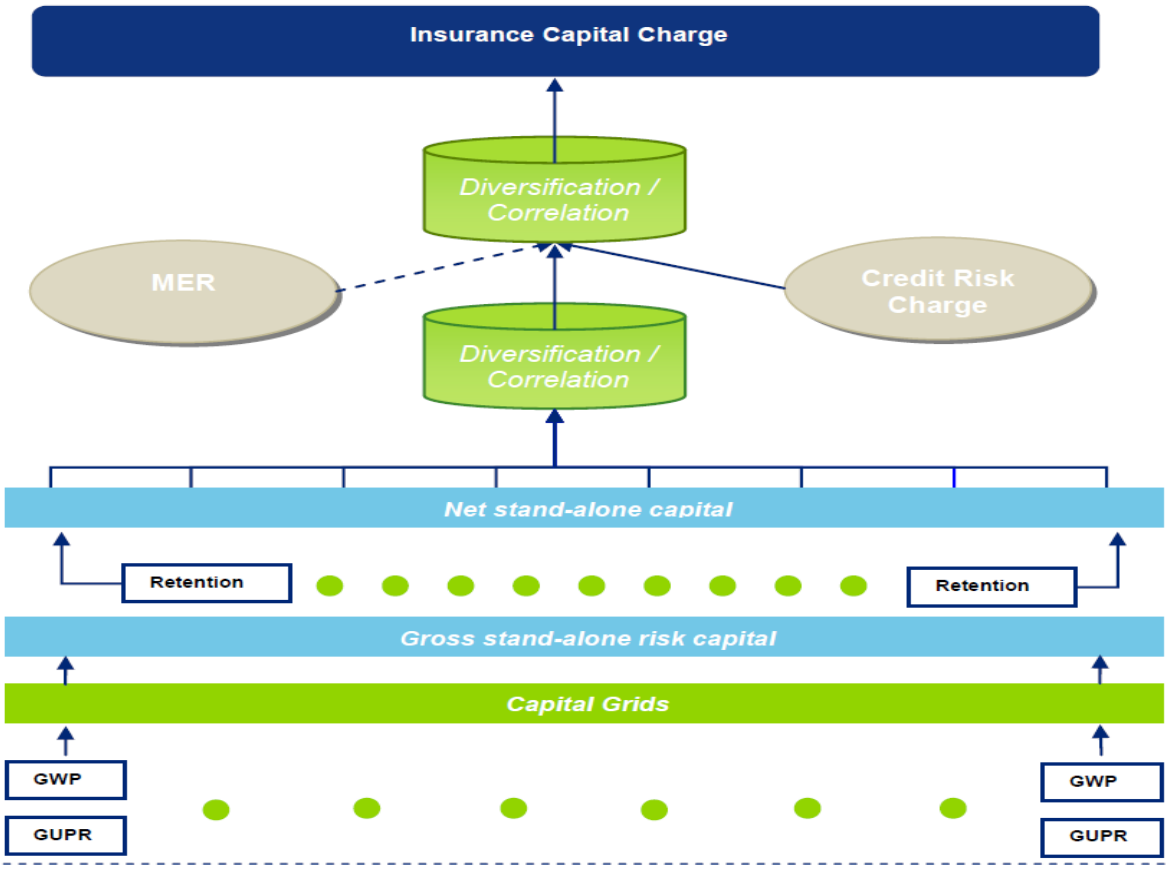
$$Reserve\ Ratio = \frac{Reserve_{k+1} + Paid_{k+1}}{Reserve_k}$$

A Reserve Ratio of unity would indicate perfect reserving, a ratio exceeding unity would mean under-reserving, and a ratio below unity would point to a situation of over-reserving.

The capital charge from this leg of the model is illustrated in Figure 6.2 below. It builds up from the bottom of the diagram, starting with the Gross Stand-alone Risk Capital estimate. This is an estimate of the capital requirement for underwriting and reserving risks for a particular class of exposures (i.e., pure insurance risks) without factoring in any retention by way of reinsurance, or any effects that may be brought about by inter-relation with other exposure classes underwritten. Through Dynamic Financial Analysis (DFA), an estimate of this is obtained from a grid mapping of Gross Written Premium (GWP) and Gross Unearned Premium (GUPR). It is beyond the scope of this paper to delve into the precise statistical computations and actuarial bases thereof.

The Gross Stand-alone Capital is then adjusted for any retentions estimated by the insurer, to arrive at Net Stand-alone Capital. Following from the argument that an insurer will still face expenses that arise from the normal course of business in the event of a worst-case loss scenario, such expenses are then added to the Net Stand-alone Capital. By the same argument, the insurer will still earn returns on existing assets backing the premium liabilities, so an adjustment that allows for such investment returns is brought in to reduce the capital charge.

Figure 6.2: The Insurance capital Charge



Source: Deloitte & Insight ABC, 2009:18

In the event that an insurer writes more than one line of business, diversification and correlation effects need to be taken into account. In general, the effect of diversification will be to reduce the overall capital charge, whereas that of correlation will increase it. The FSB have decided on applying the so-called heuristic rule, which sums the squares of the Net Stand-alone Capital charges of the different lines of business, and then takes the square root thereof to arrive at a final Insurance Capital charge for the insurer.

A further addition to the insurance capital charge arises from credit risk. The likelihood of counterparties failing to fulfil their contractual obligations, willingly or forced, constitutes credit risk, which is inherent in investment assets. A measure of this is achieved in the FCR model by reference to international rating agencies. Because of differences in how the various agencies refer to the same level of default probability, as well as the fact that international ratings are not always

the same as national ones, the FCR has come up with the following tables (Tables 6.4 and 6.5) to ensure consistency of measurement:

Table 6.4: Credit Risk Capital Charges

Intenational Rating (Local Currency)	National Rating	Capital Charge
Unrated	Unrated	13.6%
Government	Government	0.0%
AAA to AA-		1.0%
A+ to A-	AAA to AA+	4.1%
BBB+ to BBB-	AA to AA-	5.0%
BB+ to BB-	A+ to BBB	13.6%
B+ to B-	BBB- to B-	22.4%
CCC+ or below	CCC or below	44.8%

Source: Deloitte & Insight ABC, 2009:34

Table 6.5 Equivalent Investment Ratings Grades

Standard & Poors	Moody's	Fitch
AAA to AA-	Aaa to Aa3	AAA to AA-
A+ to A-	A1 to A3	A+ to A-
BBB+ to BBB-	Baa1 to Baa3	BBB+ to BBB-
BB+ to BB-	Ba1 to Ba3	BB+ to BB-
B+ to B-	B1 to B3	B+ to B-
CCC+ or below	Caa1 or below	CCC+ or below

Source: Deloitte & ABC, 2009:34

The credit risk component is computed for those assets assumed to entail default risk, including

- Bonds and short-term notes
- Policies of insurance and reinsurance
- Debtors, and
- Credit derivatives.

One issue of contention has been the matter of non-proportional reinsurance that kicks in when catastrophes occur. Such events are called Maximum Event Retentions (MER), and insurers have voiced concerns about being unduly penalised for not allowing for the recovery or protection that they enjoy from reinsurance coverage of these events. However, in the process of calibrating the FCR, the data available was not enough to allow a determination of the extent to which catastrophic events allowed for capital relief. In Australia, for example, the regulator (Australia Prudential Regulatory Authority - APRA) adds the MER to the final Solvency Capital Requirement, on the assumption that the model calibration is based only on attritional claims data, excluding catastrophic claims. In South Africa, the FSB has proposed artificially removing catastrophic events from the data reported, by simply shortening the tails of the Ultimate Loss Ratio distribution through a reduction of the standard deviation, but a final resolution of the issue is yet to be reached.

Another issue relates to the estimation of operational risk – the risk of financial loss through error, fraud, or a breakdown in the internal controls of the insurer. The FCR recognises the difficulty in quantifying this risk (FSB, 2007:57), and leaves it to the management of the insuring entity to make informed judgements and to provide a rationale for such judgements as to the capital charge arrived at.

The ICC is thus a combination of the charges above, giving

$$ICC = \sqrt{ICC^{*2} + MER^2 + RCRC^2}$$

The RCRC is the reinsurance credit risk charge. The ICC^* is the insurance capital charge before allowing for the MER and reinsurance credit risk.

Asset Capital Charge (ACC)

The final leg of the FCR model consists of the capital requirement charge deriving from the assets backing the actuarial liabilities of the insurer. The underlying investment risk is that market movements reduce the value of the assets held to back the liabilities and solvency capital requirements to the extent of threatening the solvency of the insurer.

Capital adjustment factors estimated using the Smith Model, and calibrated to the South African market are specified for different investment classes as below (Table 6.6) (Financial Services Board, 2007:24):

Table 6.6: Capital Adjustment Factors for Different Asset Classes

Investment Class	Capital Adjustment Factor
Cash	0.0%
Equity	38.0%
Property	32.5%
Fixed Interest (Outstanding Term = 1 year)	6.7%
Fixed Interest (Outstanding Term = 2 years)	11.27%
Fixed Interest (Outstanding Term = 5 years)	19.8%
Fixed Interest (Outstanding Term = 7 years)	24.6%
Fixed Interest (Outstanding Term = 10 years)	27.0%

Source: FSB, 2007:24

These factors are estimated to provide a 99.5% level of sufficiency (i.e., one failure in 200 years). The adjustment factor is applied to the value of assets held in a particular class to arrive at an amount of capital required to be held as a charge for investment risk. It is important to note that the protection provided relates only to those assets allocated to back the liabilities and other capital requirements. This requires therefore, that assets be allocated to liabilities and capital requirements first, in order to decide which assets to apply the factors to.

Intuitively then, one would expect an insurer to first allocate those assets with the lowest adjustment factors, in order to minimise capital requirements. The prudent approach, however, would be to attempt to match assets and liabilities in terms of nature, term and currency. The logical steps to follow would be as follows.

- To first match assets and liabilities, starting with current and other liabilities, and assigning the remaining assets to insurance liabilities;
- Then would follow the adjustment exercise on only those assets backing the insurance liabilities, and finally

- To aggregate the Asset Capital Charge and Insurance Capital Charge, allowing for covariance effects.

The total asset capital charge is given by

$$ACC = \sqrt{ACC^{*2} + ACRC^2}$$

Where ACC^* is the asset capital charge before allowing for credit risk, and $ACRC$ is the asset credit risk charge.

Total Capital Required (TCR)

The asset capital charge ACC and the insurance capital charge ICC are the inputs for determining the total capital requirement. In the formula below the grossing-up factors g_{acc} and g_{icc} are obtained from intermediate calculation steps to effect adjustments relating to an assumed 50% correlation between insurance catastrophes and investment market crashes (FSB, 2007:28), in line with European practice, as well as to avoid penalising companies for the portion of shareholders' funds not used to back their CAR.

$$TCR = \sqrt{\left(\frac{ACC}{g_{acc}}\right)^2 + \left(\frac{ICC}{g_{icc}}\right)^2} + OR$$

The OR is a reference to the charge relating to operational risk, the best estimate of which is left to the insurer's management.

Minimum Capital Required

The Capital Adequacy Requirement CAR is obtained by deducting prescribed margins on both claim liabilities and the unearned premium provision:

$$CAR = TCR - PM\ on\ claim\ liabilities - PM\ within\ Unearned\ Premium\ Provision$$

The FSB requires that the CAR is subject to a minimum of R10 million.

6.3.3 Transparency regarding risk and the adequacy of capital

The issue of transparency in relation to MI regulation reinforces the recommendation that the MI operator in SA should start out as, and remain monoline. This is to say that the risks assumed and the reserves held must ideally be completely segregated from any other lines of business. As

discussed in Chapter 2, most successful MI programmes are monoline, and those that are not have had trouble (as for example the multiline carriers in the UK in the 1980s). Given the international cross-holdings in the banking and insurance sectors in the country, it is conceivable, however, that the FSB might in due course allow private mortgage insurers to be multiline carriers. This of course assumes that the government-sponsored initiative takes off successfully and leads to entry by private insurers to the business of default insurance in later years.

Another aspect of transparency is with regard to the claims-paying capacity of the MI Company. Although the FSB has done away with the old terminology of contingency and loss reserves with its new Financial Condition Reporting framework (FSB, 2007:7), the essence and rationale for these provisions remain. The notion of a contingency reserve to reinforce claims-paying capacity during depressions began in the USA (Blood, 2009b:22) in the 1950s. It has since found its way into countries such as Mexico, Canada, and Hong Kong. The idea is for a sizeable fraction of the earned premium (for example, 50% in Mexico and the USA, according to Joyce and Molesky, (2009:33)) to be placed in a special reserve on a continued basis. Release into unencumbered earnings would require authorisation by the regulator.

The situation in the USA, for instance, is that half of all earned premiums is placed in the contingency reserve for a period of ten years, which period exceeds the average expected life of loans insured. In Canada, the equivalent reserve is held by government to support a 90 percent government reinsurance guarantee for private MI providers, and pays out in the event of insurer insolvency.

Loss reserving, on the other hand, involves a deduction of losses from capital on the liability side of an insurer's balance sheet (as opposed to the contingency reserve, which is on the asset side – similar to bank capital). Much of the policy requirements relating to loss reserving will be based on historical patterns of default and loss severity (i.e., LGD – loss given default). Expected losses estimated based on the historical data are deducted from capital and recognised as a liability in the loss reserve account.

These two traditional supplementary safeguards (contingency and loss reserves) are implicitly recognised in the FCR. As an active member of the International Association of Insurance Supervisors (IAIS), the FSB has sought to ensure that its solvency assessment and management

(SAM) principles are aligned with the core principles of the IAIS (FSB, 2013:5,24). The objective of the IAIS is to provide effective and globally consistent supervision of the insurance industry and to contribute to global financial stability.

6.4 The South African Reserve Bank (SARB)

In South Africa, bank regulation and supervision falls under the ambit of the country's central bank, the SARB. The main role for the SARB in the launching of the new MI initiative is through its granting of capital requirement relief to the lending banks. Capital relief (discussed further in section 6.6 below) effectively lowers the minimum capital requirement for the banks. This is expected to provide a major incentive for their participation in the programme. A lower capital requirement not only means more origination capacity for a given bank lender, but also an opportunity for such lender to expand into relatively riskier market segments, given the MI's role of transferring default risk out of the banking sector into the hands of the MI provider. Reduced required risk weight factors on mortgages with LTV's above 80% will translate into a lower cost of capital for the banks, and more favourable lending rates for borrowers. The potential benefits of MI to the banks from capital relief are illustrated below under section 6.6: Banks.

6.5 The National Treasury

The National Treasury is expected to provide the initial capitalisation of the MI entity. In its annual report for the financial year ended 31 March 2012, the CEO of the NHFC reports, "Recent advanced engagements with the National Treasury…", indicating an amount of R715 million as adequate capitalisation sufficient to meet the FSB's requirements.

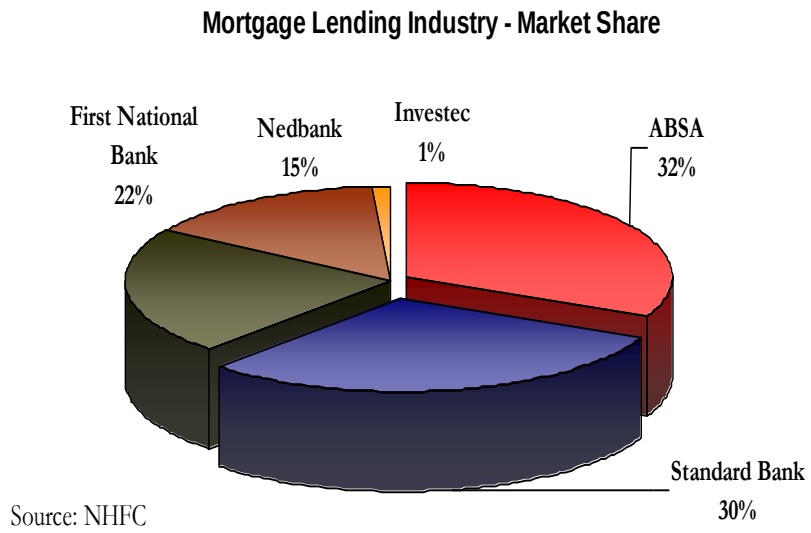
Of immediate concern in this study is that the provider of the funding be agreeable to a moratorium on dividends in the initial phases of the programme. This is crucial, as the new company will require time to gather momentum in terms of volumes of business underwritten, and one might expect losses during teething start-up. At the same time, the need for reserve build-up must be borne in mind. This period of non-remittance of dividends could last up to five years, depending on how the market reacts to the new product.

6.6 Banks

The initial strategy for the MI Company will be to enter into a Mortgage Loan Insurance Agreement (MLIA) with a few carefully selected lenders meeting some qualifying criteria such as financial strength, experience with mortgage lending, and sound operational policies and procedures for underwriting, loan servicing and default management. In any event, the MI Company would need to have in place a solid, non-discriminatory lender approval process prior to business implementation.

The World Economic Forum's Global Competitiveness Report of 2012-2013 ranks South Africa's banks at the no.1 position in what it calls "soundness", out of 144 countries. The country's banks were second to Canada a year earlier in the same report. The so-called top four (ABSA, First National Bank, Standard Bank, and Nedbank) are the main mortgage lenders in the country, and together account for upwards of 95% of the primary mortgage market (as of 2010) (NHFC, 2010:30). Figure 6.3 below shows the relative market shares of the Big Four. Their involvement in the MI programme will be indispensable to MI success.

Figure 6.3: Market Share of Mortgage Lending in SA (October 2010)

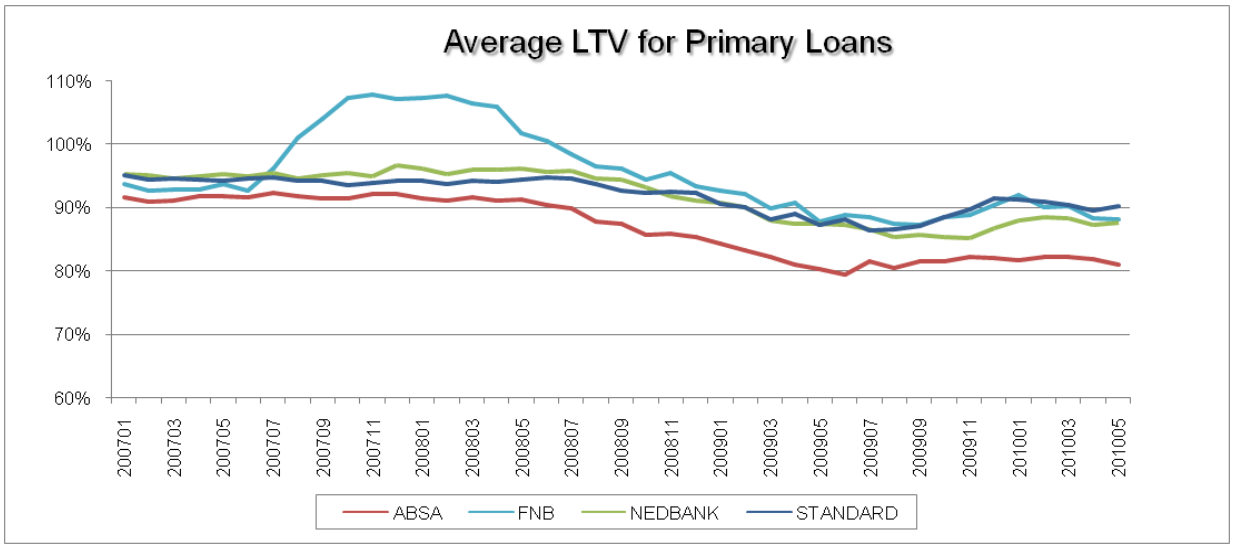


Source: NHFC, 2010:30

As pointed out elsewhere, a well-functioning, mature mortgage market exists in the country. Figure 6.4 below provides an indication of the level of risk up to which the main mortgage players are already willing to provide mortgage finance in the absence of MI (risk being measured here by

LTV). As of mid-2010, a minimum of a downpayment around 10% (LTV of 90%) appears to have been the limit. The graphic of course does not tell the whole story. Other criteria for affordability, such as payment-to-income ratio, creditworthiness, age of applicant, etc., would have been taken into account in the loan approval process.

Figure 6.4: Primary Mortgage Lending By LTV - The Top Four Banks



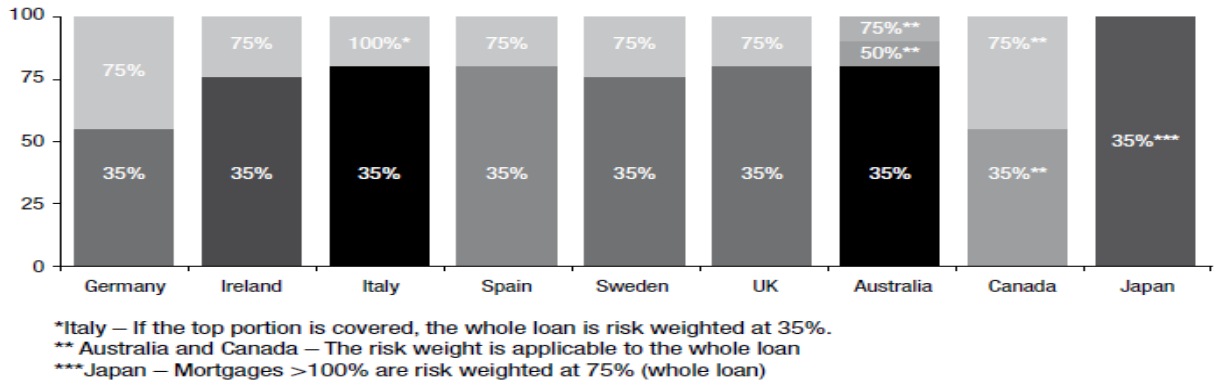
Source: Lightstone, 2010:47

What MI seeks to achieve, inter alia, is to raise the LTV to at least 95% in the particular instance of this study. More importantly, the programme will seek to make a substantial impact on the effective approval rate of about 64% reported by ooba, a leading South African bond originator, in April 2012 (ooba, 2012). The initial decline ratio (some applications declined by one bank will subsequently be approved by another) reported by ooba at the same time was some 47%. The new MI programme will have to make a persuasive commercial sense to the lenders. These well run companies ranking first in the world for soundness are already in business. They ordinarily have their own captives managing their risks in respect of their mortgage books, in the style of the British multiline model. Furthermore, they consistently report liquidity surpluses available to absorb default losses. An appeal to them based on social responsibility grounds may not be enough to dissuade them from carrying on business as usual. This may explain, in part, the apparent lack of interest in the HLGC initiative, which, as seen, has not been a resounding success.

MI offers numerous incentives to the lending institutions. Among the most important of these is regulatory capital requirement relief, in the form of reduced risk-weight factors on loan assets carrying MI. Standard global practice for banking regulators is to grant beneficial recognition to lenders that secure MI. The bank regulator in SA (SARB) has been no exception, and has indicated that such relief would be available to those lenders participating in the MI programme (CMHC, 2010b:20). The extent of such relief varies by country, of course, as does the LTV threshold for classification of a mortgage as high-risk.

Figure 6.5 presents a sample of country LTV thresholds. Above these LTV limits, some form of credit enhancement would be required, to avoid application of higher risk weights. MI is one such credit enhancer. On the one extreme, Germany's regulators view any mortgage loan with an LTV above 55% as high-risk, which would be assigned a risk-weight factor of 75% in the absence of MI or equivalent protection. On the other, Japan's regulator demands credit enhancement for LTV ratios above 100%, without which protection the risk-weight factor of 75% would apply. The actual extent of risk weight reduction varies by country regulator. In Australia, for example, a standard mortgage with an LTV between 80% and 90% would carry a risk weight factor of 50% without MI, but only 35% with MI. For a mortgage with an LTV between 90% and 100% the risk weight reduces from 75% without MI to 50% with MI. Appendix 6 provides further risk weight categories for both Australia and the USA.

Figure 6.5: LTV Thresholds and Standard Risk Weights in Some Countries



Source: Blood, 2009b:24

The benefit deriving from MI in terms of capital relief is illustrated in Table 6.7 below. Assuming a baseline capital requirement for the mortgage asset class of 8%, a normal loan (i.e., below the LTV

threshold, whatever it is) would carry a risk weight factor of 35% as against one with an LTV above the threshold, which would bear a factor of 75%. Applying these factors to the baseline requirement of 8% for the asset class, the capital allocated to the normal loan would be 2.8% against 6% for the higher risk loan. This would be in the absence of MI. With MI, both the normal and the high-risk loans would be allocated a risk weight factor of 20%, resulting in a capital requirement of 1.6% for each. The resulting benefit is thus 1.2% for the normal loan and 4.2% for the high LTV loan.

Table 6.7: Capital Relief through MI

	Normal	High LTV
Baseline requirement	8%	8%
Without MI coverage:		
Assigned risk weight	35%	75%*
Capital allocated	2.8%	6%
With AA-rated MI:**		
Assigned risk weight	20%	20%
Capital allocated	1.6%	1.6%
Potential MI benefit	**1.2%**	**4.2%**

* MI recognition and coverage level to be determined by individual country
** Local regulators determine LTV level and full or partial risk weight treatment

Source: Blood, 2009b:25

6.7 Non-Bank lenders

The MI initiative is not intended to be, nor should it be expected to be panacea for the country's housing problems, but rather as part of the larger housing finance system with a multi-faceted approach to tackling housing shortages wherever they arise. Despite the commanding position of the major banks in the mortgage market, the non-bank financial institutions who are not as stringently regulated (and have in all likelihood had closer dealings with the low-income households thus far shunned by the major financial institutions) may find efficiency gaps in delivering housing loans to the gap market. Taking a long-term perspective, it is possibly necessary, in the interest of competition, to include these players in the initiative, requiring at all times that their participation be on a commercially viable and sustainable basis.

6.8 Developers

Housing construction businesses cannot be left out of the equation, for they deliver the actual units of residential property. An issue of concern among housing developers has been the risk of low or no take-up of finished houses, caused in part by unpredictable approval rates for mortgage loans. The introduction of MI should lead to increased volumes of end users qualifying for housing finance and thus reduced off-take risk.

In turn, developers may be expected to enjoy better access to construction finance, enabling multiple project developments. More predictability should facilitate more reliable project and capital planning for them. Income constraints for borrowers might even lead to innovative building technologies in terms of cheaper top structure materials.

6.9 Conclusion

MI operations across the globe have mostly originated from government sponsorship, due to the high level of risk entailed. It is only after a period of continued success that entry by the private sector has been seen. South Africa is not unique in this respect, therefore, and the provision of the R1 billion guarantee for innovative ways of promoting mortgage finance access is a step towards market provisioning of housing away from state capital subsidies. This initiative by the government is, however, understood to be premised on either eventual complete privatisation, or an industry in which both government-sponsored programmes and private MI providers (PMIs) will coexist.

Support by the various role players will be crucial. The South African banks, considered the most sound in the world by the World Economic Forum in the 2012-2013 Global Competitiveness Report, already dominate the mortgage lending industry. Their full participation in the programme will be required for the successful development of the new industry. It is equally important in this connection that the bank regulator, SARB, provides the capital relief measures in respect of minimum regulatory capital requirements to the banks as added incentive.

The shifting regulatory landscape with regard to the insurance industry will have a major influence on how the new industry shapes up. Globally, new risk-based rules for capital adequacy requirements are changing the way the business of mortgage finance and insurance is conducted.

The FSB is keeping up, as evidenced by the recently introduced FCR (Financial Condition Reporting) methodology of establishing capital requirements for insurers.

The next chapter attempts to set up a hypothetical MI company against the backdrop of the regulatory environment outlined above. A simulation exercise is carried out, culminating in a set of pro forma financial statements providing the basis for an assessment of profitability of the hypothesised entity, extending some nine years into an unknown and risky future.

CHAPTER 7: ASSESSING THE COMMERCIAL VIABILITY OF THE HYPOTHETICAL MI COMPANY

7.1 Introduction

The annual financial statements of a going concern entity provide a basis upon which a critical inquiry may be built relating to the entity's past financial performance, the financial strength (or lack thereof) at a particular point in time, and the prospects for the entity within a foreseeable future time horizon. The Statement of Comprehensive Income, the Statement of Financial Position, and the Statement of Cash Flows, respectively, constitute the traditional bases for such an appraisal, individually and read in conjunction. Even in the presence of a reasonably long period of solid historical performance, it is always a difficult proposition to venture an opinion on how such an entity might fare in the period ahead, and predictions about future performance are often a matter of educated judgment.

It is more so in the case of a company yet to get off the ground, without the benefit of any past to look to for guidance. The preceding three chapters have sought to lay the foundation for an attempt at predicting the operating results of just such a company, the SA MI Company. Chapter 4 began with estimating the amount of business the MI enterprise might enjoy. The task was compounded by the fact that it would be a new industry in the country, without comparable industry history to appeal to for benchmarking. The exercise in that chapter resorted to the mature, existing residential mortgage lending industry to derive estimates of future residential mortgage loan extensions. The intuitive economic reasoning was that there are macroeconomic variables that may be assumed to serve as leading indicators of activity in the home loan arena.

Having obtained some idea of the level of business in terms of the monetary value of credit that could be extended to households for residential purposes, chapter 5 then sought to put a price on the product being sold to the market. Again, the non-existence of historical default behaviour, a major determinant of premium pricing, posed a major hurdle in that chapter, prompting the use of claims and earnings patterns available in established markets (OSFI, Canada) as proxies for South Africa.

Chapter 6 emphasised the legislative and regulatory regime that the MI Company would have to operate under, in the wake of the recent global financial turmoil associated with deficient regulatory oversight of innovations in the financial derivatives and secondary mortgage markets. Compliance with the newly introduced risk-based regulatory standards in respect of minimum capital requirements will be mandatory in South Africa, and the MI business will have to meet these standards. Likewise, it is assumed that the financial institutions with which MI will be dealing will themselves be operating under a Basel III standards regime.

This chapter will focus on the financial model necessary for producing pro-forma financial statements of the hypothetical company, as well as the analysis and interpretation of such results as will be obtained from the model. The goal remains to formulate a basis for conclusions as to the commercial viability of the new industry, given the local economic conditions and the target gap market for which the initiative arose.

The financial model itself is nothing new to those in the mortgage insurance industry. What is of relevance in the context of this study is how the figures pertaining to the South African housing market fit in, and more specifically, what the model output indicates in respect of the gap market to which it applies. Consistent with the observation of the numerous uncertainties alluded to throughout the study, the analysis will take the form of a scenario simulation exercise. The scenarios will attempt to capture a wide range of outcomes based on the varying values for the assumed inputs.

The rest of this chapter is structured as follows: the next section lays out the overall approach to the appraisal of the financial performance of the MI Company, and uses diagrams to explain the setting of the scenarios. The section explains the origin of certain assumed values where appropriate. Section 7.3 places the gap market in the context of the overall national market in terms of size. It also establishes an estimate of the potential initial audience for MI. Section 7.4 presents the financial model used to generate the pro-forma financial statements of the MI entity, but starts by explaining the process of mortgage default insurance itself first, before dealing with the elements of the financial statements. The last section analyses the financial statements generated by the financial model, and provides an interpretation and conclusions.

7.2 Gap market penetration

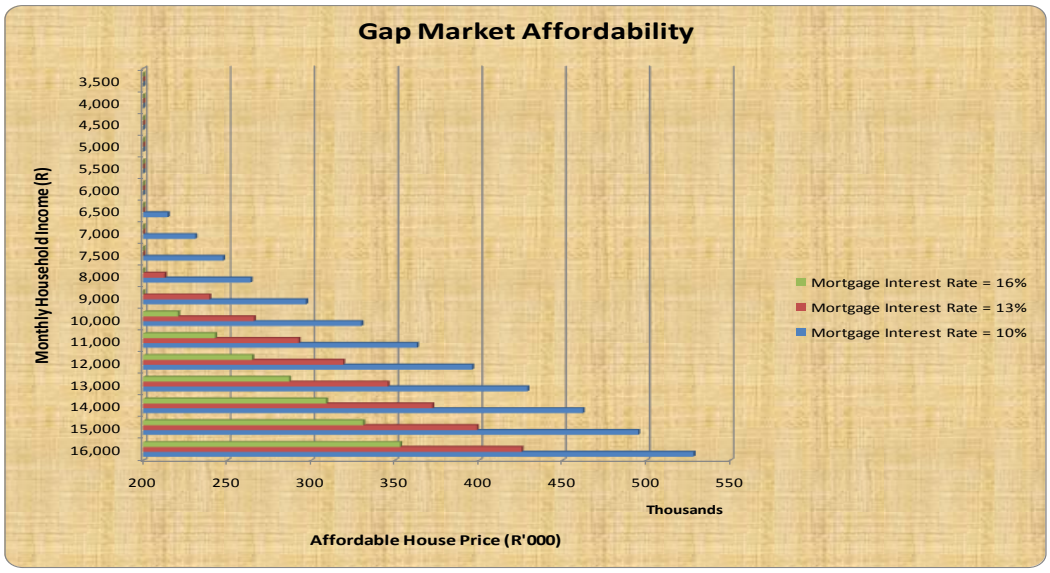
The problem of the initial penetration rate mentioned above is dealt with here by assuming that gap market activity would approximate a percentage of the mature market represented by the Financial Sector Charter commitment of R42 billion (Moss, 2009:47) for their affordable target market over a five-year period to 2008. This figure is some 4.2%, given that the total mortgage advances for residential loans as at end 2009 was just over R 1 trillion (i.e., R42 billion/ R1 trillion) as in Table 3.4, Chapter 3, Sub-section 3.3.4. According to BASA, some 95 000 housing units were financed in the FSC target market during the period (Venter, 2009:7). This would translate into an average annual figure of 19 000 mortgage loans, which compares closely to the figures obtained in the Table 3.4 for the years 2012 onwards, Base Growth, R500 000 property price), since the MI Company would only have been in business for three months by December 2011 (5 626*4 = 22 504 for 2011). The figures in the table are obtained by taking the fraction of 4.2% of the annual mature market residential credit extension (as estimated) to be what the MI business could expect in its initial phases. As pointed out in Sub-section 3.3.4. From the rand amount, the number of actual loans is computed by dividing by the average mortgage loan amount used in each specific scenario.

There were questions raised regarding the actual lending to the FSC target market as reported by BASA as at end 2008, raised earlier in chapter 2. At the time of the R42 billion pledge by the lending institutions in 2004, the FSC target market was defined as those households with a joint monthly income in the range R1 500 – R7 500 (Eighty20 Consulting, 2011:3). The upper income threshold was raised to R15 142 in 2009. Some observers disputed the assertion by the lenders of having exceeded the target of R42 billion in credit extension by end 2008. For example, in their five-year review of access to housing finance in South Africa, Eighty20 Consulting (2011:5) note that of the total first-quarter mortgage credit extended of R769.89 billion at march 2011, nearly 93% had gone to households earning above R15 000 pm. In a similar vein, Moss (2009:51) points out data by Finscope as suggesting that only 3% of the FSC market had mortgages. The underlying allegation was of course that the lending had gone to households outside the target market as defined.

The chart in Figure 7.1 shows what the various income bands can be expected to afford, based on the industry norm of a 30% mortgage payment-to-income ratio. At the Best Case mortgage rate of

10% pa over a 25-year mortgage term, only those households with joint monthly incomes of R7 500 and above would afford properties priced at around R250 000.

Figure 7.1: Gap Market Affordability



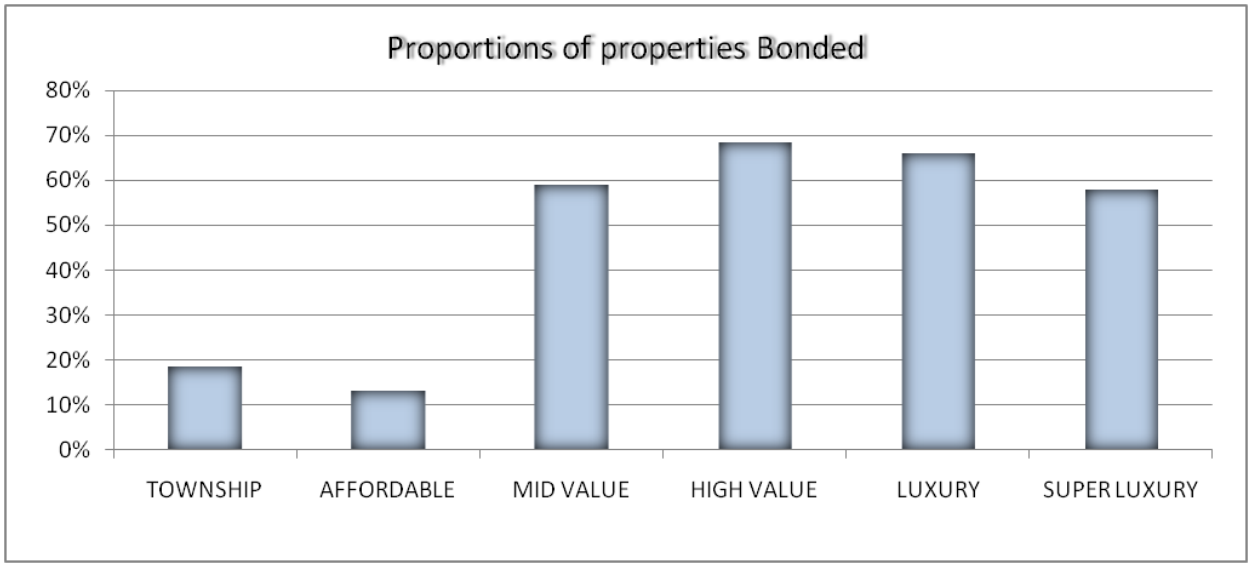
Source: Author's own construction

BASA's estimate of the average cost of a welfare home, that is, a 40-m^2 top structure on a 250-m^2 site, with concrete tiles, ceilings, and guttering to be to have been about R180 000 (Venter, 2009:8). These properties have, thus far, been provided by the state through the capital subsidy programme. The gap market is by definition in an income level above this. It would seem reasonable to expect gap market households, through mortgage finance, to own properties higher in value than those provided by the subsidy scheme that excludes them. It follows therefore that their properties can be no less in price than R200 000, say, or else the state would have inadvertently precipitated a market distortion against their favour. In fact, R240 000 for a 50-m^2 top structure with improved finishes is the banking Association's estimate of the average price for the gap market. Landman and Napier, citing Gardner, are in agreement with the view that the R200 000 must be a minimum (2010:301).

In the absence of MI, Lightstone (2010:13) report a bond penetration rate in the affordable market segment at around 12% (see Figure 7.2 below). Lightstone's property categorization defines "Affordable" as those properties with a value below R250 000. "Mid value" refers to properties

with a value in the range R250 000 – R750 000, "High value" to those in the range R750 000 – R1.5m, and "Luxury" to property values in the range R1.5m – R3.0m.

Figure 7.2: Total Bond Penetration by Area Value



Source: Lightstone, 2010:13

If one assumes a slightly higher penetration rate in the presence of MI, say 15% per year, and a total value of all bonds written (residential, i.e.,) monthly of R10 billion, as reported by Lightstone (2010:15), then one arrives at an annual loan number of 18 000 in the gap market. This is again in rough agreement with the High Growth scenario in Table 3.4, at a property price of R900 000 (i.e., LTV of 90%, average loan amount of R810 000 – see last row of Table 3.4).

7.3 Target market relative to the national market

Within the gap market, there are those that MI simply cannot assist for the purely commercial reason that their incomes are not sufficient. Income distribution data as of 2008 (based on Stats SA household income survey data) indicate that only those in the upper stratum of the gap market (R8 000 pm – R16 000 pm) would be served by MI, based on property market prices prevailing in 2010. These households comprise some 14% of the national 13 million households. In addition to these, it is envisaged that those with higher incomes would be included, at least up to a monthly household income of R100 000 pm, as any household with income above this would be unlikely to need MI.

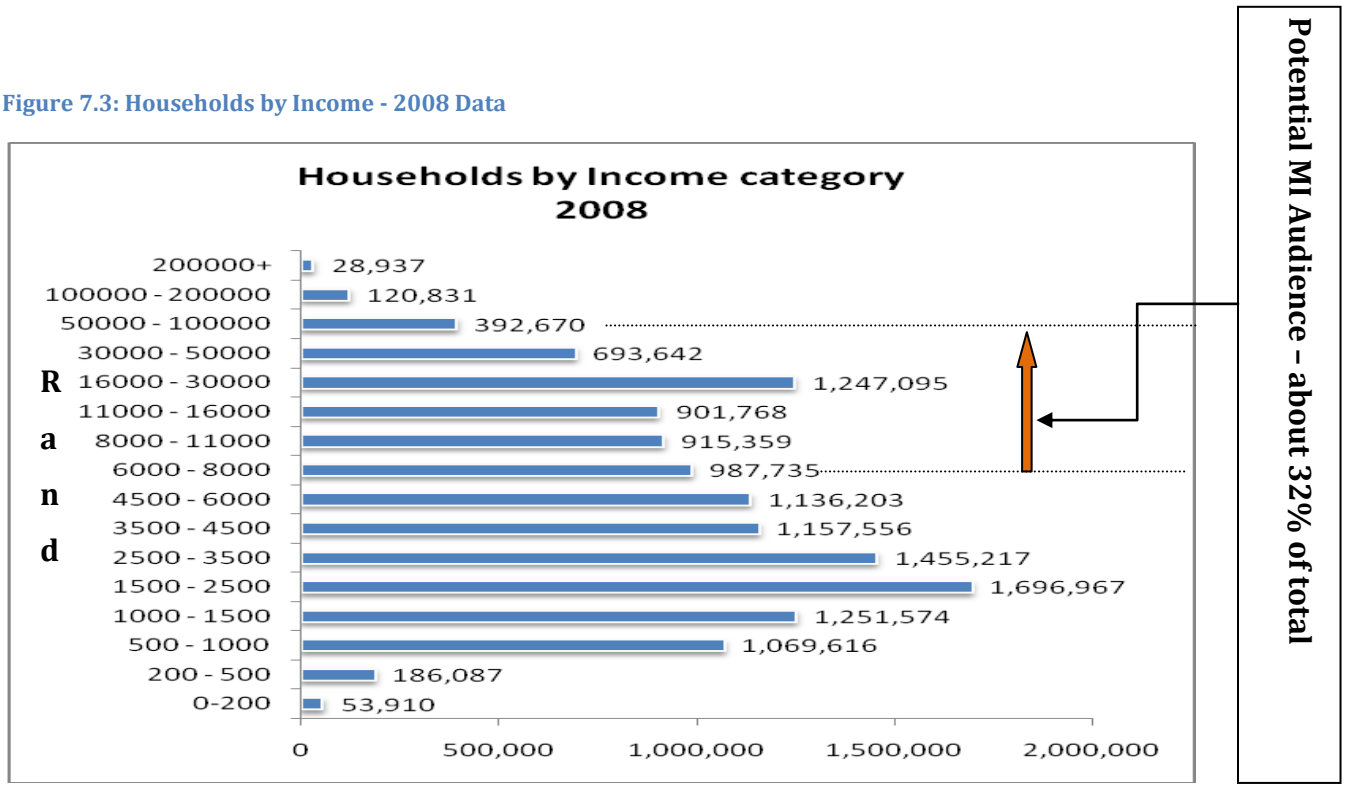
The size and nature of the gap market in terms of affordability will vary with time, dependent on the subsidy structure and property prices available on the market. The Housing Ministry has recognised not only the need to link the ceiling to inflation but also to increase the quanta (Department of Human Settlements, 2004:23-24). For many years, the subsidy eligibility ceiling of R3 500 pm was static, without adjustment for inflation. As mentioned earlier, the subsidy allocation scheme prior to revision tended to discriminate against gap market households in that, for example, a household with a monthly income of say R 3 490 would receive a subsidy, whereas one earning just R20 more per month would not. The introduction of MI is intended to focus more on capacity to repay mortgage obligations than arbitrarily setting salary caps and rationing limited financial resources on these cut-off points.

Household income surveys provide a useful indication of what proportion of the national workforce falls within the category defined as the gap market. The gap market definition by income level is not cast in stone. Any household with a stable income unable to secure mortgage finance theoretically belongs in the gap. The fact that MI will focus on those households not already catered for by the state subsidy programme does not preclude any one with a demonstrable ability to repay a mortgage over a 25-year term. High-income earners are not unwelcome to the programme.

Neither are those, for example, qualifying for NHFC's assistance through their finance-linked subsidy programme (FLISP). FLISP targets households in the income category R 3 500 – R 13 000 per month (NHFC, 2012:26). The programme offers state-provided financing to these households through loans ranging from R 87 000 for the bottom end of the band to R 10 050 to the top end. The thinking behind the loans is that mortgage principal amounts will be reduced to enhance monthly repayment ability. FLISP sets a maximum property price of R 300 000 for qualification for assistance. From MI's perspective, such loans would assist those households in need of cash resources for the upfront premium required for an MI-insured mortgage loan.

Broadly defining MI's target market in this way, one obtains a figure of some 32% of all of South Africa's total 13 million households, as the overall potential MI audience (Figure 7.3). The addition of high-income households to the MI universe will have the added benefit of generating pooling effects for the programme through risk dispersion.

Figure 7.3: Households by Income - 2008 Data



Source: Author's graphic, based on data from CMHC, 2010a:23

7.4 The Financial Model

With the scenarios in place, and having defined the market specific to MI operation, the next step is a translation of the numbers into pro-forma financial statements necessary for the appraisal of the project. These financial statements will require figures of revenues, expenses, as well as cash flows. However, for an understanding of how these figures emerge from the financial model, the process itself of mortgage default insurance needs explication.

7.4.1 The insurance process

The mortgage loan insurance process proceeds in tandem with a normal mortgage loan application process. Following submission of an application to the lending institution, the lender will perform the due process of assessing the borrower and the asset in question. The insurer (MI) will consider its own underwriting standards at the same time and, in the event of an approved loan, the lender remits the insurance premium to the insurer on disbursal of the loan amount to

the borrower. The premium payable in advance may be incorporated by the lender into the mortgage loan amount for amortization by the borrower where circumstances permit.

It is standard MI practice for the lender to keep the insurer appraised with regard to any non-performing loans, typically two missed payments (called delinquent). A mortgage loan is considered in default when 3 consecutive payments have been missed. An MI participating lender may submit a claim to the insurer when the following three conditions are satisfied (CMHC, 2010b:45):

- When a borrower has been in default for at least 90 days;
- The lender has taken all reasonable steps to remedy the defaulting loan;
- The lender has foreclosed on the property in question, and the property has been sold through auction.

The amount of the claim submitted by the lender, having deducted any proceeds recovered from the auction, may not exceed the total outstanding balance on the mortgage loan plus accrued interest plus reasonable legal and administrative costs. Interest on the principal loan amount may be accrued only up to a maximum of 15 months.

The MI product proposed here, it should be borne in mind, is one covering mortgages exclusively for the purchase of owner-occupied residential housing. In this regard, the reader will note that MI could be employed for other, more complex situations as for example for the purchase of multi-family dwellings or rental properties. Lenders could also use it as a credit enhancement tool for existing loan portfolios on their balance sheets in anticipation of securitisation, or to provide protection against default in the case of non-mortgaged properties. All these, it is argued, could be introduced in good time when the product was firmly rooted in the market place and had the confidence of market participants.

At the core of the MI business will be an agreement between the MI Company and a number of mortgage lenders willing to participate in the programme. The intended beneficiaries, i.e., the borrowers in the gap market (and others from the other income segments) will not be a party to this agreement. Apart from such auxiliary activities as might be deemed socially beneficial or responsible, such as borrower education and awareness campaigns, the borrower does not feature

formally in the business. Homebuyers benefit solely through the expedited acquisition of properties that MI is intended to achieve. In the event of default, they have no recourse to the MI firm for they are not beneficiaries of the insurance product. Properties in default will be foreclosed through operation of the law and their values recovered through sales-in-execution to the benefit of the lender who, pursuant to the Master Agreement may or may not have a claim against the MI entity.

The Master Agreement

The agreement between the MI firm and a lender (or lenders) will be governed by a so so-called Master Loan Insurance Agreement (MLIA). Among the terms and conditions to be agreed upon will be the following:

- Rights and obligations of the lender and the insurer;
- Lender underwriting requirements;
- Duration and scope of coverage;
- Default management and due diligence requirements;
- Claim payment trigger;
- Claim payment;
- Coverage exclusions or limits, such as war, riot, *force majeure*, fraud or negligence, property damage, or natural disasters.

It is crucial that lenders entering into MLIA adhere to strict qualifying criteria. The approval process on the part of the MI company will need to consider factors such as lenders' financial strength, minimum performance criteria for mortgage portfolios, management experience with mortgage lending, and sound operational policies and procedures for underwriting, loan servicing, default management, and recovery.

In summary then, to ensure a solid, sustainable start the proposed MI product would bear the following characteristics:

- The product would be monoline, exclusively insuring residential mortgage loans for the purchase of owner-occupied houses;

- The MI provider would be publicly-sponsored initially, but with a view to eventual partial or total privatisation;
- The product would provide for full, 100% coverage on a first exposure basis;
- The product would seek to target all households earning above R 8 000 pm, with a maximum loan term of 25 years at a fixed rate of interest.

With regard to losses incurred and consequent claims submitted, it is important that there be clarity from the outset as to obligations on the parts of both parties to the Master Agreement. In this regard, it will be noted that claims by lenders (representing losses for the MI company) and their timely payment would be critical to the objective of instilling confidence in the market place for the MI firm.

The MI product proposed in this paper is a full cover product that will apply to residential mortgage loans with LTV ratios of up to 95%. The full coverage is for 100% of any loss suffered by the lender at the end of the foreclosure legal proceedings, plus any costs related to legal action, plus interest costs up to a specified maximum number of months from the date of declaration of default. The coverage may be expressed in words as follows (CMHC, 2010a:28):

> *The amount to be paid to the approved lender by the MI company in case of default is the lesser of the Maximum Amount Payable under the Policy ("P") or the Actual Loss to the Lender ("L"), provided that the total amount paid does not exceed the maximum insurance coverage at the time of default,*

Where:

a) P is the amount calculated in accordance with the formula:

   P = (the Outstanding Balance at the time of Default) x (Level of Coverage)

b) L is the amount of Loss calculated in accordance with the Company's policy and guidelines, using the formula:

   L = A – B – C – D

c) A is the aggregate of:

i. The principal outstanding in the loan account at the date of Default;
ii. The borrower's charges as prescribed by policy and guidelines or approved by the Company;
iii. Such reasonable amounts on account of legal and administrative costs, fees and taxes related to the disposal of the foreclosed property as approved by the Company;
iv. Such reasonable amounts on account of costs incurred for default management as are approved by the Company; and
v. Such amount of interest on each amount specified in c)i. and c)iii. for a maximum period of 15 months.
    a) Interest for the period of 15 months referred to in c)v. shall be calculated at the rate specified in the mortgage.
    b) Interest calculated in c)v. shall be compounded in the manner specified in the mortgage for compounding arrears of interest.
    c) Notwithstanding section c)v., no interest may be included in calculation of a payment on:
        a) The amount of any payment made by the Company for any time after the payment is made; and
        b) Any amount deducted pursuant to Company policy and guidelines for any time after the deduction is made.
    d) Nothing in section c)v.a. authorizes the charging or claiming of interest at a rate, or the compounding of interest at a frequency, that exceeds the rate or frequency, as the case may be, approved by the Company.

d) B is the amount of the loss or damage:
    i. that results from failure to exercise reasonable care and prudence in the making or administration of the loan, in the collection of the repayment thereof or in the protection of or realisation on security for the loan; and
    ii. that from a contravention of or failure to comply with the Company policies and guidelines or a condition on which the loan was insured.
e) C is the aggregate amount of receipts by the Approved Lender on disposal of the Property.

The aggregate amount of receipts by the Approved Lender may include any of the following amounts:

i. Any amount received by the Approved Lender on disposal of the Property;
ii. Any amounts in respect of rent or other income derived from the mortgaged property after the taking of possession thereof pursuant to the enforcement of any security, except insofar as those amounts have been applied to the payment of costs incurred for repairing, maintaining, renting or managing the mortgaged property or otherwise incurred in respect of that mortgaged property.

2.4 D is the aggregate amount of receipts by the Approved Lender from the Company, as interim claim payment upon confirmation of the legal action being filed in Court.

Under no circumstances can the insurance company be liable for an amount in excess of the initial coverage of 100% of the loan amount at the date of issuance.

7.4.2 MI Revenue

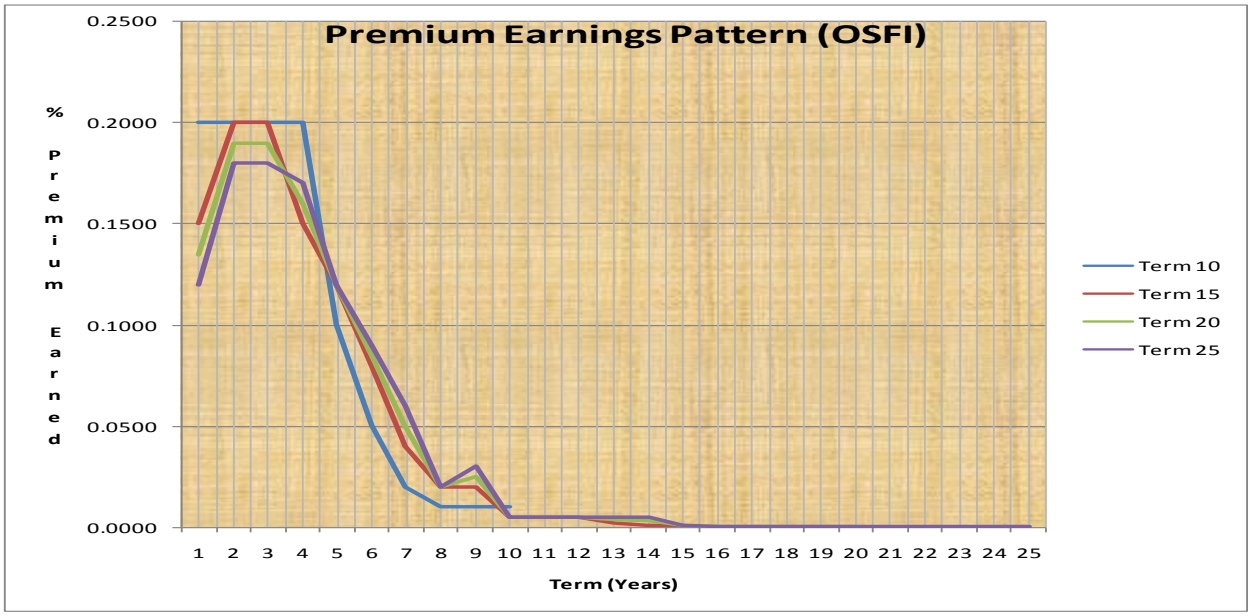
The MI entity derives its revenues from two sources: The premium received upfront on loans underwritten, and the interest income earned on investments. The price of the premium as indicated on the assumptions table (Table 3.3) is inclusive of an underwriting or issuance fee charged on all loans underwritten as a norm in the MI industry.

Premium earnings

There is an important assumption implicit in the revenue recognition policy for the MI Company. The issue was raised in the chapter on pricing (Chapter 5), and has to do with the absence of an historical record of default patterns on MI-insured mortgage loans in the country. For a pool of mortgages underwritten in a particular year, defaults will occur asymmetrically over time. Typically, as shown in Figure 5.4 of chapter 5, which is based on FHA data in the USA, defaults tend to peak at around years 4 and 5, thereafter declining for the rest of the mortgage term. For the case at hand, some pattern was needed (in fact the same pattern needed for premium pricing purposes) in order that the entity can have a basis for apportioning the premium received in advance as income year by year. Data from the Canadian OSFI, with over fifty years' history with MI and the regulator of banks in that country, was used as a proxy for South Africa, and the

pattern is shown graphically in Figure 7.4 below. The assumption is of course that claims will occur in the same pattern as premiums are earned.

Figure 7.4: MI Earnings Curve



Source: Own graphic, based on OSFI data

Investment income

The other source of revenue for the MI is in the form of investment income. Capital reserves set aside each year, as well as the initial founding capital, will be invested in secure, liquid forms so as to allow the company immediate and ready access for paying claims promptly as they arise in the course of business. The assumed rate of return on these investments is indicated in Table 3.3 for the three main scenarios. The rates are in nominal terms, and may be adjusted downwards using the assumed inflation factor of 5% pa for real rates.

7.4.3 MI Expenses

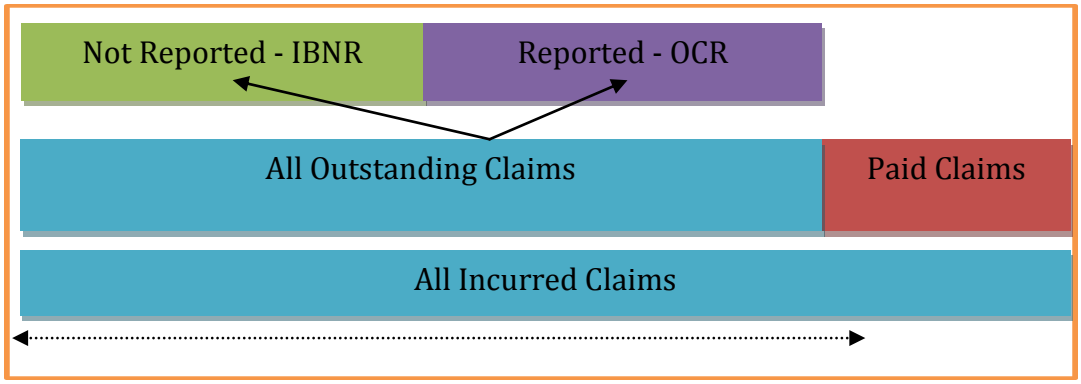
The MI business will face two main categories of expenses: Those arising from the underwriting business (as claims costs), and those incurred through normal activities as operating costs. Whilst the claims costs derive directly from the borrowed earnings curve above (Fig. 7.4) and the assumed level of activity regarding volumes of loans underwritten each period, the operating cost

assumptions are based heavily on insurance industry norms and are as one might expect to find in a proposed business plan.

Underwriting expenses

Underwriting expenses in the model consist of graduated claims on the gross premium received. The model simulates an incidence of default based on the claims pattern depicted in Figure 7.4 above, and the actual claims rate (default rate) obtained from the pricing exercise. Perhaps the best way to illustrate the different components of the expense item is to consider the diagram below, Figure 7.5. The entire expense must actually have been incurred, of course. Of the aggregate number of claims incurred, some will have been paid at year-end, and others outstanding. The model ensures that both the IBNR (incurred but not reported) and the OCR (outstanding claims reported) are recognised in the period in which they were actually incurred, and not when they are paid.

Figure 7.5: Illustrating Incurred Claims Expense



Source: Author's own

Operating expenses

The model includes capital expenditures on start-up in the operating expense class, along with normal business expenses such as staff costs, rental of premises, business services (IT, legal, auditing, marketing, etc.). The estimates are based on market rates in the industry at the time of forecasting, escalated by the assumed annual inflation rate of 5% where applicable.

Staff expense

The level of business activity (growth in volume of loans underwritten) will determine the number of underwriters required. Based on industry norms, one underwriter is assumed capable of approving 450 loans a month. Initially, the MI Company is assumed to employ five underwriters. As the business grows, additional staff will be required for standard functions such as administration and human resources. Allowances and employee benefits are determined as a percentage of basic salary, with recruitment costs accounted for as new employees are hired.

The management will initially comprise one General Manager and three directors. The standard industry ratios of one manager per 18 employees, and 1 senior officer for every 5 underwriters are used.

Facilities Expense

Rent, utilities, office supplies, fixed and mobile phone service charges, internet access, insurance, and PBX rent fall in this category. Rental charges are based initially on a rate of R 80/m^2/year. An initial fixed rate is assumed, with adjustments for company size as the number of employees rises. Most of the expenditure in respect of furniture and fittings and other equipment will occur at start-up. Computer hardware is replaced every three years.

Business Services Expense

Items in this expense category include training, IT services, accounting and auditing, legal and consulting, and advertising and marketing. The marketing expense will take up about 70% of the total category expense, based on the average in the industry. Like facilities, the budget for the category will be fixed initially, with an adjustment for inflation and company growth with time.

Additionally, all insurance companies pay an annual insurance fee expressed as a percentage of annual gross premiums written. This was set at 0.75% at the time of the study.

Set-up Costs

Office set-up costs and the purchase of hardware and software servers will be incurred mostly in the first two years of operation. In addition, special underwriting software will be needed, which is available internationally, and the MI entity will either purchase this or develop its own internally. Whatever the case, an expense item is included for this, as is an item for accounting software. Incorporation and registration fees are included in the set-up costs.

7.4.4 Initial MI Capitalisation

The FSB's capital adequacy requirement is subject to a minimum of R 10 million (FSB, 2007:29). In deciding what initial capital is sufficient, the important issue to bear in mind is the expected loss accumulation in the initial phases of operation, as the business gathers momentum. These initial losses will occur at a time when claims reserves will need to be built up. Given the government guarantee of R 1b as announced by the Human Settlements Minister, there is some comfort in the knowledge that an unanticipated claims experience need not lead to disaster. However, in planning the MI business the objective ought to be to avoid frequent calls on the guarantee.

In the NHFC's annual report of 2012 (NHFC, 2012:26), the CEO indicates in his review that the national treasury would release R 715 million as sufficient for the capitalisation of the MI business. Based on this, the scenarios in the study use two figures: R 500m and R 700m. The idea is to establish the extent of the impact of the level of initial capitalisation on the performance of the MI Company.

7.4.5 MI Pro-forma Financial Statements for the model for SA

There are over 30 countries with differing MI models and variants. Some countries have purely private MI providers, such as obtains in Australia and New Zealand, whilst others have a mix of government (public) and private companies in competition (e.g., Sweden, France, Finland, Canada, and the US). The monoline approach was argued to be the ideal for MI programmes in Chapter 2, and the UK found to be a notable exception in its multiline approach among the major mortgage default insurance markets. Multiline is a reference to the practice of MI firms to commingle their MI offerings with other lines of insurance. The recommendation for the SA MI product is the monoline approach, to avoid the difficulties referred to in Chapter 2, as well as to woo the market's confidence in relation to transparency in determining and reporting claims-paying capacity.

Some markets offer full coverage of losses on outstanding mortgage loan principal and interest (plus taxes and insurance where applicable) that result from default, net of foreclosure costs and recoveries from auction sales. Others provide only partial coverage (e.g., top 25% coverage), also known as "top layer" or "first loss" coverage. In some countries, such as Canada, the law mandates MI on all loans exceeding a prescribed LTV minimum, whereas in some markets MI is utilised even

on low LTV loans to provide additional comfort for investors in the secondary market. The basic types are distinguished, all the same, by whether loss coverage is full or partial. The full coverage product seems the choice for the MI product in SA, to provide maximum comfort to lenders and boost their willingness to participate in the programme.

The construction of the pro-forma financial statements assumes the MI Company commences operations on 1 October 2011, with a financial year-end at 31 December of each year. For each year, the study presents the following pro-forma financial statements:

- Income Statement
- Balance Sheet
- Cash Flow Statement
- Statement of Financial Ratios

The scenarios discussed in section 3.3 of the Method Chapter, in various combinations of growth, property price, and capitalisation assumptions produce a total 36 variations, 12 for each secondary scenario of Base, Best and Worst Cases. Presented here are the financial statements for the most favourable of the thirty-six combinations produced by the financial model. This set comes out of the Base Case grouping. The pro-forma financial statements relating to the most favourable in the other two groupings are in Appendix 7, as well as those in respect of the least favourable overall, belonging to the Best Case group. To distinguish the various scenarios, the notation used is read as follows. HG_700_300 refers to High Growth, R700 m capitalisation, R300 000 average property price. Similarly, BG_500_900 is a reference to a combination of the base-growth loan volumes, an initial capitalisation of R 500m, and an average property price of R 900 000.

The average property prices of R 300 000, R 500 000 and R 900 000 were chosen to make the MI market inclusive of the range of income earners likely to participate in the facility. At the low end, R 300 000 is the qualifying maximum property price for the newly revised FLISP programme by the NHFC, as mentioned before. The income band targeted by the FLISP is R 3 500 – R 13 000 in total monthly household income. This is a separate subsidy programme, and must not be confused with the gap market. Arguably, only those in the top half of this band, that is, from about R 8000 upward, would be able to access MI-insured mortgages. The R 900 000 property price would

apply to the households earning outside of the gap market, since these are not precluded from applying for MI mortgages and, as pointed out earlier, would serve to inject a risk-pooling effect on the overall MI mortgage portfolio.

The capitalisation figures of R 500m and R 700m are not arbitrary either. The R 700m was considered close enough to the R 715m promised by the Treasury, as announced in NHFC's 2012 annual report. The lower R 500m figure was chosen to assess any impact that initial capitalisation may have on the sustainability of the MI Company.

The most favourable scenario – Base Case HG_700_300

Of the twelve possible outcomes in the Base Case scenario, the HG_700_300 combination produces the highest after-tax earnings in year 2020. This is the combination in which the high-growth loan volume figures are used along with the assumption of an initial capitalisation of R 700 million, with the average property price set at R 300 000. From a first-year loss of R 76 million (after 3 months of operations) in 2011, there is a period of low but positive earnings until the year 2015, when the net income starts rising appreciably each year.

A discussion of these results follows in the next section. The aim here is to provide the reader with the background information necessary to read the financial statements.

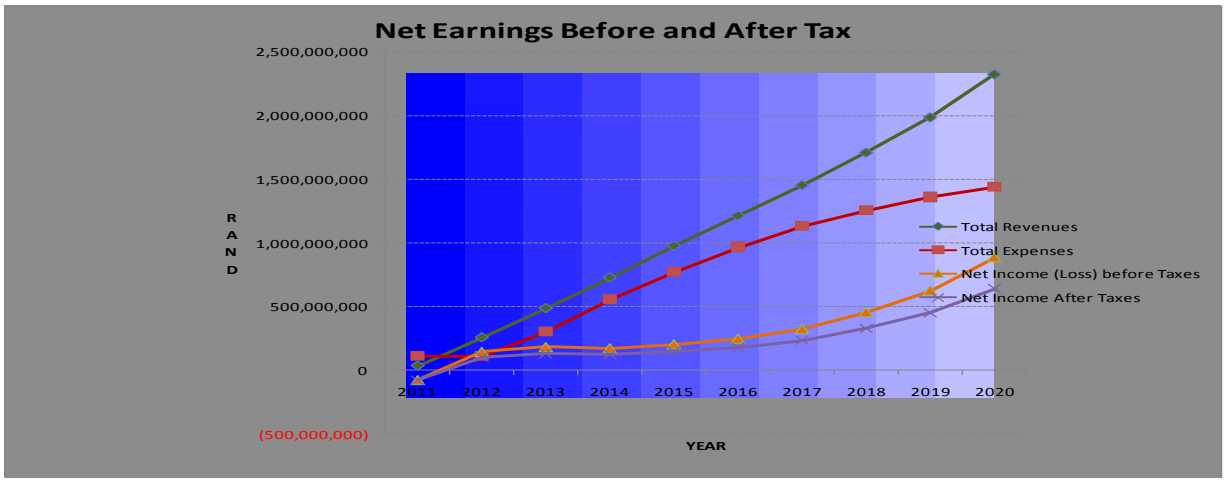
The Income Statement

Figure 7.6: Base Case most favourable scenario - Income Statement

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY					Base Case HG_700_300				High Growth Scenario	
BUSINESS PLAN FINANCIAL PROJECTIONS										
PRO-FORMA INCOME STATEMENT	(Start-Up)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Premium & Underwriting Income										
Risk Premium	228,602,640	954,520,414	978,126,294	987,529,085	1,088,737,146	1,200,349,297	1,323,367,676	1,459,020,867	1,608,572,907	1,773,464,236
Less: Increase in Unearned Premium	224,030,587	862,758,244	727,835,247	561,594,289	487,707,530	445,068,214	427,663,437	431,029,717	462,013,176	494,222,191
Subtotal Earned Premium	4,572,053	91,762,170	250,291,047	425,934,796	601,029,615	755,281,083	895,704,239	1,027,991,150	1,146,559,731	1,279,242,046
Underwriting Fee	18,255,660	76,225,719	78,110,828	78,861,712	86,943,946	95,857,026	105,680,979	116,513,919	128,456,788	141,624,615
Total Premium & Underwriting Income	22,827,713	167,987,889	328,401,875	504,796,508	687,973,561	851,138,108	1,001,385,219	1,144,505,069	1,275,016,519	1,420,866,661
Investment Income										
Interest on Initial Capital	12,250,000	49,000,000	49,000,000	49,000,000	49,000,000	49,000,000	49,000,000	49,000,000	49,000,000	49,000,000
Other Investment Income	84,645	40,145,744	109,019,607	174,580,265	240,362,093	314,514,118	403,517,821	516,617,619	663,457,703	856,122,127
Total Investment Income	12,334,645	89,145,744	158,019,607	223,580,265	289,362,093	363,514,118	452,517,821	565,617,619	712,457,703	905,122,127
Total Revenues	**35,162,358**	**257,133,633**	**486,421,482**	**728,376,773**	**977,335,655**	**1,214,652,226**	**1,453,903,039**	**1,710,122,688**	**1,987,474,222**	**2,325,988,787**
Underwriting Expenses										
Paid Claims	0	0	88,421,806	293,331,908	528,654,548	750,969,260	936,226,393	1,081,140,805	1,200,545,861	1,288,071,180
Increase in IBNR	0	27,200,799	53,622,896	58,546,890	55,184,509	44,532,982	35,397,257	29,084,815	20,655,797	21,299,842
Increase in Outstanding Claims	0	23,868,840	92,929,494	118,840,014	112,605,694	99,661,724	75,755,324	62,748,047	48,683,945	38,251,291
Claims & Underwriting Expenses	0	51,069,639	234,974,196	470,718,812	696,444,751	895,163,966	1,047,378,974	1,172,973,666	1,269,885,602	1,347,622,313
Total Underwriting Expenses	**0**	**51,069,639**	**234,974,196**	**470,718,812**	**696,444,751**	**895,163,966**	**1,047,378,974**	**1,172,973,666**	**1,269,885,602**	**1,347,622,313**
Operating Expenses										
Staff Costs	36,140,814	32,296,755	33,911,592	50,511,172	37,387,531	39,256,907	41,219,753	43,280,740	45,444,777	47,717,016
Facilities & Equipment	5,544,548	2,629,410	2,760,881	4,766,029	3,043,871	3,196,064	5,517,274	3,523,661	3,699,844	6,386,935
Business Services	15,127,041	15,590,838	16,370,880	17,189,924	18,049,920	18,952,916	19,901,062	20,896,615	21,941,945	23,039,543
Development Costs	53,000,000	3,399,478	8,025,000	4,042,426	9,160,000	785,868	6,050,000	864,455	6,655,000	0
Insurance Business Fees	1,714,520	7,158,903	7,335,947	7,406,468	8,165,529	9,002,620	9,925,258	10,942,657	12,064,297	13,300,982
Total Operating Expenses	**111,526,922**	**61,075,384**	**68,404,300**	**83,916,019**	**75,806,850**	**71,194,375**	**82,613,346**	**79,508,127**	**89,805,863**	**90,444,475**
Total Expenses	**111,526,922**	**112,145,022**	**303,378,496**	**554,634,831**	**772,251,601**	**966,358,341**	**1,129,992,320**	**1,252,481,793**	**1,359,691,465**	**1,438,066,788**
Net Income (Loss) before Taxes	**(76,364,564)**	**144,988,611**	**183,042,986**	**173,741,942**	**205,084,054**	**248,293,885**	**323,910,720**	**457,640,895**	**627,782,757**	**887,921,999**
VAT on Premium	0	0	0	0	0	0	0	0	0	0
Corporate Taxes on Net Income	0	40,596,811	51,252,036	48,647,744	57,423,535	69,522,288	90,695,001	128,139,451	175,779,172	248,618,160
Net Income After Taxes	**(76,364,564)**	**104,391,800**	**131,790,950**	**125,094,198**	**147,660,519**	**178,771,597**	**233,215,718**	**329,501,444**	**452,003,585**	**639,303,839**
Dividends	0	15,658,770	19,768,643	18,764,130	22,149,078	26,815,740	34,982,358	49,425,217	67,800,538	95,895,576
Net Income Available to Shareholders	**(76,364,564)**	**88,733,030**	**112,022,308**	**106,330,068**	**125,511,441**	**151,955,857**	**198,233,360**	**280,076,228**	**384,203,047**	**543,408,263**

Source: Author's own construction

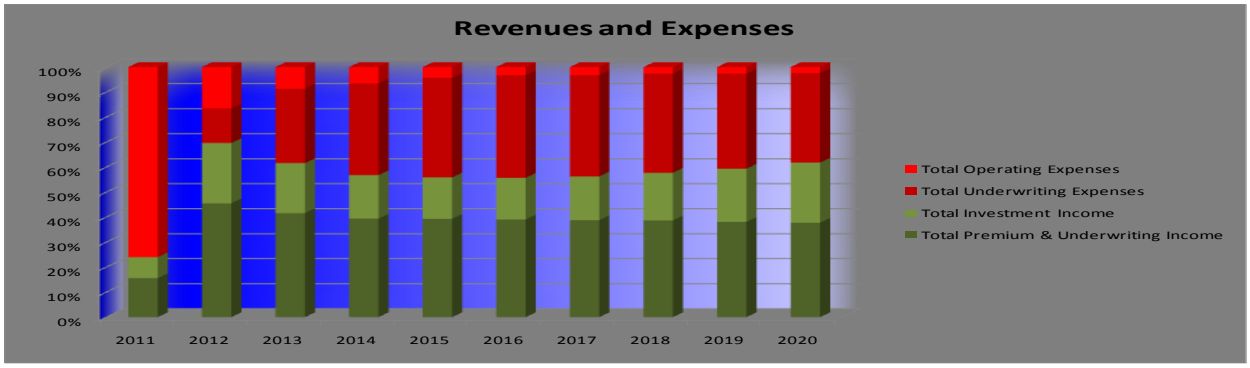
Figure 7.7: Net Earnings Before and After Tax - based on Fig. 7.6 above



Source: Author's own graphic

The classification of the various scenarios as "most favourable" and "least favourable" is based on the post-tax net earnings figures for the period through to 2020. The fading shading is an admission that growth figures from the year 2015 onwards are not derived from the volume estimation model, but from the use of the assumed inflation rate of 5% annually as a growth factor.

Figure 7.8: Revenue and Expense composition - based on Fig. 7.6 above



Source: Author's own graphic

The major components of the revenue and expense items are shown in Figure 7.8 above to aid in discerning the source of rising (or declining) net earnings after tax, over the years projected.

Figure 7.9: Base Case most favourable scenario – Cash Flow, Balance sheet and Ratios

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY					Base Case HG_700_300				High Growth Scenario	
BUSINESS PLAN FINANCIAL PROJECTIONS										
PRO-FORMA CASH FLOW STATEMENT	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cash From (Used In) Operating Activities										
Risk Premium	228,602,640	954,520,414	978,126,294	987,529,085	1,088,737,146	1,200,349,297	1,323,367,676	1,459,020,867	1,608,572,907	1,773,464,236
Underwriting Fee	18,255,660	76,225,719	78,110,828	78,861,712	86,943,946	95,857,026	105,680,979	116,513,919	128,456,788	141,624,615
Total Investment Income	12,334,645	89,145,744	158,019,607	223,580,265	289,362,093	363,514,118	452,517,821	565,617,619	712,457,703	905,122,127
Paid Claims	0	0	(88,421,806)	(293,331,908)	(528,654,548)	(750,969,260)	(936,226,393)	(1,081,140,805)	(1,200,545,861)	(1,288,071,180)
Operating Costs	(111,526,922)	(61,075,384)	(68,404,300)	(83,916,019)	(75,806,850)	(71,194,375)	(82,613,346)	(79,508,127)	(89,805,863)	(90,444,475)
Tax Payable	0	(40,596,811)	(51,252,036)	(48,647,744)	(57,423,535)	(69,522,288)	(90,695,001)	(128,139,451)	(175,779,172)	(248,618,160)
Dividends	0	(15,658,770)	(19,768,643)	(18,764,130)	(22,149,078)	(26,815,740)	(34,982,358)	(49,425,217)	(67,800,538)	(95,895,576)
Net Operating Cash Flow	**147,666,023**	**1,002,560,913**	**986,409,945**	**845,311,262**	**781,009,174**	**741,218,778**	**737,049,378**	**802,938,806**	**915,555,964**	**1,097,181,587**
Cash From (Used In) Investing Activities										
Equity Investment	**700,000,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Investments Purchased	147,666,023	1,002,560,913	986,409,945	845,311,262	781,009,174	741,218,778	737,049,378	802,938,806	915,555,964	1,097,181,587
Investments Redeemed	0	0	0	0	0	0	0	0	0	0
Total Investments	**847,666,023**	**1,850,226,935**	**2,836,636,880**	**3,681,948,142**	**4,462,957,316**	**5,204,176,094**	**5,941,225,472**	**6,744,164,278**	**7,659,720,243**	**8,756,901,830**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY					Base Case HG_700_300				High Growth Scenario	
BUSINESS PLAN FINANCIAL PROJECTIONS										
PRO-FORMA BALANCE SHEET	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Assets										
Investments	847,666,023	1,850,226,935	2,836,636,880	3,681,948,142	4,462,957,316	5,204,176,094	5,941,225,472	6,744,164,278	7,659,720,243	8,756,901,830
Total Assets	**847,666,023**	**1,850,226,935**	**2,836,636,880**	**3,681,948,142**	**4,462,957,316**	**5,204,176,094**	**5,941,225,472**	**6,744,164,278**	**7,659,720,243**	**8,756,901,830**
Liabilities and Capital										
Liabilities										
Unearned Premium Reserve	224,030,587	1,086,788,831	1,814,624,078	2,376,218,367	2,863,925,897	3,308,994,112	3,736,657,549	4,167,687,266	4,629,700,442	5,123,922,632
IBNR Reserve	0	27,200,799	80,823,695	139,370,585	194,555,094	239,088,076	274,485,333	303,570,147	324,225,944	345,525,786
Outstanding Claims Reserve	0	23,868,840	116,798,334	235,638,348	348,244,042	447,905,766	523,661,090	586,409,137	635,093,082	673,344,373
Total Liabilities	**224,030,587**	**1,137,858,470**	**2,012,246,107**	**2,751,227,301**	**3,406,725,034**	**3,995,987,954**	**4,534,803,972**	**5,057,666,550**	**5,589,019,468**	**6,142,792,791**
Capital										
Paid-in Capital	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000
Retained Earnings (Losses)	(76,364,564)	12,368,466	124,390,773	230,720,842	356,232,283	508,188,140	706,421,500	986,497,728	1,370,700,775	1,914,109,039
Total Capital	**623,635,436**	**712,368,466**	**824,390,773**	**930,720,842**	**1,056,232,283**	**1,208,188,140**	**1,406,421,500**	**1,686,497,728**	**2,070,700,775**	**2,614,109,039**
Total Liabilities and Capital	**847,666,023**	**1,850,226,935**	**2,836,636,880**	**3,681,948,142**	**4,462,957,316**	**5,204,176,094**	**5,941,225,472**	**6,744,164,278**	**7,659,720,243**	**8,756,901,830**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY					Base Case HG_700_300				High Growth Scenario	
BUSINESS PLAN FINANCIAL PROJECTIONS										
PRO-FORMA FINANCIAL RATIOS	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Capital Measures										
Total MI Exposure (AAR[1]) at Year End (millions)	3,990.0	19,035.1	32,416.6	44,028.0	55,305.8	66,338.8	77,200.5	87,954.1	98,665.2	109,363.5
Minimum Required Capital (millions)	179.6	856.6	1,458.7	1,981.3	2,488.8	2,985.2	3,474.0	3,957.9	4,439.9	4,921.4
Assets to Insurance in Force Ratio (MI Exposure)	21%	10%	9%	8%	8%	8%	8%	8%	8%	8%
Financial Analysis										
Capital to Risk Premium Ratio	273%	75%	84%	94%	97%	101%	106%	116%	129%	147%
Capital as % of Liabilities		63%	41%	34%	31%	30%	31%	33%	37%	43%
Assets as % of Liabilities		163%	141%	134%	131%	130%	131%	133%	137%	143%
Capital as % of AAR	15.6%	3.7%	2.5%	2.1%	1.9%	1.8%	1.8%	1.9%	2.1%	2.4%
Profitability Ratios										
Return on Equity (Net income & dividend)	-12%	8%	9%	7%	7%	8%	9%	11%	12%	14%
Profit as % of Risk Premium		11%	13%	13%	14%	15%	18%	23%	28%	36%
Loss Ratio *Incurred Claims / Earned Premiums*		56%	94%	111%	116%	119%	117%	114%	111%	105%
Expense Ratio *Operating Exp. / Earned Premiums*			27%	20%	13%	9%	9%	8%	8%	7%
Combined Ratio *Loss + Expense Ratio*			121%	130%	128%	128%	126%	122%	119%	112%
Investment Share of Revenue	35%	35%	32%	31%	30%	30%	31%	33%	36%	39%
Operating Ratios										
Efficiency Ratio *Operating Exp. / Total Revenue*	317%	24%	14%	12%	8%	6%	6%	5%	5%	4%
Number of Insured Loans Issued	14,066	55,935	54,589	52,489	55,113	57,870	60,762	63,801	66,991	70,341
Number of Employees	25	25	25	25	25	25	25	25	25	25
Net Income/Employee	(3,054,583)	4,175,672	5,271,638	5,003,768	5,906,421	7,150,864	9,328,629	13,180,058	18,080,143	25,572,154
Assets/Employee	33,906,641	74,009,077	113,465,475	147,277,926	178,518,293	208,167,044	237,649,019	269,766,571	306,388,810	350,276,073
Operating Expenses per Employee	4,461,077	2,443,015	2,736,172	3,356,641	3,032,274	2,847,775	3,304,534	3,180,325	3,592,235	3,617,779

[1] AAR = Amount at Risk

Source: Author's own construction

7.5 Analysis of results and conclusion

The 36 sub-variations obtained from the financial model encompass a wide range of assumed economic conditions. The mortgage interest varies, for example, from 10% pa in the Best Case to 16% pa in the Worst Case scenarios. The return on investment (ROI) varies from a low of 6% pa in the Worst Case to 10% in the Best Case. The objective of the simulation was to establish not only under what conditions the MI entity would fare best, but also to identify those conditions under which it would struggle as a going concern.

Ultimately, the evaluation needs to provide answers to the research questions, as well as meet the research objectives set in chapter 1. The analysis of these pro-forma statements will accordingly focus on information that can be gleaned from the figures to provide the answers. There are many ways in which to achieve this objective, but perhaps the easiest approach is to isolate the most favourable overall combination from the thirty-six, and the least favourable.

Each of the primary scenarios contains twelve possible combinations. By picking the most and the least profitable combinations from each, one reduces the thirty-six combinations to just six. Similarly, by comparing the three most profitable, and by doing the same with the three least profitable, the single overall most profitable will be obtained, as will be the single least profitable. Having done so, the analysis will then turn to the figures in the two opposite cases for implications as to the extent of overall viability. Viability, of course, is only part of the answer, the other being how much of an impact on the housing backlog the business would effect.

7.5.1 All 36 Variations

Within each primary scenario, four distinct groupings of performance are clearly discernible. These are a result of the three growth assumptions (BG, LG, and HG) and the increase in capitalisation from R 500m to R 700m. A glance at Fig. 7.10 below confirms this. The average property price does not appear to play a role in the grouping, except to the extent that lower prices will produce higher loan numbers, simply because given amounts of mortgage finance will yield more loans the lower each loan amount.

Figure 7.10: All the 36 cases

	(Start-Up)				The Base Case					
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NIAT_Base Case LG_500_900	-94,890,412	24,187,340	30,850,127	15,293,873	28,900,506	43,530,659	57,098,107	98,430,618	141,149,744	218,088,508
NIAT_Base Case LG_500_300	-94,887,208	24,185,122	30,851,257	15,291,550	28,904,829	43,533,674	57,096,328	98,433,793	141,149,058	218,088,888
NIAT_Base Case LG_500_500	-94,886,674	24,184,753	30,848,350	15,290,207	28,904,449	43,534,698	57,097,136	98,438,548	141,149,312	218,090,784
NIAT_Base Case BG_500_500	-87,376,420	77,464,736	99,517,537	86,761,450	108,870,649	137,348,959	181,405,150	268,268,019	373,848,723	541,314,139
NIAT_Base Case BG_500_900	-87,379,090	77,466,584	99,514,385	86,765,644	108,870,434	137,346,009	181,400,261	268,263,961	373,846,658	541,318,605
NIAT_Base Case BG_500_300	-84,845,504	81,179,204	103,007,783	91,475,115	113,447,999	139,260,834	182,751,936	270,812,561	375,953,483	543,966,467
NIAT_Base Case HG_500_900	-79,867,768	130,745,828	168,186,601	158,232,654	188,836,994	231,159,954	305,711,142	438,093,795	606,552,405	864,532,505
NIAT_Base Case HG_500_500	-79,866,166	130,744,719	168,186,723	158,232,692	188,836,848	231,163,220	305,707,638	438,099,847	606,549,892	864,538,354
NIAT_Base Case HG_500_300	-79,864,564	130,743,611	168,187,731	158,233,137	188,833,834	231,164,871	305,707,749	438,098,928	606,550,224	864,538,539
NIAT_Base Case HG_700_900	-76,367,768	144,990,828	183,041,856	173,741,459	205,087,214	248,288,968	323,914,112	457,635,761	627,784,938	887,915,965
NIAT_Base Case HG_700_500	-76,366,166	144,989,719	183,041,979	173,741,497	205,087,068	248,292,233	323,910,608	457,641,813	627,782,425	887,921,815
NIAT_Base Case HG_700_300	-76,364,564	144,988,611	183,042,986	173,741,942	205,084,054	248,293,885	323,910,720	457,640,895	627,782,757	887,921,999

	(Start-Up)				The Best Case					
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NIAT_Best Case LG_500_900	-98,622,419	-13,986,143	-38,975,705	-86,138,523	-111,281,663	-138,961,401	-177,630,086	-200,560,703	-236,123,507	-261,828,035
NIAT_Best Case LG_500_300	-98,622,164	-13,987,044	-38,976,707	-86,139,871	-111,282,108	-138,962,162	-177,632,748	-200,562,271	-236,125,326	-261,829,632
NIAT_Best Case LG_500_500	-98,622,122	-13,987,194	-38,977,220	-86,139,433	-111,280,814	-138,960,441	-177,631,244	-200,560,834	-236,125,399	-261,830,463
NIAT_Best Case BG_500_900	-98,025,588	-9,833,891	-50,329,324	-124,129,469	-175,605,652	-226,537,719	-279,398,851	-309,699,033	-344,485,163	-358,854,344
NIAT_Best Case BG_500_300	-98,025,333	-9,834,792	-50,330,030	-124,131,664	-175,607,337	-226,537,997	-279,400,335	-309,700,684	-344,486,971	-358,857,401
NIAT_Best Case BG_500_500	-98,025,376	-9,834,642	-50,329,913	-124,131,406	-175,606,846	-226,537,659	-279,399,325	-309,700,189	-344,487,491	-358,857,759
NIAT_Best Case HG_700_900	-92,428,757	10,669,220	-39,707,008	-137,900,403	-213,039,984	-283,863,590	-346,531,262	-378,355,368	-404,468,067	-396,771,127
NIAT_Best Case HG_700_300	-92,428,502	10,668,572	-39,707,975	-137,901,387	-213,041,903	-283,863,632	-346,532,815	-378,355,702	-404,468,843	-396,771,518
NIAT_Best Case HG_700_500	-92,428,629	10,668,896	-39,707,541	-137,900,808	-213,040,543	-283,863,544	-346,532,645	-378,355,266	-404,469,035	-396,771,559
NIAT_Best Case HG_500_900	-97,428,757	-5,681,639	-61,682,055	-162,122,955	-239,932,297	-314,114,893	-381,166,687	-418,838,457	-452,847,129	-455,884,069
NIAT_Best Case HG_500_500	-97,428,629	-5,682,089	-61,682,606	-162,123,380	-239,932,878	-314,114,877	-381,168,108	-418,838,405	-452,848,166	-455,884,593
NIAT_Best Case HG_500_300	-97,428,502	-5,682,539	-61,683,058	-162,123,978	-239,934,261	-314,114,994	-381,168,316	-418,838,892	-452,848,041	-455,884,645

	(Start-Up)				The Worst Case					
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NIAT_Worst Case LG_500_300	-95,074,881	15,130,906	9,343,595	-22,949,024	-30,065,142	-35,684,363	-39,556,480	-15,262,093	7,889,781	51,036,436
NIAT_Worst Case LG_500_900	-95,078,457	15,133,309	9,343,141	-22,945,687	-30,069,201	-35,686,212	-39,552,515	-15,263,915	7,891,741	51,037,381
NIAT_Worst Case LG_500_500	-95,074,285	15,130,506	9,341,320	-22,949,749	-30,064,473	-35,682,056	-39,554,582	-15,256,216	7,889,925	51,037,805
NIAT_Worst Case BG_500_300	-86,691,693	53,807,984	48,438,812	9,650,443	-5,483,506	-17,060,007	-7,767,328	32,541,575	83,949,868	178,265,014
NIAT_Worst Case BG_500_500	-86,692,289	53,808,384	48,438,400	9,650,419	-5,483,148	-17,060,798	-7,763,872	32,542,823	83,949,161	178,265,541
NIAT_Worst Case BG_500_900	-86,695,269	53,810,387	48,436,344	9,654,571	-5,482,932	-17,063,550	-7,767,981	32,541,043	83,949,353	178,270,852
NIAT_Worst Case HG_500_900	-78,312,081	92,487,464	87,535,590	35,824,860	13,366,410	402,346	16,504,007	74,775,662	158,303,373	303,526,209
NIAT_Worst Case HG_500_300	-78,308,505	92,485,062	87,536,043	35,824,593	13,363,166	405,885	16,500,347	74,779,152	158,300,668	303,530,062
NIAT_Worst Case HG_500_500	-78,310,293	92,486,263	87,535,481	35,824,658	13,366,013	404,616	16,500,546	74,780,124	158,300,443	303,530,087
NIAT_Worst Case HG_700_900	-75,312,081	101,257,064	96,627,209	45,258,100	23,180,911	10,659,703	27,290,953	86,208,684	170,535,011	316,753,369
NIAT_Worst Case HG_700_300	-75,308,505	101,254,662	96,627,663	45,257,833	23,177,668	10,663,243	27,287,293	86,212,173	170,532,306	316,757,223
NIAT_Worst Case HG_700_500	-75,310,293	101,255,863	96,627,100	45,257,898	23,180,515	10,661,973	27,287,492	86,213,145	170,532,081	316,757,248

Author's own construction

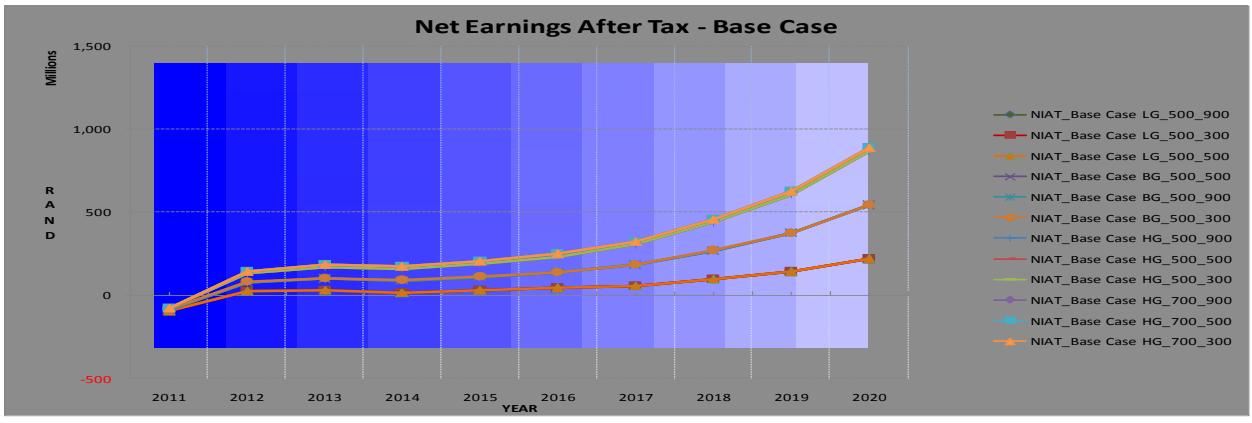
This is not surprising: the property price itself (or the principal amount borrowed) does not influence the claims rate. It is the LTV ratio that does. Put differently, it is the borrower's equity stake in the property, through the downpayment, that impacts on default behaviour. The simulation exercises are all based on an average LTV ratio of 90%, the implication being that all the loans bear the same amount of risk, regardless of the amount borrowed.

A second point of note is that in the first year of operation, which runs for only three months from 1 October, start-up costs outweigh interest income from the initial capital, so that all the scenarios report a net loss. In the years 2012 through 2014, the MI does not gather any appreciable momentum. This is due largely to the volume forecasts obtained from chapter 4. At the time of the

forecast, the mature market upon which the estimation model was based was itself subdued following the global financial crisis. Mortgage advances were in decline during these years, with the annual figure for 2012 dropping some 7% from R 242 billion to R 226 billion in 2014. For MI to gather momentum, increasing volumes of underwriting are required from year to year.

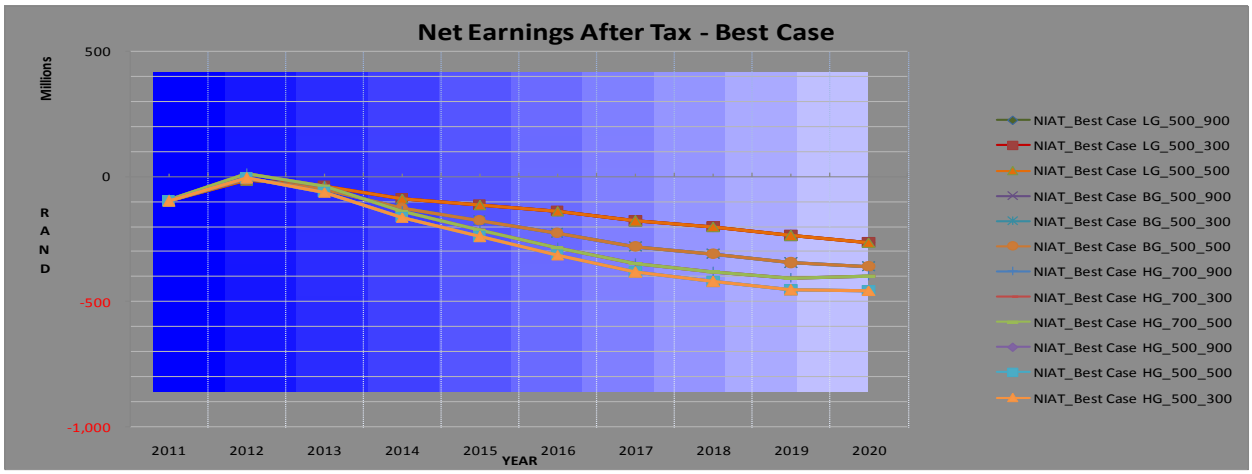
Perhaps more surprising is the profitability of the Best Case category (Figure 7.12 graphic). It will be recalled that this scenario bears the lowest mortgage interest rate of 10% pa, the lowest default rate of 5.2% at the assumed LTV of 90%, and the highest return on investment of 10%. Apart from modest profits of about R 10.5m in three out of the twelve cases in 2012, increasing losses are reported throughout. In fact, even by the end of 2020, there is no sign of a turnaround in profitability in this scenario. What is probably happening is that the claims rate, which at 5.2% is comparable to that of 7.2% for the Base Case and 9.2% for the Worst Case, dominates the premium revenues deriving from the low premium price of only 1.8% of the mortgage amount. The impact of this low premium price relative to the other cases is such that the higher investment return of 10% is not sufficient to counteract the underwriting expenses. Whilst the assumptions under this scenario are favourable to the borrower in terms of relatively lower mortgage payments, they turn out to be adverse to the insurer. In fact, as will be seen below, the least favourable scenario overall comes from this category.

Figure 7.11: The 12 Base Case scenarios graphically



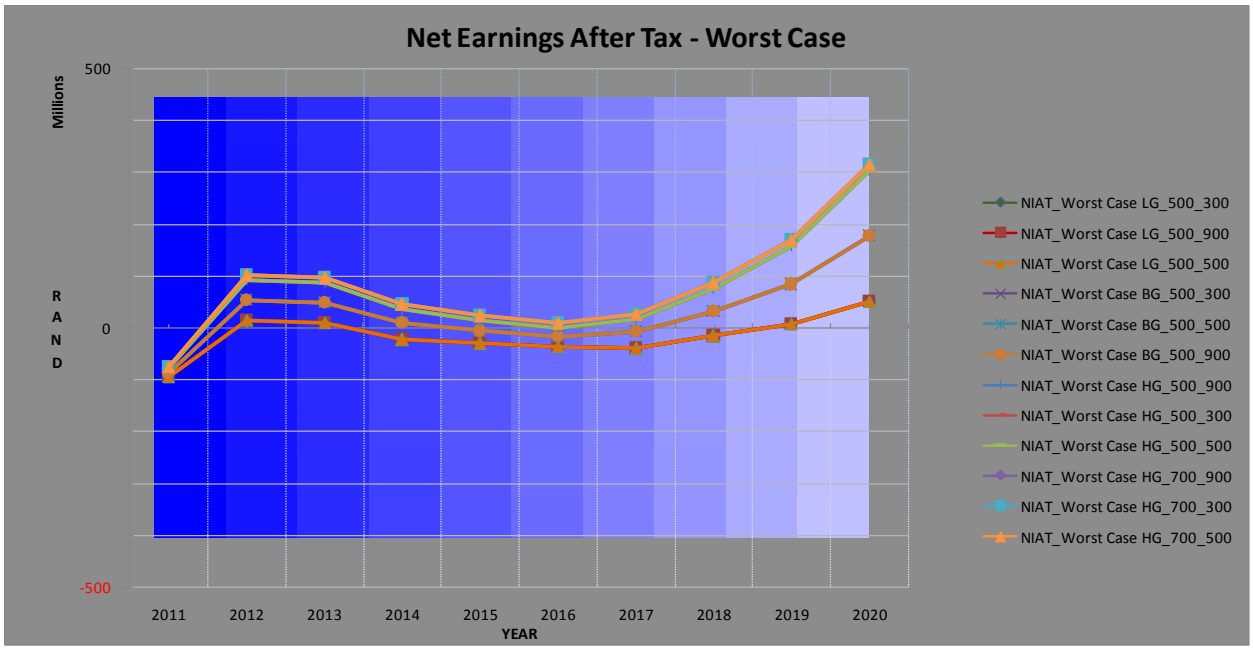
Source: Author's own graphic

Figure 7.12: The 12 Best Case Scenarios graphically



Source: Author's own graphic

Figure 7.13: The 12 Worst Case scenarios graphically



Source: Author's own graphic

The situation in the Worst Case scenario (Figure 7.13 graphic) is surprisingly not the worst. The assumptions are an extreme relative to the other scenarios, and yet the performance, in terms of earnings, is somewhat middle-of-the-road. Figure 7.14 clearly shows its position relative to the other two, in terms both of the most favourable and of the least favourable scenarios. Among the

most favourable three, the Worst Case reports net earnings of R 317 m for year 2020, as against R 888m for the Base Case and a loss of R 262m for the Best Case. In the least favourable grouping of three, it reports R 51m in earnings compared to R 218m for the Base Case and relatively big loss of R 456m for the Best Case.

Another rather intriguing aspect in respect of the Worst Case grouping is the occurrence of losses in the middle period following two consecutive years of positive earnings. These losses are restricted to the lower growth cases (LG and BG). In the LG cases, the losses occur in the years 2014 – 2018, whereas in the BG cases they occur in the years 2015 – 2017. There is thus a period of momentum loss during this period, attributable to a peaking incidence of default as loans reach their 4th and 5th years in maturity age. It will be recalled that this is dictated by the claims curve (earnings curve) as shown in Fig. 7.4. A contributing factor is that the incidence of default was peaking at a time when much needed higher volume rates were not forthcoming because of declining mortgage advances in the mature market in the wake of the credit crunch.

7.5.2 The three most favourable and the three least favourable cases

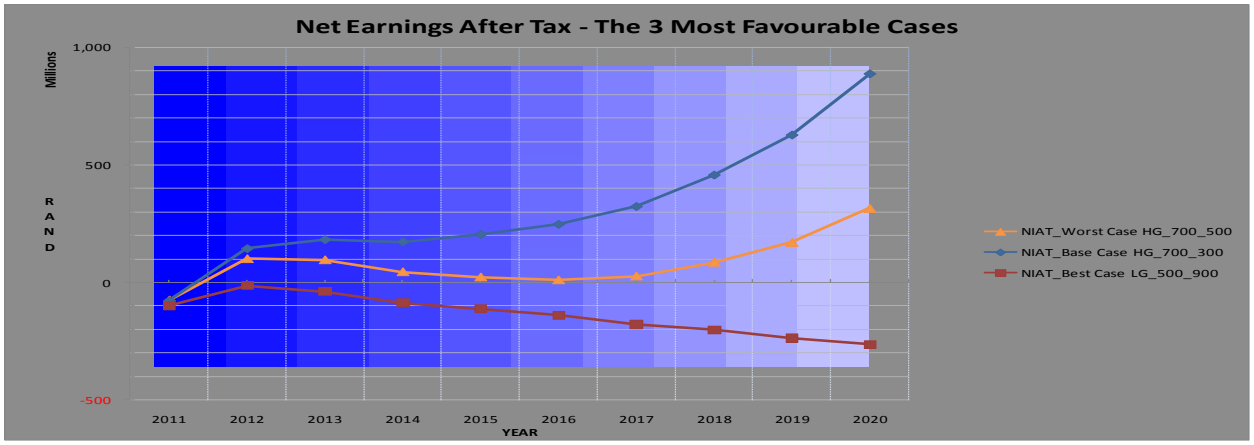
It is not very difficult, having reduced the candidate combinations to three of each of the most and the least favourable scenarios, to pick the final two. The numbers and graphics in Fig. 7.14 below show how both the Base Case and the Worst Case are profitable, even in the least favourable grouping. The Best Case never reports positive earnings except in a single year at the beginning of operations (2012), and even then in only the High-Growth, higher capitalisation sub scenarios.

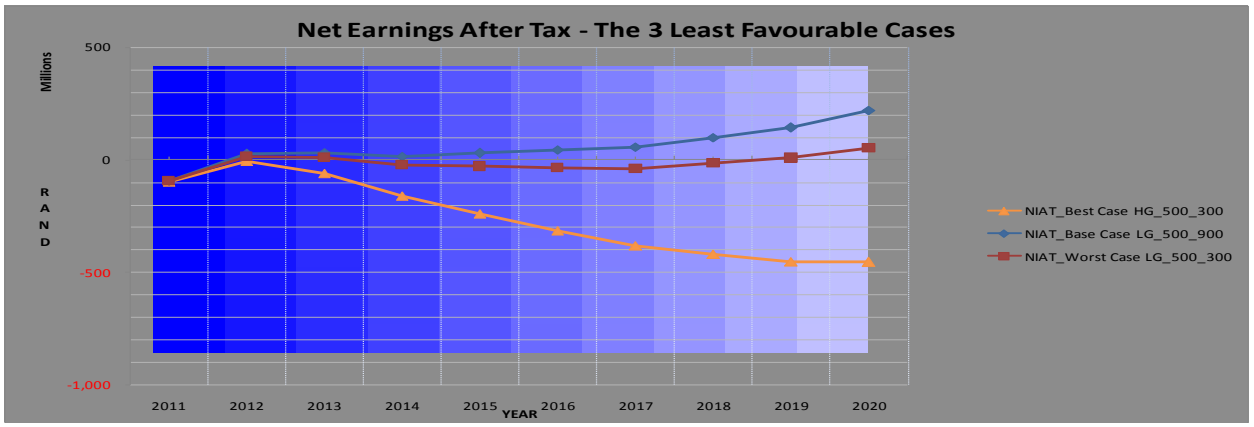
It may well be that the Best Case is not to be written off completely in terms of MI viability. A closer look at the bottom lines in the two graphics above reveals that even though losses are being reported, there is a flattening out towards the end of the period forecast, suggesting a decreasing loss-making rate. The suggestion here is that the Best Case conditions simply require a longer period for the MI to recover losses and to return to

Figure 7.14: The three most favourable and three least favourable scenarios

	(Start-Up)			The Three most favourable scenarios						
The Three most favourable	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NIAT_Base Case HG_700_300	-76,364,564	144,988,611	183,042,986	173,741,942	205,084,054	248,293,885	323,910,720	457,640,895	627,782,757	887,921,999
NIAT_Best Case LG_500_900	-98,622,419	-13,986,143	-38,975,705	-86,138,523	-111,281,663	-138,961,401	-177,630,086	-200,560,703	-236,123,507	-261,828,035
NIAT_Worst Case HG_700_500	-75,310,293	101,255,863	96,627,100	45,257,898	23,180,515	10,661,973	27,287,492	86,213,145	170,532,081	316,757,248

	(Start-Up)			The Three least favourable scenarios						
The Three least favourable	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NIAT_Base Case LG_500_900	-94,890,412	24,187,340	30,850,127	15,293,873	28,900,506	43,530,659	57,098,107	98,430,618	141,149,744	218,088,508
NIAT_Best Case HG_500_300	-97,428,502	-5,682,539	-61,683,058	-162,123,978	-239,934,261	-314,114,994	-381,168,316	-418,838,892	-452,848,041	-455,884,645
NIAT_Worst Case LG_500_300	-95,074,881	15,130,906	9,343,595	-22,949,024	-30,065,142	-35,684,363	-39,556,480	-15,262,093	7,889,781	51,036,436



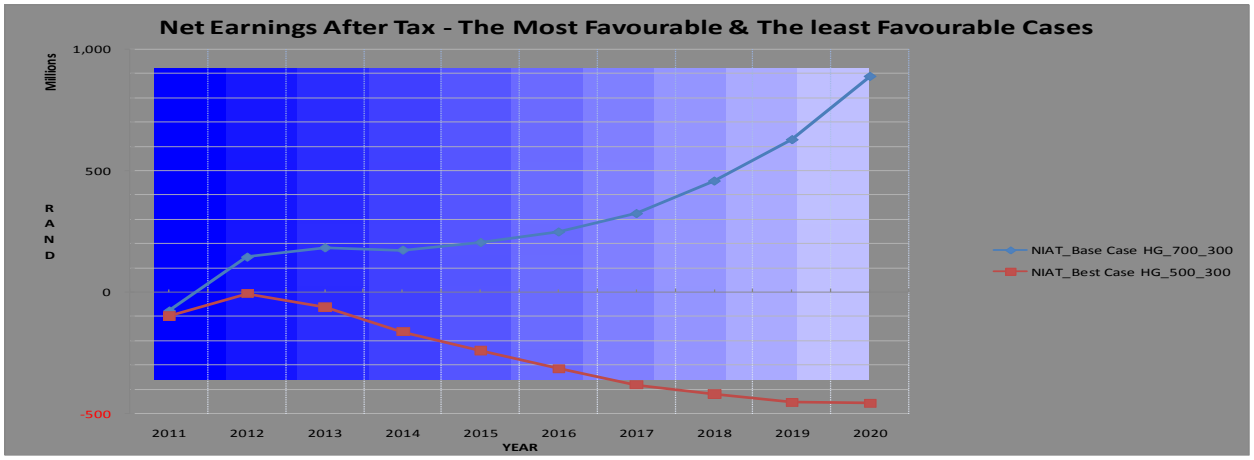


Source: Author's own computations and graphics

profitability. Another issue to consider is whether the premium pricing at 1.8% of mortgage loan principal is actuarially fair. It may well be that the price is too low for the indicated claims rate of 5.2%. For the purposes of this study, however, the interpretation is that the Best Case HG_500_300 would not be a viable option for the MI.

7.5.3 The most favourable and the least favourable scenarios

Figure 7.15: The Most and the Least Favourable scenarios



Source: Author's own construction

The graphic in Figure 7.15 represents the final phase in the appraisal process. The reader will recall that the Base Case conditions were considered the most likely during the scenario setting stage. To recapitulate, the mortgage rate of 13% pa was based on a previous ten-year average in the country as at 2010. The return on investment of 7% pa was a reflection of the risk-free rate in the country by reference to the R203 government bond yield.

Apart from the stagnation period in the years 2012 – 2014, the Base Case HG_700_300 climbs rapidly, reporting post-tax net earnings of nearly R 1b by 2020. Its opposite, the Best Case HG_500_300, reports net losses of nearly R 0.5b in 2020. However, net profits alone are not the complete story. Having established what might and might not work, it is necessary to look at the other facets of success or failure, notably the physical number of loans that might be achieved. This is to assess whether any significant progress would be made in terms of the housing backlog in the gap market. The number of loans issued appears in Figure 7.9, under "Operating Ratios". The number rises from 14 066 in 2011 to 70 341 by 2020, representing a cumulative 551 957 by the end of the period. The initial estimate for the backlog in the gap market was between 661 000 and 800 000, so at worst, over two-thirds of the backlog is eliminated in the space on nine years.

7.5.4 Key Ratios

The financial statements include a number of financial ratios considered useful in assessing the health of companies in the insurance industry. Among the most important of these, for the purposes of this study, are the following, given in Figure 7.9 under "Pro-forma Financial Ratios":

Capital measures

The three most important of capital measures from the study's perspective are: 1) Amount at Risk (AAR), 2) minimum capital required (MCR), and 3) the total asset/AAR ratio. The amount at risk is a measure of the total MI exposure at a given time, representing the value of the mortgage principal insured net of repayments. It is also referred to as the total insurance in force. The total AAR in the most favourable scenario (i.e., Base Case HG_700_300) stands at over R 109b at 2020. This is to be read in relation, of course, to the number of mortgage loans underwritten given above.

As discussed at length in chapter 6, the FSB has migrated to the new risk-based capital requirement regime in line with international developments. Prior to the new methodology, a fixed percentage of the total AAR would represent the MCR, which was R 1 of risk capital for every R 25 of insured value, or 4%. The premium-pricing model in this study added a 50 basis point provision for adverse deviation (PAD), for protection against catastrophes. This reflects in Fig. 7.12 as 4.5% of AAR for the MCR.

The last ratio is self-explanatory, and simply indicates the extent to which total assets cover the total exposure. In the present case, the ratio stabilises around 8%, which is perfectly acceptable in the industry.

Profitability ratios

The return on equity (ROE) rises from 8% initially to 14% by 2020, which compares favourably with the assumptions of 11.5% for the expected return on capital and 7% for the return on investment. The investment share of revenue is at 39% by 2020, which is acceptable, for as long as it does not exceed 50%. The expense ratio, defined as the ratio of operating expenses to earned premium, is stable at 8%. The loss ratio, which is the ratio of incurred expense to earned premium, peaks alarmingly at 119% in 2016 and then declines to 105% by 2020. In mature industries, the norm is around 60%.

Operating ratios

Relevant in this category of measures is the number of loans insured, which has been mentioned, and the so-called efficiency ratio – the ratio of operating expenses to total revenue. In the current scenario, this ratio improves drastically from 24% in 2012 to just 4% by 2020.

CHAPTER 8: CONCLUSION

8.1 Summary of findings

Residential mortgage loan default insurance (MI) is a familiar sight in many developed countries. Many decades of experience with MI have brought mortgage finance to levels of Mortgage Debt/GDP ratios well above 60% in many of these countries. A common, noteworthy characteristic of these finance systems is stringent and yet consistent underwriting standards and prudent regulatory oversight by state agencies.

In relatively less developed, emerging markets, a shift towards market provisioning of housing away from state capital subsidies is well underway. In the search for credit enhancing mechanisms, countries in Africa and Latin America are turning to various forms of mortgage liquidity facilities and guarantee schemes. African examples are the Collateral Replacement Indemnity (CRI) funds in Ghana and Mauritius, mortgage liquidity facilities in Tanzania, Uganda, and Rwanda, and Morocco's Fogarim guarantee scheme. There is an acknowledgement of the need for an increasing role by the private sector in the market for housing finance for the low-income working population.

The ratio of mortgage debt to GDP is relatively low in these countries, perhaps a reflection of the extent to which housing shortages in low-income segments have mainly been addressed as a social ill at which state money could be thrown in the form of grants. In Latin America, for example, Brazil and Peru boast a meagre 4%, with Chile the highest at only 20%. This is the case despite impressive growths in mortgage credit extension in recent years in the so-called LAC-5 countries (Brazil, Chile, Peru, Colombia, and Mexico). Shallow secondary markets and a general lack of risk-sharing insurance products have been suggested as possible reasons for the low ratio figures. By contrast, for instance, Sweden's ratio stands at 87%, that in the USA at 71%, and the UK's at 70%.

The South African government's announcement of a guarantee fund for low-income financing purposes in February 2010 is an example of such an admission that hand-outs and subsidies in the housing market have limited benefit. Interestingly, MI came to the fore as the best candidate for utilisation of such a fund. The relatively large mortgage loan industry in the country, a firmly

established legal and regulatory framework, and a willing government provide the basis for an argument for such an initiative. The lending institutions, through the Banking Association (BASA), have in fact not been averse to the idea either. The local banks, adjudged the soundest in the world in the World Economic Forum's Global Competitiveness Report of 2012/13, have indicated a need for such a risk sharing mechanism. As does the new government programme, Breaking New Ground (BNG).

One interesting finding that emerges from the scenario analysis is that a low interest rate environment does not necessarily imply favourable conditions for the insurer. Of the three primary scenario categories, the lowest mortgage rate scenario, the Best Case, is the most adverse for MI. In fact, all twelve variations within the category report losses for all the years except for the high growth, high capitalisation variation which is profitable in only one year at the beginning of operations. Although the return on investment assumption, at 10%, is higher than the rate in the other two cases (Base Case 7%, Worst Case 6%), this is not sufficient to counteract the effect of the lower premium price of only 1.8% of the mortgage loan amount. The premium price for the Base Case is 6.5% and that in the Worst Case 7.3%. In addition, the claims rate is not much lower in the Best Case than in the other two (Table 3.3). Labelled Best from the borrower's perspective in terms of mortgage repayments, it turns out worst for the insurer in terms of premium revenues.

8.2 Achievement of objectives

In sections 1.3 and 1.4 of the introductory chapter to the study, some six questions were asked, with a corresponding number of related objectives to address them. This section will presently draw the reader's attention to those objectives, and provide a response as to the extent to which the questions have been addressed and the related objectives met:

1. The first question asked was whether MI could provide the necessary incentive for lending institutions to do the business of mortgage lending in the gap market, or at least in the upper income range of the segment. The related objective was to establish if the perceived risk of lending to this income segment was the main hurdle, and to determine whether some households defined as falling in this market segment could in fact be served by MI. The logic was that if, indeed, that was the case, then MI could possibly provide a means to reduce that risk through sharing it with an entity outside the banking sector (this being the

dominant lending sector in the country). Such risk reduction could then lead to qualification for mortgage finance for at least some portion of the gap market.

In response, there is some compelling evidence that the banking sector is willing to go into partnership with the government to address the problem in the low end of the housing market. The financial sector already has its own target segment in this part of the market, and repeatedly voices their commitment to the lower-income sector. In chapter 2 (Section 2.4) BASA voice their satisfaction with the willingness on the part of the FSC target segment to service their mortgage obligations. Venter cites a supply issue (Sub-section 2.4.3), as well as infrastructural problems, including procedural delays in obtaining approval for housing development.

The recent R250 billion social contract signed in October 2014 is yet another indication (Sub-section 2.4.4) that, given a commercial incentive, the banks would exploit the market in question, and sensibly so, debatably. It appears, then, that the question about the lenders "going down market" has been answered. As a final note on this question, the author does have his own personal confirmation of the banks' attitude, through personal involvement with their representatives while at NHFC. Both objective and question number 5, relating to government and private sector financial institutional acceptance of the idea of MI, are thus answered by this response, too.

2. The second question and objective have to do with the actual size, in terms of housing units needed, and income capacity, in joint income terms, of the gap market.

Figure 3.4 aided an estimation of the gap market size, although, as pointed out there, the definition can be problematic due its dependence on subsidy levels. Using the old subsidy ceiling of R3 5000, and defining the gap market as households with incomes in the range R3 5001 – R16 000 would give an answer of some 38% of total households (as in 2009). Stats SA's General Household Survey of 2011 estimates the country's total population at 50.325 million, or 14.8 million households at a household size of 3.4. The erroneous answer would be around 5.6 million households. More accurate, because the subsidy ceiling has increased to R7 500, would be to use the range R8 000 – R16 000, which yields 14% of total households for the gap market, or some 790 000. This figure is more in line with various estimates by market commentators, who give a figure between 660 000 and 800 000 (Section 1.4, Sub-sections 2.4.3 – 2.4.4).

In terms of affordability, the latest commentary suggests that the cheapest market product today would be in the range R300 000 – R350 000, requiring a monthly combined household income of R11 667 (Sub-section 2.4.4). With the new NHFC subsidy programme for those in the range R3 501- R15 000, MI could be affordable to such income levels.

3. The third question and objective related to South Africa's readiness for MI, in infrastructural, economic, and regulatory terms. The question asked whether the overall mortgage finance market had reached a sufficient level of sophistication requisite for MI implementation.

A consideration of the many prerequisite conditions for MI implementation on pages (Sub-section 2.3.3) suggests that the country qualifies with comfort. The country's relatively large mortgage market, with a banking and finance system rated highly by the Global Competitiveness Report of the World Economic Forum (Sub-section 2.4.4) should stand the country in good stead regarding MI.

4. The fourth question asked whether other nations, either developing or developed, had gone the MI route, with the objective being to glean any issues of critical importance pertaining to MI implementation, and to take heed of lessons from past MI experience elsewhere globally.

The study has found numerous developing countries with MI programmes operating in their markets. India has a recent implementation, Mexico has had MI for years, and so has the Philippines, Lithuania, and Kazakhstan (Sub-section 2.2.3). Many of these countries have smaller mortgage markets than South Africa. On the African continent, Tanzania has a mortgage liquidity facility in the form of the TMRC, which refinances banks' mortgage portfolios after a minimum of six months on their balance sheets (Sub-section 2.2.3), and Uganda and Rwanda have been reported to be contemplating a similar facility. Morocco's *Fogarim* programme encourages bank lending to households with informal earnings. The guarantee programme was achieving 1200 new borrowers monthly in 2012 (Sub-section 2.2.3).

Regarding lessons from other countries' experience, perhaps the monoline principle, discussed in Sub-section 2.3.5 and again referred to in Sub-section 6.3.3, is of particular relevance. Conducting

other lines of insurance business concurrently with MI resulted in problems in the UK, and a firm resistance to this temptation is one such lesson. It would seem logical for an MI insurer to maintain a transparent claims-paying capacity at all times, not only for own sustainability, but also to send out a confidence signal to participating and potential mortgage lenders that claims incurred and reported will be paid up promptly. In addition, the importance of running the MI business on sound, prudent, commercial grounds, notwithstanding any guarantees in place, would appear a good lesson from past failed experience with MI.

5. The last question/objective combination relates to the simulation exercise carried out in this study. It is about market access facilitation and commercial viability, as defined (i.e., positive post-tax earnings), of the MI programme.

The response to this will be found in section 8.4 below.

8.3 Discussion of problems

A number of issues of concern emerge from the study. An appraisal of an existing, going-concern entity in terms of future prospects poses a difficult challenge, even in the presence of historical performance data. The case for a hypothetical one, representing a completely new industry is an even more challenging task. That was exactly what this study set out to do.

The attention of the reader is drawn, at this point, to Section 3.4 of the study, to be read in conjunction with Section 1.6. In the former section, reference is made to the limitations inherent in any forecasting exercise, as well as to an awareness, at the outset, of the absence of an historical mortgage default pattern in the market segment at the centre of this study. In combination, these two issues lead, unavoidably, to pricing difficulty and inaccuracy. Since premium price is, on the one hand, a principal driver of the insurer's revenues and, on the other, a determinant of affordability, it is important to bear this issue in mind in interpreting the study's findings.

In the latter section (1.6), delineation is drawn limiting the study to the primary mortgage origination market, thus excluding the issue of securitisation that inevitably follows in a well-functioning housing finance market. In addition, other considerations are mentioned that conceivably could be incorporated in assessing commercial viability, with a note that the present study deliberately narrowly considers positive post-tax earnings only as its measure of viability.

Given this context, these shortcomings are not seen as detracting from the validity of the findings, but as suggestive of a richer further study.

The pricing issue is further elaborated on in 8.3.1 below, followed in 8.3.2 by another issue of some discomfort relating to predicting the take-up rate of the MI product. Whilst reasonable assumptions may be made in respect of observable macroeconomic conditions, and knowledge of existing economic policy helps predict future states, this latter issue is not trivial, given a lack of prior education of the target market at the time of implementation of the MI product.

8.3.1 Pricing

At the core of any MI programme lies an actuarially fair premium price (AFP). To this AFP is added a profit margin to generate equity returns commensurate with the risk borne by the investor. Sophisticated iterative procedures exist for the pricing of premiums on MI-insured FRMs (fixed-rate mortgages). Central to many of these procedures is a determination of probabilities of default. Such is the nature of risk pricing. A determination of probabilities in the absence of a history of past behaviour posed a major hurdle to this study. Because the pricing of the premium is crucially central to the whole idea of setting up the MI entity, a claims pattern purporting to be based on established international data was adopted from Canada's OSFI as a way to sidestep the problem. Claims and earnings patterns follow the same paths. Ideally, one would wish for a pattern peculiar to the market for which the MI product is intended but such, of course, can only be established with time as the new operation gathers data.

8.3.2 Penetration rate

Another issue of concern is a way to estimate the response of the target market to the new product. Even given an estimate of the size of the housing backlog, and the proportion of the gap market likely to qualify for MI, it remains unknown at what rate the lenders would be able to originate MI-insured loans to this market. As a result, one can only estimate the level of business the MI Company can expect, and the rate of volume growth to feed into the financial model. This led to the setting of the secondary assumptions for possible growth paths as a way to overcome the problem.

8.4 Conclusions

The study set out to provide answers to several questions, and to achieve a number of objectives related thereto. The thesis statement put forward a hypothesis that, given certain conditions, greater access to mortgage finance could be achieved in the gap market in South Africa through a programme of residential mortgage insurance, leading to a reduction in the housing backlog in that market segment.

The main conclusion drawn from the study is that an MI programme is indeed commercially viable in South Africa. More specifically, based on an analysis of an aggregate of thirty-six scenario variations, the most favourable (in terms of MI profitability and market penetration) scenario arises from a combination of Base Case conditions, high-growth assumption level, an initial MI capitalisation of R 700m, and an average property price of R 300 000. The Base Case HG_700_300 scenario is profitable throughout the period of assessment, reporting post-tax earnings of nearly R1 billion by 2020. By this time (i.e., end of year 9 plus the three months in 2011), the MI has a total exposure of R109b, exposure being a reference to the amount at risk (AAR) or total insurance in force. The cumulative number of mortgage loans insured by this time is 551 958, at an average mortgage loan value of R270 000. This is assuming an average LTV of 90% on property price of R300 000. These figures are reflected on the pro-forma financial statements in Figures 7.6 and 7.9 in the preceding chapter. The detailed specifications for the Base Case scenario are in Table 3.3 in Chapter 3, Sub-section 3.3.3.

Somewhat surprising is the fact that the MI operation is profitable even under Worst Case scenario assumptions in which the mortgage rate is 16% pa, 300 basis points above the Base Case 13% pa above. From the Worst Case grouping of scenarios, the best combination is given by the HG_700_500 (initial capitalisation R700m, average property price R500 000. Due to the higher assumed average house price, however, the cumulative number of loans underwritten by year 2020 is 331 175, with insurance in force of R110b and an after-tax profit of R317m. The financial statements relating to this combination are in Appendix 5.

The grouping for the Best Case (all twelve variations) fails to show positive earnings apart from the year 2012, in which only the R700m capitalisation sub-group at high growth shows a modest profit of R10.6m, where after losses are reported throughout. By 2020, there is still little sign of a

return to profitability, raising a question as to whether the relatively low premium price of only 1.8% of mortgage loan is in fact actuarially fair. This was discussed in the preceding chapter.

To put the 551 958 cumulative number of loans achieved by MI over a period of 9.25 years (in the most favourable scenario above) into perspective, the FSC (Financial Sector Charter), in pursuit of their R42 billion commitment to the FSC target market, achieved a total of 95 000 housing units in the five years to end 2008. During that period, the big five lenders claimed to have extended R52.3b in mortgage loan advances to the low-income sector. Together with the contribution of the smaller lenders, the total reported to have been extended (Sub-section 2.4.3) was R55b. If one were to assume an average property price of R250 000, this amount could have financed some 220 000 units at an LTV of 100%. Even at R300 000, which is probably way outside the reach of the charter target segment, over 183 300 could have been financed.

A final point in concluding is noteworthy. Although the study set out to target MI at a specific segment of the housing ladder in South Africa, namely the gap market, it emerges from the research that it is not strictly necessary to limit MI to this market. There is no obvious reason to exclude, it turns out, any household that satisfies the qualifying criteria. This includes higher-income households up to a probable limit of R100 000 pm in joint income. Any household with a monthly income higher than this should not need MI. The inclusion of higher-income households in the MI programme would have the added benefit of a risk pooling effect.

8.5 Summary of contributions

8.5.1 From the HLGC to full MI

Among existing efforts dealing with housing finance access in the low-income end of the housing market, the Home Loan Guarantee Company (HLGC) was mentioned in the introduction to this research paper (1.9 Rationale for the study). The HLGC's limitations were noted: multi-line, limited guarantees to various housing loan organisations, including a presence in the rent-to-buy market. Created at a time of abnormal economic conditions in the country's history back in 1989, the non-profit organisation (Section 21 company) was intended to lend where formal lending institutions did not. By their own admission (their website www.hlgc.co.za), their loan book has remained small, with only 50 000 loans guaranteed in their first ten years of operation, for instance.

In contrast, MI will be for profit, will be monoline, and will seek to expand as quickly and as big as the economy will allow it. In addition, the default insurance offered by MI will be full-cover, and only residential mortgage loans will be insured. This is the main contribution of the paper: the country would be seeing a completely new industry. The most favourable scenario in the previous chapter indicates a figure of over 550 000 mortgage loans insured in the first nine years of operation (compared to 50 000 in ten years achieved by the HLGC). Even under the worst-case scenario, some 330 000 loans are covered by year 9, over six and a half times that achieved by the HLGC in a longer period.

The advent of a new industry to an economy the size and nature of South Africa's will have far reaching ramifications. As pointed out elsewhere, the proportion of GDP that housing finance constitutes in South Africa, albeit half what it is in developed economies, means that developments in the sector will have spill over effects of national gravity. Some of the less obvious contributions of this work are mentioned below.

8.5.2 Gap market definition

Traditionally, the gap market has been a reference to those earning above the state subsidy ceiling but too little to afford a property at ruling market prices. This definition ignores the reality that there is little difference in affordability between households just making the subsidy cut-off and those immediately above the ceiling and therefore not qualifying. Theoretically, these two groups could well end up in the same-valued properties, with the difference being that the non-qualifying households would have had to obtain mortgage finance for their residences. The simple logic is that higher income earners ought to afford higher-priced properties than lower earners.

Rather than define the gap market as households falling in a particular income band, as has commonly occurred in the literature, the study adopts a more practical approach based only on affordability, given prevailing housing stock prices. In order to avoid the potential for market distortion alluded to above, the study proposes to include those in the upper echelons of the subsidy range, the only criterion being that they meet originating and underwriting standards set by the lenders and the MI Company. At the upper end, in addition, no household should be barred from an MI-insured mortgage loan simply by virtue of earning too high an income. As argued in

the study, such relatively high-earning households would bring the added benefit of risk pooling to the MI programme, in addition to contributing to the growth in scale of the company.

8.5.3 Backlog reduction

It was reported in 2009 (Sub-section 2.4.3) that an estimated 135 000 new houses would need to be built annually in order to begin to reduce the housing shortage in the gap market. This study indicates MI reaching an annual figure in excess of 70 000 by year nine of operation, and growing. Bearing in mind that it is not the only effort being waged against the backlog, a significant contribution would be made by the MI entity.

8.5.4 Job creation

In NHFC's annual report for 2012, the chief executive observes that eleven new jobs are created for every R 1m spent on projects related to human settlements. If this is indeed the case, the analysis in this study indicates R 21b in underwritten loans by MI whilst in its infancy at age nine, which translates into some 230 000 jobs. The point to make about the nature of MI business is that the full potential is only realised once scale has been reached. As pointed out earlier, well-developed mortgage finance markets command a sizeable proportion of the gross domestic product of their countries, for example nearly three quarters of the USA's GDP is accounted for by mortgage finance. Were South Africa's 30% to rise even modestly to, say, 40%, the ramifications are immense.

8.5.5 *Secondary market development*

Another aspect that the prospect of a well-functioning, sustainable MI industry carries is the development of a secondary mortgage market, which, as discussed in chapter 2, requires a well-developed primary mortgage market. MI serves to facilitate growth in the primary market. Overall, MI removes default risk from the banking sector, allowing expanded mortgage lending in previously shunned markets. Moreover, mortgage lenders receive relief in the form of lower minimum capital requirements by the regulator (SARB), thus freeing up more of their capital for increased lending. Although the present study excludes consideration of the secondary market, the incidental benefit MI carries in promoting securitisation and other innovative mortgage finance products by merely expanding the primary market is hard to ignore.

8.6 Suggestions for further research

Following on the penetration rate issue mentioned in 8.2.2, a procedure for estimating the take-up rate in the gap market based on that market's unique characteristics of income constraints and available property prices affordable to it is likely to generate better estimates than the approach adopted here. Such a procedure could, for example, involve a survey of the attitudes of the targeted market segment.

Another fruitful avenue for research would be a pricing methodology based on, not international pattern data, but the target market's unique profile, perhaps drawing on credit records relating to other finance products a history of which households in the gap market would have accumulated. Such products may include hire purchase agreements in respect of durable goods, and credit card management. The notion being raised here is that households in different nations will behave differently in respect of their mortgage obligations. Why, if not, are national anthems different?

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APPENDICES

Appendix 1: List of abbreviations

Table 6.8: List of abbreviations

Abbreviation	Full name
AAR	Amount at risk
ABSA	Amalgamated Banks of South Africa
ACC	Asset capital charge
ACRC	Asset credit risk charge
AFP	Actuarially fair premium price
AML	Association of Mortgage Lenders
AMPS	All media and product survey
APRA	Australia Prudential Regulatory Authority
ARMs	adjustable rate mortgages
BASA	The Banking Association South Africa
BCBS	Basel Committee on Banking Supervision
BNG	Breaking new ground
CAHF	Centre for Affordable Housing Finance in Africa
CAR	Capital adequacy requirement
CCCs	Contingent capital certificates
CDFIs	Community development finance institutions
CEO	Chief executive officer
CMHC	Canada Mortgage and Housing Corporation
CPIX	Consumer price index excluding mortgages
CRA	Community Reinvestment Act
CRI	Collateral replacement indemnity
DA	Devil's advocate
DFA	Dynamic financial analysis
DFI	Development finance institution
DHS	Department of Human Settlements
DI	Dialectical inquiry
DP	Default probability
EAD	Exposure at default
EAL	Expected accumulated losses
EAR	Expected accumulated revenues
EL	Expected losses

Abbreviation	Full name
FCR	Financial condition reporting
Fed	Federal Reserve Banking System (USA)
FHA	Federal Housing Administration
FHLMC (Freddie Mac)	Federal Housing Loan Mortgage Corporation
FLISP	Finance-linked subsidy programme
FNMA (Fannie Mae)	Federal National Mortgage Association
FRMs	Fixed rate mortgages
FSB	Financial Services Board
FSC	Financial sector charter
FSCC	Financial Sector Charter Council
GAAP	Generally accepted accounting practice
GDP	Gross national product
GHS	General household survey
Ginnie Mae	Governmental National Mortgage Association
GSEs	Government sponsored enterprises
GUPR	Gross unearned premium
GWP	Gross written premium
HFC	Housing finance companies
HLAMDA	Home Loan and Mortgage Disclosure Act
HLGC	Home Loan Guarantee Company
HWP	housing white paper, 1994
IAA	International Actuarial Association
IAIS	International Association of Insurance Supervisors
IBNR	Incurred but not reported
ICC	Insurance capital charge
ICRA	Investment Information and Credit Rating Agency
IMGC	India Mortgage Guarantee Corporation
LAC-5	Brazil, Chile, Peru, Colombia and Mexico
LGD	Loss given default
L_R	Loss ratio
LTV	Loan to value ratio
MBSs	Mortgage backed securities
MCR	Minimum capital required
MD	Managing Director
MDI	Mortgage default insurance
MER	Maximum event retentions
MGC	Mortgage Guarantee Corporation

Abbreviation	Full name
MI	Mortgage default insurance
MIF	Mortgage indemnity fund
MLIA	Mortgage loan insurance agreement
MoU	Memorandum of understanding
NCR	The National Credit Regulator
Nedcor	Nedbank Corporation
NHF	National Housing Forum
NHFC	National Housing Finance Corporation
NHFT	National Housing Finance Trust
NPLs	Non-performing loans
NURCHA	National Urban Reconstruction and Housing Agency
OCR	Outstanding claims reported
OECD	Organisation for Economic Co-operation and Development
OR	Operational risk
OSFI	Office of the Superintendent of Financial Institutions
PD	Unconditional probability of default
PDE	Partial differential equation
PHP	Peoples Housing Project
PIP	Property in possession
PLAMS	Price level adjusted mortgages
PM	Prescribed margin
PMI	Private mortgage insurance
PMIs	Private mortgage insurers
PV	Present value
RBI	Reserve Bank of India
RCRC	Reinsurance credit risk charge
RDP	Reconstruction and development programme
RHLF	Rural Housing Loan Fund
RMB	Rand Merchant Bank
ROE	Return on equity
RoU	Record of understanding
S & L	Savings and loans
S&Ls	Savings and loans companies
SA	South Africa
SAM	Solvency assessment and management
SANCO	South African National Civic Organisations

Abbreviation	Full name
SARB	South African Reserve Bank
SMEs	Small and medium enterprises
Stats SA	Statistics South Africa
TCR	Total capital required
TMRC	Tanzania Mortgage Refinance Company
TRPM	Township Residential Property Market
UK	United Kingdom
UPR	Unearned premium reserve
URR	Unexpired risk reserve
US	United States of America
VA	Veterans Affairs

Source: Own research

Appendix 2: Time series data: Mortgage Lending Volume Estimates – Sample 1st 3 Years

Table 6.9: Time series data sample

Raw Data: January 1997 to December 2009									
Period	New Mortgage loans Rmil	Prime rate (%)	CPI (2000 = 100)	CPI (% m-on-m)	CPI (2008 = 100)	New Vehicle Sales Idex (2000=100)	M3 (seasonally adj.) Rmil	Household Credit Ext (Rmil)	Private Sector Credit Ext R mil
1997/01	2,824	20.25	78.7		47.0	110.8	338,653	223,189	341,412
1997/02	3,297	20.25	79.0	0.4	47.2	117.1	340,085	226,952	346,907
1997/03	3,017	20.25	79.5	0.6	47.5	111.7	347,150	228,257	349,430
1997/04	3,472	20.25	80.3	1.0	48.0	108.6	347,998	229,561	355,991
1997/05	3,536	20.25	80.5	0.2	48.1	106.9	351,906	230,866	361,140
1997/06	3,119	20.25	80.7	0.2	48.2	108.8	357,055	232,071	361,992
1997/07	3,621	20.25	81.6	1.1	48.8	113.1	360,453	233,276	367,213
1997/08	3,379	20.25	81.8	0.2	48.9	105.7	366,093	234,481	373,150
1997/09	3,275	20.25	82.1	0.4	49.1	104.5	379,288	237,645	379,631
1997/10	3,280	19.25	82.5	0.5	49.3	106.6	384,141	240,810	383,208
1997/11	2,982	19.25	82.8	0.4	49.5	98.9	383,723	243,974	388,519
1997/12	2,504	19.25	83.1	0.4	49.7	97.9	383,858	244,374	389,815
1998/01	2,417	19.25	83.9	1.0	50.1	100	397,892	244,775	397,120
1998/02	2,711	19.25	84.1	0.2	50.3	94.3	404,796	245,175	398,045
1998/03	3,345	18.25	84.8	0.8	50.7	102.4	400,072	246,759	400,759
1998/04	2,671	18.25	85.7	1.1	51.2	101.4	408,563	248,342	406,823
1998/05	3,103	18.25	86.1	0.5	51.5	97	403,855	249,926	413,395
1998/06	3,042	22.25	86.5	0.5	51.7	95.1	415,135	250,629	414,647
1998/07	2,793	24	87.3	0.9	52.2	100.6	415,413	251,333	419,872
1998/08	2,546	25.5	87.7	0.5	52.4	87.1	422,860	252,037	422,530
1998/09	2,404	25.5	88.3	0.7	52.8	77.3	426,722	253,069	431,886
1998/10	2,735	24.5	88.7	0.5	53.0	81.9	425,643	254,101	439,020
1998/11	2,171	23.5	88.9	0.2	53.1	84.5	433,456	255,134	447,162
1998/12	1,800	23	89.2	0.3	53.3	84.4	439,464	255,756	453,630
1999/01	2,117	22	90.1	1.0	53.9	81.8	442,179	256,378	460,828
1999/02	2,340	21	90.2	0.1	53.9	80.2	427,490	257,000	466,710
1999/03	2,671	20	90.9	0.8	54.3	81.2	437,710	258,641	470,967
1999/04	2,766	19	91.7	0.9	54.8	81.8	437,540	260,283	468,950
1999/05	3,175	19	92.1	0.4	55.1	89.6	434,588	261,924	480,152
1999/06	3,128	18	92.6	0.5	55.3	83.3	448,514	261,779	487,791
1999/07	3,277	17.5	93.4	0.9	55.8	88.1	450,463	261,634	489,893
1999/08	3,397	16.5	93.6	0.2	55.9	92.8	450,221	261,489	491,467
1999/09	3,415	16.5	94.1	0.5	56.2	92.7	464,401	261,646	493,440
1999/10	4,018	15.5	94.5	0.4	56.5	90.1	467,802	261,803	499,838
1999/11	4,021	15.5	94.9	0.4	56.7	87.1	476,745	261,960	498,068
1999/12	3,269	15.5	95.3	0.4	57.0	91.9	485,768	263,983	500,434

Source: Data from the SARB

Appendix 3: Risk weight credit for MI in the US

Table 6.10: Risk weight credit for MI in the US

Proposed Basel II Risk Weight Credit for MI in the USA
MI Provider Rated "A" or Higher; First Loss Coverage Down to 60% LTV
(First Liens - Standardized Approach)

LTV Ratio	Risk Wt	No MI (capital allocated)	With MI (capital allocated)
<=60%	20%	1.6%	1.6%
60.01 – 80%	35%	2.8%	1.6%
80.01 – 85%	50%	4.0%	1.6%
85.01 – 90%	75%	6.0%	1.6%
90.01 – 95%	100%	8.0%	1.6%
>95%	150%	12.0%	1.6%

Source: Blood, 2009b:25

Table 6.11: Risk Weight Credit for MI in Australia

Risk Weight Capital Credit for MI in Australia
(Standardized Approach)

	Standard Eligible Mortgages		Non-standard Eligible Mortgages	
LTV Ratio	Risk Weight (no MI)	Risk Weight (with MI)	Risk Weight (no MI)	Risk Weight (with MI)
<60%	35%	35%	50%	35%
60.01 – 80%	35%	35%	75%	50%
80.01 – 90%	50%	35%	100%	75%
90.01 – 100%	75%	50%	100%	75%
>100%	100%	75%	100%	100%

Source: Blood, 2009b:25

Appendix 4: The least favourable scenario – Best Case HG_500_300

Figure 7.a: Best Case least favourable scenario – Income Statement

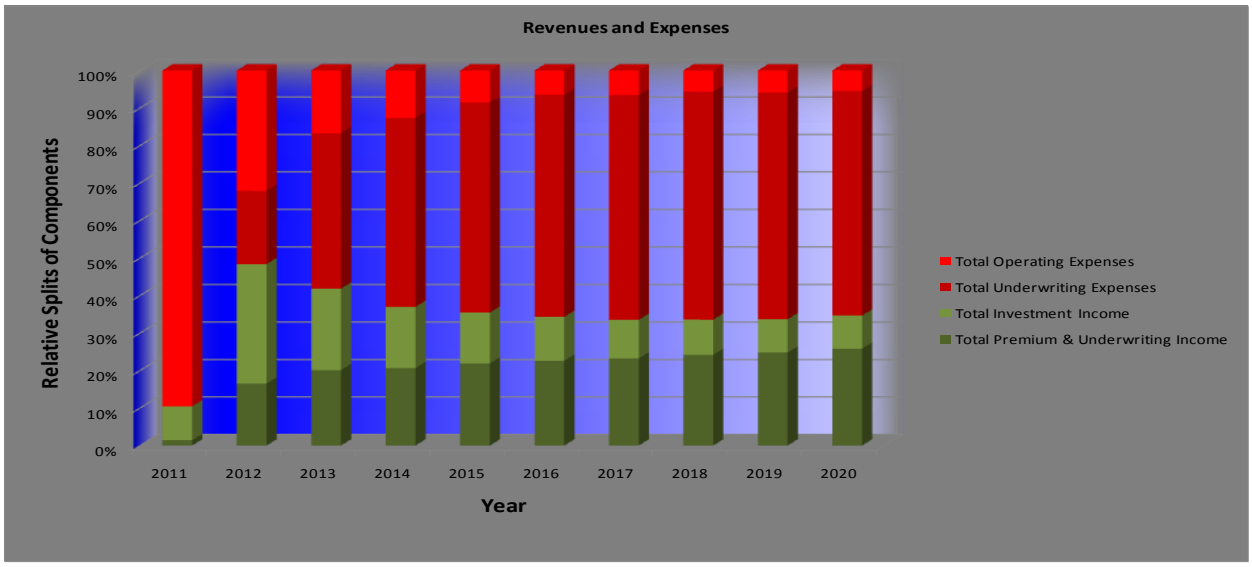
SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case HG_500_300				High Growth Scenario	
PRO-FORMA INCOME STATEMENT	**(Start-Up)** **2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Premium & Underwriting Income										
Risk Premium	67,980,978	283,851,627	290,871,454	293,667,620	323,764,485	356,955,280	393,538,014	433,878,041	478,351,254	527,386,007
Less: Increase in Unearned Premium	66,621,358	256,563,744	216,440,860	167,004,760	145,032,599	132,352,682	127,176,916	128,177,968	137,391,710	146,969,903
Subtotal Earned Premium	1,359,620	27,287,883	74,430,594	126,662,859	178,731,887	224,602,598	266,361,098	305,700,074	340,959,544	380,416,103
Underwriting Fee	379,782	1,585,763	1,624,980	1,640,601	1,808,740	1,994,164	2,198,536	2,423,900	2,672,353	2,946,291
Total Premium & Underwriting Income	1,739,402	28,873,646	76,055,574	128,303,461	180,540,627	226,596,761	268,559,635	308,123,973	343,631,898	383,362,394
Investment Income										
Interest on Initial Capital	12,500,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000
Other Investment Income	(1,345,644)	5,594,382	32,144,749	51,390,226	61,860,534	67,202,067	68,773,749	69,881,718	73,286,130	81,261,941
Total Investment Income	11,154,356	55,594,382	82,144,749	101,390,226	111,860,534	117,202,067	118,773,749	119,881,718	123,286,130	131,261,941
Total Revenues	**12,893,758**	**84,468,029**	**158,200,323**	**229,693,686**	**292,401,161**	**343,798,828**	**387,333,384**	**428,005,691**	**466,918,028**	**514,624,335**
Underwriting Expenses										
Paid Claims	0	0	59,031,133	195,427,959	351,453,174	498,197,262	620,001,637	714,960,996	793,049,325	850,375,534
Increase in IBNR	0	18,160,214	35,679,144	38,796,558	36,405,880	29,264,322	23,186,101	19,017,560	13,536,631	13,945,112
Increase in Outstanding Claims	0	15,944,987	61,923,216	78,881,090	74,406,813	65,583,317	49,674,338	41,046,471	31,850,913	25,089,444
Claims & Underwriting Expenses	0	34,105,200	156,633,492	313,105,607	462,265,867	593,044,901	692,862,076	775,025,027	838,436,869	889,410,091
Total Underwriting Expenses	**0**	**34,105,200**	**156,633,492**	**313,105,607**	**462,265,867**	**593,044,901**	**692,862,076**	**775,025,027**	**838,436,869**	**889,410,091**
Operating Expenses										
Staff Costs	36,140,814	32,296,755	33,911,592	50,511,172	37,387,531	39,256,907	41,219,753	43,280,740	45,444,777	47,717,016
Facilities & Equipment	5,544,548	2,629,410	2,760,881	4,766,029	3,043,871	3,196,064	5,517,274	3,523,661	3,699,844	6,386,935
Business Services	15,127,041	15,590,838	16,370,880	17,189,924	18,049,920	18,952,916	19,901,062	20,896,615	21,941,945	23,039,543
Development Costs	53,000,000	3,399,478	8,025,000	4,042,426	9,160,000	785,868	6,050,000	864,455	6,655,000	0
Insurance Business Fees	509,857	2,128,887	2,181,536	2,202,507	2,428,234	2,677,165	2,951,535	3,254,085	3,587,634	3,955,395
Total Operating Expenses	**110,322,260**	**56,045,368**	**63,249,888**	**78,712,058**	**70,069,555**	**64,868,920**	**75,639,623**	**71,819,556**	**81,329,201**	**81,098,888**
Total Expenses	**110,322,260**	**90,150,568**	**219,883,381**	**391,817,664**	**532,335,422**	**657,913,822**	**768,501,699**	**846,844,583**	**919,766,070**	**970,508,979**
Net Income (Loss) before Taxes	**(97,428,502)**	**(5,682,539)**	**(61,683,058)**	**(162,123,978)**	**(239,934,261)**	**(314,114,994)**	**(381,168,316)**	**(418,838,892)**	**(452,848,041)**	**(455,884,645)**
VAT on Premium	0	0	0	0	0	0	0	0	0	0
Corporate Taxes on Net Income	0	0	0	0	0	0	0	0	0	0
Net Income After Taxes	**(97,428,502)**	**(5,682,539)**	**(61,683,058)**	**(162,123,978)**	**(239,934,261)**	**(314,114,994)**	**(381,168,316)**	**(418,838,892)**	**(452,848,041)**	**(455,884,645)**
Dividends	0	0	0	0	0	0	0	0	0	0
Net Income Available to Shareholders	**(97,428,502)**	**(5,682,539)**	**(61,683,058)**	**(162,123,978)**	**(239,934,261)**	**(314,114,994)**	**(381,168,316)**	**(418,838,892)**	**(452,848,041)**	**(455,884,645)**

Source: Author's own construction

Figure 7.b: Earnings Before and After Tax - based on Fig. 7.10a

Source: Author's own construction

Figure 7.c: Revenue and Expense Composition - based on Fig. 7.10a



Source: Author's own construction

Figure 7.d: Best Case least favourable scenario – Cash Flow, Balance Sheet and Ratios

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case HG_500_300				High Growth Scenario	
PRO-FORMA CASH FLOW STATEMENT	(Start-Up)									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cash From (Used In) Operating Activities										
Risk Premium	67,980,978	283,851,627	290,871,454	293,667,620	323,764,485	356,955,280	393,538,014	433,878,041	478,351,254	527,386,007
Underwriting Fee	379,782	1,585,763	1,624,980	1,640,601	1,808,740	1,994,164	2,198,536	2,423,900	2,672,353	2,946,291
Total Investment Income	11,154,356	55,594,382	82,144,749	101,390,226	111,860,534	117,202,067	118,773,749	119,881,718	123,286,130	131,261,941
Paid Claims	0	0	(59,031,133)	(195,427,959)	(351,453,174)	(498,197,262)	(620,001,637)	(714,960,996)	(793,049,325)	(850,375,534)
Operating Costs	(110,322,260)	(56,045,368)	(63,249,888)	(78,712,058)	(70,069,555)	(64,868,920)	(75,639,623)	(71,819,556)	(81,329,201)	(81,098,888)
Tax Payable	0	0	0	0	0	0	0	0	0	0
Dividends	0	0	0	0	0	0	0	0	0	0
Net Operating Cash Flow	**(30,807,144)**	**284,986,405**	**252,360,162**	**122,558,430**	**15,911,031**	**(86,914,673)**	**(181,130,961)**	**(230,596,893)**	**(270,068,787)**	**(269,880,185)**
Cash From (Used In) Investing Activities										
Equity Investment	**500,000,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Investments Purchased	0	284,986,405	252,360,162	122,558,430	15,911,031	0	0	0	0	0
Investments Redeemed	(30,807,144)	0	0	0	0	(86,914,673)	(181,130,961)	(230,596,893)	(270,068,787)	(269,880,185)
Total Investments	**469,192,856**	**754,179,262**	**1,006,539,423**	**1,129,097,854**	**1,145,008,884**	**1,058,094,211**	**876,963,251**	**646,366,358**	**376,297,571**	**106,417,386**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case HG_500_300				High Growth Scenario	
PRO-FORMA BALANCE SHEET	(Start-Up)									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Assets										
Investments	469,192,856	754,179,262	1,006,539,423	1,129,097,854	1,145,008,884	1,058,094,211	876,963,251	646,366,358	376,297,571	106,417,386
Total Assets	**469,192,856**	**754,179,262**	**1,006,539,423**	**1,129,097,854**	**1,145,008,884**	**1,058,094,211**	**876,963,251**	**646,366,358**	**376,297,571**	**106,417,386**
Liabilities and Capital										
Liabilities										
Unearned Premium Reserve	66,621,358	323,185,103	539,625,963	706,630,723	851,663,322	984,016,004	1,111,192,920	1,239,370,887	1,376,762,597	1,523,732,501
IBNR Reserve	0	18,160,214	53,839,357	92,635,915	129,041,795	158,306,117	181,492,218	200,509,778	214,046,410	227,991,522
Outstanding Claims Reserve	0	15,944,987	77,868,202	156,749,293	231,156,106	296,739,423	346,413,761	387,460,232	419,311,145	444,400,589
Total Liabilities	**66,621,358**	**357,290,303**	**671,333,523**	**956,015,931**	**1,211,861,223**	**1,439,061,544**	**1,639,098,899**	**1,827,340,897**	**2,010,120,151**	**2,196,124,611**
Capital										
Paid-in Capital	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000
Retained Earnings (Losses)	(97,428,502)	(103,111,042)	(164,794,099)	(326,918,077)	(566,852,339)	(880,967,332)	(1,262,135,648)	(1,680,974,539)	(2,133,822,581)	(2,589,707,226)
Total Capital	**402,571,498**	**396,888,958**	**335,205,901**	**173,081,923**	**(66,852,339)**	**(380,967,332)**	**(762,135,648)**	**(1,180,974,539)**	**(1,633,822,581)**	**(2,089,707,226)**
Total Liabilities and Capital	**469,192,856**	**754,179,262**	**1,006,539,423**	**1,129,097,854**	**1,145,008,884**	**1,058,094,211**	**876,963,251**	**646,366,358**	**376,297,571**	**106,417,386**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case HG_500_300				High Growth Scenario	
PRO-FORMA FINANCIAL RATIOS	(Start-Up)									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Capital Measures										
Total MI Exposure (AAR[1]) at Year End (millions)	3,814.3	18,186.7	30,967.0	42,059.1	52,834.4	63,366.4	73,717.2	83,941.4	94,094.5	104,207.7
Minimum Required Capital (millions)	171.6	818.4	1,393.5	1,892.7	2,377.5	2,851.5	3,317.3	3,777.4	4,234.3	4,689.3
Assets to Insurance in Force Ratio (MI Exposure)	12%	4%	3%	3%	2%	2%	1%	1%	0%	0%
Financial Analysis										
Capital to Risk Premium Ratio	592%	140%	115%	59%	-21%	-107%	-194%	-272%	-342%	-396%
Capital as % of Liabilities		111%	50%	18%	-6%	-26%	-46%	-65%	-81%	-95%
Assets as % of Liabilities		211%	150%	118%	94%	74%	54%	35%	19%	5%
Capital as % of AAR	10.6%	2.2%	1.1%	0.4%	-0.1%	-0.6%	-1.0%	-1.4%	-1.7%	-2.0%
Profitability Ratios										
Return on Equity (Net income & dividend)	-24%	-1%	-8%	-32%	-226%	70%	33%	22%	16%	12%
Profit as % of Risk Premium		-2%	-21%	-55%	-74%	-88%	-97%	-97%	-95%	-86%
Loss Ratio *Incurred Claims / Earned Premiums*		125%	210%	247%	259%	264%	260%	254%	246%	234%
Expense Ratio *Operating Exp. / Earned Premiums*			85%	62%	39%	29%	28%	23%	24%	21%
Combined Ratio *Loss + Expense Ratio*			295%	309%	298%	293%	289%	277%	270%	255%
Investment Share of Revenue	87%	66%	52%	44%	38%	34%	31%	28%	26%	26%
Operating Ratios										
Efficiency Ratio *Operating Exp. / Total Revenue*	856%	66%	40%	34%	24%	19%	20%	17%	17%	16%
Number of Insured Loans Issued	14,066	55,935	54,589	52,489	55,113	57,870	60,762	63,801	66,991	70,341
Number of Employees	25	25	25	25	25	25	25	25	25	25
Net Income/Employee	(3,897,140)	(227,302)	(2,467,322)	(6,484,959)	(9,597,370)	(12,564,600)	(15,246,733)	(16,753,556)	(18,113,922)	(18,235,386)
Assets/Employee	18,767,714	30,167,170	40,261,577	45,163,914	45,800,355	42,323,768	35,078,530	25,854,654	15,051,903	4,256,695
Operating Expenses per Employee	4,412,890	2,241,815	2,529,996	3,148,482	2,802,782	2,594,757	3,025,585	2,872,782	3,253,168	3,243,956

[1] AAR = Amount at Risk

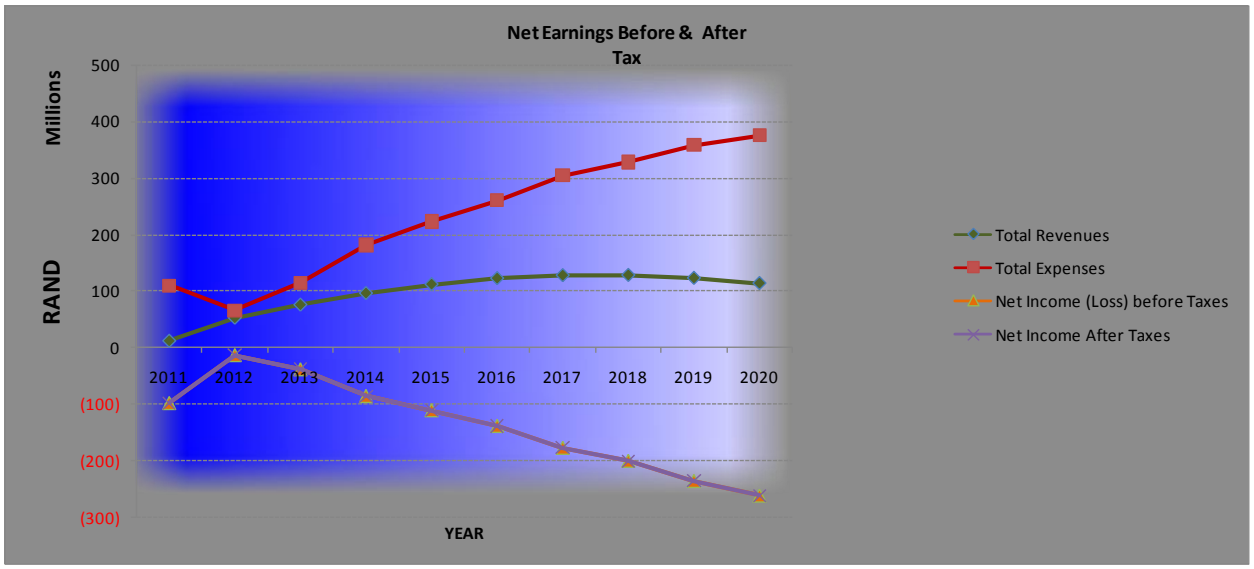
Source: Author's own construction

Figure 7.e: Best Case most favourable scenario - Income Statement

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case LG_500_900				Low Growth Scenario	
PRO-FORMA INCOME STATEMENT	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Premium & Underwriting Income										
Risk Premium	22,647,438	94,630,742	96,950,047	97,894,801	107,911,704	118,980,981	131,190,133	144,614,680	159,462,319	175,790,337
Less: Increase in Unearned Premium	22,194,489	85,535,576	72,140,567	55,674,431	48,335,192	44,114,990	42,404,518	42,715,822	45,809,971	48,985,087
Subtotal Earned Premium	452,949	9,095,165	24,809,480	42,220,371	59,576,512	74,865,991	88,785,615	101,898,858	113,652,348	126,805,250
Underwriting Fee	126,522	528,663	541,620	546,898	602,859	664,698	732,906	807,903	890,851	982,069
Total Premium & Underwriting Income	579,471	9,623,828	25,351,100	42,767,269	60,179,371	75,530,689	89,518,521	102,706,761	114,543,199	127,787,319
Investment Income										
Interest on Initial Capital	12,500,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000	50,000,000
Other Investment Income	(1,719,631)	(7,618,059)	(322,389)	2,704,069	1,076,220	(3,729,472)	(12,527,669)	(25,278,750)	(42,253,353)	(64,685,017)
Total Investment Income	10,780,369	42,381,941	49,677,611	52,704,069	51,076,220	46,270,528	37,472,331	24,721,250	7,746,647	(14,685,017)
Total Revenues	**11,359,840**	**52,005,769**	**75,028,712**	**95,471,338**	**111,255,591**	**121,801,217**	**126,990,852**	**127,428,011**	**122,289,846**	**113,102,301**
Underwriting Expenses										
Paid Claims	0	0	19,673,919	65,140,220	117,148,738	166,063,444	206,663,591	238,315,529	264,346,775	283,455,817
Increase in IBNR	0	6,052,652	11,893,166	12,932,259	12,135,220	9,754,409	7,728,561	6,339,542	4,512,382	4,648,731
Increase in Outstanding Claims	0	5,313,050	20,641,853	26,293,622	24,802,636	21,860,652	16,556,771	13,683,562	10,616,662	8,363,868
Claims & Underwriting Expenses	0	11,365,702	52,208,939	104,366,100	154,086,595	197,678,505	230,948,923	258,338,633	279,475,819	296,468,416
Total Underwriting Expenses	**0**	**11,365,702**	**52,208,939**	**104,366,100**	**154,086,595**	**197,678,505**	**230,948,923**	**258,338,633**	**279,475,819**	**296,468,416**
Operating Expenses										
Staff Costs	36,140,814	32,296,755	33,911,592	50,511,172	37,387,531	39,256,907	41,219,753	43,280,740	45,444,777	47,717,016
Facilities & Equipment	5,544,548	2,629,410	2,760,881	4,766,029	3,043,871	3,196,064	5,517,274	3,523,661	3,699,844	6,386,935
Business Services	15,127,041	15,590,838	16,370,880	17,189,924	18,049,920	18,952,916	19,901,062	20,896,615	21,941,945	23,039,543
Development Costs	53,000,000	3,399,478	8,025,000	4,042,426	9,160,000	785,868	6,050,000	864,455	6,655,000	0
Insurance Business Fees	169,856	709,731	727,125	734,211	809,338	892,357	983,926	1,084,610	1,195,967	1,318,428
Total Operating Expenses	**109,982,258**	**54,626,211**	**61,795,478**	**77,243,761**	**68,450,659**	**63,084,113**	**73,672,014**	**69,650,081**	**78,937,534**	**78,461,921**
Total Expenses	**109,982,258**	**65,991,913**	**114,004,417**	**181,609,862**	**222,537,254**	**260,762,618**	**304,620,937**	**327,988,714**	**358,413,353**	**374,930,337**
Net Income (Loss) before Taxes	**(98,622,419)**	**(13,986,143)**	**(38,975,705)**	**(86,138,523)**	**(111,281,663)**	**(138,961,401)**	**(177,630,086)**	**(200,560,703)**	**(236,123,507)**	**(261,828,035)**
VAT on Premium	0	0	0	0	0	0	0	0	0	0
Corporate Taxes on Net Income	0	0	0	0	0	0	0	0	0	0
Net Income After Taxes	**(98,622,419)**	**(13,986,143)**	**(38,975,705)**	**(86,138,523)**	**(111,281,663)**	**(138,961,401)**	**(177,630,086)**	**(200,560,703)**	**(236,123,507)**	**(261,828,035)**
Dividends	0	0	0	0	0	0	0	0	0	0
Net Income Available to Shareholders	**(98,622,419)**	**(13,986,143)**	**(38,975,705)**	**(86,138,523)**	**(111,281,663)**	**(138,961,401)**	**(177,630,086)**	**(200,560,703)**	**(236,123,507)**	**(261,828,035)**

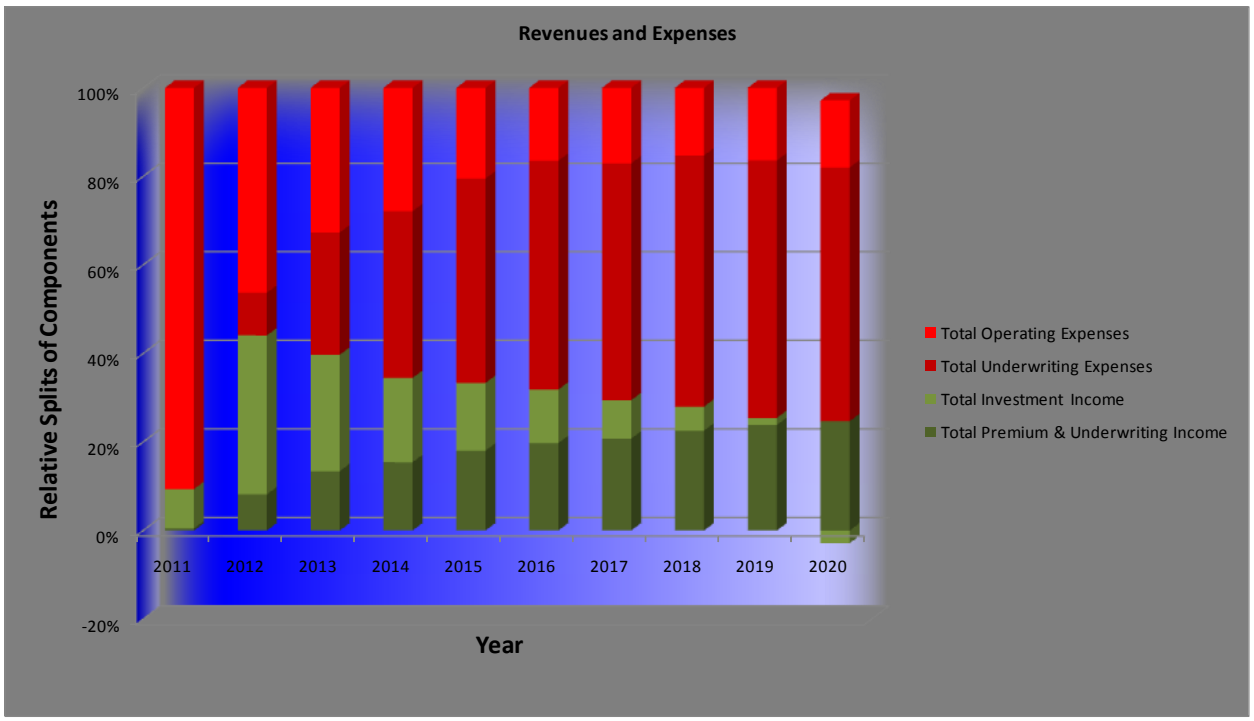
Source: Author's own construction

Figure 7.f: Best Case most favourable scenario - Earnings Before & After Tax



Source: Author's own construction

Figure 7.g: Best Case most favourable scenario - Composition of Revenue & Expense



Source: Author's own construction

Figure 7.h: Best Case most favourable scenario - Cash Flow Statement & Balance Sheet

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case LG_500_900				Low Growth Scenario	
PRO-FORMA CASH FLOW STATEMENT	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cash From (Used In) Operating Activities										
Risk Premium	22,647,438	94,630,742	96,950,047	97,894,801	107,911,704	118,980,981	131,190,133	144,614,680	159,462,319	175,790,337
Underwriting Fee	126,522	528,663	541,620	546,898	602,859	664,698	732,906	807,903	890,851	982,069
Total Investment Income	10,780,369	42,381,941	49,677,611	52,704,069	51,076,220	46,270,528	37,472,331	24,721,250	7,746,647	(14,685,017)
Paid Claims	0	0	(19,673,919)	(65,140,220)	(117,148,738)	(166,063,444)	(206,663,591)	(238,315,529)	(264,346,775)	(283,455,817)
Operating Costs	(109,982,258)	(54,626,211)	(61,795,478)	(77,243,761)	(68,450,659)	(63,084,113)	(73,672,014)	(69,650,081)	(78,937,534)	(78,461,921)
Tax Payable	0	0	0	0	0	0	0	0	0	0
Dividends	0	0	0	0	0	0	0	0	0	0
Net Operating Cash Flow	**(76,427,929)**	**82,915,135**	**65,699,881**	**8,761,788**	**(26,008,615)**	**(63,231,349)**	**(110,940,236)**	**(137,821,777)**	**(175,184,492)**	**(199,830,349)**
Cash From (Used In) Investing Activities										
Equity Investment	**500,000,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Investments Purchased	0	82,915,135	65,699,881	8,761,788	0	0	0	0	0	0
Investments Redeemed	(76,427,929)	0	0	0	(26,008,615)	(63,231,349)	(110,940,236)	(137,821,777)	(175,184,492)	(199,830,349)
Total Investments	**423,572,071**	**506,487,205**	**572,187,086**	**580,948,874**	**554,940,260**	**491,708,910**	**380,768,674**	**242,946,897**	**67,762,404**	**-132,067,945**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case LG_500_900				Low Growth Scenario	
PRO-FORMA BALANCE SHEET	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Assets										
Investments	423,572,071	506,487,205	572,187,086	580,948,874	554,940,260	491,708,910	380,768,674	242,946,897	67,762,404	(132,067,945)
Total Assets	**423,572,071**	**506,487,205**	**572,187,086**	**580,948,874**	**554,940,260**	**491,708,910**	**380,768,674**	**242,946,897**	**67,762,404**	**(132,067,945)**
Liabilities and Capital										
Liabilities										
Unearned Premium Reserve	22,194,489	107,730,066	179,870,632	235,545,063	283,880,255	327,995,245	370,399,763	413,115,585	458,925,555	507,910,642
IBNR Reserve	0	6,052,652	17,945,818	30,878,077	43,013,297	52,767,706	60,496,267	66,835,809	71,348,191	75,996,922
Outstanding Claims Reserve	0	5,313,050	25,954,903	52,248,525	77,051,162	98,911,814	115,468,585	129,152,146	139,768,809	148,132,676
Total Liabilities	**22,194,489**	**119,095,767**	**223,771,353**	**318,671,665**	**403,944,713**	**479,674,765**	**546,364,614**	**609,103,540**	**670,042,555**	**732,040,241**
Capital										
Paid-in Capital	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000
Retained Earnings (Losses)	(98,622,419)	(112,608,562)	(151,584,267)	(237,722,790)	(349,004,453)	(487,965,855)	(665,595,940)	(866,156,644)	(1,102,280,151)	(1,364,108,186)
Total Capital	**401,377,581**	**387,391,438**	**348,415,733**	**262,277,210**	**150,995,547**	**12,034,145**	**(165,595,940)**	**(366,156,644)**	**(602,280,151)**	**(864,108,186)**
Total Liabilities and Capital	**423,572,071**	**506,487,205**	**572,187,086**	**580,948,874**	**554,940,260**	**491,708,910**	**380,768,674**	**242,946,897**	**67,762,404**	**(132,067,945)**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Best Case LG_500_900				Low Growth Scenario	
PRO-FORMA FINANCIAL RATIOS	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Capital Measures										
Total MI Exposure (AAR[1]) at Year End (millions)	1,270.7	6,062.3	10,322.0	14,019.7	17,611.0	21,121.5	24,572.3	27,979.9	31,364.8	34,735.7
Minimum Required Capital (millions)	57.2	272.8	464.5	630.9	792.5	950.5	1,105.8	1,259.1	1,411.4	1,563.1
Assets to Insurance in Force Ratio (MI Exposure)	33%	8%	6%	4%	3%	2%	2%	1%	0%	0%
Financial Analysis										
Capital to Risk Premium Ratio	1772%	409%	359%	268%	140%	10%	-126%	-253%	-378%	-492%
Capital as % of Liabilities		325%	156%	82%	37%	3%	-30%	-60%	-90%	-118%
Assets as % of Liabilities		425%	256%	182%	137%	103%	70%	40%	10%	-18%
Capital as % of AAR	31.6%	6.4%	3.4%	1.9%	0.9%	0.1%	-0.7%	-1.3%	-1.9%	-2.5%
Profitability Ratios										
Return on Equity (Net income & dividend)	-25%	-2%	-5%	-14%	-27%	-85%	116%	38%	24%	18%
Profit as % of Risk Premium		-15%	-40%	-88%	-103%	-117%	-135%	-139%	-148%	-149%
Loss Ratio *Incurred Claims / Earned Premiums*		125%	210%	247%	259%	264%	260%	254%	246%	234%
Expense Ratio *Operating Exp. / Earned Premiums*			249%	183%	115%	84%	83%	68%	69%	62%
Combined Ratio *Loss + Expense Ratio*			460%	430%	374%	348%	343%	322%	315%	296%
Investment Share of Revenue	95%	81%	66%	55%	46%	38%	30%	19%	6%	-13%
Operating Ratios										
Efficiency Ratio *Operating Exp. / Total Revenue*	968%	105%	82%	81%	62%	52%	58%	55%	65%	69%
Number of Insured Loans Issued	1,562	6,216	6,065	5,832	6,123	6,430	6,752	7,088	7,444	7,815
Number of Employees	25	25	25	25	25	25	25	25	25	25
Net Income/Employee	(3,944,897)	(559,446)	(1,559,028)	(3,445,541)	(4,451,267)	(5,558,456)	(7,105,203)	(8,022,428)	(9,444,940)	(10,473,121)
Assets/Employee	16,942,883	20,259,488	22,887,483	23,237,955	22,197,610	19,668,356	15,230,747	9,717,876	2,710,496	(5,282,718)
Operating Expenses per Employee	4,399,290	2,185,048	2,471,819	3,089,750	2,738,026	2,523,365	2,946,881	2,786,003	3,157,501	3,138,477

[1] AAR = Amount at Risk

Source: Author's own construction

Appendix 5: The Worst Case Pro-forma Financial Statements – Most favourable in group

Figure 7.i: Worst Case most favourable scenario - Income Statement

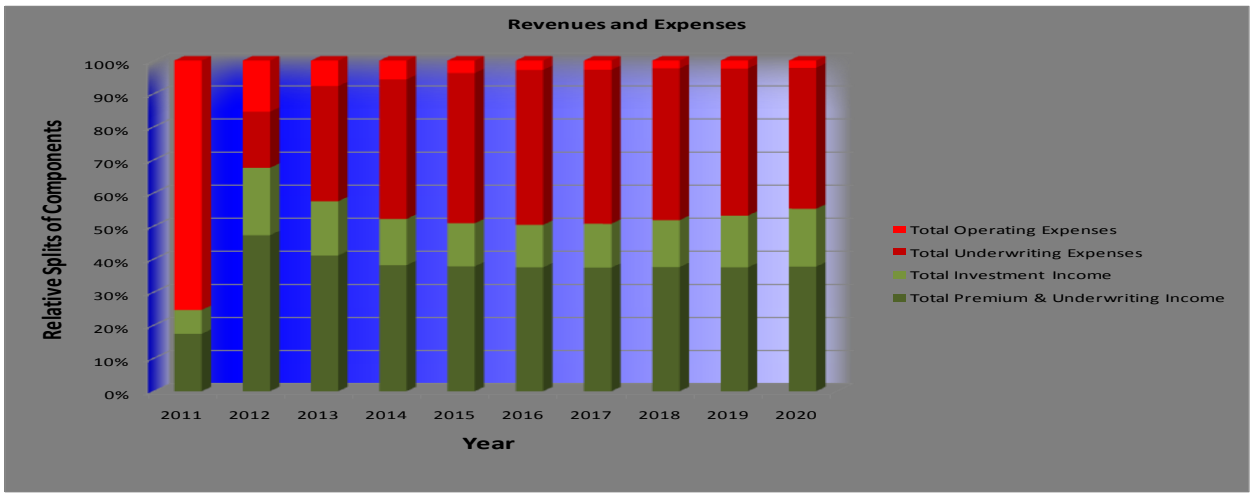
SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Worst case HG_700_500				High Growth Scenario	
PRO-FORMA INCOME STATEMENT	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Premium & Underwriting Income										
Risk Premium	256,649,333	1,071,723,519	1,098,194,859	1,108,765,417	1,222,420,703	1,347,689,714	1,485,842,174	1,638,149,556	1,806,053,145	1,991,187,747
Less: Increase in Unearned Premium	251,516,347	968,697,077	817,177,476	630,541,584	547,604,850	499,684,605	480,175,206	483,954,125	518,732,084	554,895,103
Subtotal Earned Premium	5,132,987	103,026,442	281,017,382	478,223,833	674,815,853	848,005,109	1,005,666,969	1,154,195,430	1,287,321,061	1,436,292,644
Underwriting Fee	20,571,817	85,904,372	88,026,192	88,873,478	97,983,558	108,024,539	119,098,197	131,306,449	144,764,819	159,604,348
Total Premium & Underwriting Income	25,704,803	188,930,814	369,043,574	567,097,311	772,799,410	956,029,648	1,124,765,166	1,285,501,879	1,432,085,880	1,595,896,992
Investment Income										
Interest on Initial Capital	10,500,000	42,000,000	42,000,000	42,000,000	42,000,000	42,000,000	42,000,000	42,000,000	42,000,000	42,000,000
Other Investment Income	222,176	39,586,011	105,385,826	166,334,112	224,295,554	286,090,734	356,955,572	444,517,968	556,225,586	701,028,911
Total Investment Income	10,722,176	81,586,011	147,385,826	208,334,112	266,295,554	328,090,734	398,955,572	486,517,968	598,225,586	743,028,911
Total Revenues	**36,426,979**	**270,516,826**	**516,429,400**	**775,431,423**	**1,039,094,964**	**1,284,120,382**	**1,523,720,738**	**1,772,019,847**	**2,030,311,467**	**2,338,925,903**
Underwriting Expenses										
Paid Claims	0	0	117,637,183	390,774,738	705,261,224	1,003,259,192	1,252,264,650	1,447,516,757	1,608,648,774	1,726,653,787
Increase in IBNR	0	36,187,389	71,495,910	78,271,041	73,998,765	59,879,399	47,706,498	39,254,399	27,838,228	28,730,107
Increase in Outstanding Claims	0	31,741,887	123,787,187	158,702,162	150,830,339	133,874,066	102,018,391	84,656,620	65,687,387	51,523,985
Claims & Underwriting Expenses	0	67,929,276	312,920,280	627,747,940	930,090,328	1,197,012,657	1,401,989,539	1,571,427,775	1,702,174,389	1,806,907,879
Total Underwriting Expenses	**0**	**67,929,276**	**312,920,280**	**627,747,940**	**930,090,328**	**1,197,012,657**	**1,401,989,539**	**1,571,427,775**	**1,702,174,389**	**1,806,907,879**
Operating Expenses										
Staff Costs	36,140,814	32,296,755	33,911,592	50,511,172	37,387,531	39,256,907	41,219,753	43,280,740	45,444,777	47,717,016
Facilities & Equipment	5,544,548	2,629,410	2,760,881	4,766,029	3,043,871	3,196,064	5,517,274	3,523,661	3,699,844	6,386,935
Business Services	15,127,041	15,590,838	16,370,880	17,189,924	18,049,920	18,952,916	19,901,062	20,896,615	21,941,945	23,039,543
Development Costs	53,000,000	3,399,478	8,025,000	4,042,426	9,160,000	785,868	6,050,000	864,455	6,655,000	0
Insurance Business Fees	1,924,870	8,037,926	8,236,461	8,315,741	9,168,155	10,107,673	11,143,816	12,286,122	13,545,399	14,933,908
Total Operating Expenses	**111,737,272**	**61,954,407**	**69,304,814**	**84,825,291**	**76,809,476**	**72,299,429**	**83,831,905**	**80,851,593**	**91,286,965**	**92,077,401**
Total Expenses	**111,737,272**	**129,883,682**	**382,225,094**	**712,573,231**	**1,006,899,805**	**1,269,312,085**	**1,485,821,444**	**1,652,279,367**	**1,793,461,354**	**1,898,985,280**
Net Income (Loss) before Taxes	**(75,310,293)**	**140,633,143**	**134,204,306**	**62,858,192**	**32,195,159**	**14,808,297**	**37,899,294**	**119,740,479**	**236,850,112**	**439,940,623**
VAT on Premium	0	0	0	0	0	0	0	0	0	0
Corporate Taxes on Net Income	0	39,377,280	37,577,206	17,600,294	9,014,645	4,146,323	10,611,802	33,527,334	66,318,031	123,183,374
Net Income After Taxes	**(75,310,293)**	**101,255,863**	**96,627,100**	**45,257,898**	**23,180,515**	**10,661,973**	**27,287,492**	**86,213,145**	**170,532,081**	**316,757,248**
Dividends	0	15,188,379	14,494,065	6,788,685	3,477,077	1,599,296	4,093,124	12,931,972	25,579,812	47,513,587

Source: Author's own construction

Figure 7.j: Worst Case Earnings - most favourable scenario

Source: Author's own construction

Figure 7.k: Worst Case most favourable - Composition of Revenue and Expense



Source: Author's own construction

Figure 7.l: Worst Case most favourable - Cash Flow Statement & Balance Sheet

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Worst case HG_700_500				High Growth Scenario	
PRO-FORMA CASH FLOW STATEMENT	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cash From (Used In) Operating Activities										
Risk Premium	256,649,333	1,071,723,519	1,098,194,859	1,108,765,417	1,222,420,703	1,347,689,714	1,485,842,174	1,638,149,556	1,806,053,145	1,991,187,747
Underwriting Fee	20,571,817	85,904,372	88,026,192	88,873,478	97,983,558	108,024,539	119,098,197	131,306,449	144,764,819	159,604,348
Total Investment Income	10,722,176	81,586,011	147,385,826	208,334,112	266,295,554	328,090,734	398,955,572	486,517,968	598,225,586	743,028,911
Paid Claims	0	0	(117,637,183)	(390,774,738)	(705,261,224)	(1,003,259,192)	(1,252,264,650)	(1,447,516,757)	(1,608,648,774)	(1,726,653,787)
Operating Costs	(111,737,272)	(61,954,407)	(69,304,814)	(84,825,291)	(76,809,476)	(72,299,429)	(83,831,905)	(80,851,593)	(91,286,965)	(92,077,401)
Tax Payable	0	(39,377,280)	(37,577,206)	(17,600,294)	(9,014,645)	(4,146,323)	(10,611,802)	(33,527,334)	(66,318,031)	(123,183,374)
Dividends	0	(15,188,379)	(14,494,065)	(6,788,685)	(3,477,077)	(1,599,296)	(4,093,124)	(12,931,972)	(25,579,812)	(47,513,587)
Net Operating Cash Flow	**176,206,053**	**1,122,693,836**	**1,094,593,609**	**905,984,000**	**792,137,392**	**702,500,748**	**653,094,463**	**681,146,317**	**757,209,969**	**904,392,856**
Cash From (Used In) Investing Activities										
Equity Investment	**700,000,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Investments Purchased	176,206,053	1,122,693,836	1,094,593,609	905,984,000	792,137,392	702,500,748	653,094,463	681,146,317	757,209,969	904,392,856
Investments Redeemed	0	0	0	0	0	0	0	0	0	0
Total Investments	**876,206,053**	**1,998,899,889**	**3,093,493,498**	**3,999,477,498**	**4,791,614,890**	**5,494,115,638**	**6,147,210,101**	**6,828,356,418**	**7,585,566,386**	**8,489,959,242**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Worst case HG_700_500				High Growth Scenario	
PRO-FORMA BALANCE SHEET	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Assets										
Investments	876,206,053	1,998,899,889	3,093,493,498	3,999,477,498	4,791,614,890	5,494,115,638	6,147,210,101	6,828,356,418	7,585,566,386	8,489,959,242
Total Assets	**876,206,053**	**1,998,899,889**	**3,093,493,498**	**3,999,477,498**	**4,791,614,890**	**5,494,115,638**	**6,147,210,101**	**6,828,356,418**	**7,585,566,386**	**8,489,959,242**
Liabilities and Capital										
Liabilities										
Unearned Premium Reserve	251,516,347	1,220,213,423	2,037,390,900	2,667,932,484	3,215,537,334	3,715,221,939	4,195,397,145	4,679,351,271	5,198,083,355	5,752,978,458
IBNR Reserve	0	36,187,389	107,683,299	185,954,340	259,953,105	319,832,504	367,539,002	406,793,401	434,631,629	463,361,736
Outstanding Claims Reserve	0	31,741,887	155,529,074	314,231,235	465,061,575	598,935,640	700,954,032	785,610,651	851,298,039	902,822,024
Total Liabilities	**251,516,347**	**1,288,142,699**	**2,300,603,272**	**3,168,118,059**	**3,940,552,014**	**4,633,990,084**	**5,263,890,179**	**5,871,755,323**	**6,484,013,022**	**7,119,162,217**
Capital										
Paid-in Capital	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000	700,000,000
Retained Earnings (Losses)	(75,310,293)	10,757,190	92,890,226	131,359,439	151,062,876	160,125,554	183,319,922	256,601,095	401,553,364	670,797,025
Total Capital	**624,689,707**	**710,757,190**	**792,890,226**	**831,359,439**	**851,062,876**	**860,125,554**	**883,319,922**	**956,601,095**	**1,101,553,364**	**1,370,797,025**
Total Liabilities and Capital	**876,206,053**	**1,998,899,889**	**3,093,493,498**	**3,999,477,498**	**4,791,614,890**	**5,494,115,638**	**6,147,210,101**	**6,828,356,418**	**7,585,566,386**	**8,489,959,242**

SOUTH AFRICA MORTGAGE LOAN INSURANCE COMPANY BUSINESS PLAN FINANCIAL PROJECTIONS					Worst case HG_700_500				High Growth Scenario	
PRO-FORMA FINANCIAL RATIOS	**(Start-Up)**									
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Capital Measures										
Total MI Exposure (AAR[1]) at Year End (millions)	4,018.8	19,171.7	32,632.2	44,290.1	55,597.4	66,655.8	77,550.3	88,351.7	99,134.6	109,927.7
Minimum Required Capital (millions)	180.8	862.7	1,468.4	1,993.1	2,501.9	2,999.5	3,489.8	3,975.8	4,461.1	4,946.7
Assets to Insurance in Force Ratio (MI Exposure)	22%	10%	9%	9%	9%	8%	8%	8%	8%	8%
Financial Analysis										
Capital to Risk Premium Ratio	243%	66%	72%	75%	70%	64%	59%	58%	61%	69%
Capital as % of Liabilities		55%	34%	26%	22%	19%	17%	16%	17%	19%
Assets as % of Liabilities		155%	134%	126%	122%	119%	117%	116%	117%	119%
Capital as % of AAR	15.5%	3.7%	2.4%	1.9%	1.5%	1.3%	1.1%	1.1%	1.1%	1.2%
Profitability Ratios										
Return on Equity (Net income & dividend)	-12%	8%	6%	3%	1%	1%	2%	5%	8%	13%
Profit as % of Risk Premium		9%	9%	4%	2%	1%	2%	5%	9%	16%
Loss Ratio *Incurred Claims / Earned Premiums*		66%	111%	131%	138%	141%	139%	136%	132%	126%
Expense Ratio *Operating Exp. / Earned Premiums*			25%	18%	11%	9%	8%	7%	7%	6%
Combined Ratio *Loss + Expense Ratio*			136%	149%	149%	150%	148%	143%	139%	132%
Investment Share of Revenue	29%	30%	29%	27%	26%	26%	26%	27%	29%	32%
Operating Ratios										
Efficiency Ratio *Operating Exp. / Total Revenue*	307%	23%	13%	11%	7%	6%	6%	5%	4%	4%
Number of Insured Loans Issued	8,439	33,562	32,753	31,494	33,068	34,721	36,458	38,281	40,195	42,205
Number of Employees	25	25	25	25	25	25	25	25	25	25
Net Income/Employee	(3,012,412)	4,050,235	3,865,084	1,810,316	927,221	426,479	1,091,500	3,448,526	6,821,283	12,670,290
Assets/Employee	35,048,242	79,955,996	123,739,740	159,979,100	191,664,596	219,764,626	245,888,404	273,134,257	303,422,655	339,598,370
Operating Expenses per Employee	4,469,491	2,478,176	2,772,193	3,393,012	3,072,379	2,891,977	3,353,276	3,234,064	3,651,479	3,683,096

[1] AAR = Amount at Risk

Source: Author's own construction