Hewitt

The Sugar Insurance Fund

Hewitt LY Ltd
(formerly Bacon Woodrow & Legris Ltd)

Actuarial review

27 March 2006

Prepared for
The Sugar Insurance Fund Board

Prepared by

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Executive Summary

We have carried out a review of the Sugar Insurance Fund ("the Fund") in accordance with the provisions of the Sugar Insurance Fund Act ("the SIF Act") and subject to the terms of reference set out in Appendix A.

The detailed conclusions and recommendations of our review and study are set out in section 9 of this report and are summarised below.

- The solvency of the Fund is not at immediate risk
- We recommend that the rule for movements up the **ranking table** after a year in which premiums have exceeded compensation should be restored to be the same as the movements down the table after an adverse claim year and that the **TIS** be calculated based on the best three out of the last eight years of past experience rather than the last twelve.
- We recommend that insureds be given a one-off boost to their ranking level so that everyone has a minimum rank of five and the previously recommended extension of the **ranking table** down to level two be postponed until the next actuarial review.
- We suggest that the formula in the Fourth Schedule of the SIF Act be amended to :

  $TIS_m = TIS_p \times SA_m/SA_p + (F_a - F_c) \times TIS_p$
- We recommend that the adjustment of compensation of planters, millers and metayers on account of losses due to non-insured factors (Third Schedule of the SIF Act) should be modified. The new approach should be to adjust the normal **TIS** by the proportion that should be disallowed due to gappiness.
- The investment strategy of the Fund should be more geared towards liquid/highly marketable assets denominated in Euros. The investment objectives of the Fund should be spelt out in the SIF Act and the Investment Committee should be clearly mandated to carry them out independently.
- Insureds who decide to regroup into larger production units should be given a one-off boost of 25% to their average ranking just before the regrouping
- The premiums and compensation payable for fire insurance, as well as the transport allowance, should be increased by 25%
- There is still a lack of understanding of the workings of the Fund among the planters' community and we suggest that the Board makes more effort in communicating with planters, particularly at the time our recommendations are implemented
- Serious consideration should be given to switching from the current reinsurance arrangement to a loan facility from the NPF/NSF

- Section 26 of the SIF Act should be amended to enable the Board to counter "cane shifting" more effectively

- Event years should be declared on the basis of homogeneous localities rather than the enlarged factory areas

- The Board should start planning a staff rightsizing exercise in order to adapt to the changing administrative needs and keep the Fund's expenses within reasonable limits

- At the time the SIF Act is amended to implement our recommendations, the opportunity should be taken to incorporate any further changes that would enable the Board to operate and manage the Fund more flexibly in the future without always having to amend the SIF Act.

- The next full actuarial review of the Fund should be carried out no later than the 2009 crop year. In the meantime, we also recommend a more regular actuarial monitoring of the effects of the changes to be made as a result of our recommendations and other relevant developments.

Contents

1. Background and terms of reference

Background

African, Caribbean and Pacific (ACP) countries, including Mauritius, have a long tradition of supplying sugar to the European Union (EU) market under the ACP – EU protocol which includes certain guaranteed sugar prices. These prices are set to fall by 36% over the 3 years from 2006.

The local sugar industry is now having to adapt to this change in order to survive as a viable industry.

Appointment

Against this background and under the provisions of the Sugar Insurance Fund Act (the SIF Act), we have been appointed by the Board of the Sugar Insurance Fund (the Fund) in October 2005 to carry out a new study of the Fund including the impact of the fall in sugar prices on the Fund's future.

Terms of reference

The detailed terms of reference for the study are set out in Appendix A of this report.

Conclusions and recommendations made in the actuarial review of June 2003 and follow up study of April 2004

The previous actuarial review was carried out by ourselves and resulted in our report dated June 2003. We also carried out a follow up study resulting in our report of April 2004.

A summary of the main conclusions and recommendations of the 2003 actuarial review and the follow up study in 2004 were as follows:

- We did not consider that the solvency of the Fund was at significant immediate risk.
- The campaign for better communications with the planter community should be maintained in order to enhance the sense of identification between planters and the Fund.
- We highlighted a number of operational weaknesses concerning the inspection system that should be addressed by the management of the Fund. We understand that most of these have now been addressed.
- There could be further work carried out to consider the possibility of requiring small planters to group themselves into larger production units for insurance purposes. This would have the benefit of reducing the volatility of claims by small planters and the administrative burden of the Fund for inspections of small plots.
- The Fire Insurance Account had progressed satisfactorily. The

relationship between premiums and compensation was sound and should be maintained.

- We recommended that the rule for movements up the **ranking table** after a year in which premiums have exceeded compensation should be restored to be the same as the movements down the table after an adverse claim year and that the **TIS** be calculated based on the best three out of the last eight years of past experience rather than the last twelve.
- We recommended that insureds be given a one-off boost to their ranking level so that everyone has a minimum rank of five.
- We recommended that in conjunction with the change in the ranking formula and a one-off boost to a minimum ranking level of five, the **ranking table** be extended down to level two.
- We suggested that the formula in the Fourth Schedule of the SIF Act be amended to :

  $TIS_m = TIS_p \times SA_m/SA_p + (F_a - F_c) \times TIS_p$
- We recommended that the adjustment of compensation of planters, millers and metayers on account of losses due to non-insured factors (Third Schedule of the SIF Act) should be modified. The new approach should be to adjust the normal **TIS** by the proportion that should be disallowed due to gappiness.
- The reinsurance arrangements which had been in effect since the 1996 crop year had been beneficial to the Fund, particularly so in the 1999 crop year when the three reinsurance layers were used up.
- The level of management expenses of the Fund appeared to be under control.
- The attributions of the Investment Committee should be clarified in the SIF Act itself.
- The investment strategy of the Fund should be aligned more closely with the fundamental requirement of the Fund, which is to preserve its capital value in real terms relative to the sugar price (currently denominated mainly in Euros).
- We concluded that the current arrangements do result in occasions where it is financially advantageous for planters not to produce sugar and claim for the losses instead, although the extent of such abuse was unknown.

Intended recipients

The intended recipient of this report is our client, the Sugar Insurance Fund Board (the Board). Third parties reading this report should bear in mind that:

- They may not have the background information necessary for a full understanding of the report.
- The advice was prepared using data provided by our client. We have carried out checks on the test results provided by the Board but we have not independently verified the underlying data.
- We are providing advice only to our client. Any third parties who rely on the advice or data in this report must do so only on the understanding that we have no liability to them.

Data & backtesting exercises

The data used for purposes of the actuarial review was provided to us by the Board.

The staff of the Board also carried out backtesting projections based on our instructions. We have carried out high level reviews whilst relying on the Board's internal checking procedures.

Compliance with professional guidance

This report has been prepared in accordance with Guidance Note 12 (GN12 : General Insurance Business : Actuarial Reports) of the Institute and Faculty of Actuaries in the UK.

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2. Reviewing recommendations

Recommendations made in our last two reports

The recommendations made in our last two reports are based on basic insurance principles. We strongly believe that these recommendations are still broadly valid. In the current context we feel that it is even more important for the Fund to implement these recommendations, albeit with one further modification as suggested below, in order to take into account the difficulty being faced by the insureds at the lower end of the ranking table as a result of the changes occurring in the sugar industry.

Helping insureds on low rankings to climb back up the table

One of our recommendations in our report dated June 2003 was regarding the extension of ranking table for insureds below a level of 5. Our recommendation was based on statistical evidence that insureds in this category were paying premiums and receiving compensation that do not reflect their true risk to the Fund.

We understand that there are a number of small planters who fall in this category. With the fall in sugar prices, the very existence of these small planters will be jeopardised. In this respect we would like to review our recommendations to take into account the vulnerability of these planters given the drastic fall in sugar prices.

Immediate promotion to a minimum ranking of 5, 6 or 7

In order to help these insureds, we have investigated the potential cost to the Fund if it decides to give a one off boost to ranking 5 for all those insureds below a ranking of 5 (scenario 1), a one off boost to ranking 6 for all those below a ranking of 6 (scenario 2) or a one off boost to ranking 7 for all those below a ranking of 7 (scenario 3). In estimating the cost to the Fund on the three above scenarios, we have assumed that the following two recommendations made in our last report were applicable throughout the period being studied:

- The Fund uses a formula for moving up the ranking table same as for moving down after an adverse claim year, so that the new formula would be: $R_2 = R_1 \text{ x } (1.1 - 0.1 \text{ x } C_1 \div P_1)$.
- The **TIS** based on an average of the three best years sugar yield figures out of the last eight years.

The investigation was carried out using historical data from 1984 onwards. We recalculated the insureds' **TIS** figures based on the actual historical **sugar accruing** data, compensation and premiums paid based on a one-off boost to minimum ranking level of 5, 6 or 7 at the start of the investigation period.

The results were then compared with the equivalent figures based on the insureds' actual ranking at the start of the investigation period, the above ranking formula and **TIS** calculated using the best three **sugar accrued** figures in the last eight years (the control run).

The detailed results are contained in Appendix B, and are summarised below.

Results

The results based on the three different scenarios are as follows:

Effect of giving one-off boost

	Control run	Scenario 1	Scenario 2	Scenario 3
Gross premiums	Rs 9,280 m	Rs 9,279 m	Rs 9,277 m	Rs 9,266 m
Gross claims	Rs 10,795 m	Rs 10,797 m	Rs 10,804 m	Rs 10,826 m
Loss ratio	116.3%	116.4%	116.5%	116.8%

This shows that applying the one off-boost (whether it is to ranking 5, 6 or 7) does not have a material impact on the Fund's finances. Based on the experience of these insureds over the last 20 years, it is also noted that they tend to gravitate towards their true ranking position very quickly and the Fund will not be significantly worse off in the long term by providing them with a one-off boost to ranking 5.

Giving a one-off boost to ranking 7 to insureds currently having a ranking below 7 would enable insureds currently ranked 5 or below to benefit from an immediate improvement to the premiums they pay and claims they will potentially receive for at least another 3 years (while their ranking, in the worst case scenario, drops by the maximum of 10% in each of these 3 years from 7 back to 5). However, the main drawback of this proposal is that the insureds having a ranking just above ranking 7 may feel left out by the action of the Board and the boost to ranking 7 can be thought of as being arbitrary by some.

Conclusion

We would recommend that the insureds who currently have a ranking below 5 be given a one-off boost to ranking 5. Our previous recommendation regarding the extension of the **ranking table** downwards to level two may be postponed until the next actuarial review subject to the insureds receiving a one off boost as recommended above. However, the rest of our recommendations made in our June 2003 and April 2004 reports will need to be implemented at the same time.

We believe that postponing the extension of the ranking table until the next actuarial review will not adversely affect the financial position of the Fund as many insureds will have a ranking of 5 or above in the inter-review period (assuming that our recommendation regarding a one off boost is adopted). The other advantage of postponing the extension of the ranking table is that it gives the Board reasonable amount of time to inform the insureds of the future possibility of the ranking table being extended.

3. Impact of falling sugar prices on the Fund

Financial position of Fund

The experience of the General Insurance Account of the Fund (the General Account) since the previous actuarial review has been favourable with a gross **loss ratio** of approximately 72% over the three years from 1 July 2002 to 30 June 2005. The actual **loss ratio** in each year is set out in the following table:

Historical Loss Ratio

Crop Year	Loss Ratio (%)
2002	102
2003	76
2004	41
average	**72**

A summary of the audited income and expenditure of the General Account between 1 July 2002 to 30 June 2005 (the last one being in draft) is set out in Appendix C. This reveals that the balance of the General Account has moved from Rs 1,913.3 million to Rs 2,507.2 million, an increase of 31% over the period.

When expressed as a percentage of the value of **TIS**, the balance of the account has increased from 21.9% to 24.2% over the period.

Effective overall cover for shortfall, including first loss, reinsurance and General Account, of 91% of TIS as at 30 June 2005

The effective cover provided by the General Account over the last 25 years is illustrated graphically in Appendix D. This shows that the General Account together with the reinsurance arrangement in place would currently withstand a crop reduction of almost 91%, the highest at any time in the last 25 years.

A variety of factors affect the effective cover provided by the General Account. The main items are as follows:

- Sugar price
- Claims experience
- Reinsurance arrangement
- Area under cultivation
- Fund accumulated to date

All other things being constant, a fall in the value of **TIS** as a result of a fall in sugar prices will strengthen the Fund's position.

Fall in sugar price

Following the EU sugar reforms, the sugar price will be reduced by 36% over the next four years. This will result in the value of the **TIS**, the future premiums and the future compensations to be reduced accordingly. The risk profile of the Fund will therefore change as a result of this significant fall in sugar price.

Currently the **TIS** stands at approximately 600,000 T, the average sugar price amounts to roughly Rs 17,000 / T, the Fund's reserves stand at Rs 2.5 billion and the annual premium income at Rs 800m.

With the fall in sugar price, we expect land under cane cultivation to be reduced even though there is a lot of talk at present regarding the incentives to be provided by the government. As things stand the level of facilities to be offered to planters by the government is far from being clear given that compensation levels from the European Union are still being discussed. The latest information available indicates that the government was hoping for a higher level of compensation for it to be able to implement its sugar industry restructuring plan.

Based on a future sugar production of 475,000 T coupled with a fall in sugar price of 36% we could expect the annual premium to be reduced to as little as Rs 400 million per annum.

Other things being equal, this would mean that the effective cover for production shortfall could be improved from its current 91% to a whopping 130%.

Modelling the development of the Fund

We have built a simple model of the General Insurance Account of the Fund. The objective is to chart the progress of the Fund as it is subjected to different production levels/shortfalls in future years and the fall in sugar price. This model takes into account the existing reinsurance treaty with its level of premium and its recoveries. The model looks at the effect of an event on the Fund as a whole rather than looking at the effect on individual insureds and then aggregating these to give the overall Fund effect. The details of the key parameters of this model are set out in Appendix E.

We have derived the distribution of the **production shortfall** from historical data. We would like to point out that the data available to derive the distribution is relatively scanty. The fitted distribution is a truncated Gamma with mean 14.5% and a standard deviation of 10.5%. The data points used to fit the truncated Gamma have increased from forty-one to forty-five for the purposes of this exercise. The details of the key parameters of the fitted distribution are set out in Appendix E.

The next step has been to simulate a series of ten-year projections of the Fund based on the Gamma distribution of the **production shortfalls**. The starting point of all the projections has been the value of the Fund on 30 June 2005.

We have carried out 10,000 projections in order to obtain a stable probability of the Fund falling below zero at any point over the ten-year period. We have then counted the number of outcomes where the

Fund has a value lower than zero in any of the future years of production. This is then the probability of ruin in a given year.

We have shown in Appendix F the results based on the following scenarios:

- No fall in sugar prices coupled with current reinsurance arrangement
- No fall in sugar prices coupled with no reinsurance
- Fall in sugar prices coupled with current reinsurance arrangement
- Fall in sugar prices with no reinsurance

The other main assumption that we have made in calculating the probability of ruin is that the investment return earned by the Fund on its assets will be fixed at 5% pa (net of sugar price inflation). We believe that an investment return of 5% pa is a conservative estimate of the future expected return. We have also set the management expenses to be 0.9% pa. With a fall in sugar prices and the regrouping exercise being encouraged, we expect the staff level to be rightsized accordingly. In this respect we believe that setting the management expenses at 0.9% pa is appropriate.

Results

The results of our projections show that reinsurance actually reduces the probability of ruin as we would expect. The other important aspect is that a fall in the sugar price is actually beneficial to the financial position of the Fund.

The results also show that some form of reinsurance is still desirable in order to preserve the Fund's good financial position. We have considered in section 7 of this report a possible variation in the Fund's reinsurance arrangement in the light of the above results going forward.

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4. Impact of the regrouping of planters

Grouping of small planters in larger medium size production units

As mentioned earlier in this report, small planters will be the most affected by a fall in the sugar price. In this respect the government and other stakeholders have advocated the regrouping of small planters as being one of the main measures to be adopted to ensure the survival of these small planters.

The government has expressed its intention to go a step further and provide a number of incentives to planters who decide to regroup themselves in larger production units. Some of these incentives include facilities such as derocking of the fields, irrigation and land preparation among others.

Regrouping project

The Ministry of Agro Industries and Fisheries has identified plots in five different localities namely Beau Climat, Vale, Chamouny, Plaine Des Papayes & Queen Victoria to be considered for regrouping on a pilot basis. These localities are found in the north, south and east of the island. Once the plots in each locality are clustered, only one insurance account will be held for each of these regrouped localities.

Effect of regrouping – historical testing

As an incentive to small planters to regroup in larger production units, we have investigated the cost to the Fund if it decides to give a weighted average ranking at the start of the investigation period (scenario 1) to all those planters who decide to regroup, a one off boost from the average ranking to ranking 10 for all those planters who decide to regroup (scenario 2), a boost to the highest ranking experienced in the particular localities for all those planters who decide to regroup (scenario 3) and a one off boost of 25% to the average ranking for all the planters who decide to regroup (scenario 4). In estimating the cost to the Fund on the above scenarios, we have assumed that the following two recommendations made in our last report were applicable throughout the period being studied:

- The Fund uses a formula for moving up the ranking table same as for moving down after an adverse claim year, so that the new formula would be: $R_2 = R_1 \times (1.1 - 0.1 \times C_1 \div P_1)$.
- The **TIS** based on an average of the three best years sugar yield figures out of the last eight years.

The investigation was carried out using historical data from 1984 onwards. We recalculated the planters' **TIS** figures based on the actual historical **sugar accruing** data, compensation and premiums paid based on a one-off boost to a weighted average ranking of the regrouped planters, a minimum ranking of 10, the highest ranking experienced in the area or a 25% increase in the average ranking at the start of the investigation period.

The results were then compared with the equivalent figures based on the planters' actual ranking at the start of the investigation period assuming that they did not regroup (i.e looking at the individual accounts and then regrouping them), the above ranking formula and **TIS** calculated using the best three **sugar accrued** figures in the last eight years (the control run).

Results

The detailed results of the backtesting exercises are shown in Appendix G of this report.

The results based on the different scenarios are summarised as follows:

Effect of regrouping

	Control run	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Gross premiums	Rs 164.2 m	Rs 140.3m	Rs 137.8 m	Rs 131.9 m	Rs 167.5 m
Gross claims	Rs 209.8 m	Rs 126.4 m	Rs 129.4 m	Rs 135.8 m	Rs 163.1 m
Loss ratio	127.8%	90.1%	93.9%	103.0%	97.4%

Comments on results

The results show that the Fund can be expected to benefit from planters regrouping themselves into larger production units. The effect of regrouping without giving any incentives i.e moving from the control run to scenario 1 actually reduces the loss ratio by approximately 30%. Part of this reduction could also be due to the elimination of "cane shifting" effect which is currently occurring when accounts are treated individually.

Giving the regrouped planters an incentive in the form of either a one off boost to ranking 10 or a one off boost of 25% in their average ranking increases the loss ratio but it is still less than 100%. Providing the regrouped planters a one off boost to the highest ranking experienced in their respective locality significantly increases the loss ratio but not beyond the status quo position.

We would recommend that scenario 4 is adopted i.e all planters who decide to regroup will have their average ranking increased by 25%. This has the advantage of giving a proportionately higher boost to higher average rankings, instead of a potentially arbitrary boost under scenarios 2 and 3, whilst keeping the estimated cost of the boost to the Fund well within the estimated benefit to the Fund based on the backtesting exercises.

5. Fire Insurance Account

Experience since June 2002

The Fire Insurance Account has continued to perform satisfactorily since the previous actuarial review. The value of the Account as at 30 June 2002 was Rs 20.2 million and this has grown to Rs 31.9m as at 30 June 2005.

Link between premium and compensation

As mentioned in our previous report, the relationship between the premium and the compensation payable must be maintained in order to ensure the solvency of the Fire Insurance Account.

However, in our view, although the relationship between premium and compensation levels remains sound they were set following the recommendations made by William M Mercer in their report dated September 1994, since which the average price of sugar has increased by 98.7%.

We believe that the level of compensation per tonne of cane burnt should reflect the lost cost of production and we are not in a position to recommend a suitable level without detailed information about the cost structure of planters. However, we believe that it would be reasonable to use the increase in average sugar price as a proxy for the increase in cost of production and hence use this to set the increase in both the premiums and compensation levels.

Reviewing compensation and premium levels

We have analysed the Fire Insurance Account in order to look at the level of compensation paid and the premiums received over the last seven crop years. According to the information provided by the Fund, it is only in two out of the last seven crop years that the level of compensation paid was higher than the premiums received.

This has resulted in the Fire Account continuing to grow significantly over time. The claim frequency experienced has been very low. One possible explanation for this is that the level of compensation is so low that an insured would not send his burnt canes to the factory as the costs involved in doing so might exceed the compensation received.

In our view, the first stage should be for the level of compensation and that of the premiums to be increased by the same ratio roughly in line with the change in sugar price. Based on past experience of the Fire Account, increasing both the premium and compensation level would have been beneficial to the Fund.

Had the compensation levels been higher during the last seven crop years, the claim frequency experienced could also have been higher. However, we cannot quantify the impact that the increase in claim frequency would have had on the claims disbursed by the Fund.

In this respect we propose that the level of compensation and premiums to be increased by 25% at the present time. The revised rates for planters and millers combined will then be as follows:

- Premiums to increase to Rs 12.50 per tonne
- Compensation to increase to Rs 625 per tonne

Ideally, as suggested above, these amounts should then be indexed to the current sugar price and automatically adjusted each year in line with the percentage change in sugar price. However, the sugar price is more likely to fall than to rise over the next few years and the suggested 25% increase is really a combination of a higher percentage increase due to past increases in sugar price and a reduction in anticipation of the changes over the next few years.

We would therefore suggest that the above rates be implemented until the next actuarial review when a more detailed investigation of the adequacy of the premiums and compensation levels should be carried out.

Transport allowance

We understand from the various discussion papers available to us that the Board is looking at increasing the transport allowance granted to planters in the case where the burnt canes can be harvested.

We have carried out a high level review of the calculations provided by the Board and we consider that it would be reasonable to implement an increase of 25% in the transport allowance in order to reduce possible disincentives in claiming under the current system.

However, the claims frequency experienced going forward is likely to rise as a result of an increase in the transport allowance and therefore we recommend a review of the situation at the next actuarial investigation.

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6. Comments from stakeholders

Request for representations and comments

As part of the actuarial review, the Fund released a press communiqué which requested stakeholders to send their representations and comments to us by 31 October 2005. In this respect we received representations from the following stakeholders and others:

- Alexander Forbes
- Cane Growers' Association
- Mauritius Chamber of Agriculture
- Mauritius Sugar Authority
- Mauritius Sugar Industry Research Institute
- Mauritius Sugar Syndicate
- Individual small planters

We would like to thank these organisations / individual small planters for their comments and suggestions put forward.

Lack of understanding among the small planters

We have been surprised by the very low number of representations sent in by the small planters. We expected to receive a much higher number of representations given that the small planter community will be more at risk with the fall in sugar price.

Based on the few representations received we have been able to gather that there is still a lack of understanding of the purpose and operation of the Fund among the planter community, especially among small planters.

We would recommend that the Fund continues to improve its communication with the insureds. This is an area where we could assist the Board in making sure that the communications sent out to insureds are pitched at the right level and address the concerns that the insureds may have.

Comments from organisations

A number of organisations sent in written submissions following the press communiqué issued by the Board. The main points raised by the different organisations are as follows:

- Recommendations made by us following the 2003 actuarial review were accepted by the Board but have yet to be implemented
- The impact of a fall in sugar prices is important and will generally benefit the Fund
- Regrouping of planters should be encouraged by the Fund
- The level of transport allowances paid to a planter whose cane plantations have been burnt while the factory in his factory area is not in operation needs to be increased
- Going forward, the Fund will need to improve its operational efficiency in order to continue its activities. It has even been proposed that an Early Retirement Scheme (ERS) be introduced to reduce the staff level of the Board
- Expectation that the level of premiums charged be reduced in order to help the small planters

We are pleased to say that most of the issues raised by the different organisations have been taken on board and been addressed accordingly in this report. There are two suggestions relating to the anticipated improvement of the Fund following the reduction in sugar price that we have simply noted at this time:

- The possibility of introducing a "no claims" discount or "bonus payment" to insureds if the Fund is deemed to have a more than comfortable surplus expressed as a percentage of GPI
- The possibility of revising the ranking table back to an earlier version that was previously replaced when the Fund's financial position was particularly weak.

We have not investigated these suggestions further at the present time because we consider it more prudent that the package of recommendations we are currently making should first be implemented and their effects reviewed before any further significant changes are made to the Fund.

7. Reinsurance

Current arrangements

The reinsurance arrangement for the 2006 crop year consists of one layer of aggregate excess of loss reinsurance. The trigger point is at 150% of the **gross premium income** and the maximum cover is 150% of the **gross premium income**. The Fund also participates in 15% of the reinsurance arrangement and the reinsurance premium rate is 12.5% of **gross premium income**. The operation of the current reinsurance arrangement is best illustrated by going through an example as shown below:

Gross Premium Income (**GPI**) = Rs 900,000,000

General Compensation (GC) = Rs 1,800,000,000

Loss ratio = GC / GPI = 200%

Since the loss ratio is greater than 150%, reinsurance recovery is possible. In this case the Fund has to bear the financial effect of the retention of the first 150% plus its 15% share of all pay-outs in the reinsured layer. In addition to the reinsurance premium, the Fund has to pay a basic fee to the broker plus the broker's claims collection fee and a bonus based on the broker's performance, but also receives a brokerage fee of 10% of the reinsurance premium.

Expected recovery from the reinsurer is the minimum of (a) and (b) as shown below:

(a) 1.5***GPI***0.85 = Rs 1,147,500,000

(b) (GC – 1.5***GPI**)*0.85 = Rs 382,500,000

The expected reinsurance recovery = Rs 382,500,000.

Reinsurance premium (net of brokerage fee) = 12.5%***GPI***0.85*0.9 = Rs 86,062,500.

The broker's claim collection fee = min (max (375,000, 0.25%* recovery), 1,000,000) = Rs 956,250.

Broker's basic fee = Rs 2,500,000.

Broker's bonus (assuming the Board is fully satisfied with the broker's performance) = Rs 1,500,000.

Net benefit to Fund for taking out the reinsurance for the year

= Rs 382,500,000 – Rs 86,062,500 – Rs 956,250 – Rs 2,500,000 - Rs 1,500,000 = Rs 291,481,250

This arrangement is renewed on a yearly basis.

Removing all reinsurance cover

We have simulated the possibility of removing the reinsurance cover altogether. The probability of ruin increases under this scenario although it is still within an acceptable level in our view. See Appendix F.

NPF loan facility

The size of the Fund has increased significantly since the last actuarial review. One of the alternative arrangements being considered by the Fund in lieu of reinsurance cover is a standby loan facility from the National Pension Fund / National Savings Fund (NPF/NSF).

Under such an arrangement, in the event of a catastrophe, a loan will be obtained from the NPF/NSF so as to repay part of the claims incurred by the Fund and in return the Fund will pay back the loan with interest over a specified period of time. In such an arrangement, the NPF/NSF is accepting the risk that the Fund is unable to repay the loan i.e. the only risk that is transferred to the NPF/NSF is the credit risk. There is no transfer of insurance risk under such an arrangement.

The main terms of the arrangement currently offered by the NPF/NSF are as follows:

Commitment Fee	**:** 0.5% of undrawn amount
Standby loan facility	**:** Rs 1 billion – Rs 1.2 billion
Interest	**:** The lower of Lombard rate less 2% or bank rate plus 2%
Repayment period	**:** 5 – 15 years

Assessing the financial merits of the proposed arrangement

In simple terms, the current reinsurance premium paid by the Fund can be thought of as being made up of the pure risk premium (based on the expected claims cost for the period) and a loading to cover the reinsurer's expenses, profit margin and a contribution towards its catastrophe reserves.

In assessing the relative merits of the two arrangements (current reinsurance or proposed NPF/NSF loan facility) we have made the following assumptions:

- The reinsurer will recoup any compensation it pays through increases to future reinsurance premiums
- A catastrophe occurs on average once every ten years
- The gross premium income amounts to Rs 800 million pa
- Time horizon of 10 years
- A loss occurs at the start of the period being looked at
- The amount to be borrowed in the event of a catastrophe is Rs 1.2 billion i.e. equal to the maximum reinsurance recovery
- The loan from the NPF / NSF is repaid over 5, 8 or 10 years

Based on the above assumptions we have compared the expected expense loading on the reinsurance premiums with the agency cost on the NPF/NSF arrangement. For the expense loading on the reinsurance premium of 12.5% of GPI, we have looked at three scenarios where the loading is 1%, 3% or 5% of GPI. For the agency cost on the NPF/NSF arrangement, we have taken the 0.5% commitment fee together with the rate of interest differential between the interest charged by the NPF/NSF arrangement and that earned by the assets of the Fund based on 3 scenarios again : 0% differential, 1% differential and 2% differential. The results of the different scenarios are shown below (the first figure in each scenario being the reinsurance expense loading and the second the NPF/NSF agency cost):

Results based on a loan repayment period of 5 years

		Expense loading on reinsurance premium		
		1%	3%	5%
Agency cost on NPF/NSF arrangement	0%	80m/60m	240m/60m	400m/60m
	1%	80m/90m	240m/90m	400m/90m
	2%	80m/120m	240m/120m	400m/120m

Results based on a loan repayment period of 8 years

		Expense loading on reinsurance premium		
		1%	3%	5%
Agency cost on NPF/NSF arrangement	0%	80m/60m	240m/60m	400m/60m
	1%	80m/108m	240m/108m	400m/108m
	2%	80m/156m	240m/156m	400m/156m

Results based on a loan repayment period of 10 years

		Expense loading on reinsurance premium		
		1%	3%	5%
Agency cost on NPF/NSFarrangement	0%	80m/60m	240m/60m	400m/60m
	1%	80m/120m	240m/120m	400m/120m
	2%	80m/180m	240m/180m	400m/180m

Results

The results demonstrate that out of the 27 scenarios being considered, 21 outcomes show that the NPF/NSF arrangement is a better choice. These results are based on the assumptions made and only consider the event where a catastrophe occurs once every ten years.

In particular, in assessing the above simulations, the Board would need to take a view on the most realistic assumptions to be made.

For the expense loading on the reinsurance premium of 12.5% of GPI, the 3% GPI scenario representing an expense loading of 24% of premium does seem the most realistic in the long term, as opposed to the 1% GPI scenario which implies a highly competitive reinsurance market or the 5% GPI scenario which implies the opposite.

For the agency cost on the NPF/NSF arrangement, it is more difficult to formulate a view on the realistic rate of interest differential between what the NPF/NSF would charge and what the Fund could earn with its own investments. In our view, it would not be unreasonable to assume 0% differential in the long term but we have shown the figures on 1% and 2% differential to illustrate the results on a more prudent approach.

It should be noted that one of the main purposes for the Fund to take out reinsurance cover is to manage its cash flow requirements. With the fall in sugar prices, the continued growth of the Fund's size and the experience of the Fund so far, the need for reinsurance cover in the next few years will decrease significantly.

In these circumstances, we believe the NPF/NSF arrangement is a viable and attractive alternative to the current reinsurance arrangement and recommend that serious consideration be given to it for the next crop year, alongside all possible alternatives including a gradual phasing out of the current reinsurance arrangement (through increased deductibles or participations in the reinsured layer) together with an increasing NPF/NSF loan facility.

8. Operational and management issues

Cane shifting

The results of the backtesting exercises shown in section 4 of this report have brought to our attention that the "cane shifting" effect may have a significant negative financial impact on the finances of the Fund. We have not tried to quantify the effect, although the Board thinks that it could be of the order of Rs 50 million per annum.

We would recommend that a subsection is added to section 26 of the SIF Act to read as follows:

"Where the Board has reasonable grounds to believe that canes from one account have been shifted to another account(s), the accounts shall be combined for assessment purposes"

Declaration of an event year

The declaration of an event year is dealt with under section 25 of the SIF Act. We would like to point out to the Board that with the closures of a number of mills, the area of land under cane cultivation under each factory area has significantly increased.

At present declaration of an event year is being done on a factory area basis. We believe that an event year should rather be declared for smaller homogeneous groups of localities. This is because the localities within a factory area exhibit distinct micro-climates. Moreover losses incurred due to adverse climate condition in one particular location should not trigger compensation to be paid in other localities where the crop reduction is below the trigger point.

We therefore recommend that serious consideration be given to amending section 25 of the SIF Act for this purpose.

Management expenses

The revenue account in Appendix C shows the evolution of the management expenses from 2001/02 to 2004/05. The expenses increased from Rs 90.6m to Rs 97.6m, an overall increase of 7.7% over these 3 years, equivalent to an annual increase of 2.5% per annum. The annual management expenses expressed as a percentage of gross premium income (GPI) is shown below:

Management expenses as a % of gross premium income

Year ending	Expenses (%)
30 June 2003	11.9
30 June 2004	11.3
30 June 2005	11.5

The **expense ratio** has been reasonably stable over the period being looked at. We can only say that the Board has been successful in keeping expenses at a reasonable level.

A fall in sugar price will either probe certain planters to stop sugar cane cultivation altogether or to regroup themselves into larger production units. In either case the required number of staff at inspectorate and administration level will be reduced. We understand that the bulk of the Fund's management expenses relates to the salaries of employees.

We would therefore recommend to the Board that it starts planning a staff rightsizing exercise. To put it bluntly, if the **expense ratio** is to be kept at around 12% of GPI while the GPI itself is reduced by half to around Rs 400m after the fall in sugar price and reduction in TIS, management expenses will also have to be reduced by half. This is a challenging objective which will require careful planning and communication.

Keep changes to SIF Act to a minimum

Changes to the SIF Act take a long time to implement and therefore there is a tendency to keep them to a minimum. However, the day to day operations of the Fund often require a certain degree of flexibility and nimbleness for the Board to be able to take and implement appropriate decisions. We therefore recommend that, when the SIF Act is amended to implement the changes we are recommending in this report, the opportunity be taken by the Board to review all sections of the SIF Act and suggest changes that would enable the Board to have greater flexibility in implementing future operational or management changes without necessarily amending the SIF Act.

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9 Conclusions and recommendations

The General Insurance Account in a satisfactory position	The General Insurance Account represented approximately 24.2% of the value of **TIS** as at 30 June 2005. We do not consider that the solvency of the Fund is at immediate risk.
Review of previous recommendations	We have reviewed the recommendations made in our last two reports and we can confirm that they are still broadly valid. With the change occurring in the sugar industry, we would strongly recommend that they are implemented, together with the modification as outlined in the next paragraphs.
Speeding up movements up ranking table and calculation of TIS	We recommend that the rule for movements up the **ranking table** after a year in which premiums have exceeded compensation should be restored to be the same as the movements down the table after an adverse claim year. We recommend that this change be made in conjunction with changing the method of calculating the **TIS.** We recommend that **TIS** be calculated based on the best three out of the last eight years of past experience being taken into consideration rather than the last twelve.
Give insureds a minimum ranking of five	We recommend that all insureds be given a one-off boost to their ranking level so that everyone has a minimum ranking of five. This will assist planters that have got "stuck" at the lower end of the table to regain their equilibrium position, especially in conjunction with the change to a "1-up" ranking formula.
Postpone extension of ranking table down to level two	We consider that our previously proposed extension of the ranking table downwards to level two can be postponed to the next actuarial review. However, our previous remaining recommendations need to be implemented as soon as possible.
Calculation of TIS_m (Fourth Schedule)	We suggest that the formula in the Fourth Schedule of the SIF Act be amended to: $TIS_m = TIS_p \times SA_m/SA_p + (F_a - F_c) \times TIS_p$

Reduction of compensation (Third Schedule)	We recommend that the adjustment of compensation of planters, millers and metayers on account of losses due to non-insured factors (Third Schedule of the SIF Act) should be modified. The new approach should be to adjust the normal **TIS** by the proportion that should be disallowed due to gappiness.
Investment strategy	The investment strategy of the Fund should be more geared towards liquid/highly marketable assets denominated in Euros. The investment objectives of the Fund should be spelt out in the SIF Act and the Investment Committee should be clearly mandated to carry them out independently.
Regrouping small planters into larger production units	We would strongly recommend that planters regroup themselves into larger production units for insurance purposes. As an incentive the Fund is in a position to give all the planters a one-off boost of 25% to their average ranking without putting its solvency in jeopardy. Regrouping is beneficial to the Fund as it would benefit from a reduction in the claims volatility and administrative issues.
Fire Insurance Account	The Fire Insurance Account has progressed satisfactorily since the last actuarial review. In the light of the significant increase in sugar prices since the premiums and compensation levels were set, we recommend that the fire compensation and premiums charged be increased by 25 % and subject to review at the next actuarial investigation. We also see no reason not to endorse the Board's proposal to increase the transport allowance by 25%.
Communication campaign	The Fund should continue its effort to communicate effectively with the insureds. The campaign will be even more crucial at the time that our recommendations are implemented by the Fund.
Reinsurance arrangement	With the benefit of hindsight the cost of obtaining reinsurance cover since the last actuarial review has proved to be expensive when comparing the reinsurance recoveries with the reinsurance premium paid. We have considered an alternative arrangement in the form of a loan facility from the NPF/NSF as a possible replacement of the current arrangement. Based on the scenarios examined the NPF/NSF arrangement looks to offer better value for money than the current reinsurance arrangement. We therefore recommend that serious consideration be given to switching to the NPF/NSF facility as soon as possible, albeit on a phased approach if considered more prudent.
Amendment to section 26	We would recommend that section 26 of the SIF Act be amended to include the additional subsection as set out in section 8 of this report in order to empower the Board in reducing overpayment of compensations due to "cane shifting".

Declaration of an event year	As a result of the decreasing number of mills in operation and the heterogeneous micro-climatic conditions of the localities within the enlarged factory areas, we would recommend that the declaration of an event year is done on a locality basis rather than on a factory area basis. Further work will be required to ensure that the smaller localities are more homogeneous than the larger factory areas.
Management expenses	We recommend that the Board start planning a staff rightsizing exercise in order to keep the **expense ratio** of the Fund within reasonable limits.
Changes to the SIF Act	At the time the SIF Act is amended to implement our recommendations, the opportunity should be taken to incorporate any further changes that would enable the Board to operate and manage the Fund more flexibly in the future without always having to amend the SIF Act.
Next full actuarial review	We recommend that the next full actuarial review of the Fund should be carried out no later than the 2009 crop year. In the meantime, we also recommend a more regular actuarial monitoring of the effects of the changes to be made as a result of our recommendations and other relevant developments.

10. Acknowledgements

SIFB staff

We would like to acknowledge the assistance that we have received from all SIFB staff with whom we have been in contact. In particular, we would like to thank those who have provided all the information and carried out all the tests which we have asked for.

Other organisations

We also wish to acknowledge the comments and suggestions received from the other relevant bodies and organisations which have proved to be very helpful in the preparation of this report.

Signed on behalf of Hewitt LY Ltd (formerly Bacon Woodrow & Legris Ltd)

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Appendix A – Terms of reference

The Actuary to investigate/advise/make recommendations on the following terms of reference:-

1) Whether recommendations made in the actuarial review of June 2003 and its follow up study of April 2004 are still valid; if not, propose modifications;
2) The impact of a fall in sugar price on the Fund's reserves and its subsequent effect on reinsurance treaty or any other financial alternative to be considered;
3) Adaptation of insurance terms within a changing industry including the need to encourage regrouping of planters;
4) Review the premium and compensation mechanism applicable to fire insurance, including transport issues; and
5) Review the operations of the Sugar Insurance Fund to render it more cost-effective and more customer friendly.

The Actuary's report to state at least:

1) Who has commissioned the report;
2) The purpose of the report or the terms of reference given;
3) The extent, if any, to which the report falls short of, or goes beyond, its stated purpose;
4) The name of the Actuary, his professional qualifications and the capacity in which he has prepared the report,
5) Methodology used and the key assumptions contained therein;
6) Any changes made in the methodology and key assumptions as compared with the last similar report;
7) The extent of any reliance on the opinions of others, for example in regard to certifying the accuracy of the data;
8) The nature, accuracy and interpretation of the data; and
9) Comparisons of actual experience with that expected under the assumptions made in the previous report

Appendix B – Backtesting exercises for one-off boost to rankings

Control run

CROP YEAR	FUND BALANCE AT START OF CROP YEAR	GENERAL COMPENSATION	GPI	FUND GROSS LOSS RATIO	REINSURANCE RECOVERY NET OF CO-REINSURANCE	REINSURANCE PREMIUM NET OF CO-REINSURANCE	BROKER'S FEE	FUND BALANCE AT END OF CROP YEAR
	[M U R]	[M U R]	[M U R]		[M U R]	[M U R]	[M U R]	[M U R]
1984	164,750,609	291,706,650	213,714,541	136.5%	0	20,436,453	3,250,000	**63,072,047**
1985	63,072,047	98,898,993	227,695,707	43.4%	0	21,773,402	3,250,000	**166,845,359**
1986	166,845,359	54,049,091	234,284,522	23.1%	0	22,403,457	3,250,000	**321,427,333**
1987	321,427,333	86,425,580	291,654,067	29.6%	0	27,889,420	3,250,000	**495,516,399**
1988	495,516,399	304,817,255	302,305,700	100.8%	0	28,907,983	3,250,000	**460,846,862**
1989	460,846,862	544,833,088	309,794,758	175.9%	68,119,808	29,624,124	3,625,000	**260,679,217**
1990	260,679,217	264,577,087	307,555,444	86.0%	0	29,409,989	3,250,000	**270,997,584**
1991	270,997,584	417,361,996	313,797,742	133.0%	0	30,006,909	3,250,000	**134,176,421**
1992	134,176,421	255,100,811	383,581,937	66.5%	0	36,680,023	3,250,000	**222,727,524**
1993	222,727,524	689,868,955	431,146,400	160.0%	36,676,952	41,228,375	3,625,000	**-44,171,453**
1994	-44,171,453	910,584,960	382,452,412	238.1%	286,370,391	36,572,012	3,965,926	**-326,471,549**
1995	-326,471,549	586,653,349	457,971,036	128.1%	0	43,793,480	3,250,000	**-502,197,342**
1996	-502,197,342	410,860,416	524,376,049	78.4%	0	50,143,460	3,250,000	**-442,075,169**
1997	-442,075,169	159,012,252	313,881,393	50.7%	0	30,014,908	3,250,000	**-320,470,936**
1998	-320,470,936	450,883,228	626,643,439	72.0%	0	59,922,779	3,250,000	**-207,883,504**
1999	-207,883,504	2,480,240,871	586,529,802	422.9%	747,825,498	56,086,912	4,250,000	**-1,414,105,987**
2000	-1,414,105,987	476,262,508	567,471,464	83.9%	0	54,264,459	3,250,000	**-1,380,411,490**
2001	-1,380,411,490	173,789,782	633,333,890	27.4%	0	60,562,553	3,250,000	**-984,679,935**
2002	-984,679,935	937,623,246	705,498,330	132.9%	0	67,463,278	3,250,000	**-1,287,518,129**
2003	-1,287,518,129	710,190,342	722,171,691	98.3%	0	69,057,668	3,250,000	**-1,347,844,448**
2004	-1,347,844,448	491,521,582	744,075,071	66.1%	0	71,152,179	3,250,000	**-1,169,693,138**
TOTAL		**10,795,262,042**	**9,279,935,395**	**116.3%**				

Scenario 1 – Ranking 5

CROP YEAR	FUND BALANCE AT START OF CROP YEAR	GENERAL COMPENSATION	GPI	FUND GROSS LOSS RATIO	REINSURANCE RECOVERY NET OF CO-REINSURANCE	REINSURANCE PREMIUM NET OF CO-REINSURANCE	BROKER'S FEE	FUND BALANCE AT END OF CROP YEAR
	[MUR]	[MUR]	[MUR]		[MUR]	[MUR]	[MUR]	[MUR]
1984	164,750,609	291,706,650	213,714,541	136.5%	0	20,436,453	3,250,000	**63,072,047**
1985	63,072,047	98,907,782	227,690,878	43.4%	0	21,772,940	3,250,000	**166,832,203**
1986	166,832,203	54,061,716	234,277,316	23.1%	0	22,402,768	3,250,000	**321,395,034**
1987	321,395,034	86,452,309	291,637,732	29.6%	0	27,887,858	3,250,000	**495,442,599**
1988	495,442,599	304,916,341	302,279,018	100.9%	0	28,905,431	3,250,000	**460,649,845**
1989	460,649,845	544,908,168	309,768,345	175.9%	68,217,303	29,621,598	3,625,000	**260,480,727**
1990	260,480,727	264,629,296	307,519,504	86.1%	0	29,406,553	3,250,000	**270,714,383**
1991	270,714,383	417,520,470	313,762,808	133.1%	0	30,003,569	3,250,000	**133,703,152**
1992	133,703,152	255,144,509	383,554,226	66.5%	0	36,677,373	3,250,000	**222,185,496**
1993	222,185,496	690,028,931	431,103,678	160.1%	36,867,402	41,224,289	3,625,000	**-44,721,644**
1994	-44,721,644	910,753,303	382,411,499	238.2%	286,565,646	36,568,100	3,966,414	**-327,032,315**
1995	-327,032,315	586,750,491	457,946,496	128.1%	0	43,791,134	3,250,000	**-502,877,444**
1996	-502,877,444	410,898,307	524,352,866	78.4%	0	50,141,243	3,250,000	**-442,814,128**
1997	-442,814,128	159,047,502	313,855,298	50.7%	0	30,012,413	3,250,000	**-321,268,745**
1998	-321,268,745	450,931,483	626,601,163	72.0%	0	59,918,736	3,250,000	**-208,767,801**
1999	-208,767,801	2,480,648,134	586,482,455	423.0%	747,765,130	56,082,385	4,250,000	**-1,415,500,735**
2000	-1,415,500,735	476,269,718	567,468,363	83.9%	0	54,264,162	3,250,000	**-1,381,816,252**
2001	-1,381,816,252	173,790,996	633,330,403	27.4%	0	60,562,220	3,250,000	**-986,089,065**
2002	-986,089,065	937,636,338	705,493,599	132.9%	0	67,462,825	3,250,000	**-1,288,944,629**
2003	-1,288,944,629	710,199,431	722,167,953	98.3%	0	69,057,311	3,250,000	**-1,349,283,418**
2004	-1,349,283,418	491,531,917	744,071,897	66.1%	0	71,151,875	3,250,000	**-1,171,145,313**
TOTAL		**10,796,733,792**	**9,279,490,038**	**116.4%**				

Scenario 2 – Ranking 6

CROP YEAR	FUND BALANCE AT START OF CROP YEAR	GENERAL COMPENSATION	GPI	FUND GROSS LOSS RATIO	REINSURANCE RECOVERY NET OF CO-REINSURANCE	REINSURANCE PREMIUM NET OF CO-REINSURANCE	BROKER'S FEE	FUND BALANCE AT END OF CROP YEAR
	[M U R]	[M U R]	[M U R]		[M U R]	[M U R]	[M U R]	[M U R]
1984	164,750,609	293,327,663	213,474,085	137.4%	0	20,413,459	3,250,000	**61,233,572**
1985	61,233,572	99,065,595	227,595,288	43.5%	0	21,763,799	3,250,000	**164,749,465**
1986	164,749,465	54,244,756	234,157,368	23.2%	0	22,391,298	3,250,000	**319,020,779**
1987	319,020,779	86,763,127	291,464,036	29.8%	0	27,871,248	3,250,000	**492,600,439**
1988	492,600,439	305,589,899	302,069,452	101.2%	0	28,885,391	3,250,000	**456,944,601**
1989	456,944,601	545,466,588	309,570,046	176.2%	68,944,791	29,602,636	3,625,000	**256,765,215**
1990	256,765,215	264,960,391	307,344,337	86.2%	0	29,389,802	3,250,000	**266,509,358**
1991	266,509,358	418,204,772	313,592,137	133.4%	0	29,987,248	3,250,000	**128,659,475**
1992	128,659,475	255,306,739	383,442,043	66.6%	0	36,666,645	3,250,000	**216,878,134**
1993	216,878,134	690,408,770	430,964,812	160.2%	37,367,319	41,211,010	3,625,000	**-50,034,515**
1994	-50,034,515	911,174,737	382,291,676	238.3%	287,076,640	36,556,642	3,967,692	**-332,365,270**
1995	-332,365,270	586,962,564	457,877,865	128.2%	0	43,784,571	3,250,000	**-508,484,539**
1996	-508,484,539	411,007,074	524,275,179	78.4%	0	50,133,814	3,250,000	**-448,600,248**
1997	-448,600,248	159,151,312	313,776,506	50.7%	0	30,004,878	3,250,000	**-327,229,933**
1998	-327,229,933	451,112,307	626,501,802	72.0%	0	59,909,235	3,250,000	**-214,999,673**
1999	-214,999,673	2,481,464,338	586,378,737	423.2%	747,632,890	56,072,467	4,250,000	**-1,422,774,851**
2000	-1,422,774,851	476,289,211	567,457,706	83.9%	0	54,263,143	3,250,000	**-1,389,119,499**
2001	-1,389,119,499	173,804,594	633,316,651	27.4%	0	60,560,905	3,250,000	**-993,418,347**
2002	-993,418,347	937,674,486	705,477,842	132.9%	0	67,461,319	3,250,000	**-1,296,326,309**
2003	-1,296,326,309	710,227,062	722,154,810	98.3%	0	69,056,054	3,250,000	**-1,356,704,615**
2004	-1,356,704,615	491,564,076	744,059,328	66.1%	0	71,150,673	3,250,000	**-1,178,610,036**
TOTAL		**10,803,770,061**	**9,277,241,706**	**116.5%**				

Scenario 3 – Ranking 7

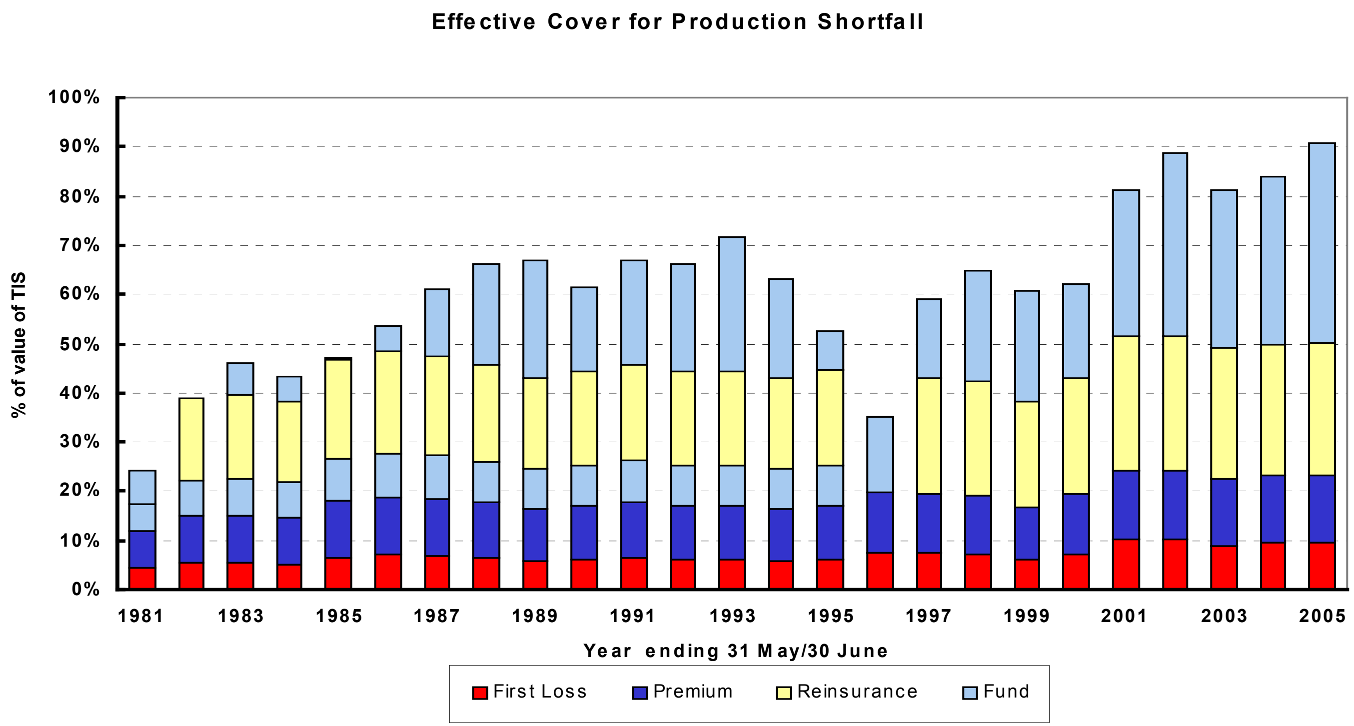
CROP YEAR	FUND BALANCE AT START OF CROP YEAR	GENERAL COMPENSATION	GPI	FUND GROSS LOSS RATIO	REINSURANCE RECOVERY NET OF CO-REINSURANCE	REINSURANCE PREMIUM NET OF CO-REINSURANCE	BROKER'S FEE	FUND BALANCE AT END OF CROP YEAR
	[MUR]	[MUR]	[MUR]		[MUR]	[MUR]	[MUR]	[MUR]
1984	164,750,609	298,509,364	212,392,798	140.5%	0	20,310,061	3,250,000	**55,073,982**
1985	55,073,982	100,324,221	227,004,899	44.2%	0	21,707,343	3,250,000	**156,797,316**
1986	156,797,316	54,990,236	233,507,775	23.5%	0	22,329,181	3,250,000	**309,735,674**
1987	309,735,674	87,658,122	290,561,091	30.2%	0	27,784,904	3,250,000	**481,603,739**
1988	481,603,739	307,285,924	301,022,068	102.1%	0	28,785,235	3,250,000	**443,304,648**
1989	443,304,648	547,324,057	308,863,708	177.2%	71,424,221	29,535,092	3,625,000	**243,108,427**
1990	243,108,427	265,932,500	306,856,867	86.7%	0	29,343,188	3,250,000	**251,439,606**
1991	251,439,606	419,475,989	313,128,132	134.0%	0	29,942,878	3,250,000	**111,898,872**
1992	111,898,872	255,829,952	382,610,304	66.9%	0	36,587,110	3,250,000	**198,842,113**
1993	198,842,113	692,010,385	429,934,660	161.0%	40,042,136	41,112,502	3,625,000	**-67,928,978**
1994	-67,928,978	913,513,888	381,179,217	239.7%	290,483,303	36,450,263	3,976,208	**-350,206,816**
1995	-350,206,816	587,800,028	457,464,988	128.5%	0	43,745,089	3,250,000	**-527,536,946**
1996	-527,536,946	411,390,889	523,957,431	78.5%	0	50,103,429	3,250,000	**-468,323,833**
1997	-468,323,833	159,288,697	313,612,545	50.8%	0	29,989,200	3,250,000	**-347,239,185**
1998	-347,239,185	451,996,958	626,096,217	72.2%	0	59,870,451	3,250,000	**-236,260,377**
1999	-236,260,377	2,482,893,320	586,023,255	423.7%	747,179,650	56,038,474	4,250,000	**-1,446,239,265**
2000	-1,446,239,265	476,365,648	567,412,784	84.0%	0	54,258,847	3,250,000	**-1,412,700,977**
2001	-1,412,700,977	173,851,667	633,273,582	27.5%	0	60,556,786	3,250,000	**-1,017,085,848**
2002	-1,017,085,848	938,384,226	705,302,958	133.0%	0	67,444,595	3,250,000	**-1,320,861,711**
2003	-1,320,861,711	710,332,115	722,110,676	98.4%	0	69,051,833	3,250,000	**-1,381,384,984**
2004	-1,381,384,984	491,155,257	744,114,416	66.0%	0	71,155,941	3,250,000	**-1,202,831,766**
TOTAL		**10,826,313,443**	**9,266,430,371**	**116.8%**				

Appendix C – General insurance revenue accounts

General insurance revenue account for crop years 2001 to 2004

	2001 Rs000	2002 Rs000	2003 Rs000	2004 Rs000
FUND AT START	**1,331,257**	**1,913,339**	**1,870,967**	**2,060,144**
INCOME :				
Premium Income	720,628	793,385	829,087	849,643
Claim from Re-insurers	8,559	9,265	7,269	23,844
Investment income	187,165	222,233	216,505	156,167
Other receipts	1,347	32,924	10,103	9,609
Total	**917,699**	**1,057,807**	**1,062,964**	**1,039,263**
EXPENDITURE :				
Compensation payable	65,265	810,157	627,256	348,112
Management Expenses	90,614	94,766	93,885	97,563
Re-insurance Premium	179,738	194,556	152,646	144,932
Other Expenditure	-	700	-	1,583
Total	**335,617**	**1,100,179**	**873,787**	**592,190**
FUND AT END	**1,913,339**	**1,870,967**	**2,060,144**	**2,507,217**

Appendix D – Effective cover for production shortfall



Appendix E – Key parameters for projecting the Fund

Iteration of development of Fund

Fund Revenue Account

$$F_1 = F_0 + P_1 + I_1 + RC_1 - C_1 - RP_1 - E_1$$

F_0 : Fund at start of the year

F_1 : Fund at end of the year

LR_0 : Loss ratio in previous year

C_1 : Compensation in current year

P_1 : Gross premium income in current year

I_1 : Investment return in current year (Net of sugar price inflation)

RP_1 : Reinsurance premium in current year

RC_1 : Reinsurance recoveries in current year

E_1 : Management expense in current year

R_0 : Average ranking in previous year

R_1 : Average ranking in current year

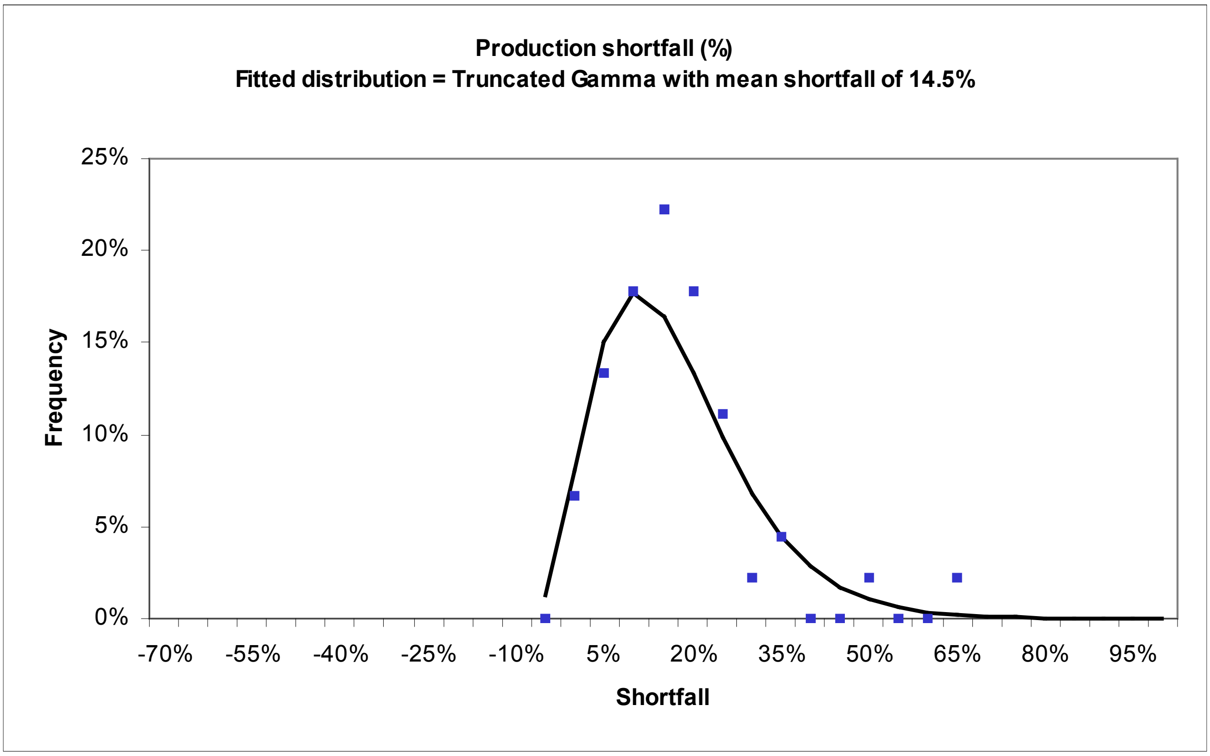
Derivation of Premium

P_1 : Premium equivalent to R_1

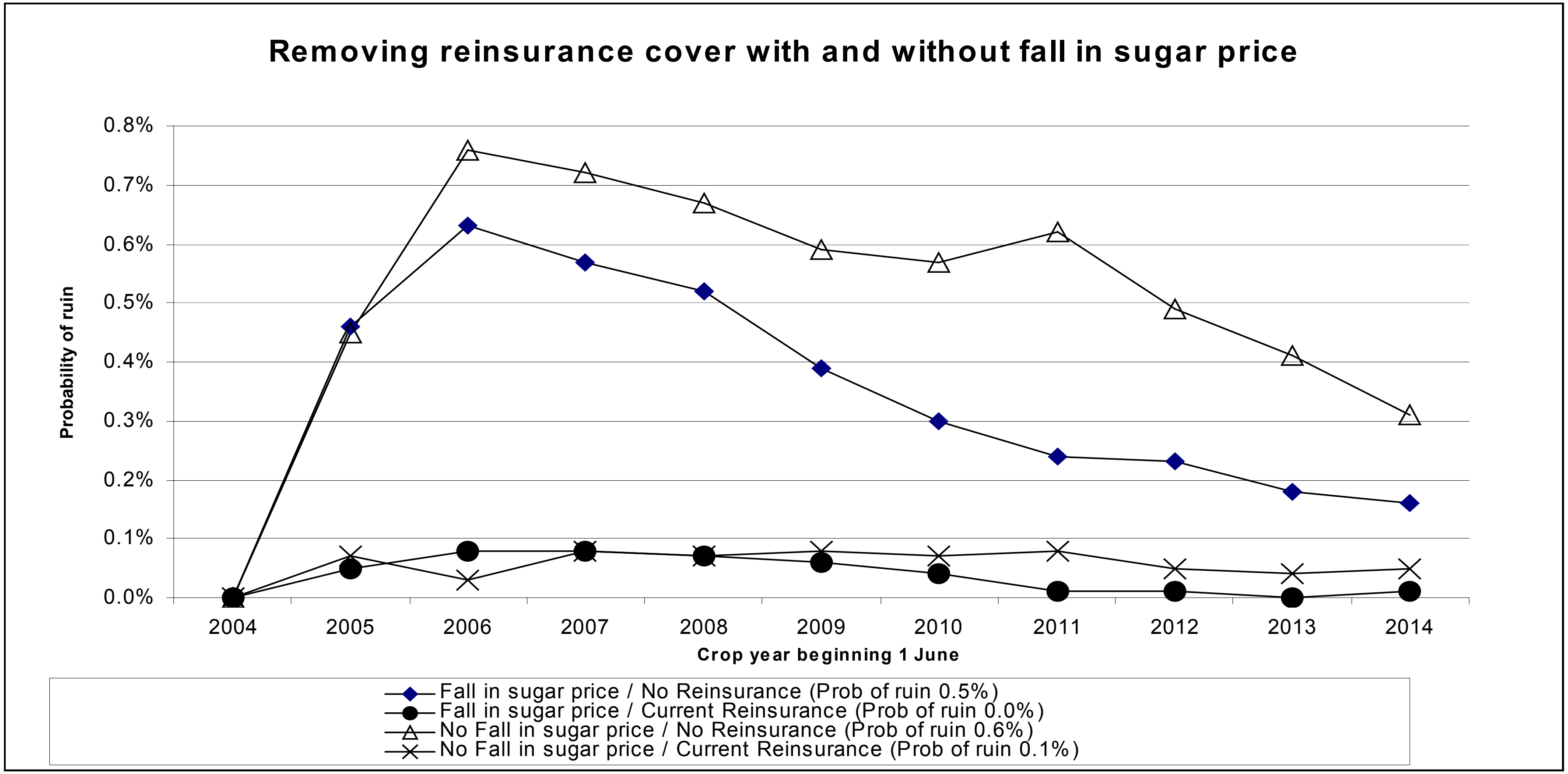
R_1 : $R_0 \times (1.1 - 0.1 \times LR_0)$

LR_0 is generated by a random process.

Distribution of production shortfall



Appendix F – Probability of ruin



Appendix G – Backtesting on regrouping planters

Control run

Crop Year	General Compensation (MUR)	GPI (MUR)	Fund Gross Loss ratio
1984	4,008,456	2,031,708	197.3%
1985	1,371,726	2,217,458	61.9%
1986	990,798	2,515,123	39.4%
1987	1,812,139	3,111,168	58.2%
1988	6,575,827	3,399,066	193.5%
1989	6,370,382	3,787,140	168.2%
1990	6,580,792	4,423,898	148.8%
1991	8,374,364	4,498,379	186.2%
1992	5,581,623	5,122,506	109.0%
1993	9,397,537	5,534,697	169.8%
1994	13,967,511	6,296,706	221.8%
1995	6,978,343	7,067,742	98.7%
1996	6,670,776	7,781,500	85.7%
1997	2,924,288	7,226,170	40.5%
1998	5,779,029	8,621,165	67.0%
1999	40,419,174	8,129,319	497.2%
2000	8,760,893	6,601,303	132.7%
2001	9,810,337	8,276,620	118.5%
2002	42,012,806	19,960,047	210.5%
2003	12,521,214	29,158,508	42.9%
2004	8,896,590	18,407,319	48.3%
TOTAL	**209,804,605**	**164,167,542**	**127.8%**

Scenario 1 – Average ranking

Crop Year	General Compensation (MUR)	GPI (MUR)	Fund Gross Loss Ratio
1984	3,157,913	1,928,054	163.8%
1985	464,431	2,113,690	22.0%
1986	36,002	2,412,964	1.5%
1987	211,744	2,886,378	7.3%
1988	4,652,508	3,049,896	152.5%
1989	4,575,093	3,423,518	133.6%
1990	4,744,573	3,890,991	121.9%
1991	7,124,515	3,987,757	178.7%
1992	2,565,779	4,537,251	56.5%
1993	7,400,479	4,730,215	156.5%
1994	12,751,878	5,306,614	240.3%
1995	3,625,875	6,374,097	56.9%
1996	3,583,259	6,868,149	52.2%
1997	458,784	6,301,009	7.3%
1998	803,804	7,348,086	10.9%
1999	40,489,260	6,635,657	610.2%
2000	5,028,205	6,103,794	82.4%
2001	-	7,600,562	0.0%
2002	10,833,979	17,582,749	61.6%
2003	8,322,803	18,532,453	44.9%
2004	5,547,501	18,666,601	29.7%
TOTAL	**126,378,385**	**140,280,485**	**90.1%**

Scenario 2 – Ranking 10

Crop Year	General Compensation (MUR)	GPI (MUR)	Fund Gross Loss Ratio
1984	3,780,821	1,778,283	212.6%
1985	465,039	2,048,397	22.7%
1986	38,086	2,260,500	1.7%
1987	261,395	2,728,581	9.6%
1988	4,996,053	2,930,199	170.5%
1989	4,681,076	3,386,010	138.2%
1990	5,001,199	3,759,491	133.0%
1991	7,379,134	3,760,552	196.2%
1992	2,655,851	4,436,590	59.9%
1993	7,459,069	4,712,477	158.3%
1994	12,873,498	5,239,176	245.7%
1995	3,611,284	6,227,078	58.0%
1996	3,822,367	6,629,207	57.7%
1997	392,134	6,177,472	6.3%
1998	971,910	7,173,958	13.5%
1999	40,406,177	6,676,563	605.2%
2000	5,035,732	6,017,360	83.7%
2001	0	7,477,574	0.0%
2002	11,209,050	17,364,960	64.5%
2003	8,627,488	18,407,458	46.9%
2004	5,687,564	18,604,462	30.6%
TOTAL	**129,354,927**	**137,796,348**	**93.9%**

Scenario 3 – Highest ranking

Crop Year	General Compensation (MUR)	GPI (MUR)	Fund Gross Loss Ratio
1984	4,046,639	1,527,275	265.0%
1985	465,817	1,888,573	24.7%
1986	40,613	2,175,796	1.9%
1987	287,975	2,627,387	11.0%
1988	5,310,114	2,786,574	190.6%
1989	4,710,487	3,376,269	139.5%
1990	5,007,894	3,752,361	133.5%
1991	7,399,380	3,753,555	197.1%
1992	2,670,742	4,430,652	60.3%
1993	7,480,152	4,706,184	158.9%
1994	12,900,276	5,232,156	246.6%
1995	4,467,647	5,686,582	78.6%
1996	4,285,441	6,164,897	69.5%
1997	733,507	5,640,686	13.0%
1998	995,074	6,831,560	14.6%
1999	41,426,191	6,417,865	645.5%
2000	5,447,231	5,512,158	98.8%
2001	0	7,063,148	0.0%
2002	11,534,009	17,033,018	67.7%
2003	9,580,462	17,725,135	54.1%
2004	7,051,996	17,552,298	40.2%
TOTAL	**135,841,647**	**131,884,129**	**103.0%**

Scenario 4 – 25% increase in ranking

Crop Year	General Compensation (MUR)	GPI (MUR)	Fund Gross Loss Ratio
1984	3,680,710	1,800,117	204.5%
1985	465,555	2,716,884	17.1%
1986	39,512	2,954,926	1.3%
1987	260,973	3,685,005	7.1%
1988	8,350,954	4,028,150	207.3%
1989	5,158,526	4,587,695	112.4%
1990	5,536,794	5,025,449	110.2%
1991	11,580,445	5,037,010	229.9%
1992	2,655,665	5,735,653	46.3%
1993	9,836,102	6,159,679	159.7%
1994	15,803,849	6,787,047	232.9%
1995	5,346,115	7,435,288	71.9%
1996	4,056,190	8,231,897	49.3%
1997	586,803	7,593,327	7.7%
1998	971,387	9,058,836	10.7%
1999	53,014,050	8,381,469	632.5%
2000	7,369,616	7,769,633	94.9%
2001	-	9,369,184	0.0%
2002	14,208,714	19,390,506	73.3%
2003	8,627,529	20,687,501	41.7%
2004	5,564,563	21,076,605	26.4%
TOTAL	**163,114,052**	**167,511,861**	**97.4%**

Glossary of terms

Expense ratio	The total management expenses in a given year divided by the **gross premium income** in that year.
First loss	The amount of a **production shortfall** which needs to be borne directly by the insured expressed as a percentage of his **TIS**.
Gross premium income (GPI)	The total premium income payable by all insureds to the Fund in a given year.
Loss ratio	The ratio of the compensation payable by the Fund in a given year to the **gross premium income** in that year.
Premium percentage	The premium payable by an insured by reference to his ranking in a given year expressed as a percentage of his **TIS**.
Production shortfall	The **Total Insurable Sugar** of an insured less his **Sugar Accruing** expressed as a percentage of his **Total Insurable Sugar** (TIS - SA)/TIS.
Ranking table	The table according to which the insured's **premium percentage**, **first loss** and **value percentage** are determined. The current **ranking table** goes from the lowest ranking 5 to the highest ranking 15.
Sugar Accruing (SA)	The total production of sugar in a given crop year measured in tonnes.
Total Insurable Sugar (TIS)	The total potential of production of a planter in a given crop year based on his historical insurable sugar per hectare and the extent of his plantation in that year. **TIS** is measured in tonnes.
Value percentage	The proportion of the **production shortfall** (less the **first loss**) which is compensated by the Fund by reference to the insured's ranking.