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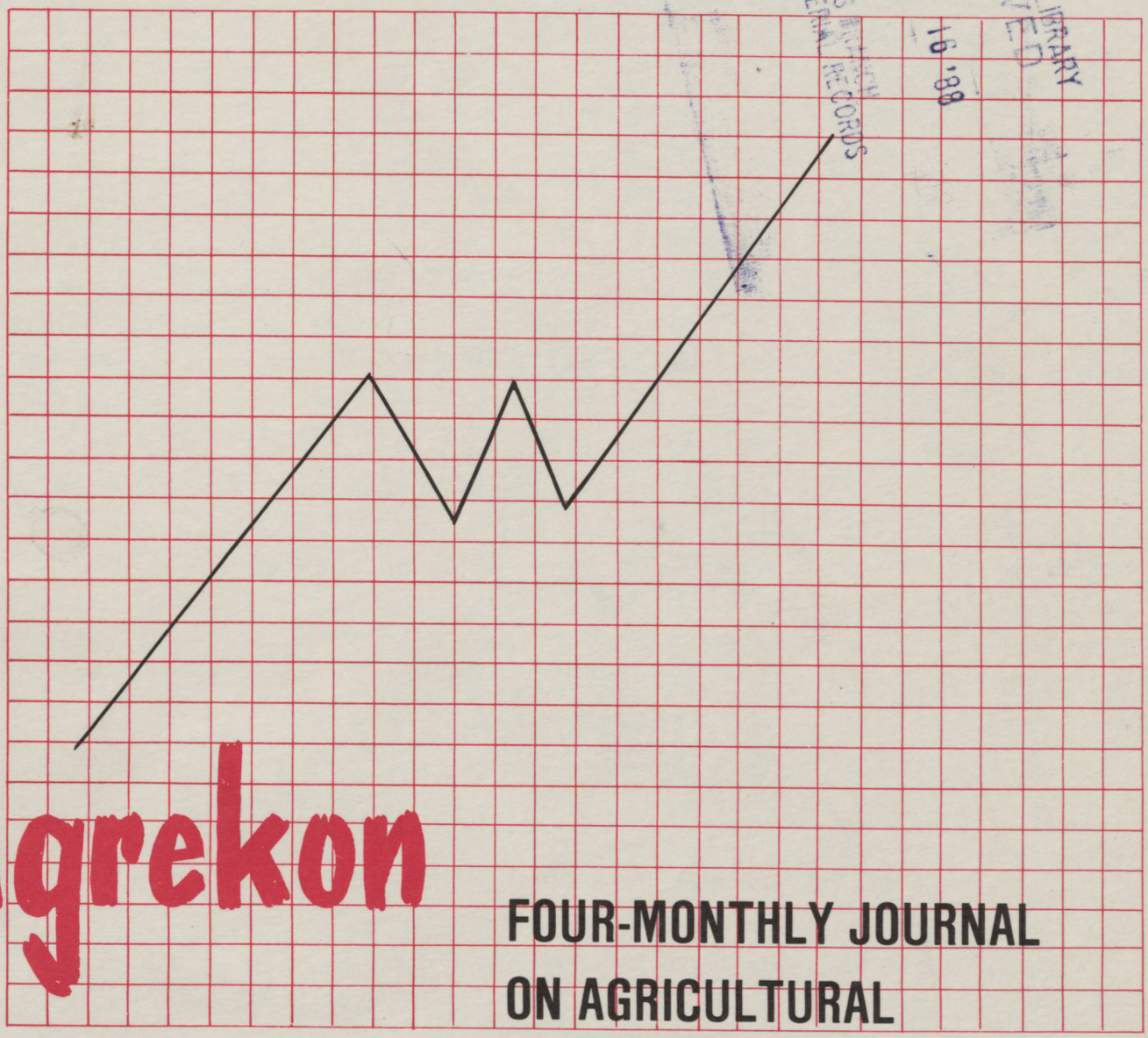

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## FOUR-MONTHLY JOURNAL ON AGRICULTURAL ECONOMICS

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# THE EFFECT OF DEBT BURDEN, INTEREST RATES AND INFLATION ON THE SURVIVAL OF FARMING ENTERPRISES: A CASE STUDY IN THE WESTERN TRANSVAAL AND THE NORTH-WESTERN BUSHVELD

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## ABSTRACT

In this study the effect of varying yield levels (drought), structural input price inflation, interest rates and initial solvency position (as influenced by debt burden) on typical farming enterprises in the Western Transvaal and the North-western Transvaal Bushveld is determined.

Initial solvency situation, interest rates and structural inflation have a significant effect on financial results of farming enterprises. Analysis of variance shows that these three factors and their effects are interdependent. The effect and influence of each on survival are therefore influenced by the levels of the other factors. Consequently all three factors must be influenced simultaneously in order to obtain positive results with regard to the survival of farming enterprises in the Western Transvaal and the North-western Transvaal Bushveld.

## INTRODUCTION

Anxiety about the condition and future of agriculture is nothing new. Trends should therefore be observed and analysed frequently to predict and understand bottlenecks. Only then is there hope for timely and proper corrections.

In a recent article Van Zyl, Van der Vyver and Groenewald (1987) showed with the help of multiple regression that drought, general economic conditions and the effect of structural inflation influence the debt burden of the farming sector. Real gross domestic product, interest rates, the ratio of input to output prices and drought each had a significant influence on the real debt burden of agriculture in the period 1970/85: The elasticities of interest rates, drought index, volume of field crop production, real GNP and the relationship of input to output prices are relatively high, i.e. greater than 1,0 (Van Zyl *et al.*, 1987). Consequently a change in any of these factors will result in a proportionally greater change in the real total debt burden of agriculture.

In such a situation it is relevant to analyse the effect of varying levels of these variables on the financial results of a farming enterprise. It is especially important to investigate the potential effect of possible support measures for agriculture. The policy options for the reconstruction of agriculture therefore can probably be analysed better. In this study the effect of varying yield levels (drought), structural input price inflation, interest rates and initial solvency position (as influenced by the debt burden) on farming enterprises in the Western Transvaal and the North-western Transvaal Bushveld is determined.

## A MODEL FOR THE DETERMINATION OF FINANCIAL RESULTS OF A FARMING ENTERPRISE

According to Van Zyl *et al.* (1987) the effect of interest rates, drought and structural input price inflation on farming debt is highly significant. For the purpose of this analysis a representative farm in the Western Transvaal and the North-western Transvaal Bushveld, respectively, was synthesised. These two areas were chosen because the financial position of farmers probably is the worst in those areas (SAAU, 1986). The extent to which the above-mentioned variables influence farming profit was determined by simulating the general characteristics of the farm.

Parts of a simulation model developed by Eisgrüber (1965, according to Louw, 1979) and adapted by Van Zyl and Groenewald (1986) were used to simulate the effect of different combinations of inflation rates (3). interest rates (4) and solvency ratios (4).

The different farm situations (farm size, land utilisation, enterprises, inventory, capital investment, etc.) were synthesised from survey results and mail-in-records of the Directorate of Agricultural Production Economics (1986). The size of and variation in yields and revenues were determined by analysing actual results. Information since 1960/61 was used for this purpose. Variable and fixed costs, and therefore also farm management practices, were also determined from survey data and mail-in-record results of the Directorate Agricultural Production Economics (1986).

The survey information and mail-in-record

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results were used to identify, aided by the calculation of the mode, a "typical" farm in each area with regard to farm size, land utilisation pattern (crop selection, herd composition and numbers), capital investment and management and cultivation practices in the different areas. One farm (collaborator) that satisfies all these requirements of a "typical" farm was thus identified. An additional requirement was that good records should have been kept over a long period (since 1960). Because this period includes both above average and drought periods, it was assumed that the size and distribution of yields represent long-term trends. A comparison of yield distributions with data reported by Louw (1975), Van Zyl (1986) and Van Zyl and Groenewald (1986) showed this assumption to be realistic. The two chosen farming situations were thereafter used as the basis for analyses. Prices are consistently as prevailed in the 1984/85 production season.

Stochastic variation in yields (and therefore also in gross income) occurs randomly within the parameters observed since 1960. Because yields are normally distributed in both cases, pseudo-random normal deviations were generated by the transformation of uniform deviations to normal (0,1) deviations. Stochastic variation is obtained by generating a number randomly and relating it to the yield distribution. The effect of varying and uncertain yields (implicitly also drought) is therefore taken into account by the model.

Three types of inflation are assumed according to the experience of agriculture since the mid-seventies:

- **Inflation 1:** Input prices and producer prices of agricultural products increase at the same rate. This is analogous to a period during which no inflation is experienced.
- **Inflation 2:** Prices of agricultural inputs increase three per cent per annum faster than those of agricultural products. It is the same as when input prices increase by three per cent per annum while producer prices of agricultural products remain constant.
- **Inflation 3:** The prices of agricultural inputs increase five per cent per annum more than the prices of agricultural products.

Because support to farmers in financial distress frequently includes the subsidisation of interest, four interest rates were assumed. The interest rates were 0, 5, 10 and 15 per cent, respectively.

The model is initiated with one of four solvency or asset/liability ratios. The four solvency ratios involve ratios of total assets to total liabilities of 1,0; 1,5; 2,0 and 3,0 respectively. It is assumed that all farming debts (liabilities) are consolidated into a long-term loan that is redeemed over 20 years. The initial total asset values of the farming enterprises in the Western Transvaal and the North-western Transvaal Bushveld are R1 127 135 and R397 780 (in Year 0), respectively.

The effect of all these variables on typical farming enterprises in the Western Transvaal and the North-western Transvaal Bushveld, respectively, is determined by simulating each situation over a planning period of 10 years. Every situation was repeated 50 times to ensure a distribution of results by using the randomly chosen yield variables. The simulation of a specific case was terminated as soon as the enterprise become insolvent.

## RESULTS

The mean net farm income (NBI), net expendable income (NBstI), net value (NW) and net capital ratio (NKV) for the different situations in Year 5 and Year 10 for the Western Transvaal and the North-western Transvaal Bushveld are shown in Table 1 and Table 2, respectively. All definitions have the same meaning as that formulated by the Directorate of Agricultural Production Economics (1984).

From Tables 1 and 2 it can be seen that the initial solvency position, interest rates and structural inflation materially influence the financial results of farming enterprises.

In the Western Transvaal (Table 1) it appears that the operators in Initial Situation 1 can survive only if they pay no interest (interest rate = 0 per cent) and Inflation Condition 1 holds. Even then a negative net expendable income (cash flow) is experienced. With Inflation Conditions 2 and 3 some progress is initially made if no interest is paid in Initial Situation 1, but later the more rapid increase in costs relative to income results in a smaller net farm income (NBI) and that net value declines. The same trend is experienced in Initial Situations 2, 3 and 4; however, it gets progressively better as the debt burden declines. Cash flow (net expendable income) is, however, negative in all situations. It is also important to note that even in Initial Situation 4 (relatively small debt burden) net value declines with Inflation 1 if the interest rate is 10 per cent or higher.

Table 2 shows the situation in the North-western Transvaal Bushveld to be more serious than that in the Western Transvaal. Operators in Initial Situations 2, 3 and 4 improve their net value only with Inflation 1 and if they pay no interest. In all the other situations the operators are on their way to bankruptcy. Even in the three situations where net value shows a positive growth rate, cash flow problems are experienced with a negative net expendable income.

From Tables 1 and 2 it is clear that cash flow (as indicated by net expendable income (NBstI)) produces the biggest problems in both situations. This liquidity problem also becomes a solvency problem as the simulation period lengthens. In such a situation profitability analysis is of less importance. The effect of whether capital is utilised advantageously or not also becomes less important because cash flow considerations such as capital redemption, income tax and living costs are not implicitly considered in such calculations. With the above in mind net expendable income was chosen as the survival criterion over the short run. Net expendable income is not as dependent on land valuations as net value and other solvency criteria.

A low repayment capacity as indicated by a

**TABLE 1 - Mean net farm income (NBI), net expendable income (NBstI), net value (NW) and net capital ratio (NKV) for the different situations in Years 5 and 10 in the Western Transvaal**

| Initial Situation | Interest rate | Item | Inflation 1 | | Inflation 2 | | Inflation 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Year 5 | Year 10 | Year 5 | Year 10 | Year 5 | Year 10 |
| 1 | 0% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | |
| | | NBstI | -45 353 | -42 301 | -49 701 | -90 526 | -99 493 | * |
| | | NW | 151 078 | 254 318 | 61 493 | 3 787 | 106 310 | |
| | | NKV | 1,171 | 1,340 | 1,070 | 1,034 | 1,116 | |
| | 5% | NBI | | | | | | |
| | | NBstI | * | * | * | * | * | * |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| | 10% | NBI | | | | | | |
| | | NBstI | * | * | * | * | * | * |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| | 15% | NBI | | | | | | |
| | | NBstI | * | * | * | * | * | * |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| 2 | 0% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -30 992 | -25 383 | -33 959 | -73 279 | -82 610 | -142 410 |
| | | NW | 496 524 | 583 215 | 408 556 | 339 158 | 452 548 | 238 810 |
| | | NKV | 1,804 | 2,187 | 1,583 | 1,479 | 1,663 | 1,312 |
| | 5% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -48 672 | -39 431 | -52 807 | -89 195 | -105 872 | -161 521 |
| | | NW | 413 228 | 420 634 | 310 320 | 146 922 | 361 878 | 40 871 |
| | | NKV | 1,629 | 1,713 | 1,404 | 1,195 | 1,486 | 1,083 |
| | 10% | NBI | 69 122 | 75 789 | 63 353 | | -2 645 | |
| | | NBstI | -67 971 | -54 489 | -74 070 | * | -131 186 | * |
| | | NW | 319 561 | 240 885 | 203 272 | | 261 396 | |
| | | NKV | 1,450 | 1,342 | 1,247 | | 1,327 | |
| | 15% | NBI | 69 122 | | 63 353 | | -2 645 | |
| | | NBstI | -106 079 | * | -113 923 | * | -175 168 | * |
| | | NW | 145 263 | | 16 114 | | 83 701 | |
| | | NKV | 1,188 | | 1,039 | | 1,110 | |
| 3 | 0% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -23 544 | -17 235 | -26 266 | -65 059 | -74 403 | -133 714 |
| | | NW | 668 336 | 746 517 | 581 731 | 505 164 | 624 990 | 405 807 |
| | | NKV | 2,435 | 3,101 | 2,081 | 1,891 | 3,193 | 1,620 |
| | 5% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -44 150 | -35 762 | -47 827 | -85 119 | -99 880 | -156 662 |
| | | NW | 576 104 | 556 807 | 476 579 | 290 570 | 526 361 | 185 887 |
| | | NKV | 2,133 | 2,189 | 1,769 | 1,405 | 1,886 | 1,248 |
| | 10% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -50 657 | -38 330 | -55 134 | -88 913 | -109 718 | -162 198 |
| | | NW | 540 760 | 497 964 | 432 036 | 212 856 | 486 877 | 105 339 |
| | | NKV | 2,025 | 1,987 | 1,663 | 1,290 | 1,783 | 1,156 |
| | 15% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | |
| | | NBstI | -64 476 | -48 391 | -70 938 | -100 272 | -128 200 | * |
| | | NW | 468 611 | 364 669 | 351 342 | 58 990 | 410 427 | |
| | | NKV | 1,813 | 1,597 | 1,495 | 1,105 | 1,609 | |
| 4 | 0% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -12 548 | -2 803 | -16 868 | -41 021 | -49 060 | -104 719 |
| | | NW | 809 232 | 840 453 | 722 626 | 599 100 | 765 885 | 499 743 |
| | | NKW | 3,504 | 4,283 | 2,829 | 2,266 | 3,012 | 1,892 |
| | 5% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -24 881 | -16 010 | -27 588 | -64 827 | -77 499 | -134 314 |
| | | NW | 800 726 | 831 394 | 706 989 | 577 506 | 753 439 | 476 462 |
| | | NKV | 3,448 | 4,204 | 2,745 | 2,189 | 2,942 | 1,839 |
| | 10% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -34 399 | -22 801 | -37 171 | -72 393 | -89 164 | -143 706 |
| | | NW | 758 699 | 749 063 | 657 177 | 480 547 | 707 849 | 376 976 |
| | | NKV | 3,203 | 3,466 | 2,489 | 1,850 | 2,699 | 1,596 |
| | 15% | NBI | 69 122 | 75 789 | 63 353 | 12 572 | -2 645 | -68 437 |
| | | NBstI | -43 130 | -29 088 | -46 830 | -79 433 | -100 793 | -152 087 |
| | | NW | 714 342 | 665 885 | 606 324 | 383 953 | 660 806 | 278 139 |
| | | NKV | 2,955 | 2,913 | 2,256 | 1,603 | 2,464 | 1,402 |

*Liabilities exceed assets and enterprise is thus insolvent

Initial Situation 1: Assets/liabilities = 1,0 and net value = 0

Initial Situation 2: Assets/liabilities = 1,5 and net value = 375 712

Initial Situation 3: Assets/liabilities = 2,0 and net value = 563 568

Initial Situation 4: Assets/liabilities = 3,0 and net value = 751 423

**TABLE 2 - Mean net farm income (NBI), net expendable income (NBstI), net value (NW) and net capital ratio (NKV) for the different situations in Years 5 and 10 for the North-western Transvaal Bushveld**

| Initial Situation | Interest rate | Item | Inflation 1 | | Inflation 2 | | Inflation 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Year 5 | Year 10 | Year 5 | Year 10 | Year 5 | Jaar 10 |
| 1 | 0% | NBI | * | * | * | * | * | * |
| | | NBstI | | | | | | |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| | 5% | NBI | * | * | * | * | * | * |
| | | NBstI | | | | | | |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| | 10% | NBI | * | * | * | * | * | * |
| | | NBstI | | | | | | |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| | 15% | NBI | * | * | * | * | * | * |
| | | NBstI | | | | | | |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| 2 | 0% | NBI | 8 286 | 8 685 | 287 | -10 684 | -8 191 | |
| | | NBstI | -17 476 | -17 117 | -27 462 | -40 742 | -37 403 | * |
| | | NW | 131 710 | 143 324 | 109 251 | 11 458 | 101 208 | |
| | | NKV | 1,497 | 1,400 | 1,375 | 1,035 | 1,336 | |
| | 5% | NBI | 8 286 | 8 685 | 287 | | -8 191 | |
| | | NBstI | -28 246 | -24 739 | -38 235 | * | -48 176 | * |
| | | NW | 82 510 | 16 571 | 59 947 | | 51 913 | |
| | | NKV | 1,263 | 1,044 | 1,176 | | 1,148 | |
| | 10% | NBI | 8 286 | | 287 | | -8 191 | |
| | | NBstI | -39 020 | * | -49 009 | * | -58 950 | * |
| | | NW | 33 199 | | 109 371 | | 2 602 | |
| | | NKV | 1,104 | | 1,031 | | 1,007 | |
| | 15% | NBI | * | * | * | * | * | * |
| | | NBstI | | | | | | |
| | | NW | | | | | | |
| | | NKV | | | | | | |
| 3 | 0% | NBI | 8 286 | 8 685 | 287 | -10 685 | -8 191 | -28 131 |
| | | NBstI | -10 462 | -10 111 | -20 214 | -31 482 | -30 649 | -54 991 |
| | | NW | 234 215 | 265 354 | 212 015 | 165 945 | 203 949 | 97 665 |
| | | NKV | 2,438 | 3,024 | 2,125 | 1,698 | 2,025 | 1,316 |
| | 5% | NBI | 8 286 | 8 685 | 287 | -10 685 | -8 191 | |
| | | NBstI | -22 239 | -19 510 | -32 229 | -43 178 | -42 170 | * |
| | | NW | 157 817 | 103 787 | 135 254 | 3 720 | 127 220 | |
| | | NKV | 1,660 | 1,355 | 1,510 | 1,010 | 1,462 | |
| | 10% | NBI | 8 286 | 8 685 | 287 | | -8 191 | |
| | | NBstI | -30 319 | -25 258 | -40 308 | * | -50 249 | * |
| | | NW | 120 838 | 31 073 | 98 275 | | 90 241 | |
| | | NKV | 1,341 | 1,098 | 1,224 | | 1,189 | |
| | 15% | NBI | 8 286 | | 287 | | -8 191 | |
| | | NBstI | -38 088 | * | -48 078 | * | -58 018 | * |
| | | NW | 84 321 | | 61 759 | | 53 724 | |
| | | NKV | 1,270 | | 1,183 | 1,154 | | |
| 4% | 0% | NBI | 8 286 | 8 685 | 287 | -10 685 | -8 191 | -28 131 |
| | | NBstI | -4 217 | -3 978 | -14 204 | -24 483 | -24 145 | -48 492 |
| | | NW | 283 938 | 298 501 | 261 738 | 199 093 | 253 672 | 130 813 |
| | | NKV | 3,511 | 4,056 | 2,886 | 1,973 | 2,699 | 1,469 |
| | 5% | NBI | 8 286 | 8 685 | 287 | -10 684 | -8 191 | -28 131 |
| | | NBstI | -16 231 | -14 287 | -26 220 | -37 946 | -36 161 | -58 955 |
| | | NW | 233 120 | 191 003 | 210 565 | 90 944 | 202 531 | 22 695 |
| | | NKV | 2,422 | 1,929 | 2,108 | 1,291 | 2,010 | 1,060 |
| | 10% | NBI | 8 286 | 8 685 | 287 | -10 685 | -8 191 | |
| | | NBstI | -21 617 | -18 110 | -31 606 | -41 778 | -41 547 | * |
| | | NW | 208 476 | 142 538 | 185 914 | 42 471 | 177 879 | |
| | | NKV | 2,106 | 1,561 | 1,867 | 1,118 | 1,790 | |
| | 15% | NBI | 8 286 | 8 685 | 287 | | -8 191 | |
| | | NBstI | -26 796 | -21 477 | -36 786 | * | -46 727 | * |
| | | NW | 184 132 | 95 921 | 161 569 | | 153 535 | |
| | | NKV | 1,865 | 1,320 | 1,676 | | 1,616 | |

*Liabilities exceed assets and enterprise is thus insolvent

Initial Situation 1: Assets/liabilities = 1,0 and net value = 0

Initial Situation 2: Assets/liabilities = 1,5 and net value = 132 592

Initial Situation 3: Assets/liabilities = 2,0 and net value = 198 890

Initial Situation 4: Assets/liabilities = 3,0 and net value = 265 187

negative net expendable income necessarily means that land values must decline over time to compensate for the low annual return on the investment in land. This will cause the solvency situation of many operators to decline faster than would otherwise have been the case. Over the short term net expendable income, is however, influenced less deleteriously by such declines in land values.

The probability of a negative net expendable income for the different situations in Years 1, 5 and 10 in the Western Transvaal and the North-western Transvaal Bushveld is shown in Tables 3 and 4, respectively. According to Tables 3 and 4 it seems that only the Western Transvaal operator has a reasonable probability (> 50 per cent) of a positive cash flow and then only with Inflation 1 with relatively low debt ratios and interest rates.

Analyses of variance were done to facilitate the interpretation of results. The importance and effect of the different factors that simultaneously influence survival could thus be determined. The results of the analyses of variance with regard to net expendable income in the fifth year for the Western Transvaal and the North-western Transvaal Bushveld are shown in Table 5.

In the interpretation of an anlysis of variance the accent must be placed on the most significant set of higher order interactions. In both the Western Transvaal and the North-western Transvaal Bushveld the main effects, two-factor interactions and three-factor interaction are highly significant. It can therefore be concluded that the factors and their effects are dependent on each other and that the effect of one factor is influenced by the different

**TABLE 3 - Probability of a negative net expendable income for the different situations in Years 1, 5 and 10 in the Western Transvaal**

| Initial Situation | Interest rate | Item | Inflation 1 | | | Inflation 2 | | | Inflation 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Year 1 | Year 5 | Year 10 | Year 1 | Year 5 | Year 10 | Year 1 | Year 5 | Jaar 10 |
| 1 | 0% | NBstI | 0,62 | 0,58 | 0,66 | 0,72 | 0,68 | 0,86 | 0,70 | 0,86 | * |
| | 5% | NBstI | * | * | * | 0,90 | * | * | 0,82 | * | * |
| | 10% | NBstI | * | * | * | * | * | * | * | * | * |
| | 15% | NBstI | * | * | * | * | * | * | * | * | * |
| 2 | 0% | NBstI | 0,46 | 0,46 | 0,58 | 0,64 | 0,60 | 0,78 | 0,52 | 0,76 | 0,88 |
| | 5% | NBstI | 0,61 | 0,54 | 0,61 | 0,36 | 0,66 | 0,40 | 0,68 | 0,86 | 0,94 |
| | 10% | NBstI | 0,72 | 0,70 | 0,66 | 0,82 | 0,76 | * | 0,80 | 0,90 | * |
| | 15% | NBstI | 0,94 | 0,90 | * | 0,96 | 0,94 | * | 0,96 | 0,98 | * |
| 3 | 0% | NBstI | 0,44 | 0,46 | 0,46 | 0,58 | 0,48 | 0,66 | 0,46 | 0,72 | 0,88 |
| | 5% | NBstI | 0,60 | 0,52 | 0,50 | 0,72 | 0,64 | 0,80 | 0,66 | 0,82 | 0,94 |
| | 10% | NBstI | 0,62 | 0,54 | 0,60 | 0,72 | 0,64 | 0,80 | 0,68 | 0,82 | 0,92 |
| | 15% | NBstI | 0,68 | 0,60 | 0,66 | 0,76 | 0,70 | 0,82 | 0,74 | 0,88 | * |
| 4 | 0% | NBstI | 0,42 | 0,38 | 0,28 | 0,48 | 0,42 | 0,46 | 0,46 | 0,66 | 0,82 |
| | 5% | NBstI | 0,44 | 0,42 | 0,46 | 0,58 | 0,46 | 0,64 | 0,46 | 0,72 | 0,88 |
| | 10% | NBstI | 0,46 | 0,46 | 0,46 | 0,64 | 0,56 | 0,68 | 0,52 | 0,74 | 0,88 |
| | 15% | NBstI | 0,54 | 0,46 | 0,54 | 0,70 | 0,60 | 0,74 | 0,64 | 0,78 | 0,88 |

*Liabilities exceed assets and enterprise is thus insolvent

**TABLE 4 - Probability of a negative net expendable income for the different situations in Years 1, 5 and 10 in the North-western Transvaal Bushveld**

| Initial Situation | Interest rate | Item | Inflation 1 | | | Inflation 2 | | | Inflation 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Year 1 | Year 5 | Year 10 | Year 1 | Year 5 | Year 10 | Year 1 | Year 5 | Year 10 |
| 1 | 0% | NBstI | * | * | * | * | * | * | * | * | * |
| | 5% | NBstI | * | * | * | * | * | * | * | * | * |
| | 10% | NBstI | * | * | * | * | * | * | * | * | * |
| | 15% | NBstI | * | * | * | * | * | * | * | * | * |
| 2 | 0% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * |
| | 5% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * | 1,00 | 1,00 | * |
| | 10% | NBstI | 1,00 | 1,00 | * | 1,00 | 1,00 | * | 1,00 | 1,00 | * |
| | 15% | NBstI | 1,00 | * | * | 1,00 | * | * | 1,00 | * | * |
| 3 | 0% | NBstI | 0,96 | 0,82 | 0,78 | 0,96 | 1,00 | 1,00 | 0,88 | 1,00 | 1,00 |
| | 5% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * |
| | 10% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * | 1,00 | 1,00 | * |
| | 15% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * | 1,00 | 1,00 | * |
| 4 | 0% | NBstI | 0,78 | 0,84 | 0,78 | 0,96 | 1,00 | 1,00 | 0,96 | 1,00 | 1,00 |
| | 5% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 |
| | 10% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * |
| | 15% | NBstI | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | * | 1,00 | 1,00 | * |

*Liablities exceed assets and enterprise is thus insolvent

TABLE 5 - Analysis of variance of factors that influence net expendable income and their interactions in the Western Transvaal and the North-western Transvaal Bushveld

| Source of variance | Western Transvaal | | | North-western Transvaal Bushveld | | |
|---|---|---|---|---|---|---|
| | Degrees of freedom | F-value | P < F | Degrees of freedom | F-value | P < F |
| Main effects | | | | | | |
| Initial Situation (B) | 3 | 200,4 | 0,0001 | 3 | 294,4 | 0,0001 |
| Interest rate (R) | 3 | 192,3 | 0,0001 | 3 | 65,9 | 0,0001 |
| Inflation rate (I) | 2 | 1 126,9 | 0,0001 | 2 | 2 683,3 | 0,0001 |
| Two-factor interaction | | | | | | |
| B x R | 9 | 121,6 | 0,0001 | 9 | 74,6 | 0,0001 |
| B x I | 6 | 224,1 | 0,0001 | 6 | 123,3 | 0,0001 |
| R x I | 6 | 63,8 | 0,0001 | 6 | 19,8 | 0,0001 |
| Three-factor interaction | | | | | | |
| B x R x I | 18 | 42,5 | 0,0001 | 18 | 21,7 | 0,0001 |
| Model | 47 | 698,7 | 0,0001 | 47 | 771,6 | 0,0001 |
| Error | 2 352 | - | - | 2 352 | - | - |
| Total | 2 399 | - | - | 2 399 | - | - |
| Coefficient of determination ($R^2$) | | 0,924 | | | 0,942 | |

levels of the other factors. Although each factor separately has a highly significant influence on net expendable income, the magnitude of the influence is determined by the level of the other factors. Subsequently the effect of neither interest rate, inflation or initial situation can be isolated from the other factors.

## CONCLUSION

Initial solvency situation, interest rates and structural inflation have a significant effect on the financial results of farming enterprises. Present inflation conditions make it difficult to survive: In the Western Transvaal and the North-western Transvaal Bushveld net value declines over time with input price inflation, even with a relatively low debt burden and if no interest is paid. The combined effect of interest rate and debt burden also plays a decisive role in survival: Only at relatively low debt burden ratios and interest rates is there growth in the net value of operators over time in the Western Transvaal and the North-western Transvaal Bushveld.

Results of the analyses of variance show that the effect of interest rate, inflation and initial situation (initial solvency position) on survival cannot be determined in isolation from each other, but that the effect of each on survival is determined by the level of the other two factors. From a policy viewpoint this finding has important implications. Subsequently all three factors have to be influenced simultaneously to achieve positive results with regard to the survival of farming enterprises in the Western Transvaal and the North-western Transvaal Bushveld. Policy actions aimed at only one or two of the three variables - interest rate, inflation and debt burden - will not influence the probabilities of survival in the areas involved significantly over the long run.

The above-mentioned results should, however, be handled with circumspection because typical situations, yield probabilities and distributions were used. The distribution of income and achievement in agriculture is relatively skew (Hattingh, 1986). It is therefore possible that individual farmers can in fact realise higher yields with smaller variations and so perform better financially. The simulation results do, however, provide a broad indication of what may happen to at least a large portion of the farmers.

Regardless of the applicability or not of the simulation results on individual farmers, all attempts at support to farmers seem to be futile if interest rates, structural input inflation and the debt burden are not taken into account simultaneously. Efforts to help that do not meet this condition will at most only postpone the day of reckoning. The answer to the problems therefore does not lie in a fragmented approach, but in an integrated support programme that is aimed simultaneously at a manageable debt burden, low interest rates and the reduction of structural input price inflation.

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