RISK AND MARKET DEREGULATION: ATTITUDES OF COMMERCIAL FARMERS IN KWAZULU-NATAL

BY

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I hereby certify that, unless specifically indicated to the contrary in the text, this thesis is the result of my own original work.

Ross C. Stockil

ABSTRACT

In a postal survey conducted among a sample of 112 commercial farmers in KwaZulu-Natal during 1996, sources and dimensions of risk, computer use and farmers' attitudes towards free trade and deregulated domestic markets were studied. Respondents were on average 49,5 years of age, had 24,3 years of farming experience and 14,1 years of formal education. The majority (60 percent) were individual owners of their farm business.

KwaZulu-Natal was divided into three relatively homogenous areas, namely the Coastal Belt, Lowveld and Midlands. The average farm area operated in the Coastal Belt was 511 hectares, 1121 hectares in the Lowveld and 866 hectares in the Midlands. Sugar-cane was the main enterprise in the Coastal Belt, sugar-cane and beef in the Lowveld, and beef, dairy, sugar-cane, timber and pigs in the Midlands. Land was cash-rented by 21 percent of respondents.

Median household income for respondents who had off-farm employment was R47 375. Coastal Belt respondents had the highest debt/asset ratio (0,141) and turnover (R2 086 000), followed by respondents from the Lowveld and Midlands.

Only one respondent was not aware of GATT (General Agreement on Tariffs and Trade). The most common information sources used to read about GATT included newspapers, *Farmer's Weekly* and *Effective Farming*. Most respondents expected a decrease in product prices, farm profits and land values if GATT provisions were successfully implemented, but approximately equal proportions of respondents expected input prices to increase and decrease.

Most respondents supported free trade. Sixty-four percent would alter farming operations if import tariffs were reduced and/or domestic markets deregulated. Responses to deregulation included seeking market information, adding value to products, controlling costs, changing the size and/or mix of enterprises currently operated, and enterprise diversification.

Changes in the cost of farm inputs, government legislation (tax, labour, and land redistribution), the Rand exchange rate, and product prices were considered as the most

important sources of risk. Factor analysis of risk sources showed that various dimensions to risk exist, including changes in government policy, enterprise gross income, credit access and cost changes. Computers, a risk management tool, are more likely to be adopted by larger farm operators with higher levels of education and who use more information sources, whilst operators of extensive production systems are less likely to adopt a computer.

Progressive, full-time farmers who considered themselves better financial managers and anticipated their land prices to increase under liberalised trade, were supportive of free trade. Respondents who viewed changes in environmental regulations, variability in crop and livestock prices, changes in the Rand exchange rate and the cost of inputs, and further reduction of import tariffs on farm products as important sources of risk, were opposed to free trade. Farmers with higher levels of debt repayment and knowledge of import tariffs were also likely to oppose free trade. Years of farming experience was negatively related to attitudes towards deregulated domestic markets, whilst dairy farmers, better financial managers and those more willing to take risks were more likely to support market deregulation.

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INTRODUCTION

Agricultural programmes are characterised by high fiscal costs (Pasour, 1988). The producer subsidy equivalent (PSE), an estimate of the direct income subsidy that would be required to compensate producers for the removal of existing government intervention (Warley, 1987), was on average 23 percent of the gross value of production or R3,5 billion per year in South Africa for the period 1986 to 1988 (Department of Agriculture, 1994).

Government agricultural policies in developed countries have stimulated agricultural output and discouraged domestic consumption due to higher prices (Warley, 1987). Consequences of agricultural policy distortions include inefficient use of the worlds' agricultural resources, exacerbation of instabilities in world commodity markets and financially costly and politically dangerous conflicts between countries who would otherwise have been friendly states (Warley, 1987).

Historically, a disproportionately large amount of food was produced in developed countries which are characterised by high levels of agricultural protection (Schuh, 1995). International trade allows countries to specialise in goods for which they have the lowest opportunity cost. This allows the country to export those goods in which it has a comparative advantage and import goods for which it has the lowest advantage. This increases the range of goods for sale and reduces their price (Obasanjo, 1995).

Amendments to international trade policy, together with improved dispute settlement procedures and monitoring provided by the Committee on Agriculture in the World Trade Organisation, will create conditions favourable for more stable international agricultural trade flows. Agricultural production will therefore be determined more by comparative advantage than the size of national budgets. Trade liberalisation will also increase import competition forcing industries to improve productivity through the adoption of innovations (MacLaren, 1995). International prices of agricultural products are also expected to increase in the medium-term following reduced supply from developed countries that pay high export subsidies (Department of Agriculture, 1994). Technological improvements may, however, reduce prices in the long-term (Goldin and Knudsen, 1990).

The Uruguay Round of the General Agreement on Tariffs and Trade (GATT), which was formally concluded on 15 December 1993 among 117 participating countries, aims to liberalise international trade (Giardini, 1995). In 1990, South Africa had 21 agricultural marketing boards which had a profound influence over producer prices, imports and exports, and the manner in which agricultural products were marketed. With the exception of most vegetables and subtropical fruit, marketing of primary food and fibre products was managed in some or other form by producer-dominated control boards (Swart, 1996).

South Africa is a signatory to GATT, resulting in increased market access here and abroad, reduced domestic support and export subsidies, and a revision of sanitary and phytosanitary measures (Department of Agriculture, 1994). Consequently, the elimination of producer controls over imports, tarification of agricultural imports, the removal of most single channel marketing schemes and a general reduction in the authority of marketing boards has been experienced. The remaining 15 marketing boards perform mainly non-trade distorting functions such as generic advertising and market information (Swart, 1996). In addition, negotiations toward a Free Trade Agreement (FTA) with the European Union may result in South African fruit producing areas, which enjoy a comparative advantage, benefitting from lower tariffs while other sectors (eg meat) may be threatened by subsidised imports (Nieuwoudt, 1995).

Freer trade will increase risk faced by farmers, particularly price risk. Farm operators are already faced with variable weather conditions, fluctuating input and product prices, rapidly advancing technology, changing environmental regulations and changing government policies, both domestically and internationally (Ortmann *et al*, 1992). Farmers may respond to risk by altering financial, marketing or production techniques (Barry *et al*, 1995; Eidman, 1990; Patrick *et al,* 1985). Withdrawal of government support, coupled with political changes and pressures on the agricultural sector to become more market orientated, has created additional uncertainty for commercial farmers in South Africa (Lyne and Ortmann, 1992).

The objectives of this study are (1) to identify the importance of various risk sources, dimensions of risk and their relative importance to commercial farmers in certain regions in KwaZulu-Natal, (2) to determine how farmers plan to adjust their farming operations to

survive under free trade and deregulated domestic markets, and (3) to determine the personal and business characteristics that affect farmers' attitudes towards free trade and deregulated domestic markets - this can help with developing appropriate policies that will enable farmers to survive in a changing economic environment.

Chapter 1 presents a literature review which includes an overview of the GATT provisions and the consequences of trade liberalisation in New Zealand. Implications of the GATT provisions for South African Agriculture and factors affecting farmers' attitudes towards free trade are also discussed. This is followed in Chapter 2 by a description of the selection of the sample survey and characteristics of respondents. Responses to GATT and deregulated domestic markets are also outlined in Chapter 2.

Farmers' attitudes towards increased uncertainty resulting from recent political changes, deregulated domestic markets and the GATT provisions will be discussed in Chapter 3. In addition, the existence of risk dimensions and their relative importance to farmers in different regions of KwaZulu-Natal will be established. Improved access to internal and external sources of information aid in risk management (Barry *et al,* 1995). Consequently, the personal and business characteristics of farmers which explain computer adoption will also be examined in Chapter 3. Factors influencing farmers' attitudes towards free trade and deregulated domestic markets are evaluated in Chapter 4. The study concludes with a discussion of the policy and management implications of the research results.

CHAPTER 1

LITERATURE REVIEW

1.1 Overview of GATT and models evaluating the consequences of agricultural policy liberalisation

1.1.1 Background to GATT

The General Agreement on Tariffs and Trade (GATT) was established at the end of World War 2. It was largely a gentlemen's agreement among participating industrialized countries, with its main focus on a reduction in tariff barriers to trade in industrial products (Schuh, 1995). The Uruguay Round of GATT was concluded on 15 December 1993 by the 117 participating nations and was implemented on 01 July 1995 by the World Trade Organisation (WTO) (Giardini, 1995). Agriculture achieved emphasis in the Uruguay Round as it was recognised that agricultural policies impose significant economic costs on national and global societies. Blanford and Dewbre (1994) suggest that the components of transfer efficiency of funds paid to farmers in the USA yield the following results: There is a net gain of 20 percent in farm household income, 40 percent accounts for increased expenditure on inputs, 10 percent constitutes a terms of trade loss and 30 percent amounts to forgone earnings of diverted farm resources. The estimate is based on the assumption that subsidies are paid directly to farmers thereby ignoring the opportunity of rent captured by downstream industries. A reduction in the degree of agricultural protectionism would add to world income (Warley, 1987).

1.1.2 Recommended changes in agricultural policy under GATT

The changes in agricultural policy as stipulated by GATT are as follows:

- Internal support be reduced by 20 percent over six years from 1986-1988 base levels. The calculation is based on the Aggregate Measurement of Support (AMS). The AMS is calculated as the average difference between the internal administered price and the

world reference price multiplied by the volume of production during the period in question (Giardini, 1995).

- All non-tariff barriers are to be converted to tariffs and individual tariff lines reduced by at least 15 percent in six years from 1986-1988 base levels. The simple average (not weighted on the basis of trade volumes) of all tariffs must be reduced by 36 percent in six years (Giardini, 1995; Josling, 1993).

- Import opportunities of three percent of internal consumption rising to five percent in six years must be allowed for to facilitate opening-up of markets. Minimum access targets will be achieved by reduced tarification (set at 32 percent of basic tariff) on imports within the minimum quota (Giardini, 1995; Josling, 1993).

- The volume of subsidised exports (food aid, processed products and non-subsidized exports are exempt) be reduced by 21 percent over six years, and budgetary expenditure on export subsidies reduced by 36 percent over six years, from 1986-1990 base levels (Giardini, 1995).

- Sanitary and phytosanitary (SPS) measures be revised and tightened, with the aim of ensuring that they are imposed only to the extent necessary to protect human, animal or plant health, according to objective scientific criteria (Giardini, 1995).

1.1.3 Likely effects of technology on agricultural trade

Recent technological advances in transportation, communication and computers have contributed to growth in international trade. These technological advances have lowered transaction costs thereby increasing the potential gains and benefits from free trade (Schuh, 1995).

1.1.4 Environmental conservation under GATT

Reduced levels of agricultural support will encourage less intensive use of inputs and

decreased usage of 'marginal' land thereby lowering the level of environmental damage in developed countries (Schuh, 1995). Carter (1993) suggests that trade liberalisation results in higher incomes which in turn results in lower levels of pollution as wealthy people are more willing to pay for clean air and water. However, Harold and Runge (1993) argue that increasing the levels of free trade will result in increased levels of investment and production thereby placing additional pressures on scarce natural resources.

1.1.5 Effect of trade liberalisation at household level

Kilkenny (1993) developed an Interregional Rural-Urban Computable General Equilibrium Model, representing the behaviour of producers, households, government and an aggregate rest of the world in rural and/or urban factor and goods markets. Results indicate that rural households in the USA spent at least half of their income on locally provided services and a change in farm income due to termination of subsidy programmes may have an impact on non-farm sectors. In the short run, rural real gross product declines affecting farmers, rural agribusiness, household services and business services. Agribusiness suffered due to increasing costs, falling prices and declining demand whilst services suffered as a result of reduced regional income and spending (Kilkenny, 1993).

According to model predictions, the termination of coupled subsidy programmes results in improved real national product, employment and household income and a reduction in consumer surplus. However, despite an improvement in urban household income a reduction in rural household income occurs. The gains arise from the reallocation of labour from farming to investment goods producing industries and an increase in employment rates. The termination of farm subsidies results in the reduced supply of agricultural goods, thereby increasing the price of the goods and reducing consumer surplus. In contrast, rural households gain consumer surplus as land rents, service prices and other elements of the rural cost structure fall (Kilkenny, 1993).

Fraser (1992) included risk effects in an evaluation of the welfare effects of deregulating producer prices. All five of the alternatives evaluated resulted in an increase in price variability, resulting in more risk averse producers being worse off. Of the five proposals

evaluated, two resulted in increased expected price and variance of price estimates, with the expected price effect dominating. The remaining three alternatives resulted in reduced short run welfare for producers.

1.1.6 Effect of trade liberalisation at international level

Kilkenny (1993) demonstrates a real net gain of $11,9 to $14, 3 billion (1982 dollars) of real GDP for the USA in the event of the termination of farm subsidies. Real value-added per worker is measured excluding production subsidies, whilst the nominal return includes subsidies. In the event of the termination of subsidies, movement out of farming is stimulated until nominal returns equate. Real gains are achieved in the event of employees migrating to sectors in which the real value-added per worker is high. The adjustment will only occur if resources are mobile. Immobility of factors represent a market imperfection referred to as regional factor market segmentation. Changes in factor demand resulting from sector specific policy changes affect costs and derived demands of other sectors within the targeted region. The effect will be more significant than if factors were perfectly mobile. Factor market segmentation enables rents and wages to vary across regions (Kilkenny, 1993).

A study examining the liberalisation of the international rice industry by Cramer *et al* (1993) yielded the following results: World trade volume as a percentage of world consumption expanded from 5,4 to 11,1 percent, with the increased exports accounted for primarily by exporting nations; increased trading volumes varied dramatically depending on rice type, and world welfare increased by $5,03 billion.

Models presented by Goldin and Knudsen (1990) formulate possible consequences of agricultural liberalisation on the prices achieved in world markets. Estimates based on three partial equilibrium models (SWOPSIM, MTM, Zietz-Valdes) and three general equilibrium models (IIASA, RUNS, Walras) are presented in Table 1.1. The IIASA and MTM models measure the resulting changes in prices in the event of the removal of direct interventions, namely tariffs, quotas and other border distortions, whilst maintaining other distortionary practices at constant levels. The SWOPSIM model examines both the income effects of policy reform and the indirect effects of a move to exchange rate equilibrium (Goldin and

Knudsen, 1990). The RUNS model was designed for sensitivity analysis in terms of output and trade in developing countries (Burniaux *et al*, 1990a). The Walras model was developed to quantify the economy-wide effects of agricultural policies in the Organisation of Economic Cooperation and Development (OECD) countries (Burniaux *et al*, 1990b). Zietz and Valdes (1990) modelled the possible effects of long-run changes in agricultural productivity and overall income growth, as well as alternative economic policies of developing and industrialised countries on agricultural production, consumption and trade flows. The RUNS model determines the direction of change in the instance of full liberalisation, but may be used in the case of partial liberalisation as the direction of change will be similar but the magnitude smaller (Department of Agriculture, 1994).

Table 1.1: Price effects of liberalisation by OECD countries (percent).

Models	Wheat	Rice	Meat	Dairy	Sugar
Partial equilibrium models:					
Zietz-Valdes	3	2	10	-	15
OECD/MTM	-5	-	5	31	9
USDA/SWOPSIM	27	18	16	84	29
General equilibrium models:					
IIASA	18	21	17	31	-
RUNS	15	14	18	-	57
Walras	17	-	10	14	-

Source: Goldin and Knudsen (1990).

Considerable variation is evident in the results presented in Table 1.1, but some consistent patterns are apparent. Supply from the developed countries decreases thereby, in most cases, resulting in an increase in world price levels (Brandao and Martin, 1993). The increases in food price resulting from trade liberalisation may be buffeted by advances in technology. Technological advancement has historically resulted in productivity gains thereby reducing the real price of food (Goldin and Knudsen, 1990).

Dairy, meat, wheat and sugar are characterised by greater levels of protection than rice, resulting in a greater rise in price than other agricultural products. The price of rice is expected to rise less than the price of other grains, demonstrating the relatively minor importance of developed countries as a group in the world rice market (Brandao and Martin, 1993). It should, however, be noted that once the supply-reducing effects of current policies are considered, output in the USA and other developed countries may increase in response to higher prices, resulting in a fall in price (Whalley and Wigle, 1990, as cited by Brandao and Martin, 1993). The results for the general equilibrium models are smaller than those of the partial equilibrium models, possibly resulting from the greater substitution possibilities included in the general equilibrium models where the flow of resources between sectors is explicitly incorporated (Brandao and Martin, 1993).

The effect of policy liberalisation on international prices is presented in Table 1.2. The effects of liberalisation in developing countries are included in addition to the effects presented in Table 1.1.

Table 1.2: Price effects of OECD and developing country liberalisation (percent).

Models	Wheat	Rice	Meat	Dairy	Sugar
Partial equilibrium models:					
Zietz-Valdes	-12	-21	13	-	1
OECD/MTM	-7	-5	-4	29	7
USDA/SWOPSIM (1986 base)	23	-	7	79	7
General equilibrium model:					
IIASA (projected 2000)	23	-	11	34	-

Source: Goldin and Knudsen (1990).

The effect of the change in the price of rice is reversed, when compared to the price change presented in Table 1.1. This occurs as the effect of the negatively protected agricultural sector on prices in the developing countries is greater than the effect of the positively protected agricultural sector in developed countries. The predicted increases of wheat prices

are reduced or become negative in most cases. The effect of liberalisation on dairy and meat is less apparent as many developing countries provide positive assistance to these sectors. Estimated effects of policy liberalisation display a greater level of diversity when developing countries are included, as estimates of developing country policy distortions are of a poor quality and due to the offsetting nature of the distortions in developed and developing countries (Brandao and Martin, 1993).

1.2 Economic liberalisation in New Zealand

In 1984 New Zealand embarked on a process of economic liberalisation often recommended by economists but assumed by many to be practically unworkable or politically impossible (Gardner, 1994). Signatories to GATT will be required to institute agricultural policy liberalisation similar to those policies enacted by the New Zealand Government. South Africa, a signatory to GATT, has been committed to a reduction in agricultural protection and farmers are likely to contend with problems similar to those experienced by their New Zealand counterparts. A knowledge of the structural changes, welfare effects and actions taken by New Zealand farmers could enable South African farmers to streamline their businesses in order to succeed in the changing policy environment.

1.2.1 Background

In the 1950's New Zealand had a small and rich economy which, together with Switzerland, had the third highest per capita Gross National Product (GNP) in the world. An agriculturally based export sector consisting predominantly of pastoral commodities and a highly protected import-substitution manufacturing sector dominated the economy (Johnston and Frengley, 1991; 1994). By 1984 public debt had risen to 51 percent of Gross Domestic Product (GDP) and equalled 79 percent of GDP by 1987 (Johnston and Frengley, 1994).

In 1984 New Zealand launched an economic liberalisation reform based on the "Big Bang" approach. This method allows reforms to be quickly implemented, reducing adjustment costs, preventing interest groups from regrouping and giving politicians less time to turn their backs on the intended reform (Bollard, as cited by Johnston and Frengley, 1994). The PSE was 34

percent in 1984, 23 percent in 1987 and was further reduced to three percent in 1994 (Sandrey and Scobie, 1994). Direct payments have been phased out but large transfers exist for research, quarantine, animal health and adverse events (Johnson, 1993).

Public debt, since policy liberalisation, has risen less rapidly than GDP, and a larger fiscal surplus was budgeted for 1994-95 than was achieved in the 1993-94 fiscal year. The annual inflation rate, which had been in double digits since 1974 and during most of the 1980's, has been about one percent since 1990. A short-lived 20 percent drop in the real trade-weighted exchange rate in 1985 benefitted agriculturalists but farmers remained worse off for the remainder of the decade. The real trade-weighted exchange rate moved in favour of agriculture during the early 1990's. Agricultural output has grown in nominal terms, particularly since 1987, but is still less (in real terms) than the distorted value of 1984 (Johnston and Frengley, 1994). Aggregate agricultural productivity, expressed as the ratio of real output to real current input, has steadily increased from a value of 1,59 in 1984 to 1,91 in 1993, which is equivalent to a log growth rate of 2,0 percent per annum (Johnson, 1993).

1.2.2 Structural adjustments

From Table 1.3 it is evident that land area farmed, employment, number of holdings and total stock numbers declined following deregulation but employment numbers have since risen. Sheep numbers have declined from 69,7 million head in 1984 to 53,0 million head in 1992 but have been substituted by an increase in dairy, beef, deer and goat numbers (Johnston and Frengley, 1994). This demonstrates the distortion in resource allocation that occurred as a result of government agricultural policy.

Table 1.3: Structural features of New Zealand Agriculture, selected years.

	1984	1987	1990	1993
Total area of farms (1000 ha)	21 124	17 795	17 489	17 300
Number of holdings	76 633	80 796	80 904	79 666
Permanent full-time employees	22 787	19 608	21 404	23 310*
Total stock units (million)	104,9	102,9	102,6	99,4

Source: Johnston and Frengley, 1994.

* 1991

1.2.3 Financial consequences of deregulation

Farm land prices are affected by expected changes in product prices, production costs, interest rates, farmers' expectations of future economic conditions and the political economy (Johnston and Frengley, 1991). Concessionary development loans introduced to encourage farm investments, boost output and profits, and support measures were capitalised into land values in the late 1970's and early 1980's (Frengley and Johnston, 1992). Deregulation resulted in a 58 percent reduction in land values for the period 1982-88 thereby weakening farmers' debt/equity position, as is evident from Table 1.4 (Johnston and Sandrey, as cited by Johnston and Frengley, 1994). From Table 1.4 it is apparent that the real price of farmland decreased from 1095 dollars per hectare in 1984 to 569 dollars per hectare in 1989 (Johnston and Frengley, 1991). Johnston and Frengley (1994) have noted, though, that land prices have since increased in nominal terms to values greater than the levels of 1984.

Data for sheep and beef farms, presented in Table 1.4 as pastoral enterprises, dominate the agricultural sector. Dairy was not included because data are limited. Income, expenditure and net farm income have risen in nominal terms but, along with real net farm income, fell in 1993 due to weakened world markets, particularly for wool. Interest expense increased from 1984 to 1987 but has since declined. Decapitalised assets, measured as real net worth, have recovered in nominal terms but are two-thirds of their real value in 1984. Interest as a percentage of total farm expenses and the long-term debt to equity ratio have gradually fallen

from their high levels in 1987. The rate of return on equity increased following deregulation due to the decline in farmland values which encouraged foreign investment in pastoral agriculture (Johnston and Frengley, 1994).

Table 1.4: Selected measures of sheep and beef farms, New Zealand, selected years.

	1984	1987	1990	1993
Income per farm:				
Gross farm income ($)	107 775	117 127	143 356	135 077
Total farm expenditure ($)	86 284	91 270	106 071	104 012
Interest expense ($)	16 305	22 619	21 642	18 729
Net farm income ($)	18 491	25 857	37 285	31 065
Real net farm income index (1989=100)	107	100	123	100
Net worth per farm:				
Total assets ($)	856 356	662 347	874 053	975 011
Fixed liabilities ($)	133 209	144 034	144 263	152 002
Net worth ($)	686 803	477 233	690 918	776 991
Real net worth index (1992=100)	159	74	91	100
Farmland values (real 1976 $ per hectare)*	1 095	616	569**	n/a
Ratios:				
Interest as percentage of total farm expenditure	19	25	20	18
Long-term debt to equity ratio (percent)	19	30	25	23
Rate of return on equity (percent)	2,7	5,4	5,4	4,0
Total agricultural debt ($ billion)	6,8	8,5	n/a	n/a
Financial institution claims ($ billion)	n/a	5,3	5,7	6,4
Total rural sale price index (1989=100)	108	92	119	136

Source: Johnston and Frengley, 1994.

* Johnston and Frengley, 1991

** Value for 1989

n/a = not available

Previous policy measures (such as the Supplementary Minimum Price Programme which targeted 93 percent of its budget at lamb, mutton and wool producers) were in favour of sheep production (Griffith and Grundy, as cited by Johnston and Frengly, 1991). Sheep have, subsequent to deregulation, largely been replaced with dairy, beef, deer, goats and forestry. Arable farming has decreased due to the termination of accelerated write-offs for machinery and development costs and the elimination of restrictions on imports of cereals. Horticultural production has however increased in area and value. The volume of pastoral exports has decreased whilst fruit and vegetable exports have increased (Johnston and Frengley, 1994).

A loan discounting scheme was introduced by the Rural Bank in 1986 in which 4 706 of the 8 099 applicants were approved. Loans were discounted, on average, by 50 000 dollars which is equal to 33 percent of the original debt to the bank (Johnson *et al*, 1989).

1.2.4 Farm household consumption, savings and debt levels

Prior to policy liberalisation, real interest rates for farmers were negative and factor/product prices were distorted. Increased profits, financial incentives and marginal tax rates exceeding 60 percent encouraged farmers to incur debt using financial leverage (Anderson, Frengley and Ward, as cited by Frengley and Johnston, 1992).

There was a short-lived improvement in farm household consumption in 1984-85 as is evident by the level of household savings in 1985 (Table 1.5). The period 1987-92 was characterised by dissaving as farm profits plummeted and debt threatened the viability of farming. Farm households whose debt exceeded 50 percent of total assets increased from 10 percent of households in 1985 to nearly 24 percent in 1986 (Johnston and Frengley, 1994). The proportion, as noted in Table 1.5, subsequently declined as a result of debt restructuring and farm sales. This group of farmers is characterised by continuous dissaving resulting in the undermining of capital to support household consumption. Low debt farmers (less than five percent debt) increased from 14 percent during 1986-88 to 21 percent in 1992. They have managed to continuously save, with the exception of 1986 and 1989 (Johnston and Frengley, 1994). Interest costs threatened the viability of 60 percent of beef and sheep farms whose debt exceeded 20 percent of total farm assets (Frengley and Johnston, 1992).

Table 1.5: Household consumption and savings, sheep and beef farms, New Zealand, selected years.

	Year	Percent of farms	Debt as percentage of total farm assets	Household consumption ($)	Savings ($)*
Average,	1985	100	23	20 143	8 575**
all	1987	100	28	21 178	-715**
farms	1990	100	21	27 854	969**
	1992	100	20	28 753	-4 139**
Highly	1985	10	68	14 589	-3 927***
indebted	1987	19	73	16 345	-17 834***
farms	1990	11	61	20 379	-6 027***
(>50 percent debt)	1992	9	62	20 388	9 644***
Low debt	1985	15	2	20 163	15 796***
farms	1987	14	2	22 299	5 109***
(<5 percent	1990	19	2	29 811	5 496***
debt)	1992	21	2	28 431	2 860***

Source: Johnston and Frengley, 1994.

* Savings include non-cash expenditures.

** In the selected years, depreciation ranges from $6 to $8 thousand on the average sheep and beef farm.

*** No estimates of depreciation and other non-cash expenses are available by equity class.

1.2.5 Household financial stress

The principal component of household financial stress is the imposed constraint of farm debt on household consumption. Despite continued annual disinvestment for beef and sheep farms since 1986, ratio analysis has indicated that household stress has declined. This could be due to a fall in the interest expense (Table 1.4), adjustments to financial reserves by sales of capital assets, increased nominal drawings, the adoption of lower-cost farm management

systems and probable changes in farmers' long-run consumption perceptions coupled with improved commodity price expectations (Frengley and Johnston, 1992).

1.2.6 Future considerations

Competitiveness will have to be improved by research and technological change, improved access to markets, product differentiation and market development (Sandrey and Scobie, 1994). In analysing trends in relative gross and net agricultural production of Australia and New Zealand, it is evident that New Zealand has an ability to control or reduce costs thereby maximising returns to farmers. Research in New Zealand is to be provided by four agricultural institutes receiving government funding in addition to seeking private funding, but extension is to be run on a fee-paying basis (Johnson, 1993).

1.2.7 Conclusions

Conclusions pertaining to the liberalisation process in New Zealand are of importance to South African farmers as similar circumstances are likely to be encountered with policy liberalisation in South Africa. The process in New Zealand was neither painless nor instantaneous but characterised by reduced incomes, reduced levels of production and investment accompanied by rising debt servicing costs and shrinking asset values (Johnston and Frengley, 1991; 1994). The policies pursued by the government have, on balance, assisted the agricultural sector (Johnson, 1993). Newer, younger farmers and heavily leveraged farmers experienced the greatest adjustment difficulties due to decapitalisation and high interest rates. The transition was tolerable due to public empathy (family and relief agency assistance), sympathetic assistance from financiers, and public and private debt write-offs in 1987. Fertilizer expenditure on beef and sheep farms is projected to be the largest expense item in two decades, indicating farmers' positive expectations regarding the future (Johnston and Frengley, 1994). Liberalisation has resulted in a strengthened economy which, coupled with increasing confidence in New Zealand, is leading to further appreciation of the domestic currency.

1.3 Likely effects of GATT on South African agriculture

The European Union (EU) and the USA, the world's dominant agricultural producers and traders, are amending their agricultural policies. Agricultural support in the EU is to be targeted at individual producers and not linked to production *per se*. The desired effect is to reduce surpluses and align EU prices with international prices. The abolishment of the US target and deficiency payment system is under consideration in the 1995 Farm Bill. Conversion of 16 million hectares of arable land under conservation programmes to grain, oilseeds and animal production could increase exportable quantities of these products. This will affect world trade in agricultural products and South African agriculture (Standard Bank, 1995a). Furthermore, deregulation in South African agriculture has been supported by a changed economic and political environment, new technologies and infrastructure, a shift in public sentiment, international developments, practical realities and a lively free market debate (Swart, 1996).

1.3.1 Agricultural support in South Africa

South Africa compares favourably with the rest of the developed world in terms of agricultural support (Department of Agriculture, 1994). It has reduced the Aggregate Measurement of Support (AMS) (the average difference between the internal administered price and the world reference price multiplied by the volume of production (Giardini, 1995)), by 20 percent between 1986 and 1991. However, agricultural support as a percentage of per capita income is high relative to other countries (Table 1.6), implying that agricultural programmes are costly relative to the level of per capita income. South Africa is required to reduce the AMS from R2 519 million, as calculated for 1986-88, to R2 015 million (20 percent reduction) by the year 2001. The relatively high annual inflation rate, a decline in the value of the Rand and fluctuating weather conditions accentuate the difficulty in reducing the AMS (Department of Agriculture, 1994).

Table 1.6: Percentage domestic support, percentage decrease in support for the period 1986 to 1991, and support as a percentage of per capita (PC) income for various countries.

	Producer Subsidy Equivalent*			
	1986 (percent)	1991 (percent)	Percentage decrease	Support as a percentage of PC income
New Zealand	33	4	88	0,15
Australia	16	15	6	0,47
South Africa	20	16	20	2,29
USA	42	30	29	1,42
Canada	49	45	8	1,81
EU	50	49	2	2,14
Japan	75	66	12	1,86
Finland	68	71	-4	4,65
Switzerland	80	80	0	2,60

* Note: Producer Subsidy Equivalent refers to an estimate of the direct income subsidy that would be required to compensate producers for the removal of existing government intervention (Warley, 1987).

Source: Department of Agriculture, 1994.

Where greater levels of protection are afforded relative to tariff protection, domestic prices are expected to decline and move closer to import parity (Standard Bank, 1994a). Changes in tariff levels will affect different industries to varying degrees in relation to current protection and proposed tariff levels (Standard Bank, 1995c). Table 1.7 presents the current tariff levels on selected agricultural products and inputs.

Table 1.7: Selected tariff levels of products and inputs, South Africa, 1996.

Product	Tariff level (percent)	Input	Tariff level (percent)
Wheat grain	0	Tractors (less than 1600 kg)	65
Maize grain	0	Tractors (more than 1600 kg)	40
Milk powder*	45	Equipment	0 → 23
Beef	40	Fertilizer	0
Pork	15	Chemicals	0 or 10 → 22
Mutton	40	Bakkies/pick-ups	65
Poultry	27		
Soya beans	0		
Sugar**	40		

Source: Chetty, 1996.

* Paul, 1996.

** Scharneck, 1996.

1.3.2 Expected changes in the farming sector under GATT

South Africa has followed an accelerated process towards liberalisation of its agricultural markets in the nineties. Of the 21 agricultural marketing boards operating in 1990, 15 remain whose function has shifted from trade-distorting functions (eg setting product prices) to generic advertising and providing market information. Furthermore, the elimination of producer controls over imports, tarification of agricultural imports, the removal of most single channel marketing schemes, and a general reduction in the authority of marketing boards has resulted in a move towards a more open market. The most notable remaining regulatory effects are single channel exporting of fruits, maize and oilseeds and the local marketing of wheat and dried fruit (Swart, 1996). Furthermore, the government elected in April 1994 is also likely to be consumer-friendly and supportive of small farmers (Standard Bank, 1995b), as opposed to the protection afforded to larger commercial farmers in the past.

Certain South African marketing boards, such as the Maize Board, have relinquished their price controls, resulting in market determined prices for their particular commodities (Standard Bank, 1995b). Prices are expected to vary to a larger degree within and between seasons resulting in increased importance of location, time of year, financial costs and availability of storage facilities. Increased price variation, reflecting increased risk, led to the founding of the Agricultural Markets Division of the South African Futures Exchange (SAFEX) in January 1995. Increased risk will result in relatively higher costs for agricultural finance (Standard Bank, 1995b). Recent trends indicate that South African farmers have diversified into livestock and/or horticultural enterprises as a means of reducing risk (Standard Bank, 1994b).

Recent acceptance into the world community has exposed the South African agricultural industry to international market forces (Swart, 1996). This will result in greater levels of market access thereby increasing agricultural competitiveness (Standard Bank, 1994a). Improved market access in foreign markets, due to the replacement of quantitative controls by import tariffs, creates export opportunities for South Africa and other exporting nations resulting in competition for South African produce on foreign markets. The expected devaluation of the Rand will improve exporting farmers' competitive ability. Imports of farm machinery and technology will, however, be relatively more expensive (Standard Bank, 1995a).

A Free Trade Agreement (FTA) currently being negotiated between South Africa and the European Union (EU), if successful, will have different impacts on various sectors of South African agriculture. South African exports to the EU are generally driven by comparative advantage whilst EU exports to South Africa are driven more by the size of EU subsidies. The South African fruit industry has a comparative advantage in production and produces fruit in the EU off-season, and is likely to be the main beneficiary of lower tariffs. However, importation of subsidised meats from the EU (especially poultry meat), is expected to have a major depressing effect on producer prices of all meats in South Africa (Nieuwoudt, 1995).

A greater diversified farm sector is anticipated with a wider range of farm sizes. An increase in part-time farmers, who are less reliant on farm income, is anticipated as price risk

increases. Aggregate agricultural land values are expected to decline. However, high potential land and land used for export industries are likely to increase in value. Farmers will be required to seek markets for their crops in the absence of marketing boards. Access to, and interpretation of, relevant, timeous and reliable information will become vital for the success of farmers (Standard Bank, 1995b). Tariff levels are subject to change and information regarding current and future tariff levels will be important to farmers in terms of management decisions and planning (Standard Bank, 1995c).

Knowledge of farmers' attitudes and preferences regarding free-trade and free-market policy environments may be important for the design of appropriate agricultural policies. This is the subject of the next section.

1.4 Factors influencing farmers' attitudes and perceptions towards free trade

Given coverage of GATT in the popular press and farming magazines, it is anticipated that farmers are aware of changes to international agricultural policy. The personal, financial and farm size characteristics of farm operators may be important factors influencing their attitudes towards free trade and deregulated domestic markets. However, considerable disagreement concerning farmers' attitudes towards free trade exists in the literature. A possible reason is the manner in which questions are framed (Kastens and Goodwin, 1994).

1.4.1 Rationale for farmers' decisions

Farmers' are assumed to be profit maximizers. Farmers are thus expected to support policies that would benefit their operations (Orazem *et al*, 1989; Barkley and Flinchbaugh, 1990). Support is expected for programmes in which perceived benefits are high relative to possible alternatives. Farmers will oppose agricultural policies in which the expected values are lower or negative relative to expected benefits resulting from current policy measures. Farmers are expected to be indifferent towards policies for which there is no perceived benefit or harm or policies for which the perceived outcome is indeterminate (Edelman and Lasley, 1988). In these cases, farmers' attitudes towards agricultural and trade policies are therefore explained by their personal and financial characteristics and farm size (Orazem *et al*, 1989).

Farmers' top three goals in a changing economic environment were assessed in this study. Maximising total farm profits was considered as the most important goal by 49 percent of respondents, while 70 percent ranked this objective in the top three places. Generating a stable income from the farm business and a steady accumulation of net worth were the next two most important objectives. The top three goals are closely related, and their high rankings reflect the importance that respondents attach to profit generation. Being competitive on the world market was ranked in the top three places by about one-third of respondents. They probably perceive being internationally competitive as important for survival in a changing trade environment.

Kastens and Goodwin (1994) report that attitudes towards free trade policies appear to display a stronger relationship to farm and operator characteristics than free market attitudes. It is important to note that Kastens and Goodwin (1994) assessed farmers' attitudes regarding a non-specific policy environment in which no particular agricultural programme was assessed, which differs from other studies.

1.4.2 Education and experience

Kastens and Goodwin (1994) found that farmers are less supportive of a free trade policy environment as their level of education increases. Highly-educated farmers may be better able to comprehend agricultural programmes' complex regulations and resulting benefits, may be less suspicious of agricultural programmes and thus may be more resistant towards policy liberalisation (Kastens and Goodwin, 1994; Barkley and Flinchbaugh, 1990). However, Edelman and Lasley (1988) suggest that younger farmers with fewer years of experience and more education were supportive of pursuing an open market. The correlation coefficients for the study were quite low, despite being statistically significant, thereby implying that none of the socioeconomic variables provide a high degree of explanatory power. Obsolescence of census data, in addition to changes in the agricultural economy, make it difficult to assess whether the sample contains a significant bias that would distort the findings.

The attitudes and preferences of farmers with greater farming experience show a similar relationship to that of education (Kastens and Goodwin, 1994). Barkley and Flinchbaugh

(1990) maintain that it is impossible to predict the effect of age on operator attitudes (in relation to economic theory) as individuals favour programmes from which they derive the greatest benefit.

Thus, as Kastens and Goodwin (1994) conclude, education and years of experience do not significantly affect farmers' attitudes toward, and preferences of, a free market environment.

1.4.3 Risk aversion and proportion of land rented

Farmers who, assessed on a subjective basis, are less risk averse are less opposed to the riskier marketing conditions resulting from trade liberalisation (Kastens and Goodwin, 1994). Farmers operating a greater proportion of rented land were more likely to support a free trade policy environment, but proportion of rented land was not significantly related to preferences for a free market environment (Kastens and Goodwin, 1994).

1.4.4 Farm type

Crop and livestock/crop farms were less likely to support a free trade policy environment than highly diverse operations (Kastens and Goodwin, 1994). Livestock producers were less likely to favour the continuation of government programmes as crop farmers received a greater level of support which raised the level of grain prices thereby increasing the cost of livestock production (Barkley and Flinchbaugh, 1990). Orazem *et al* (1989) suggest that farms heavily committed to crop production oppose decoupling (which provides direct support to farmers but does not distort production, consumption and trade), but the coefficient was not significant at standard levels. Decoupling results in lower crop prices thereby resulting in dairy farmers supporting decoupling.

1.4.5 Farm size and farmers' wealth

Larger farms in the USA show a greater level of support for policy liberalisation. This may be due to limitations placed on individual farmers' benefits or may indicate that larger farmers perceive greater benefits from economies of size in a free trade and free market

environment. If farmers' perceptions are correct, policy liberalisation may lead to increased farm size (Kastens and Goodwin, 1994). Edelman and Lasley (1988) indicate that amongst USA farmers, acres owned and corn acres were significantly positively related to pursuing an open market and there was a positive relationship between decoupling and farm size. Conversely, research by Orazem *et al* (1989) indicates that the largest farms tend to oppose decoupling because it would result in lower crop prices and returns per hectare.

As farmers' wealth (net worth) increases, their preference for a liberalised policy environment rises (Kastens and Goodwin, 1994). Farmers under financial stress are less likely to support market-orientated domestic policies or the elimination of domestic policies because of increased price risk (Edelman and Lasley, 1988).

1.4.6 Off-farm employment and government receipts

The greater the number of days worked off the farm, the lower is the support for the continuation of present government programmes (Edelman and Lasley, 1988). This is supported by Barkley and Flinchbaugh (1990) who suggest that producers with significant off-farm income are less dependent on government programmes and are thus more likely to support market liberalisation.

Kastens and Goodwin (1994) found that government farm programme receipts were significantly correlated with policy preferences. This suggests that farmers recognise that government programmes inhibit international trade and liberalisation would result in lower direct programme benefits. Government receipts have a greater effect on farmers' attitudes towards a free market than a free trade environment.

A major objective of this study is to determine personal and business characteristics of commercial farmers in KwaZulu-Natal that influence their perceptions regarding free trade and free market policy environments. Selection of the survey sample of commercial farmers is the subject of the next chapter.

CHAPTER 2

SAMPLE SELECTION, CHARACTERISTICS OF RESPONDENTS AND THEIR RESPONSES TO GATT

2.1 Sample selection

The target population in this study consists of commercial farmers in KwaZulu-Natal. Due to the size of the target population (4436 farmers), a random sample of farmers will be drawn and a postal survey administered as it has cost advantages (Barnett, 1991).

Multi-stage sampling techniques constitute an important part of advanced sampling theory. The study population is considered as comprising a number of non-overlapping first or primary stage units (PSU's or constituencies) each consisting of a number of secondary stage units (SSU's or farmers) and so on. PSU's selected with probability proportionate to a measure of their size (PPS) enables control of size variations. Selection of PSU's with replacement facilitates extrapolation from the data. Sample units (SSU's) are randomly drawn without replacement (Lyne, 1981). The technique used is termed two-stage cluster sampling (Barnett, 1991). The first stage involves the random selection of constituencies while the second stage includes the random selection of farmers within the constituencies.

The Natal Agricultural Union (NAU) maintains a mailing list consisting of members (SSU's) divided into 22 constituencies (PSU's) from which the sample of commercial farmers was drawn. In order to define strata, constituencies were allocated to bioclimatic regions, as defined by Phillips (1973). The strata are defined in a manner similar to Lyne and Ortmann (1996). The first stratum, constituting bioclimatic groups 1 and 2, is termed the Coastal Belt. Bioclimatic groups 3, 4, 5, 6 and 8 represent the Midlands, whilst bioclimatic groups 7, 9, 10 and 11 comprise the Lowveld region. Selection of PSU's is presented in Table 2.1.

Table 2.1: Selection of sample farmers, 1996.

Stratum	Constituency	Membership (farmers)	Selection probability	Range	Selection
Coastal	B	108	0,09927	1-108	
	C	233 (81)*	0,21415	109-341	✓
	D	153 (53)	0,14063	342-494	✓
	V	266	0,24449	495-760	
	X	257	0,23621	761-1017	
	Y	71	0,06526	1018-1088	
Total	6	1088 (134)	1,00000		2
Desired sampling intensity		11,0 percent			
Actual sampling intensity		12,3 percent			
Lowveld	A	209 (67)	0,34950	1-209	✓
	E	212 (67)	0,35452	210-421	✓
	O	177	0,29598	422-598	
Total	3	598 (134)	1,00000		2
Desired sampling intensity		10,0 percent			
Actual sampling intensity		22,4 percent			
Midlands	F	132 (38)	0,04800	1-132	✓
	G	133 (38)	0,04836	133-265	✓
	H	247	0,08982	266-512	
	J	223 (64)	0,08109	513-735	✓
	K	140	0,05091	736-875	
	N	211	0,07673	876-1086	
	P	316 (91)	0,11491	1087-1402	✓
	Q	220	0,08000	1403-1622	
	R	198	0,07200	1623-1820	
	S	274 (79)	0,09964	1821-2094	✓
	T	165	0,06000	2095-2259	
	U	163	0,05927	2260-2422	
	W	328	0,11927	2423-2750	
Total	13	2750 (319)	1,00000		5
Desired sampling intensity		12,0 percent			
Actual sampling intensity		11,3 percent			

* Figures in parentheses indicate the number of randomly selected farmers.

Membership numbers in each constituency determine a range and probability of selection for the particular constituency. A table of random numbers (Barnett, 1991) was used to select constituencies within the three regions (Lyne, 1981). Sampling intensity may vary in relation to expected population variance. However, limitations of sample size in the Lowveld and Coastal regions determine sampling intensity as 40 usable questionnaires are required per stratum to facilitate data analysis. The number of constituencies selected within each stratum ensure an average of 15 to 20 respondents per constituency, assuming a 30 percent response rate (Lyne, 1996). Random numbers determine which farmers are selected within the designated constituencies (Lyne, 1981).

2.2 Pilot survey and response rate

A preliminary questionnaire was compiled, based on work by Kastens and Goodwin (1994) and Woodburn (1993). A pilot survey was conducted among five commercial farmers in the Winterton area to rectify misinterpretation of questions and to identify possible improvements to the questionnaire. A copy of the questionnaire is included in Appendix A.

The questionnaire was mailed to 578 farmers in June 1996. A follow-up letter was posted in July 1996 to all farmers who had not yet responded to the survey, encouraging them to participate. One-hundred and forty-nine responses (25,8 percent) were returned of which 112 (19,4 percent) were usable. This response is lower than the usable response rate of 35 percent achieved by Woodburn (1993) for a similar sample population. Possible reasons for the lower response rate in this study are the time of year in which the questionnaires were mailed (June being an important month for crop harvesting; Woodburn (1993) conducted his survey mainly during March 1993), and the lack of interest of sample farmers in free trade and deregulated markets. The non-usable questionnaires were due to missing values, the sale of farming operations, or the retirement of some farmers. Twenty-six usable questionnaires were received from each of the Coastal and Lowveld regions, which is lower that the anticipated response (40 usable questionnaires). Sixty usable questionnaires were returned by Midlands' farmers.

2.3 Characteristics of respondents

Respondents were on average 49,5 years of age, had 24,3 years of farming experience and 14,1 years of formal education. Sixty percent of respondents were individual owners of their farm business, 12 percent of the operations were close corporations, 10 percent companies and nine percent of respondents operated partnerships and nine percent trusts. Thirty-nine percent of respondents were employed to manage the farming operations. Computers were owned and used in the farm business by 64 percent of respondents, which is higher than the 48 percent reported by Woodburn *et al* (1994).

The average area operated in the Coastal Belt was 511 hectares (median was 313 hectares), 1121 hectares in the Lowveld region (median was 253 hectares, due to a predominance of irrigated sugar-cane farms and a few large extensive beef enterprises), and 866 hectares in the Midlands (median was 604 hectares). More than 70 percent of gross farm income was derived from sugar-cane production by 75 percent of farmers in the Coastal Belt. Sixty-two percent and 15 percent of farmers in the Lowveld region derived more than 70 percent of gross farm income from sugar-cane and beef production respectively. The Midlands region is characterised by a variety of farming activities. Among the farmers who received 70 percent or more of their gross income from a single enterprise, 27 percent were beef farmers, 12 percent dairy farmers, 10 percent sugar-cane farmers, eight percent timber farmers and six percent pig farmers.

Land is cash-rented by 21 percent of respondents, with the area rented ranging from 10 to 900 hectares (mean of 264 hectares). Two respondents were involved in share-lease agreements (50 and 100 hectares), while a single respondent rented out land (150 hectares).

About 86 percent of respondents were full-time farmers. Median household income from off-farm employment (including spouse's income) was R47 375 for the 35 percent of respondents who indicated off-farm employment (by themselves or their spouse). Estimated market values of assets, debt/asset levels and farm turnover (gross income) in a normal year for the three regions are presented in Table 2.2. The Coastal Belt had the highest mean turnover and debt/asset ratio, followed by the Lowveld and Midlands regions respectively. The debt/asset

ratio should preferably be less than 0,5 (Barry *et al*, 1995). At a nominal interest rate of 15 percent, farmers will experience cash flow problems if borrowed capital exceeds one-third of the value of farmland, as the return to farmland in approximately five percent (Nieuwoudt and Vink, 1995). The ratios presented in Table 2.2 indicate that sample farmers are, on average, solvent.

Table 2.2: Farm asset values, debt/asset ratios and turnover of sample farms in three regions of KwaZulu-Natal, February 1996.

	Asset value (Rm)			Debt/asset ratio			Turnover (Rm)		
	n	Mean	Median	n	Mean	Median	n	Mean	Median
Coastal (n=26)	25	5,612	3,691	18	0,149	0,141	22	2,086	1,471
Lowveld (n=26)	25	5,676	3,800	25	0,131	0,116	26	1,594	1,076
Midlands (n=60)	50	2,709	1,670	48	0,083	0,012	54	1,147	0,620

Table 2.3 shows the distribution of debt/asset ratios. Ninety-two percent of respondents had ratios of less than 0,30, further indicating that respondents are solvent.

Table 2.3: Frequency distribution of farm debt/asset ratios (N=91).

Debt/asset ratio	n	Percentage	Cumulative percentage
0	32	35	35
0,01 - 0,09	22	25	60
0,10 - 0,19	20	22	82
0,20 - 0,29	9	10	92
0,30 - 0,39	3	3	95
0,40 - 0,49	3	3	98
0,50 and more	2	2	100

2.4 The General Agreement on Tariffs and Trade

The General Agreement on Tariffs and Trade (GATT) focuses primarily on reducing tariff barriers to trade in industrial and agricultural products (Schuh, 1995). In compliance with the GATT agreement, signatories are required to reduce internal support (Giardini, 1995), all non-tariff barriers are to be converted to tariffs, individual tariff lines reduced and import opportunities must be allowed for to facilitate opening-up of markets (Josling, 1993). The volume of subsidised exports is to be reduced and sanitary and phytosanitary (SPS) measures revised and tightened (Giardini, 1995). A greater degree of price uncertainty faced by commercial farmers is therefore anticipated in the event of reduced government protection (Lyne and Ortmann, 1992).

Only one respondent was not aware of GATT. Seventy percent of respondents gained information on GATT by reading newspapers, whilst 45 and 31 percent obtained information from *Effective Farming* and *Farmers' Weekly* respectively. Twenty-eight percent indicated attendance at farmers' days whilst *Financial Mail*, *Landbou Weekblad* and industry publications (eg *Sugar Journal*) were used by 23 percent of respondents to gain information on GATT. Private consultants were employed by 10 percent of respondents, nine percent read *Finance Week*, six percent read *Finansies en Tegniek*, and only five percent made use of extension officers. Sixty percent of respondents intended seeking additional information on GATT.

Fifty-two percent of respondents anticipated a decrease in their crop prices in the event of the successful implementation of the GATT requirements, whilst 25 percent expected their crop prices to increase. A decrease in livestock prices was expected by 61 percent of respondents and 12 percent anticipated an increase in livestock prices. Approximately equal proportions of respondents expected input prices to decrease (43 percent) and increase (39 percent). However, a greater proportion of crop and livestock producers (ie those who realised more than 55 percent of their gross income from either crop or livestock production respectively) anticipated a decrease in input prices. As is shown in Table 2.4, about one-half of respondents foresaw a decline in farm profits and 38 percent a fall in land values if the GATT requirements are successfully implemented.

Table 2.4: Percentage of respondents anticipating changes to product and input prices, farm profits and land values following the GATT provisions.

	Decrease (percent)	Increase (percent)	No change (percent)	Uncertain (percent)
Crop prices (n=103)	52	25	14	9
Livestock prices (n=87)	61	12	10	17
Input prices (n=108)	43	39	11	7
Crop farmers* (n=54)	45	35	11	9
Livestock farmers* (n=37)	49	38	8	5
Farm profits (n=109)	49	19	16	16
Land values (n=110)	38	14	22	26

* Farmers who received more than 55 percent of their gross income from either crops or livestock.

Following the reduction of import tariffs on meats in 1995, beef respondents experienced a 24 percent decrease in beef prices. Poultry farmers indicated a 29 percent reduction in broiler prices, mutton farmers a 16 percent decrease in mutton prices, and pork farmers a 17 percent decrease in pigmeat prices. Seventy-seven percent of respondents did not know the level of import tariffs on the products they produced, whilst 90 percent did not know the levels of import tariff on the inputs they used.

A five-category scale, ranging from 'strongly disagree' with the statement given to 'strongly agree' was used to elicit farmers' attitudes towards a free trade environment (Table 2.5). For the various questions posed, between 59 and 92 percent of respondents were in favour of free trade. Ninety-two percent of respondents were in favour of the deregulation of domestic product and input markets, indicating that they perceive the recent deregulation of product marketing boards to be of benefit to their farm businesses. This conclusion may not apply generally as approximately 74 percent of the original 578 farmers in the sample did not return the questionnaire, while those who did may have definite views on liberalised trade.

Table 2.5: Responses of sample farmers to statements on a free trade environment.

Statement	Percentage of respondents in each category				
	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
Free, unrestrained international trade (without the interference of governments both here and abroad) is beneficial for South African farmers (n=109).	5	16	20	50	9
A free, open market system of trade (ie. one without government intervention) should be pursued by all food exporting and importing countries by reducing all trade barriers (n=110).	2	18	13	51	16
Farmers in all countries exporting agricultural commodities should not receive any government support (n=111).	4	11	7	52	26
South African farmers should compete in a deregulated (free) domestic product market, if input markets are also deregulated (n=110).	0	3	5	71	21

Thirty-nine percent of all respondents, including 31 percent of livestock producers and 40 percent of crop farmers, would respond to *further reduction in import tariffs* by adjusting their farming operations. In the event of *complete deregulation of domestic product and input markets,* 48 percent of respondents, including 49 percent of livestock producers and 46 percent of crop farmers, would alter their farming operations. A greater proportion of crop farmers are concerned with further reduction in import tariffs, while nearly one-half of livestock producers are concerned with the complete deregulation of domestic markets. The recent high maize price, following on the deregulation of the maize industry, may be of concern to livestock producers. A large proportion of sugar-cane producers in the sample may have been concerned about changes in the domestic sugar price resulting from reduced import tariffs.

Of the respondents who considered altering their cost structure in response to successful implementation of the GATT provisions, 29 percent would reduce labour employment, increase use of machinery, and maintain fertilizer use at current levels. Of the 45 percent of respondents who would change the size and mix of enterprises currently operated, 46 percent would increase the size of current enterprises. Both enterprise diversification (adding a new

enterprise) and changing the relative sizes of current enterprises were suggested by 23 percent of respondents. Reducing enterprise size (four percent of respondents) and changing farm enterprises totally (four percent) were also considered.

Of the 64 percent of respondents who would respond to reduced import tariffs and/or complete domestic market deregulation, 46 percent would seek additional marketing information to aid in management decisions and 44 percent would add value to their products. Forty percent of respondents considered purchasing additional technology to improve productivity, 35 percent considered exporting products, 32 percent employing machinery contractors and 24 percent would employ labour contractors. Employing the services of a private consultant or restructuring debt commitments were considered by 22 percent of respondents, 19 percent indicated engaging in forward contracts, 18 percent borrowing less capital or reducing family drawings, and 10 percent would trade on the futures market (SAFEX). The relatively small proportion of respondents considering trading on the futures market could possibly be due to the limited range of contracts currently available (eg there are no sugar contracts at present). Selling land was considered by 12 percent of respondents, 10 percent intended seeking off-farm employment, nine percent would introduce capital invested off the farm into the farm business, and six percent would sell assets or borrow more capital.

Sample farmers were also asked to rate their level of management skill relative to other farmers in their district on a five-point Likert-type scale (where 1 = low and 5 = high). The average rating for their managerial ability in farm production and overall farm management was 3,72, in farm finance 3,61, and 3,11 for product marketing. In the past, 21 control boards marketed about 90 percent of the total value of agricultural production (Lyne and Ortmann, 1992), thereby reducing the need for farmers to market their products. For farmers to survive in a deregulated policy and trade environment with increased price risk, product marketing skills will need to be improved and/or marketing experts employed.

CHAPTER 3

PERCEPTIONS AND MANAGEMENT OF RISK IN A CHANGING ECONOMIC ENVIRONMENT

3.1 Sources of risk

The most important sources of risk reported in other studies have typically included variability in crop and livestock production and prices (Ortmann *et al,* 1992; Swanepoel and Ortmann, 1993) and changes in cost (Woodburn *et al,* 1995). Recent changes in South African agricultural policy and advances made by GATT may result in other factors being considered by farmers as important risk sources. Mean ratings of various sources of risk, measured on a five-point Likert-type scale (where five indicated 'very important'), are presented in Table 3.1, which also includes overall ratings of various risk sources derived in a 1993 study of commercial farmers in KwaZulu-Natal by Woodburn *et al* (1995).

Changes in costs of farm inputs achieved the highest rating (4,01) as was found by Woodburn *et al* (1995). This was followed by changes in tax legislation and variability in livestock prices (3,98), changes in labour legislation (3,96), changes in the Rand exchange rate (3,87) and further land redistribution by government (3,86). Variability in crop prices (3,85) and crop yields (3,82) were other sources of risk to achieve mean ratings greater than 3,8.

The relatively high ratings for changes in tax and labour legislation, the Rand exchange rate and further land redistribution by government suggests that farmers currently perceive changes in government policies to be a greater source of risk to their farming operations than in the past. This is most probably due to recent policy changes implemented by the government. Deregulation of domestic product markets (3,22) ranked relatively low despite the recent abolition of certain marketing boards. This may indicate that many respondents have welcomed the deregulation of the domestic market.

Table 3.1: Relative importance of various sources of risk for sample farmers in KwaZulu-Natal.

Sources of risk	Mean ratings*	
	This study (1996) (n=112)	Woodburn *et al* (1995) (n=199)
Changes in costs of farm inputs	4,01(1)**	4,53(1)
Changes in tax legislation	3,98(2)	3,67
Variability in livestock prices (eg beef prices)	3,98(2)	4,20(4)
Changes in labour legislation	3,96(4)	3,59
Changes in the Rand exchange rate	3,87(5)	n/a
Further land redistribution/restitution	3,86(6)	n/a
Variability in crop prices	3,85(7)	4,20(3)
Variability in crop yields	3,82(8)	4,23(2)
Changes in costs of capital items	3,69	4,07(6)
Further reduction in trade tariffs on imported agricultural products	3,68	n/a
Variability in interest rates	3,63	3,99
Variability in livestock product prices (eg milk prices)	3,62	4,18(5)
Deregulation of domestic product markets	3,22	2,88
Variability in livestock production	3,19	3,88
Changes in environmental regulations	2,94	2,91
Changes in credit availability	2,89	3,47

* Mean ratings are based on a five-point Likert-type scale (where 1 = low and 5 = high). Values include the ratings of those farmers who responded to the question, ie, only non-missing values were used to compute mean scores. Since the data are ordinal, the means should be roughly interpreted to give an overall view of the perceived importance of risk sources, and standard errors would not be meaningful, and hence are not given.

** Figures in parentheses indicate ratings of risk sources.

Variability in crop prices and yields were ranked relatively low compared to the study by

Woodburn *et al* (1995). Changes in government policy and reduced import tariffs in 1995, which had a greater impact on livestock prices than on crop prices, may have given rise to changes in relative perceptions.

3.2 Factor analysis of risk sources

Barry *et al* (1995) contend that sources of risk faced by farmers may be business (inherent in the farming operation) and/or financial (financial claims on the firm). Economic research typically estimates the risk of a monetary outcome. However, five major dimensions of risk (namely technological, climatic, social, political and economic) may be viewed as sources of uncertainty particular to the external environment of the production unit (Eidman, 1990). Patrick *et al* (1993) suggest that farmers view uncertainty as having various dimensions but not as many as the original sources. Price and yield uncertainty are not viewed independently as farmers are concerned with gross income variability.

Factor analysis finds combinations of variables to produce indices that are uncorrelated. The indices obtained measure different dimensions in the data as they are uncorrelated (Manly, 1994). The 16 sources of risk given in Table 3.1 were included in a factor analysis to determine various dimensions to the sources of risk. Five factors, having Eigen values greater than one and accounting for 71 percent of the variation in the data, were included in the analysis. Eight of the 16 sources of risk had component loadings greater than 0,4 in two or more factors. Varimax rotation was therefore used to transform the provisional factors into new factors which are easier to interpret (Manly, 1994). Results of the analysis are presented in Table 3.2.

Communalities, except for the deregulation of domestic product markets, are greater than 0,5, indicating that most of the variation in the sources of risk is accounted for by the five common factors (Manly, 1994). In general, risk sources which had loadings greater than 0,5 in one factor did not exceed 0,3 in any other factor. Exceptions are changes in the Rand exchange rate, and further reduction in import tariffs.

Table 3.2: Rotated factor loadings of risk sources and regional factor scores for sample commercial farmers in KwaZulu-Natal, 1996.

Factor		1	2	3	4	5
Eigenvalue		5,124	2,150	1,783	1,215	1,098
Percentage variance explained		32,0	13,4	11,1	7,6	6,9
Sources of risk	Communalities*	Government policy	Crop gross income	Livestock gross income	Credit access	Cost changes
Changes in tax legislation	0,778	**0,861**	0,039	0,008	0,081	0,168
Changes in labour legislation	0,756	**0,824**	0,132	-0,009	-0,055	0,237
Further land redistribution/restitution	0,705	**0,790**	0,073	0,143	0,235	-0,024
Changes in environmental regulations	0,546	**0,664**	-0,041	-0,170	0,267	0,051
Changes in the Rand exchange rate	0,573	**0,542**	**0,499**	0,167	-0,018	-0,036
Deregulation of domestic product markets	0,428	**0,465**	0,222	-0,048	0,247	0,314
Further reduction in trade tariffs on imported agricultural products	0,528	**0,472**	0,250	**0,416**	0,207	0,166
Variability in crop prices	0,879	0,097	**0,907**	-0,041	0,138	0,161
Variability in crop yields	0,849	0,096	**0,871**	-0,073	0,193	0,199
Variability in livestock prices	0,896	-0,073	-0,125	**0,935**	0,011	0,036
Variability in livestock production	0,829	0,078	0,007	**0,896**	0,138	0,033
Changes in credit availability	0,768	0,289	0,085	0,095	**0,816**	0,051
Variability in interest rates	0,663	0,196	0,097	-0,012	**0,765**	0,175
Variability in livestock product prices	0,540	-0,062	0,251	0,381	**0,572**	0,031
Changes of costs of capital items	0,838	0,212	0,056	-0,030	0,067	**0,886**
Changes in costs of farm inputs	0,794	0,111	0,306	0,192	0,163	**0,790**
Factor scores:						
Coastal Belt		0,090	0,518	-0,579	0,073	-0,281
Lowveld		0,444	-0,373	-0,313	-0,044	0,126
Midlands		-0,231	-0,063	0,387	-0,013	0,067
Livestock		-0,213	-0,354	0,747	0,188	-0,289
Crop		0,323	0,271	-0,480	-0,062	0,036

* Part of the variable's variance that is related to the common factors.

Relatively high factor loadings for changes in tax, labour and environmental regulations, further land redistribution by government, further reduction in trade tariffs on imported agricultural products and changes in the Rand exchange rate defined the first factor as "government policy". The second factor was labelled "crop gross income" due to loadings in excess of 0,85 for variability in crop prices and yields. Variability in livestock prices and production had high factor loadings in the third factor classifying it as "livestock gross income". The fourth factor was termed "credit access" owing to high factor loadings for changes in credit availability and variability in interest rates. High factor loadings for changes in costs of capital items and farm inputs identified the fifth factor as "cost changes". Similar risk dimensions were derived by Woodburn *et al* (1995).

For the first factor, positive factor scores for the Lowveld and Coastal Belt indicate that respondents in these regions, particularly in the Lowveld, are more concerned about changes in government policy than Midlands farmers. The predominance of sugar-cane farmers in these regions indicates that deregulation of the sugar industry may be of concern. This is also reflected in the high factor score for crop farmers. The higher score for the Lowveld relative to the Coastal Belt indicates a greater concern for changes in government policy in the Lowveld region. Respondents in the lower-rainfall region of the Lowveld, where irrigated sugar-cane is important, could be more concerned with potential changes in water rights because changes in environmental regulations as a source of risk has a higher mean score for Lowveld (3,29) than Coastal Belt (2,71) respondents.

The scores for the second and third factors indicate that variability in crop gross income is of greater concern to respondents in the Coastal Belt, which produces mainly sugar-cane, whilst variability in livestock gross income concerns respondents from the Midlands, which is an important beef and dairy producing region. The relatively low scores for the fourth factor (credit access) indicate that changes in credit availability and variability in interest rates are of similar importance to respondents in the three regions. There is a slight bias towards Coastal Belt farmers who have the highest mean debt/asset ratio (Table 2.2). The fifth factor, cost changes, appears to be more important to Lowveld and Midlands farmers.

Mean factor scores are also given for producers who receive more than 55 percent of their

gross income from crop or livestock production. A large and positive mean score for crop farmers in the first factor indicates that the risk associated with changing government policies is of greater importance to crop farmers than to livestock producers. This may be due to the risk associated with changes in labour and environmental regulations as crop farmers on average employ more labour and use more chemicals and fertilizer that may be of environmental concern. Credit access appears to be more important to livestock farmers (variability in livestock product prices has a weighting of 0,572 in the factor), and the factor cost changes has a small but positive coefficient for crop farmers.

These results suggest that farmers view risk as having certain dimensions, as indicated by Patrick *et al* (1993) and Woodburn *et al* (1995). In addition to income variability and changes in credit access and costs, farmers also consider changes in government policy to be an important source of risk to their farming operations.

3.3 Relationship between risk preferences and farmers' objectives

Thomas (1987) indicates that farmers have the ability to assess their own risk attitudes. Sample farmers were requested to rate their willingness to take risks relative to other farmers in their district on a Likert-type scale ranging from one (much less willing) to five (much more willing). About 24 percent of respondents considered themselves more willing to take risks than other farmers (categories four and five).

Spearman's rank correlation coefficient may be used to determine the linear association between variables of ordinal nature (SPSS, 1993a). Consequently, Spearman's correlation coefficients for respondents who rated their willingness to take risks relative to other farmers and their objectives (ranked in order of preference, with one being the most important) were computed. Being competitive on the world market was the only objective to display a significant relationship with willingness to take risks (five percent level). The negative coefficient indicates that farmers who perceive themselves more willing to take risks relative to other farmers consider international competitiveness to be important, and it is these farmers who are likely to benefit the most from the GATT provisions.

3.4 Computer adoption in a changing risk environment

With a decline in government support, commercial farmers will need to assume greater risk-bearing in their management (Lyne and Ortmann, 1992; Ortmann *et al*, 1992). Internal (financial accounting systems) and external (agribusiness) sources of information aid in risk management (Barry *et al,* 1995). This will increase the demand for new production, marketing and financial information that update and improve their expectations regarding future events (Barry and Fraser, 1976). Following agricultural liberalisation in New Zealand, demand for information relating to assessing market opportunities increased substantially (Robinson, 1995). In a study by Woodburn *et al* (1994), computers were considered to be helpful in most management activities, enabling farmers to process data quickly and efficiently thereby empowering managers to make more relevant, informed and timeous decisions.

The objective of this analysis is to determine the effect of personal and business characteristics on the adoption of a personal computer in the farm business. The dependent variable (Y_i) is dichotomous, scoring one if a personal computer is owned and used by the farmer, and zero otherwise. Discriminant analysis may be used for dichotomous dependent variables but the linear discriminant function is not optimal if a mixture of discrete and continuous variables are included as the assumption of multivariate normality may be violated (SPSS, 1993b). According to Gujarati (1995), linear probability, logit and probit models are suitable for regression on dummy dependent variables. Linear probability models are, however, unattractive as they express Y_i as a linear function of the explanatory variable(s) (X_i) and there is no guarantee that the conditional probability of the event *Y* occurring, given *X*, will lie within the zero to one range. Logit and probit models, however, overcome this disadvantage. The logit model is mathematically less complex than the probit model (Gujarati, 1995) and is therefore applied in this study.

Based on the results of other studies (eg Ortmann *et al*, 1994; Woodburn *et al*, 1994), personal characteristics considered in this analysis include farmer's age, educational level, number of information sources used, willingness to take risks, and the rating of own management skills relative to other farmers in the district. Business characteristics constitute

annual farm turnover in a normal year, proportion of land rented, the business' debt/asset ratio, off-farm income and dummy variables accounting for beef, dairy and sugar-cane.

Only variables with coefficients significant at the 10 percent (or higher) level were retained in the analysis. The following general logit model shows the explanatory variables included:

$$\ln[pi/(1\text{-}pi)] = \beta_0 + \beta_1 EDU_i + \beta_2 INFO_i + \beta_3 SIZE_i + \beta_4 BEEF_i \ldots . \quad (3.1)$$

where *pi* is the probability of adopting a computer on farm *i*. The dependent variable $\ln[pi/(1\text{-}pi)]$ is the natural log of the odds ratio in favour of adopting a computer (ie, the ratio of the probability that a farmer will adopt a computer to the probability that a computer will not be adopted (Gujarati, 1995)). EDU measures the number of years of formal education, whilst INFO shows the number of information sources used by the farmer. SIZE represents the annual turnover of the farm business (in millions of rands) and BEEF is a dummy variable (equal to one if turnover from beef production exceeds 55 percent of gross farm income, and zero otherwise). Predicted classification and maximum likelihood estimates of this model are included in Table 3.3.

The model Chi-square statistic, which tests the joint significance of the explanatory variables included in the model, is highly significant. The goodness of fit statistic shows no significant lack of fit in the overall model. For the Chi-square distribution to give a good approximation to the probabilities in the tails, an assumption is that the number of cells is held constant. This assumption is, however, not tenable when the model has one or more continuous predictors (Demaris, 1992). Nevertheless, Hosmer and Lemeshow (1989) maintain that, for practical purposes, the Chi-square statistic provides a reasonable estimate of the expected value of Chi-square when the number of cells is not held constant.

Table 3.3: Logit model of computer adoption by sample commercial farmers in KwaZulu-Natal, 1996 (n=102).

Variable	Parameter estimate	Standard error	Asymptotic *t*-statistic	Standardised parameter estimate
Intercept	-4,2619	1,9499	-2,19**	-1,2651
EDU	0,2218	0,1311	1,69*	0,5201
INFO	0,4405	0,2164	2,04**	0,6617
SIZE	0,9158	0,4068	2,25**	1,7522
BEEF	-1,2866	0,7393	-1,74*	-0,4637
Model Chi-square	37,108*** on 4 degrees of freedom			
Goodness of fit	111,469 (N.S.) on 97 degrees of freedom			
Correct prediction (percent)				
Total:	79,41			
Adopters:	86,76			
Non-adopters:	64,71			

Note: *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels of probability respectively.

The estimated model correctly classifies 86,76 percent (59 of 68) of adopters and 64,71 percent (22 of 34) of non-adopters, yielding an overall correct classification rate of 79,41 percent (81 of 102). Upward bias may exist in the classification rate as the entire sample was used to estimate the logit model and to classify cases. Cross-validation involves splitting the sample in half into a prediction sample and a validation sample, but the entire sample is used to derive final parameter estimates. The cross-validation proportion reduction in error for this study (0,204) indicates that prediction errors are reduced by 20,4 percent when using the prediction model (Demaris, 1992). Reduction in prediction error is probably underestimated as sample size limitations resulted in a reduction of statistical significance of coefficients in the prediction model due to information loss.

A measure of predictive efficiency based on the log likelihood gives rise to a R^2-type

measure for logistic regression. Strictly speaking, this is not a measure of the variance explained by the model as the minus twice log likelihood is not really an interpretable quantity. It should therefore be used as a rough approximation of predictive efficiency of the model. The R^2 of 0,286 is, however, underestimated due to a loss of explanatory power when the response variable is measured at binary level (Demaris, 1992).

The results of the estimated model are consistent with those of Ortmann *et al* (1994) and Woodburn *et al* (1994). The positive EDU coefficient implies that the probability of computer adoption increases with higher levels of education. This is expected as time spent on mastering computer systems is reduced, the capacity to use computer-provided information and exposure to computer systems is greater with higher levels of education. Understanding of complexities in production and financial relationships is expected to improve with increasing levels of education (Batte *et al,* 1990).

The number of information sources (INFO) used is positively related to computer adoption. It is anticipated that farmers who seek more information believe the benefits of additional information outweigh the costs. These farmers will thus have a higher probability of adopting a computer in order to gain additional information to aid with decision making. As expected, a positive and significant zero-order correlation coefficient of 0,261 exists between EDU and INFO, but this did not lead to multicollinearity in the logit model. The coefficients estimated for these variables are both significant at least at the 10 percent level of probability.

Gross farm turnover (SIZE) has a large effect relative to the other independent variables (highest standardised coefficient) and is positively related to the adoption of a personal computer. Decision making on larger farms is expected to be more complex thereby increasing the benefit of computers as a decision aid. The cost of computer adoption is largely scale independent whilst the return to improved information is scale dependent, thereby increasing profit per unit of output as farm size increases (Woodburn *et al*, 1994).

The predominance of a beef enterprise (BEEF) in the farming operation reduces the probability of owning and using a computer. Mean farm size for farmers who scored a one for the BEEF variable was 1480 hectares indicating extensive beef production systems.

Benefits of computerised information systems are expected to be lower for less intensive production systems. These operations require less complex recording systems and have lower information requirements.

CHAPTER 4

FARMERS' ATTITUDES TOWARDS FREE TRADE AND DEREGULATED MARKETS

4.1 Introduction

The personal, financial and farm size characteristics of farm operators may be important factors influencing their attitudes towards free trade (Kastens and Goodwin, 1994). Consequently, the objective of this section is to determine the personal and business characteristics of respondents that influence their perceptions regarding free trade and deregulated domestic markets. A logit model is developed for this purpose. The dependent variable (Y_i) is dichotomous, scoring one if the respondent agreed with free trade (or deregulated domestic markets), and zero otherwise.

Equation (4.1) can be used to estimate the log odds of the probability of an event occurring, in this case the probability that a respondent will favour a free-trade environment. Respondents who 'strongly disagreed' or 'disagreed' with the statement regarding free trade (first question in Table 2.5) were allocated a zero, while respondents who 'agreed' and 'strongly agreed' were coded a one. 'Uncertain' responses were excluded from the analysis.

$$\ln[p_i/(1-p_i)] = a + \sum_{k=1}^{n} \beta_k X_{ki} \quad \ldots(4.1)$$

where p_i is the probability of the ith respondent favouring a free-trade environment and X_k the kth explanatory variable. The dependent variable $\ln[p_i/(1-p_i)]$ is the natural log of the odds ratio in favour of the ith respondent being in favour of free trade (Gujarati, 1995).

4.2 Independent variables considered in the model

Based on previous studies discussed in Chapter 1, personal characteristics considered include years of farming experience, level of education, and willingness to take risks. Proportion of

land rented, farm type, turnover (farm size), operator's wealth (net worth), off-farm employment, distance to nearest town, the debt/asset ratio, and a measure of financial stress (incorporating both solvency and liquidity measures) were the business characteristics considered. Exploratory analysis was also pursued to determine other factors affecting farmers' attitudes towards free trade. Variables which were hypothesized to have an impact on free-trade attitudes are defined in Table 4.1.

Hypothesized relationships between free-trade attitudes and EXP, EDU, RENT, SIZE, NWORTH and RISK are consistent with those of past studies and are discussed in Chapter 1. Increased price risk is expected with free trade, and thus farmers who have to contend with the additional financial risk associated with borrowed capital (D/A, FSTRESS, FFOPT and REPAY) are likely to oppose free trade.

Beef (BEEF) and sugar-cane (SUGAR) farmers are likely to be faced with reduced product prices under free-trade conditions (lower tariffs), and most beef farmers are unlikely to benefit substantially from reduced input costs under free trade owing to the extensive nature of production. These farmers are expected to oppose free trade. Milk is highly perishable and thus not easily exportable, and opportunities exist to add value to it. Dairy farmers (DAIRY) are, therefore, hypothesized to support free trade.

COMPUT is expected to have a positive effect on farmers' free-trade attitudes as it is a measure of farmer progressiveness. Rapid information flows are vital in a free market, and farmers using computers can develop a competitive edge over other farmers owing to more timeous information. DIST is expected to have a negative relationship because proximity to markets is an important advantage to farmers if they are to market their own products.

Table 4.1: Definition of variables expected to influence farmers' attitudes towards free trade.

Variable	Definition	Expected relationship
EXP	Years of farming experience.	-
EDU	Years of formal education.	-
RENT	Percentage of the total area operated that is rented.	+
SIZE	Annual gross income from farming operations (Rand).	+
NWORTH	Net worth of farm business (Rand).	+
RISK	Farmers' willingness to take risks relative to other farmers in the district (measured on a Likert-type scale ranging from 1 = much less willing to 5 = much more willing).	+
D/A	Debt to asset ratio.	-
FSTRESS	Measure of financial stress (liquidity and solvency) scoring 0 if low up to 4 if high (Orazem *et al*, 1989).	-
FFOPT	Fixed financial obligations as a proportion of turnover.	-
REPAY	Value of medium and long term debt repayments (R100 000).	-
BEEF	Dummy variable = 1 if more than 55 percent of gross income is derived from beef production, 0 otherwise.	-
SUGAR	Dummy variable = 1 if more than 55 percent of gross income is derived from sugar-cane production, 0 otherwise.	-
DAIRY	Dummy variable = 1 if more than 55 percent of gross income is derived from dairy production, 0 otherwise.	+
COMPUT	Dummy variable = 1 if a computer is used in the farm business, 0 otherwise.	+
DIST	Distance of farm from nearest town (km).	-
ENVIRO	Rating of changes in environmental regulations as a source of risk (1 = low and 5 = high)*.	-
RISKFAC	Factor consisting of variability in crop prices, changes in the Rand exchange rate, changes in costs of inputs and further reduction of tariffs on imported farm products as sources of risk, as per section 3.1 (1 = low and 5 = high for all sources of risk).	-
LPRICE	Rating of variability in livestock prices as a source of risk (1 = low and 5 = high).	-
LANDP	Dummy variable = 1 if farmer expects land prices to increase if GATT provisions are successfully implemented, 0 otherwise.	+
LANDRED	Rating of further land redistribution and/or restitution by government as a source of risk (1 = low and 5 = high).	+
MFINAN	Self-rating of management skill in farm finance (1 = low and 5 = high).	+
PORF	Dummy variable = 1 if respondent is involved full-time in the farming operation, 0 otherwise. PORF is an inverse measure of off-farm income.	-
TLEVEL	Dummy variable = 1 if respondent indicated some knowledge of tariff levels on products sold or inputs used, 0 otherwise.	-

* All ratings, where 1 = low and 5 = high, are based on a Likert-type scale.

Farmers who attach greater importance to various risk sources are expected to have a negative attitude towards free trade (which gives rise to greater price risk). Hence, the variables ENVIRO, RISKFAC and LPRICE are expected to have a negative relationship with the dependent variable. Note that RISKFAC was developed for the following reason: Variability in crop prices, changes in the Rand exchange rate, changes in the cost of inputs and further reduction of import tariffs on agricultural products are sources of risk expected to influence respondents' attitudes towards free trade. Multicollinearity was anticipated among these variables owing to significant (one percent) zero-order correlation coefficients. A factor (RISKFAC), explaining 51 percent of the variation in these variables, was therefore created.

Farmers expecting profits, and thus land prices (LANDP), to fall (rise) under free trade conditions are expected to have a negative (positive) attitude towards free trade. However, farmers who perceive further land redistribution as a source of risk (LANDRED) may see an opportunity in free trade to secure their land base if they can become relatively more competitive. If this is the case, a positive relationship between LANDRED and attitudes towards free trade is expected.

MFINAN is hypothesized to have a positive effect on free-trade attitudes. Farmers who rate their financial skills highly most probably manage financial risk more effectively and are thus in a better position to manage increased price risk under free trade.

Previous studies have reported a positive relationship between off-farm income earned by farmers and their attitude towards free trade; these farmers are less reliant on income from government programmes (eg Orazem *et al*, 1989; Barkley and Flinchbaugh, 1990). Hence, a negative relationship is expected between PORF and attitudes towards free trade.

Knowledge of tariff levels is also expected to influence free-trade attitudes. Reduction of tariffs on imported products is expected to reduce local prices and hence farmers' profits. However, lower import tariffs on farm inputs are expected to have a positive effect on farmers' finances owing to lower input costs. Hence, if farmers have more knowledge of (or are more concerned with) tariffs on imported farm products than of input tariffs, a negative

relationship between TLEVEL and attitudes towards free trade is expected.

The general logit model can now be defined as:

$$\ln[pi/(1\text{-}pi)] = \beta_0 + \beta_1 EXP_i + \beta_2 EDU_i + \beta_3 RENT_i + \beta_4 SIZE_i + \beta_5 NWORTH_i + \beta_6 RISK_i + \beta_7 D/A_i + \beta_8 FSTRESS_i + \beta_9 FFOPT_i + \beta_{10} REPAY_i + \beta_{11} BEEF_i + \beta_{12} SUGAR_i + \beta_{13} DAIRY_i + \beta_{14} COMPUT_i + \beta_{15} DIST_i + \beta_{16} ENVIRO_i + \beta_{17} RISKFAC_i + \beta_{18} LPRICE_i + \beta_{19} LANDP_i + \beta_{20} LANDRED_i + \beta_{21} MFINAN_i + \beta_{22} PORF_i + \beta_{23} TLEVEL_i \quad \ldots . \quad (4.2)$$

4.3 Results of the analysis

Independent variables included in other studies proved to be poor determinants of farmers' attitudes towards free trade in this study. This may be due to a relatively small sample and lack of variation in the data. Only variables with coefficients significant at the ten percent (or higher) level of probability were retained in the logit model. Results of the analysis are presented in Table 4.2.

The model Chi-square statistic is highly significant. The goodness of fit statistic shows no significant lack of fit in the overall model. The estimated model correctly classifies 92,59 percent (50 of 54) of those in favour of free trade and 75,00 percent (12 of 16) of those opposed to free trade, yielding an overall correct classification rate of 88,57 percent (62 of 70). Upward bias may exist in the classification rate as the entire sample was used to estimate the logit model and to classify cases. Due to sample size limitations (70 valid cases) cross-validation was not feasible. The R^2-type measure for logistic regression (Demaris, 1992) was 0,613.

Large standardised parameter estimates indicate that a unit change in the independent variable will have a large effect on the log of the odds ratio of a respondent agreeing with free trade relative to other independent variables. RISKFAC has the largest effect on trade attitudes followed by LANDP and LANDRED.

Table 4.2: Logit model of attitudes towards free trade by sample farmers in KwaZulu-Natal, 1996 (n=70).

Variable	Parameter estimate	Standard error	Asymptotic *t*-statistic	Standardised parameter estimate
COMPUT	3,2968	1,7066	1,93*	1,5868
DIST	-0,1996	0,0732	-2,73***	-2,7686
ENVIRO	-1,8245	0,6970	-2,62**	-2,8680
RISKFAC	-6,4153	2,2851	-2,81***	-6,4153
LANDP	10,1536	3,8559	2,63**	3,5825
LANDRED	2,0176	0,7684	2,63**	3,4635
LPRICE	-1,0460	0,4452	-2,35**	-2,1820
MFINAN	2,8454	1,0248	2,78***	2,4708
PORF	3,8046	1,9115	1,99**	1,3373
REPAY	-2,600	0,9552	-2,72***	-2,4226
TLEVEL	-3,7165	1,7032	-2,18**	-1,5958
CONSTANT	-4,2732	2,8689	-1,49	7,2305
Model Chi-square	46,163*** on 11 degrees of freedom			
Goodness of fit	27,393 (N.S.) on 58 degrees of freedom			
Correct prediction (percent)				
Total	88,57			
Agree	92,59			
Disagree	75,00			

Note: *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels of probability respectively.

Computer adoption (COMPUT), a proxy for a farmer's progressiveness, has a positive coefficient as hypothesized, implying that respondents who own and use a computer are more likely to favour a liberalised trade environment. Progressive farmers are more likely to adopt relevant technologies which increase their competitive advantage. However, this variable may also capture the effects of other factors such as farm size, farmer's age and level of education

as larger, younger and better educated farmers are more likely to adopt a computer (Woodburn *et al*, 1994).

A negative relationship for DIST indicates that farmers more distant from a town will oppose free trade. In the past, 21 control boards marketed about 90 percent of the total value of agricultural production (Lyne and Ortmann, 1992), thereby reducing the need for farmers to market their products. In the event of trade liberalisation, farmers will be required to market their products (either themselves or by agents), and locality of potential markets will therefore be important.

Respondents who consider changes in environmental regulations (ENVIRO) as a risk to their businesses are likely to oppose a free-trade environment, as evidenced by a negative coefficient. The South African commercial farming industry has relied on chemicals and commercial fertilizers to produce high yields (Lyne and Ortmann, 1992), whilst environmental restrictions under GATT could include limits or bans on the use of fertilizers, pesticides and herbicides (LaFrance, 1992). Provisions under GATT include revision and tightening of sanitary and phytosanitary measures (Giardini, 1995). In addition to these concerns, issues relating to the landscape, conservation, water quality, quality of foodstuffs and animal welfare are to be addressed (MacLaren, 1995). Adherence to certain environmental measures would require additional investment for farmers, thereby increasing their costs of production. Environmental groups are also becoming an effective counter force to traditional farm lobbies (MacLaren, 1995).

A negative coefficient for RISKFAC indicates that respondents who perceive variability in crop prices, changes in the Rand exchange rate, changes in input costs and further reduction in import tariffs as sources of risk are opposed to liberalisation of trade. This is expected as crop prices would be more variable under free trade. Changes in the Rand exchange rate would affect the domestic cost of inputs and prices of imported products, whilst further reduction in import tariffs on agricultural products would also affect local product prices. As hypothesized, respondents who perceive these factors as important sources of risk to their operations would oppose liberalisation of trade. This independent variable has the highest standardised parameter estimate and thus has the largest effect on free-trade attitudes relative

to other independent variables.

As expected, respondents anticipating an increase in land prices (LANDP) in the event of the successful implementation of GATT are supportive of a free-trade environment. GATT is synonymous with free trade and this response is therefore rational as increased land prices are of benefit to land owners.

LANDRED, the importance of further land redistribution as a source of risk, is positively related to attitudes towards free trade. Respondents' supportive of free trade probably consider themselves competitive and are likely to survive in a free-trade environment. Respondents' perceptions may indicate that more productive units will not be redistributed ahead of other less competitive operations.

As expected, variability in livestock prices (LPRICE) has a negative association with the dependent variable. Operators who regard variable livestock prices as an important source of risk are likely to oppose free trade as livestock prices are likely to be more variable under free-trade conditions.

Respondents with a higher self-rating of management skill in farm finance (MFINAN) are supportive of a free-trade environment. Above-average financial managers are better equipped to manage increased price risk associated with market forces by controlling financial risk. Following economic liberalisation, farmers in New Zealand reduced fixed financial repayment obligations by reducing debt levels (Robinson, 1995).

The positive PORF coefficient suggests that full-time farmers are in favour of a liberalised trade environment. This is contrary to expectations and the results reported by Edelman and Lasley (1988) and Barkley and Flinchbaugh (1990). In this study, respondents farming on a full-time basis may have a greater incentive to adapt to a market-orientated economy in order to satisfy household consumption needs. These farmers may have more time available to investigate different marketing alternatives and to identify and respond to market signals.

A negative relationship exists between attitudes towards free trade and debt repayment levels

(REPAY) (The debt/asset ratio, fixed financial obligations as a proportion of turnover, and another measure of financial stress were also investigated, but their coefficients were not statistically significant). Following economic liberalisation in New Zealand in 1984, the real price of farmland decreased from 1095 dollars per hectare in 1984 to 569 dollars per hectare in 1989 (Johnston and Frengley, 1991). Consequently, farm households whose debt exceeded 50 percent of total assets increased from 10 percent of households in 1985 to nearly 24 percent in 1986. This proportion of farmers with high debt levels subsequently declined due to debt restructuring and farm sales (Johnston and Frengley, 1994). Lower levels of debt are now evident as farmers seek to have a financial buffer to protect themselves from a future downturn (Robinson, 1995). Given the potential decline in land values, operators with higher debt levels are possibly aware of the effect of free trade on their debt/asset ratio. The anticipated increase in price risk associated with trade liberalisation, in addition to the level of financial risk associated with borrowed capital, may be of concern.

Respondents who indicated that they knew the level of import tariffs on products they produced or inputs they used (TLEVEL) were opposed to free trade. Seventy-seven and 90 percent of respondents respectively did not know the tariff level on products they produced or inputs they used. More respondents have an expectation regarding the effect of tariff removal on reduced product prices (negative effect on farm business) than on reduced input prices (benefit to farm business), which could explain the negative relationship. This result may imply that farmers need more information on the level of tariffs on imported goods, particularly on the potential benefits (decreased costs) to the farm business of reduced (abolished) tariffs on imported inputs.

4.4 Logit model of attitudes towards deregulated domestic markets

Logit analysis was also used to establish the personal and business characteristics (presented in section 4.2) influencing farmers' attitudes towards deregulated domestic markets. The logit model adapted from equation (1) is used to predict that a respondent will strongly agree with the statement given.

Only three percent of respondents disagreed with the statement regarding deregulated

domestic product and input markets (last question in Table 2.5). Consequently, respondents who 'agreed' with the statement given were coded as zero, whilst those who 'strongly agreed' were coded as one. After investigating variables considered in section 4.2, only variables with coefficients significant at the ten percent (or higher) level were retained in the model. These include DAIRY, EXP, MFINAN and RISK all of which are defined in Table 4.1. Results of the analysis are presented in Table 4.3.

Table 4.3: Logit model of attitudes towards deregulated domestic markets by sample farmers in KwaZulu-Natal, 1996 (n=98).

Variable	Parameter estimate	Standard error	Asymptotic *t*-statistic	Standardised parameter estimate
DAIRY	1,74943	1,1011	1,59*	0,3957
EXP	-0,0641	0,0261	-2,46**	-0,8653
MFINAN	1,3482	0,4602	2,93***	1,1707
RISK	0,7865	0,3427	2,30**	0,7756
CONSTANT	-7,5856	2,3161	-3,28***	-1,9576
Model Chi-square	24,600*** on 4 degrees of freedom			
Goodness of fit	90,266 (N.S.) on 93 degrees of freedom			
Correct prediction (percent)				
Total	84,69			
Agree	96,10			
Strongly agree	42,86			

Note: *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels of probability respectively.

The model's Chi-square statistic is highly significant. The goodness of fit statistic shows no significant lack of fit in the overall model. Zero-order correlation coefficients were all less than 0,19 and there were no relationships significant at the five percent level, thus multicollinearity is not suspected. Of the independent variables included, MFINAN has the highest standardised coefficient indicating the relatively large effect it has on attitudes

towards market deregulation.

The estimated model correctly classifies 96,10 percent (74 of 77) of those who 'agree' and 42,86 percent (9 of 21) of those who 'strongly agree' with market deregulation, yielding an overall correct classification rate of 84,69 percent (83 of 98). Upward bias again exists in the classification rate as the entire sample was used to estimate the logit model and to classify cases. The cross-validation proportion reduction in error for the logit model (0,407) indicates that prediction errors are reduced by 40,7 percent when using the prediction model (Demaris, 1992). Reduction in prediction error is probably underestimated as sample size limitations resulted in a reduction of the statistical significance of coefficients in the prediction model due to information loss. The R^2-type measure for logistic regression, which is underestimated (Demaris, 1992), was 0,242.

Respondents who derive more than 55 percent of their gross income from dairy production are more likely to strongly agree with deregulation of domestic product and input markets. These (dairy) respondents, as opposed to beef and sugar-cane producers, possibly perceive greater benefits from the deregulation of the maize (feed) industry and improved marketing opportunities, as product differentiation and adding value to milk (eg cheese and yoghurt) are feasible alternatives.

Years of farming experience (EXP) is negatively related to deregulation attitude, indicating that less experienced farmers are more likely to agree with market deregulation than more experienced producers. The latter could be less suspicious of government programmes' complex regulations (Kastens and Goodwin, 1994).

Respondents who have a higher self-rating of management ability in farm finance (MFINAN, which also has the highest standardised parameter estimate), are more likely to strongly agree with market deregulation. Skilled financial managers may be able to exercise prudent purchasing of inputs and should also be better able to manage increased price risk associated with deregulated markets.

Willingness to take risks (RISK) was positively related to deregulation attitudes. Increased

price risk associated with the deregulation of product markets is less likely to be perceived as a problem by farmers who are more willing to take risks.

POLICY IMPLICATIONS AND CONCLUSIONS

Most respondents in this study support trade liberalisation *but* foresee lower product prices, farm profits and land values if the GATT provisions are successfully implemented. A possible reason for this apparent anomaly is the additional source of risk associated with potential changes in government agricultural policy. Following agricultural liberalisation in New Zealand, farmers were faced with changes in prices and the economic environment but considered these more modest and predictable than government's reactions to political demands (Robinson, 1995). Government should be aware of the risk and uncertainty it creates for farmers, and should therefore carefully evaluate potential policy changes to minimise this risk and also keep farmers informed of possible developments so that they can plan their operations accordingly. Respondents also seem to be aware of the importance of becoming more competitive on domestic and international markets.

Seeking additional marketing information to aid in management decisions and adding value to their products were cited as responses to reduced agricultural support. Production responses included increasing the size of current enterprises (to take advantage of economies of size), adding a new enterprise (diversification) and changing the size and mix of current enterprises. Opportunities exist for private consultants, who are considered by 22 percent of respondents as a potential source of information (but currently used by only 10 percent of them), to advise farmers, particularly on product marketing (respondents considered their marketing skills as poor relative to other farming skills). Restructuring debt commitments, borrowing less capital and reducing drawings were financial responses considered, but were not considered as important.

Changes in tax, labour and land legislation were considered more of a threat to the farm business than variability in crop prices, crop yields and livestock production. This is contrary to results presented by Woodburn *et al* (1995). The uncertainty surrounding present government policies may have contributed to this changing perception. Consequently, improved information flows from government regarding changes in policies that affect farmers (eg by encouraging vigorous debate among policymakers, farmers and agricultural unions at farmers' days) are important. This will make farmers aware of potential policy

changes and help them to adapt by planning appropriate strategies for their businesses.

Results of a factor analysis of 16 sources of risk confirmed that farmers view risk in various dimensions and not necessarily as individual sources. This supports the results of Patrick *et al* (1993) and Woodburn *et al* (1995). For example, credit access, a factor involving availability of credit and changes in the interest rate, was viewed as a source of risk. This source affects the viability of farms and lenders and other consultants should inform agricultural producers of the implications of changes in monetary policy. Alternatively, farmers themselves should be seeking this type of information.

The adoption of a personal computer will enhance risk bearing as it will improve farmers' access to relevant and timeous information. Level of education and importance placed on attainment of information are personal characteristics that are positively related to the adoption of a computer. Farmers operating less intensive production systems (eg extensive beef) are less likely to adopt a computer. Farm size had the largest effect on computer adoption and larger farm operators are more likely to use a personal computer in their farm business.

A large proportion of respondents did not know the level of import tariffs on the products they produced (77 percent) or inputs they used (90 percent). The perceived knowledge of tariff levels (TLEVEL) negatively affects attitudes towards free trade because more farmers knew about the negative effect of reduced import tariffs on their product prices than about the cost-saving effect (positive) of lower tariffs on imported inputs, *ceteris paribus*. More information on import tariffs and their possible effects could improve farmers' perceptions of free trade, particularly information on how lower tariffs affect imported inputs. Information channels could include publications frequently used by farmers, such as *Effective Farming* and *Farmers' Weekly* (as per section 2.4), more industry-specific information provided by industrial publications (eg SA Sugar Journal) or the electronic media. Generic advertising and providing market information appear to be the main functions of the remaining marketing boards (Swart, 1996); they may therefore also have an important role to play in the dissemination of industry-specific information.

Sixty percent of respondents intended seeking additional information about GATT. Information regarding anticipated price changes and the implications of the GATT provisions may also be useful to farmers in planning the future direction of their businesses.

The low anticipated use of futures markets (by 10 percent of respondents) could be improved by increasing the range of futures contracts (eg more crop contracts) and/or educating farmers on the function and principles of futures markets. This could help farmers in managing price risk as more variable prices are expected with trade liberalisation.

Respondents who perceive sources of risk such as changes in environmental regulations, variability in crop and livestock prices, changes in the Rand exchange rate and the cost of inputs, and further reduction of import tariffs on farm products as important sources of risk, were more likely to oppose free trade. Farmers who are relatively risk averse are also less likely to favour market deregulation. High standardised parameter estimates for RISKFAC (a factor capturing various sources of risk) and LANDRED (the risk of further land redistribution) indicate the relative importance of these risk sources on perceptions of free trade.

Increased price risk is anticipated with free trade and market deregulation. To improve farmers' ability to survive in the changing policy environment and to avoid resistance towards trade liberalisation from risk-averse producers, improved information flows and education regarding methods of managing financial and business risk could be pursued (Barry *et al*, 1995). Educating farmers on how to manage risk by using methods such as production responses (eg irrigation and diversification), marketing responses (eg market information and forward contracting) and financial responses (eg restructuring debt and formal insurance) could enable farmers to better manage the increased price risk associated with free trade (Eidman, 1990). Self-rating of managerial ability in farm finance may improve, thereby reducing debt repayment levels which may in turn, also improve perceptions of free trade.

Small-scale emerging farmers are likely to have less information and knowledge of risk management strategies than large-scale commercial farmers. Consequently, government extension services may have an important role to play in disseminating information and

educating small-scale producers on risk management strategies in a changing trade environment.

SUMMARY

Signatories to GATT are required to reduce the Aggregate Measure of Support, convert all non-tariff barriers to tariffs, increase domestic import opportunities, reduce the volume of subsidised exports and revise and tighten sanitary and phytosanitary measures. International trade liberalisation is likely to result in a reduction in welfare of agricultural operators and an improvement in consumer welfare in the event of termination of farm subsidy programmes. Aggregate welfare is expected to be greater under liberalised trade.

World prices for most agricultural commodities are expected to increase in the medium-term as production will be determined by the market and surpluses, as are currently experienced, will be substantially reduced or eliminated. However, technological improvements may reduce prices in the long-term.

Agricultural support, as calculated by the Producer Subsidy Equivalent (PSE), was reduced in New Zealand from 34 percent in 1984 to three percent in 1994. Improvements in the level of public debt, the inflation rate and agricultural productivity have been observed. Area farmed, number of holdings and sheep numbers declined following policy liberalisation. Dairy, beef, goat and deer numbers increased. The percentage of low debt farms has increased whilst the percentage of highly indebted farms has declined.

Changes in EU and USA farm policies are likely to affect world trade and South African agriculture. South Africa compares favourably with the rest of the world in terms of the level of agricultural support, but this support as a percentage of per capita income is high relative to other countries. South Africa has been committed to a reduction in agricultural support under GATT which is evident by reduced tariffs and changes in the structure of agricultural support programmes. The exposure of the agricultural sector to international market forces has increased competition for local farmers in both domestic and foreign markets.

Farmers are assumed to be rational, profit maximising decision makers and will therefore support agricultural policies in which they perceive the greatest benefit. Research in the USA has shown that farm operators with higher levels of education and experience display a

resistance towards policy liberalisation because they are better able to comprehend agricultural programmes' complex regulations and resulting benefits and are less suspicious of agricultural programmes. Farm operators who perceive themselves to be risk averse and operators with lower levels of rented land display a resistance to policy liberalisation. Specialised farms are less likely to support liberalisation than diverse operations and farm types enjoying relatively high levels of government support are expected to oppose policy liberalisation. Farm size, wealth and number of days worked off the farm display a positive relationship with policy liberalisation. As the level of government receipts paid to farmers increased, support for trade liberalisation declined because farmers perceived government receipts to be of benefit to their businesses.

Of the 578 questionnaires mailed to commercial farmers in KwaZulu-Natal, 149 were returned of which 112 were usable. Respondents were on average 49,5 years of age, had 24,3 years of farming experience and 14,1 years of formal education. The majority (60 percent) were individual owners of their farm business. The average area operated in the sugar-cane producing Coastal Belt region was 511 hectares, and 1121 hectares in the Lowveld region which produces mainly sugar-cane and beef. Midlands farmers operated 866 hectares on average and farmed with beef, dairy, sugar-cane, timber or pigs. Land was cash-rented by 21 percent of respondents.

About 86 percent of respondents were full-time farmers. Median household income from off-farm employment was R47 375. Coastal Belt respondents had the highest debt/asset ratio (0,149) and turnover (R2 086 000), followed by respondents from the Lowveld and Midlands regions.

Respondents supported free trade *but* foresaw a decline in product prices, farm profits and land values if GATT provisions were successfully implemented. A possible reason for this is the source of risk associated with potential changes in government policy. Thirty-nine percent of respondents would respond to further reduction of import tariffs and 48 percent to deregulation of domestic markets. Responses included seeking market information, adding value to products, controlling costs, changing enterprise size and mix and adding an enterprise. Amongst others, newspapers, *Farmer's Weekly* and *Effective Farming* were

sources of information used to read about GATT.

Changes in costs of farm inputs was considered as the most important source of risk. In order of importance, changes in tax legislation, variability in livestock prices, changes in labour legislation, changes in the Rand exchange rate and further land redistribution by government were considered important risk sources. Variability in crop prices and crop yields were other important sources of risk.

Factor analysis of risk sources showed that various dimensions to risk exist, including changes in government policy, enterprise gross income, credit access and cost changes. Recent government policy changes may have resulted in respondents viewing certain sources of risk associated with changes in government policy as more important than in a 1993 study by Woodburn *et al* (1995).

Larger farm operators with higher levels of education and who use more information sources are more likely to adopt a computer, whilst operators of extensive production systems are less likely to adopt one. Operators with these personal and business characteristics are likely to have better access to internal and external sources of information which help with risk management.

Progressive, full-time farmers who considered themselves better financial managers and anticipated their land prices to increase under liberalised trade, were supportive of free trade. Respondents who viewed changes in environmental regulations, variability in crop and livestock prices, changes in the Rand exchange rate and the cost of inputs, and further reduction of import tariffs on farm products as important sources of risk, were more likely to oppose free trade. Farmers with higher levels of debt repayment and knowledge of import tariffs were also likely to oppose free trade. Years of farming experience was negatively related to attitudes towards deregulated domestic markets, whilst dairy farmers, better financial managers and those more willing to take risks were more likely to support market deregulation.

Improved information flows regarding tariff levels on imported agricultural goods,

particularly on inputs, may improve farmers' perceptions of free trade and reduce resistance towards liberalisation of agricultural markets. Knowledge of the possible implications of free trade and education about altering production, marketing and financial techniques to manage risk could also help farmers to survive in a changing economic environment.

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APPENDIX A

FARM SURVEY QUESTIONNAIRE USED IN KWAZULU-NATAL

UNIVERSITY OF NATAL
DEPARTMENT OF AGRICULTURAL ECONOMICS

FARMER QUESTIONNAIRE

TO BE COMPLETED BY THE **PRINCIPAL** FARM DECISION-MAKER
OF THE FARM BUSINESS

The objective of this questionnaire is to assess the consequences of trade and market deregulation on farm businesses, and to gauge your response to questions about free trade and deregulated markets.

Please answer every question. If a particular question is not relevant to your situation then please leave it blank. If a question is not clear please place a question mark (?) next to it.

YOUR SURVEY RESPONSES WILL BE KEPT STRICTLY CONFIDENTIAL.

1. Code: _____

2. To which Farmers' Association do you belong?

_____

The following questions deal with general aspects of your farm business.

3.1 Please tick the phrase which best describes the farm ownership structure:

_____ Individual owner
_____ Partnership
_____ Company
_____ Trust
_____ Close Corporation
_____ Other (Please describe) _____

3.2 Are you the owner of, or a shareholder in, the farm business? (Yes or No) _____

Are you employed to manage the farm business? (Yes or No) _____

4. Distance to nearest town? _____ Km

5. How many hectares does your farm business

Own?		_____ Ha
Rent in?	- cash rent	_____ Ha
	- share lease	_____ Ha
Rent out?		_____ Ha

6. Please supply the following details regarding yourself

Sex (Male or Female) _____
Part-time or full-time employment
in farming operation (P or F) _____
Age (years) _____
Farming experience (years) _____
Formal education (years)[1] _____

[1] For example, matric = 12 years, four year university degree = 16 years, etc.

7. Do you or your spouse receive off-farm income or have off-farm investments in addition to income derived from your farming operations? Indicate whether part-time or full-time employment is applicable, type of employment and the value of off-farm income.

	Yourself	Spouse
Do you or your spouse have off-farm employment? (Yes or No)		
If so, is it part-time (P) or full-time (F) off-farm employment?		
Type of off-farm employment (eg. chairman of company, doctor, lawyer, secretary, teacher, nurse, self-employed)		
Annual gross income from off-farm employment (Rand)		
Do you or your spouse have off-farm investments? (Yes or No)		

8. What were the estimated market values of your farm assets at 28 February 1995 and 28 February 1996?

Farm Assets	28 February 1995*	28 February 1996*
Land and buildings (R)		
Livestock (R)		
Machinery (R)		
Other (R)		
Total (R)		

* If it is more convenient to use your financial year-end, which is not the end of February, please indicate the appropriate month above February and fill in the relevant details. The same applies to question 9.

9. Indicate the level of your farm debt in the classes below at 28 February 1995 and at 28 February 1996, and the current annual repayments in the given debt classes. Classes of debt are classified below the table.

Farm Debt	28 February 1995	28 February 1996	Annual repayment [4]
Short-term [1] (R)			
Medium-term [2] (R)			
Long-term [3] (R)			
Total (R)			

1 To be repaid within a year (eg. bank overdraft).
2 To be repaid within a period of one to five years (eg. hire purchase).
3 To be repaid within a period of more than five years (eg. mortgage bond).
4 Annual capital plus interest repayment.

Note: Repayment period is considered as the entire period of the loan and not the time left to the final instalment.

The following questions deal with the possible effects of freeing-up international trade (by removing import quotas and eventually abolishing import tariffs on agricultural products and inputs) and deregulating domestic product and input markets (by abolishing production quotas, marketing boards, etc). They also relate to your attitudes and preferences regarding free trade and deregulated domestic markets.

10.1 Have you heard of, or read about, GATT (General Agreement on Tariffs and Trade) before? (Yes or No) _____

10.2 If GATT, which is aimed at freeing-up international trade, is successfully implemented here and abroad, so that all import tariffs are eventually removed, what do you think will happen to the following? (Please tick the appropriate space). **Focus your attention on the removal of tariffs only; eg. do not consider possible changes in the Rand exchange rate.**

	Increase	Decrease	Not change	Not sure
Your crop prices will	_____	_____	_____	_____
Your livestock prices will	_____	_____	_____	_____
Your input costs will	_____	_____	_____	_____
Your farm profits will	_____	_____	_____	_____
Your land prices will	_____	_____	_____	_____

11.1 From which of the following sources of information did you obtain information on GATT? (Please tick the appropriate space).

Newspapers _____
Private Consultant(s) _____
Farmers' days _____
Magazines: Effective Farming _____
Farmer's Weekly _____
Landbou Weekblad _____
Financial Mail _____
Finance Week _____
Extension officer(s) _____
Industry publications (eg Porcus) _____
Other (please specify) _____

11.2 Do you intend to seek more information on the policies of GATT?
(Yes or No) _____

12. **What are your views on the following four statements?** Please tick the block that best indicates your answer.

12.1 Free, unrestrained international trade (without the interference of governments both here and abroad) is beneficial for South African farmers.

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree

12.2 A free, open-market system of trade (ie. one without government intervention) should be pursued by all food exporting and importing countries by reducing all trade barriers.

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree

12.3 Farmers in all countries exporting agricultural commodities should not receive any government support.

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree

12.4 South African farmers should compete in deregulated (free) domestic product markets, if input markets are also deregulated.

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree

The following section considers the size of your enterprises and attempts to measure the effect of abolishing import tariffs and deregulating domestic product and input markets on your farm business.

13. Please indicate details of your main enterprises in the table below. For gross income in a normal year indicate Rand **and/or** percentage in the columns provided (Note: Size is defined in terms of milking cows, number of broilers, hectares, etc).

Enterprise	Size	Enterprise gross income (turnover) in a normal year (Rand)	Enterprise income as percentage of farm income
Dairy (Milking cows)			
Beef (Breeding cows)			
Pigs (Breeding sows)			
Sheep (Breeding ewes)			
Poultry (Layers)			
Poultry (Broilers)			
Vegetables (Ha)			
Maize (Ha)			
Soyabeans (Ha)			
Wheat (Ha)			
Timber (Ha)			
Sugar cane (Ha)			
Citrus (Trees)			
Others (please specify)			
Total			100 %

14. What is your total farm gross income (turnover) in a normal year?

R _____

15. If you produce any of the meat products listed below, what effect did the tariff reduction on imported meats (poultry and pork) in 1995 have on your meat prices?

	Percentage price decrease		Percentage price decrease
Beef	_____ %	Mutton	_____ %
Poultry meat	_____ %	Pork	_____ %

16.1 Are you responding, or do you have firm plans to respond, to the expected **abolishment of import tariffs** on imported agricultural products and inputs? (Yes or No) _____

16.2 Would you change your farming operation in response to a **complete deregulation** of product and input markets in South Africa? (Yes or No) _____

17. If you answered **No** in questions 16.1 and 16.2 you may leave out questions 17.1, 17.2 and 17.3. If you answered **Yes** to one or both questions, how would you adapt to **the complete abolishment of import tariffs on agricultural products and inputs** and/or **the complete deregulation of domestic product and input markets (the abolishment of production quotas, marketing boards, etc)?**

17.1 **By changing the size and mix of various enterprises.** Indicate the desired size of enterprises in the longer term if they are to be changed, ie number of cows, hectares, etc.

Enterprise	Desired size
Dairy (Milking cows)	
Beef (Breeding cows)	
Pigs (Breeding sows)	
Sheep (Breeding ewes)	
Poultry (Layers)	
Poultry (Broilers)	
Vegetables (Ha)	
Maize (Ha)	
Soyabeans (Ha)	
Wheat (Ha)	
Timber (Ha)	
Sugar (Ha)	
Citrus (trees)	
Other (please specify)	

17.2 **By altering costs.** Based on your response to the previous question, please indicate how you would change use of the following inputs (increase, decrease or not change). Please tick the appropriate space.

	Increase	Decrease	Not Change
Labour	____	____	____
Machinery	____	____	____
Fertilizer	____	____	____
Other _____	____	____	____
_____	____	____	____

17.3 **By pursuing one or more of the following options** (tick the appropriate space):

___ Exporting your products.

___ Adding value to your products

___ Purchasing additional technologies to improve productivity.

___ Seeking additional marketing information that may aid you in management decisions.

___ Employing machinery contractors.

___ Employing labour contractors.

___ Employing the services of consultant(s).

___ Seeking off-farm employment.

___ Renting additional land (_____ Ha).

___ Restructuring your debt by any number of the following methods

- ___ Selling land.
- ___ Selling other farm assets.
- ___ Introducing into the farm capital invested off the farm.
- ___ Restructuring debt commitments (eg. changing short term debt to long term debt).
- ___ Borrowing more capital.
- ___ Borrowing less capital.

___ Trading on the futures market (SAFEX) as a means of reducing price risk.

___ Engaging in forward contracts to secure product prices.

___ Reducing drawings (personal expenditure) from the farm business.

If you have other methods, please specify

_____

_____

The following questions relate to your level of information regarding import tariffs in South Africa.

18.1 Do you know the **level of tariffs** on the imports of the **products you produce** or the **inputs you use?** Please tick the appropriate space.

Imported products	
Yes	No

Imported inputs	
Yes	No

18.2 For the products listed below, please indicate the tariff levels for the **products you produce** and the **inputs you use.**

Products		**Inputs**	
Whole Chicken (frozen)	___ %	Protein feed	___ %
Pork	___ %	Chemicals	___ %
Beef	___ %	Fertilizer	___ %
Mutton	___ %	Tractors	___ %
Sugar	___ %	Equipment	___ %
Milk powder	___ %	Bakkies/pick-ups	___ %
Maize grain	___ %		
Wheat grain	___ %		

The next questions relate to your use of computers, your perception of risk, sources of risk, your management rating and your objectives as a farmer.

19. **Computers**

Do you own a computer? (Yes or No) _____

If yes, do you use the computer(s) in your farm business (eg. to keep records, budgeting)? (Yes or No) _____

20. How do you rate **your willingness to take risks** in farming relative to other farmers in your district? On the scale below, please circle the number which best indicates your answer.

Willingness to take risks

Low				High
1	2	3	4	5

21. How do you rate the following **sources of risk** in terms of their importance to **your** farm decision making? On the scale below, please circle the number which best indicates your answer. If a risk source is not applicable, please leave it blank.

Sources of risk	Importance				
	Low				High
Variability in crop yields	1	2	3	4	5
Variability in crop prices	1	2	3	4	5
Variability in livestock production (eg. due to weather)	1	2	3	4	5
Variability in livestock prices (eg. beef prices)	1	2	3	4	5
Variability in livestock product prices (eg. milk prices)	1	2	3	4	5
Changes in costs of farm inputs (eg. seed, fertilizer, feed, fuel)	1	2	3	4	5
Changes in costs of capital items (eg. machinery and equipment)	1	2	3	4	5
Variability in interest rates	1	2	3	4	5
Changes in credit availability	1	2	3	4	5
Deregulation of domestic product markets	1	2	3	4	5
Changes in environmental regulations	1	2	3	4	5
Changes in labour legislation	1	2	3	4	5
Changes in tax legislation	1	2	3	4	5
Further land redistribution/restitution by government	1	2	3	4	5
Further reduction in trade tariffs on imported agricultural products	1	2	3	4	5
Changes in the Rand exchange rate	1	2	3	4	5
Other _____ _____	1	2	3	4	5

22. How do you rate **your management skills** in farming relative to other farmers in your district? Please give your ratings for your management skills in farm production, product marketing, farm finance and in overall farm management. On the scale below, please circle the number which best indicates your answer.

	Relative management skills				
	Low				High
Farm production	1	2	3	4	5
Product marketing	1	2	3	4	5
Farm finance	1	2	3	4	5
Overall management	1	2	3	4	5

23. What are **your objectives as a farmer?** Please rank the top three (3) of the following options in order of preference (1 = first choice, 2 = second choice, 3 = third choice).

___ Maximise total farm profits.

___ Farm business survival.

___ To have more off-farm investments.

___ A farm business that produces a stable income.

___ Have net worth accumulate steadily.

___ Have a comfortable lifestyle.

___ Be the best farmer in the district.

___ Be your own boss.

___ Be competitive on the world market.

Other (please specify). _____

_____

_____

24. Would you like to see the results of this study? Please tick the appropriate space.

Yes	
No	

Please return the completed questionnaire to me as soon as possible, but not later than 30 June 1996.

THANK YOU FOR PARTICIPATING IN THE STUDY