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Contributed Paper Presented to 50th Annual Conference of the Australian Agricultural and Resource Economics Society, Sydney, 7 – 10 February 2006

Policy Responses to Threats to Rural Household Incomes: the Case of Fiji

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Abstract

The incomes of people in Fiji who rely directly on agricultural production are under threat due to a number of institutional changes or shocks that are occurring now, or are expected in the near future. In this paper we examine recent evidence on the current nature and level of rural and urban incomes in Fiji and consider the sensitivity of the welfare of different groups of rural people to these shocks. The data are drawn from a census of individual rural households in the Seaqaqa Tikina (District) of Macuata Province in the Northern Region of Fiji. The potential for alternative responses open to the Government and individual producers to moderate the adverse impact of these shocks is considered[3] [4].

Key Words

Agricultural Policy, Poverty, Smallholder Agriculture, Pacific Island Countries.

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[3] The authors wish to thank Tevita Natasiwai (Ministry of Agriculture, Sugar and Land Resettlement, Suva) for providing the generic survey tabulations for Seaqaqa and particularly the raw data from which the unit record data used in this analysis were constructed. Naturally, all errors and omissions are the responsibility of the authors.

[4] The authors are also pleased to acknowledge the financial support towards the preparation of this paper from the Australian Centre for International Agricultural Research (ACIAR). Again, the authors accept responsibility for any errors or omissions.

Policy Responses to Threats to Rural Household Incomes: the Case of Fiji

1. Introduction

The agricultural sector is an important part of the economy of the Fiji Islands. Official data suggest that agriculture accounts for some 22 per cent of total GDP and around 44 per cent of total employment. Most of the producers in this sector farm relatively small lots of land and can be broadly classed as subsistence or semi-commercial producers. Both these groups rely on home production for most of their consumption of food and they have limited income from outside sources.

These subsistence and semi-commercial farmers – smallholders – are important to policy makers in Fiji. It has been variously estimated that between 25 to 30 per cent of the population in Fiji lives below the local poverty line and most of this number are likely to be rural smallholders (ADB and MFNP 2003). Therefore, strategies aimed at dealing with poverty need to be based on an understanding of the position and actions of smallholders. Moreover, smallholders account for a major slice of total national production for many agricultural outputs. National accounts estimates suggest that agricultural production from subsistence sources alone accounts for around 35 per cent of total agricultural output. This means smallholders are an important source of agricultural production and need to be considered when formulating agricultural production policies and forecasting industry output. This is particularly the case where smallholders respond to price changes and policy changes in different ways to larger commercial producers.

McGregor (2000) has identified smallholders as the hidden strength of the economy as they contribute substantively to food security, employment and foreign exchange savings. According to McGregor, Fiji's food security is dependent on the continuation of subsistence farming and its on-going transformation to semi-commercial farming of crops for which Fiji has a competitive advantage. Similarly, the 1996 ADB Agriculture Sector Review highlighted the impressive quantity and range of traditional foods grown in Fiji. The Review also noted that as a result of the contribution of the subsistence smallholder sector, food imports were still comparatively low and had fallen slightly as a percentage of total imports over the previous decade despite deregulation. This suggested that food supply had been able to expand with increases in demand. The production capacity of smallholders was severely tested with the "great" 1997 – 1998 drought when the overall level of food imports as a percentage of total imports did not increase and remained the lowest among the Pacific Island Countries. In addition, the 2000 political upheaval confirmed that Fiji's smallholder production system was able to sustain the country's food security despite of the bans placed on Fiji by its major trading partners.

So far there has been relatively little work focused on smallholder agricultural producers in Fiji. Official data on their production and income position are sketchy, and there are no published

estimates on their supply response to price changes or other market shocks. This dearth of information constrains the ability of the local agricultural policy community to develop appropriate policies to both improve the position of this potentially vulnerable group and respond to the substantial market shocks that now confront the agricultural sector.

For example, the Fiji Islands sugar industry is confronting a period of significant adjustment due to the proposed policy changes in the EU which will effectively withdraw output price support for Fiji's sugar. The high prices previously paid for sugar in Fiji have sustained a large industry, accounting for 45 per cent of the value of official farm output and around 25 per cent of the nation's exports. Recent disruptions to land tenure arrangements in the sugar industry are likely to aggravate the disruption from the change in EU policy. The resultant current high turnover in sugar farm tenancies may reduce industry efficiency as some land is under-utilised and other land is taken up by farmers with limited experience in sugar production. Overall, extensive land use changes look likely, with potentially significant impacts on individual non-urban incomes, regional economies and the national economy.

The impacts that will ultimately flow from these changes will be felt by the poor in the community – many of whom are smallholders – and will in turn be determined by how smallholders and other producers deal with the market changes that will occur over the next few years.

Smallholders are limited in their ability to deal with market shocks. Financial barriers prevent smallholders from intensifying their production as the investment required often exceeds their capital wealth. The available farm credit goes largely to sugarcane farmers as they have a regular market to supply and – critically – their loan repayments are automatically deducted from their cane payments. Policies and institutions often do not facilitate credit services targeted at small to medium farmers. For example, as most lands are owned by native owners, credit is not provided to smallholder farmers in villages as they do not own any legal title to these native lands unless they are leased.

Furthermore, a combination of higher production and higher transaction costs can make small producers uncompetitive and limit their access to markets. They do not benefit from the economies of scale available to large-scale units, so their production costs are usually higher, outweighing any cost advantages from the discounted value of relying importantly on their own family labour.

The ability of smallholders to access commercial markets can be constrained by high transaction costs. These costs can be prohibitively high for small-scale producers because of the small quantities of marketable product and the absence of adequate physical and market infrastructures in remote areas. Transaction costs are also increased where producers lack negotiating power or access to market information, and remain dependent on intermediaries.

We have two objectives with this paper. The first is to analyse how the shocks to the agricultural sector in Fiji are likely to translate into welfare changes at the household level, particularly for

smallholders. The second is to analyse the likely efficacy of a range of possible generic policy responses to these shocks.

In approaching this task we first develop a conceptual model to analyse the linkage between the shocks and household welfare. A disaggregated data set on household production and income is then analysed to assess the current position of households in the sector and their vulnerability to the expected shocks. The potential for a range of alternative policy responses to ameliorate the welfare impacts of these shocks is then analysed. Finally, we consider the policy implications of this analysis and point to some necessary future work.

2. A Conceptual Framework

The agricultural sector in Fiji is characterised by a complex system of inter-related markets based on diverse resource stocks and market demands. Changes in any one industry or region have the potential to flow through to many related markets. Moreover, the nature and extent of the impact of any shock on a market or industry will depend on the extent to which these interactions provide the potential to spread and/or moderate the financial consequences. A simple conceptual framework in which to analyse these interactions and impacts is portrayed in Figure 1.

For the purposes of this model, agricultural production is divided into sugar and fruit and vegetables. Reflecting reality, it is assumed that while production choices do exist, not all resources are equally suited to each enterprise. That is, the available resources can shift between these two alternative uses in a flexible, but imperfect fashion. All sugar is assumed to be sold on export markets while fruit and vegetables are sold both domestically and overseas. The export market for fruit and vegetables is assumed to offer higher prices to growers than the domestic market, but not all output is of a suitable standard for export at these high prices. All production results in some share of lesser quality output that is sold into lower priced domestic markets.

The physical dimension of the model in Figure 1 is defined in terms of the quantity of fruit and vegetable production (F&V) and prices are for units of F&V production. The export demand for F&V is given by the curve Dx and Fiji as a whole is assumed to have no market power in this market. Domestic demand for F&V is summarised by Dd. For any crop harvested, some percentage is sold on export markets (say 80%) while the remainder is sold domestically. This means that in an average ex ante sense growers expect to receive a blended price determined as a weighted average of export and domestic returns. This ex ante average price is Pb and it is downward sloping reflecting the lower prices received for increasing levels of domestic sales.

On the supply side, the supply of F&V from existing land devoted to F&V is given by So. The potential to expand F&V production by shifting resources out of sugar is reflected in Ss. Consequently the total ex ante supply curve for F&V is St. That is, no additional land would shift out of sugar production until F&V prices lifted to at least P4. This also means that the current return to the sector from sugar production is given by the value of the area under the curve Ss up to Qs (the F&V equivalent of the land currently used in sugar production).

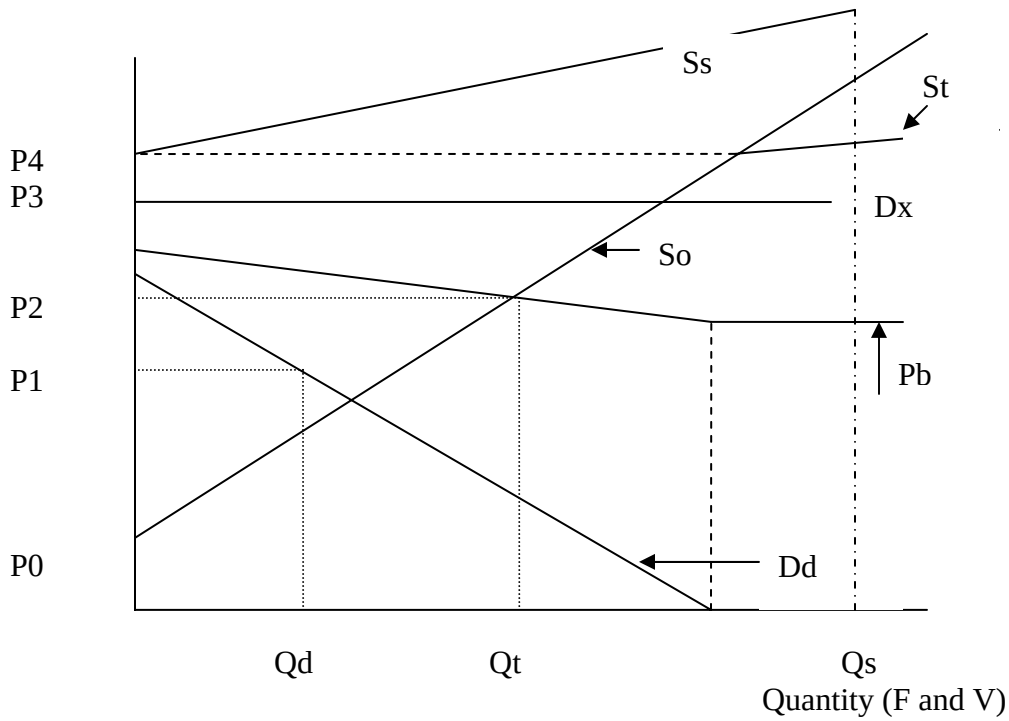
Given the assumptions underpinning Figure 1, planned F&V production would be Qt – where the price line Pb cuts the supply curve St. This would result in farmers being paid P1 for domestic sales of Qd and P3 for export sales of Qt - Qd. As F&V prices are below P4 initially no additional land shifts into F&V production from sugar production.

The returns to the agricultural sector can be summarised as follows:

- Sugar production yields the value of the area under Ss up to Qs.
- F&V production results in a producer surplus on Qt equivalent to the value of the area above St and below P2.

Society as a whole gains the consumer surplus associated with Qd domestic consumption of F&V (under the demand curve Dd and above P1).

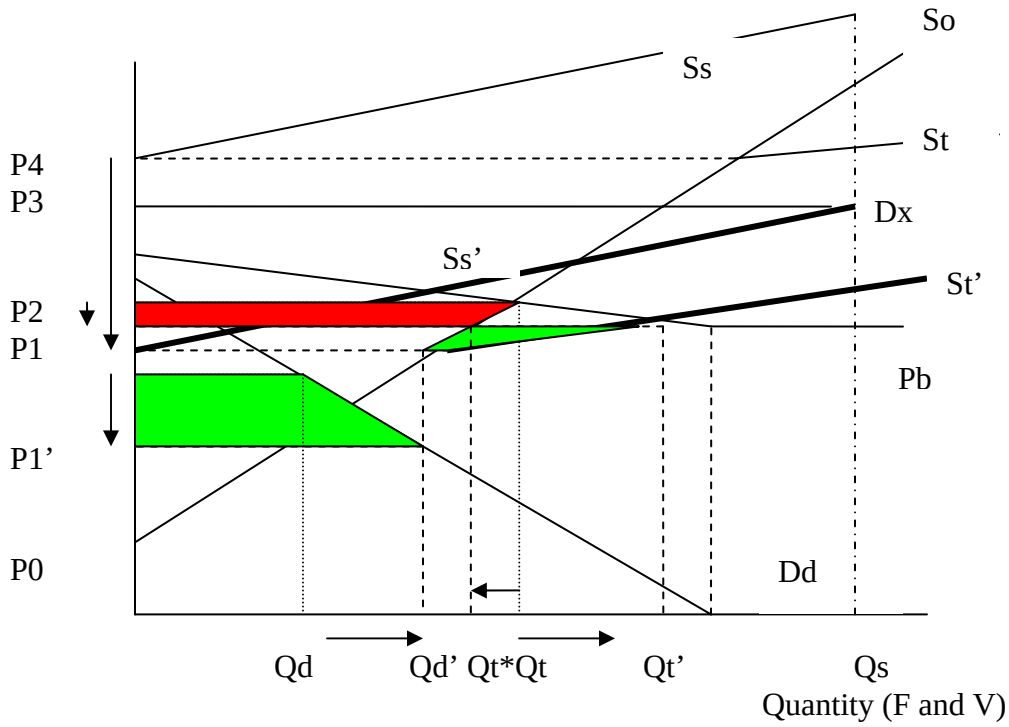
Figure 1: Returns from Agricultural Production



Now consider the situation when sugar prices fall shown in Figure 2. The fall is represented by the downward displacement of the sugar land supply curve from Ss to Ss' reflecting the reduced opportunity cost of this land in sugar production. The new total F&V supply curve then becomes P0,St' and the consequent expansion in the total level of F&V production is Qt'- Qt. The residual lower quality supply on domestic markets has increased from Qd to Qd'. The expansion in output all comes from land shifting out of sugar production with production on existing F&V land actually falling from Qt to Qt*.

In the scenario portrayed in Figure 2 the main losers are clearly sugar producers. But the original F&V producers lose as well. The loss of the later group is the value of the red area in the diagram which reflects both the drop in the effective blended price F&V growers receive and the contraction in their production that follows. For sugar growers, the extent of their actual loss is moderated by their diversification into F&V. The value of the moderation due to diversification is the green triangle above St' and below the new blended price line. The major winners from this market shock are the domestic consumers of F&V. They reap an expansion in their consumer surplus equal to the green area below Dd and between the two domestic prices.

Figure 2: The impact of falling sugar prices



The magnitude of the gains and losses identified in Figure 2 rests critically on the following factors:

- The extent of the fall in sugar prices;
- The ease with which resources can shift into F&V from sugar;
- The elasticities of S and D in F&V; and
- The relationship between F&V supply to export and domestic markets.

Furthermore, the three groups identified as being influenced by the shock in Figure 2 are not mutually exclusive. Existing F&V producers may also be sugar producers and all producers are, at least to some extent, consumers.

For smallholders the distinction between producers and consumers becomes even less clear. Many producers of F&V in Fiji produce primarily, but not exclusively, for home consumption. Official data suggest that production for home consumption represents around 50% to 60% by value of non-sugar agricultural output.

For smallholders in addition to the factors listed above, the impacts would depend on whether part of their F&V output would meet export standards and whether the quality composition of their output reflects the national average. If yes on both counts, then the drop in their blend price as producers would be less than the drop in their consumption price. Under these circumstances smallholders stand to lose less.

This conceptual model represents a simple partial equilibrium view of the problem. A similar general equilibrium model could be developed and might provide a different perspective. General equilibrium effects that might – if they occurred – result in different impacts include a significant exchange rate adjustment as a result of the shock, a substantial shift of sugar resources to other uses and occupations and an economically significant national income effect due to the shock. Our model assumes that these changes do not occur – that is the reduction in the exchange rate is small and few resources leave the agricultural sector and as a result any decline in national income does not have a substantial impact on domestic demand for F&V.

If we relax these assumptions the market shock would tend to lift export prices (due to the exchange rate reduction), depress domestic demand (due to the income fall), and reduce the extent in the expansion in the supply of F&V (as resource fail to move into F&V production). Compared to our case in Figure 2, the end result would be indeterminate without a formal CGE simulation. The tendency to increase export returns would be at least partially offset by a smaller outwards shift in the supply curve and the contraction in domestic demand would tend to offset the resultant growth in export prices.

Narayan and Prasad (2004) have relaxed these assumptions and produced CGE results that suggest that the resultant decline in the sugar industry from the anticipated form of market shock would both reduce non-sugar agricultural output and expand non-sugar agricultural exports.

These surprising results may be an artefact of the way in which Narayan and Prasad modelled the decline in sugar production and in any case probably reflect extreme case scenarios. The results may be due to the apparent imposition of a simple (30 per cent) cut in sugar production implying that that land and other resources leaving sugarcane production do not move into alternative agricultural – and other – uses, combined with the effects of using relatively high income elasticities of demand (declining domestic demand as national income falls) in their model. Both conditions would need to be met to produce the model results they report, especially given that they allow for a downward adjustment of the exchange rate.

That is, Narayan and Prasad imply that the reduction in domestic demand (due to income falls) outweighs any growth in export demand (due to devaluation) and that the agricultural F&V supply curve does not shift out (no resource shift from cane farming).

3. Current Income Position and Vulnerability of Households

In this section of this paper we analyse a new data set that provides some insight into the nature of agricultural producers and how the sugar price shock is likely to impact on them. We then consider appropriate policy responses to the situation given the conceptual model in the previous section and the household level data presented in Section 3.

Characteristics and Brief History of Agriculture in Seaqaqa

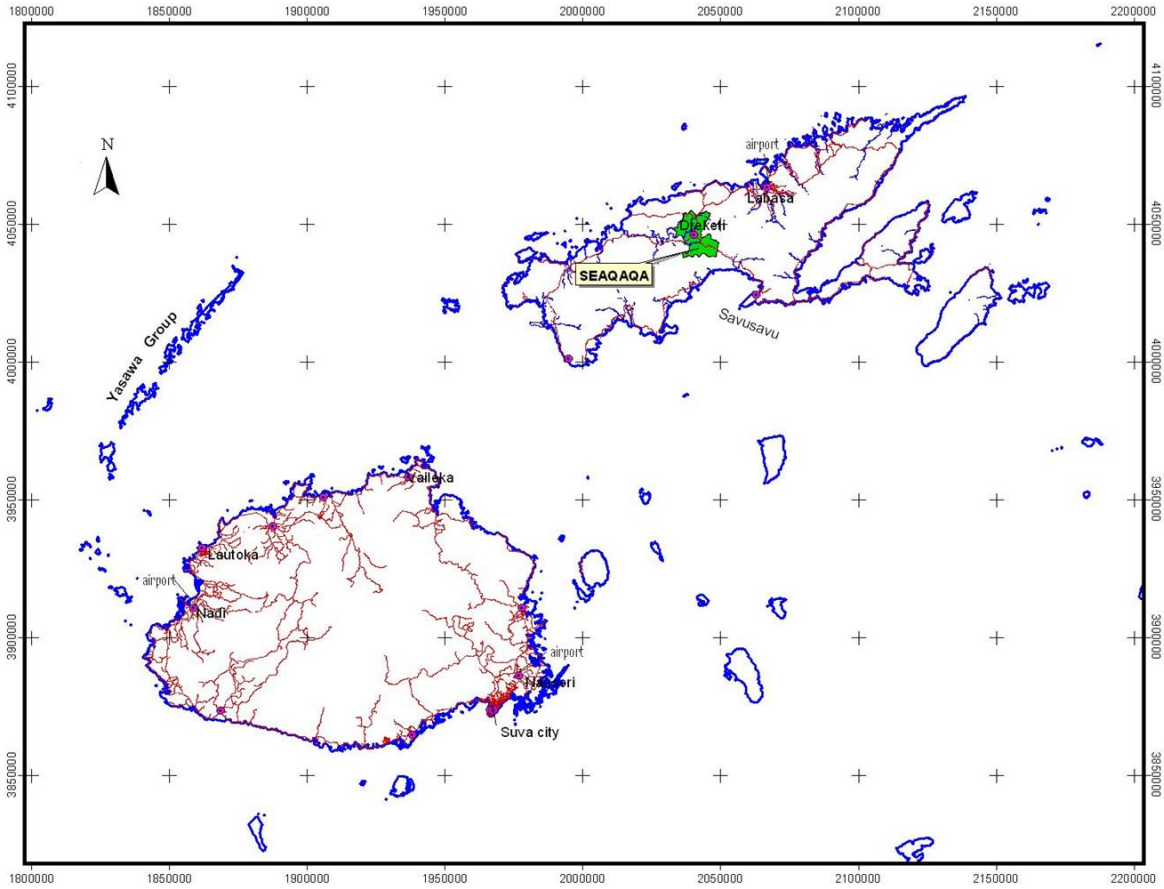
The data analysed in this section has been drawn from a 2005 census of Seaqaqa Tikina (District) households in which information was collected for the previous year. Seaqaqa is located in the northern region on Vanua Levu in the province of Macuata. It is 23 km from Labasa, the regional capital and on the major link road between Labasa on the north coast and the regional port of Savusavu in the south. Originally the area was selected by the Department of Agriculture in 1956 for the development of pastures and selected crops. In early 1962 alternative crops needing less cultivation and water use became the preferred option.

Seaqaqa soils are generally talasiga soils (ferruginous latosols). Soils are generally red latosolic clays and clay loams of satisfactory depth, and relatively free-draining. They are acid (pH4.5 to 6.7), highly leached, erodible, drought-susceptible, and of very low nutrient status, thus requiring a lot of fertiliser. The topography is rolling, and arable areas generally have a slope of from 3° and 6°. The Climate is tropical oceanic, with high and variable rainfall which is particularly heavy during the period of the north-west monsoon – from December to March – but in common with the sugarcane belt on the leeward coasts of both islands, there is a marked dry season from May to October when the south-east trade winds prevail. The monthly rainfall in the area varies between 50 mm in August and 500 mm in March which make Seaqaqa the wettest cane belt in Fiji.

Land in the area is native owned and, until the start of the resettlement scheme, had been little used other than by a few tenants for a small amount of subsistence cropping, mainly of rice in the valley floors. With the consent of the landowners, the Native Lands Trust Board in 1974 commenced demarcation of 800 blocks of about 50 acres each to be leased to selected tenants, half Fijians and half Indian, for an initial period of 30 years. Because of the limited number of applications by Fijians in the early stages, the Government decided that the Native land Development Corporation(NLDC) should develop surplus Fijian blocks on an estate basis in trust for future Fijian farmers. The Corporation has already commenced development of 37 blocks (1,613 acres) with a target area of 600acres of cane. Some of the blocks are outside the boundary of Seaqaqa Tikina.

Over the years, however, there has been an increasing general concern regarding the deteriorating performance of the indigenous Fijian cane farmers. Due to this a Seaqaqa Task Force (STF) was set up in July 1983 aiming to assist underperforming growers.

Figure 3: Location of Seaqaqa Tikina



The Seaqaqa Cane Scheme (SCS) is a major agricultural development project undertaken in the district in the early 1970's. The SCS) was nurtured in 1974 and 1976 when the World Bank approved its first agricultural loan of $US12 million to Fiji for a Sugar Development Project at Seaqaqa. It was intended that the project would boost cane production and increase indigenous Fijian participation in commercial agriculture. Initially, it was proposed that half the settlers were to be indigenous Fijians and half other races. At the same time, the Fijian Affairs Board (FAB) had successfully experimented with some techniques and equipment use needed for better cultivation of sugarcane by indigenous Fijian cane farmers in the Ba, Nadroga/Navosa, Ra and Macuata provinces. Due to the positive result of the experiment, the FAB was optimistic that indigenous Fijian cane farmers should be provided with an assistance scheme. Unfortunately, owing to social and economic constraints the Fijian cane farmers were not successful and most have since returned to their villages.

The smallholder farming systems of Fiji including that of Seaqaqa Tikina are complex and have proven to be robust and productive in the face of adversity. Sugarcane is the predominant crop in the area and has an available market at Labasa where there is a sugar mill with nearby access for deep water vessels that can handle bulk processed sugar. The readily availability of this

guaranteed outlet helps support and promote sugarcane production in the area, especially as sugar has been a relatively profitable crop.

With other crops direct selling at the municipal markets and sales to middlemen are the common market outlets for smallholders. These outlets are mostly unreliable as demands are fairly inconsistent with no fixed contracts on quantities and prices available to farmers. Farmers are exposed to both sales price and quantity risks and in most cases have to consume produce which they would have preferred to sell. This problem is particularly significant with seasonal crops such as pineapples and temperate vegetables for which the problems of the seasonal flush are compounded by the lack of post harvest processing facilities. The lack of processing facilities for perishable products reduces the negotiating power of smallholders, particularly where they are distant from consumption centres.

Production and Income Patterns in Seaqaqa

The characteristics of the farms surveyed are summarised in Tables 1, 2, 3 and 4 below. Those tables deal with crop production only as the unit record data for livestock activities and individual farm expenditures were not available. According to the primary survey tabulations, there are 328 households located in Seaqaqa Tikina. These households exist as predominantly low income subsistence and semi-commercial farming operations (40 and 27 per cent respectively) and manage relatively small holdings. Two-thirds of the smallholders in the area are Fijians and two-thirds of Seaqaqa'a commercial farmers are Indo-Fijians.

In the survey year the area planted to crops totalled just over 1300 ha of which 1,062 ha were harvested to support a total of around 1,800 people. The population is roughly equally divided between males (52 per cent) and females and 60 per cent of the people are ethnic Fijians while the remainder are Indo-Fijians. The great bulk of the population aged 10 years and over works on farm, predominantly in a permanent capacity. Casual farm workers account for around 30 per cent of the working population (10 years and over) and only 8 per cent of the people work off farm, either on a permanent or casual basis.

Sugarcane production accounts for the bulk of the land use in Seaqaqa. In the survey year sugarcane accounted for 66 per cent of the total harvested land area and provided an estimated 49 per cent of the gross farm gate equivalent income from crops. While 27% of households harvested cane on their holdings in 2004, the average area was only 8 ha per household. Moreover, of this number, 31 households harvested 5 ha or less.

Yaqona is the other major cash crop, indicated by the fact that nearly 90 per cent of the yaqona harvested was sold commercially through middlemen. While it accounted for only 4.7 per cent of the harvested area, yaqona provided nearly one-third of Seaqaqa's estimated gross crop income. .

The only other specialist cash crops grown are maize, peanuts, pineapples and watermelons, but these were grown by only a small number of producers and in total only occupied 12 ha or just over 1 per cent of the harvested area in the survey year. For example, maize was grown by 5 households, peanuts by 14, pineapples by 7 and watermelons were grown by 11 households

Table 1: Overview of Seaqaqa Farm Scale, Crop Production and Crop Disposal

Production Scale & Crop	Number of Farms	Area Harvested		Gross Receipts		Crop Disposal	
		Total	Per Farm	Total	Per Farm	Marketed	Home Use
	no.	ha	ha	$F	$F	%	%
Subsistence							
Fruits	48	10	0.2	11808	246	0.32	0.68
Grains	49	34	0.7	25720	525	0.04	0.96
Starchy Staples	91	53	0.6	141017	1550	0.16	0.84
Sugarcane	5	18	3.5	14361	2872	1.00	0.00
Vegetables	49	5	0.1	25689	524	0.04	0.96
Yaqona	34	5	0.2	160500	4721	0.62	0.38
Other Crops	33	47	1.4	6924	210	0.59	0.41
Total	132	172	1.3	386018	2924	0.38	0.62
Semi-Commercial							
Fruits	55	11	0.2	12756	232	0.21	0.79
Grains	19	17	0.9	15044	792	0.00	1.00
Starchy Staples	100	60	0.6	101680	1017	0.13	0.87
Sugarcane	24	101	4.2	206451	8602	1.00	0.00
Vegetables	35	4	0.1	13187	377	0.03	0.97
Yaqona	70	32	0.5	364200	5203	0.99	0.01
Other Crops	27	10	0.4	2671	99	0.34	0.66
Total	100	234	2.3	715989	7160	0.81	0.19
Smallholder							
Fruits	103	20	0.2	24564	238	0.26	0.74
Grains	68	51	0.7	40763	599	0.03	0.97
Starchy Staples	191	113	0.6	242696	1271	0.15	0.85
Sugarcane	29	118	4.1	220812	7614	1.00	0.00
Vegetables	84	9	0.1	38876	463	0.03	0.97
Yaqona	104	37	0.4	524700	5045	0.88	0.12
Other Crops	60	57	0.9	9595	160	0.52	0.48
Total	232	406	1.8	1102007	4750	0.66	0.34

Continued/-

Table 1: Overview of Seaqaqa Farm Scale (cont)

Production Scale & Crop	Number of Farms	Area Harvested		Gross Receipts		Crop Disposal	
		Total	Per Farm	Total	Per Farm	Marketed	Home Use
	no.	ha	ha	$F	$F	%	%
Commercial							
Fruits	30	8	0.3	12660	422	0.70	0.30
Grains	35	19	0.6	11855	339	0.07	0.93
Starchy Staples	54	19	0.3	42329	784	0.34	0.66
Sugarcane	59	584	9.9	903992	15322	1.00	0.00
Vegetables	57	5	0.1	17408	305	0.04	0.96
Yaqona	29	12	0.4	219000	7552	1.00	0.00
Other Crops	24	8	0.3	3478	145	0.42	0.58
Total	90	656	7.3	1210722	13452	0.95	0.05
All Farmers							
Fruits	133	28	0.2	37224	280	0.41	0.59
Grains	103	70	0.7	52618	511	0.04	0.96
Starchy Staples	245	132	0.5	285026	1163	0.18	0.82
Sugarcane	88	702	8.0	1124804	12782	1.00	0.00
Vegetables	141	14	0.1	56284	399	0.04	0.96
Yaqona	133	50	0.4	743700	5592	0.91	0.09
Other Crops	84	65	0.8	13073	156	0.49	0.51
Total	322	1062	3.3	2312729	7182	0.81	0.19

Note: grains are principally rice; vegetables include pulses; other crops are mainly coconuts.
Source: Ministry of Agriculture, Sugar and Land Resettlement;

Other crops that occupy significant areas of land are starchy staples such as dalo and cassava, coconuts, and rice. These crops are predominantly grown for home consumption.

The capital stock on most holdings is low with most farmers not owning a vehicle of tractor. Chainsaws were the most common form of mechanisation on these farms.

In Table 1 the figures in the "Total" rows show the relevant total and per farm data for all farms classified as subsistence, semi-commercial, etc. On the other hand, the rows for individual crops give the details for those farms harvesting that particular crop in the survey year. So any single subsistence or commercial farm can contribute to the information shown any number of the commodity rows in its block.

As expected, the data in Table 1 indicate there is quite a disparity between the scales of operations of subsistence, semi-commercial and commercial farmers.

For the purpose of the present analysis farmers were classified as subsistence, semi-commercial and commercial on the basis of the estimated gross farm equivalent value of their crop production. In line with conventional practice, home consumption and market sales were valued at the same prices. The prices used are those for the nearby Labasa municipal market in 2005 (see appendix Table 1). The available retail prices were converted to farm equivalent values on the assumption that the mark-up for fruit and vegetables is around 25 per cent but that the mark-up for yaqona is 50 per cent higher than the standard rate (Personal communication, Sakiusa Tubuna, February 2006). The cut-off points for the farm categorisations were:

- *Subsistence*: the estimated value of home consumption of the farm's total crop production accounts for 35 per cent or more of the total gross value of crop production;
- *Commercial*: the estimated value of home consumption of the farm's total crop production accounts for 11 per cent or less of the total gross value of crop production;
- *Semi-Commercia*l: farms with home consumption of crops accounting for between 11 per cent and 35 percent of the gross value of crop production.

These cut-off points were chosen iteratively so that the value based classification used here yielded roughly the same proportionate distribution of farms between the three categories as reported in summary (not unit record) survey tabulations. The comparison is given below:

	Classification System	
	Summary Survey Tabulation	Value Based
	Percentage of farms	
Subsistence	40.5	41.0
Semi-Commercial	31.9	31.1
Commercial	27.6	28.0

The data in Table 1 reinforce the point about the importance of sugarcane and yaqona as sources of cash income to farmers in this area. For instance the gross income from all crops of the 34 subsistence farmers who grew and harvested yaqona averaged $F7230 of which the total gross for yaqona was $F4720 of which, in turn, $F2930 came from market sales. So the *cash* incomes alone of subsistence yaqona producers equalled the average income from cash sales *and* home consumption of all subsistence farmers. The story is broadly the same for yaqona producers classified as semi-commercial.

Table 2: Crop Combinations

Item	Fruit	Grains	Starchy Staples	Sugarcane	Vegetables	Yaqona	Other Crops	Diversity
				– number of farmers –				Ratio
Subsistence Farmers								
Fruit	**24**	5	22		8	2	3	2.7
Grains	5	**40**	10	1	17		13	2.2
Starchy Staples	22	10	**47**	1	22	8	9	2.5
Sugarcane	na	na	na	**na**	Na	na	na	na
Total Vegetables	8	17	22	1	**32**	2	10	2.9
Yaqona	2		8		2	**8**	2	2.8
Other Crops	3	13	9		10	2	**20**	2.9
Semi-Commercial Farmers								
Fruit	62	9	58	8	22	34	16	3.4
Grains	9	16	7	8	11		14	4.1
Starchy Staples	58	7	119	12	31	89	19	2.8
Sugarcane	8	8	12	13	12	2	9	4.9
Total Vegetables	22	11	31	12	35	14	18	4.1
Yaqona	34		89	2	14	89	6	2.6
Other Crops	16	14	19	9	18	6	26	4.2
Commercial Farmers								
Fruit	47	15	41	31	32	13	29	4.4
Grains	15	48	24	48	46		21	4.2
Starchy Staples	41	24	80	42	46	33	34	3.8
Sugarcane	31	48	42	74	67	1	33	4.0
Total Vegetables	32	46	46	67	75	6	33	4.1
Yaqona	13		33	1	6	36	2	2.5
Other Crops	29	21	34	33	33	2	39	4.9
All Seaqaqa Farmers								
Fruit	133	29	121	39	62	49	48	3.6
Grains	29	104	41	57	74		48	3.4
Starchy Staples	121	41	246	55	99	130	62	3.1
Sugarcane	39	57	55	88	80	3	42	4.1
Total Vegetables	62	74	99	80	142	22	61	3.8
Yaqona	49		130	3	22	133	10	2.6
Other Crops	48	48	62	42	61	10	85	4.2

Na not available on account of too few observations.

Source: Based on data supplied by Ministry of Agriculture, Sugar and Land Resettlement;

The majority of cane growers were indo-Fijians while all the yaqona producers were ethnic Fijians. Of the 104 farmers who did not grow sugarcane or yaqona, 93 were classified as subsistence farmers and all these farmers were native Fijians.

Table 2 above shows the combinations of crops grown in Seaqaqa in the survey year along with a simple "Diversity Ratio". The ratio is simply the ratio of the full row sums to the number of farmers growing the crop indicated by the row heading. So the ratio of 2.7 for subsistence fruit growers indicates that on average each of the 24 fruit growers grew 2.7 crops. The higher the ratio, the more diversified the cropping pattern of farmers growing the crops identified by the row headings. The general picture that emerges is of a diversified cropping pattern.

Actually, this simple ratio understates the true extent of cropping diversity in the tikina because, aside from sugarcane and yaqona, all the other headings include a number of crops.

While Seaqaqa farmers produce diverse crops, there is considerable concentration in crop production (see Table 3). For instance, 30 per cent of the farmers harvesting sugarcane account for 50 per cent of production. The production concentration is comparable for starchy staples, vegetables and yaqona. However, production of other crops – principally coconuts – is the most concentrated as only 3 per cent of producers account for half the area harvested.

Table 3: Concentration Measures

Farmers Producing	Total Harvested Area per Farm Accounted for by:			Percentage of Harvested Area		
	2 Crops	3 Crops	4 Crops	25	50	75
	– Ratio –			– Percentage of Farmers –		
Fruit	0.78	0.85	0.91	4	19	46
Grains	0.88	0.97	0.98	6	19	42
Starchy Staples	0.78	0.85	0.91	8	41	47
Sugarcane	0.95	0.97	0.98	11	30	54
Total Vegetables	0.89	0.93	0.96	8	29	56
Yaqona	0.79	0.89	0.95	12	28	48
Other Crops	0.81	0.93	0.96	na	3	24

Source: Based on data from Ministry of Agriculture, Sugar and Land Resettlement;

While sugarcane and yaqona are the principal cash crops and earn their producers sizeable gross incomes, these earnings are by no means sufficient to make Seaqaqa farmers well off by Fiji's urban standards. Table 4 below presents the estimates on the average total gross crop earnings for producers "specialising" in the range of individual crops and groups of crops discussed

above. Farmers are defined here as "specialising" in a particular crop if they earn – in cash or imputed form – 50 per cent or more of their total gross incomes from that particular crop. With this type of definition every farmer is assigned to a unique category.

It is important to remember that the comparison between the Seaqaqa farm and all-Fiji urban incomes in the table is subject to limitations.

For example, the farm incomes do not include any cash or imputed incomes from livestock enterprises. But neither are the farm incomes adjusted for the costs that must be met in producing the various crops. Moreover, the urban incomes obtained from the recent Household Income and Expenditure Survey (HIES) shown in the table are the "regular" incomes of households. Total urban incomes from all sources were somewhat above the figures shown in the table.

That said, it is clear that rural incomes – at least as represented by Seaqaqa Tikina – fall short of the earnings of urban Fijians. Only commercial sugarcane producers are likely to achieve net incomes comparable to the urban averages, even for people living in squatter settlements.

Table 4: Comparison of Seaqaqa with Urban Incomes

	Seaqaqa Census 2005			Urban HIES 2002-03	
Crop	Smallholders	Commercial	Total	Residential Area	Regular Income per Household
	Gross Crop Receipts/Farm - $F				$F
Fruits	3276		3276	High Class	18793
Grains	714		714	Middle Class	13059
Starchy Staples	1972	8790	2089	Settlement	9922
Sugarcane	10750	16476	14751	Housing Authority	12066
Vegetables	864		864	PRB Flats	
Yaqona	6772	8404	7154	Squatter	8548
Other & Mixed	3155	1815	3066	Urban Village	11284
Total	4750	13453	7182	Total	12784

Note: smallholders defined as subsistence plus semi-commercial.

Sources: Ministry of Agriculture, Sugar and Land Resettlement; Fiji Island Bureau of Statistics (2003), "Urban Household Income and Expenditure Survey 2002-03: Provisional Results", *Statistical News*, No. 70, 18 December.

Some Quantification

Although the available unit record data do not cover either all farm operations or all the cropping related data, we attempted to quantify three relationships thought to have a bearing on the potential resilience and profitability of smallholders and other farmers in Seaqaqa Tikina.

The degree of commercialisation of farmers is indicated by the proportion of their production that is sold rather than consumed at home. As shown in Table 5, the commercialisation of Seaqaqa householders was found to be significantly associated with the cultural background of the household (race) the size of the farm (sugarcane area) and the extent of cropping diversity (number of crops grown).

Table 5: Factors Associated with Degree of Commercialisation

Dependent Variable: Home Dependency
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.782852	0.098887	7.916668	0.0000
AGE	0.001178	0.001286	0.916118	0.3603
RACE	-0.460808	0.098179	-4.693555	0.0000
SUGAR AREA	-0.045461	0.005978	-7.604977	0.0000
CROPS NO	-0.060671	0.017124	-3.542957	0.0005
RACE*SUGAR AREA	0.033373	0.009753	3.421802	0.0007
CROPS NO*RACE	0.064857	0.023630	2.744685	0.0064
EDU	-0.023700	0.041253	-0.574504	0.5660

R-squared	0.248749	Mean dependent var	0.388678
Adjusted R-squared	0.232055	S.D. dependent var	0.361338
S.E. of regression	0.316650	Akaike info criterion	0.562415
Sum squared resid	31.58413	Schwarz criterion	0.655979
Log likelihood	-82.83006	F-statistic	14.90009
Durbin-Watson stat	1.531475	Prob(F-statistic)	0.000000

The relationship between these variables and the degree of commercialisation of the farms does not appear to be a simple linear one. For example, the regression results in Table 5 suggest that Indo-Fijians who have little sugarcane are more likely to be subsistence farmers than their Fijian neighbours.

However this propensity declines as the area of sugarcane harvested increases and larger Indo-Fijian sugar growers are more likely to produce crops for disposal in commercial markets than Fijian growers with similar crop areas. Similarly, the greater the diversity of crops grown the

more likely it is that Fijian households will be less involved with commercial markets than an equivalent Indo-Fijian family. Age and the extent of formal education did not seem to be statistically associated with the extent to which households were involved in commercial market activities.

The regression results in Table 6 suggest that the extent of cropping diversity is significantly influenced by cultural background of the household, with Fijian families tending to produce a wider range of crops than Indo-Fijians. Surprisingly, younger farmers and those farmers who were most involved in commercial markets also appeared to have a strategy of greater crop diversity.

The cropping performance of the farmers in this region also exhibited considerable variability. For example, for the largest land use, sugarcane, the average yield was 50 tonnes per hectare and the standard deviation was nearly 17 tonnes per ha. Bigger farms with younger managers and a greater degree of commercialisation tended to achieve the higher yields. Again, education did not appear to be an important factor.

Table 6: Factors Associated with Cropping Diversity

Dependent Variable: CROPS_NO
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.689719	0.349473	13.41939	0.0000
RACE	0.471449	0.176842	2.665930	0.0081
AGE	-0.010842	0.006060	-1.789260	0.0745
EDU	-0.260513	0.194831	-1.337122	0.1821
HOME DEP	-0.904340	0.233938	-3.865723	0.0001

R-squared	0.073142	Mean dependent var	3.993808
Adjusted R-squared	0.061484	S.D. dependent var	1.562356
S.E. of regression	1.513564	Akaike info criterion	3.682170
Sum squared resid	728.4987	Schwarz criterion	3.740648
Log likelihood	-589.6705	F-statistic	6.273679
Durbin-Watson stat	1.333807	Prob(F-statistic)	0.000072

Livestock production is similarly on a small scale. Goats, cattle, pigs and poultry are widely farmed in small numbers for home consumption. Newer enterprises such as sheep and honey production exist but only on very few holdings.

Table 7: Determinants of Sugarcane Yield

Dependent Variable: Sugar Yield
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	55.85768	7.341300	7.608691	0.0000
HOME DEP	-14.73023	8.512322	-1.730460	0.0873
RACE	-7.278677	6.165239	-1.180599	0.2412
EDU	-4.790548	4.129044	-1.160208	0.2493
AGE	-0.261503	0.128114	-2.041173	0.0444
VALUE Crops	0.000602	0.000188	3.200465	0.0020

R-squared	0.225011	Mean dependent var	49.67060
Adjusted R-squared	0.177756	S.D. dependent var	16.60371
S.E. of regression	15.05586	Akaike info criterion	8.327158
Sum squared resid	18587.68	Schwarz criterion	8.496067
Log likelihood	-360.3950	F-statistic	4.761596
Durbin-Watson stat	1.728389	Prob(F-statistic)	0.000719

Impact of Sugar Changes

The impact that changes in the sugar industry will have on households in Seaqaqa Tikina is likely to differ markedly between households in terms of both its severity and nature. While Seaqaqa is located in an important sugarcane producing region, most households produce no sugarcane and even some of those who do produce cane have a relatively low direct dependence on it for their household income. For most of those households producing sugarcane, the main impact will be directly through falling cane prices. For example, a 30 per cent drop in cane prices, with no production or supply responses, would reduce the average incomes of cane farmers by 27 per cent and would reduce the tikina's income by 15 per cent. Growers who harvested no more than 5 hectares of cane in 2004 could be expected to suffer less. This is because they were more diversified in terms of their production and their sugar yields tended to be lower than that of larger producers.

Given the importance of yaqona as a cash crop, a significant issue is the extent to which land now used for sugar could shift into yaqona which seems to be a relatively profitable crop. However, the substitution between sugarcane and yaqona is not feasible for technical reasons so the key interactions will be those between sugarcane and fruit and vegetables such as pineapples.

In addition, more than 80 per cent of the commercial farmers, who are mostly sugarcane farmers, spent over $1,000 annually on labour. This expenditure is mainly devoted to farm operations such as weeding in the cane fields and, most significantly, to paying cane cutters during harvest. Smallholders derive significant income from working on sugarcane farms. It is anticipated that

smallholders would not have access to this source of income should there be any dramatic reduction in sugarcane prices.

4. Evaluation of the Policy Settings

There are many policy options available to the Fiji Islands Government to mitigate the impact of the sugar price shock. However, the likely impact of the possible policy responses is probably fairly limited.

The most obvious policy responses available to the Government include:

- Improving the efficiency of the off farm aspects of the sugar industry;
- Improving the efficiency of cane production;
- Facilitating the movement of resources into other enterprises and sectors;
- Improving the returns from alternative farm enterprises;
- Providing income support to disadvantaged rural producers.

All of these alternatives are being tried to varying degrees. But, clearly, the existing size of the sugar industry suggests that in the foreseeable future at least, cane production will remain the dominant land use in the existing cane producing regions. That means that policies aimed at improving both the on-farm and off-farm efficiency of the sugar industry will have to be central parts of any optimal policy mix. Such sugar-focussed policies are being actively supported by the Government of India through a long term loan package.

The small size of both mill and individual farm operations suggests that the potential for reducing production costs should be considerable. The issue of production costs is widely acknowledged at government levels as indicated by the following comments by the Prime Minister:.

> *"The high cost of sugar production is due to two main reasons. One is the high cost of cane farming and low productivity by the growers. The other is high milling costs and inefficiency at the mills."* Qarase (2004)

Prasad and Narayan (2003) suggest that the off farm aspects of the sugar industry have been poorly managed creating unnecessarily higher costs in sugar milling and transport and underperformance in research. However, restructuring of mill operations is capital intensive and the ability to consolidate processing is limited by the geographical spread of Fiji's cane producing areas.

There also appears to be substantial scope for improving the farm level technical efficiency (Reddy and Yanagida, 1999). Unfortunately, the prospects for achieving the potential gains are limited by the uncertainty surrounding tenure in some areas. Uncertain land tenure is not

conducive to longer term on farm investment in productive capacity and new technology. Nevertheless, consolidation of holdings into larger parcels can be expected in response to lower sugarcane prices although this consolidation will not be easy given the relatively complex land tenure arrangements in Fiji. However, in the northern region there has been some farm consolidation which has facilitated the introduction of the first mechanised cane harvester in Fiji.

The other main policy response to the "sugar threat" is focussed on facilitating the shift of resources out of the cane industry into alternative enterprises. This effort has two main thrusts – the facilitation of the growth of export markets for agricultural products and the identification of opportunities and the provision of extension services to help cane producers shift into alternative enterprises. The former is evident in the development of FijiAgTrade and the later has been heavily supported by the ADB.

FijiAgTrade is a government initiative aimed at developing markets for a wider range of agricultural products. In terms of the conceptual model in Section 2, it represents an attempt to expand the share of alternative crop production going on to export markets rather than domestic markets. This export promotion has become the focus of agriculture in Fiji despite the handicaps of location and distance from market that prejudice even modest success in this area. Horticulture exports from Fiji have not been significantly viable because of the combination of high producer prices, poor transportation linkages, high transport costs, and quarantine constraints. New Zealand, an important market for Fiji farmers – and also for the Cook Islands, Samoa, Tonga, and New Caledonia – has a population of only 3.6 million people and, therefore, is a limited market. Although Australia produces tropical produce itself, it offers Pacific Islands produce a potentially much larger market than does New Zealand. Fiji has direct shipping and air links to Sydney and Melbourne and in southern Australia Fiji could readily compete with produce grown in northern Australia. Yet Australia's fresh produce imports from the Pacific are less now than they were a decade ago. The Australian Quarantine Inspection Service (AQIS) has adopted pest risk assessment and industry consultation procedures that make it difficult for Fiji produce to obtain access. For example, southern Australia could be a big market for Fiji's ginger growers, but ginger imports from Fiji are prohibited on quarantine grounds.

Pineapples as an Alternative

Despite these problems, tropical fruits – and particularly pineapples – are seen as a promising alternative for generating income to alleviate poverty and enhance food security (McGregor and Gonemaituba 2003). The focus on tropical fruits has now become even sharper in light of the potential sugar price shock. It has been proposed at government level that a significant pineapple industry be established as a catalyst for agricultural development (MASLR 2003). However, the challenges of effectively creating a new industry are likely to be substantial.

Pineapples are not a new crop to Fiji. Commercial production for canning and fresh exports has had a long, albeit, erratic history. In the 1920s the Colonial Sugar Refinery (CSR) was growing and canning pineapples in the Nadi area for export to New Zealand. In the late 1920s the Hawaiian Pineapple Co. operated a cannery at Dreketi, in Western Vanua Levu for three years. The CSR (West Coast Pines Ltd subsidiary) factory closed in 1955 as a result of increasing

concentration on the sugarcane monoculture and the loss of estate land to the Nadi international airport. Currently, pineapple production is confined to smallholders characterized by small and scattered fruit gardens. The principal growing areas are Ba, Tailevu, Central division and Western Vanua Levu including Seaqaqa. But, according to the Seaqaqa survey, only 2 ha of pineapples were harvested in the tikina in 2004.

There are currently no commercial processors of pineapple products in Fiji. Preliminary discussions suggest that the minimum economic size for a processing plant is 50 tonnes/day operating at 200 days/year — that is a minimum capacity of 10,000 tonnes/year. This represents a vast expansion from current levels of pineapple production. In 2001, an estimated 4,260 tonnes of pineapples were produced in Fiji. Most of these pineapples were sold on the urban fresh market where there is a large demand. For the Savusavu market and hotels, Labasa market and Suva market, demand is approximately 34.5 tonnes per week. A very small amount (1.16 tonnes in 2000) of fresh pineapples exports are confined to the outer islands.

The small scale of production and associated high cost structure in Fiji means that exports of fresh pineapples grown in the conventional manner (that is non-organic) are no longer a viable option. The alternative is to develop a niche market for organically grown pineapples as the demand for organically grown products is increasing, especially in the EU, USA and Japan.

However, there have been previous attempts at establishing a pineapple industry in Seaqaqa. An EU funded Micro Pineapple Project commenced at Seaqaqa in 1989 with the objective of establishing a small scale commercial pineapple industry in the area. The implementing body was the Ministry of Agriculture, Fisheries & Forests and the targeted market was New Zealand. Planting material, extension services, and marketing infrastructure were provided. A grower's cooperative, The Tropical Fruit Growers Association (TFGA), was formed to take responsibility for marketing.

Until the end of 1993 Seaqaqa had an excellent market for its high quality pineapples in New Zealand where Seaqaqa pineapples could be sold at competitive prices. However, the last quarter of 1993 saw a dramatic shift in the New Zealand market with the entry of Dole pineapples from the Philippines. The effect of Dole pineapples proved to be catastrophic for Fiji pineapple exports. The TFGA's first few shipments exactly coincided with the commencement of the large scale imports of Dole pineapples. Furthermore, Seaqaqa pineapples were landed in Auckland at $NZ1.45/kg compared to $NZ0.80/kg for Dole pineapples. Poorly presented products and the inability to meet production targets on time further exacerbated the problem.

This disastrous export experience was a severe set back to the Cooperative and the reputation of Fiji pineapples. The loss of credibility has meant that these markets have not since been re-established. A marketing study in 1995 concluded that under those conditions and the cost structure of fresh pineapple exports from Vanua Levu, exports of fresh pineapples to New Zealand, or to any other market, were no longer viable.

The future viability of an export oriented pineapple industry based in Vanua Levu will depend on the following elements:

• Substantially reducing cost;
• Concentrating on specialty and value added products;
• Consolidating production.

By reducing costs, improving marketing efficiency and assuring supply continuity Fiji would have an opportunity to sell a reasonable volume of fresh pineapple into New Zealand. However, the 1995 marketing study also concluded that exports to New Zealand would not be sufficient to support the infrastructure necessary for a viable pineapple industry. To achieve the necessary volume the focus needs to shift to value added and specialty products that avoid direct competition with Dole pineapples and minimize the competitive disadvantages of Fiji's high freight and packaging costs.

The products that were identified as having the best opportunities are:
• Organic pineapples;
• Fresh prepared pouched fruit;
• Premium quality processed fruit.

Large areas of Seaqaqa Tikina and surrounding areas are unused or underutilized. The soils is this area are characterized by high acidity levels and are unsuitable for growing most crops without heavy use of fertilizer. However, pineapples have a high tolerance for acid soils and with reasonable management will grow well in this area.

In Fiji as a whole the development of a commercial industry based on fresh and processed exports, over the last 80 years has been constrained by problems of supply continuity and high raw material costs. An underlying problem is that pineapple production has tended to be a small industry, directed at supplying the large local fresh market. Farmers have treated the processors as a residual market, only to be supplied in times of production gluts. To be successful, processors must establish long-term contractual arrangements with growers/cooperatives for at least a substantial part of their raw material requirement. This has proved difficult.

Moreover, existing infrastructure such as water and electricity services would need to be improved. And new infrastructure such as irrigation facilities, roads and port facilities would need to be constructed to support a commercial processing factory. An overseas led agro-industrial type complex might be technically the most appropriate solution, but may not be politically attractive. If small farmers are to be involved in a significant way in the development of a substantial pineapple industry, a far higher level of efficiency, and control is necessary than has ever been the case. The answer may lie with strengthening the nucleus estate and growers cooperative concept.

The concern with the identification and development of new or alternative enterprises for land currently used in cane production has a long history in Fiji. The prospect of the sugar price drop has added urgency to this long-standing effort. Lal (2004) has shown that a considerable proportion of the land devoted to cane production is comparatively poorly suited to the crop. The

land is subject to erosion and yields are fairly low. These findings have been supported by recent work by the ADB and add weight to the argument that there may be a considerable return from moving some resources out of cane production..

The evaluation of the likely returns from these efforts requires information about the current markets for existing products and the future possible markets for new enterprises. Unfortunately reliable information on basic market parameters such as the price elasticities of demand and supply within Fiji are unavailable. The model in Section 2 highlights the importance the of the slope of both the domestic demand curve and the supply curve in determining the impact on the various players in the system of moving resources out of cane production into alternative enterprises. In the absence of data on these basic parameters the impact of expanding root crop production and other cash crop production on the existing producers who supply domestic markets is far from clear.

Anecdotal evidence suggests that market prices for fruit and vegetables tend to be quite responsive to changes in the level of supply on local markets. However, the individual product demand curves involved have not been estimated. Fiji is a rather special case as it is a relatively low income developing country without a widespread food availability problem. Application of estimated elasticities from countries with different characteristics is likely to be unreliable.

Similarly, the structural characteristics on the supply side appear vague. We do not have an estimate of responsiveness of either larger commercial producers or smallholders to output price changes. Smallholders, who probably represent a large part of the current domestic wholesale supply, may well have markedly different supply elasticities than their larger commercial counterparts. Studies in other countries show that the magnitude and sign on smallholder supply are both difficult to specify in an ex ante sense.

Still, at this stage one cannot rule out the possibility that efforts to shift existing cane producing land into the production of alternative crops such as fruit, green leaf vegetables and root crops will not have a serious negative impact of the incomes of smallholders.

5. Policy Recommendations and Concluding Comments

The economy of the Fiji Islands appears to be confronting the possibility of a major external shock in the form of a downward adjustment in returns to the country's main agricultural crop – sugarcane. Both the extent and distribution of the cost of this shock will be influenced by the nature of the government policy mix that is put in place to deal with the problem. One potentially vulnerable group in society that could suffer from these changes is the smallholder production sector incorporating both subsistence and semi-commercial food producers. While little is known about the position and characteristics of this group and their interaction with commercial markets, there is evidence that they are already relatively poor.

While true subsistence households are unlikely to be adversely affected by market shocks, this group is small. The survey of Seaqaqa households shows that most producers who class themselves as subsistence interact through markets to a lesser or greater extent. They sell some part of their produce into commercial markets (often via middlemen) and/or have household members who work outside the family farm.

The current policy response to the threat of this market shock is a mixture of sugar industry restructuring, research into new cropping alternatives, facilitation of the agricultural export trade, and the amelioration of some infrastructure constraints to trade. While these responses all seem sensible, important questions remain as to whether the mix of policies is optimal and whether the resources are available to support these initiatives in the medium to longer term. The design of an optimal mix of policies rests on information about the relative cost effectiveness to the policies at the margin and the distributional impacts involved.

In this paper we have outlined a conceptual framework with which to analyse the position of smallholders in Fiji's agricultural sector and the impact that alternative policies are likely to have on this group. Smallholders are linked to markets through output markets and/or input markets. The impact of changes in the sugar industry will adversely affect smallholders through both linkages. On the output side, smallholders who produce sugarcane will suffer lower returns while the efforts of cane producers to diversify will depress returns for the other crops smallholders currently produce. On the factor market side, smallholders will lose casual employment opportunities in the sugar industry but may gain to the extent they gain greater access to land released from cane production. However, our ability to quantify these impacts is constrained by the lack of basic quantitative information about the interaction between smallholders and the wider agricultural sector through markets.

Development interventions in the smallholder crops sector as in Seaqaqa Tikina generally have not been very successful in the past. Many crop development projects have not succeeded because of inappropriate technologies and failure to deliver services to poor farmers. A Micro pineapple Project funded by the European Union was initiated by the Ministry of Agriculture in the early 1990s with the objective of establishing an export industry to supply the New Zealand market. However, the project failed due to inadequate extension services which did not effectively disseminate the relevant technologies to ensure consistent supply

Smallholder farmers in Seaqaqa Tikina who do not rely on sugarcane retain a strong traditional agricultural production system which often contains an impressive quantity and range of traditional food crops. The integration of these traditional crops is a source of resilience for smallholders in Fiji. With the decline in opportunity for off farm income through the work on sugarcane farms and worsening food security status as a result of declining livestock numbers and food supply from sugarcane farms, there is a significant risk that these smallholders would resort to monoculture to enhance their income earning capacity.

Previous attempts to introduce monoculture crops into traditional cropping systems have failed and pose significant risks. While it may generate a huge rate of return, monoculture cropping has considerable drawbacks. The labour required to harvest, and transport the crop to the point of

and sale, is likely to be much more than available in most households. Wage labour therefore has to be hired – if available – and all household labour diverted from self-sufficiency gardening activities. There are therefore, food security implications from intensive cropping of crops such as kava, particularly as there are high risk of crops losses from cyclones and diseases. As a consequence of monoculture practices, kava dieback disease is currently widespread in Fiji and is adversely affecting farmers' incomes.

There is a very real need to gain a greater understanding of this interaction between the smallholder sector and the wider agri – food sector in Fiji. Estimation of basic market parameters such as the own and cross price elasticities of supply for home consumption and market sale would provide information of relevance to many key food issues confronting Fiji and the other small Pacific Island Countries. Information on the price elasticities of demand for foods consumed in this region is also required.

In this paper it has been assumed that the expected market shock to the sugar industry will eventuate and it will be of a serious magnitude. While this assumption is probably reasonable, the magnitude of the shock is far from certain. Uncertainty relates to the extent to which the extent of EU price support will be reduced (Lal and Rita 2005), especially in the short-run. The timing, nature and extent of support changes will all influence the extent of market pressures imposed upon the industry and all these factors are subject to international bargaining.

Moreover, world sugar prices recently hit a 16 year peak. Prices have risen from around US 6 cents per pound over 1999 – 2000 to more than US 16 cents per pound in late January 2006 (ABARE 2005a). Moreover, current futures prices are consistent with this trend continuing in the short to medium term at least. The possibility of reduced production and exports from the EU – and EU supported producers –in the longer term support this optimistic price outlook. The growing importance of ethanol production from cane – especially in Brazil – fuelled partly by the prospect of continuing high oil prices adds to the likelihood of world sugar prices remaining reasonably strong (ABARE 2005b). The specific returns to producers in Fiji will also be influenced by possible movements in the exchange rate. In this regard it is likely that, given the importance of sugar as an export earner, any major decline in sugar returns would be ameliorated by a tendency for a devaluation of the currency.

In the final analysis, the ability of households to cope with change will be influenced to a large extent by the characteristics of the people in the households, the resources they have and the geography of their location. Factors such as education, farming expertise, attitude to risk, the quality of resources and access to markets will differ between households and between regions. The data analysed in this paper relates to the Seaqaqa Tikina in the northern region of Fiji. The characteristics of these farming communities are unlikely to be same as those elsewhere in Fiji. Similarly the options available to them to respond to shocks may well be markedly different to other groups of farmers. For example, households closer to major centres such as Nadi and Suva have greater options for marketing their produce and accessing off farm labour markets than farmers in Seaqaqa. The compilation of the complete ALP data base will provide a reliable guide as to how well households are likely to fare in the changing market and policy conditions they will confront over the next few years.

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Appendix Table 1: Labasa Market Prices: 2005 ($F)

Item	Unit	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
Bananas	kg	0.77	1.01	1.07	1.08	1.02	0.92	0.97	1.05	0.99	0.99	1.27	1.00	1.01
Beans	kg	1.57	1.52	0.98	1.37	1.28	2.01	1.87	1.55	1.13	1.57	1.26	1.50	1.47
Bele	bundle	1.00	0.88	1.10	1.33	1.13	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.02
Cabbage	kg	1.88	1.71	1.76	2.61	1.61	1.07	0.88	0.66	0.81	1.12	1.36	1.38	1.40
Carrots	kg	1.71	1.60	0.30	0.72	0.50	0.47		0.50					0.83
Cassava	kg	0.62	0.79	0.75	0.58	0.45	0.40	0.37	0.51	1.11	0.48	0.53	0.62	0.60
Coconuts	doz	2.65	2.49	2.23	2.48	2.33	2.42	2.19	1.10	2.05	2.52	2.65	2.00	2.26
Dalo	kg	0.81	0.79	0.74	0.74	0.74	0.71	0.72	0.71	0.67	0.81	0.80	0.97	0.76
Eggplant	kg	0.51	0.32	0.26	0.35	0.88	0.42	0.40	0.45	0.64	0.49	0.63	0.32	0.47
Ginger	kg	0.95	1.46	1.01	1.51	1.52	1.61	1.47	1.38	1.30	1.22	1.23	1.19	1.32
Lemons	kg	0.60	0.13						0.18			0.25		0.29
Melons	kg	1.18	0.91	0.72	1.08	0.91	1.12	1.78	1.46	1.19	1.00	0.73	0.75	1.07
Moca/Tubua	bnd	0.62	0.63	0.53	0.69	1.03	0.80	0.63	0.49	0.50	0.67	0.73	0.70	0.67
Ota	bnd	0.33	0.50			0.33	0.18		0.25					0.32
Pawpaws	kg	0.70	0.79	0.59	0.86	0.79	0.72	0.87	0.69	0.61	0.83	0.76	0.61	0.74
Pineapples	kg	0.99	0.44	0.56	0.21	0.97	1.20	1.29	0.99	0.92	0.83	1.45	0.69	0.88
Sweet Potatoes	kg	0.80	0.59	0.96	0.59	0.66	0.63	0.44	0.65	0.25	0.13		0.60	0.57
Tomatoes	kg	0.98	2.02	3.07	2.77	4.08	3.50	1.81	0.65	0.28	0.72	0.40	0.39	1.72
Vegetables nes	kg	1.04	1.22	1.01	1.10	1.27	1.11	1.65	1.26	1.28	1.23	1.87	1.15	1.27
Yams	kg				1.08	0.85	1.66	0.63	0.67	0.26	0.25			0.77
Yaqona	kg	19.95	20.28	17.79	20.81	24.67	23.39	25.29	24.30	26.23	30.63	28.51	28.84	24.22

Source: Based on information provided by Ministry of Agriculture, Sugar and Land Resettlement (MASLR).