Agricultural supply response in Fiji

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This article presents supply elasticities for 10 major food crops produced and consumed in Fiji. The estimates were derived from a stated-intention survey of rural households. The results appear to be consistent with the dual nature of Fiji's agricultural sector and show that agricultural supply response is own-price elastic for the commodities analysed.

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Agriculture contributes 11 per cent of Fiji's gross domestic product (GDP) and contributes directly to the incomes of many people—especially the 49 per cent of the population living in rural areas. The incidence of poverty is much greater in rural areas than in urban areas and in general is higher for Indo-Fijians than for other ethnic groups (Table 1). In recent years, the economic performance of rural enterprises in Fiji has suffered from declining prices for key commodities and disruption in land-tenure arrangements for sugarcane growers. The end result has been a crisis in the financial outlook for those dependent on the rural sector.

The ability of the agricultural policy community to respond to the challenges facing Fiji is impaired by a lack of basic information about the sector. For example, there are no published estimates of farm supply responses to changes in food prices. Reflecting this gap, models to forecast the likely consequences of the current market disruptions and the impact of alternative policy regimes designed to deal with these problems are not well developed. Consequently, policymakers have little reliable information about the extent of the changes in food production and prices—levels and mixes—that might occur in the medium term. This is particularly important given the rural-to-urban drift of the population and the high proportion of family incomes that poorer people spend on basic foods.

Not only are there no published estimates of supply elasticities for food crops in Fiji, there are limited data for comparable production systems in other countries. Fleming and Hardaker (1986) analysed supply response in several South

Table 1 **Incomes and poverty in Fiji: results from the 2002–03 household survey**

Group	Annual household income (F$)			Population in poverty (per cent)		
	Rural	Urban	All Fiji	Rural	Urban	All Fiji
Fijians	11,082	16,539	12,972	38	27	34
Indo-Fijians	9,653	13,593	11,902	43	29	36
Others	11,066	21,877	19,105	41	17	24
Average	10,559	15,267	12,753	40	27	34

Note: The exchange rate in late January 2008 was roughly A$1 = F$1.35 or F$1 = A$0.74.
Source: Fiji Islands Bureau of Statistics, 2008. *2007 Facts and Figures*. Available from www.statsfiji.gov.fj (accessed 20 January 2008).

Pacific countries, but not Fiji. They found that the export supply of bananas and taro (*dalo* in Fiji) from (then Western) Samoa was quite elastic in the longer run (bananas 2.1 and taro 2.8). The short-run elasticities were markedly lower (bananas 0.6 and taro 0.4).

Fleming and Hardaker (1986) also estimated domestic supply functions for root crops in Tonga and found the supply response to be highly sensitive to the level of prices. They reported a negative response to price changes in low-price periods, while there was a positive response when prices were relatively high. They explained the apparently perverse response in low-price periods as a reflection of the dominance of small producers focusing on income targets. The higher the price, the less these families needed to sell to achieve their income target to cover expenses such as school fees and social obligations. In higher-price periods, commercial motives tended to dominate supply decisions and the supply functions were sloped positively. Fleming and Hardaker found that at relatively high prices the supply of taro was inelastic but the supply of cassava and yams was elastic.

Fleming estimated supply elasticities for coffee (1999a), palm-oil (1999b), copra (1999c) and cocoa (1999d) in Papua New Guinea. He found the supply of all these commercial tree crops was inelastic in the short and long term. Rosegrant et al. (1998) report inelastic long-term supply elasticities in Indonesia for rice, corn, cassava and soybeans, which are also grown in Fiji.

It is not safe to assume that these earlier estimates will be relevant to the policy environment of Fiji today. The farming systems in Fiji are likely to differ from those elsewhere and all farming systems change over time. To ensure the advice they receive is reliable, policymakers need country and time-specific estimates of supply elasticities—not elasticities based on data from up to 30 years ago, such as some of the estimates reviewed above. Our objective was therefore to develop a set of own-price elasticities of supply for the important food items produced and consumed in Fiji, representative of price responses under current conditions.

Conceptual framework

Supply elasticities can be estimated in various ways. One method is to use time-series data. The estimation of time-series models was precluded by the absence of reliable data (Walton 2002). For example, individual crop data frequently cover largely commercial production and exclude much of the subsistence production for home use, which is significant for most food crops. Moreover, the basis of collection has changed over time, so the consistency of the available time-series data is questionable.

Another approach would be to develop models based on an optimising framework and to derive the elasticity estimates through model simulations that rest, at least implicitly, on a relatively tight set of behavioural assumptions (Singh et al. 1986).

For the present analysis, we use a stated-preference technique. In essence, our method is a non-parametric approach to implicitly deriving individual supply elasticities from stated-preference data gathered in a producer/household survey. We surveyed rural food-producing households and asked them how much they produced of each of a range of products. We then asked how production of each item would change if its price were to fall while the prices of other products remained unchanged. In particular, we asked households to indicate their 'choke' price for each product—that is, the price at which they would stop producing the particular item, all other prices held constant. From this information, we derive implicit household product supply curves for each item. We then derive the unrestricted household and product-specific supply elasticities that can be averaged or aggregated to market supply elasticities.

The general form of the own-price elasticity of supply is given by the well-known equation

$$\varepsilon = \frac{\partial Q}{\partial P} * \frac{P}{Q} \qquad (1)$$

in which ε is the own-price elasticity of supply for some good, x; *Q* is the quantity of good, x, supplied; and *P* is the farm-gate price of good x.

Rearranging Equation 1 gives the elasticity in terms of prices

$$\varepsilon = \frac{P}{\frac{\partial P}{\partial Q} * Q} = \frac{P}{\Delta P} \qquad (2)$$

in which ΔP is the difference between the current market price and the choke price or price intercept of the supply curve.

Assuming linearity, the individual producer's own-price supply elasticity is completely identified by the existing market price and the change in price needed to induce the producer to cease production of the good. This choke price represents the lower limit on the opportunity cost of resources in the production of the good for that particular producer and can be obtained directly in a stated-preference survey of producers. The market price is available from official data or can be collected from each respondent. We asked producers to list market prices received by, or familiar to, them as a means of self-referencing their stated production responses. This procedure helped in allowing for any quality differences in production between producers.

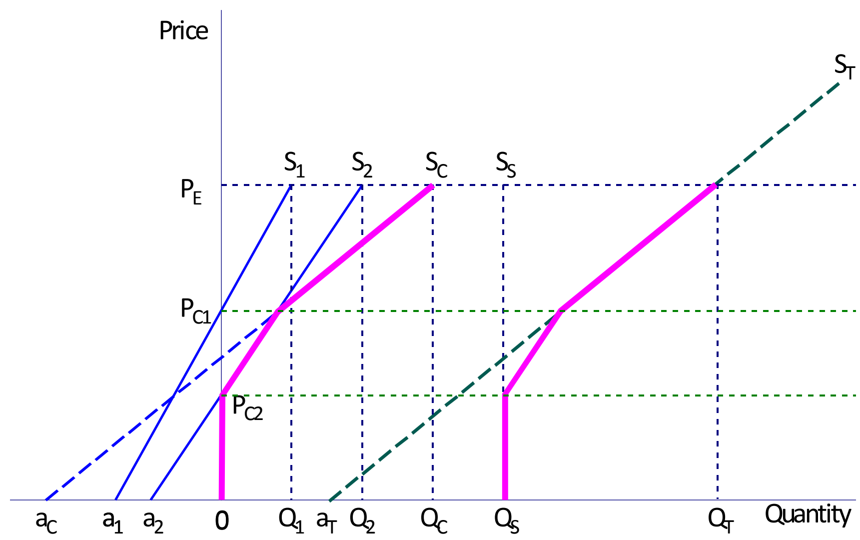
Our survey approach to estimating elasticities employs contingent valuation techniques used widely in the environmental economics literature and has the advantage that it does not require possibly questionable time-series data. It also generates supply elasticities based on current circumstances rather than on average circumstances, potentially extending long into the past. Ideally, the 'current circumstances' should be reasonably 'normal' if the estimated elasticities are to have a reasonable shelf life. The stated-preference method does rely on the assumption that the individual supply curves are at least approximately linear and suffers from the well-known reservations attached to the CVM approach to valuation (see Hanemann 1994 for a discussion).

The supply system underpinning the approach is illustrated in Figure 1. Assume there are three rural households engaged in farm production. Two of these are 'commercial' farming households—that is, they produce for market sale. One household is a subsistence producer: it produces only for its own use. The two commercial farm households are represented by their supply curves, S_1 and S_2. The subsistence household is represented by S_S, which shows that subsistence production is Q_S, regardless of the level of market prices. For each crop produced by each commercial household, we obtain their choke price (P_{C1} and P_{C2}) and production (Q_1 and Q_2) at the current market price, P_E. We use the survey information on P_E, Q_1, Q_2, P_{C1} and P_{C2} to estimate the supply curves, S_1 and S_2, for each household. There is no choke price for the subsistence household because, as noted already, it produces Q_S regardless of price.

The supply curves for each commercial farm derived from the survey responses can be summed in the usual way to generate the aggregate commercial supply curve, S_C. The addition of subsistence production Q_S to S_C generates the total supply curve, S_T. In the case of S_C, its intercept, a_C, is the sum of the intercepts a_1 and a_2 of S_1 and S_2. Similarly, the slopes of S_C and S_T are identical and equal to the sum of the slopes of S_1 and S_2. The aggregation procedure shown in Figure 1 will result in a non-continuous or kinked function with as many kinks as there are households with differently sloped household functions.

The supply elasticities we estimate here are intended ultimately as inputs to an agricultural policy simulation model for Fiji. Our primary concern, then, is to obtain estimates of the market elasticities at the points where P_E intersects S_C and S_T. Our intended approach is to estimate the relevant market elasticities and then to derive the functions making up the simulation model by imposing an appropriate functional form onto the elasticities. This procedure is analogous to the more conventional time-series approach under which functional

Figure 1 **A system of implicit supply curves**



forms are imposed on the data and elasticity estimates are then derived from the estimated equations.

Data and estimation

The data for the reported elasticity estimates were collected in a 2007 survey of rural food-producing households in Fiji. The survey was a quasi-random sample based on the survey list from Fiji's 2002–03 Household Income and Expenditure Survey (HIES), which itself was based on the distribution of households in the 1996 Census. Narsey (2006) describes the HIES and summarises some of its results.

To be included in our survey, households had to have sold any one of a number of farm products and/or to have been engaged in subsistence food production in 2003.[1] The HIES identifies 20 agricultural and fisheries products including cassava, *dalo*, rice, bananas, pineapples, poultry, sugarcane and, of course, *yaqona*, the base of kava. We attempted to select statistically adequate samples of households that had produced the 'smaller' crops while leaving it to the sampling as a whole to include enough households growing major crops such as cassava and sugarcane.

The sample was stratified by statistical division. We clustered households to reduce travel costs and were mindful of including adequate numbers of Fijian and Indo-Fijian households because earlier research by Tubuna et al. (2007) had indicated differences in the farming systems applicable to the two groups. For financial reasons, we excluded households from the more remote outer islands, but households from isolated areas on Viti Levu and Vanua Levu were surveyed. The survey also covered the island of Kadavu as it is important in commercial *yaqona* production. The survey data were obtained in face-to-face interviews conducted by staff from the Fiji Islands Ministry of Primary Industries.

We recognise our sampling procedure is not necessarily optimal; however, details of the sample summarised in Table 2 do suggest the sample is broadly consistent with the geographical and ethnic distribution of rural households and with their agricultural commodity focus.

Our sample is a 1.1 per cent sample of rural households (HIES 2.7 per cent). In aggregate, Indo-Fijian households are under-represented in our sample as it contains seemingly 'too few' Indo-Fijian households from the Western Division and especially too few Western Division sugarcane-producing households. Nevertheless, we consider the sample of 52 Western Division sugarcane producers sufficient for statistical purposes.

Results

The elasticities reported here show medium to longer-term responses under certainty. Respondents were asked to consider a scenario with a guaranteed or certain price over a period sufficient for a production response, rather than an immediate change in price of uncertain duration.

The estimates presented in Table 3 are based on raw survey data. In addition, the individual household data have not been calibrated to a single representative market price, P_E, and are not weighted by their sample weights. The estimated household elasticities have, however, been 'winsorised'[2] to reduce the impacts of outliers on the mean elasticities (Olive 2007).

We have winsorised the derived elasticity values rather than their source data. In principle, the values of the household elasticities can range widely—from negative values (the 'peasant effect') to zero (pure subsistence production)—and then to a

Table 2 **Selected details of rural sample** (number of households)

Item	Central		Northern		Western		Total Fiji		
	HIES	Sample	HIES	Sample	HIES	Sample	Total population	HIES	Sample
Ethnic group									
Fijian	687	336	271	197	376	171	51,282	1,334	704
Indo-Fijian	53	21	210	103	583	84	30,631	846	208
Other	19	1	25	15	6	1	1,756	50	17
Total	759	358	506	315	965	256	83,669	2,230	929
Commodity earnings[a]									
Cassava	187	120	10	10	84	59	10,582	281	199
Dalo	1	1	17	17	-	-	716	18	18
Rice	218	161	108	93	59	52	15,781	385	306
Sugarcane	-	-	63	31	306	52	13,128	369	83
Yaqona	218	134	131	109	51	45	16,196	400	288
Bananas	91	67	5	5	58	49	5,559	154	121
Pineapples	16	12	5	5	6	6	1,062	27	23

[a] households reporting earnings from products shown
Note: Eastern Division included in Central Division.
Source: Raikoti, T., 2006. Personal communication, Fiji Islands Bureau of Statistics, October 2006.

range of positive values extending even to infinity (when the current price equals the choke price). Our main problem has been with a few households for which the elasticities appear to be very large and in some cases even infinite.

The winsorisation procedure enables us to keep these households in the calculations at elasticity values that are arithmetically tractable and, we believe, plausible.

We truncate the top elasticities at values equal to the means plus two standard errors of the distributions of the unadjusted values of the raw elasticities greater than zero but excluding the infinite values. If the distributions were normal, the procedure would cut off only the top 2.5 per cent of the distribution of the unadjusted raw estimates.[3] As indicated in Appendix Table 1, the winsorisation ranged from a low of 5 per cent of the estimates (cassava) to a high of 24 per cent (rice).

Our elasticities are not directly comparable with estimates published elsewhere because ours are for individual household, not total market, elasticities. That said, the results from our sample appear to be reasonably consistent with the Fleming and Hardaker (1986) estimates for bananas and *dalo* in Western Samoa, despite the differences of time and country. In fact, our elasticities for bananas and *dalo* for commercial households fall quite close to the long-run values reported in the earlier study. And, like Fleming and Hardaker's estimates for Tonga, our estimates indicate that agricultural supply in Fiji is own-price elastic.

Aside from the Fleming and Hardaker comparison, our elasticities appear to be relatively high compared with the values reported by Fleming (1999a, 1999b, 1999c, 1999d), Rosegrant et al. (1998) and values used in some global partial-equilibrium

Table 3 **Estimated own-price elasticities of supply for Fiji: selected commodities**[a]

Item	Cassava	*Dalo*	Rice	Coconut	Sugarcane	*Yaqona*	Banana	Pawpaw	Pineapple	Bele
All reporting households										
Weighted mean[b]	1.59	1.95	2.29	2.48	2.52	2.99	1.25	1.76	1.32	1.11
Mean	1.49	1.81	1.22	1.42	2.55	2.51	1.01	1.14	0.90	0.77
Standard error	0.06	0.07	0.48	0.18	0.28	0.17	0.07	0.16	0.16	0.10
RSE (%)	4.07	3.83	39.73	12.91	10.90	6.87	7.16	13.85	17.30	13.05
95% confidence interval	0.12	0.14	0.95	0.36	0.54	0.34	0.14	0.31	0.30	0.20
Median	1.45	1.67	0.00	1.07	1.65	1.67	1.07	0.00	0.00	0.00
Mode	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skewness	0.97	0.86	3.23	1.21	2.40	1.68	0.65	1.23	1.49	1.32
Price-responsive households										
Weighted mean[b]	1.89	2.34	10.19	3.01	3.34	3.91	1.84	1.94	2.58	2.15
Mean	2.06	2.28	4.52	2.67	3.45	3.55	1.96	2.37	2.51	2.29
Standard error	0.06	0.07	1.50	0.23	0.33	0.20	0.07	0.19	0.22	0.12
RSE (%)	2.86	2.93	33.24	8.63	9.63	5.63	3.35	7.84	8.77	5.33
95% confidence interval	0.12	0.13	2.94	0.45	0.65	0.39	0.13	0.36	0.43	0.24
Median	1.67	1.83	1.11	2.00	2.43	2.52	2.00	2.00	2.00	2.00
Mode	1.50	1.67	1.09	1.33	2.43	11.25	2.00	2.00	3.00	2.00
Skewness	1.66	1.34	1.11	0.80	2.31	1.70	0.99	1.42	1.01	1.31

[a] outlier values excluding zero values but including apparently infinite elasticities are winsorised to values equal to the means plus two standard errors of the distributions of the unadjusted values of the raw elasticities greater than zero but excluding the infinite values.

[b] weighted by household production but not sample weights

Table 4 **Ethnicity–related differences in elasticities**[a]

Commodity	All Fiji	Fijians	Indo–Fijians	t value	Significant difference[b]	
					95 per cent	99 per cent
Cassava	2.06	2.05	2.16	–6.43	Yes	Yes
Dalo	2.28	2.21	2.96	–40.34	Yes	Yes
Rice	4.52	13.69	2.99	11.50	Yes	Yes
Coconuts	2.67	2.43	2.99	–6.02	Yes	Yes
Sugarcane	3.45	3.71	3.38	2.84	Yes	Yes
Yaqona	3.55	3.56	3.28	3.07	Yes	Yes
Bananas	1.96	1.95	2.02	–2.59	Yes	Yes
Pawpaws	2.37	2.34	2.41	–0.82	No	No
Pineapples	2.51	2.85	1.74	11.33	Yes	Yes
Bele	2.29	2.34	2.23	2.18	Yes	No

[a] ethnicity based on ethnicity of the head of household or 'Person 1'.
[b] test of the significance of the difference between two sample means using a two–tail test (Karmel 1963:98)
Note: Sample statistics not adjusted for winsorisation of the elasticities.

models. One example is the SWOPSIM model used to inform the policy debate for the Uruguay Round of trade negotiations (Roningen and Dixit 1989). The data for that model included 33 countries/regions and 22 commodities represented by 638 medium-term supply elasticities. Of these elasticities—admittedly mostly for temperate-zone products—only two were greater than 1 (Sullivan et al. 1992).

So far, we have precluded the possibility of negative supply elasticities associated with the 'peasant effect' reported by Fleming and Hardaker (1986). We do, however, find evidence of a dual-production system, consistent with the results of earlier research for Seaqaqa Tikina (or district) on Vanua Levu (Tubuna et al. 2007). In particular, we find significant differences between the own-price responses of Fijian and Indo-Fijian households (Table 4).

These differences are likely to be dependent mostly on differences in the farming systems applicable to the two groups rather than on ethnicity *per se*. At least 89 per cent[4] of the Fijian households in our sample operate on *Mataqali*, or communal, land by customary right, rather than under any formal lease arrangements. Many of these households follow a farming system characterised by a very low reliance on purchased inputs. In contrast, only 5 per cent of Indo-Fijian households seem to farm *Mataqali* land, with the remainder farming either freehold or formally leased land (Table 5). Nearly 60 per cent of the Indo-Fijian households farming under Native Land Trust Board (NLTB) leases (of *Mataqali* land) grow sugarcane.

The highest values of the estimated elasticities are those for rice, coconuts, sugarcane and *yaqona*. The high value for rice might reflect the relatively small sample of households that reported price-responsive rice production. There might, however, be more substantive reasons for the relatively high supply elasticities for coconuts, sugarcane and *yaqona*.

The high elasticity for coconuts could arise from the fact that coconut supply can be a basic production decision as well as a harvesting decision—that is, a decision to not collect or collect and process fallen nuts. *Yaqona* can be harvested after about a year but becomes more potent if left to mature in the ground. In this sense, *yaqona* is like a 'bank account in the ground' because the capital stock earns interest if left in the ground. Because of the flexibility in harvesting the crop, *yaqona* appears to be a particularly useful crop for meeting the family and social obligations of subsistence and smaller commercial producers. Significantly, *yaqona* plays this banker role principally for Fijian households. Of the 190 households producing 'price-responsive' *yaqona*, only six were Indo-Fijian households.

The relatively high elasticities for sugarcane could result from our sample of sugarcane-producing households better representing mixed rather than specialist sugarcane farms. The mixed farms are likely to be more responsive to price changes because they are likely to be on more marginal sugar country and, at current prices, probably already have profitable alternatives to sugarcane.[5]

The estimated elasticities also differ by region. For all the possible pair-wise comparisons in the regional elasticities shown in Appendix Table 1, there are significant differences between all the elasticities shown. As with the ethnicity-related differences, these regional differences are likely to reflect differences in farming systems—as in the case of sugarcane described above.

This study is unusual in reporting individual household elasticities, so we should comment briefly on the distributions of the estimated values. The distributions for cassava, *dalo* and sugarcane are shown in Figure 2. The distributions for all the commodities are positively skewed, with that for *dalo* possibly the most uni-modal of the three shown. The overall bi-modal distribution for sugarcane helps 'explain' the difference between the average Western Division and Northern Division elasticities. The modal elasticity for the larger number of Western Division sugarcane growers is about 1.75 while that for the Northern Division growers is higher, at 2.75.

Concluding comments

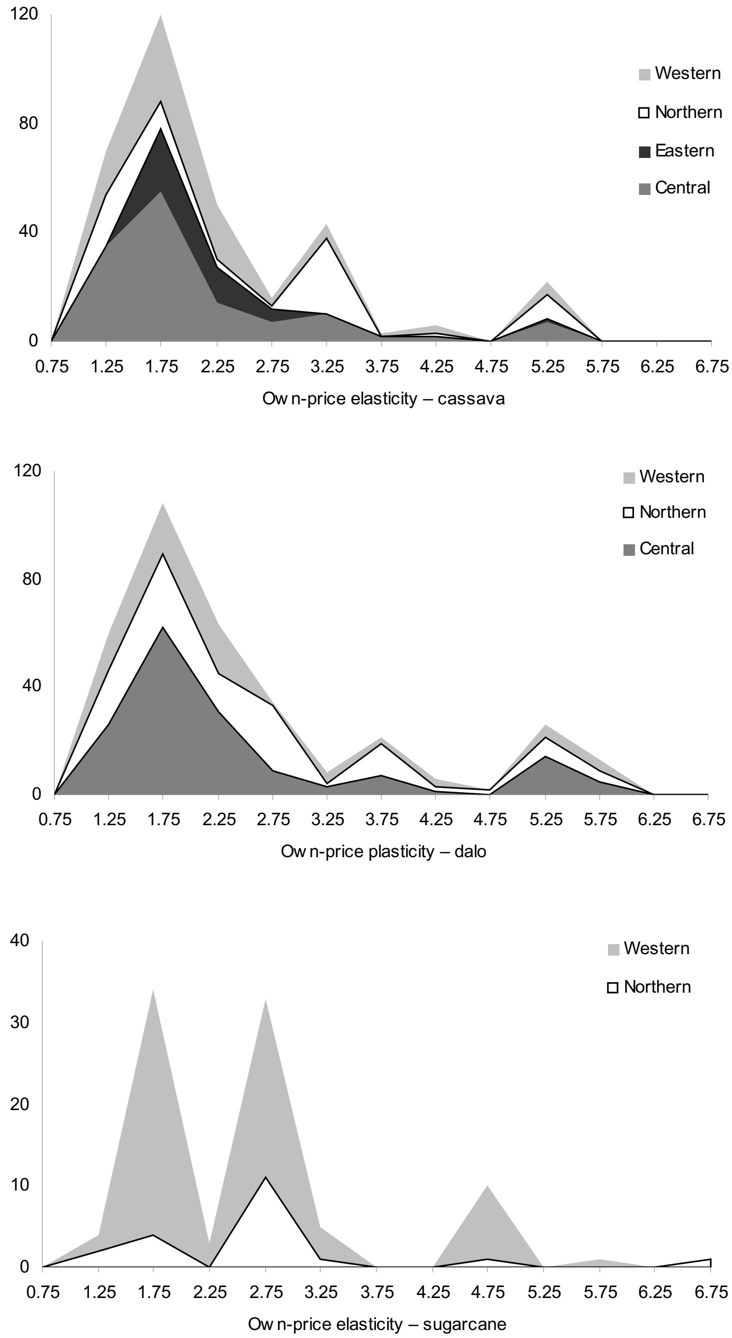
Contrary to our initial expectations, the medium to long-term elasticities reported here appear to be generally consistent with the levels reported by Fleming and Hardaker (1986) some 20 years ago. In an analytical

Table 5 **Land tenure 'Plot 1': surveyed households**

Household ethnicity[a]	Freehold	NLTB* lease	*Mataqali*	Other lease	Share cropping	Total
	Percentage of households					
Fijian	2.5	5.6	88.8	2.0	1.1	100.0
Indo-Fijian	30.7	46.7	5.0	17.6	0.0	100.0

[a] ethnicity of head of household or 'Person 1'
* Native Land Trust Board

Figure 2 **Distribution of selected elasticities by division**



sense, this would mean that the production system represented by our elasticities is probably less responsive than the systems analysed by Fleming and Hardaker because we report medium to long-term responses under certainty.

Leaving that aside, perhaps the unexpected similarity in the levels of the elasticity estimates is not surprising after all.

Much of the agriculture in Samoa and Tonga was then—and probably is still—based on traditional farming on communal land. This is certainly the case for a significant part of Fiji's agriculture; hence, the unexpected similarities in elasticities might be the result of similarities in farming systems then and now. The fact that the elasticities reported here are higher than levels that have been used for largely temperate-zone products might be because a good deal of Fiji's agriculture relies on few, if any, purchased inputs. Given this, and the widespread availability of ample land—at least to traditional owners—it is probably easy for households to modify production levels and switch between outputs.

Whatever the final judgment about the values of the elasticities, it is clear from our estimates that the food-production sector in Fiji is highly diverse. While we did consider restricting our survey to Viti Levu to save time and costs, it was clearly appropriate to spread our sample more broadly across Fiji. Our analysis supports the earlier conclusions of Tubuna et al. (2007) that Fiji's agriculture is essentially characterised by a dualism captured by the phrase 'Two groups, two systems and two crops'. There are two predominant ethnic groups (Fijians and Indo-Fijians), two farming systems (on communal land and on leased or freehold land) and two key cash crops (*yaqona* and sugarcane). While broad generalisations are risky, we find that in general ethnic Fijians farm *Mataqali* or communal land and grow *yaqona* as their principal cash crop; Indo-Fijians farm leased or freehold land and, broadly speaking, grow sugarcane as their main cash crop.

For each crop considered here, we divided the sample households producing the crop into pure subsistence and 'price-responsive' households. Considered over all their production, however, the exposure of rural households to the market will be one of degree rather than a simple dichotomy. Commercial producers will all produce some food for family consumption and most subsistence producers have at least some exposure to the market through intermittent sales of surplus produce or through supplying their labour to commercial farms. We believe the own-price elasticities of supply for food crops are likely to differ markedly between producers who, taking account of their entire production regime, might be classified as 'commercial' and subsistence producers. The identification of these differences will be the subject of further research.

Overall, we find agricultural supply responses in Fiji to be own-price elastic—at least in the medium to longer term. This means that the contribution of agriculture to Fiji's economic development could be substantial if the profitability of farming can be increased. In particular, policies that help relax the resource constraints in the sector offer significant gains for the community as a whole. Fiji therefore has much to gain from policies that help to resolve land-tenure problems and the related problems in gaining access to credit, and from policies that support targeted extension and research and development in an appropriate way and improve marketing efficiency. Based on related research (Tubuna et al. 2007; Tubuna forthcoming), it would be helpful if it were possible to take a longer-term and more strategic approach to agricultural research and development and development efforts.

In that way, Fiji might be able to progress beyond the stop–start nature of some of its earlier agricultural development initiatives under which production of particular commodities expanded for a time, only to subsequently decline.

Notes

1 The urban component of the HIES was conducted from March 2002 to February 2003, while the rural survey covered the period May 2003 to April 2004. As Narsey (2006:1) explains, the urban and rural components of the Household Income and Expenditures Survey had to be split because of funding constraints related to the political events of 2000.

2 Winsorisation refers to the formalised editing of outliers in statistical data sets. In its simplest form, winsorisation would involve setting all values above and below critical values to equal the critical values, perhaps defined as some percentile value. Winsorisation appears to be a common procedure and has been used by the Australian Bureau of Statistics in its Household Expenditure Survey (www.abs.gov.au search for 'winsorised').

3 We excluded any negative elasticity values thrown up by the arithmetic because, on the basis of casual observation, the negative values seemed to be the result of data input errors.

4 This figure is based on details for 'Plot 1' only—usually the largest of the plots farmed by a household.

5 The uncertain outlook for the industry in Fiji might also be a contributor. Depending on world market conditions, the changes to the European Union's import arrangements—the 'sugar shock'—might reduce the market returns for Fiji's sugar by about 30 per cent below the price of F$51 in 2007—that is, to about F$35 a tonne. Based on the raw sample data, about 20 per cent of sugarcane-producing households indicated a choke price above F$35 a tonne. Therefore, according to these preliminary results, it is possible that Fiji's sugarcane production might—other things remaining constant—decline by a further 20 per cent as a result of the sugar shock.

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Acknowledgments

We are pleased to acknowledge the financial support towards the preparation of this paper from the Australian Centre for International Agricultural Research (ACIAR). We also acknowledge assistance from the Fiji Islands Bureau of Statistics, especially from Toga Raikoti and Epeli Waqavonovono, who provided the HIES sampling frame and other background information essential to this research. We accept responsibility for any errors or omissions.

Table A1 **Summary of own-price elasticities by division**

Item	Cassava	*Dalo*	Rice	Coconuts	Sugarcane	*Yaqona*	Bananas	Pawpaws	Pineapples	*Bele*
Elasticities: price-responsive households										
Central Division[a]										
Mean	1.90	2.19		1.86		4.11	1.57			2.45
RSE (per cent)	3.70	4.40		13.20		7.70	3.90			30.80
Median	1.67	1.67		1.67		3.00	1.50			2.00
Northern Division										
Mean	2.54	2.40	4.52	2.78	5.98	2.63	2.00	2.48	2.54	2.34
RSE (per cent)	6.10	4.80	33.20	9.20	15.70	8.10	6.20	8.30	9.50	6.00
Median	3.00	2.00	1.11	2.00	2.55	2.13	2.00	2.00	2.14	2.00
Western Division										
Mean	1.99	2.28			2.39	3.39	2.18	1.62	2.38	1.91
RSE (per cent)	5.70	6.90			5.30	13.10	5.00	11.10	23.90	4.60
Median	1.67	2.00			2.32	2.50	2.00	1.67	2.00	2.00
Price-responsive households (no.)										
Central Division	174	158	-	6	-	99	33	-	-	3
Northern Division	71	113	14	45	30	54	37	35	23	38
Western Division	85	70	-	-	71	37	51	5	6	6
	330	341	14	51	101	190	121	40	29	47
Significance of mean difference (99 per cent confidence)[b]										
Central–Northern	Yes	Yes	n.a.	Yes	n.a.	Yes	Yes	n.a.	n.a.	Yes
Central–Western	Yes	Yes	n.a.	n.a.	n.a.	Yes	Yes	n.a.	n.a.	Yes
Northern–Western	Yes	Yes	n.a.	n.a.	Yes	Yes	Yes	Yes	Yes	Yes

[a] Central Division includes Eastern Division
[b] test of significance between two sample means (Karmel 1963:98)
Note: Sample statistics not adjusted for winsorisation of the elasticities.