

Chapter 3

EVOLUTION OF SOUTH PACIFIC AGRICULTURAL MARKETING SYSTEMS:
STRUCTURE, CONDUCT AND PERFORMANCE

3.1 INTRODUCTION

3.1.1 Purpose

The purpose of this chapter is to assess the impact of agricultural market evolution on agricultural development in developing nations in the South Pacific region. Agricultural institutions in the developed countries have evolved in an environment considerably different from the environments of agricultural sectors in developing nations of the South Pacific today. One area of difference has been the nature of evolution of agricultural marketing systems in developed countries compared with South Pacific developing nations. It is argued that these divergences between agricultural marketing systems have implications for agricultural market development policies in South Pacific nations.

A variant of the structure-conduct-performance (SCP) method is employed in this study to examine institutional development within an agricultural marketing system. This method was first propounded by Bain (1968) who based his analysis in the 'industrial organisation' paradigm, predicated on the unidirectional sequential effects of market structure on the conduct of market participants and, ultimately, on their performance.

Market structure has generally been defined narrowly, in terms of the characteristics of economic organisations. It 'consists of "characteristics of the organization of a market which seem to influence strategically the nature of competition and pricing within the market" [quoting Bain]... these are the degree of seller and buyer concentration, entry conditions,... the extent of agent and product information and its adequacy in sharpening price and quality comparisons and in reducing risk...' (Harriss 1979, pp. 197-8). The association between these characteristics and the assumptions of a perfectly competitive market is

clear and helps to explain the preoccupation of analysts with perfect competition as a norm for performance measurement described above.

Market conduct 'refers to the manner in which [market participants] assign values to choice variables' (Helmberger et al. 1981, p.513). Bain (1968, pp. 302-3) explained conduct in terms of the way in which participants respond in adapting or adjusting their behaviour to changes in the structure of markets in which they participate: the character of marketing strategies adopted and the co-ordination of decisions and actions. Marion and Mueller (1983, p.25) lamented the lack of attention paid to market conduct which they ascribe to the 'difficulty of quantifying conduct and the virtual absence of secondary data'.

3.1.2 Analysis of Market Structure and Conduct

Having resolved the choice of a performance norm in Chapter 2, attention is now directed towards market structure and conduct. Many analysts have used Bain's terms and general approach to investigate and explain market competitiveness and levels of market integration, primarily by undertaking a comparative analysis of commodity prices at different levels in the agricultural marketing systems. Reviews of studies undertaken, and some telling criticisms of them, have been made by Harriss (1979, pp. 213-5), Shaffer (1980) and Helmberger et al. (1981). Helmberger et al. (p. 514), recognised that the 'exceedingly complex nature' of market conduct stems from the fact that it encompasses 'virtually all human decision making'. Hence, an attempt to explain conduct 'would presumably entail several social sciences in addition to economics'.

A different tack is adopted in this paper in an effort to avoid the most damaging criticisms made of previous studies. The approach adopted in most of these studies has been to attempt to describe and explain fully the evolving structure of marketing systems, and conduct of market participants, in terms of a small number of economic parameters. Such an approach is unlikely to be successful in South Pacific countries, particularly as these parameters generally are estimated on the pretext that the systems satisfy the assumptions of a perfectly competitive market, or at least 'workable competition' (Sosnick 1958).

The main departure from previous studies is the adduction of a catholicity of observations and conclusions, derived from the wealth of literature on South Pacific societies that is available from studies in various disciplines. This eclectic approach enables essential attributes of agricultural marketing systems to be distilled and provides, in turn, the basis for explaining current conduct of market participants, especially in comparison with the way agricultural market operations are conducted in developed economies.

The analysis of market structure and conduct, then, is in terms of the process or 'path' of agricultural market development while performance is evaluated against an 'operational norm' which is expressed in terms of a single comprehensive economic measure. The benchmark for studying market structure and conduct is the process of agricultural development which took place in developed countries. This process has a peculiar advantage as a benchmark for drawing policy conclusions in that the types of marketing institutions that have evolved in developed countries today closely resemble those types present in South Pacific countries.

The procedure outlined above takes as its model the approach to structure-conduct-performance analysis outlined by Shaffer (1980) which, although elementary, is worth quoting in full.

Each [market] participant responds to his environmental situation and the aggregate consequence is a change in environment. The changes in the environment contain the benefits and costs for individuals and groups which follow from behavioral responses. Changes in participants' perceptions of the environment and appropriate behavior follow from the change in the environment. The sequence continues, the system evolves. Call the total flow of consequences which follow from the organization of the political economy [the satisfaction of agricultural product and marketing service needs], performance. Then we can say that the evolving system is driven by this basic three-term sequence of environment, behavioral responses, and performance. ... The task is to classify strategic characteristics of the environment, classify participants and their behavioral modes, classify outcomes and develop meaningful hypotheses about their relationships (p.311).

An advantage of this approach over other SCP studies is that it implies recognition that future market structure evolves in response to current market conduct and performance. SCP is thus a recursive process rather than the simple unidirectional process commonly modelled.

3.2 PERIODS OF AGRICULTURAL MARKET DEVELOPMENT

3.2.1 Delineation of Periods

Breimyer (1976) has provided a good outline of the historical development of marketing in agriculture in the now-developed countries. He identified four epochs: self-sufficiency; agrarian organisation; agricultural organisation; and commercial organisation. If Breimyer's historical record is accepted as an accurate description of agricultural market development in mixed economies, a parallel set of periods of development of agricultural marketing in South Pacific countries can be hypothesised, assuming these countries were to undergo the same processes of economic growth as occurred in developed countries. A fifth period of development, dominance of agricultural marketing institutions, is added, reflecting the present predominant position of large public and private corporations in the agricultural marketing systems of developed countries. Finally, a sixth period is appended to take account of recent innovations in organisational structure within established marketing corporations.

The six periods of agricultural market development are categorised as follows:

- Period 1: Pure subsistence
- Period 2: Village marketing organisation
- Period 3: Independent agricultural marketing organisation
- Period 4: Commercial marketing organisation
- Period 5: Dominance of agricultural marketing institutions
- Period 6: Emergence of intrapreneurship

A brief description of the main attributes of each period follows.

Pure subsistence. In the pure subsistence period of agricultural market development, trading in agricultural products and inputs is largely restricted to within the extended family unit. The basis of exchange is prestation (Epstein 1982, p. 14) and family members have reciprocal rights and obligations which dictate the nature of exchange of agricultural products. No market contact exists outside the village. The degree of specialisation of labour and the differentiation of production and marketing tasks is limited.

Village marketing organisation. Both intravillage and intervillage market trading in agricultural products commences in this second period of market development. Trade in food items tends to be dominant. Market contact with outside economic sectors is still in its infancy and the extent of transactions between stages in the marketing process and interregional coordination of agricultural marketing activities are limited. Communal relationships dominate economic decision processes and activities, including agricultural production and marketing. Marketing activities still often take the form of ceremonial exchange and prestation. Marketing operations remain labour-intensive.

Independent agricultural marketing organisation. By this period, a class of small, independent agricultural producers, middlemen and entrepreneurs has emerged, less influenced by the village organisation. There is increased use of purchased capital and current inputs in both agricultural production and agricultural marketing activities. An atomistic, competitive market structure exists, usually with many buyers and sellers at each stage of marketing and reasonably free market entry and exit. There is an increasing number and variety of marketing services and a continued specialisation of marketing activities, with some specialisation in producing agricultural commodities for export. However, agricultural products continue to be traded in small lots. Market information and knowledge become more widespread in the agricultural marketing system. Competition in the market place takes place through price variations. Finally, economic individualism supersedes communal decision making and common access to goods and services produced.

Commercial marketing organisation. Small independent producers, middlemen and entrepreneurs have now made way for larger scale, more commercial marketing organisations. Private corporations begin to dominate agricultural market operations, particularly at those stages of the marketing processes which require large capital investments and in which significant economies of size exist. Infrastructural facilities are more comprehensive and market coordination is complete throughout the agricultural marketing system. The internal organisation of agricultural marketing businesses is formally defined and, in many instances, research and entrepreneurial activities become specialised functions within the business unit, with linkages developed with foreign-owned marketing

firms. Price competition becomes relatively less important as new forms of non-price competitive strategies are developed by marketing firms. A greater diversity of agricultural products becomes available for distribution.

Dominance of agricultural marketing institutions. The predominant influence of large public and private agricultural marketing institutions on market conduct becomes apparent. The agricultural marketing system becomes finely tuned to supply considerations and the demands of final consumers. Market-controlling institutions are more evident, particularly in agricultural policy-making. Positive market strategies give way to defensive strategies. Private marketing institutions now often take the form of transnational corporations and are increasingly sensitive to political processes and the activities of the public marketing institutions.

The emergence of intrapreneurship. As marketing institutions grow in size and complexity, their ability to respond to new marketing opportunities becomes constrained by inertia and resistance to change from within the organisational structure. Incentives to personnel within these organisations become muted and distorted. It becomes more difficult to motivate them to strive to exploit changing conditions in the market-place for corporate gain.

Internal pressures are created within the marketing institutions to alter their structures to encourage personnel to seek out and exploit new marketing opportunities on behalf of the institution. Thus, entrepreneurial endeavour is harnessed and fostered within established organisations in the form of 'intrapreneurship'. Intrapreneurship thus differs from entrepreneurship in that it develops within established institutions rather than independently, as has traditionally been the case in early stages of agricultural market development, and rewards are claims on internal resources rather than supernormal profits in the market-place.

3.2.2 Transition between Periods

In order to understand how such an agricultural marketing system develops, it is useful to appreciate the pressures which cause the system to be transformed from one period to the next, as outlined in the previous section. Relations within the system are affected endogenously, by changing interdependences and attributes of elements of the system, and exogenously, by events elsewhere in the economy and in foreign markets. These effects create a need for further change because marketing forces alter the existing marketing relations. The marketing forces reflect the type and extent of agricultural production and marketing technology, the existing status and relative power of groups in the marketing system, the knowledge and skills of market participants, the institutional arrangements for allocating roles among agricultural market participants and the demands of final consumers of goods and services in the agricultural marketing system.

A schematic representation of the transition between periods of agricultural market development is outlined in Table 3.1. While agricultural market development is characterised here as falling into five defined stages, it is implied that there is a gradual transition from one stage to the next. Indeed, in the developed countries, these transitions between stages took place over very long periods and may not yet be completed. Different parts of the marketing system could be at different stages of evolution within the same country.

As mentioned above, this representation is based on a stylised version of agricultural market development in the developed market economies of today. The next step is to assess how accurately this version describes the processes of agricultural market development in South Pacific countries. The purpose of this comparison is not to argue that the process of agricultural market development in developed countries is the ideal path that should be followed in South Pacific countries. Rather, the comparison is made with the purpose of demonstrating that what is suitable as a process of agricultural market development in developed countries is not necessarily appropriate for the evolution of marketing systems in South Pacific countries. The problems of inappropriate evolution are highlighted in the following analysis in

Table 3.1

Transition between Periods of Agricultural Market DevelopmentPeriod 1 to Period 2

Marketing Forces	Market Development
<ul style="list-style-type: none"> . Comparative advantage in specialisation of productive activities . Increasing difficulties in bartering agricultural products for other goods and services . Not all demands of consumers of agricultural products and requirements of agricultural producers can be met by the village organisation 	<ul style="list-style-type: none"> . Emergence of agricultural production and marketing specialists . Creation of money as a medium of market exchange and standard measure of value in market transactions . Establishment of outside links and greater interaction between families within the village system

Period 2 to Period 3

Marketing Forces	Market Development
<ul style="list-style-type: none"> . Economic conditions favour forces of profit incentive as the terms of trade move in favour of agriculture . Growing intensity in the use of agricultural marketing facilities available in the village exposing greater and more numerous inadequacies in the agricultural marketing system 	<ul style="list-style-type: none"> . Major benefits flow to those who privately own and control agricultural marketing resources, leading to the emergence of the individual marketing businessman and the accumulation of capital . Emergence of the innovative entrepreneur, to undertake activities needed to promote agricultural marketing enterprise where not all markets are well established or clearly defined

Period 3 to Period 4

Marketing Forces

Market Development

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| <ul style="list-style-type: none"> . Increasing consumer demands on the agricultural marketing system: <ul style="list-style-type: none"> (a) for a wider range of goods and services, and (b) for goods and services closely tailored to their tastes and preferences . Growth in opportunities for capital accumulation, begun in Stage 3, by <ul style="list-style-type: none"> (a) taking risks; (b) innovating new marketing technologies; and (c) exploiting market imperfections . Consumer population now located mainly in urban areas . Greater commercial requirements in agricultural marketing transactions . Increasing interdependence between the domestic economy and foreign economies . Greater scope for obtaining capital from outside the organisation. | <ul style="list-style-type: none"> . Marketing firm expansion to reap economies of size and product diversification; increasing attention by firms to product differentiation . Increased specialisation of the entrepreneurial role, particularly in capital investment, and growing sophistication of the marketing firm in terms of management and technologies; investment by market participants in agricultural market structures . Increased urbanisation of agricultural marketing functions and investment in social overhead capital to link agricultural areas with urban centres . More formal, corporate marketing entities and a trend to long-range marketing strategies; entities have their bases in an enforceable legal system rather than customary codes of behaviour . Establishment of links and trading relations with foreign firms; entry of domestic firms into foreign marketing systems and foreign firms into the domestic agricultural marketing system . Greater reliance on capital markets, including share capital. As the international capital market is tapped, there is a trend towards increased domination by multinational corporations. |
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Period 4 to Period 5

Marketing Forces

Market Development

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| <ul style="list-style-type: none"> . Growing government responsibility in planning economic activity . Increased corporatism in marketing activities . Population now overwhelmingly urban and non-agricultural, relying on urban markets for basic food supply . Increasing importance of demand creation in the expansion of consumption | <ul style="list-style-type: none"> . Agricultural marketing systems used as a vehicle for implementing policy measures. . Concentration of ownership of modes of agricultural marketing, often involving transnational marketing corporations; growing interface between market participants and policymakers; countervailing control exerted by government in the marketing system to promote widespread domestic market participation . Government increasingly sensitive to the need to ensure regular supplies of staple food items at reasonable prices for political reasons; marketing institutions are urban-oriented . Development of advertising and promotion activities as key component in corporate strategies |
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Period 5 to Period 6

Marketing Forces

Market Development

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- | | |
|---|---|
| <ul style="list-style-type: none"> . Diminishing ability of most marketing institutions to adapt quickly to new marketing opportunities, technologies and competition from imports, and to develop new marketing services (less likely where scale economies are not substantial and market entry is easy) | <ul style="list-style-type: none"> . Restructuring of institutions to promote intrapreneurship; exploitation of marketing opportunities from within the organisation |
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two respects. First, the divergences which have occurred in marketing systems in South Pacific countries from the stylised version of agricultural market development in developed countries have created obstacles to agricultural market development. Second, the attributes of marketing institutions in South Pacific countries reveal them to be prototypes of institutions that have characterised different periods of agricultural market development in the developed countries; these attributes are not necessarily suitable for South Pacific conditions.

3.2.3 Agricultural Market Development in the South Pacific

The path of agricultural market development in South Pacific countries has diverged substantially from the hypothesised market development process outlined above. Most importantly, the neat linear progression from one period of development to the next has not occurred and changes that have taken place have often been discrete rather than smooth. At present, Periods 2, 3, 4 and 5 can all be identified in an examination of the agricultural marketing systems of virtually all countries in the region while the crucial sixth period is yet to emerge. Only the progression from Period 1 to Period 2 appears to have been substantially completed. The reasons why there has not been a smooth linear transition are helpful in explaining why shortcomings exist in these agricultural marketing systems and why there are difficulties in achieving agricultural development based on existing policies.

The following reasons are put forward for divergences between the hypothesised path of market development and the situation observed in South Pacific countries today.

Influence of colonialism.¹ Perry (1974) has outlined five motives of colonialism: the need for raw materials for metropolitan industry; the

¹ Colonialism has been defined by Brookfield (1972 , p. 1) as 'a thoroughgoing, comprehensive and deliberate penetration of a local or "residential" system by the agents of an external system, who aim to restructure the patterns of organisation, resource use, circulation and outlook so as to bring these into a linked relationship with their own system'.

need for cheap agricultural products; the search for new markets for commercial or industrial products; power struggles among nations, particularly for strategic bases; and pressure from religious missionaries on metropolitan governments. While it could be argued that all five motives have been present in the colonisation of South Pacific countries, the first two have been especially important (McKillop and Firth 1981) with respect to their effects on the agricultural marketing systems. Colonialism occurred in the South Pacific region from about the mid-nineteenth century.

The agricultural marketing systems in the South Pacific have been affected in various ways:

- (a) The pattern of food consumption was altered, particularly in urban areas the expansion of which was encouraged by colonisation (Brookfield 1969, p. 15; McGee 1975; Epstein 1982, p. 12; Thaman 1983; Connell 1984).
- (b) Foreign trading firms became active in agricultural marketing activities early in the processes of agricultural market development, changing the structure of the agricultural marketing system.²
- (c) The plantation system was introduced in some South Pacific countries, influencing the nature of the marketing organisation, the role of labour and infrastructural development.³
- (d) Commercial law codes and conventions of the colonising powers were imposed on the indigenous economy, altering the manner in which marketing transactions were undertaken and often leading to a dual economy (Leung Wai 1975).⁴

² A good case study is the account of the activities of Burns Philp and Co. Ltd. in Buckley and Klugman (1981).

³ See, for instance, Gillion (1962); Biggs (1968); Fiji Sugar Board (1978); and Moynagh (1981).

⁴ Some examples of business relations between expatriate companies and local inhabitants can be found in Pitt (1970), Finney (1972) and Vele (1981).

- (e) Trading links were closely tied to the colonisation processes (Ministry of Foreign Affairs 1973) influencing the patterns of agricultural trade and the destination of agricultural products marketed with the exchange of industrial and commercial goods for raw agricultural materials.⁵
- (f) A new system of class relations was introduced into the South Pacific societies, bringing with it a new set of trading and bargaining relationships between local market participants and expatriates.⁶
- (g) Developing indigenous post-harvest operations, such as food processing and storage, were adversely affected by the availability of new products entering into exchange transactions which were brought with colonisation (Baxter 1980, p. 9).

Biases in infrastructural development. The development of agricultural marketing infrastructure in South Pacific countries has taken place along lines that conform to the patterns of agricultural marketing of commodities produced by plantation systems and the needs of large expatriate plantation and trading companies (Staples 1983). The early development of road networks and ports, for instance, was principally designed to serve these companies and individuals rather than local people (Brookfield 1972, pp. 53-5; Nayacakalou 1978, p. 89; Dennis 1981) and to raise capital for the colonising country (McGee 1975; Institute of Pacific Studies 1979, p. 112; Baxter 1980, p. 5; Allen 1981).

⁵ A thorough account of the development of trade links between Germany and Samoa in the 19th century has been provided by Kennedy (1974). Brookfield (1972) has described the links established with Melanesian countries by France and Great Britain.

⁶ See, for example, Maude (1949); Pitt (1970, Ch. 1); Finney (1972); and Donaldson and Good (1981).

Infrastructural developments were not designed to cater for an expanding trade in local food produce as would have been expected in the second stage of agricultural market development. Many observers have noted the lack of development in staple food marketing systems.⁷ In contrast, processed food distribution systems were developed from ports to rural areas early in the economic development processes. It was commonly more convenient and reliable to import foodstuffs for plantation labour than to obtain local food items (Harris 1981). Hence, the practice was developed by trading and plantation companies of providing imported food and other products to rural dwellers and purchasing labour and agricultural raw materials in return.

Two results of biased infrastructural development have been unequal access to facilities between plantations and smallholders and regional income disparities (Chandra 1976).

Effects of foreign investment in domestic marketing operations. Apart from the foreign influences associated with the colonial period discussed above, there is also recent foreign investment in domestic agricultural marketing operations, especially processing, transportation and wholesaling, which has influenced the character of present-day agricultural marketing systems. The main outcome of this investment has been to hasten the growth of commercial marketing organisation, typical of the fourth period of the hypothesised market development.

State intervention. With the growing emphasis on the role of the state in planning economic development, governments in developing market economies have played an increasingly important role in economic affairs (Belshaw 1964; Brookfield 1972). While governments of the now developed market economies played only a supporting or facilitating role in the early stages of development, governments of today's developing countries have become much more active in economic affairs as development plans become the norm rather than the exception. Even in the colonial era, there was a long-term growth of government intervention in the economy.⁸ Also, in the postcolonial period, governments have been

⁷ To name but a few, Biggs (1968); Harrison (1974); McGee (1975); Baxter (1980); and Morris (1980).

⁸ Particularly in what has been described by Brookfield (1972, pp. 81-2) as the late colonial phase.

forced to assume the responsibilities left behind by departing foreign businesses. As a result, the state is conspicuous in its activities as a controlling, participating or facilitating entity in commercial agricultural production and marketing,⁹ making the marketing processes more exposed to political influences (e.g. Brown 1977, p. 19).

The instances of government intervention in South Pacific countries are too numerous to list here, but a sample could include marketing boards such as the Copra Boards (participating and controlling),¹⁰ Solomon Islands Palm Oil Limited (participating) (Central Planning Office 1980, p. 57), Western Samoa Trust Estates Corporation (WSTEC) (participating) (Economic Development Department 1980, pp. 117-8), the National Marketing Authority of Fiji (NMA) (participating) (Baxter 1980, pp. 129-30), the Primary Produce Marketing Board in Cook Islands (controlling, facilitating and participating) (SPC 1980, pp. 9-10) and public produce marketing authorities (controlling and facilitating) (Baxter 1980, pp. 46-60). Such institutions are characteristic of Period 5 in the agricultural market development processes and have become increasingly relied upon to provide 'a suitable environment for the expression of the drive and ability of the exceptional individual' (Fisk and Honeybone 1972, p. 188).

Small size of domestic markets. The problem of the small size of the South Pacific economies in retarding the development of domestic marketing industries has affected both agricultural product marketing and input supplies. The small size of the South Pacific economies (with the possible exception of Papua New Guinea) relative to the size of the developed market economies at a comparative stage of development places them at a disadvantage in developing post-harvest agricultural businesses, especially as the traditional village post-harvest operations have been inexorably replaced since the onset of colonisation. Small market size for agricultural products means that in many cases there is insufficient volume of marketed surplus to justify the commercial processing and marketing of a diversified range of agricultural products

⁹ For an outline of factors accounting for increased government participation in marketing, see FAO (1972, pp. 4-5).

¹⁰ An outline is provided in SPC (1980, Ch. 2) and Hardaker and Fleming (1986).

and the provision of substantial commercial marketing services on a profitable basis (Castle 1980; Nicholson 1980). This problem is often heightened by the competition unprotected local firms would face from foreign-owned transnational corporations which supply and service vast consumer markets throughout the world. Food comprises a high proportion of imports of virtually all South Pacific nations (Ward and Proctor 1980, pp. 492-3). This reliance on processed food imports can be partly attributed to a lack of domestic processing of local produce in addition to other factors such as the nature of food preferences of the urban population, physiological constraints on production of some agricultural products and liberal import regulations (Baxter 1980, Ch. 1).

International trading relations. Trade between nations in the South Pacific region preceded the colonial era.¹¹ However, with the advent of colonialism, changes occurred in international trade relations. South Pacific nations currently find themselves at a disadvantage in international marketing of agricultural products compared with the more developed market economies in Europe, Australasia, North America and East Asia because of their isolated location, away from the major trade routes, frequently overvalued exchange rates relative to their main trading partners, and lack of market power. This situation contrasts with the circumstances existing when the market economies now referred to as developed underwent development. Participants in those economies were in a position to exploit underdeveloped regions of the world. Their isolated location has put South Pacific countries at a disadvantage in export markets and restricted indigenous export-based growth in their agricultural marketing systems.¹²

The lack of market power of South Pacific countries (as with most other developing countries) is demonstrated by the lack of success which these countries have in negotiating for more liberal trade in primary products at multilateral trade meetings such as the recent GATT talks

11 This has been well documented by Couper (1967), Brookfield (1969) and Brookfield and Hart (1971).

12 See, for example, Proctor (1980, Ch. 7). To appreciate these effects, consider the costs faced by the Solomon Islands Copra Board in selling copra to markets in developed countries. In 1977, the Board spent \$2.44m on shipping, marketing and agency charges out of gross export sales of \$8.72m (Copra Board 1978).

held in Geneva. The effect on market development has been to suppress the growth of export-oriented, indigenous, private agricultural marketing firms in Periods 3 and 4.

Migration. The effects of migration on the development of the agricultural marketing system are threefold. First, migrants who work temporarily in developed countries tend to return to their homeland with changed eating habits (Shankman 1976, p. 86) thus affecting the demand for food products in the country concerned. Second, migrants send back remittances which in aggregate are of considerable value relative to the size of the national product of the country.¹³ This exogenously-determined factor affects the level of effective demand for agricultural and other goods and services in South Pacific countries in which remittances are important. A significant proportion of effective demand for agricultural products and inputs is therefore dependent on events outside the sphere of control of the country and is not generated internally within the economy.

Third, migrants are generally of productive age (Bedford 1973; Ponter 1975) so that their absence can have a detrimental effect on agricultural production, leading to what has been termed the 'substitution of cash for agriculture' (Shankman 1976, p. 90).¹⁴ A main effect of migration is likely to be a reduction in incentives to villagers to produce an agricultural marketed surplus to provide funds to purchase consumer goods. A major cause of migration is the desire to earn wages from employment (Ponter 1975, p. 94). This enables the

13 For example, in Western Samoa in 1978, net remittances were 83 per cent of the value of merchandise exports (Economic Development Department (1980, p. 29); in Tonga 'transfer receipts exceeded export earnings during the DPIII period' (Central Planning Department 1981, p. 52).

14 The effects may be mitigated where the absence from the village coincides with the period between planting and harvesting (Bedford 1973, p. 224). This is quite a likely event given the circular nature of much migration in the South Pacific, as observed by Chapman (1976) and Bedford (1973, p. 187).

migrants to send remittances back to their families in rural areas, reducing the need for those families to produce an agricultural surplus.¹⁵

The main effect of migration on the agricultural marketing system is likely to be a reduction in the amount of agricultural marketed surplus below that level which could be expected were migration not to take place. This can be expected to retard the progression from Period 2 to Period 3.

Village organisation. The effects of village organisation on agricultural market development are considered to be crucial and are the subject of the following chapter. Critical issues are the extent to which village social organisation and production distort the transmission of commercial incentives to village market participants and in other ways constrain participation in the commercial economy, and the efficacy of the village as a receiving system for new technologies.

What is apparent is the lack of emergence of the third period of development with independent agricultural marketing organisations forming out of the second period in which village organisation plays a vital role. The lack of emergence of a strong third period of development has in turn precluded the evolution of an indigenously-based fourth period of market development. Also, the effective operation of Period 5 marketing institutions is impeded by the lack of linkages between village-level agricultural market participants (particularly producers) and the institutions.

3.2.4 Assessment

The eight causes of divergences from the stylised version of agricultural market development in the South Pacific have led to an agricultural marketing system which can be summarised as follows:

¹⁵ This is supported by the findings of Connell (1980). He concluded from his study that the bulk of remittances are used to purchase consumer goods. They are also used to repay debts and finance trips but are used only rarely to finance agricultural investment.

1. Period 3 marketing firms have failed to emerge in a viable and competitive form.
2. Periods 4 and 5 have appeared primarily as a result of exogenous influences on the agricultural marketing system rather than evolving endogenously in a natural sequence from Period 3.
3. Period 2 has persisted despite the emergence of marketing organisations typical of later development periods.
4. Period 6 has yet to characterise agricultural marketing systems in the South Pacific.

The outcome has been generally deteriorating agricultural marketing performance, as indicated in Chapter 2. Over the past two decades, this has been reflected in a decline in the performance indicator specified in Chapter 2 (ratio of value of agricultural exports to value of food imports), as observed by Hardaker and Fleming (1986). A major feature of the divergences noted has been the perpetuation of a dualistic market structure, initiated by colonisation, in which large commercial (often expatriate-owned) and public marketing institutions dominate the agricultural export marketing sector while small (mainly village-based) participants prevail in the domestic fresh produce marketing sector. An outcome of this dualism has been the frequent breakdown of what Sosnick (1958) described as conditions of workable competition which are reported to have existed especially in Period 3 in the benchmark model of agricultural market development in developed countries. In particular, the 'conduct dimensions of workable competition' and 'malleable dimensions of structure' conducive to conditions of workable competition, as specified by Sosnick (1958, pp. 418-21), bear little resemblance to the past and present situations in agricultural marketing systems in developing South Pacific countries.

3.3 IMPLICATIONS FOR AGRICULTURAL MARKET DEVELOPMENT

3.3.1 Factors Inhibiting Development of Agricultural Marketing Systems

Two major forces have been at work inhibiting agricultural market development in the South Pacific: the constraining effects of village organisation and the influence of large marketing institutions. In

respect of the former, the effects of village organisation on agricultural market development are analysed in the next chapter. The influence of large marketing institutions is assessed below.

The presence of large (public and private) marketing organisations would appear to have had a negative influence on the development of small agricultural marketing organisations indigenous to South Pacific countries. The emergence of the latter in the commercial economy has likely been suppressed by their inability to match the stronger marketing positions of the former. Large public marketing institutions also often possess monopoly rights, enabling them to suppress the emergence of the small-scale agricultural market participants. Their actions are not necessarily tactical in this regard and may be quite unintentional. Their ability to suppress stems, *inter alia*, from their high market share; relatively substantial resource backing provided by government; and erratic behaviour in terms of pricing tactics and levels of supply to the market which can upset planning decisions of smaller competitors (e.g. Blackie et al. 1979).

The outcome of this suppression has been that the third period of agricultural market development has failed to emerge in any substantive form. The hallmark of this period is the emergence of the small entrepreneur who, through inter-market activities, promotes growth within the framework of a competitive agricultural marketing system. Under these conditions, the equity and efficiency criteria converge. The assumptions of a perfectly competitive agricultural marketing system, however, have been violated in the South Pacific in a number of different ways. This has been in part an outcome of early foreign domination of the economies, because of 'a movement towards monopoly...[arising] inevitably from the fact that foreign capital markets cannot cope with small independent concerns' (Lewis 1955, p. 261). There are often only few buyers of agricultural products, agricultural inputs and products are heterogeneous, there is imperfect information and market uncertainty, lack of free entry and exit in the agricultural marketing system and, in some cases, indivisibilities in marketing processes. A lack of free market entry and exit has restricted the ability of prospective market participants to share in the rewards from undertaking marketing functions and to contribute to the growth of the agricultural marketing system.

Imperfect knowledge can potentially provide large, urban-based marketing organisations with a trading advantage over their smaller rural rivals in commercial markets. Also, the ability to differentiate agricultural products is greater for large commercial marketing organisations with better access to infrastructure and commercial services (e.g. advertising and promotion) than for small rural market participants.

3.3.2 Dualism and the Processes of Agricultural Market Development

Besides their influence in suppressing the emergence of viable indigenous and small agricultural marketing organisations, large commercial marketing institutions often possess two features considered to be inimical to agricultural and rural development. First, because of their relatively large size and importance in the marketing systems, most benefits from any growth in the agricultural marketing system flow directly to these institutions. This raises the commonly-debated issue of equity in development as the dualistic structure of the agricultural marketing system is reinforced. It is nevertheless an insufficient argument for replacing private with public marketing institutions, because it does not necessarily follow that greater inequity arises from the operations of large private marketing institutions than those of large public marketing institutions. As Schaffer and Lamb (1981, p. 3) have observed, the effect of public action to correct an 'inequity' may produce new types of 'inequitable outcome'.

Second, the strength of many of the large commercial marketing organisations stems from their relationships to large overseas corporations - either in terms of being a subsidiary of a transnational corporation or in terms of coordinating their trading activities in an established network involving foreign corporations. Growth of such organisations - and the setting of their long-term goals - takes place in a decision environment that transcends national boundaries, such that maximisation of the welfare of the firm is unlikely to coincide with the maximisation of welfare in the South Pacific country concerned (and, more particularly, maximisation of the development processes of the agricultural marketing system in that country).

The trading activities of the large commercial marketing organisations are predominantly an urban phenomenon in the South Pacific region.¹⁶ These organisations find it unprofitable to service numerous small and widely dispersed rural producers and consumers, thus concentrating market growth in urban and nearby rural areas. The result has been that 'producers often lack adequate access to inputs...[and] small urban centres accessible to the rural producer...do not exist in many areas' (Ward and Proctor 1980).¹⁷ An outcome of this state of affairs has been that the indigenous agricultural marketing entrepreneur or businessman originating from the rural sector has found it difficult to enter the increasingly lucrative urban consumer market because of the competition provided from their entrenched positions by large market organisations in this field. This competition can be price competition - particularly short-term price cutting strategies and the ability to pay highest prices for scarce skilled commercial labour resources - and non-price competition, such as ownership control over the food importing channels and the advantages of knowledge and experience of the commercial law codes and conventions and marketing operations which derive from their long-established position in the urban commercial marketing system.

Public marketing institutions also are almost invariably urban-based in terms of their organisation and management, selling activities, storage and, often, buying activities. Personnel in these institutions who operate from an urban base have little incentive to provide marketing services to remote rural areas which are difficult and costly to reach in the early stages of agricultural development because of poorly developed infrastructural facilities (Ward and Proctor 1980,

16 For instance, see the account given by Baxter (1980) of the produce and processed foods distribution systems in Fiji, involving activities to satisfy the (often) sophisticated wants of the small but growing middle-class urban population.

17 On the contrary, large commercial marketing firms have been able to develop strong linkages in the import supply system to provide goods the demand for which is not presently satisfied by local production, as outlined in Baxter (1980, Ch. 3).

Chs. 7-8). Also, the coordination of activities between stages of marketing is impeded by the urban-based provision of marketing services to agricultural producers who are based almost entirely in rural areas. This results, for example, in criticism of producers for a lack of motivation (e.g. Government of Fiji 1975, p. 65) and failing to provide consistently a marketed surplus of regular quality (Ward and Proctor 1980, p. 374; Yen 1980). On the other hand, the producers can blame the institutions for failing to provide regular services and offering unduly low prices (e.g. UNESCO/UNFPA 1976, pp. 120, 129).

The most recently revealed factor is the array of defensive marketing strategies adopted by both commercial and public marketing organisations to protect their established positions in the market-place. Given the priority attached to entrepreneurship as an essential ingredient of innovations in agricultural marketing activities, which in turn are a prerequisite to agricultural market development (FAO 1972, p. 2), defensive marketing strategies are unlikely to enhance the development of agricultural marketing systems.

Public marketing institutions have been primarily concerned with defensive marketing strategies for different reasons from their commercial counterparts. The nature of their strategies has derived from their responsibility either in implementing, often conflicting, economic policies or in undertaking the supervision of economic regulations.¹⁸ Examples of the latter are (a) regulations aimed to provide for 'orderly' marketing and market stability, and (b) measures to provide countervailing power to large commercial organisations (particularly in opposition to the influence of large trading companies in the export marketing of copra and cocoa). Also, defensive marketing strategies can be adopted because the managers of public marketing institutions are seldom rewarded for fulfilling entrepreneurial functions and taking risks in the expectations of earning supernormal profits. Pressing for the establishment of an oligopolistic or monopolistic position in the

18 See the problems faced by the National Marketing Authority in Fiji in attempting to keep prices low to consumers and high to producers in an orderly marketing environment, outlined by Baxter (1980, pp. 114-27).

marketing system is often a more effective and comfortable way of ensuring that an institution achieves good trading results.

The relationships between large marketing organisations and political institutions are usually strong in small economies. In South Pacific economies, they can be especially strong where the government intervenes frequently in the economy to promote development. One effect of a major government presence in economic activities is to create within the strategic sphere of control of commercial organisations a strong emphasis on government-firm relations. Such organisations respond quickly to changes in public policy or new government initiatives where the pay-offs are high, at the expense of responsiveness to changes in marketing operations and market prices (e.g. Staples 1983, p. 44). Leadership in public marketing institutions is also more oriented towards political events than to market forces. The political influence is likely to be even greater than in commercial market organisations because of the closeness of leaders of public marketing institutions to the policy implementation processes (Baxter 1980, p. 122; Sevele 1981). Success for personnel working in public marketing institutions can be measured in terms of contributing to the attainment of political ends rather than in the record of economic achievements of the institution.

Public marketing institutions can bid trained commercial labour resources away from small market participants and entice into the public sector of the economy potential marketing entrepreneurs who opt for a safe yet substantial and regular income compared with operating in a risky market environment. Yet despite their capacity to bid for a high proportion of the country's recently educated personnel to join their ranks, public marketing institutions nevertheless suffer from a lack of experienced manpower dedicated to marketing management (e.g. Economic Development Department 1980, p. 17). Many commercial functions in these institutions (e.g. price analysis, grading, product differentiation, scheduling, sales negotiation and interpretation of commercial law codes and conventions) have not been well developed. They are nonetheless essential to agricultural market development. It can be a particular handicap in marketing operations in export markets where personnel have to deal with negotiators from developed countries hardened by experience in international business circles.

3.4 CONCLUSION

The major conclusion to be derived from the above analysis is that, through various forms of market failure, South Pacific agricultural marketing systems have evolved in a dualistic structure. On one hand, the commercial urban-based export marketing sector based on cash crops introduced in the colonial period has survived intact. On the other hand, the domestic food marketing system has evolved largely within the village system, uninfluenced by the commercial export sector in that the marketing channels, methods and organisational structures are quite separate. The colonial influence alone cannot account for this dualistic structure. Government intervention in the agricultural marketing system has led to what Mellor and Desai (1985, p. 209) termed 'state-sponsored dualism'.

Chapter 4

EFFECTS OF VILLAGE ORGANISATION ON AGRICULTURAL
MARKET DEVELOPMENT

4.1 INTRODUCTION

In South Pacific countries where most agricultural market participants tend to be village-based (Watters 1984), village systems play a crucial role in conditioning the attitudes of their members towards commercial marketing activities. As part of a broader economic system, they influence market response via the linkages that exist between their members and the rest of the economy. Marketing behaviour can also be influenced by village organisation in respect of the demands placed on villagers in fulfilling their social and cultural obligations; these demands reflect the commonly-held goals and values of people in the village. For such a system to survive, it requires that individual behaviour conforms to communally-accepted norms that have been developed and refined over the centuries.

The main purpose of this chapter is to explore in some detail the influences of village organisation on agricultural marketing performance in South Pacific countries. The aim is not to prove conclusively that certain causal relationships exist but to identify many commonly observed attributes of village organisation. This identification is useful in isolating key factors affecting agricultural market development to be incorporated in the empirical work that follows. In this respect, much of the material covered in this chapter is 'scene-setting' for the studies undertaken in Chapters 5 to 9. The study is also useful in explaining, and drawing out the implications of, the dualistic structure of South Pacific marketing systems noted in the previous chapter.

4.2 OVERVIEW OF RELEVANT LITERATURE

The literature on village systems and their effects on agricultural and economic development is too large to review here. Instead, a number of studies are surveyed that are judged relevant to the problem of how agricultural marketed surplus might be increased and

agricultural marketing systems developed. The survey has been confined mainly to material relating either to the region in general or to individual countries within the region, and emphasis has been placed on material published within the past 20 years. No attempt has been made to include the many official reports of one kind or another, many of which are not published, that deal with aspects of the subject.

The impact of village organisation on economic development has been assessed in these studies from a variety of viewpoints. The conclusions drawn differ on the question of whether this impact overall is positive or negative. Many reasons are proffered to support the different conclusions reached. In this chapter, the focus is on village organisations as a constraint on agricultural market development. A synthesis of conclusions reached in the various studies undertaken reveals four main potentially constraining influences of village organisation on increased agricultural marketed surplus in countries in the South Pacific region. These are now briefly outlined.

4.3 INFLUENCE OF VILLAGE ORGANISATION ON AGRICULTURAL MARKETING ACTIVITIES

4.3.1 Delineation of Important Features of Village Organisation

Features of village societies can be expected to have an important bearing on efficiency and equity in agricultural marketing systems in South Pacific countries because of the considerable extent to which agricultural market development is dictated by the level of throughput in the system.

Of the various characteristics commonly observed in village economic organisation throughout the South Pacific, some are important determinants of village marketing efficiency:

- (a) the small size of the economic units in terms of resources used and output achieved;
- (b) a close relationship between the production unit and household and, particularly, a high proportion of output consumed by members of the household;

- (c) reliance on a high proportion of inputs which originate from within the village system, particularly labour and land;
- (d) limited use of modern, technologically-advanced inputs;
- (e) absence of advanced specialisation of production;
- (f) strong commitments to established, well-tried practices, reflecting villagers' accommodation to their environment; and
- (g) a high degree of variability in output within production units (in quantity and quality), a symptom of the risky environment of producers who tend to be risk averse.

Although these characteristics are generalisations, they provide a useful picture of village production to illustrate the problems in marketing that can ensue from them.

An analysis of village organisation provides insights into the limitations it places on agricultural marketing activities. The four features selected for analysis in this section are influenced by the above characteristics. They are: (a) the nexus between production and marketing in the village economy; (b) spatial distribution of villages; (c) the extent to which motivation, incentives and responsiveness to economic change are affected by constraints placed on villagers to take independent decisions and actions; and (d) the ease with which new technology is adopted in village societies.

4.3.2 Motivation, Incentives and Response to Economic Change in Village Societies

Contrasts in social context between commercial and village marketing sectors. The traditional social system has been shown to be flexible in certain respects in response to outside change (e.g. Tupouniua 1977). This flexibility has enabled the superimposition of cash earning activities on the subsistence way of life. However, the extent of this

flexibility in marketing has been limited in respect of response to outside economic influences. In order to discern the effects of social and cultural constraints on agricultural market development, it is useful to review the differences in society between the commercial and village sectors within the agricultural marketing system.¹

No agricultural marketing system exists in a vacuum; its participants influence, and are influenced by, the social system in which they operate. In modern specialised economies, market participants treat each marketing transaction undertaken largely as an impersonal event, based on commercial consideration. This is typical of agricultural marketing activities in South Pacific economies in the commercial marketing sector, regardless of the social relationships between the participants. On the other hand, in the village sphere, social relationships frequently affect the direction and nature of agricultural marketing activities.

Village marketing activities are different in that market participants commonly attach strong personal importance to each marketing transaction. The social organisation of the village regulates market trading through the existence of differentiated social roles within the marketing system. There is also an underlying basis of reciprocity to many marketing activities. Hence, social factors may affect agricultural marketing differently, according to the social context in which the marketing transaction takes place (cf. Bonnemaïson 1978; Huber 1978).

The origins of the dual agricultural marketing structure in the South Pacific began with the emergence of a plantation economy. The plantation economy specialised in commercial export crops, combining both the production and marketing functions. Plantations took different forms - private family units, limited liability companies or simply private individuals - and had in common a commercial approach to agricultural production and marketing.

¹ The marketing system is taken to embrace both gift and commodity exchange.

The commercial agricultural marketing sector in South Pacific countries, which has mainly grown out of what was the plantation system, has some distinctive features in its production and marketing operations. The plantation system was the result of inputs of capital and entrepreneurial and managerial skills from predominantly foreign sources. These inputs were combined with indigenous resources of land and unskilled labour. Also, the system placed heavy demands on the local economy to provide marketing infrastructure almost exclusively to serve the plantations. The social relations between plantation ownership or management and the workers and any traders who served their needs was one of subservience of the latter groups towards the former group.

The foreign source of plantation enterprise was matched by an export orientation of agricultural production and marketing. In both input and product marketing, vertical integration of marketing functions was common; local traders were therefore largely excluded from this enclave agricultural system. This affected the patterns of resource use in the host countries. Indigenous (and indentured) labour was closely tied to the plantation system but was not in a position to develop highly skilled production or marketing roles. Other local resources were exploited for the benefit of the plantation system. To a limited extent, this system prevails in parts of the South Pacific today; in many other instances, governments have inherited the plantations together with their distinctive social and marketing relationships.

Forces affecting village market response. Two opposing sets of forces² affect agricultural market response in the South Pacific region. The first force - the 'incentive factor' - represents the strength of the commercial incentives transmitted to market participants through the economic forces operating within the agricultural marketing system. It reflects simply the positive response of market participants to incentives and is a force easily recognisable in the transition from the second stage through to the fourth stage of market development outlined in the previous chapter. On the other hand, the second force - called here the 'reaction factor' - is one that is deeply rooted in the social

² As suggested by Fisk (1972).

and cultural systems of countries in the region.³ The reaction factor encompasses a set of actions taken by the village organisation to proscribe those activities and ideas adopted from outside the village that are deemed not to be in the communal interest of village members. It represents a buffer or defence mechanism against unwanted forces of change with their accompanying effects on the social structure, culture and economic and political organisation in the village sector as well as often an increased degree of uncertainty in agricultural marketing and other village operations (e.g. Pitt 1970, p. 249). This force is strongest in the second period of agricultural market development. The nature of the reaction factor is passive in the sense that village market participants react to events in the economy rather than actively seek market opportunities.

The reaction factor has maintained considerable strength in villages in the South Pacific region,⁴ to the extent that village social and cultural values are strongly adhered to and indigenous exchange remains an important part of rural life (Couper 1973, pp. 236-8). This strength may be explained to a considerable extent by the existence of 'subsistence affluence' in much of the South Pacific (Fisk 1975). The debate about whether this factor has a negative or positive effect on national economic development continues and it is not clear which side of the debate is generally in the ascendancy. Much seems to depend on the particular circumstances being examined and great care is needed in attempting to generalise from any particular circumstance.⁵

³ Empirical evidence suggests that the reaction factor (termed by Fisk the response factor) is stronger in some South Pacific countries than others. See, for instance, Finney (1972), Shand (1972) and Moulik (1973).

⁴ There is accumulating evidence that the individual is now much less bound to the village (e.g. Frazer 1973).

⁵ To review the opposing views and evidence is beyond the scope of this study. It would suffice to quote from Rutz (1978, p. 805) who studied a particular aspect of village organisation, ceremonial exchange, in Fiji, and concluded that it 'is *intrinsically* neither inhibitory nor facilitative of economic development' (emphasis added).

Nevertheless, some generalisations on potential constraints to agricultural market development do appear useful. First, agricultural marketing needs may conflict with the allocation of time required to carry out village-related non-economic activities, with the latter accorded highest priority (Hau'ofa and Ward 1980; Ward 1982, 1983). Second, the ability to take marketing decisions and the motivation to seek cash profits may be restricted by the village organisation. Decisions taken by village elders based on village welfare considerations can often override private agricultural marketing decisions taken by the individual market participant, stressing the importance of social balance in the village (Ala'ilima and Ala'ilima 1965). Third, villagers have had a choice between becoming traders (or landless market participants) and remaining within the village organisation (for examples of those who chose the latter, see Baxter 1980). Given the security provided by the village organisation and the inherent riskiness of a reliance on returns from marketing activities in the early periods of agricultural market development (e.g. Fleming and Hardaker 1982), many potential traders choose to retain a permanent base in the village (Brookfield 1972, p. 165). Fourth, and related to the previous point, in a dynamic world, risk aversion is only important if capital markets are imperfect. Hence, the lack of an effectively organised and efficient capital market to which villagers have access has meant village traders have had to operate on a lowly-g geared basis (Pitt 1970, p. 211). They have little in the way of financial reserves with poor prospects for obtaining carryover credit in bad times and operate closer to the threat of insolvency than do large commercial organisations (Leff 1978, p. 48).

Where the strength of the reaction factor has outweighed the incentive factor,⁶ the second period of agricultural market development has continued to be of considerable importance while the emergence of the third period (described in the previous chapter) has been retarded. In some areas of the South Pacific, village agriculture has scarcely changed throughout the century (e.g. Harris 1981).

Subsistence affluence and village market response. Of all the potential constraints on agricultural market development of village organisation,

⁶ An example of these forces at work is provided in the study undertaken by Shand and Straatmans (1974).

subsistence affluence is the most widely mentioned in the literature. Historically, there has persisted a widely held view among civil servants and researchers in the South Pacific region that semi-subsistence producers do not respond to market forces, for reasons such as laziness or backwardness⁷ (Ward 1982, p. 18). This view was rebutted by Fisk (1975) who developed a theoretical construct of the response of non-monetary production units to contact with the commodity exchange economy in the South Pacific region. Fisk was concerned primarily with those producers who produce mainly for subsistence purpose with supplementary cash production. The analysis focused upon 'how the extent of such supplementary production is determined' (p. 54). As the semi-subsistence producers with supplementary cash production would appear to be the most common type of producer at present in South Pacific agriculture, it is interesting to examine the relevance today of Fisk's findings. He concluded, correctly, that 'there has been insufficient understanding of the underlying rationale of these responses ... [which] are in fact quite rational, at least in the short run, and that it is incumbent on the economic planner to make a closer study of the motivational pattern of peasant agriculture' (p. 83). Fisk explained producers' behaviour in terms of subsistence affluence (Fisk 1962, 1964, 1971). Subsistence affluence 'entails the co-existence of a ceiling to the demand for food, clothing, etc. together with a supply of labour and other factor inputs in excess of that required to meet the demand' (Stent and Webb 1975, p. 522). It is determined largely by the relationship between the number of people in the farm family to be supported and the amount of land available for production. According to this theory, an equilibrium situation is reached in the farm family which sets an upper limit to the level of its involvement in cash cropping activities.

Implicit in the subsistence affluence model is a recognition that, while villages may respond to market prices, the extent of the response is likely to be constrained by the limited cash needs of the farm family.

Fisk's analysis was tested in Western Samoa by Lockwood (1971). One of Lockwood's main findings was support for the proposition that 'Subsistence production in a situation of primitive affluence is limited

⁷ See Pitt (1970, pp. 1-6) for some examples.

by demand for the goods and services the subsistence unit can produce rather than by any shortages of factors of production' (p. 188). This study needs to be supplemented by further empirical work if economic planners and policy makers are to be in a position to anticipate the extent of semi-subsistence producers' response to changing market forces.

Moulik (1973, p. 220) concluded from his study that as long as subsistence affluence persists, 'economic duality will continue ... leading to a psychological conditioning that money-oriented activities are supplementary to subsistence crops...'. He recognised, however, that there will be differences between different groups of people in the extent to which they adhere to this condition. This recognition is consistent with the findings of Shand and Straatmans (1974, pp. 189-90). The possibility of groups of market participants with different motives is addressed in Chapter 6.

Constraining influence of personal relations and obligations. The constraints on agricultural market development placed by social organisation in the South Pacific derive from personal relations and obligations that have evolved in villages, the nature of village organisation and conflicts brought about by contact with market participants outside the village system. Some commentators have considered that growing commercialisation along capitalist lines would be in conflict with existing organisation in village society. This view has been expressed most strongly by Hau'ofa (1980). Hau'ofa asserted (pp. 486-7):

... the systems of social relations and community life ... arose from and are therefore appropriate to subsistence existence. To say that [villagers] can have goods and services of industrial societies while maintaining values that are inappropriate is to indulge in fantasy. ... It is impossible for Pacific Islanders ... to achieve their present aspirations without fundamental changes in their social organisation and their cultures and some sacrifice of autonomy.

The perceived need for personal relations in marketing transactions reduces the scope of activities of the agricultural market participant. Personal relations place bounds upon the flexibility of market operations

and put a heavy demand on the time of the market participant. Further, the adaptability needed in marketing activities is limited by the rigidity in village organisation (Belshaw 1964, p. 274; Moulik 1973, p. 219).

There are circumstances where the social obligations of market participants can restrict their freedom to develop their marketing operations. Social pressures to conform to traditional values and village mores can prevent the emergence of economic individualism needed for the development of commercial agricultural marketing. In particular, the fulfilment of social obligations, by committing the decision processes of agricultural marketing firmly to the social needs of the village, can prevent market participants from creating or selling a regular agricultural marketed surplus.

Communal organisation, still prevalent in many village communities in the South Pacific, is often argued to be in conflict with the concept of economic individualism. Fisk and Honeybone (1972, p. 187), for instance, foresaw difficulties in achieving expanded economic activity in the exchange sector where the profits of the enterprise are directed mainly to communal use. Market participants are less likely to seek (or to be able to seek) to accumulate wealth in the form of material possessions or productive capital. There may be exceptions where people hold privileged positions in the village hierarchy.⁸ Commercial incentives may have restricted appeal to village people as the aims behind the incentive are easily thwarted by (a) the lack of assurance of a remunerative outlet for extra market throughput because of restricted access to community resources, and (b) an inability to reap and use the rewards from the productive marketing enterprise that is achieved.

8

See, for example, Denoon (1981, p. 7). On the other hand, commercial endeavours and their rewards may enable villagers to earn more respect in their villages when they use these rewards to benefit other members of the villages (Pitt 1970). In achievement-based societies, status might also be advanced by entrepreneurial activities (Finney 1972). These activities may also have led to growing inequalities (Lacey 1981).

Social conflicts are associated with market transition (Hau'ofa and Ward 1980, p. 52). Over time, village market participants have developed their own ways of undertaking marketing transactions and of incurring and discharging contractual obligations. The capitalist concept of entrepreneurship, according to Fisk (1978, p. 360), is at the root of many of the difficulties of adaptation of village agricultural systems. Further, the superimposition of an imported system of commercial law in which formal contracts are required is the basis of commercial marketing in the South Pacific. Yet because it is superimposed on an existing social structure and is unfamiliar to many market participants, its introduction benefits market participants unevenly. Crocombe (1983, p. 103) has argued that this superimposition associated with colonisation was a major factor for the demise of most indigenous business during the 20th century.

Finally, as mentioned above, the social structure of the commercial plantation systems that existed in many South Pacific countries has left a legacy on the marketing of cash crops in those countries today. Where the plantation system still persists, some marketing decisions remain in the hands of foreigners or persons whose interests might differ from those of the majority of agricultural market participants. Where the ownership and management of plantations has devolved to local interests, the ability to perform the necessary marketing functions is often inadequate because much of the skilled labour and managerial talent departed with the former owners. Although primarily a short-run problem, it still can take a long time before the necessary local marketing skills, experiences and knowledge can be accumulated.⁹

⁹ One side effect of the plantation system has been the import of indentured labour to work as unskilled labourers on the plantations. A few of these people (e.g. the Indians in Fiji and Chinese in Western Samoa) have turned their hands successfully to commercial marketing after their labour was no longer required on the plantations. They differed from the indigenous population in that they were not so bound by local social obligations and mores when operating in the agricultural marketing system; they also found access to land more difficult and many were forced to seek a living outside agricultural production.

Traditional social organisation in villages may have influenced the development of agricultural marketing systems in eight main respects. These can be expressed in terms of the following propositions:

- (a) The conflict between traditional village and modern commercial attitudes has affected the activities of the village population engaged in agricultural production and marketing. Village participants have been affected by the introduction of modern commercial agricultural marketing processes and have been exposed to the material benefits derived from marketing. However, they have been unable to benefit individually from commercial market development to the same extent as urban participants. As a result, much of the change in agricultural marketing has occurred in the urban sector rather than the rural sector.
- (b) Traditional social organisation has slowed the rate of development of agricultural markets in the South Pacific. In general, the pace of development has been greater for introduced cash crops than for traditional crops and livestock. In the former case, the influence of village social organisation has been less. The marketing of traditional village crops and livestock, on the other hand, has been made more difficult and complex for market participants in that 'trading cannot be seen as wholly economic; ... the essential motivation is prestige and ambition to leadership and influence; trade partners stand in the relation of kin ...' (Brookfield 1969, p. 10).
- (c) An important feature of the village agricultural marketing sector is the influence of the social organisation and the close production-household relationships on the direction and level of the agricultural marketed surplus. The level is influenced to some extent by decisions made by village labour in productive activities and household consumption decisions. The direction is also influenced by village leaders in accordance with social requirements, e.g., surplus used to build a church or to obtain produce for a feast that has been

planned. In the commercial sector, the level and direction of agricultural marketed surplus is influenced more by economic decisions than social factors.

- (d) The alleged existence of a state of 'subsistence affluence' may have blunted the responsiveness of villagers to market incentives.
- (e) The dispersed nature of agricultural production centred on villages has made agricultural marketing costs high because of the considerable inputs of labour time and effort, financial costs per unit of throughput, and demands on infrastructure.
- (f) Market suppliers face considerable risks, at least partly attributable to the nature of village production and the limited ability to deal with perishable commodities. Village organisations do not appear to have been good receiving mechanisms for improved marketing technology that could help in reducing marketing risks.
- (g) There has been a lack of specialisation in agricultural production and marketing, with adverse consequences for efficiency.
- (h) The potential for change in agricultural marketing is limited by the lack of flexibility in production (because of the influence of perennial crops in the product mix) and marketing (because of the constraining effects of village organisation).

In sum, village organisation is argued to have dampened market incentives to smallholders and to have been ineffective in reducing risks in the commercial agricultural marketing sector. It has also probably made difficult the tasks of policy makers in identifying and implementing appropriate policies for agricultural market development.

4.3.3 Nexus between Agricultural Production and Marketing in a Village Economy

Small scale of production units. An inherent problem of village agriculture is the small scale of village agricultural production (e.g. Chandra 1983, p. 67). In many cases, the marketing of agricultural products is hampered by the low levels of resources used in agricultural production by each producer. In particular, exploitation of economies of size can be limited and coordination problems in marketing operations magnified by the need to deal with large numbers of producers whose marketed surpluses are small. Marketing efficiency in these circumstances is further eroded in product marketing by uncertainties associated with the lack of a consistent marketed surplus. Small producers are less likely to be in a position to guarantee consistently a surplus for disposal in commercial markets.

Agricultural market development may be restricted by the small size of agricultural production units in another way. Increased marketed surplus is vital to agricultural market development. The level of surplus in turn depends on the level of market response to incentives. A crucial question that needs to be answered is whether small producers would be willing to respond to market incentives as readily as large commercial producers. Thus far, this question has been answered unsatisfactorily with much speculative assertion. It has been argued that the small resource base of production of smallholders, preventing full exploitation of available technologies, and the relatively risky environment might prevent response comparable in magnitude to large commercial producers (Ward and Proctor 1980). Small producers are more likely to be operating close to the poverty line. Attempts to increase output which jeopardise their basic subsistence minimum might expose them to large negative pay-offs and restrict the extent to which they can expand output compared with large producers. There is also the possibility that the marginal propensity to consume of the family of the small producer is higher than the marginal propensity to consume of the family of the large producer. The validity of these assertions can only be tested empirically.

Variability in output. A major factor contributing to marketing problems derived from the nature of production is climate. Climatic influences are felt in terms of variability of output, seasonality in production and control over quality in agricultural production. It is a moot point whether these problems are any more severe under village production conditions than under the conditions that prevail in commercial farming systems. If they are more severe, it makes the marketing of village agricultural output more difficult to undertake. If subsistence needs are large and fixed, marketed surplus will be more variable in relative terms than total production.

Instability in agricultural production can lead to volatility in farm-level supply of agricultural products over time. The agricultural production process retains great importance in the agricultural system in most South Pacific countries, accounting for a high proportion of the total value added in the system. Hence, changes in production processes that affect the degree of variability or seasonality in product supply at the farm level can have profound effects on later stages in the marketing system. For example, market participants, plus producers themselves, would be adversely affected by unfavourable seasonal conditions or attacks of pests or diseases which reduce the output of traditional crops in any period. In both cases, the market throughput handled by various market participants in the traditional markets would be reduced and consumers could be faced with escalating prices at the retail level (depending on the elasticities of demand and supply at the primary and derived levels).

While variability in agricultural production is often random in its occurrence, there are some anticipated variations in agricultural production, particularly seasonal fluctuations and cycles, that are less risky for market participants. Despite the predictability of their occurrence, however, these variations can also impair the operations of an agricultural marketing system. In order to cope with seasonal and cyclical variations in production, the capacity of marketing channels must be held at levels that leave marketing resources underutilised for long periods of time when production levels fall. The alternative is to risk periodic bottlenecks in the marketing system.

The problems of seasonality and cyclical patterns in agricultural supply are greater for commercial agricultural marketing activities than

for the village marketing activities. The commercial agricultural marketing sector is characterised by (a) marketing resources that derive from a variety of sources and require complex assembly processes; (b) demand functions for agricultural marketed throughput differentiated according to quality and attributes; (c) final consumption patterns that do not vary over time in response to supply conditions; (d) greater distance between the producer and consumers, making control of the coordinative processes of marketing difficult; and (e) finely-tuned requirements of market participants whose marketing activities depend on a regular marketed throughput of consistent quality. These requirements make the performance of commercial marketing more vulnerable to seasonal and cyclical changes. They are requirements that village-based participants are likely to find difficult to satisfy.

Effective commercial marketing of agricultural products requires a high degree of uniformity among products being sold. The fundamental source of control of product uniformity is in the control over the production processes themselves. Failure to control the quality of products as they leave the production process precludes attainment of product uniformity at later stages of marketing in many instances. In developed economies, the highest degree of control over agricultural production is in intensive production processes such as pig production, poultry and horticultural crops. Less control over production can be exerted in many of the more extensive forms of agricultural production where the influences of climatic factors, soil heterogeneity, pests and diseases are much greater and are less easy to control. In South Pacific agriculture, village production processes are exposed to the effects of climate, pests and diseases as well as to variability in management practices.

The effects of climate on the production-marketing nexus can be particularly great in another respect: the perishability of most agricultural (particularly food) products. Unlike most developing countries, root crops rather than grains form the main component of South Pacific staple diets. Root crops are much more prone to post-harvest pests and diseases than grains and are less easy to store once harvested (Shaw 1983, p. 29). Given the humid tropical climate of South Pacific countries, the ability to maintain the quality of harvested produce is

an important function of participants in agricultural marketing systems in these countries. The ability and willingness of village market participants to adopt improved post-harvest activities is taken up below in the discussion of marketing technology.

Lack of specialisation. The existence of village agricultural producers who specialise in one particular agricultural enterprise is rare in the South Pacific (e.g. Leung Wai 1978). Even among commercially-oriented small farmers, there is substantial diversification of production. Only among large commercial producers is there any great specialisation. The major reasons for diversification at the village level are: (a) the need to hedge against crop failure which, in a monocultural system, can prove disastrous for the village economy; (b) the diverse consumption requirements of villagers whose needs are largely provided within the village agricultural production system; and (c) the existence of multiple- and inter-cropping, particularly involving perennial crops, which enable the complementary use of land, labour and management resources.

There are two further reasons for the lack of specialisation. The first stems from uncertainties facing village producers to meet contingencies created by unexpected occurrences in production and consumption. Brookfield (1969, p. 153) surveyed the evidence and found that village producers and market participants 'arm themselves with a range of choices for cash-acquisition, having among other things both a marketable surplus of foodstuffs and a planting of long-term cash crops that may be tapped at will'. One consequence is a high proportion of perennial crops in the product mix. This can bring about market inflexibility in the face of economic change because of the long production cycles of these crops.

A second major reason for the failure of specialisation to develop has been the lack of productivity of the monetary enterprise relative to the subsistence enterprise (Fisk 1975, p. 79). Fisk argued that, in terms of 'the effort cost of obtaining the essentials of life', subsistence activities have been a more efficient means of satisfying basic needs than commercial enterprise.

The production of a diverse range of agricultural commodities is commonly associated with the sale of small quantities of a variety of food products in the fresh produce retail markets by the producing household (Enright 1976; Hau'ofa 1979; Baxter 1980; McGee et al. 1980; Epstein 1982). Hence, lack of specialisation in production often is linked to a lack of specialist market participants, a lack of specialisation in food products being marketed, and a lack of specialisation in functions within the fresh produce marketing sector.

The consequences of a lack of specialisation in village agricultural production and marketing for commercial activities are likely to be a loss of technical efficiency, failure to take advantage of economies of size in marketing, less knowledge of market fluctuations where villagers are only irregular participants in market activities (e.g. Chandra 1983, p. 67), and less opportunity to accumulate private capital that might be necessary for investment in marketing resources.

Production-household relationships. The close relationship between the agricultural production unit and the household is reciprocal. A large proportion of agricultural inputs derives from the household while a significant portion of agricultural output is consumed in the household. The acceptance of commercial marketing attitudes and the use of improved agricultural inputs imply a break in this nexus. However, to deduce that the path to a strong commercial agricultural marketing sector involves the ability to break the nexus can be simplistic. Strong historical reasons exist for the close farm-household relationship (e.g. security of food supply and little reliance on an uncertain world). There are implications for marketing policy making were changes to be induced in family labour use and consumption patterns as a consequence of the household adopting a more commercial approach to their productive activities. Household decisions on labour supply and marketed surplus can influence both the level of market throughput and the manner in which this throughput is handled in the early stages in the marketing process. The implications of changes in this relationship become apparent in the following two chapters on market response.

Commitment to established methods. A strong commitment by village producers to established and known agricultural production techniques,

intensity and activities, like the farm-household relationship mentioned above, reflects the producers' accommodation to their farming environment. The exchange of knowledge of the nature and risks of agricultural production and marketing at the village level is substantial. However, the extent of such knowledge is limited to established truths based on village resources, known farming techniques and local market information. This might lead villagers to take conservative attitudes to new methods or ideas related to traditional practices and has led to a commonly-held view that it may be easier to achieve market development, and its usually related increases in marketing efficiency, when a new area of agricultural production is established, rather than to alter the existing structure of production (Sevele 1979).

Effects on market integration. The sum of difficulties that derive from the characteristics of village agricultural production described above have been used by observers to explain the low level of integration of village agricultural production in commercial agricultural marketing. Commercial agricultural marketing has virtually always been introduced from outside the village production unit and therefore is not always consistent with village needs. On the other hand, the village marketing processes have usually been kept simple, in tune with the consumption needs of people in the village. The latter approach ignores the fact that there are changes taking place in the rest of the economy which will eventually influence economic activity in the villages. This is not an argument for neglecting the development of commercial market operations at the village level but for recognising the time and effort needed to undertake the transition phase. It is an empirical issue to resolve whether village producers in their role as suppliers of produce to the agricultural marketing system are responding to the needs for change induced by economic forces outside the village. The evidence on this issue will be assessed in the chapters that follow.

4.3.4 Spatial Distribution of Villages

There has been a marked lack of planning taking place at intermediate levels between the village and the centre in South Pacific countries. This vacuum has been accompanied by a lack of growth of population centres outside the capital cities in countries other than PNG and, to a lesser extent, Fiji. The village has therefore remained the

primary force in settlement patterns other than capital cities. It is not the purpose in this section to question why this settlement pattern has occurred (obviously, there would be some good reasons), but to assess its likely effects on agricultural market development.

It was conceded by Hardaker, Fleming and Harris (1984) that dispersion of production is one of the main inherent disadvantages of a VSI strategy. The problems created by isolation have been extensively covered in the literature. Shand (1980) and Brookfield (1980) have discussed the obstacles created by remoteness in achieving economic development and the importance of transportation and shipping technology. Chandra (1976) observed that the growth of commercial trade has led to growing spatial inequalities in Fiji as more remote areas suffered in comparison with regions with good access to commercial markets. Sevele (1973) examined the importance of regional disparities of income between the main island groups of Tonga and drew attention particularly to the need for improved shipping. Ward (1982, 1983) pointed to the increasing difficulties of remoteness from markets brought about by rising costs of inter-island shipping and of changing transport technology that leads to fewer visits to fewer places to collect produce. Proctor (1980) concluded from his study of transport and agricultural development in South Pacific countries that problems affecting the internal or domestic shipping sector are far more important than those affecting international shipping. He argued that market opportunities at the village level depend often on the provision of uneconomic transport services. Lockwood (1971) and Fairbairn (1985, Ch. 26) related the state of economic and social development reached by villages in Western Samoa to levels of access to the main urban centre.

The existence of numerous small villages in South Pacific countries has combined with the fragmentation of land areas and physical barriers to transportation and communication to create a wide dispersion of agricultural production units, usually clustered around the villages. This dispersion provides one of the most persistent obstacles to the development of agricultural marketing in South Pacific countries (Shaw 1983, p. 25). Few commercial centres exist between the production unit and the consumer, and food marketing systems have not developed in an hierarchical structure (Epstein 1982, p. 230). Therefore, there is a

lack of market-places that would enable intermediate marketing functions to be performed (Ward and Ward 1980). Procurement of supplies of agricultural produce from these production units in numerous villages is costly in terms of:

- (a) The extra effort involved (e.g. the additional effort taken in setting up personal relations that can be important in marketing in the South Pacific).
- (b) Additional direct costs involved in dealing with large numbers of suppliers (e.g. additional vehicle running costs).
- (c) Greater time taken in contacting a large number of product suppliers (e.g. the collection of copra from four large plantations will clearly involve less time than collection of the same quantity from 200 village suppliers scattered over the country). The greater time input involves an opportunity cost to the marketing agent or buyer.
- (d) Greater demands (not necessarily met) on agricultural marketing infrastructure, because of the need to collect from many scattered production units, thereby increasing the social costs of marketing.

In summary, as long as agricultural marketing activities at the producer level are carried out as a sum of many small trading transactions covering a wide area under a VSI strategy, the task of improving agricultural marketing performance and developing market specialisations will be difficult. However, it is by no means impossible. Recognition of the marketing problems created by the dispersed nature of agricultural production in the South Pacific is the first step towards limiting their effects on the agricultural marketing processes and generating increased agricultural marketed surplus.

4.3.5 Village Marketing Organisation and Technology

The traditional village marketing sector and economic pressures for market change. In village economies, the traditional agricultural marketing system can seldom be faulted on either efficiency or equity

grounds, taking into account the limited economic and physical facilities and the objectives on which marketing activities are based. Agricultural market participants have generally come to terms with the nature of the village economy in which their activities are carried out (e.g. Pernetta and Hill 1981). Marketing plans are developed bearing in mind the limitations on the end use of the product concerned, the location of potential consumers of surplus produce and the availability of inputs from outside the sphere of operations of the market participants.

The development of agricultural markets is the outcome of the actions of agricultural marketing institutions, *inter alia*, in providing a link between the national economy and the village economies. Their role is particularly crucial in the creation of incentives to villagers to participate in the commercial economy. Growth in the national economy, however, brings about changes in consumer demand. There is a limit to the extent to which traditional marketing functions (e.g. post-harvest techniques) can cater for these changes, particularly as the changes are likely to induce greater articulation by consumers of their wants.

Institutional change and the introduction of improved technologies in agricultural marketing in these countries have therefore been implemented almost without exception from outside the village marketing sector in the commercial agricultural marketing sphere. What is seen to be essential and beneficial from the point of view of the latter is not necessarily true from the perspective of the former. Hence, there arises a conflict in the transition from traditional to commercial agricultural marketing.

Village organisation as a vehicle for improved marketing technology. A stagnant agricultural marketing system implies a lack of technological change in the provision of marketing services. Advances in the performance of commercial marketing services require the existence of facilities and know-how that are usually associated with the industry and commerce of developed economies. The ability to transfer these services to village market participants depends largely on the linkages that exist between the village and the national and international economies, and the orientation and capacity of market research.

A strong case can be made for the introduction of improved marketing technologies by institutional action, involving government intervention on the grounds of apparent market failure. The performance of food processing laboratories in adapting known technologies to produce commodities for domestic and export markets appears to be one of the most encouraging aspects in the food marketing sphere (e.g. ADB 1985).

Considerable emphasis has recently been placed on the role of the village as a receiving system for development efforts.¹⁰ There is little evidence in the South Pacific, however, that villages would be a suitable receiving mechanism for improved agricultural marketing technologies. Any adoption of improved marketing technologies has been by a few people (usually involved in export marketing) who have been 'relatively successful in the increasing individualization of economic activity...' (Howlett 1973, p. 288). Village leaders have seldom emerged who are familiar with new technologies or with ways of diffusing such techniques among village market participants (e.g. Belshaw 1964, pp. 272-3). Advances in food processing for commercial markets therefore appear likely to be confined to the urban marketing sector.

The introduction of improved marketing technology provides a major means of lifting the constraints of subsistence affluence on village economic activities by increasing returns to commercial relative to subsistence output. However, a particular danger of institutional and technological change in agricultural markets brought about outside the village sector is that leadership in village marketing activities may be lost by the traditional village institutions. In the words of Hau'ofa and Ward (1980, p. 52), 'Once the external influences become the primary source of economic and social motivation for people, older conventions cease to be supportive and become constraints'. In small economies, the chances are high that they may be replaced by monopolistic or oligopolistic commercial marketing organisations whose sphere of interest does not include village welfare.

¹⁰ For instance, a recent volume of Regional Development Dialogue (Vol. 6 No. 1) was devoted to this topic.

Another consequence of the persistence of the village agricultural marketing organisation has been chronic difficulties in the eradication of market imperfections. Many traditional products are difficult to market (McGee 1975, p. 3). Progress in the standardisation of agricultural products has been slow¹¹ and the absence of price differentials that reflect quality, time and space variations in agricultural products has been noted (Hardaker 1976, p. 171). Wastage and losses of village produce have commonly occurred because of the lack of village marketing infrastructure (e.g. Laborius, Burgstaller and Von Keyserlingk 1980; Waleka 1981). Also, it has been alleged that village market participants have been unable or unwilling to take advantage of opportunities for developing specialist export markets in fruit and vegetables that are quite demanding in technical requirements and timeliness (A.M. McGregor, personal communication, 1986). The lack of progress in private and social capital investment in the village marketing system and the village market imperfections noted above nevertheless appear to offer considerable opportunities for entrepreneurial initiatives. However, the nature of village organisations may well have had the effect of suppressing capital investment (Crocombe 1978; Hau'ofa 1979; Sevele 1983) and the way in which marketing systems have evolved has not encouraged entrepreneurial initiatives.

A stagnant agricultural marketing system that arises from a lack of responsiveness to change implies static levels of market throughput, static technology and, with no changes in real prices for marketed products, constant levels of income received by market participants. The resultant effect on market participants is that opportunities to develop marketing enterprises by adopting better marketing methods are limited. Established market participants, who can adopt defensive marketing strategies to protect their market shares, are generally in a more favourable position than those other smaller market participants who are trying to expand their marketing activities.

¹¹ Export bananas are a good example; see Jones (1977).

There is one stage of marketing that is often closely identified with the village, viz. post-harvest processing. For example, an important post-harvest processing activity in South Pacific countries is the drying of copra which is integrated at the village level with coconut production. Traditionally, these activities have been carried out using simple technology. The use of simple techniques has offered little scope for improving control over product quality. Many other traditional post-harvest methods have been used in villages for dealing with large quantities of seasonal, perishable food products (especially preservation of staple carbohydrate foods), but these have declined in importance since colonisation and growth of the cash economy (Crawford 1983, p. 140; Parkinson and Malolo 1983).

Given the damaging effects that a humid tropical climate can have on the quality of perishable foodstuffs, the ability to introduce food preservation methods through better storage, handling and processing is very important for the development of a village agricultural marketing sector. Without such development, village commercial marketing activities will be confined to relatively simple methods of processing of non-perishable produce and, for those with easy access to urban centres, disposal of small volumes of surplus in the fresh produce markets with its attendant risks of wastage of unsold produce.

4.4 CONCLUSION

The points made in the above summary are taken up again and empirically tested in the chapters that follow. In Chapters 5 and 6, market response studies are undertaken for products that are mostly produced by village-based semi-subsistence smallholders. The results of these studies provide pertinent information on the responsiveness of producers and market participants to economic change. Included in these studies is some analysis of the effects of remoteness on response to change. While technological change in agricultural marketing systems dominated by village-based market participants is not dealt with specifically, reference is made to the problems created by deficiencies in handling perishable commodities in fresh produce marketing systems. Supply response studies are undertaken for perennial as well as short-term crops.

The dualistic structure of marketing noted in the previous chapter has probably been strengthened as a result of market failure within the agricultural marketing system, brought about by the effects of village organisation on village participants (and potential participants) in commercial agricultural marketing operations. These influences are likely to slow down the increasing commercialisation of the village economy although they are unlikely to prevent its occurrence completely. An issue of interest in future chapters, then, is the balance in influence between profit-oriented market participants and those market participants whose activities are still mainly dictated by social and other factors pertaining to the village system, well documented by, among others, Brookfield (1969).

In Chapters 7 to 9, various forms of risk associated with agricultural marketing are examined. These studies have been undertaken in the expectation that variability in village agricultural production, government intervention, lack of knowledge and other forms of market failure can limit the ability of market participants to expand the level of agricultural marketed surplus.

Finally, in formulating some policy suggestions in Chapter 10, some of the points made in this chapter are important in specifying policies that might work. They are useful in indicating the limitations and possible contradictions in applying such policies.

PART 3

OPERATIONAL FACTORS INFLUENCING AGRICULTURAL MARKETING PERFORMANCE

Chapter 5

EXPORT SUPPLY RESPONSE FOR PERENNIAL CROPS:
COPRA IN SOLOMON ISLANDS AND WESTERN SAMOA

5.1 BACKGROUND

The economies of Solomon Islands and Western Samoa are typical of most South Pacific countries in that they depend to a considerable extent on the performance of the primary export sector. In 1985, total domestic exports in Solomon Islands were SI\$101.3m, consisting almost entirely of exports of agricultural, fish and forestry products (Statistics Office 1985c). Gross Domestic Product at Factor Cost in 1984 was estimated to be SI\$202.7m so that primary exports contributed about 50 per cent of the total output of the economy in that year. The comparable figure for Western Samoa in 1980 was 21 per cent (ISNAR 1983, pp. 67-8).

Coconut products have traditionally dominated primary exports from both countries. In 1965, copra exports accounted for 93 per cent of all exports from Solomon Islands. By 1985, however, the share of exports attributable to copra had declined to 23 per cent (Statistics Office 1985c). To a significant extent, this decline was brought about by the rise in importance of the timber, fish and palm oil industries in export trade. In Western Samoa, the decline in relative importance of copra exports has been much less apparent. The percentage of copra to total exports fluctuated between 35 and 60 per cent during the 1960s and 1970s (Fleming and Piggott 1985). By 1982, copra and coconut oil accounted for 42 per cent of total exports (Department of Statistics 1983). Despite these declines in relative importance, both governments have been concerned nevertheless about the unstable nature of the world copra market and the sensitivity of copra producers to changes in prices received (e.g. Central Planning Office 1980, p. 20; Economic Development Department 1980, p. 58).

5.2 REVIEW OF LITERATURE

Past studies of perennial crop supply response in developing countries have been adequately reviewed by, among others, Lim (1975), Askari and Cummings (1976) and Ghatak and Ingersent (1984). There is

little to be gained by covering this ground again. The purpose in this section is to distil some observations of these reviewers that are pertinent in attempting to model copra export supply response.

The first point to note is that short-run response is highly inelastic reflecting the biological constraints on the production cycles of perennial crops. This leads to the second point, that any model formulated to estimate long-term supply response needs to consist of two parts. The first part is the planting-price relationship and the second is the planting-output relationship. Third, the key economic variable explaining planting decisions is likely to be expected long-term profit rather than some form of price variable. Finally, because perennial crops derive from a stock of capital (usually trees, bushes or vines), the condition of the plants plays a crucial role in determining yields from them. For instance, hurricanes and other natural catastrophes may destroy some plants in the plantation and permanently stop output; pests and disease may temporarily impair their yielding capacity; maintenance lapses may reduce their potential yield in the future; and yields will vary upwards then downwards as the plants age.

There has been an analysis of copra export supply response undertaken for the world's largest copra exporter, the Philippines. Bautista (1978) studied the interdependence between the copra and coconut oil industries for the Philippines and estimated export supply response elasticities for both commodities. He estimated export supply functions for the two commodities and a domestic demand equation for coconut oil, the more highly processed commodity. Assuming a fixed coefficient technological relationship between the commodities, a price equation was then estimated to establish the link between domestic prices of the commodities being studied and related commodities. The study was based (somewhat dubiously) on the 'small country' assumption despite the predominant position of the Philippines in the world copra market. Bautista (1978, p. 187) argued that although 'roughly 60 per cent of world exports of indigenous coconut products originate from the Philippines, coconut oil constitutes only about 14 per cent of world trade in fats and oils'.

Bautista's results included an estimate of the elasticity of copra export supply of 0.174 at mean values. The corresponding estimate for

coconut oil was much higher, 0.954. In light of these results, copra export supply response in South Pacific countries also might be expected to be very inelastic.

The importance attached by Bautista to modelling the interrelationship between copra and coconut oil markets proved in his study to be soundly based. In selecting to study copra export supply response in Solomon Islands and Western Samoa, however, this imperative can be avoided because neither country had a significant coconut oil processing industry during the study period. (An oil milling factory has since commenced operations in Western Samoa.)

5.3 USES OF COCONUTS

While coconuts are a perennial crop and production would be expected to be insensitive to changes in short-run economic conditions, there is scope to vary copra supply to export markets in the short run. The insensitivity may arise from three sources: the obvious limitation placed on producers in varying production by the biological nature of tree crop production; inflexibility in village consumption of cooking and drinking nuts; and the small size of the domestic market relative to the export market (Niu Leau 1983, p. 36) which restricts the scope for diversion of supplies from one market to the other.

The scope for varying export supply is established by three factors. First, there is a decision whether or not to collect fallen nuts, a decision relevant to South Pacific producers to a much greater extent than to producers in other developing countries where harvesting of nuts is practised. This decision will be influenced by copra prices and by the variable costs of copra production and marketing. Variable costs include the cost of search for nuts that have fallen from the palms (particularly for those which fall in thick scrub); the costs of dehusking the nuts, chopping and drying the copra and putting it into sacks; and internal and international transport costs. Internal transport costs can be quite considerable, but it is the international freight and marketing costs that are particularly great because both countries are situated long distances from the major copra importing countries. To illustrate, in Solomon Islands in 1984, the internal and international costs of shipping, marketing and agency charges were \$6.72m

out of gross export sales of \$29.13m (Copra Board 1984). Because of the costs of copra production and marketing, the collection of coconuts for making copra may not be as thorough when world prices are low as it is when prices are high. It has been estimated that about one-third of coconuts remain uncollected on smallholder land in Solomon Islands (Statistics Office 1975). A similar situation prevails in Western Samoa. It has been estimated that about 40 million coconuts remain unutilised each year, worth about WS\$5 million in 1983 prices (ADB 1985, p. 57). No comparable estimate is available for plantations but the proportion of uncollected nuts would be expected to be much lower because of their more formal industrial organisation.

A second source of variations in supply occurs because village and on-farm consumption of coconuts can account for a significant proportion of output. Approximately one-quarter of the coconuts grown by smallholders in Solomon Islands are estimated to be consumed fresh or used in cooking (Statistics Office 1975). Similar estimates would again be expected if a survey were to be undertaken in Western Samoa.

A third, minor, way of varying the supply of copra for export in the short run is for producers to sell coconuts in the local fresh produce markets. Bathgate (1978) studied the supply of fresh produce to the main produce market in Solomon Islands, situated in the capital, Honiara. He found, as implied above, that fresh coconuts accounted for a relatively small proportion of produce sold. For example, he estimated (p. 33) that only seven per cent of the value of produce sold in the market in the period 5 November to 6 December 1971 consisted of fresh coconuts. The values of coconuts as a proportion of the total value of throughput at Savalalo market in Western Samoa for the weeks 29 January to 3 February and 5 to 9 March 1979 were estimated to be nine per cent and eight per cent, respectively (Economic Analysis and Planning Division 1979).

Two other causes of variation in export supply of copra are more of a medium- to long-term nature. In the medium term, low copra prices may induce producers to neglect the upkeep of their plantations. This neglect can be a lagged negative effect on both coconut production and copra supply. In the long term, the replanting of coconut palms can affect copra production and supply. For smallholders, various subsidised

replanting programs have been operating since 1970 in Solomon Islands and 1966 in Western Samoa (Niu Leau 1983, p. 2). Of the area planted to coconuts in 1979 in Solomon Islands (estimated to be 38 000 ha), 11 000 ha had been replanted during the decade 1970-79 (Central Planning Office 1980, p. 49). Hybrid and superior local 'tall' (Rennell-type) coconut varieties have been used in these replanting programs. The hybrids start yielding after about five years while the local 'tall' variety has a gestation period approaching ten years. The programs are not likely to have had much effect on production before 1978 (Eele 1978, p. 58).

In summary, opportunities exist for producers and other market participants to vary the supply of copra to export markets in response to changes in world market and domestic conditions. For plantations, this opportunity occurs almost entirely through replanting, thus being a long-term response. For participants involved in the marketing of smallholder copra, however, the potential to vary copra export supplies in the short run is considerable. It is expected, therefore, that the elasticity of smallholder export supply response would be greater than zero. The two related hypotheses of this study are that copra market supply response is (a) positive and (b) substantial. Given the evidence of inelastic short-run supply of agricultural products in general and of perennial crops in particular (Askari and Cummings 1976), it is difficult to settle upon an unambiguous value for short-run elasticity of supply response which can be regarded as 'substantial'. For policy purposes, a figure of 0.17 is used in this study, the estimate obtained for Philippines copra export supply elasticity. Elasticity of unity is accepted as 'substantial' in the long run. If this assumption were to hold, changes in copra export price reflecting shifts in the world excess demand function would be matched in the long run by proportionate changes in the quantity of copra supplied to the export market.

5.4 THE MODELS USED

An econometric model of supply response is estimated for each country. The period of the study is 1970 to mid-1981 for Solomon Islands and 1970 to the end of 1982 for Western Samoa. Quarterly observations are used in both cases. The stage in the marketing system at which observations are chosen is at the point of export of copra, by which time various marketing activities such as processing (copra drying), packing,

transportation and procurement have been undertaken. Estimates from the model therefore approximate export supply response. Because all exports went through statutory marketing boards (the Solomon Islands Copra Board (hereafter SICB) and the Western Samoa Copra Board (hereafter WSCB)), the deliveries made to the Boards can be used as estimates of exports for each quarter. (Actual exports might vary slightly from deliveries for a particular period because of changes in the amount of copra that SICB or WSCB has on hand awaiting shipment.)

In estimating the export supply response models, both price expectations models and models incorporating various forms of present and lagged actual prices were formulated and tested for each country. Export prices (estimated for each period of the study by dividing export value by quantity) were included as explanatory variables in both countries; payout prices to producers were also used as an alternative to export prices in Solomon Islands (these were not available from WSCB for the whole study period).

The exports of the smallholder sector were considered separately from the (quite large) plantation sector in Solomon Islands. In Western Samoa, however, data included all privately-produced copra exports. Only the exports of the government-owned WSTEC plantations were excluded. The size of the non-WSTEC private plantation sector is small so the study is virtually one of village-based smallholder export supply response. Village smallholders contribute in the range of 80 to 90 per cent of total copra exports according to the various estimates that have been made (Fernando, Asghar and Opio 1984, p. 6).

The general form of the model (Griffiths 1980) is

$$(5.1) \quad Q_t = a_0 + \sum_{j=1}^n a_j Z_{jt} + \sum_{j=1}^m b_j P_{jt}^* + u_t,$$

where Q_t is the quantity of copra exported in period t ,

Z_{jt} are other explanatory variables not subject to expectations in time period t ,

P_{jt}^* is the expected value of price variable P_j in time period t ,

a_0 , a_j and b_j are parameters to be estimated, and

u_t is the disturbance term in period t .

It was assumed that price expectations are formed in an adaptive manner. P_{jt}^* is expressed as a geometrically declining weighted average of all past values of P_j in the form

$$\begin{aligned} P_{jt}^* &= P_{jt-1} + (1-\theta) P_{jt-1}^*, & 0 < \theta < 1 \\ &= \theta \sum_{i=0}^{\infty} (1-\theta)^i P_{jt-i-1} \\ &= \theta \sum_{i=0}^{t-1} (1-\theta)^i P_{jt-i-1} + (1-\theta)^t P_{j0}^* \end{aligned}$$

where P_{j0}^* is the pre-sample expected value of P_j .

There are many potential influences on copra export supply response in the two countries under study. Factors considered for inclusion in the estimated models are now outlined.

5.4.1 Copra Price

Copra price is included as an explanatory variable in terms of the price paid to the Boards. It approximates the price paid by buyers of Philippines FMS copra in the London market. Smallholder copra producers have ready access to information on world copra prices and could be expected to hold certain expectations about future price movements. Their decisions to supply copra for export are likely to be influenced by world prices which filter through to the payout prices made by the Boards. Similarly, the decisions and effort made by middlemen in the copra marketing system could also be expected to be influenced by price changes in the world market.

A lagged response of copra supply to price changes may occur for a variety of reasons:

- (a) Because of the post-harvest operations involved, a time lapse occurs between the harvesting of the coconuts and the presentation of the copra for grading to the Boards' agents at the ports.

- (b) Decisions on the use to which the nuts are to be put cannot be made instantaneously. Producers must wait for the nuts to ripen to the appropriate stage (which is earlier for direct consumption than for making copra).
- (c) Producers are likely to adapt their expectations of price of copra over time.
- (d) There is a gestation period of between five to ten years when replanting decisions are made as a response to changes in copra market conditions.
- (e) Where maintenance of plantations is neglected as a result of a decline in copra price, it would take at least a couple of years before the effects of the neglect show up in coconut yields. There is also a delay before improved maintenance has effects on yields.

While no estimates are available of the length of lag caused by the first two factors, it is unlikely to be greater than one quarter. A lag of one period seems appropriate for copra price variables in the supply equations to be estimated.

To take account of adaptive expectations, the copra price variables were included in the estimation equations as subjective expected values (considered as geometrically weighted sums of past observations of the price of copra) as well as actual values. While an expected price variable is favoured for the export price variable, actual price is likely to be the more appropriate form for the payout price variable because prices are announced by the Boards in advance for each period. Export price and payout price variables were included in the model to be estimated as mutually exclusive alternatives.

The fourth and fifth factors present difficulties for estimation. Any attempt to include the effects of replantings on export supply was thwarted by a lack of information. First, for smallholders, by far the major source of incentive to replant palms comes from the subsidised

replanting programs. Areas to be replanted are determined primarily in the development planning processes rather than by individual coconut producers concerned with the long-run profitability of coconuts relative to other crops competing for the use of the land. Specific information on how these planning decisions are arrived at, and on the areas replanted in each period, is not available. Second, land tenure considerations are relevant in planting decisions. In Solomon Islands, coconut planting can influence the rights of the person to use the land (Eele 1978, p. 58). In Western Samoa, problems may arise for those who cannot get secure title to land (Crocombe 1978, p. 9). A copra producer may plant palms which later become the property of a member of the village who is more senior according to the *matai* system. The link between effort and reward is thus broken. It has not been possible to quantify such factors in either of the countries.

Third, no studies have been made and reported in the two countries on the effect of the level of maintenance of coconut palms on future yields. It is possible that a substantial and sustained decline in copra prices may induce producers to forgo normal maintenance operations such as clearing and pest control. A reversion to normal maintenance practices when prices eventually rise again is unlikely to eradicate completely the yield-depressing effects of earlier neglect. The causal relationship between maintenance and yields has not been intensively researched but it is likely to be asymmetric, resulting in asymmetric long-run supply response to copra price changes. That is, elasticity of yield response to neglect of maintenance is probably much higher than in the converse situation when normal maintenance standards are resumed. Given the lack of data available, no attempt is made to model the maintenance-yield relationship in either country.

5.4.2 Productive Area of Palms

Because of the difficulties in modelling the relationship between product prices and planting (or replanting) decisions, the productive area of coconut palms was considered as an explanator of the effects of yields on copra supply. Insufficient data were available to include such a variable in the Solomon Islands models but estimates were included in the Western Samoan model. Figures were available for new plantings and replantings from 1966 onwards. Palm productivity estimates were based on

age, derived from a conversion table prepared by Jensen and Van Wissen (1978, p. 26). While this approach was considered satisfactory for changes in yields of young palms, no comparable estimates could be made to approximate the effects of declining yields of senescent and senile palms. A time trend was included as a proxy variable in an attempt to capture the gradual effects of declining productivity of ageing palms.

5.4.3 Prices of Related Products

Because coconuts are a staple food item used for cooking and drinking in both countries, they would be expected to be competitive with other staple foods such as bananas and root crops in the domestic market. In addition, imported rice may have become a major substitute for locally produced staple food products since the commencement of the observation period. Producers' decisions to supply coconuts to the domestic market might be influenced by local prices relative to export prices, as price changes lead to changes in the relative profitability of supplying the domestic or export market.

Local prices of the major staple food products as well as domestic rice prices were included in the equations to be estimated and their coefficients were expected to have a negative sign. One possible exception is the local price of taro in Western Samoa. Because coconut cream is commonly cooked together with taro, a complementary relationship might exist in this case, making the coefficient sign ambiguous. The price variables included are taro and bananas in Western Samoa and sweet potatoes and a composite index for domestically-produced food products in Solomon Islands.

5.4.4 Climate

The complex climatic influences on coconut and copra production - rainfall and its distribution, sunlight, humidity, cloud cover, wind and temperature - would be expected to be substantial. Some attempts have been made to mitigate (but, because of lack of data, not to remove completely) the damage caused by the omission of variables to capture climatic effects. First, seasonal dummy variables were included on the intercept term in models estimated in both countries. Second, variables were included for sunshine (hours per observation period) and rainfall

(millimetres per observation period) in models for Western Samoa. The dispersed nature of coconut production in Solomon Islands (especially compared with Western Samoa) makes the use of any set of values for a climatic variable meaningless given the great differences in climatic experiences among regions for any observation period. Also, very little copra is sun-dried in Solomon Islands, reducing the impact of sunshine on quantity and quality of output. Third, the study period was scrutinised in both countries for any widespread devastating climatic effects such as hurricanes. The effects of hurricanes would likely require two dummy variables: one to account for a peak in output as a result of the dislodgment of nuts, many immature, from the palms; a second to account for a trough in output which ensues because of the reduced number of nuts left on the palms. Fourth, the further use of dummy variables was considered to account for short-term droughts which may not show up in quarterly data. Because soils in both countries can be very permeable, even short periods without adequate rainfall can cause significant yield reductions, caused by retardation of the new leaves and their flower spathes. The task of identifying periods of short-term drought in Solomon Islands proved too difficult, again because of the dispersed nature of copra production. In Western Samoa, it was considered after analysis of available data that any short-term drought periods identified would have been adequately represented in the quarterly rainfall data. No hurricanes of importance occurred in either country during the period of study.

5.4.5 Input Prices

By far the most important inputs in copra production other than exogenous climatic effects are land and labour. In the short run, competition for land between coconuts and alternative crop enterprises is limited by the perennial nature of coconut production. Labour (mainly farm family), however, can be reallocated among different activities as its productivity in different uses changes or as there are variations over time in family cash needs. (In periods of high cash demand such as at the beginning of the school year, farm families may concentrate on short-term cash crops and neglect plantations.) Lack of an adequate and reliable quarterly series on the price of agricultural labour unfortunately precluded attempts to include a wage variable in the estimated equations. Nor are time series data available on smallholder labour allocation.

Other inputs in the production process that might be relevant in influencing copra supply include purchased items such as fertilisers, pesticides and herbicides. Very little fertiliser and pesticides are applied to coconut plantations in both countries; while there is some use of herbicides between palms, its use is limited and changes in its price are not expected to influence copra supply. Lack of fertiliser application persists in Western Samoa despite growing evidence of widespread potassium deficiency in the soils (Fernando et al. 1984, p. 14). Potassium deficiency is also widespread in Solomon Islands where use of fertilisers for coconuts by smallholders is rare (L.D.C. Chase, personal communication, 1985).

Prices of marketing inputs - particularly transportation - are expected to be major factors influencing copra supply and are pertinent to a study of agricultural market development. These factors are more important in the widespread smallholder coconut sector in Solomon Islands than the more compact sector in Western Samoa. Lack of reliable data on marketing input prices over the period of the study, however, again proved to be a stumbling block to the inclusion of relevant variables.

5.4.6 Pests and Diseases

Copra production has suffered at frequent intervals from the effects of pests and diseases in both countries under study. It would appear that the effects have been greatest, however, in Western Samoa. The attacks of the rhinoceros beetle and coconut stick insect have been particularly damaging to coconut production and have substantially reduced Samoan copra yields (Stace 1956; Dharmaraju 1977). Other minor pest problems exist as well as occasional outbreaks of fungal diseases (Fernando et al. 1984, p. 17). Finally, pests and diseases also attack copra during and after harvesting. Moulds causing free fatty acid development are particularly common (Newton 1983). *Amblypelta* is a major pest of coconuts in Solomon Islands, causing premature nut fall.

Lack of data on the incidence of pests and diseases precluded any attempt to include their effects on copra exports in the estimated model. Furthermore, even if such data had been available, it is uncertain whether the incidence-yield-export volume relationships could have been modelled adequately.

5.4.7 Technology

Given the relatively low level of use of purchased inputs and fairly stable technologies in the production of copra over the 12-13 years of the study period, it was considered safe to ignore the effects on copra supply of changes in technology.

5.4.8 Household Consumption

It is being increasingly realised that decisions made in semi-subsistence farm households are based on a diversity of choices (e.g. Barnum and Squire 1979, p. 26). Decisions made influence the levels of agricultural production and household consumption of both marketed and non-marketed goods, affecting the level of agricultural marketed surplus. Part of the decision-making process concerns trade-offs between income and leisure, influencing household labour supply to agricultural production activities (Livingstone 1977) as well as decisions on participation in the labour market. The effects of these decisions were recognised above in the discussion on the effects of wages and input prices on copra supply.

An impetus to studies of production-household relations in developing countries occurred with the publication by Barnum and Squire of their theoretic model of an agricultural household and empirical evidence from its application. This model was based on a much earlier model developed for an aggregate agrarian economy by Hymer and Resnick (1969). A few subsequent studies have drawn upon the model formulated by Barnum and Squire (1979). These have included Ahn, Singh and Squire (1981) and Strauss (1982, 1984a, 1984b). The work of Barnum and Squire (1979) had a number of seminal antecedent studies. Notable contributions other than Hymer and Resnick (1969) have been made by Krishna (1962), Becker (1965), Behrman (1966), Nakajima (1969), Bardhan (1970), Haessel (1975), Abbott and Ashenfelter (1976), Chinn (1976) and Lau, Lin and Yotopoulos (1978). The most famous early treatment of the concept of the farm household, however, was probably by Chayanov (1966).

Recent empirical evidence for agricultural households in Sierra Leone demonstrates the need to distinguish between (a) the supply of particular crops, (b) the supply of total production, and (c) the supply of a marketed surplus (Livingstone 1977, p. 275). Strauss (1984a) estimated mean elasticities of marketed surplus of 0.89 for rice, 0.46 for root crops and other cereals and 0.44 for oils and fats.¹ Estimates varied substantially between expenditure groups. Elasticities of expected quantities of outputs were found to be much smaller: 0.11 for rice; 0.10 for root crops and other cereals; and 0.02 for oils and fats.

The farm production-household consumption nexus represents an agricultural marketing system in its most elementary form. In studying agricultural development, however, the concern is not directly about the nature of household consumption decisions but, indirectly, about the effects they have on agricultural marketed surplus and hence on the more complex marketing operations outside the farm production-household system. Household factors need to be included in the estimation of agricultural marketed surplus - whether at the farm level or at a later stage in the agricultural marketing process between the 'village gate' and the retail or point of export level. The later the marketing stage, the more complex the set of factors influencing the level of agricultural marketed surplus as the influences of more marketing activities need to be considered.

In solving for the reduced form of agricultural marketed surplus at the farm level, Strauss (1984a, p. 322) suggested the following equation to be estimated:

$$(5.2) \quad MS_i = MS_i(p, \eta, m, z, k, A)$$

where MS_i is the marketed surplus of good i ,

p is an N vector of prices (including wages),

η is household characteristics affecting the time available to the household for work and leisure,

¹ Components include palm oil, groundnut oil, cocoa butter and palm kernels (which are not consumed); the dominance of tree crops explains the very low elasticity.

- z is a vector of farm characteristics including fixed inputs,
 k is a vector of production technology parameters, and
 A is exogenous income.

Explanatory variables for m , z , and k have been discussed above. Of concern here are those other variables which influence household consumption. Data needed for such an analysis to be undertaken properly are difficult and expensive to collect; none is available in any South Pacific country. A lack of data on farm household consumption of cooking and drinking coconuts unfortunately precluded any estimation of elasticities of household consumption. This in turn prevents a comparison of elasticities of marketed surplus of coconut products.² The omission of household variables requires assumptions that there is zero elasticity of total production of copra and zero elasticity of household demand for coconut products. The strength of these assumptions is difficult to assess. The estimate of a low elasticity of total supply of 0.02 from the study made by Strauss (1984a) provides some evidence that the likelihood of autocorrelation in the estimated equations as a result of the first assumptions is slight (see below). The prospects are less assuring given the mean estimate of elasticity of household consumption of oils and fats of -0.73 (Strauss 1984b).

5.4.9 Possible Specification Bias

The impact of the difficulties caused by the omission of possibly relevant explanatory variables such as those discussed above is lessened by the fact that they pertain mainly to the production-household system and not to the commercial marketing processes. Nevertheless, the omission of relevant variables can cause bias in the estimated coefficients of the included explanatory variables (Theil 1957).

² A study is presently underway in two South Pacific countries - Solomon Islands and Tonga - in which 12 months of data on farm households are being collected (Hardaker and Fleming 1986). An analysis of marketed surplus similar to that undertaken by Strauss (1984a, b) is being planned in this study.

The extent of the bias depends on the correlations between the included and excluded variables and on the coefficient values of the excluded variables. The incorrect specification of an estimated equation through the omission of relevant explanatory variables is likely to be revealed in the existence of serial correlation. Serial correlation may occur because the influence of the omitted variables is represented in the disturbance term (Johnston 1972, p. 244). It is not expected that high correlations exist between included and excluded variables, particularly between the excluded variables and export price which is the variable of most concern in this study, with two exceptions.

The first exception concerns the maintenance of plantations and replanting decisions which are likely to be correlated significantly with past prices of copra exports. The expected values of the coefficients of these two excluded variables are difficult to judge. Three attempts were made to take account of the impact on supply of these variables. First, the Nerlovian partial adjustment variable (Nerlove 1958a) was included in all models to take account of any lags in the adjustment of export supply to changes in the explanatory variables (particularly export price). This would enable estimation of both short-run and long-run price elasticities of export supply. Disappointing results from this endeavour are reported below. Second, fruitless attempts were made to include significant lagged prices of varying lengths up to five years as a proxy for changes in plantation maintenance and replanting.

The third approach bore limited fruit, at least in the case of Western Samoa where special consideration was given in the copra export supply response equation to the need to take account of the long production cycle of coconut palms. Crucial factors influencing production, and hence supply, are the area under palms and their productivity. As mentioned above, estimates were made of full-bearing equivalent hectares of coconut palms for each observation period, based on estimates of areas under coconut palm by age group made by Jensen and Van Wissen (1978) and data on new plantings provided by the Department of Statistics (1983). One problem encountered in preparing these estimates was an inability to account for the increasing senility of a significant proportion of palms and their consequently declining productivity (Jensen and Van Wissen). In an effort to capture this effect, a time trend variable was also included as an explanatory variable in the model. The

coefficient sign was expected to be negative on the time trend variable and positive on the planted area variable. A problem with the time trend variable is the lack of assurance that it necessarily reflects trends in senility. Another explanation for a downward trend in copra export supply could be that, with increases in the rural population over the study period, increasingly more coconuts are destined for village consumption in a fresh form rather than being used for copra production.

The second exception concerns farm household consumption which is probably correlated with the price of coconut products. As mentioned above, the elasticity of village household demand for oil products may well be substantially greater than zero, leading to specification bias in the estimated equations for marketed surplus.

5.4.10 Estimated Model

As a consequence of decisions made on the inclusion of explanatory variables in the foregoing discussion, the estimated model for Solomon Islands is shown in equation (5.3) and that for Western Samoa in equation (5.4):

$$(5.3) \quad Q_C = f_1 [PX_C^*, PL_K, PL_F, D1, D2, D3, CD, Q_C(t-1)]$$

$$(5.4) \quad Q_C = f_2 [PX_C^*, PL_T, PL_B, PL_R, A, H, SUN, RF, D1, D2, D3, CD, Q_C(t-1)]$$

where Q is quantity exported,
 PX is export price,
 PL is local price,
 A is time trend for falling productivity
 of senescent and senile palms,
 H is full bearing equivalent hectares of coconut
 palms,
 D1, D2, and D3 are seasonal dummy variables,
 RF is rainfall,
 SUN is sunshine,
 CD is a climate dummy variable for cyclonic effects,

subscripts C, K, F, T, B and R are for copra, sweet potatoes, domestic food, taro, bananas and rice respectively,

* denotes expectations.

5.5 RESULTS

Linear and logarithmic models were tested and the logarithmic model was found to be the most suitable on statistical grounds in both countries. The results of the estimated models are presented in Table 5.1. Results for each country are discussed separately, followed by a comparison of relevant variables included in, and explanatory power of, each model.

5.5.1 Solomon Islands

An analysis of the study period indicated that there was no exogenous event likely to have influenced copra exports significantly while the seasonal dummy variables proved to be insignificant explanators of copra export supply. Domestic prices of coconut food substitutes also proved not to influence copra exports significantly. Inclusion of the lagged dependent variable in the model led to results inferior to those reported here. It is concluded on the basis of this result that the partial adjustment model is not appropriate. Data deficiencies prevented the inclusion of a productive area variable; its omission is likely to be one reason for autocorrelation which was present in all equations. Cochrane-Orcutt procedures were used successfully to correct for autocorrelation in all equations. In carrying out these corrections, it has been assumed that $(P_{jt}^* - P_{jt-1}^*)$ is the same function of P_{jo} as P_{jt}^* is of P_{jt} (where P_{jo} is the pre-sample value of P_{jt}).

It was found that current expected price had better explanatory power than expected price lagged one quarter, with 49 per cent of the variation in exports explained compared with 38 per cent. (Traditional supply models incorporating actual price variables and using payout price rather than export price were also estimated but these provided markedly inferior results to those reported.)

Table 5.1

Copra Market Supply Response Models

Constant	$\ln PX_C^*$	$\ln PX_C^*(t-1)$	$\ln H$	$\ln A$	D1	$\ln SUN$	$\frac{-2}{R}$	d
<u>Solomon Islands</u>								
2.16 †	0.59 †					0.50 †	0.49	1.98 ^a
(8.62)	(5.68)					(3.26)		
<u>Western Samoa</u>								
-23.07		0.31 †	2.92**	-0.07**	0.19*	0.14*	0.13	1.67
(-1.56)		(2.47)	(1.99)	(2.26)	(1.57)	(1.32)		

Figures in parentheses are t values.

† Significant at one per cent level.

** Significant at five per cent level.

* Significant at ten per cent level.

a Corrected for autocorrelation.

The first hypothesis was tested using a one-tail t test. Short-run elasticities can be obtained directly from the copra price coefficients in the models because the equations are linear in logarithms. It was found that the elasticity of export supply of copra was significantly greater than the estimate of 0.17 for the Philippines; in fact, it was not significantly less than 0.5 in both models reported. It follows that participants in copra export marketing can be regarded as responding substantially to export price changes. A substantial response would still be accepted at the five per cent level of significance if the threshold elasticity were raised to 0.7.

Because the lagged dependent variable was dropped from the estimated models, no measure of the mean lag was possible as a result of partial adjustment to price changes. It was possible, nevertheless, to estimate long-run price elasticity of copra export supply response using the estimate of the coefficient of expectations. Based on the results presented in Table 5.1, the long-run elasticity is at least 1.18 and is not significantly less than unity. The second hypothesis is also not rejected.

5.5.2 Western Samoa

Results are presented in Table 5.1 for only one model among those tested for export supply response of participants in copra marketing in Western Samoa. Explanatory power of the model is weak; the most plausible reason is the omission of variables which could not be quantified or for which data were not available. In particular, the absence of detailed household data, climatic data and information about marketing influences on export supply is likely to have reduced explanatory power. Rather surprisingly, on the basis of the Durbin-Watson statistic reported, the model did not appear to suffer from autocorrelation.

The naive expectations model (actual export price of copra lagged one quarter) was preferred to expected price and present actual price. The price elasticity of export supply response was estimated to be 0.31 and was significantly greater than zero at the one per cent level using a one-tail t test.

Of the other variables expected to shift export supply response, four were found to be significant at least at the ten per cent level and all of these were included in the preferred model: area of productive palms (H); time trend of falling productivity of senescent and senile palms (A); sunshine hours; and the first seasonal dummy variable (second quarter of each year). Local prices of related products, rainfall and the third and fourth quarter dummy variables proved to be insignificant explanators of copra export supply response.

Various lengths of lags of the rainfall variable were tested to determine whether the effects of low periods of rainfall have a delayed effect on volumes of copra exported. Barrett (1961) found in Western Samoa that, despite drought conditions in 1956, copra yields were high. Copra exports in the following year, however, were low. He explained this lagged fall in output not just in terms of a reduction in the setting of fruit brought about by the dry weather but also by the diversion of some output to village consumption to offset the effects of reduced output of the staple foodstuffs. No such effects were revealed in this analysis.

A review of the study period revealed no single climatic shocks such as cyclones which would have substantially affected copra production and marketing activities. Finally, the inclusion of the lagged dependent variable produced results inferior to those reported in Table 5.1. The attributes of the four supply shifters included in the estimated model now are described briefly. Because the first two are related, they are discussed together.

Yield effects. The area of fully productive coconut palms proved to be a significant explainer of copra supply at five per cent level. As would be expected, the effect of new plantings reaching productive age is quite marked; for each one per cent increase in fully productive hectares, there is almost a three per cent increase in copra exported. Assuming the time trend accurately reflects declining productivity of old trees, it follows that there is a gradual negative effect on copra supply with a seven per cent drop in supplies as each year passes. (Note that this might also reflect to some extent the gradual increases in domestic consumption associated with population increases.)

Sunshine. Only sunshine hours in the quarter when copra is exported provided any significant explanation of the response of supply to climatic factors (and, then, only at ten per cent level of significance.) A one per cent increase in hours of sunshine would lead to 0.14 per cent increase in copra exports in the current quarter. This result, with a positive coefficient for the variable representing hours of sunshine, reflects the advantages for export supply of good drying conditions as much of the copra is still sun-dried in Western Samoa.

Seasonal effects. Only one of the three seasonal dummy variables helped to explain changes in copra export supply. As for the sunshine variable, this dummy (D1) was only weakly significant (at ten per cent level). The seasonal dummy variable for the second quarter has a positive coefficient which probably reflects the importance of cash needs associated with celebrations and the suitability of the season for ripening of coconuts, at the onset of the dry season and just after the wet season has finished.

Excluded variables. Attempts to simulate the relationship between other climatic factors and coconut production were fruitless. Also, none of the local price variables was included in the model. The most plausible explanation concerns the small size of the domestic market for coconuts relative to the copra export market. It would require enormous changes in the domestic marketing of coconuts to have any significant effect on the quantity of copra exported; thus, the findings of negligible cross-elasticities of supply to the domestic market would appear to be reasonable. The partial adjustment variable was also excluded, most likely because of the long production cycle for coconuts which could not be adequately represented using a data set covering a period of only 12 years. This meant that no long-run supply elasticity estimate could be made and that the second hypothesis could not be tested.

Hypothesis tests. A test was undertaken of the first hypothesis along similar lines to that reported for Solomon Islands. It was found that the hypothesis was not rejected at one per cent significance level. Again, response proved to be significantly greater than the estimated elasticity reported for the Philippines, being not significantly less than 0.5 at five per cent level of significance. If the threshold

response were raised beyond this level, however, the hypothesis would have been rejected.

The adjustment coefficient for copra export supply response must be close to, if not, zero on the basis of estimates made. Both short-run and long-run elasticities are therefore low. It follows that the manipulation of copra price as an economic policy instrument to influence supply is unlikely to be very effective.

Because equations for each country were estimated separately, it was not possible to determine whether the short-run estimates of export supply elasticity in Solomon Islands are significantly higher than those in Western Samoa. The extent of the difference (Solomon Islands estimates being virtually double those in Western Samoa), however, suggests that this may be so. There are four possible causes of the differences: a smaller proportion of nuts left uncollected in Western Samoa (unlikely given the data reported above); less responsiveness in substitution between coconuts and other food items in Samoan village diets; the inclusion in the Samoan model of the (relatively small) plantation sector for which export supply responsiveness is negligible; and a system of collection of copra from the village in Western Samoa that is less responsive to the needs of producers than the system in Solomon Islands.

5.6 REGIONAL VARIATIONS IN SMALLHOLDER COPRA SUPPLY RESPONSE IN SOLOMON ISLANDS

5.6.1 Purpose of Analysis

Further analysis of copra supply response in Solomon Islands is made possible by the disaggregation of export quantities according to copra districts. There are 61 districts designated by the Copra Board of which 28 have been consistent suppliers of copra in each quarter during the 10-year period 1975-84. These 28 districts are spread throughout all provinces in Solomon Islands and represent differing degrees of accessibility to points of export.

The Copra Board introduced in December 1979 a price equalisation scheme, operated through the granting of freight subsidies, in which four production zones were delineated according to market accessibility (Abeyasinghe 1981, p. 83). The Board periodically sets transport allowances to producers in each designated zone in an attempt to ensure that producers get similar prices regardless of location. In 1980, freight equalisation payments were \$45.78, \$32.10, \$22.92 and \$13.75 for zones 1 to 4, respectively. The same ratio of payments were retained throughout the period 1980-84. However, actual payments were increased during the period for all zones to allow for inflation - by about 10 per cent in 1981 and again by 16.7 per cent in the second quarter of 1984 (Statistics Office 1985a).

Accessibility to export markets is not necessarily a function of distance from the capital, Honiara, for three reasons. First, fragmentation of land surface means producers on some islands may find it more difficult to export than other producers further from the point of export because of deficiencies in sea transportation facilities. Second, land transportation facilities vary greatly such that market access varies according to the network of roads and their quality. Third, Honiara is not the only port of export. The Copra Board has purchased copra through Honiara, Yandina (Central Province), and Noro/Gizo (Western Province) since well before the study period, and from Lata (Temotu Province) since June 1984.

The purpose of the analysis in this section is to determine whether differences occur in responsiveness to price by producers in different districts. Two hypotheses are formulated:

- (a) Ho: Coefficients of dummy variables on all the copra price variables are insignificantly different from zero.
Ha: Ho is false.

Further, it is hypothesised that differences in responsiveness can be explained by remoteness from points of export of copra.

- (b) H_0 : Price elasticities of copra supply for districts in zones 2,3, and 4 are significantly greater than those for districts in zone 1.

H_a : H_0 is false.

5.6.2 Method

Model. A similar approach was adopted in selecting the supply response model to that reported in Section 5.1. Nerlovian adaptive expectations models were estimated for both linear and log-linear functional forms.

Selection of variables. Separate models were also estimated for export and payout prices, as in Section 5.4, bringing to four the number of models to be estimated. All other variables tested for significance in explaining changes in quantities of copra supplied were dummy variables. First, simple (zero-one) dummy variables were placed on the intercept term for all districts except the base, Inner Reef (district 28). These variables were included to take account of differences in production conditions between districts.

Second, two types of dummy variables were included on all price variables in the four estimated models. The first of these variables was a district dummy variable. Two alternative procedures were adopted in this respect. The simple dummy variable was used first. However, this implies that there are only two categories of districts: near and remote. Remoteness is a continuous factor, and distinguishing between near districts and remote districts is quite an arbitrary procedure. It was therefore decided to employ also a continuous dummy variable (Doran 1985) on the price variables. Because actual transportation costs for each district were unavailable, the continuous dummy variable was based on freight equalisation payments as a proxy for remoteness. Where a district comprised suppliers in different zones, the figure was estimated to be an average of payments made to the zones concerned.

The second simple dummy variable on the price variable was a period dummy to distinguish pre-1980 supply response in each district from response after the introduction of the copra freight allowance at the beginning of 1980.

A third dummy variable was placed on the intercept, again according to whether the observation fell in the period prior to the introduction of the freight equalisation payments scheme or after its implementation. The purpose of inclusion of this simple dummy variable was to determine whether there was a change in supply conditions irrespective of price changes. It was felt that the provision of a freight subsidy might encourage copra producers generally to adopt a more commercial approach to copra production and supply the export market on a more regular basis, now that the barrier of high transportation costs had been lowered.

Data. Quarterly observations on quantities of copra supplied by the 28 districts included in the estimated models were obtained from Statistics Office (1985b) for the period 1975-84. Average quarterly copra prices for the same period were obtained from Statistics Office (1985a).

5.6.3 Results

Results of three estimated models including only district simple dummy variables on the price variables are presented in Appendix 2. These models include the linear export price variable (Appendix 2.1), logarithm of the export price variable (Appendix 2.2) and linear domestic price variable (Appendix 2.3). Using an F test, it was found that there was no significant difference between the model including export price as an explanatory variable and that including domestic price. Because the model including export price was chosen as best in Section 5.5, this model was also preferred in this section. An ℓ -test was carried out to determine if the linear model (with a residual sum of squares divided by the geometric mean of 305.42) was significantly superior to the log-linear model (with a residual sum of squares of 317.23). The null hypothesis set was that there was no significant difference between the models. Compared with a critical χ^2 value at five per cent significance level of 3.841, the ℓ value was found to be much higher. It was concluded that the linear functional form was superior. The model chosen for analysis among the four containing block dummy variables on the price variable is therefore the linear form of the model containing the export price variable. This model is presented in summary form in Table 5.2.

Table 5.2

Estimated Model of Copra Supply by District: Regular Suppliers

Variable	Coefficient	t value
Intercept	28.486	6.346†
Copra export price	0.065	6.983†
Lagged copra exports	0.519	20.827†
Intercept dummy -		
Rannogga	64.400	6.627†
Kolombangara	-18.514	-2.006**
East Vella	30.853	1.495*
Weather Coast	-11.554	-1.256
East Malaita	-16.413	-1.782*
North Malaita	66.433	3.122†
Price dummy -		
South Central Choiseul	0.065	3.267†
East Vella	0.072	1.635*
West Vella	0.047	2.365**
Simbo	-0.080	-4.002†
North West Marovo	-0.064	-3.209†
West Isabel	-0.023	-1.183
East Isabel	0.065	3.287†
Savo	-0.031	-1.565*
Tasimboko	0.105	5.198†
Kakambona	0.133	6.445†
South Malaita	0.014	5.159†
North Malaita	0.055	1.242
East Makira	-0.035	-1.763*

$$R^2 = 0.664$$

- † Significant at one per cent level.
 ** Significant at five per cent level.
 * Significant at 15 per cent level.

The models including the continuous dummy variables on the price variables were estimated in non-linear form using the SHAZAM program developed by White (1982). The results obtained revealed that the standard deviation around the cut-off point (the mean of the distribution) between near and remote estimated in the program was not significantly different from zero. Doran (1985) argued that such a result indicates that the use of a simple dummy variable is equally efficient as a continuous dummy variable. Two reasons may explain this result. First, only six different values were available to estimate the continuous dummy variable (the four individual zone payments plus two payments calculated as an average of two zone allowances where districts included producers in different zones). Such a variable is unlikely to be much different from a simple dummy variable (H. Doran, personal communication, 1986). Second, it is conceivable that the classification of zones might not accurately reflect the relative remoteness of one district from another. This second point is followed up below.

5.6.4 Discussion of Results

In the linear model with export price as the explanatory price variable, reported in Table 5.2, coefficients on the price and lagged dependent variables are both greater than zero at 0.5 per cent level of significance. The coefficient of expectations is 0.48, giving a mean lag in adapting price expectations of just 1.08 quarters. Short-run and long-run estimates of price elasticity of supply are 0.20 and 0.42.

Determination of which dummy variables to include was based on a two-tail t test at 15 per cent level of significance. Six intercept and 13 price dummy variables were included in the estimated model, including 3 variables that were narrowly insignificant at 15 per cent. A summary of the price elasticity estimates, together with their zone classification, is presented in Table 5.3. It is clear from these results that there are significant differences among price elasticities of copra supply. Elasticities vary from 0.193 to 0.217, which indicates that the elasticity estimate for the base district is approximately in the middle of the range of estimates. About one-half of the districts have elasticities significantly different from the base district while the other one-half of the districts have elasticities not significantly

different from the base. From these results, it is concluded that the first hypothesis - there are significant differences among price elasticities of copra supply - holds.

A review of the evidence in Table 5.3 demonstrates, however, that the second hypothesis does not hold. There is no clear pattern that reveals higher elasticity estimates for less remote districts. Inner Reef, the base district, is among the most remote of the consistent copra supplying districts included in the estimated model. If the second hypothesis were to hold, only those other districts categorised as zone 1 suppliers would have similar elasticity estimates. All other districts should have estimates that are significantly higher than the base estimate. Yet, as noted above, the base estimate falls about the middle of the range of 28 elasticities. Some districts classified as zone 2 or zone 3 suppliers (Simbo, North West Marovo, West Isabel, Savo and East Makira) have significantly lower estimates than the base elasticity. Only 8 of the remaining 20 districts classified as zones 2 to 4 have significantly higher estimates. Of those 6 districts with zone 4 (least remote) classification, only 2 - Tasimboko and Kakambona - have elasticities significantly higher than base estimates. These are, admittedly, easily the highest among all elasticity estimates. Both districts are situated in Guadalcanal Province, where most producers have easy access to Honiara, the major Copra Board buying point.

Assuming that the model has been correctly specified, three alternative explanations can be put forward to account for the failure to support this null hypothesis. First, remoteness may not be a factor influencing responsiveness of copra supply to export price. This explanation is supported by the poor results attained when the block dummy variables on price were replaced by continuous dummy variables. However, these poor results could also support the second explanation: the classification of freight allowance zones might be a poor representation of the remoteness - and the costs involved in getting produce to market - of copra producers in particular districts.

Support for the latter explanation is also provided by the fact that access to export markets may vary greatly within each district. Remoteness is probably a more complex factor than indicated by the classification for paying subsidies by the Copra Board. The third, minor

Table 5.3

Price Elasticity of Copra Supply by District: Regular Suppliers

District	Price Elasticity of Supply	Zone Classification
2 South Central Choiseul	.209	2
7 East Vella	.210	2
8 West Vella	.207	2
9 Simbo	.193	2
10 North West Marovo	.195	2
11 West Isabel	.199	2
13 East Isabel	.209	2
16 Savo	.199	3
20 Tasimboko	.214	4
21 Kakambona	.217	2,4
24 South Malaita	.214	2
25 North Malaita	.208	2
27 East Makira	.206	2
28 Inner Reef (and other districts)	.202	1-4

explanation is that accessibility to export markets may have been altered in some districts during the study period. Changes in access could have ensued from the opening up of the new buying station at Lata in Temotu Province.

The final points to note on these estimates of price elasticity of supply are the narrow range among the districts (.193 to .217) and the substantially lower elasticities compared with the estimate of 0.59 reported above in Table 5.1. The narrow range of elasticity estimates indicates that there is little difference between districts in supply responsiveness of copra producers. Comparison of the substantially lower estimates in this study with the estimate reported in Section 5.5 is probably not valid because of the different functional form used in the previous section. A fairer comparison would be with the district elasticity estimates derived using the log-linear functional form (see Appendix 2.2). In this case, the range of estimates of price elasticity of copra supply was even narrower, from 0.355 to 0.363. These estimates are still considerably lower than those for aggregate copra export supply. Two reasons can be put forward to explain the difference. First, it is conceivable that the less consistent suppliers in excluded districts are more responsive to price than suppliers in districts that more regularly supply copra for export. There is, however, little evidence to support this contention (see next section). Second, the study period in Section 5.5 (1970-mid 1981) differs from the period used for modelling in this section. The former study excluded most of the period during which the freight allowance scheme was operating and included all of the 1970s during which world copra prices varied greatly.

In order to test whether the introduction of the copra freight allowance scheme had any effects on copra supply, two procedures were followed, as previously described. First, a simple dummy variable was placed on the intercept. No significant effect was noted, with t values on these variables negligible. Second, simple dummy variables were placed on the price variables, in addition to the existing district dummy variable described above. The additions marginally raised the explanatory power of the model. Two features of the results are worth reporting.

First, as might be expected, price elasticities of supply were significantly higher (by 0.05) in the second sub-period (1980-84) than in the first sub-period (1975-79), with four exceptions. In North West Marovo, East Isabel, Savo and North Malaita, the differences in elasticity between sub-periods were less (being 0.043, 0.044, 0.046 and 0.042, respectively). This result indicates that the implementation of the freight subsidy scheme has slightly increased the level of responsiveness of producers to changes in copra prices.

The second result of note is that the imposition of the period dummy variable rendered the district price dummy variable insignificant in five instances: East Vella, North West Marovo, West Isabel, Savo and East Makira. There is no distinct pattern to these changes. Three of the districts were previously among those below average elasticities while two were above average. The changes demonstrate, however, that there are yet fewer districts with price elasticities of copra supply different from base after taking into account the effects of the freight subsidy.

5.6.5 Comparison with Irregularly-Supplying Districts

Analysis was undertaken for a further set of 24 districts in which copra producers have been irregular suppliers to the export market during the study period used above. (Irregularly supplying districts are defined as those for which there were no copra supplies for at least one quarter.) Because of the existence of censored data (a large number of the observations for the dependent variable were zero), a Tobit regression model had to be used (Tobin 1958) in order to avoid biased estimates.

Results are presented in Appendix 2.4 and summarised in Table 5.4. The explanatory power of the model was similar ($R^2 = 0.67$) and price elasticities of supply were generally of a similar magnitude to those described above for districts regularly supplying copra. For all but two districts, the elasticity estimate was 0.224, slightly above the previous estimates. It was not possible to determine whether this slight difference was statistically significant. This is because separate estimation procedures had to be used for each set of districts (as the programming capacity limit for Tobit estimation prevented the pooling of

Table 5.4

Estimated Model of Copra Supply by District:
Irregular Suppliers

Variable	Coefficient	t value
Intercept	-8.653	-2.36*
Copra export price	0.034	4.32**
Lagged copra exports	0.671	22.61**
Intercept dummy -		
North Central Choiseul	28.432	3.53**
East Choiseul	19.174	2.45*
West Malaita	59.771	6.82**
West Makira	57.389	6.62**
Price dummy -		
Wagina	-0.042	-2.38*
Tangarare/Wandere Bay	0.062	3.63**

$$\bar{R}^2 = 0.672$$

** Significant at one per cent level.

* Significant at five per cent level.

data from both sets of districts). The two districts for which price dummy variables were significant were outliers. Estimates of elasticities for Wagina and Tangarare/Wandere Bay (both zone 2 suppliers) were 0.107 and 0.395, respectively. Again, these divergences did not fit the hypothesis that variations in regional supply elasticities are caused by remoteness. The 22 districts for which elasticities were not significantly different included zones 1, 2 and 3 suppliers.

Two final points worthy of note concern differences in the results for the irregular supply districts compared with the regular suppliers. First, the coefficient of expectations is much lower (0.33), indicating a longer lag in response to expected price. Second, the dummy variable for the period during which the freight equalisation scheme was operating was found to be an insignificant explanator of copra supply. This indicates that the scheme has had less impact on quantities marketed by irregular copra supplying districts than those that have consistently supplied the export market.

5.7 CONCLUSION

In both Solomon Islands and Western Samoa, supply response to export price changes was found to be substantial although inelastic. Response appears at least as great, if not greater, as that in the Philippines, the world's largest exporter of copra. The inelasticity of market response was expected. Notwithstanding this confirmation, the finding of a substantial export supply response supports the expectation that copra market participants and producers are sensitive to price changes and respond to them despite their apparently limited capacity to do so. Finally, while some significant regional variations in supply responsiveness were observed in Solomon Islands, they did not appear to be great and did not accord with the hypothesis that remoteness is the main cause of these variations. The evidence on the effect of the freight equalisation scheme in Solomon Islands on levels of supply was unclear, but the scheme appears to have had some effect on those districts regularly supplying the export market.