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Household Expenditure Behavior and Consumption Growth Linkages in Rural Nampula Province, Mozambique

By

Maria Nita Dengo

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NOTE

This paper is a reprint of Maria Nita Dengo's Masters of Science thesis in the Department of Agricultural Economics at Michigan State University (MSU), under the same title. Ms. Dengo was identified as a candidate for graduate study in Agricultural Economics through the MSU Food Security in Africa Cooperative Agreement, and her studies were financed by AFGRAD (currently ATLAS). Ms. Dengo utilized the Nampula Smallholder Survey data set and conducted original analysis which we believe sheds light on the important issue of rural development both on and off the farm in Mozambique. With the eventual coming of peace, rural off-farm development will take on ever greater importance for the welfare of rural residents. We offer this thesis in unedited form in order to make a timely initial contribution to the debate in Mozambique on how best to promote rural off-farm development, and how to balance farm based with broader rural development projects. Like any serious work, this thesis raises as many questions as it answers. It should therefore be taken only as an opening of this debate and as a useful guide for important further research which needs to be done.

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Paulo F. Zucula
Vice-Minister
Ministry of Agriculture

Julio Massinga
Director
National Directorate of Agricultural Economics
Ministry of Agriculture

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Julio Massinga
Director
National Directorate of Agricultural Economics
Ministry of Agriculture, Mozambique

Raul Jorge G. Varela
In-Country Director, Food Security in Africa
Cooperative Agreement Activities in Mozambique
Department of Agricultural Economics,
Michigan State University

MOA/MSU RESEARCH TEAM MEMBERS

Paulo F. Zucula, Vice-Minister

Julio Massinga, Director

Higino Francisco De Murrule, Research Associate

Ana Paula Manuel Santos, Research Associate

Rui Manuel dos Santos Benfica, Research Associate

Mathias Isac Mugabe, Research Associate

Raul Jorge G. Varela, MSU In-Country Project Director

David Tschirley, MSU Analyst

Michael T. Weber, MSU Analyst

Paul Strasberg, MSU Graduate Research Assistant

Cynthia Donovan, MSU Graduate Research Assistant

HOUSEHOLD EXPENDITURE BEHAVIOR AND CONSUMPTION GROWTH LINKAGES IN RURAL NAMPULA PROVINCE, MOZAMBIQUE

By

Maria Nita Cau Dengo

A THESIS

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ABSTRACT

HOUSEHOLD EXPENDITURE BEHAVIOR
AND CONSUMPTION GROWTH LINKAGES
IN RURAL NAMPULA PROVINCE, MOZAMBIQUE

By

Maria Nita Cau Dengo

Understanding the dynamics of consumption expenditure patterns is recognized as an important tool in economic planning and policy analysis. This study reports the consumption expenditure behavior in rural Nampula Province, Mozambique, with special emphasis on the effects of cotton and cashew production and marketing activities on household consumption behavior and the potential derived consumption growth linkages.

Both tabular descriptive analysis and econometric estimation of semi-log Engels curves, are used to address these issues. Data is from a survey of 343 farm households in rural Nampula province.

Results of this analysis find that food expenditure is dominant, whatever the household income level and whichever the household production activity. Estimated average and marginal food budget shares are very high. Households pursue a strong subsistence strategy, with

significant large own food produced and consumed budget shares. Food expenditure elasticities are above 0.80.

As income rises, households tend to substitute one type of food for another. Households substitute away from cassava and towards cereals, fish and beans as income rises.

The impact of cotton on household consumption expenditure is similar to the impact of income, moving people away from own produced food and towards cash purchased food. Cashew surprisingly has little impact on household consumption patterns. Access to land reinforces household subsistence strategy.

Based on the model coefficient estimates and the estimated household average and marginal propensities to consume purchased goods, the study infers that support to smallholder cotton production has the potential to increase consumption growth linkages with local farmers and other sectors of the economy.

To my dauther,

Willie Ebenizário Chonguiça

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Any errors of omission and/or commission are solely mine.

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CHAPTER 1

INTRODUCTION AND STUDY CONTEXT

1.1 INTRODUCTION

Despite Mozambique's well-endowed and diversified resource base, the country's economic performance has been declining sharply since the early nineteen-eighties. The main reasons for this decline relate to the simultaneous incidence of a series of adverse economic and non economic factors. The key economic factors have been the highly centralized economic policies of Frelimo, the ruling party since independence in 1975. Non economic factors include the recurrence of drought and the 15 years of civil war, both of which have further damaged the already weakened economy.

These factors have had a severe adverse impact on the agricultural sector. This sector contributes about 40% to 50% of GDP, employs more than 80% of the labor force, and generates around 80% of the country's export earnings. More than 95% of all farmers are smallholders, of whom more than 60% are women (World Bank, 1992). The smallholder sector works approximately 80% of all cultivated land in the country.

To reverse the economic decline and restore minimum levels of consumption and income, the Government adopted in 1987 the Economic Rehabilitation Program (ERP) with International Monetary Fund (IMF) and World Bank (WB) support. The ERP is a structural adjustment program similar to others implemented in Sub-Saharan Africa (SSA), with special emphasis on price and market liberalization. It's aim is to reestablish an economic environment with adequate incentives for private economic agents, and thereby to stimulate broad based and sustainable economic growth.

Although phase one (1987-1990) of the ERP has been successfully implemented, and significant market liberalization measures have been taken, the magnitude of Mozambique's economic crisis is such that the attainment of self-sustaining economic growth still remains a long term objective to achieve (World Bank, 1992).

The rural smallholder sector, due to its large size, is key to sustainable economic growth. Hence polices that enhance agriculture's contribution to the national economy and that encourage linkages between smallholders and local and regional economies are crucial. These policies are especially important now, given the rural devastation caused by the war and the subsistence strategy that smallholders have adopted in response to widespread food and labor market failures (MOA/MSU/UA Research Team, 1992a).

1.2. RESEARCH OBJECTIVES

The principal goal of this study is to describe and statistically analyze the relationships between income and consumer demand in rural Nampula, in order to derive broad conclusions about potential rural growth linkages.

The study has three main objectives:

i) To understand the relationships between consumption and income in rural Nampula;

ii) To identify types of households, according to their demographic characteristics and engagement in selected activities, whose demand pattern suggests strong growth linkages to the local economy;

iii) To identify and draw broad conclusions regarding investment and policy priorities to promote local economic growth.

Given the current levels and sources of household income which determine the expenditure pattern, it is hypothesized that:

H(1). Households growing cotton in Monapo have relatively high cash budget shares. Hence their marginal propensities to consume commodities locally produced and with potential growth linkages is higher than the non-cotton growing households.

H(2). Households selling cashew in Monapo and Angoche have relatively high marginal propensities to consume non food commodities.

H(3). Household access to land reduces household cash expenditure in food in all three districts.

Empirical evidence reported particularly by the MOA/MSU/UA Research team and briefly presented below constitute the basis for formulating these hypotheses.

The data for this study were collected during June, July, and August, 1991, as part of the MOA/MSU/UA Food Security Project. A sample of 343 households was drawn selected from 15 villages from three districts in Nampula: Monapo, Angoche and Ribaue. Because Nampula reveals marked ecological differences from east to west, which in turn are reflected in changing agricultural patterns, the three districts were selected purposively to reflect the ecological and economic differences within the region. Within each district, the set of secure villages was identified, and a two stage sampling procedure was used. In the first stage, villages were randomly selected, and in the second households were randomly selected from these villages (MOA/MSU/UA Research Team, 1992b).

Each household was interviewed once during the data collection period. The survey instrument was designed to collect data on several aspects of the smallholder sector: household demographic structure,

patterns of use of family labor, access to and use of land, household participation in the market and the importance of cotton (MOA/MSU/UA Research Team, 1992b). The statistical results derived from this sample should not be extrapolated to all rural households, but to those in relatively secure areas, hence the use of terminology "rural Nampula" in this study should be understood in this context.

1.3 THE STUDY SETTING

Monapo, Ribaue and Angoche are alike in general but have interesting contrasts. A brief description of the study setting follows, based heavily on MOA/MSU/UA Research Team (1992a).

Perhaps the key characteristic of Monapo is the existence of cotton production and processing. Sixty percent of surveyed households cultivated cotton as a major cash crop in 1991. Ribaue produces basically food grains. Although cotton and cashew production contributed significantly to household income in the past, at the time the research was carried out, income from these crops constituted only a very small proportion of current household income. Angoche on the coast has fishing, cashew and food grains as important sources of household income.

All three districts are very poor, with household average annual net income of about MT 380,000 approximately US$ 190 in Monapo and Angoche. Ribaue has the lowest income among the three. Within each district, income is highly correlated with land holdings. Approximately 85% of household average net income in all three districts is derived from on-farm activities, of which about half is cash income in Monapo and Angoche. In Ribaue, about one quarter of on-farm income is cash.

Households pursue a strong subsistence strategy due largely to market failures. The proportion of staple food retained with respect to gross household income is 40% in Monapo, 38% in Angoche and 64% in Ribaue. Monapo has the lowest share of food sales, 6% of household income.

Cotton is an important cash crop in Monapo, contributing about 20% of gross household income and cashew sales are the second large source of on-farm cash income in Monapo. In Angoche food crops and cashew are important sources of cash income. Food sales account for almost one fourth of gross household income, most of this from peanuts and rice, followed by cashew sales with 14%. Although Ribaue has the highest proportion of food retained for consumption, still food sales are the most important source of cash farm income, accounting for 12% of gross household income. In Ribaue cashew and cotton sales contribution to household gross income is only 1,5%.

Household cash income as a proportion of total income is a crude indicator of household market integration. The level of households food market integration in rural Nampula is one of the lowest in sub-Saharan Africa. In rural Nampula households face high transaction costs associated with transport and risk costs aggravated by the war.

The structure of household income determines the household cash expenditure pattern. In all three districts the share of own food produced and retained for consumption is high relative to other SSA countries, revealing an overall orientation to a strong subsistence strategy. This implies generally weak linkages with the outside economy for most households. This household strategy may be seen as a response to the very low level of services and the widespread food market

failures in terms of high cost and frequently unavailable supplies for purchase.

1.4. LITERATURE REVIEW

Development strategies which strengthen the potential growth linkages of rural smallholders are not yet fully developed. However as reported by Haggblade, Hazell and Brown (1989), evidence from Asia suggests significant income and employment growth multipliers derived from production and consumption linkages. The issue is complex, and to fully address it would require the analysis of growth linkages derived from all factor and product markets. Under the current SSA socio-economic and institutional framework, consumption linkages account for about 80% of total agricultural growth multipliers.

Research based on consumption expenditure data shows that growth linkages derived from rural consumption expenditure pressure demand for locally produced commodities, which in general are labor intensive and generate second round effects of growth to the local economy with strong employment links. In general it is believed that demand for labor intensive goods decreases as income rises, suggesting that investment directed to low income households whose marginal propensity to consume labor intensive goods is high, may improve income distribution while at the same time contributing most to local economic growth.

This line of reasoning suggests that equity and maximized local economic growth may be complementary goals. But such a general statement must be evaluated with location specific analyses. In fact, the goals may be conflicting. Too, growth multipliers are only effective where there is an elastic supply of the commodities whose demand increases. Investment directed to low income households may

jeopardize long term development in part because low income households tend to have low saving rates. Hence there may be a trade off between equity and growth which should be taken into account.

The importance of rural consumption linkages for economic development is centered on the following questions: which households exhibit expenditure patterns with potential to cause higher second rounds of growth and promote local and regional development? What household characteristics have strong impacts on local development?

Household characteristics which are associated with strong linkages are open to policy influence. For example, if cotton growers tend to have stronger growth linkages, then strategic policies to expand cotton growing schemes so more households could participate should be appropriate.

Households whose marginal propensity to consume goods with strong potential growth linkages would then be targeted for public investment and strategic policy. Also for households with weak linkages, policies to improve their income and consumption status are especially important.

As noted by Hazell and Roell (1983) this partial approach has some drawbacks which should be taken into account:

(a) expenditure patterns *per se* do not determine the magnitude of income and employment generated through growth linkages. The level of the multipliers depends on the elasticity of supply of the products demanded which in turn depends on the level of development in the area.

(b) investing in low income households with high marginal propensities to consume locally produced goods or services may jeopardize long term development, because these households tend to have low savings rates.

(c) if expenditure patterns indicate that grain production is strongly associated with growth linkages (which is generally typical in poor economies), then to expect growth linkages requires that grain supply be elastic. This presupposes markets operating with neither barriers to entry nor price rigidities.

Household consumption decisions are determined by household income, the price of goods and services and a set of other social and economic factors each household member as an individual faces. The complexity of the consumption and expenditure decisions that households undertake as both producing and consuming units in rural Nampula are explained and schematically analyzed in MOA/MSU/UA Research Team, 1992b (p21, 22). Consumption and expenditure patterns in rural Nampula are yet not well known. Given Mozambique's economic and social setting, characterized by fragile economic activity, deeply influenced by market instability and the majority of the population living in absolute poverty[1], we expect household consumption expenditure patterns to be strongly influenced by the household engagement in cotton or cashew activities.

Why may growing cotton or selling cashew determine different consumption expenditure patterns? The cash income obtained through these activities is obviously positively related to household good purchases. Furthermore in some cases the cotton and cashew structure of incentive schemes directly determines the household access to selected commodities.

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[1] Household is in "absolute poverty" if its members have an inadequate nutritional standard, even when the household is spending more than 60% of it's total income in food (Green R. , 1989).

A brief overview of the differences between cashew and cotton institutional support may help to understand the role of those crops in influencing household consumption expenditure patterns. Historically cotton and cashew have been important agricultural smallholder cash crops. Before independence (1975) cotton was produced with both forced labor and coerced production on smallholder farms. The state determined the areas to be planted, guaranteed the input supply, and supervised and controlled the entire production management process. In contrast to cotton, cashew production and management has been less controlled, i.e. households produced and marketed cashew based on their market price expectations and on the availability of consumer goods in the market.

The cashew marketing policy has historically relied heavily on the provision of consumer goods to households selling cashew. Local traders played an important role in cashew marketing. They guaranteed the provision of consumer goods, mainly cloth and footwear, sugar and illumination oil to households selling cashew.

After independence cotton production fell sharply as the institutional framework collapsed. Cashew marketing also declined as the rural trade system broke down.

The current cotton policy is based on large private companies associated with the government. The company is responsible for cotton production, processing and marketing in selected areas and provides support for households growing cotton in their area of influence. This support includes the supply of production inputs and the provision of extension and market services. The private companies also provide hired labor opportunities.

Given the nature of the institutional support to cotton and cashew production and marketing, we hypothesize that these activities will have strong effects on consumption and expenditure patterns, increasing the linkages of these households with the local economy.

The importance of consumption linkages as income rises in rural areas of LDCs has been widely studied as one key determinant of rural development. A rise in per capita income in low-income countries is associated with a substantial increase in the demand for food. Typically the income elasticity of demand for food is about 0.8 or even higher (Mellor, 1966). Household marginal propensities to consume are important in the analysis of consumption expenditure linkages, and are an important part of the story of growth and development. Questions to be considered include whose income is rising? For which goods and services does demand most increase with rises in income? And is the policy and institutional framework setting appropriate to promote growth?

Knowledge of consumption patterns is recognized as one of the major contributors to economic planning and policy analysis in Africa. Understanding the nature and dynamics of consumer demand may be a quite valuable tool in policy and project design. As reported by King and Byerlee (1977), research on the relationships between income distribution and the pattern of consumer demand, and their implications for growth and employment in the total economy, has been growing and consumption based linkages are considered an important factor in the development process.

The pattern of consumption expenditure is of particular interest because it varies with income. Hence, income distribution has an important influence on the pattern of expenditure, which in turn may

affect employment in sectors adjusting to the demand changes, causing second round effects on the demand pattern (Mellor, 1977).

Hazell and Roell (1983) find in Malaysia and Nigeria that households on the larger farms have the most desired expenditure patterns for stimulating secondary rounds of growth in the local economy, and conclude that those households may be appropriate targets for public investment to increase agricultural output. In the study area in Malaysia the average household spends 18% of its total budget on locally produced non-food goods and services, and allocates 37% of its marginal expenditure to services and non-food commodities. Similar indicators for the study area in Nigeria are relatively lower. This is expected, since this area has a less developed economy than the one in Malaysia, hence relatively low living standards and consequently households have fewer commodities to share among their members. This suggests that the development level of the region, as well as the institutional setting are important determinants of the size and incidence of consumption linkages.

King and Byerlee in their study in Sierra Leone (1977), found that the marginal propensity to consume subsistence goods drops dramatically as income increases. In the lowest income households, almost 70% of any increase in expenditure is allocated to subsistence food consumption while only 29% of incremental expenditures for the highest income households is allocated to subsistence food. Furthermore, King and Byerlee classify consumption patterns in Sierra Leone, in 1977, as quite labor intensive since 84% of all increases in consumer expenditures were on goods produced in small-scale agricultural, fishing, industrial and service sectors. It has been noted that most of the agricultural commodities for which demand expands rapidly with rising rural income,

are those which are labor intensive (Mellor, 1966), hence this provides a large market for farmers and absorbs more labor.

Consumption expenditure patterns vary with household characteristics. Households are not homogeneous, and the differences among them affect consumption patterns (Cellis and Bliven, 1991). Deaton and Case (1985) note that households in Sri Lanka and Indonesia with more adults have expenditure patterns consistent with a higher standard of living than their per capita outlay would suggest.

The following household characteristic effects were reported by Hazell and Roell (1983): In Nigeria family size has a significant negative effect on food budget shares, except for eggs and dairy products; the older the household head, the greater the share of the budget allocated to non locally produced food and the more educated the household head the more important livestock products, clothing and footwear, transport, education and health, and personal services and entertainment in the budget. Similar but less strong results were found in Malaysia.

The poorest households tend to have large, young families, with limited potential to earn additional income and significant child care demands. Similarly, female headed households are often poor and more vulnerable, hence the expected evidence of a negative relationship between those household characteristics and household per capita consumption. Consequently, these households are expected to fall under the category of low income households which tend to allocate a high proportion of incremental incomes to locally produced food.

Cellis and Bliven (1991), found that in rural Zambia, the level of education of the head of household affects cash purchases of food. As the level of education increases, so does the share of cash purchased

food. This suggests different farm labor allocation, as off farm income opportunities rise. Furthermore, Cellis and Bliven found that the household revenue source matters in determining the household's consumption patterns. Households with high revenue proportions from off-farm income tend to have large cash expenditure shares. In Zambia, as the household's revenue share from animal husbandry increases, the maize expenditure share decreases and the meat and gathered food budget shares rises.

Although the importance of consumption expenditure analysis and the related growth linkages effects is clear, it should be recognized that it is only part of the growth linkages story. A more complete picture of the role of linkages in economic growth requires the analysis of both urban and rural consumption, other input-output and factor market linkages and a deep comprehension of the institutional arrangements within and through which resources are allocated.

1.5 THESIS ORGANIZATION

The paper has five chapters including this introduction. The following chapter defines the most important concepts to be used throughout the study, and describes and conducts tabular analyses of consumption expenditure patterns and household characteristics. Budget shares are presented by commodity group and income class. Chapter 3 deals with the estimation of Engels curves, the function which captures the relationship between the demand for a good or service and total income. A brief discussion of the selected functional form is presented and model results are reported. Chapter 4 explores the potential consumption growth linkages derived from the model. The overall results

of the study and possible policy implications are summarized in the final chapter.

CHAPTER 2

CONSUMPTION EXPENDITURE PATTERNS

2.1 INTRODUCTION

In order to have a broad outline of the differences among households, and of the impact of household characteristics on consumption expenditure patterns, descriptive analysis on selected variables was performed. Special emphasis is given to highlighting differences between households with respect to their demographic characteristics, income levels, and engagement in particular activities like cotton or cashew production. The objective is to identify particular characteristics which may influence household consumption expenditure. Before addressing these issues, let's first broadly define the most important concepts used in this study:

Consumption expenditure is used as a proxy for net household income[2], and is defined as the value of consumed production plus total household annual cash expenditure. Annual cash expenditure is the aggregate value of household cash expenditures in hungry and harvest seasons. The choice of consumption expenditure as a proxy for income is recommended as it is considered the appropriate indicator of permanent income (Friedman, 1957) and empirical research has often reported income data to be less consistent than household expenditure data (Hazell and Roell, 1983).

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[2]Net household income is defined as the sum of: Value of own production consumed + Value of household production sold + Wages from off-farm employment - Value of production inputs.

Income classes are defined based on quartiles[3] of annual per capita consumption expenditure (PCCE), rather than total household expenditure.

Budget shares are the ratios between expenditure on a good/service or group of goods/services and total expenditure. Because they are dimensionless, they can be compared across households, across time, and across regions without the need to take into account prices and exchange rate conversions. The analysis of consumption expenditure behavior is done using budget shares. Budget shares are recommended variables for any demand analysis. Variables representing quantities consumed are more generally used in nutrition and detailed poverty studies.

2.2 HOUSEHOLD DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

Despite significant inter-household heterogeneity the demographic structure of the "typical" sample household in the three districts is quite similar. Most families (66%) in Ribaue have two or more children. In Monapo and Angoche the proportion of households with two or more children are respectively about 48% and 39%.

Comparative analysis among different types of households shows that households growing cotton are more likely than other households to have two or more children. In Monapo among cotton growing households, 65% have two or more children, while this proportion is only 23% among households not growing cotton. Relatively large families tend to have large numbers of children. Households without children are about 31% in Monapo, 26% Angoche, and 20% in Ribaue. Tables A1 - A7 in Appendix A

[3] By definition, households are equally spread among the four quartiles, in ascending order of consumption expenditure.

show the frequency distribution of households according to their size and number of children.

There are no more than two elderly[4] people per household. In Monapo 10% of surveyed households have one or two elderly people. In Ribaue and Angoche this proportion is respectively 5.7% and 7.2%. The dependency ratio[5] is largely determined by the number of children in the household. The average dependency ratio is 0.99, 1.00 and 0.85 in Monapo, Ribaue and Angoche respectively. Among cotton growing households relatively higher dependency ratio is found: 1.1 in Monapo and 1.02 in Ribaue.

The annual average per capita consumption expenditure (PCCE) is about 75,000 Meticais, approximately US$ 50[6] in Monapo and Angoche, and 25% lower in Ribaue. Thus it is estimated that the income per capita of about three fourths of the population surveyed in all three districts falls below US$ 100. This result reveals a picture of general acute poverty in rural areas, even though incomes may be underestimated, since some households reported zero expenditure in some commodity expenses and the recorded products may not be exhaustive. Zero expenditures may appear for more than one reason: the household may never consume that good or service, or the household did not consume that good or service during the recall period. The infrequency of certain expenses may cause some recall problems too.

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[4] Elderly people are defined as adults over 65 years old.

[5] Dependency ratio is defined as the number of children up to 10 years old plus elderly people divided by number of adults aged 18 to 65. This differs from some measures of dependency ratio, indicating the number of dependents per adult in the family.

[6] USD 1.00 = Meticais 1450,00 (Average for 1991. World Bank,1992)

In all three districts both household size and the dependency ratio decline as income per capita rises. One probable explanation of this result may be that relatively large households are associated with large numbers of children, which have relatively lower productivity, and hence the inverse relationship between income per capita and household size in these households. On the other hand, the low variability of these indicators reflect general similarities among rural households. Economic and demographic characteristics of the households in each income class are shown in Tables 2.1, 2.2 and 2.3.

Table 2.1 HOUSEHOLD ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS BY EXPENDITURE QUARTILE IN MONAPO DISTRICT

Expenditure Quartile	Mean Annual PCCE*	Upper PCCE* bound	Lower PCCE* bound	Average household size	Dependency ratio
	-------- Meticais --------				
1	22,341	31,770	5,439	4.4	1.497
2	47,826	63,419	35,721	4.7	1.014
3	76,130	96,826	63,791	4.2	1.106
4	149,612	289,078	99,250	2.5	0.419
District Mean	76,150			3.9	0.980

*PCCE: Per capita consumption expenditure
Source: Nampula Smallholder Survey, 1991

The data suggest some income differences among districts, particularly for Ribaue, were the mean consumption expenditure per capita is at least one fourth lower than in Monapo and Angoche. Average PCCE is relatively higher in the districts with cashew production (Angoche and Monapo), and cotton production (Monapo).

Table 2.4 shows the PCCE and the TCE distribution among cotton and non cotton growing households. Comparative analysis of the average

Table 2.2 HOUSEHOLD ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS BY EXPENDITURE QUARTILE IN RIBAUE DISTRICT

Expenditure Quartile	Mean annual PCCE*	Upper PCCE* bound	Lower PCCE* bound	Average household size	Dependency ratio
	------- Meticais -------				
1	23,808	32,568	6,940	6.2	1.300
2	40,991	49,099	32,983	5.0	1.043
3	58,746	72,650	49,369	5.4	1.043
4	108,263	181,142	75,265	3.4	0.620
District Mean	56,865			5.0	1.010

*PCCE: Per capita consumption expenditure
Source: Nampula Smallholder Survey,1991

Table 2.3 HOUSEHOLD ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS BY EXPENDITURE QUARTILE IN ANGOCHE DISTRICT

Expenditure Quartile	Mean annual PCCE*	Upper PCCE* bound	Lower PCCE* bound	Average household size	Dependency ratio
	------ Meticais -------				
1	29,451	39,156	17,715	5.6	1.468
2	51,123	62,739	40,994	3.9	0.685
3	76,735	95,250	65,028	3.5	0.694
4	157,645	369,993	96,603	3.0	0.553
District Mean	78,446			4.0	0.853

*PCCE: Per capita consumption expenditure
Source: Nampula Smallholder Survey,1991

income among selected groups of households shows that households growing cotton in Monapo district surprisingly do not have higher mean PCCE than the households who do not grow cotton.

Table 2.4 MEAN PCCE AND TCE BY QUARTILES IN MONAPO FOR COTTON AND NON-COTTON GROWING HOUSEHOLDS

Expenditure Quartiles	PCCE[a]		TCE[b]	
	Cotton n = 63	No Cotton n = 41	Cotton n = 63	No Cotton n =41
	---------- Meticais ----------			
1	24,928	20,122	124,195	89,470
2	47,760	44,267	242,443	142,449
3	71,246	90,108	340,581	236,319
4	130,039	172,721	384,226	350,592
Overall Mean	67,791	89,009	273,548	217,108

(a) PCCE: Per capita consumption expenditure
(b) TCE: Total consumption expenditure

Source: Nampula Smallholder Survey, 1991

However, a positive income effect associated with growing cotton, is reflected for these households in the two lowest income quartiles in Monapo. The mean PCCE of the households growing cotton in the first and second quartiles in Monapo district is 24% and 8% respectively higher than the PCCE for non cotton growing households in the same quartiles. Furthermore, total household consumption expenditure (TCE) is much higher for cotton growers than for non cotton growers, especially in the lowest quartiles.A possible explanation for the relatively lower mean PCCE among cotton growing households in the third and fourth quartiles, is associated with the fact that households growing cotton tend to have larger families, with larger numbers of children. The dependency ratio shows that for every adult member in cotton growing households there

are 1.1 dependents, while in non-cotton growing households this relation is 1.0 to 0.78. The dependency ratio difference is larger in the third quartile.

Inter distrital PCCE distribution among growing and non-growing cotton households is shown in tables 2.5 and 2.6.

TABLE 2.5 HOUSEHOLD PCCE* DISTRIBUTION AMONG COTTON AND NON-COTTON GROWING HOUSEHOLDS IN MONAPO AND RIBAUE

Expenditure Quartile	Cotton		Non-Cotton	
	Monapo n=63	Ribaue n=19	Monapo n = 41	Ribaue n = 74
	--------- Meticais ---------			
1	24,928	21,829	20,122	24,291
2	47,760	41,984	44,267	40,933
3	71,246	63,429	90,108	57,858
4	130,039	121,251	172,722	106,696
overall mean	67,791	58,846	89,009	56,352

*PCCE: Per capita consumption expenditure
Source: Nampula Household Survey, 1991

The above results support the hypothesis that, cotton has a positive income effect in Monapo[7].

Tables 2.7 and 2.8 show the income distribution by quartiles in Monapo and Angoche among households selling and those not selling

[7] Due to very poor cotton performance associated with institutional collapse of the Secretariat of State for Cotton (SEA) in Ribaue, the cotton issue is not examined there.

TABLE 2.6 HOUSEHOLD TCE* DISTRIBUTION AMONG COTTON AND NON-COTTON GROWING HOUSEHOLDS IN MONAPO AND RIBAUE

Expenditure Quartile	Monapo		Ribaue	
	Cotton	Non-Cotton	Cotton	Non-Cotton
	--------- Meticais ---------			
1	124,195	89,470	154,005	146,941
2	242,444	142,449	259,815	186,362
3	340,581	236,319	358,441	304,226
4	384,226	350,592	379,004	349,869
Mean	273,548	217,108	288,185	244,878

*TCE: Total Consumption Expenditure

Source: Nampula Smallholder Survey, 1991

cashew. We hypothesized that cashew production increases growth linkages regardless of its impact on income in Monapo and Angoche[8]. Comparative analysis of income distribution among households selling cashew and those who do not, show that TCE and PCCE are higher for the households who sold cashew in Monapo and Angoche. Mean PCCE is about one fourth and one third higher in Angoche and Monapo respectively for cashew selling households.

The above statistical results do support consistently the hypothesis that cashew production has a positive effect on household income. Hence we expect these households to exhibit consumption expenditure patterns consistent with relatively high cash budget shares. To complement the analysis of income distribution, Gini coefficients on TCE have been calculated for the three districts and have the following values: 0.361, 0.318 and 0.376 for Angoche, Ribaue and Monapo

[8] Ribaue is not considered because of the pest problem which destroyed the cashew harvest.

TABLE 2.7 PCCE[a] AND TCE[b] DISTRIBUTION AMONG CASHEW AND NON-CASHEW SELLING HOUSEHOLDS IN MONAPO

Expenditure Quartiles	PCCE[(a)]		TCE[(b)]	
	Cashew	Non-Cashew	Cashew	Non-Cashew
	-------- Meticais --------			
1	23,426	21,081	109,534*	86,941*
2	51,663*	44,878*	232,986	235,130
3	80,033*	72,772*	302,290	291,241
4	168,045*	125,603*	390,828	319,167
Overall Mean	83,525	67,550	268,840	236,704

(a) PCCE : Per capita Consumption Expenditure
(b) TCE : Total Consumption Expenditure
* : Significant at $\alpha = 0.001$
Source : Nampula Smallholder Survey, 1991

TABLE 2.8 MEAN PCCE[a] AND TCE[b] DISTRIBUTION AMONG CASHEW AND NON-CASHEW SELLING HOUSEHOLDS IN ANGOCHE

Expenditure Quartiles	PCCE[a]		TCE[b]	
	Cashew	Non-cashew	Cashew	Non-Cashew
	-------- Meticais ---------			
1	34,520*	24,706*	189,996*	101,221*
2	53,010*	44,434*	208,706*	139,944*
3	83,814*	71,347*	284,772	261,579
4	168,386*	132,461*	470,842	394,597
Overall Mean	85,747	65,236	290,361	228,530

(a)PCCE : Per Capita Consumption Expenditure
(b) TCE : Total Consumption Expenditure
* : Significant at $\alpha = 0.001$
Source : Nampula Smallholder Survey, 1991

respectively. Figures 2.1, 2.2 and 2.3 show the associated Lorenz curves.

These coefficients reflect typical levels of inequality in income distribution in rural areas of SSA. This pattern is expected in Nampula rural areas, where farmers households have similar production practices.

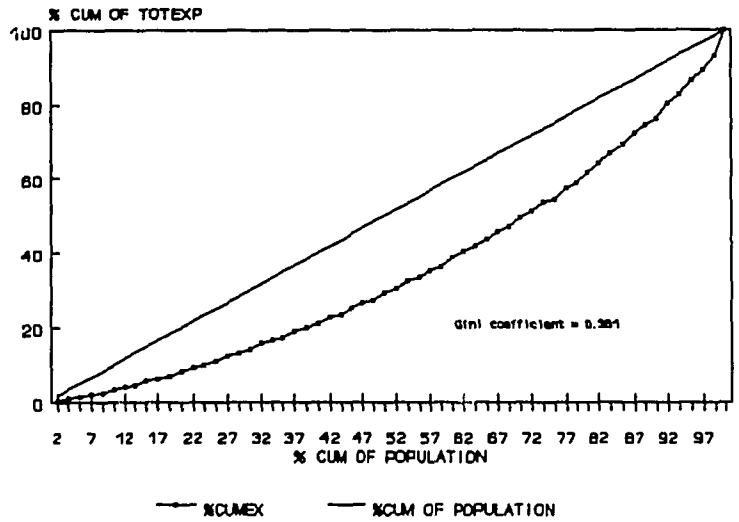

FIGURE 2.1 LORENZ CURVE, ANGOCHE

Source: Nampula Smallholder Survey, 1991

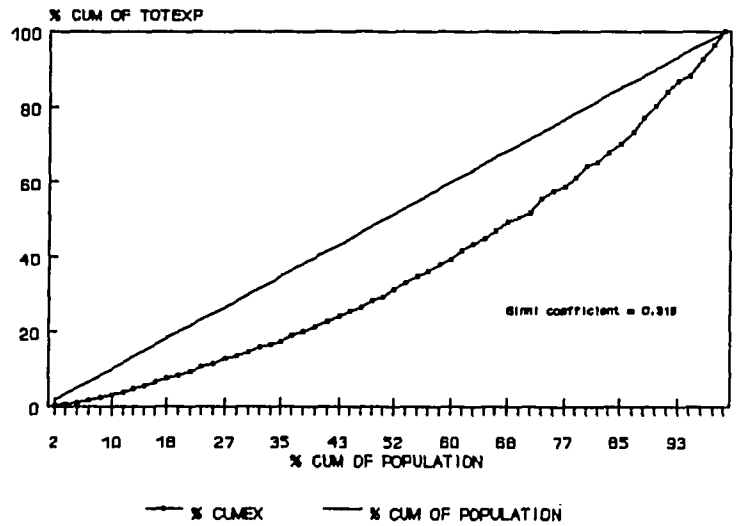

FIGURE 2.2 LORENZ CURVE, RIBAUE

Source: Nampula Smallholder Survey,1991

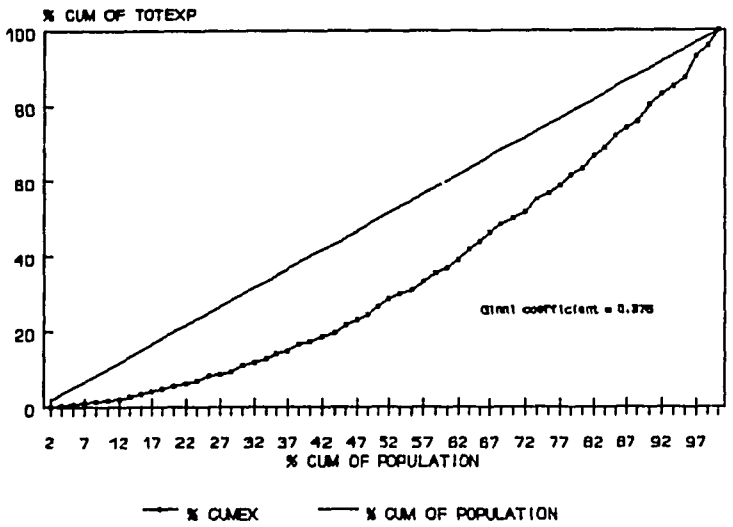

FIGURE 2.3 LORENZ CURVE,MONAPO

Source: Nampula Smallholder Survey, 1991

Income inequalities in Monapo and Angoche are slightly more pronounced then in Ribaue. King and Byerlee estimate a gini ratio of 0.32 for rural Sierra Leone in 1977, and in a recent study Abdoulaye Fall (1992) found gini coefficients ranging from 0.31 to 0.51 in rural Senegal.

2.3 RELATIONSHIPS BETWEEN HOUSEHOLD TYPE AND CONSUMPTION EXPENDITURE PATTERNS

Sets of eight mutually exclusive and exhaustive commodity groups have been created, including all food and non food expenditures. Table 2.9 shows the average budget share[9] for each commodity group by district.

As expected, expenditures on food are very high, above 70% of total expenditure in all three districts. This result reveals the level of absolute poverty throughout rural areas. Cereals, beans and cassava

[9] Shares are means calculated from individual household shares.

TABLE 2.9 MEAN HOUSEHOLD EXPENDITURE SHARE BY EXPENDITURE CATEGORY IN MONAPO, RIBAUE AND ANGOCHE

Expenditure Category	Monapo	Ribaue	Angoche
	------- Budget shares --------		
Food	0.801	0.832	0.747
	(0.13)	(0.13)	(0.14)
Cereals	0.176	0.338	0.141
	(0.16)	(0.19)	(0.11)
Beans	0.069	0.128	0.037
	(0.08)	(0.11)	(0.05)
Cassava	0.330	0.229	0.249
	(0.20)	(0.16)	(0.13)
Fish	0.106	0.033	0.206
	(0.09)	(0.05)	(0.17)
Meat	0.028	0.043	0.020
	(0.05)	(0.08)	(0.05)
Other foods	0.092	0.060	0.090
	(0.11)	(0.08)	(0.08)
Non Food	0.199	0.168	0.253
	(0.14)	(0.13)	(0.11)
Cloth & Footwear	0.099	0.068	0.103
	(0.08)	(0.08)	(0.08)
Education & Health	0.002	0.015	0.017
	(0.01)	(0.02)	(0.04)
Other non food	0.098	0.084	0.134
	(0.10)	(0.09)	(0.11)

Note : Values in parentheses are the standard deviation.

Source: Nampula Household Smallholder survey, 1991

constitute 58% of total household food expenditures in Angoche, 72% in Monapo, and 84% in Ribaue. Expenditure on cassava is relatively higher in Monapo (33%), and about one fourth of total expenditure in Ribaue and Angoche. As expected, Angoche has the highest mean budget share for fish, constituting the third major component of household consumption expenditure in Monapo and the second in Angoche. Non food expenditure shares range from about 17% in Ribaue to 25% in Angoche. Education and health budget shares are very low, around 2% in each district. This

reveals the large deficiency in the provision of these services in rural areas.

The analysis of budget shares by income class can provide insights on the pattern of expenditures on luxuries and necessities. Luxuries are goods or services whose budget share rises with income, while budget shares for necessities fall with increases in income. Figure 2.4 illustrates the average food budget shares by income class (PCCE quartiles) in Monapo, Ribaue and Angoche.

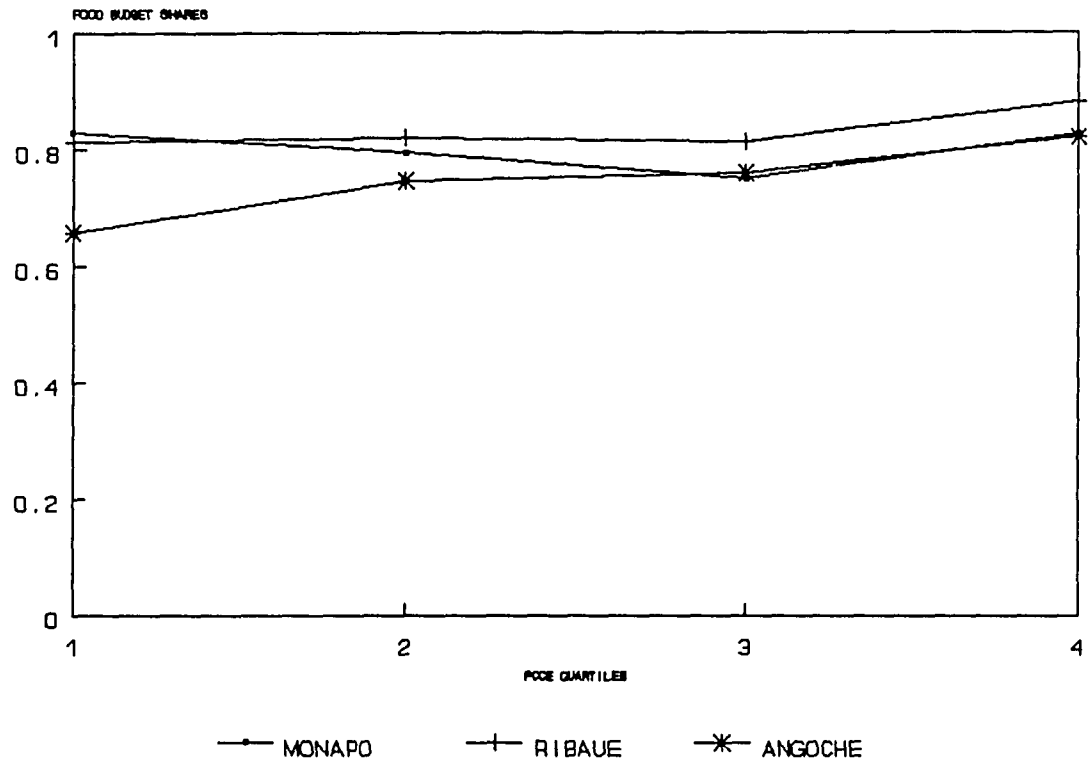

FIGURE 2.4 TOTAL FOOD BUDGET SHARE BY PCCE QUARTILES IN MONAPO, RIBAUE AND ANGOCHE

Source: Nampula Smallholder Survey, 1991

The food budget share is dominant in all three districts, and there is no significant change on total food budget share as PCCE rises in Monapo and Ribaue. In Angoche the average food budget share rises

from 66% in the lowest quartile to 82% in the highest. This increase is not expected despite the great poverty.

There is quite large food budget shares variation among households in the same income class (quartiles) as shown by the standard deviation in relation to its mean. Table 2.10 and Figures 2.5, 2.6 and 2.7 show the demand patterns for selected commodities by income class for each district.

Given the general situation of acute absolute poverty, and widespread market shortages, demand patterns for some basic commodities like cereals in Monapo and Ribaue, and cereals and fish in Angoche, are positively related to income. However, as expected, cassava budgets shares decline as income rises in all three districts, from 48% to 27% in Monapo, from 26% to 19% in Ribaue, and from 27% to 20% in Angoche. Fish budget shares rise with income in all districts, though they do so most strongly in Angoche. Overall, the data indicate that households tend to move towards better diet patterns as they become relatively better off.

The budget share pattern for other non-food items, which includes among others soap, tobacco, and some durable items (radio), as a complement to total food expenditure shares, tend to decline as income rises in Angoche. Probable economic explanation for this behavior is as mentioned above, the level of poverty and the deficient commodity supply. The mean cloth and footwear budget share ranges from 7% to 11%, and is almost equally distributed among households in different income classes.

TABLE 2.10 MEAN SELECTED BUDGET SHARES BY PCCE QUARTILE IN MONAPO RIBAUE AND ANGOCHE

Expenditure Category	Monapo				Ribaue				Angoche			
	1	2	3	4	1	2	3	4	1	2	3	4
	----- % of Total Expenditure by PCCE* Quartile ----											
Food	83	80	75	83	82	82	81	88	66	75	76	82
	(14)	(13)	(17)	(10)	(15)	(15)	(12)	(9)	(15)	(11)	(13)	(10)
Cereals	9.1	18	19	23	31	34	30	40	11	16	13	16
	(11)	(15)	(15)	(18)	(18)	(21)	(16)	(22)	(11)	(11)	(9)	(13)
Beans	9.1	5.3	6.2	7.3	11	13	15	13	3	6	3	4
	(9)	(5)	(4)	(9)	(7)	(11)	(14)	(11)	(3)	(6)	(2)	(5)
Fish	8.8	12	11	11	4.2	2.1	2.3	5	14	18	23	29
	(8)	(8)	(8)	(9)	(6)	(2)	(2)	(8)	(13)	(12)	(19)	(19)
Cassava	48	36	23	27	26	25	21	19	27	25	27	21
	(20)	(19)	(14)	(19)	(16)	(17)	(14)	(15)	(13)	(13)	(13)	(12)
Non-Food	17	20	25	17	18	18	19	12	34	25	24	18
	(14)	(13)	(17)	(10)	(15)	(15)	(12)	(9)	(15)	(11)	(13)	(10)

* PCCE : Per capita consumption expenditure
Note : Values in parentheses are standard deviations

Source : Nampula Smallholder Survey, 1991

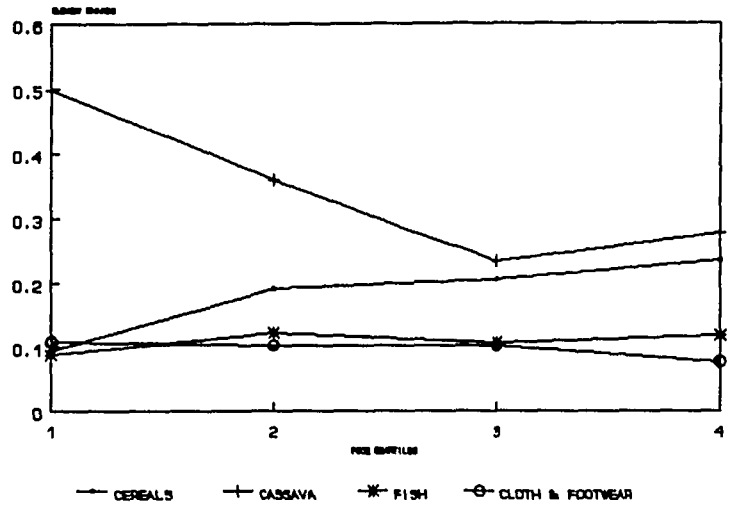

FIGURE 2.5 MEAN SELECTED BUDGET SHARES BY PCCE QUARTILES IN MONAPO

Source: Nampula Smallholder Survey, 1991

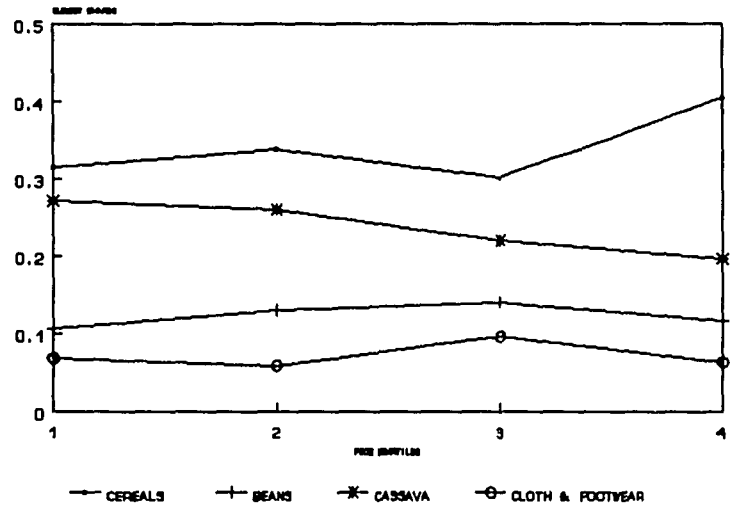

FIGURE 2.6 MEAN SELECTED BUDGET SHARES BY PCCE QUARTILES IN RIBAUE

Source: Nampula Smallholder Survey, 1991

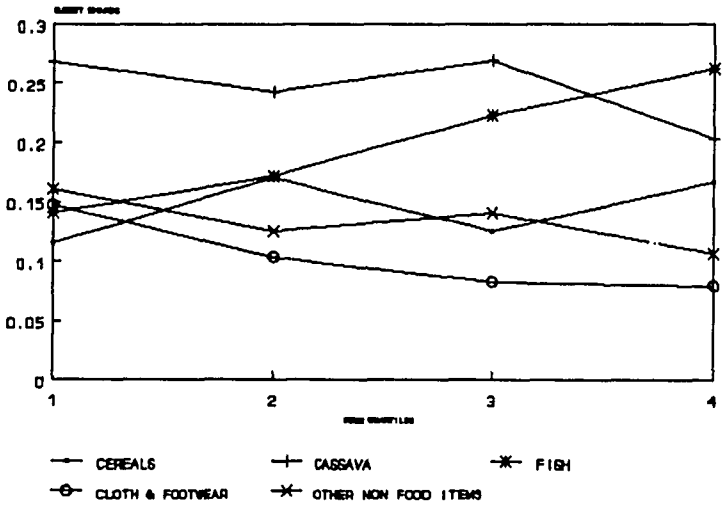

FIGURE 2.7 MEAN SELECTED BUDGET SHARES BY PCCE QUARTILE IN ANGOCHE

Sorce: Nampula Smallholder Survey, 1991

Table 2.11 presents the average budget shares for cotton and non-cotton growing households in Monapo. The analysis of expenditure shares across households who grow cotton and those who do not shows that in Monapo, cotton growing households have a relatively lower food budget share. The mean expenditure share for other non-food items is about 64% higher for cotton growing households than for those who did not grow cotton.

Household PCCE of cotton growers is not higher, on average. It is higher, though, in the lower income classes (Table 2.4). Cotton growers are neither as poor on the low end, nor as "rich" on the high end, as compared to non-cotton growers. Household TCE is much higher for cotton growers in all income classes. If we observe the mean cassava expenditure share by income class (PCCE quartiles) among cotton growing and non-growing households, the latter have cassava expenditure share about 50% higher in the first and second PCCE quartiles than the cotton growers, and they have a strong decrease in cassava share in the third

TABLE 2.11 MEAN HOUSEHOLD EXPENDITURE SHARES BY EXPENDITURE CATEGORY AMONG COTTON AND NON-COTTON GROWING HOUSEHOLDS IN MONAPO

Expenditure Category	Monapo	
	Cotton	No Cotton
	---- Expenditure shares ----	
Food	0.765	0.856
Cereals	0.185	0.162
Beans	0.069	0.071
Cassava	0.294	0.385
Fish	0.115	0.091
Meat	0.031	0.023
Other Food	0.071	0.124
Non Food	0.235	0.144
Cloth & Footwear	0.112	0.079
Education & Health	0.002	0.002
Other non Food	0.121	0.063

Source : Nampula Smallholder Survey, 1991

and fourth quartiles. This result may be explained by the fact that cotton growers in the lowest PCCE quartiles, choose to allocate some land to cotton production. Hence for these households cassava production may be associated with a relatively higher opportunity cost than cotton production. Non-cotton growing households with larger cassava budget shares in the lowest PCCE quartiles may be following a strong subsistence food security strategy. Cassava is the household food security crop, particularly in dry areas. Table 2.12 presents mean expenditure shares for cashew and non cashew selling households. The similarity of consumption expenditure patterns across households who sold cashew and those who did not is quite surprising. Average food budget shares are relatively lower in non-cashew selling households in Monapo and Angoche. We expected budget share differences between these

household subgroups for two reasons. First, the institutional aspects of cashew marketing, as it had historically been conducted, encouraged the purchase of consumer goods. Second, we demonstrated that cashew households have significantly higher incomes than non-cashew households, and thus expected income induced changes in expenditure behavior by those producing cashew.

TABLE 2.12 MEAN HOUSEHOLD EXPENDITURE SHARES AMONG CASHEW SELLING AND NON-SELLING HOUSEHOLDS BY EXPENDITURE CATEGORY IN MONAPO AND ANGOCHE

Expenditure Category	Monapo		Angoche	
	Cashew	No Cashew	Cashew	No Cashew
Food	0.822	0.775	0.775	0.696
Cereals	0.184	0.167	0.164	0.100
Beans	0.062	0.079	0.044	0.024
Cassava	0.362	0.292	0.259	0.229
Fish	0.095	0.118	0.182	0.246
Meat	0.038	0.016	0.026	0.011
Other Food	0.081	0.103	0.090	0.086
Non Food	0.178	0.225	0.225	0.304
Cloth & Footwear	0.089	0.111	0.106	0.097
Education & Health	0.002	0.002	0.012	0.026
Others non Food	0.087	0.112	0.107	0.181

Source: Nampula Household Survey,1991

The hypothesis that due to the way marketing of cashew is run, cashew selling households would have access to a larger array of goods to purchase and/or exchange for cashew, is shaken. The data does not suggest differences for cloth and footwear expenditure shares between the households growing cotton and those selling cashew. Total non-food shares are actually higher for non-cashew households. These results require further research.

Food budget shares grouped by source are given in Table 2.13. More than 50% of total consumption expenditure is allocated to own household food production in Monapo and Ribaue. A slightly lower proportion was found in Angoche (48%). Cash food expenditures shares are about one fourth in Monapo, 35% in Angoche and in Ribaue are less than 10% of total food budget share. The pattern of food expenditure shares by source reveals a high level of subsistence good consumption, most markedly in Ribaue, related to the low degree of diversification of agricultural activities in rural areas and widespread imperfection in food markets.

TABLE 2.13 MEAN HOUSEHOLD FOOD EXPENDITURE SHARES BY SOURCE OF FOOD IN MONAPO, RIBAUE AND ANGOCHE

Food Expenditure Category	Monapo	Ribaue	Angoche
Consumed own production	0.589	0.751	0.479
Cash purchases	0.211	0.082	0.267
Total food	0.801	0.832	0.747

Source: Nampula Smallholder Survey,1991

Comparative analysis in Table 2.14 between households growing and not growing cotton in Monapo, reveals as expected, a relatively low own food expenditure share in households growing cotton.

Comparative analysis in Table 2.15 shows that among households selling cashew, the cash food expenditure share is relatively higher in the households who did not sell cashew in Monapo. This result requires further investigation.

The food budget shares by source for Angoche district with a relatively strong cashew industry, suggest that selling cashew may not

TABLE 2.14 MEAN HOUSEHOLD FOOD EXPENDITURE SHARES BY SOURCE OF FOOD AMONG COTTON AND NON-COTTON GROWING HOUSEHOLDS IN MONAPO, RIBAUE AND ANGOCHE

Food Expenditure Category	Monapo	
	Cotton	No Cotton
Own food produced	0.536	0.672
Cash food purchased	0.230	0.183
Total food	0.766	0.855

Source: Nampula Smallholder Survey,1991

change substantially the household resource allocation towards own food production. However, the relatively high cash food expenditure share found in households not selling cashew, may be due to the existence of other non agricultural activities in this district, particularly fishing, which may strongly influence the household source of food.

TABLE 2.15 MEAN HOUSEHOLD FOOD EXPENDITURE SHARES BY SOURCE OF FOOD AMONG CASHEW SELLING AND NON-SELLING HOUSEHOLDS IN MONAPO, RIBAUE AND ANGOCHE

Food Expenditure Category	Monapo		Angoche	
	Cashew	No Cashew	Cashew	No Cashew
Consumed Own production	0.639	0.532	0.535	0.379
Cash food purchased	0.184	0.243	0.240	0.317
Total food	0.823	0.775	0.775	0.696

Source: Nampula Smallholder Survey,1991

2.4 SUMMARIZED FINDINGS

A more systematic formal analysis of consumption expenditure patterns will be presented in the next chapter which deals with the derivation of Engels curves. Nevertheless, the descriptive tabular

analysis performed in this chapter has provided insights about household consumption behavior, especially those factors apparently associated with high cash (food and non-food) shares. Hence we can begin to see some potential to promote local growth through consumption linkages.

There are five key results in this chapter.

1. Food expenditure is dominant, whatever the household income level and whichever the household production activity.
2. Because mean household income is relatively low and food markets are underdeveloped, as income rises, households tend to substitute one type of food for another. In Monapo and Ribaue the substitution is towards cereals and away from cassava as income rises. In Angoche the trade off appears to be between fish and cassava.
3. So to the extent that patterns are detectable, they are largely consistent with what was expected.
4. Cotton has a positive effect on the cash food budget share, and reinforces household market integration.
5. The data showed no significant role of cashew in determining household expenditure patterns, particularly on demand for cloth and footwear.

CHAPTER 3

MODEL DEVELOPMENT: THE ESTIMATION OF ENGELS CURVES

This chapter deals with the estimation of Engels curves. First, brief background on income-consumption theory is presented, followed by an explanation of the selected functional form. The model results are discussed with particular emphasis on the effect of some key variables: income per capita, proportion of cash crop sales in total income and the access to land. Average and marginal budget shares, and expenditure elasticities are analyzed at mean values for all right hand side variables (RHS).

3.1 BRIEF BACKGROUND ON ENGELS CURVES

Engels curves express the relationship between income and expenditure on a particular good or service, holding prices and other relevant variables constant. An engels curve is a demand function, derived by constrained utility maximization, in which all prices are assumed to be constant. The derivation of Engels curves from cross sectional data is appropriate since the expenditure data is collected at one moment in time, hence prices show little variation[10] and most people face the same prices. Engels curves are named after Ernest Engels (1857), who seems to have been the first to formulate the "Engels laws":

(1) food is the most important item in poor households' budgets;

---

[10] Timmer and Alderman, (1979) argue that price variation may be found in cross sectional studies, due to transportation costs, particularly in less developed countries.

(2) proportion of total expenditures allocated to food decreases as income increases;

(3) proportion devoted to clothing and housing is approximately constant, while the share of luxury items increases as income increases; (Philps, 1983).

These "laws" are in fact empirical regularities which may tend to change as living standards improve. But in general they are valid particularly for most low income countries. However, in case of severe market distortions (like rationing, or a high level of commodity shortage) Engels "laws" may not apply.

Given the assumption of constant prices, the Engels curve as a demand function only has to satisfy the adding-up property (the Engels aggregation). The remaining properties of demand functions, homogeneity, symmetry and negativity of own price substitution effect, are restrictions related to price derivatives, hence are not applicable. The adding-up condition states that:

"The sum of the marginal propensities to consume (or the marginal budget shares) has to be equal to one at all income levels." (Philips, 1983).

So, if expenditure on good or service i is a function of income:

$$S_i = f_i(E) \tag{3.1}$$

the sum of all expenditure is equal to the total expenditure as a proxy for income and the predicted marginal budget shares add up to one

$$\sum_i f_i(E) = E \tag{3.2}$$

$$\sum_i \partial S_i/\partial E = 1 \qquad (3.3)$$

where S_i is the expenditure share of good i and E is total expenditure (income).

Research done on different Engels functional forms indicates that the semi-logarithmic form produces the best estimates for food items, since it allows a commodity to appear as a luxury at low income levels, and as a necessity at higher income levels. The double-logarithmic form provides the best statistical results for all other goods (Philips, 1983), (Deaton and Muellbauer, 1980).

As a final remark, it is worth noting that empirical evidence shows that:

(a) there is a certain minimum level of consumption, whatever the level of income;

(b) for some goods/services there is a level of income below which these commodities are not consumed;

(c) for some goods/services there is a saturation level which acts as the consumption upper limit, whatever the level of income;

(d) the adding-up criterion implies that not all goods/services can have a saturation level, otherwise total expenditure (income) would not be fully allocated above a certain level. If some commodities have a saturation level some other commodities that do not must exist.

3.2 THE CHOICE OF FUNCTIONAL FORM

The choice of functional form is determined by the hypotheses to be tested, must be based on sound economic theory and should be consistent with the empirical data.

Searching for a functional form consistent with the empirical data could be done by a systematic (iterative) analysis of empirical joint distributions of different commodity expenditure shares and household total expenditure per capita, selecting the suggested best functional form based on the goodness of fit. This procedure may result in a choice of different functional forms for each good or service, which would jeopardize the necessary adding-up property.

The semi-log linear expenditure system is chosen to derive the Engels curves. The model specification was adapted from the work of Celis and Bliven (1991), and follows the Working-Lesser type equation (Leser, 1963). The use of this particular Engels functional form is done for it's simplicity and because it satisfies the adding-up property.

Model Specification:

The model is a set of three linear expenditure systems, one for each district. The critical assumption underlying the model is that the marginal propensity to consume good i is the same across households with the same characteristics in each district. The semi-log Engels curves are :

$$E_i^d = \beta_i E + \gamma_i E \ln E + \sum_j \lambda_{ij} E Z_j + e_i \qquad (3.4)$$

Where:

E_i^d is household expenditure on commodity i in district d;

E is total household expenditure per capita;

Z_j is a vector of household characteristics, observed non random variables;

β_i, γ_i and λ_{ij} are the estimated unknown coefficients and e_i are the unobservable random error terms

i= 1,...,13

j= 1,...,10

d= 1,...,3

The above Engels curves are equivalent to the following system of equations, which are chosen to estimate the model, in the three districts:

$$S_i^d = E_i^d/E = \beta_i + \gamma_i LnE + \sum_j \lambda_{ij} Z_j + e_i \qquad (3.5)$$

Where:

β_i is the constant term, and γ_i and λ_{ij} are coefficients. Equation (3.5) has been "normalized" by dividing all terms of (3.4) by E. This "normalization " helps to eliminate the heteroskedasticity problem which occurs in (3.4), since empirical evidence suggests that in cross-sectional data we would expect larger variances in expenditure shares as total expenditure rises.

The formulation of these Engels curves is consistent with the requirement of an allocation model[11] if applied to all goods: the budget share estimates add to one. No restrictions are necessary to guarantee that:

and

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[11] An allocation model applied to all goods in the budget results in predicted budget shares that add up to unity (Deaton and Case,1985).

$$\sum_I e_I = \sum_I \lambda_{ij} = \sum_I \gamma_I = 0 \qquad (3.6)$$

$$\sum_i \beta_i = 1 \qquad (3.7)$$

as long as each budget share equation has an intercept on the right hand side (RHS), the independent variables are the same for all budget share equations, and least squares is used to calculate the estimates (Deaton and Muellbauer, 1980);(Hazell and Roell, 1983).

Furthermore for those commodities with $\gamma_i > 0$, the budget share increases as income rises, while for those with $\gamma_i < 0$ the budget share decreases as income rises. Expenditure shares independent from income have $\gamma_i = 0$. If $\lambda_{ij} < 0$, then the share of good i decreases with the increase of the j^{th} household characteristic, holding constant the remaining factors.

The identity (3.6) reflects household budget rearrangements, in response to different household characteristics, meaning that whatever the household budget shares reallocation, the effects cancel out to conform to the income unity constraint.

The model is estimated using ordinary least squares (OLS) for each single equation, hence it is assumed that the classical linear regression assumptions hold. The classical regression method has been applied in similar studies by Hazell and Roell (1983), King and Byerlee (1977), Deaton and Case (1985) and others.

The parameter estimates allow the calculation of marginal budget shares (MBS_i), average budget shares (ABS_i) and expenditure elasticities (ξ_i) as shown by equations (3.8), (3.9) and (3.10):

$$MBS_i = \partial E_i/\partial E = \beta_i + \gamma_i(1 + LnE) + \sum_j \lambda_{ij} Z_j . \quad (3.8)$$

$$ABS_i = S_i = \beta_i + \gamma_i LnE + \sum_j \lambda_{ij} Z_j \quad (3.9)$$

$$\xi_i = \{\partial E_i/\partial E\} * E/E_i = MBS_i/ABS_i \quad (3.10)$$

As usually done these are short run (point) indicators calculated for the average household, evaluated at the sample mean expenditure (E) and the sample mean value of household characteristics (Z_j) for each district.

The marginal budget shares are important predictors of consumption linkages as income changes (Hazell and Brown, 1989), although the growth linkage response from good i depends on good i's supply elasticity. The marginal budget shares tell how a one unit change of household income would affect the demand of a specific good or service holding constant all other factors.

The expenditure elasticity allows the categorization of goods according to their income elasticity. If the ξ_i is less than or equal to one and greater than zero, goods i are often called **normal necessities**. Goods with elasticities greater then one are considered **normal luxuries**, and goods with elasticities less then zero are **inferior necessities** (Layard and Walters, 1978). As income rises one would expect food expenditures to increase less rapidly than income, hence food in general is a normal necessity. Expenditure on luxury goods would behave in the opposite manner.

Variables included in the analysis

Endogenous variables

The dependent variables in any household consumption expenditure analysis are a group of commodity expenditure shares which are regressed against income and other selected independent variables. Figure 3.1 shows the 13 commodity budget shares used in this study.

Name	Commodity Subgroup
FDBSHARE	Total food budget share
FCBSHARE	Cash purchased food budget share
FOBSHARE	Own produced consumed budget share
CEBSHARE[a]	Cereals budget share
BEBSHARE	Beans budget share
CSBSHARE	Cassava budget share
FSBSHARE	Fish budget share
CRBSHARE	Meat budget share
OFBSHARE[b]	Other food budget share
NFBSHARE	Non-food budget share
CFBSHARE	Cloth & footwear budget share
EHBSHARE	Education & Health budget share
OTBSHARE[c]	Other non-food budget share

a: Maize, Maize flower, Sorghum, and Rice;
b: Sugar, Cooking oil, groundnut, salt, vegetables, and coconut;
c: petroleum, soap, taxes, radios, transport, tobacco, taxes, and other household utilities.

FIGURE 3.1 DEPENDENT VARIABLES INCLUDED IN THE REGRESSIONS

The product aggregation is consistent with the study's main concern. We are particularly concerned with household cash purchased food shares, fish budget shares, and non-food shares as principal indicators of linkages. Although expenditures on fish are already included in the variable cash purchased food, the regression coefficients associated with fish budget share are important *per se* as they indicate the importance of household linkages with the non-agricultural economy. Furthermore any RHS variable that has a

significantly positive impact on these endogenous variables represents a household characteristic that is associated with linkages to the outside economy. Conversely, any RHS that has a significantly negative impact indicates a household characteristic that is strongly associated with household subsistence orientation.

Exogenous variables

Figure 3.2 illustrates the set of exogenous variables included in each district. The independent variables were selected taking into account the household demographic, economic and institutional framework.

Name	Description	Unit
INTERCEPT	Intercept.	
LNTOTEXP	Ln of per capita total expenditure.	Meticais
FAREA_PC	Per capita access to land.	Ha/people
HMEM	Total members in the household.	People
HHAGE	Age of head of household.	Years
HHED	Head of household level of formal education.	Years
PWMHH	Proportion of adult women in the household.	%
COTSHARE (or AZAMSHAR)	Cotton (or rice and Groundnut) sales as % of total income.	%
CAJSHARE	Cashew sales as % of total income.	%
DUMMY_GR	Dummy for head of household gender: Male headed household =1; otherwise =0.	
DUMMY_NT	Dummy for native household: Native household =1; otherwise =0.	
DUMMY_FC	Dummy for household with dry and wetland: Household with both dry and wetland =1; otherwise =0.	

FIGURE 3.2 INDEPENDENT VARIABLES INCLUDED IN THE REGRESSIONS

Although income is usually the dominant variable in explaining expenditure patterns in cross-sectional studies (assuming households

face the same price), it is widely accepted that household characteristics have to be taken into account in the explanation of household consumption expenditure behavior. Household size, simply defined as the total number of members in the household, is generally considered to be an important explanatory variable in household consumption expenditure patterns. It is expected that large families will have larger total food budget shares than small families ceteris paribus. The proportion of women in the household, the level of formal education and the age of the household head were included in the model to trace their possible association with household consumption expenditure patterns. We expect that households with a larger proportion of women are likely to have a larger share of own food produced and consumed, and the higher the level of education and age of the household head, the larger the cash food expenditure share. In addition to household characteristics, other key explanatory variables are included: total expenditure per capita, proportion of selected cash crops[12] sales in total expenditure, and the household's per capita access to land.

Where all factor and product markets exist and operate competitively, one would expect that the proportion of cash income would not affect relative food and non-food budget shares allocated to each type of food. Household choice of crop mix and allocation of household resources would be only based on price expectations. But the current market situation in rural Nampula constitutes an additional constraint on household consumption decisions.

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[12] Cotton sales for Monapo and Ribaue; Rice and groundnuts for Angoche and Cashew for all three districts.

Most households are very poor and face widespread market failure for both factor (there is no formal capital market in rural Nampula, and the labor market is very weak) and product markets. The predominance and association of these facts (poverty and a large degree of market failure) lead to great difficulties in purchasing food and other commodities, and constrains the choices open to the household. As income rises, households would obviously tend to move towards improved diets. But households in rural Nampula have limited means to improve their consumption. Hence we hypothesize that as household income rises, holding constant all other factors, households would improve their diets through two adjustments. First the households would adjust in their production mix, which would affect household consumption patterns. Households would move towards the production of more preferred items. Particularly in rural Nampula we expect that as income rises households would substitute out of cassava into cereals and beans. The second household adjustment would be the response to the strong limitation on access to cash purchased food and non-food commodities due to market failures and the relatively high cost of purchased food. "Purchased food, driven largely by fish is between 29 and 70 times more expensive than the value of retained own production" (MOA/MSU/UA Research Team, 1992c). Therefore it is hypothesized that households with larger proportions of cash income would tend to have larger expenditure shares on purchased food and non-food. This consumption pattern would lead to a positive relationship between income and total food budget share, given the larger share of cereals and fish in household total food budget.

Land is one of the most important household assets in rural Nampula. Poor households are associated with small land holdings and income is highly correlated with land holdings (MOA/MSU/UA Research

team, 1992f). Therefore it is expected that access to land will exhibit the similar sign pattern as income, except obviously for purchased food budget share. Households with more access to land would have a consumption expenditure pattern corresponding to a relatively high income households, with larger budget shares for cereals and fish, and relatively lower budget shares on cassava.

Cash crops are in general perceived as means to increase smallholder income and stimulate growth linkages with other sectors in the local economy. The general hypothesis is that revenues from cash crop would be positively related to cereals, beans and fish budget shares and negatively related to cassava budget shares following the similar pattern as income. It is also hypothesized that cash crops have positive effects on non-food budget shares, particularly for cashew and cotton, whose institutional support may increase the availability of some non-food commodities to households selling cashew or growing cotton. Due to agroecological differences among the three districts cotton and cashew crops were selected for Monapo, and rice and groundnut and cashew for Angoche.

To take into account qualitative household characteristics, like the effect of household access to both types of land: dry and wetland; native household and the gender of head of household, three dummy[13] variables were included in the model RHS. It is hypothesized that households with two types of land have relatively higher expenditure shares on own food produced consumed. Male headed households are hypothesized to have higher cash purchased food and non-food budget

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[13] A dummy variable is a binary variable constructed such that it takes the value of unity whenever the qualitative phenomenon it represents occurs, and zero otherwise.(Kennedy, 1943)

shares. Native households are expected to be associated with higher own food produced and consumed budget shares.

3.3. MODEL RESULTS

Tables 3.1 and 3.2 show the parameter estimates for selected household expenditure shares grouped by commodity and origin. The complete regression results are shown in Appendix B1 and B2. The overall significance of the regression can be assessed by the F-tests against the null hypothesis that the expenditure shares are not influenced by any of the exogenous regressed variables.

As expected the null hypotheses is rejected for almost all the expenditure shares regression at less than 10% level of error, except for fish and meat budget shares in Monapo and beans, meat and own produced food budget shares in Angoche.

Empirical data shows that the average fish expenditure share in Monapo (29.5%) is relatively lower than in Angoche (36%) (MOA/MSU/UA Research team, 1992a Table 11 pp 18). In Monapo fish is less available and has a higher cost then in Angoche. The cost of dried fish in Monapo is almost twice (1.78) that in Angoche (MOA/MSU/UA Research Team, 1992c). It is therefore not surprising that the fish budget share regression is not significant at 10% in Monapo while in Angoche is strongly significant (0.0065). The discussion of the model results[14] will concentrate on variables directly related to the hypotheses to be tested. The coefficient estimates predict the extent and direction of

[14]In interpreting the results it should be noted that the derivation of Engels curves using commodity share equations results in lower R^2 statistics than if actual expenditures were used as dependent variables.

TABLE 3.1 REGRESSION RESULTS: PARAMETER ESTIMATES FOR SELECTED FOOD GROUPS IN MONAPO AND ANGOCHE

Independent Variables	Monapo						Angoche					
	CEBSHARE	BEBSHARE	CSBSHARE	FSBSHARE	CRBSHARE	OFBSHARE	CEBSHARE	BEBSHARE	CSBSHARE	FSBSHARE	CRBSHARE	OFBSHARE
DUMMY_NT	-0.0001	-0.0126	0.0820	-0.0140	0.0097	-0.1194	-0.0469	-0.0249	0.0429	-0.0149	0.0221	-0.0161
	(0.999)	(0.6132)	(0.1503)	(0.6335)	(0.5367)	(0.004)	(0.0490)	(0.0327)	(0.1124)	(0.6385)	(0.0701)	(0.3572)
PWMHH	0.0606	0.0083	0.0005	-0.0491	0.0096	-0.0473	-0.1075	-0.0282	0.0258	-0.0739	0.0291	0.0471
	(0.4986)	(0.8530)	(0.9958)	(0.3514)	(0.7340)	(0.4145)	(0.1638)	(0.4531)	(0.7682)	(0.4749)	(0.4620)	(0.4089)
COTSHARE/AZAMSHAR	0.0221	-0.0532	-0.1474	0.1043	-0.0169	-0.0116	0.1564	-0.0527	-0.1959	-0.0880	0.0040	0.1748
	(0.7812)	(0.1835)	(0.4966)	(0.0273)	(0.4995)	(0.8218)	(0.0044)	(0.0480)	(0.0018)	(0.2272)	(0.8844)	(0.0000)
DUMMY_FC	-0.0818	0.0304	0.1006	-0.0099	0.0030	-0.0198	0.0259	-0.0229	0.0182	-0.0214	-0.0300	-0.0069
	(0.0461)	(0.1370)	(0.0310)	(0.6770)	(0.8116)	(0.4520)	(0.4759)	(0.1986)	(0.6600)	(0.6614)	(0.1098)	(0.7962)
FAREA_PC	0.0066	0.0305	0.0484	-0.0078	0.0161	-0.0836	0.0723	0.0088	0.0397	-0.0979	-0.0160	-0.0022
	(0.8477)	(0.0793)	(0.2162)	(0.6993)	(0.1387)	(0.0003)	(0.0298)	(0.5868)	(0.2902)	(0.0286)	(0.3443)	(0.9277)
HHAGE	0.0021	-0.0006	-0.0009	0.0008	0.0003	-0.0004	0.0005	0.0003	-0.0005	0.0024	-0.0003	-0.0012
	(0.0650)	(0.2963)	(0.4966)	(0.1911)	(0.4077)	(0.6042)	(0.5367)	(0.4233)	(0.5833)	(0.0218)	(0.5034)	(0.0442)
HHED	-0.0021	0.0043	-0.0022	0.0021	0.0007	0.0022	0.0064	-0.0006	-0.0061	0.0085	-0.0001	-0.0113
	(0.8348)	(0.4033)	(0.8500)	(0.7227)	(0.8387)	(0.7461)	(0.3965)	(0.8667)	(0.4796)	(0.3992)	(0.9841)	(0.0455)
CAJSHARE	0.0133	-0.1495	0.2086	-0.0075	-0.0440	0.0827	0.1239	0.0041	-0.0091	-0.1776	0.0093	0.0798
	(0.9099)	(0.0126)	(0.1206)	(0.9130)	(0.2369)	(0.2788)	(0.0640)	(0.8990)	(0.9038)	(0.0483)	(0.7842)	(0.1069)
LNTOTEXP	0.0635	-0.0324	-0.1332	0.0193	-0.0049	0.0597	0.0127	-0.0117	-0.0245	0.1198	0.0101	0.0008
	(0.0162)	(0.0143)	(0.000)	(0.2090)	(0.5499)	(0.0006)	(0.5719)	(0.2897)	(0.3399)	(0.0001)	(0.3852)	(0.9615)
HMEM	0.0191	-0.0078	-0.0139	0.0026	0.0008	-0.0145	-0.0006	-0.0040	0.0004	0.0110	-0.0008	-0.0012
	(0.0975)	(0.1744)	(0.2859)	(0.7020)	(0.8272)	(0.0516)	(9294)	(0.2269)	(0.9583)	(0.2274)	(0.8120)	(0.3572)
DUMMY_GR	-0.0429	0.0159	0.1071	-0.0481	0.0163	-0.0616	0.0045	-0.0105	0.0129	-0.0817	-0.0126	0.0666
	(0.4585)	(0.5824)	(0.1051)	(0.1518)	(0.3723)	(0.1020)	(0.9102)	(0.5885)	(0.7754)	(0.1280)	(0.5374)	(0.1069)
Constant	-0.6385	0.4636	1.6717	-0.0979	0.0381	-0.2708	-0.0541	0.2170	0.5292	-1.0735	-0.0832	0.0263
	(0.0470)	(0.004)	(0.000)	(0.6001)	(0.7038)	(0.1903)	(0.8362)	(0.0914)	(0.0771)	(0.0027)	(0.5362)	(0.8918)
Adjustd. R^2	0.1246	0.0904	0.3157	-0.201	-0.0362	0.3153	0.0967	0.0136	0.1108	0.1150	-0.0083	0.1303
Signf(F-stat)	0.0142	0.0454	0.000	0.6242	0.7601	0.000	0.0151	0.3204	0.0079	0.0065	0.5407	0.0031

Note: Figures in parentheses are significance levels, calculated from adjusted standard errors. The estimation of share equations leads to typically smaller R^2 statistics than if actual expenditure shares equations were used as dependent variables

Source: Nampula Smallholder Survey, 1991

TABLE 3.2 REGRESSION RESULTS: PARAMETER ESTIMATES FOR SELECTED FOOD GROUPS IN MONAPO AND ANGOCHE

Independent Variables	Monapo				Angoche			
DEPENDENT VAR:	FDBSHARE	FOBSHARE	FCBSHARE	NFBSHARE	FDBSHARE	FOBSHARE	FCBSHARE	NFBSHARE
DUMMY_NT	-0.0567	0.0732	-0.1299	0.0567	-0.0315	-0.0154	-0.0161	0.0315
	(0.2017)	(0.2915)	(0.0095)	(0.2017)	(0.2500)	(0.6915)	(0.6362)	(0.2500)
PWMHH	-0.0211	-0.1049	0.0838	0.0211	-0.1124	-0.0353	-0.0771	0.1124
	(0.7903)	(0.3987)	(0.9224)	(0.7903)	(0.2075)	(0.7798)	(0.486[illegible]	(0.2075)
COTSHARE/AZAMSHAR	-0.1057	-0.3297	0.2239	0.1057	-0.0181	-0.0330	0.0149	0.0181
	(0.1355)	(0.0035)	(0.0051)	(0.1355)	(0.7721)	(0.7103)	(0.8486)	(0.7721)
DUMMY_FC	0.0210	0.0868	-0.0658	-0.0210	-0.0385	-0.1122	0.0737	0.0385
	(0.5590)	(0.1250)	(0.1019)	(0.5590)	(0.3597)	(0.0616)	(0.1605)	(0.3597)
FAREA_PC	0.0107	0.0964	-0.0858	-0.0107	0.0023	0.1034	-0.1011	-0.0023
	(0.7264)	(0.0453)	(0.0127)	(0.7264)	(0.9528)	(0.0578)	(0.0349)	(0.9528)
HHAGE	0.0014	0.0013	0.0001	-0.0014	0.0014	-0.0009	0.0023	-0.0014
	(0.1448)	(0.3901)	(0.9146)	(0.1448)	(0.1280)	(0.4889)	(0.0456)	(0.1280)
HHED	0.0046	0.0006	0.0039	-0.0046	-0.0037	-0.0102	0.0065	0.0037
	(0.6177)	(0.9443)	(0.6994)	(0.6177)	(0.6722)	(0.4085)	(0.5466)	(0.6722)
CAJSHARE	0.1013	0.0334	0.0679	-0.1013	0.0209	0.1670	-0.1461	-0.0209
	(0.3323)	(0.8378)	(0.5581)	(0.3323)	(0.7852)	(0.1274)	(0.1287)	(0.7852)
LNTOTEXP	-0.0279	-0.1009	0.0729	0.0279	0.1099	-0.0329	0.1428	-0.1099
	(0.2270)	(0.0061)	(0.0053)	(0.2270)	(0.0000)	(0.3742)	(0.0000)	(0.0000)
HMEM	-0.0135	-0.0124	-0.0011	0.0135	0.0058	-0.0080	0.0138	-0.0058
	(0.1857)	(0.4358)	(0.9224)	(0.1857)	(0.4614)	(0.4711)	(0.1593)	(0.4614)
DUMMY_GR	-0.0156	0.0211	-0.0366	0.0156	-0.0215	0.0219	-0.0433	0.0215
	(0.7611)	(0.7926)	(0.5202)	(0.7611)	(0.6407)	(0.7378)	(0.4501)	(0.6407)
Constant	1.1694	1.6188	-0.4493	-0.1694	-0.4645	0.8784	-1.3428	1.4644
	(0.0000)	(0.0004)	(0.1536)	(0.5479)	(0.1262)	(0.0425)	(0.0005)	(0.000)
Adjustd. R^2	0.1244	0.2191	0.1957	0.1244	0.1665	0.0226	0.1380	0.1665
Signf(F-stat)	0.0143	0.0003	0.0008	0.0143	0.0005	0.2475	0.0021	0.0005

Note: Figures in parentheses are significance levels. The estimation of share equations leads to typically smaller R^2 statistics than if actual expenditure were used as dependent variables.

Source: Nampula Smallholder Survey, 1991

changes in household budget allocations due to marginal changes of income or any other independent variable, holding constant all other factors.

3.3.1 INCOME EFFECTS

In both districts an additional unit of income, holding constant all other factors, is associated with a reallocation of household food consumption away from beans and cassava and into cereals and fish. As the regression results show, income per capita (LNTOTEXP) coefficient estimates are statistically significant and positively related to purchased food budget share (FCBSHARE), cereals budget share (CEBSHARE), and fish budget share (FSBSHARE) in Monapo and Angoche, and negatively related to cassava budget shares (CSBSHARE) in both districts. Results indicate that a doubling of household income per capita raises the purchased food budget share by 7 percentage points and decreases the share of own food produced and consumed by 10 percentage points in Monapo, hence the overall food budget share decreases by approximately 3 percentage points. In terms of specific commodity groups, a doubling of per capita income in Monapo decreases the cassava budget share by 13 percentage points and raises the cereals and fish budget shares by 6 and 2 percentage points respectively. Similar analysis can be done for Angoche district, were we see decreases of 2.5, 1.2 and 10.9 percentage points in the cassava, beans and non-food budget shares and increases in fish, cereals and meat budget shares by 11.9, 1.3 and 1 percentage points respectively with a doubling of income.

According to Engels laws, one would expect that an increase in income would lead to an increase in the non-food budget share. In Monapo a doubling of income will raise the non-food budget share by

approximately 3 percentage points, although the result is not significant at $\alpha = 0.1$. But, in Angoche non-food budget shares fall almost 11 percentage points with a doubling of income.

However, as Mellor state "A rise in per capita income in low income countries is associated with a substantial rise in demand for food".

Given the poverty level among households in rural Nampula, additional income raises the average budget shares for cereals and fish, and decreases the shares for cassava and non-food commodities. Poor households tend to reallocate incremental expenditure among food commodities. Cereals and fish can be ranked superior goods relative to cassava. The large demand for cereals and fish suggests the importance of cereals production and fishing as potential activities which can stimulate local farm and non-farm growth linkages in rural Nampula.

3.3.2 EFFECTS OF COTTON AND CASHEW PRODUCTION

In the absence of labor, input and product market failures, household source or type of income, either cash or in kind, would not matter in household consumption expenditure decisions.

"In Nampula the failure of rural food markets is extreme. Poor infrastructure, many years of tightly controlled commercial activity, slow response to recent policy liberalization, and continuing risk of attack have all contributed to this situation" (MOA/MSU/UA Research Team, 1992c). Given this socio economic environment we do expect household source or type of income to influence expenditure decisions.

It is hypothesized that household engagement in growing selected cash crops (cotton and cashew in Monapo and cashew and rice and groundnut[15] in Angoche), would consequently raise household cash

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[15] Rice and groundnut are in Angoche grown as cash crop

income, and as expected these households would have larger purchased food and non-food budget shares. These households would consequentially have potential consumption growth linkages to the local economy, due to their relatively higher marginal demand for purchased food and non-food budget items.

These activities are expected to increase income. But beyond any effect they may have on income it is also expected that they will affect expenditure patterns even with income held constant. This is what the regression results will tell us; e,g., do cotton growers with same income and other characteristics as other households, have stronger linkages with the outside economy?

Regression results show that the proportion of cotton sales in total income (COTSHARE) is positively related to cereals and fish budget shares and negatively related to the cassava budget share in Monapo. In Angoche the sample survey did not have households producing cotton. Instead rice and groundnut are largely produced as cash crops. The coefficient of rice and groundnut sales proportion in total income (AZAMSHAR), is significant and positively related to cereals budget share and negatively related to cassava, beans and fish expenditure shares, though the coefficient on fish is not significant. The coefficients and sign patterns of COTSHARE and AZAMSHAR are as expected and reflect the importance of household orientation to a cash crop strategy. In Monapo a 1% increase in the proportion of cotton in total income, increases the cash food share by 0.22% and decreases the own food share by 0.33%, thus decreasing the food share by 0.11%. Growing cotton has an important effect on household marginal demand for purchased food and non -food in Monapo, hence should be a potential target for public investment to strengthen local economic growth.

Selling cashew is an additional source of income. We expected that the impact of the proportion of cashew sales in total income (CAJSHARE) on household consumption expenditure allocation would be similar to the impact of COTSHARE and LNTOTEXP. But surprisingly cashew selling has little impact. In both Monapo and Angoche, a marginal rise in CAJSHARE, *ceteris paribus*, is positively related to own food produced and consumed but statistically insignificant. The impact of a marginal increase in the cashew income share on household reallocation of consumption expenditure, holding constant all other factors, is ambiguous and in most cases is not significant at the level of 10%. We expected that, given the historical support for cashew marketing, an incremental rise in CAJSHARE would be positively related to non-food expenditure share (NFBSHARE) particularly cloth and footwear (CFBSHARE). However, regression results do not support that hypothesis in Angoche and Monapo. These results may suggest the effect of institutional breakdown and the consequent failure of the cashew marketing policy. This is an important issue which requires further research.

The magnitude and direction of changes in selected expenditure shares due to marginal changes in income proportion of cash crop sales is shown on Table 3.3.

The marginal effect of changes in the income proportion of cotton sales is also reflected in household expenditure reallocations between purchased food, own produced and consumed food and non-food expenditures. If the household has 1% change in its proportion of income from cotton sales (COTSHARE), holding constant all other variables, the households would increase its purchased food and non-food budget shares in Monapo by 0.22 and 0.11 percentage points respectively. Marginal changes in the income proportion of cashew sales (CAJSHARE) do

TABLE 3.3 CHANGE IN COMMODITY EXPENDITURE SHARE DUE A 1% CHANGE IN THE INCOME PROPORTION OF CASH CROP SALES

Expenditure Category	COTTON	CASHEW		RICE & GROUNDNUT
	Monapo	Monapo	Angoche	Angoche
	-------- percentage points ---------			
Total Food	-0.106	0.101	0.021	-0.018
Cereals	0.022	0.013	0.124**	0.156**
Beans	0.053	-0.15**	0.004	-0.053**
Cassava	-0.15*	0.209*	-0.009	-0.196**
Fish	0.104**	-0.08	-0.18**	-0.088
Cloth & Footwear	0.056	-0.042	0.011	0.036
Non-food	0.106	-0.101	-0.021	0.018

** : Significant at less than 5%
* : Significant at 10%
Source: Nampula Smallholder Survey, 1991

not translate into increase demand for non-food commodities as we had expected. Table 3.4 illustrates the direction of change in household demand for purchased food, produced and consumed food, and non-food commodities in response to changes in changes in cash crop income proportions.

TABLE 3.4 DIRECTION CHANGES IN FOOD EXPENDITURE SHARES BY SOURCE AND NON-FOOD EXPENDITURE SHARES DUE TO MARGINAL CHANGES IN THE PROPORTION OF CASH CROP SALES

Expenditure Category	COTTON	CASHEW		RICE & GROUNDNUT
	Monapo	Monapo	Angoche	Angoche
Total Food	- *	+	+	-
Prod & consmd	- **	+	+ *	-
Purchased	+ **	+	- *	+
Non-food	+ *	-	-	+

** : Significant at less than 5%
* : Significant at less than 15%
Source: Nampula Smallholder Survey, 1991

3.3.3 EFFECTS OF SELECTED OTHER HOUSEHOLD CHARACTERISTICS

The regression results of the effect of an additional unit of land (FAREA_PC) on household expenditure shares reallocation, *ceteris* paribus, show that own food budget share increases, cash food falls by about the same amount with no significant effect on total food budget share. This result is consistent with the subsistence production strategy reported by MOA/MSU/UA Research team. The FAREA_PC coefficient estimates for cereals budget share is positive and significant in Angoche, while for fish the budget share is significant and negative. This suggests that if households have additional access to land in Angoche, they raise their cereal budget proportion and decrease the fish expenditure share. This is expected given the relatively high pressure on land in this district and the relatively high availability of fish.

The proportion of adult women in the household (PWMHH) seems to have no effect on household consumption expenditure. This variable may be faulty in capturing the women's influence on household consumption behavior, hence little should be concluded based on these results.

3.3.2 EXPENDITURE BEHAVIOR OF THE AVERAGE HOUSEHOLD

Average budget shares, marginal budget shares and total expenditure elasticities are derived from the parameter estimates at the mean household expenditure level and mean values of other household characteristics for each district. Detailed results on consumption expenditure behavior for the average household are reported in table 3.5.

As expected the average and marginal budget shares confirm the large importance of food expenditures in both districts. The average food budget shares are about 80% of total expenditure in Monapo, and about 74% in Angoche. For the average household, 77% of a one unit increase in income will be spent on food in Monapo, and about 85% in Angoche.

In terms of particular commodities or groups of commodities, cassava has the largest average budget share (32.9%), followed by cereals (17.6%) in Monapo. In Angoche cassava also has the largest household expenditure share (24.8%) followed by fish. The third major aggregate is fish in Monapo and cereals in Angoche. Beans and meat have the lowest average and marginal budget shares in both districts. These results reveal a picture of very poor diets. High protein foods like beans and meat each absorb less than 5% of total household expenditure. The fish budget share is relatively high but this does not compensate the protein deficiency because the relatively high fish expenditure share is mostly driven by very high fish prices. The MOA/MSU/UA Research team reports that the price of purchased fish can be 40 to 50 times more expensive per calorie than staple food retained for consumption.

TABLE 3.5 CONSUMER EXPENDITURE BEHAVIOR IN MONAPO AND ANGOCHE

Expenditure Category	Monapo			Angoche		
	Average Budget shares	Marginal Budget shares	Expenditure Elasticity	Average Budget shares	Marginal Budget shares	Expenditure Elasticity
	---------- percent of total expenditure ----------					
Cereals	17.6	23.9	1.36	14.7	15.9	1.09
Beans	6.9	3.7	0.53	3.4	2.2	0.66
Cassava	32.9	19.7	0.57	24.8	23.3	0.90
Fish	10.5	12.5	1.18	19.9	31.8	1.60
Meat	2.8	2.3	0.82	1.7	2.7	1.60
Other foods	9.4	15.2	1.65	9.4	9.1	1.01
Total food	**80.1**	**77.3**	**0.97**	**73.9**	**85.0**	**1.15**
Own Produced Food	58.9	48.9	0.83	47.4	44.1	0.93
Cash Food	21.2	28.4	1.35	26.5	40.9	1.54
Non-Food	**19.9**	**22.7**	**1.14**	**26.1**	**15.0**	**0.58**

Source: Nampula Smallholder Survey Data, 1991.

The total expenditure elasticity on food is less than one in Monapo, reflecting that food as expected is a normal necessity. However this indicator for Angoche is greater than one, indicating that food is luxury good. This is a surprising result which stands in direct contrast to Engels law. It is partly explained by the strong move into fish (a luxury good) as income increases in this district. In fact, the increase in the fish share almost entirely explains the change in the total food share. Shares of other foods show no significant change with income in Angoche. Thus this result is partially explainable, but is nonetheless quite surprising[16].

For the average household no expenditure elasticity was found negative, meaning that within the food group no inferior good is identified at mean income levels. This again is a reflection of the poverty in the sample area.

The analysis of income elasticities by commodity may provide some insights on average household food expenditure patterns (Table 3.6).

In both districts cereals and fish are categorized as "luxury" goods. Meat in Monapo falls under the category of a normal good, but this result is not significant at the 10% level of error.

The analysis of household consumption behavior by source of food is as expected. Own food produced and consumed has the larger average budget share than purchased food in both districts.

If income changes by 1%, the average household in Monapo will increase expenditure shares on purchased food by 0.073 percentage points. In Angoche the marginal propensity to consume purchased food is higher almost 41%, indicating that in this district households have more

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[16] Food expenditure elasticities greater then one (1.27) has been reported by Hay, in a study in Eastern Nigeria.

TABLE 3.6 CLASSIFICATION OF FOOD COMMODITIES ACCORDING TO THEIR EXPENDITURE ELASTICITIES FOR AVERAGE HOUSEHOLD

Ho: $\xi_i = 1$ (Expenditure have no effect on commodity budget share)
Ha: ξ_i not equal one

Expenditure Category	Monapo			Angoche		
	ξ_i	classf	stat signf	ξ_i	classf	stat signf
Cereals	1.36	luxury	.016	1.09	luxury	.572
Beans	0.53	normal	.014	0.66	normal	.289
Cassava	0.57	normal	.000	0.90	normal	.339
Fish	1.18	luxury	.209	1.60	luxury	.001
Meat	0.82	normal	.549	1.60	luxury	.385

Source: Nampula Smallholder Survey, 1991

linkages to the external economy, particularly reinforced by the fishing sector.

The overall regressions results for the non-food group should be interpreted cautiously, given the level of acute market shortages particularly for this commodity subgroup. Monapo has the expected normal pattern, were the non-food group expenditure elasticity is above one.

Comparison of the estimated household consumption expenditure indicators in rural Nampula with similar Sub-Saharan African studies should be done cautiously because commodities groupings differ. However for major subgroups we find that the expenditure elasticity for food of 0.97 in Monapo district and 1.15 in Angoche district are within the range of food estimated elasticities of 0.90 in rural Zambia (Cellis and Bliven, 1991), 0.93 in rural Sierra Leone (King and Byerlee, 1977), 0.96 in Rwanda (Braun, Haen and Blanken, 1986) and 1.27 in Eastern Nigeria (Hay, 1966).

3.4 SUMMARY OF FINDINGS

In summary we can conclude that:

1 Estimated average and marginal food budget shares are high, as expected in a poor SSA setting.

2. Food expenditure shares rise faster than income in Angoche. In Monapo the food budget share rises slightly less than income, though the elasticity is nearly unitary.

3. The largest marginal expenditure shares are for cereals, cassava and fish, which at the average household constitute more than 50% of total expenditure, although there are regional differences.

4. For the average household, marginal increases in income result in households substituting out of cassava and into fish and cereals in Monapo and Angoche.

5. At mean household income, cassava is not identified as an inferior good.

6. Household are subsistence oriented, and access to land reinforces this strategy. The average household increases the own food produced and consumed share given a marginal increase in per capita access to land.

7. The effect of additional income from cash crops (cotton, rice and groundnut) sales rises demand of purchased food and non-food commodities, holding constant the household income. However the proportion of cashew sales are not positively related neither to demand of purchased food nor to non-food as we expected.

8. There is no evidence of any particular household demographic characteristic which strongly explains marginal changes in household consumption expenditure patterns.

CHAPTER 4

POTENTIAL CONSUMPTION EXPENDITURE LINKAGES TO ECONOMIC GROWTH

4.1 INTRODUCTION

The importance of small farmers in a development strategy which focuses on increasing domestic food production, employment and income is critical. Polices oriented to reduce poverty and improve equity should look for programs and investments that maximize potential growth linkages.

Five different linkages have been identified in factor and product markets. Growth linkages in factor markets involve flows of capital and labor between agriculture and non-agricultural sectors. Product markets include backward production linkages from agriculture to input supply sectors, forward production linkages from agriculture to processors and distributors, and consumer demand linkages resulting from increases in income (Haggblade; Hazell and Brown, 1989).

This chapter explores potential consumer demand linkages in rural Nampula, using estimated expenditure-income relationships particularly the estimated marginal propensities to consume different goods. We assume that as income changes the marginal impact of all the RHS variables does not change. Special attention will be given to consumer demand linkages derived from household participation in cotton production and marketing in Monapo, cashew production and marketing in Monapo and Angoche and the potential effect of relaxing food market failures in rural Nampula.

Consumer based linkages of different income classes will be analyzed to test the hypothesis that high income classes have higher

marginal propensities to consume purchased food and non-food items than the low income population. This analysis will focus not on the average household behavior, but we are interested in those household characteristics most associated with high marginal budget shares especially for cash food and non-food expenditures. We will consider primarily the household marginal budget shares, rather then the average budget shares due their relevance for policy decisions.

4.2 CONSUMPTION LINKAGES: THE IMPACT OF CASH CROPS

In this section we try to capture the consumption based linkages derived from expenditure-income relationships, based on our previous hypothesis that households growing cotton have higher marginal propensity to consume purchased food and non-food commodities than the non-cotton growing households. Hence potential second round growth effects (derived from cotton growing households' marginal budget shares) result in the form of a rise in demand for purchased goods. If the sector producing these goods is capable of an elastic supply response , production will be stimulated and income in this sector will rise. The analysis is based on the inspection of household marginal budget shares among cotton and non-cotton growing households, and cashew and non-cashew households in Monapo and Angoche districts.

The average cotton growing household has a relatively higher marginal propensity to consume cash purchased food than the average non-cotton growing households (Table 4.1).

The average budget share of own produced and consumed food is only about one third for cotton growing households, while it is more then half for non-cotton growing households. The proportion of marginal

TABLE 4.1 CONSUMPTION EXPENDITURE BEHAVIOR* AMONG COTTON AND NON-COTTON GROWING HOUSEHOLDS IN MONAPO

Expenditure Category	Cotton			Non-Cotton		
	Absolute Budget Shares	Marginal Budget Shares	Expenditure Elasticity	Absolute Budget Shares	Marginal budget Shares	Expenditure Elasticity
	---------- percent of total expenditure ----------					
Cereals	18.2	23.0	1.35	16.7	23.0	1.38
Beans	6.4	3.1	0.49	8.0	4.8	0.59
Cassava	30.1	17.5	0.57	36.8	23.5	0.64
Fish	11.7	13.6	1.17	8.9	10.7	1.22
Meat	2.7	2.2	0.82	2.8	2.3	0.83
Other food	7.3	13.2	1.82	11.9	17.9	1.49
Total Food	76.8	74.0	0.96	85.2	82.4	0.97
Own Produced Food	53.8	43.8	0.81	67.1	57.0	0.84
Cash Purchased Food	23.0	30.2	1.32	18.1	25.4	1.40
Non-Food	23.2	26.0	1.12	14.8	17.6	1.19

* : Calculated at mean level of all RHS variables for cotton and non-cotton growing households.
Source : Nampula Smallholder Survey, 1991

income allocated to own food produced and consumed is about 44% for growing cotton households, while for non-cotton growing households,it is 57%. The figures for non-food purchases are 26% and 18%.

This means that, of an additional 1000 Meticais of income per capita accruing to the average cotton growing household in Monapo, about 562 Meticais would be spent on purchased food and non-food commodities, while for the average non-cotton growing household these expenses would only amount to 430 Meticais. This result suggests relatively stronger growth linkages among cotton growing households then non-cotton growing households.

These results reveal that cotton growing households rely relatively more on food markets to satisfy their food requirements. This household strategy should have positive effects on the development of local food and non-food markets and help raise the incomes of net food selling households[17], conditional upon an elastic supply response and effective institutional support. Thus, policies and investments directed to support smallholder cotton production and simultaneously strengthen food market development need to be pursued.

To maximize the potential consumption growth linkages which derive from investment in the cotton smallholder sector, current constraints on household food availability must be relaxed. This requires appropriate policy strategies addressing improvement in food production and productivity, and improvement in labor and product market efficiency. Table 4.2 presents budget share information for cashew and non-cashew selling households in Monapo and Angoche. Results do not support the

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[17] A household is food net seller if it sell more food than it buys. (MOA/MSU/UA Research Team, 1992c)

hypothesis advanced earlier in this chapter regarding the growth linkage impact of cashew production and marketing.

TABLE 4.2 MARGINAL PROPENSITIES TO CONSUME* FOR CASHEW AND NON-CASHEW SELLING HOUSEHOLDS IN MONAPO AND ANGOCHE

Expenditure Category	Monapo		Angoche	
	Cashew	Non- Cashew	Cashew	Non-Cashew
	----- percent of total expenditure -----			
Cereals	25.2	22.5	16.7	14.0
Beans	3.0	4.5	2.6	2.1
Cassava	22.4	16.5	22.5	21.5
Fish	12.1	13.0	31.5	32.9
Meat	2.5	1.9	3.1	2.7
Other food	13.7	16.9	9.6	8.4
Total Food	78.9	75.3	86.9	82.5
Own Produced Food	52.9	44.2	47.1	41.5
Cash Purchased Food	26.0	31.1	39.8	41.0
Non-Food	21.1	24.6	13.1	17.5

*: Calculated at mean level of all RHS variables for cashew selling and non-cashew selling households.

Source : Nampula Smallholder Survey, 1991

The marginal propensity to consume purchased food and non-food commodities is relatively higher for non-cashew selling households than for cashew selling households in both districts. Thus, cashew production and marketing does not appear to strengthen consumption based household linkages with the local economy.

4.3 CONSUMPTION GROWTH LINKAGES: RELAXING THE FOOD MARKET CONSTRAINTS

We found in rural Nampula that as income per capita increases, demand for all food rises. But, demand for cereals and fish rises faster. Given the rural Nampula socio-economic setting, cereals and

fish are labor intensive in their production (they are produced by the smallholder sector, which rely basically on family labor force). Thus expanded demand for these commodities may stimulate increases in cereals production and fishing given the appropriate policy strategy to improve food markets and support the smallholder sector.

If households increase their cereals and fish marketing, these households raise their cash income which is likely to be spent on other agricultural goods and in the non-agricultural sector, creating a chain of growth linkages. The size of this consumption multiplier effect depends on the initial consumption expenditure pattern and on the supply response of the agricultural and non-agricultural sectors.

How does the marginal propensity to consume different goods change as we move from low to high income classes? Table 4.3 presents marginal budget shares by income quartile in Monapo and Angoche.

Key results for Monapo are, first, that total food share does not change much as income rises, but cash food is subistituted for own produced food.

Second, the cassava budget share decreases as income rises as expected. Finally the fish share increases with income until the last quartile, were it inexplicably falls.

For Angoche we find first, that the own food share does not change with income, but cash food increases sharply in highest quartile, so total food also rises. This result is derived by a large increase in the fish share at this income level. These results confirm those presented earlier in this paper and continue to be difficult to explain. Second, cassava falls as income increases, as found also in Monapo.

So what we conclude?

TABLE 4.3 MARGINAL BUDGET SHARES BY EXPENDITURE QUARTILE IN MONAPO AND ANGOCHE

Expenditure Category	Monapo				Angoche			
	1	2	3	4	1	2	3	4
Cereals	15.2	25.4	15.5	27.7	13.3	15.1	26.7	19.2
Beans	6.3	3.0	2.3	2.9	2.5	2.8	2.8	2.2
Cassava	34.9	19.8	22.5	14.5	23.0	23.9	10.9	19.1
Fish	10.5	13.2	33.4	12.2	27.7	28.3	13.8	38.9
Meat	2.1	2.6	3.2	2.4	2.0	3.0	2.0	3.6
Other food	10.9	12.1	8.2	18.9	9.2	9.1	17.9	10.2
Total Food	80.0	76.3	85.9	78.8	78.6	83.1	74.2	93.8
Own Produced Food	59.0	48.5	44.1	48.6	43.7	47.2	40.3	45.2
Cash Purchased Food	21.0	27.8	41.8	30.2	34.9	35.9	33.9	48.6
Non-Food	20.0	23.7	14.1	21.2	21.4	16.9	25.8	6.2

Source : Nampula Smallholder Survey, 1991

Higher income households do not have significantly stronger consumption growth linkages than the lower income households. At least the difference between higher and lower income households is not as large as one might have expected. This could be explained by the widespread market failure in the survey area, meaning that income alone does not have the impact we expected. The institutional setting is crucial, as demonstrated by the past impact of cotton. Having a secure market outlet as well as access to improved food and non-food markets for purchases (these are facilitated by the company and made more possible by the fact that a relatively larger number of people in a small area have significant cash income) makes a big difference. This emphasizes the importance of investment in farm and non-farm enterprises, as well as infrastructure.

Cotton production and marketing (controlling for income) has more impact more than income it self. The importance of relaxing the current food markets constraints is crucial for increasing consumption growth linkages. Investment in roads and other rural infrastructure, the reestablishment of credit programs to local traders and the smallholder sector would substantially contribute to food market efficiency, by reducing the cost of entry and the transactions costs of operating in these markets.

The consumption expenditure pattern on the non-food subgroup, can be seen as household income leaking from the local area, because almost all commodities included in this subgroup are not currently produced locally. But they could be as the economy improves, if investments are made to facilitate small scale off-farm industry. However, on the other hand, rising demand for non-food commodities is required hence provides

stimulus to agricultural marketing and expands household opportunities to diversify income.

4.4 SUMMARY OF FINDINGS

The analysis of consumption expenditure pattern in rural Nampula has revealed a number of key lessons. First, increased smallholder cotton production has the potential to significantly increase consumption growth linkages with local farmers and other sectors of the economy. These linkages are originated by the rise in demand for purchased food particularly cereals and fish, and also non-food commodities.

Second, the increase in demand for cash purchased food which is associated with cotton production and with increased incomes in Monapo promotes agricultural marketing, and contributes to raise the income of net food selling households, fishermen and local traders. Third, changing the distribution income at the margin does not change significantly the demand for purchased goods.

Fourth, households selling cashew do not have larger marginal propensity to consume goods purchased in the market. Fifth, although this study can not conclusively report about the effect of consumption growth linkages on local employment, given the structure of smallholder agriculture production, we believe that increased demand for food will generate more demand for labor, one of the most important household resources.

Finally, to maximize the potential growth linkages derived from household consumption expenditure pattern requires the establishment of appropriate policies and strategies which lead to a relaxing of the

current product and labor market constraints and an improvement in the institutional framework to support smallholder production and marketing.

CHAPTER 5

CONCLUSIONS AND POLICY IMPLICATIONS

5.1 SUMMARY OF RESEARCH FINDINGS

The principal purpose of this study was to understand consumption expenditure behavior in rural Nampula and to identify household characteristics which have strong impacts on household consumption expenditure patterns, in order to present broad policy and investment priority proposals, which may have potential to promote local growth.

Descriptive analysis of the survey data reveal a picture of general poverty, with household per capita income below $US 100.00 estimated for more than two thirds of surveyed population in Monapo and Angoche. Income distribution inequalities are moderate what is typical for rural SSA. Estimated Gini coefficients are 0.376, 0.318, and 0.361 for Monapo, Ribaue and Angoche respectively.

In addition to extensive tabular analysis, Engels curves were derived using a semi-log function and including a vector of household characteristics. This particular functional form was selected due it's simplicity and the fact that it ensures that the marginal propensities to consume add up to one (Engels aggregation). In general, both tabular and econometric analysis gave similar results.

The average household allocates a very high proportion of consumption expenditure to own produced and consumed food, revealing a strong "food-first" subsistence strategies on the part of farmers. Food produced and consumed accounts for almost 60% of total household expenditure in Monapo and 47% in Angoche.

Total food expenditure shares are very high in both districts. Average budget shares for the average household are 80% in Monapo and 74% in Angoche. These values are comparable to those estimated for rural Zambia (83.25%) by Cellis and Bliven (1991) and for Nigeria (80.66%) by Hazell and Roell (1983).

Marginal food budget shares in both districts are also quite high. If the average household receives an additional income of 1000.00 Meticais, *ceteris paribus*, 773 Meticais will be spent on food in Monapo, and 849 Meticais in Angoche.

Increases in household income move people away from own produced food into cash purchased food in both districts. Total food shares do not change significantly. Regarding specific foods, as income increases the average household substitutes out of beans and cassava into cereals and fish in both districts.

Expenditure elasticities of demand for food estimated at mean per capita income are high, and particularly very high for cereals and fish.

Cereals and fish are classified as luxury goods as their expenditure elasticities were found to be 1.36 and 1.18 in Monapo, and 1.09 and 1.60 in Angoche. The strong demand for fish as income increases may partially explain the elasticity of demand for food greater then one in Angoche.

In Monapo cotton income moves people away from own produced food and toward cash purchased food. So cotton income holding total income and other household characteristics constant, acts in the same manner as total income, increasing linkages with the local economy.

The impact of cotton income, *ceteris paribus*, on changes in household consumption behavior out of food into non-food items is captured in Monapo, but is significant only at α=0.136.

Cashew income surprisingly has little impact on household consumption expenditure behavior. The hypothesis associating household cashew income with changes in household expenditure behavior, with income and other household characteristics constant, particularly the expected positive impact of cashew income on food purchases and non-food budget shares, is not supported by research results in either district. However households selling cashew have relatively higher income then the non selling cashew households. This result suggests failure of the cashew marketing institutional support.

The results obtained in this study support in statistical sense the hypothesis that cotton growing households in Monapo have relatively high marginal propensities to consume purchased food and non-food items. Therefore these households are associated with potential consumption growth linkages to the local economy.

Household access to land has the expected effect of increasing own food shares and decreasing cash food shares.

Households have in general similar demographic characteristics, although households growing cotton tend to have relatively large families. Regression results did not successfully capture household demographic characteristics strongly and consistently associated with changes in household expenditure behavior in both districts.

5.2 RESEARCH IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Household consumption patterns are important indicators and determinants of the structure of economic activity. The study of household consumption expenditures helps to explain the structure of final demand, and of demand patterns across households as income varies,

and can provide some guidance on how the economy is likely to develop as income increases in the future.

The study results indicate the importance of supporting the cotton smallholder schemes, and fishing and of promoting policies for the improvement of labor and product markets.

The development challenge faced by the country depends on the development of rural small farmers. Given the current extent of market failures and the level of poverty, policies which encourage the diversification of activities in rural Nampula should be promoted. Rural households should have more opportunities to earn cash income and strengthen household market oriented strategies. Hence, policies oriented towards developing non-farm activities as a complement to the effort to develop agriculture have to be pursued (Reardon, 1992).

Projects to rebuild the rural infrastructure, feeder roads, small-scale agroprocessing industries, and small scale non-agricultural business deserve high priority. These investments would create more rural employment, diversify and increase farmers incomes and strengthen agriculture and non-agriculture growth linkages.

Small traders have an important role to play in the rural development. Policies and projects which aim to facilitate the rural market transactions are very important. The reestablishing of credit to local traders and farmers could improve long term market performance and contribute to diversification of activities in rural areas.

Consumption expenditure patterns in rural Nampula did not show clearly the average household preference for beans as income increases. Beans are an important source of protein, hence it seems reasonable to continue promoting this crop to improve rural households diets,

particularly given the scarcity of meat, fish, eggs and other foods with high protein content.

The above suggestions are based on this study, which is partial and has limited scope. Furthermore, we should recognize the study limitations due to the model assumptions and data limitations, particularly the influence of zero expenditures on some goods.

The importance of consumption expenditure studies goes beyond the information about household demand patterns. More complex income-consumption functions can be estimated and provide insights about linkages between income and the pattern of demand, which reflect the structure of industrial and agricultural output and back to employment and income linkages. These formulations can be used in planning and demand projections.

We suggest that different model specification of Engels curves, be explored and functional forms which can more specifically capture labor market linkages.

Alternative formulations of household characteristic variables may be tried to see if they are more successful in capturing the effect of household demographic characteristics on consumption expenditure patterns.

APPENDICES

APPENDIX A1

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN IN MONAPO DISTRICT

	0 child	1 child	2 children	3 children	4 children	5 children	Σ(n)	Σ(%)
1 Memb	10						10	9.9
2 Membs	12	4					16	15.8
3 Membs	4	10	3				16	15.8
4 Membs	4	7	11	1			24	22.3
5 or + Membs	2		10	15	9		38	36.2
Σ(n)	32	21	24	16	9	1	104	
Σ(%)	31.3	20.1	23.2	15.7	8.3	1.4		100

Source: Nampula Smallholder Survey,1991

APPENDIX A2

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN IN RIBAUE DISTRICT

	0 child	1 child	2 children	3 children	4 children	5 or + children	Σ(n)	Σ(%)
1 Memb	2						2	1.8
2 Membs	7	2					9	9.8
3 Membs	6	5	1				12	13.2
4 Membs		1	13	1	1		15	16.4
5 or + Membs	5	5	14	20	10	4	55	58.8
Σ(n)	19	13	27	20	11	4	93	
Σ(%)	20.8	13.5	28.9	21.2	12.4	3.2		100

Source: Nampula Smallholder Survey, 1991

APPENDIX A3

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN IN ANGOCHE DISTRICT

	0 child	1 child	2 children	3 children	4 children	5 or + children	Σ(n)	Σ(%)
1 memb	4						4	2.9
2 membs	18	2					20	14.0
3 membs	7	27	5				39	28.2
4 membs	4	15	17	1			38	27.0
5 or + membs	3	4	12	10	3	1	3	27.9
Σ(n)	36	48	34	13	3	4	139	
Σ(%)	26.0	34.4	24.7	9.7	2.1	3.2		100

Source: Nampula Smallholder Survey, 1991

APPENDIX A4

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN AMONG COTTON GROWING HOUSEHOLDS

	0 CHILD	1 CHILD	2 CHILDREN	3 CHILDREN	4 CHILDREN	5 OR + CHILDREN	Σ(n)	Σ(%)
1 MEMB	1						1	1.6
2 MEMBS	6	1					7	9.2
3 MEMBS	1	6	1				8	10.2
4 MEMBS	4	3	15	1			23	27.9
5 OR +	2	1	15	16	7	1	42	51.2
Σ(n)	15	11	31	17	7	1	82	
Σ(%)	18.1	13.8	38.1	19.8	8.4	1.8		100

Source: Nampula Smallholder Survey, 1991

APPENDIX A5

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN AMONG NON-COTTON GROWING HOUSEHOLDS

	0 CHILD	1 CHILD	2 CHILDREN	3 CHILDREN	4 CHILDREN	5 OR + CHILDREN	Σ(n)	Σ(%)
1 MEMB	15						15	5.8
2 MEMBS	31	6					37	14.8
3 MEMBS	16	36	7				59	23.5
4 MEMBS	5	19	27	1	1		53	20.9
5 OR +	6	8	20	32	15	7	89	35.1
Σ(n)	73	70	54	33	16	7	254	
Σ(%)	28.8	27.5	21.3	12 9	6,4	2.9		100

Source: Nampula Smallholder Survey, 1991

APPENDIX A6

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN AMONG CASHEW SELLING HOUSEHOLDS

	0 CHILD	1 CHILD	2 CHILDREN	3 CHILDREN	4 CHILDREN	5 OR + CHILDREN	Σ(n)	Σ(%)
1 MEMB	11						11	7.3
2 MEMBS	18	3					21	13.9
3 MEMBS	8	24	4				37	24.3
4 MEMBS	6	13	14	1			34	22.5
5 OR +	2	1	12	19	8	4	48	32
Σ(n)	46	43	30	20	8	4	152	
Σ(%)	30.6	28.3	19.7	13.3	5.5	2.7		100

Source: Nampula Smallholder Survey, 1991

APPENDIX A7

HOUSEHOLD DEMOGRAPHIC COMPOSITION

HOUSEHOLD SIZE AND NUMBER OF CHILDREN AMONG NON-CASHEW SELLING HOUSEHOLDS

	0 CHILD	1 CHILD	2 CHILDREN	3 CHILDREN	4 CHILDREN	5 OR + CHILDREN	Σ(n)	Σ(%)
1 MEMB	5						5	2.7
2 MEMBS	19	5					24	13.0
3 MEMBS	9	18	4				31	16.9
4 MEMBS	2	9	28	1	1		42	22.7
5 OR +	6	7	23	28	14	5	83	44.8
Σ(n)	41	38	55	29	15	5	184	
Σ(%)	22.5	20.8	30.1	15.9	8.0	2.6		100

Source: Nampula Smallholder Survey, 1991

APPENDICES

APPENDIX B1.

REGRESSION RESULTS, MONAPO

DEPENDENT VAR.	INDEPENDENT VAR.	COEFF.	SIG. t.
FDBSHARE			
	DUMMY_NT	-0.0567	0.2017
	PWMHH	-0.0211	0.7903
	COTSHARE/DUMMY_CT	-0.1057	0.1355
	DUMMY_FC	0.0210	0.5590
	FAREA_PC	0.0107	0.7264
	HHAGE	0.0014	0.1448
	HHED	0.0046	0.6177
	CAJSHARE/DUMMY_CJ	0.1013	0.3323
	LNTOTEXP	-0.0279	0.2270
	HMEM	-0.0135	0.1857
	DUMMY_GR	-0.0156	0.7611
	Constant	1.1694	0.0000
	Adj. R Sqr.	0.1244	0.0143
FCBSHARE			
	DUMMY_NT	-0.1299	0.0095
	PWMHH	0.0838	0.9224
	COTSHARE/DUMMY_CT	0.2239	0.0051
	DUMMY_FC	-0.0658	0.1019
	FAREA_PC	-0.0858	0.0127
	HHAGE	0.0001	0.9146
	HHED	0.0039	0.6994
	CAJSHARE/DUMMY_CJ	0.0679	0.5581
	LNTOTEXP	0.0729	0.0053
	HMEM	-0.0011	0.9224
	DUMMY_GR	-0.0366	0.5202
	Constant	-0.4493	0.1536
	Adj. R Sqr.	0.2818	0.0008
FOBSHARE			

	DUMMY_NT	0.0732	0.2915
	PWMHH	-0.1049	0.3987
	COTSHARE/DUMMY_CT	-0.3297	0.0035
	DUMMY_FC	0.0868	0.1250
	FAREA_PC	0.0964	0.0453
	HHAGE	0.0013	0.3901
	HHED	0.0006	0.9443
	CAJSHARE/DUMMY_CJ	0.0334	0.8378
	LNTOTEXP	-0.1009	0.0061
	HMEM	-0.0124	0.4358
	DUMMY_GR	0.0211	0.7926
	Constant	1.6188	0.0004
	Adj. R Sqr.	0.2191	0.0003
CEBSHARE			
	DUMMY_NT	-0.0001	0.9990
	PWMHH	0.0606	0.4986
	COTSHARE/DUMMY_CT	0.0221	0.7812
	DUMMY_FC	-0.0818	0.0461
	FAREA_PC	0.0066	0.8477
	HHAGE	0.0021	0.0650
	HHED	-0.0021	0.8348
	CAJSHARE/DUMMY_CJ	0.0133	0.9099
	LNTOTEXP	0.0635	0.0162
	HMEM	0.0191	0.0975
	DUMMY_GR	-0.0429	0.4585
	Constant	-0.6385	0.0470
	Adj. R Sqr.	0.1246	0.0144
BEBSHARE			
	DUMMY_NT	-0.0126	0.6132
	PWMHH	0.0083	0.8530
	COTSHARE/DUMMY_CT	-0.0532	0.1835
	DUMMY_FC	0.0304	0.1370
	FAREA_PC	0.0305	0.0793
	HHAGE	-0.0006	0.2963

	HHED	0.0043	0.4033
	CAJSHARE/DUMMY_CJ	-0.1495	0.0126
	LNTOTEXP	-0.0324	0.0143
	HMEM	-0.0078	0.1744
	DUMMY_GR	0.0159	0.5824
	Constant	0.4636	0.0044
	Adj. R Sqr.	0.0904	0.0454
CSBSHARE			
	DUMMY_NT	0.0820	0.1503
	PWMHH	0.0005	0.9958
	COTSHARE/DUMMY_CT	-0.1474	0.4966
	DUMMY_FC	0.1006	0.0310
	FAREA_PC	0.0484	0.2162
	HHAGE	-0.0009	0.4966
	HHED	-0.0022	0.8500
	CAJSHARE/DUMMY_CJ	0.2086	0.1206
	LNTOTEXP	-0.1332	0.0000
	HMEM	-0.0139	0.2859
	DUMMY_GR	0.1071	0.1051
	Constant	1.6717	0.0000
	Adj. R Sqr.	0.3157	0.0000
FSBSHARE			
	DUMMY_NT	-0.0140	0.6335
	PWMHH	-0.0491	0.3514
	COTSHARE/DUMMY_CT	0.1043	0.0273
	DUMMY_FC	-0.0099	0.6770
	FAREA_PC	-0.0078	0.6993
	HHAGE	0.0008	0.1911
	HHED	0.0021	0.7227
	CAJSHARE/DUMMY_CJ	-0.0075	0.9130
	LNTOTEXP	0.0193	0.2090
	HMEM	0.0026	0.7021
	DUMMY_GR	-0.0481	0.1586
	Constant	-0.0979	0.6001

	Adj. R Sqr.	-0.0201	0.6242
CRBSHARE			
	DUMMY_NT	0.0097	0.5367
	PWMHH	0.0096	0.7340
	COTSHARE/DUMMY_CT	-0.0169	0.4995
	DUMMY_FC	0.0030	0.8116
	FAREA_PC	0.0161	0.1387
	HHAGE	0.0003	0.4077
	HHED	0.0007	0.8387
	CAJSHARE/DUMMY_CJ	-0.0440	0.2369
	LNTOTEXP	-0.0049	0.5499
	HMEM	0.0008	0.8272
	DUMMY_GR	0.0163	0.3723
	Constant	0.0381	0.7038
	Adj. R Sqr.	-0.0362	0.7601
OFBSHARE			
	DUMMY_NT	-0.1194	0.0004
	PWMHH	-0.0473	0.4145
	COTSHARE/DUMMY_CT	-0.0116	0.8218
	DUMMY_FC	-0.0198	0.4520
	FAREA_PC	-0.0836	0.0003
	HHAGE	-0.0004	0.6042
	HHED	0.0022	0.7461
	CAJSHARE/DUMMY_CJ	0.0827	0.2788
	LNTOTEXP	0.0597	0.0006
	HMEM	-0.0145	0.0516
	DUMMY_GR	-0.0616	0.1020
	Constant	-0.2708	0.1903
	Adj. R Sqr.	0.3153	0.0000
NFBSHARE			
	DUMMY_NT	0.0567	0.2017
	PWMHH	0.0211	0.7903
	COTSHARE/DUMMY_CT	0.1057	0.1355
	DUMMY_FC	-0.0210	0.5590

	FAREA_PC	-0.0107	0.7264
	HHAGE	-0.0014	0.1448
	HHED	-0.0046	0.6177
	CAJSHARE/DUMMY_CJ	-0.1013	0.3323
	LNTOTEXP	0.0279	0.2270
	HMEM	0.0135	0.1857
	DUMMY_GR	0.0156	0.7611
	Constant	-0.1694	0.5479
	Adj. R Sqr.	0.1244	0.0143
CFBSHARE			
	DUMMY_NT	0.0325	0.2528
	PWMHH	0.0322	0.5259
	COTSHARE/DUMMY_CT	0.0557	0.2180
	DUMMY_FC	-0.0114	0.6203
	FAREA_PC	0.0099	0.6098
	HHAGE	-0.0010	0.1294
	HHED	-0.0052	0.3751
	CAJSHARE/DUMMY_CJ	-0.0418	0.5311
	LNTOTEXP	-0.0166	0.2626
	HMEM	0.0039	0.5465
	DUMMY_GR	0.0220	0.5027
	Constant	0.2417	0.1820
	Adj. R Sqr.	0.0525	0.1384
EHBSHARE			
	DUMMY_NT	-0.0041	0.1712
	PWMHH	0.0015	0.7775
	COTSHARE/DUMMY_CT	0.0047	0.3248
	DUMMY_FC	-0.0005	0.8080
	FAREA_PC	0.0004	0.8296
	HHAGE	0.0000	0.6239
	HHED	0.0011	0.0685
	CAJSHARE/DUMMY_CJ	-0.0012	0.8623
	LNTOTEXP	0.0004	0.7859
	HMEM	0.0007	0.3177

	DUMMY_GR	-0.0011	0.7581
	Constant	-0.0055	0.7728
	Adj. R Sqr.	-0.0173	0.5995
OTBSHARE			
	DUMMY_NT	0.0284	0.1458
	PWMHH	-0.0126	0.8396
	COTSHARE/DUMMY_CT	0.0453	0.4143
	DUMMY_FC	-0.0102	0.7181
	FAREA_PC	-0.0210	0.3808
	HHAGE	-0.0001	0.5061
	HHED	-0.0001	0.9437
	CAJSHARE/DUMMY_CJ	-0.0583	0.4781
	LNTOTEXP	0.0441	0.0167
	HMEM	0.0089	0.2676
	DUMMY_GR	-0.0053	0.8446
	Constant	-0.4056	0.0699
	Adj. R Sqr.	0.0610	0.1098

APPENDIX B2.

REGRESSION RESULTS, ANGOCHE

DEPENDENT VAR.	INDEPENDENT VAR.	COEFF.	SIG. t.
FDBSHARE			
	DUMMY_NT	-0.0282	0.2669
	PWMHH	-0.0181	0.8085
	AZAMSHAR		
	DUMMY_FC	0.0012	0.9151
	FAREA_PC	-0.0034	0.9326
	HHAGE	0.0020	0.0184
	HHED	-0.0018	0.9343
	CAJSHARE/DUMMY_CJ	-0.0018	0.9795
	LNTOTEXP	0.1126	0.0000
	HMEM	-0.0168	0.0262
	DUMMY_GR	-0.0574	0.1742
	Constant	-0.5807	0.0463
	Adj. R Sqr.	0.1998	
FCBSHARE			
	DUMMY_NT	0.0098	0.7785
	PWMHH	0.0240	0.8154
	AZAMSHAR		
	DUMMY_FC	-0.0218	0.1537
	FAREA_PC	-0.0845	0.1247
	HHAGE	0.0033	0.0043
	HHED	0.0187	0.1065
	CAJSHARE/DUMMY_CJ	-0.1790	0.0625
	LNTOTEXP	0.1322	0.0001
	HMEM	-0.0164	0.1124
	DUMMY_GR	-0.1196	0.0401
	Constant	-1.2145	0.0027
	Adj. R Sqr.	0.1601	
FOBSHARE			

	DUMMY_NT	-0.0380	0.3088
	PWMHH	-0.0421	0.7018
	AZAMSHAR		
	DUMMY_FC	0.0230	0.1602
	FAREA_PC	0.0811	0.1683
	HHAGE	-0.0013	0.2773
	HHED	-0.0193	0.1179
	CAJSHARE/DUMMY_CJ	0.1773	0.0847
	LNTOTEXP	-0.0196	0.5660
	HMEM	-0.0004	0.9703
	DUMMY_GR	0.0622	0.3157
	Constant	0.6337	0.1378
	Adj. R Sqr.	0.0326	
CBBSHARE			
	DUMMY_NT	-0.0807	0.0032
	PWMHH	-0.1139	0.1524
	AZAMSHAR		
	DUMMY_FC	-0.0001	0.9313
	FAREA_PC	0.1089	0.0111
	HHAGE	0.0006	0.5152
	HHED	0.0002	0.9848
	CAJSHARE/DUMMY_CJ	0.0843	0.2547
	LNTOTEXP	-0.0022	0.9294
	HMEM	-0.0027	0.7374
	DUMMY_GR	-0.0026	0.9535
	Constant	0.2351	0.4442
	Adj. R Sqr.	0.0799	
BEBSHARE			
	DUMMY_NT	-0.0807	0.0032
	PWMHH	-0.1139	0.1524
	AZAMSHAR		
	DUMMY_FC	-0.0001	0.9313
	FAREA_PC	0.1089	0.0111
	HHAGE	0.0006	0.5152

	HHED	0.0002	0.9848
	CAJSHARE/DUMMY_CJ	0.0843	0.2547
	LNTOTEXP	-0.0022	0.9294
	HMEM	-0.0027	0.7374
	DUMMY_GR	-0.0026	0.9535
	Constant	0.2351	0.4442
	Adj. R Sqr.	0.0799	
CSBSHARE			
	DUMMY_NT	0.0366	0.1414
	PWMHH	-0.0127	0.8619
	AZAMSHAR		
	DUMMY_FC	0.0159	0.1444
	FAREA_PC	0.0135	0.7290
	HHAGE	-0.0002	0.8388
	HHED	-0.0025	0.7599
	CAJSHARE/DUMMY_CJ	0.1051	0.1238
	LNTOTEXP	-0.0694	0.0026
	HMEM	-0.0037	0.6132
	DUMMY_GR	0.0112	0.7853
	Constant	1.0043	0.0005
	Adj. R Sqr.	0.1734	
FSBSHARE			
	DUMMY_NT	0.0072	0.8217
	PWMHH	0.0564	0.5513
	AZAMSHAR		
	DUMMY_FC	0.0035	0.8038
	FAREA_PC	-0.1163	0.0227
	HHAGE	0.0034	0.0015
	HHED	0.0180	0.0918
	CAJSHARE/DUMMY_CJ	-0.2127	0.0169
	LNTOTEXP	0.1177	0.0001
	HMEM	-0.0154	0.1052
	DUMMY_GR	-0.1512	0.0052
	Constant		

	Adj. R Sqr.	0.1685	
CRBSHARE			
	DUMMY_NT	0.0182	0.1035
	PWMHH	0.0127	0.6980
	AZAMSHAR		
	DUMMY_FC	0.0093	0.0572
	FAREA_PC	-0.0256	0.1435
	HHAGE	-0.0003	0.4304
	HHED	-0.0002	0.9577
	CAJSHARE/DUMMY_CJ	0.0099	0.7439
	LNTOTEXP	0.0127	0.2107
	HMEM	-0.0045	0.1704
	DUMMY_GR	-0.0108	0.5576
	Constant	-0.1395	0.2712
	Adj. R Sqr.	0.0096	
OFBSHARE			
	DUMMY_NT	-0.0308	0.0848
	PWMHH	0.0807	0.1246
	AZAMSHAR		
	DUMMY_FC	-0.0115	0.1386
	FAREA_PC	0.0014	0.9588
	HHAGE	-0.0010	0.0948
	HHED	-0.0136	0.0220
	CAJSHARE/DUMMY_CJ	0.0242	0.6188
	LNTOTEXP	0.0247	0.1287
	HMEM	0.0017	0.7438
	DUMMY_GR	0.0585	0.0490
	Constant	-0.1787	0.3782
	Adj. R Sqr.	0.0737	
NFBSHARE			
	DUMMY_NT	0.0282	0.2669
	PWMHH	0.0181	0.8085
	AZAMSHAR		
	DUMMY_FC	-0.0012	0.9151

	FAREA_PC	0.0034	0.9326
	HHAGE	-0.0020	0.0184
	HHED	0.0007	0.9343
	CAJSHARE/DUMMY_CJ	0.0018	0.9795
	LNTOTEXP	-0.1126	0.0000
	HMEM	0.0168	0.0262
	DUMMY_GR	0.0574	0.1742
	Constant	1.5807	0.0000
	Adj. R Sqr.	0.1998	
CFBSHARE			
	DUMMY_NT	-0.0314	0.0546
	PWMHH	-0.0095	0.8428
	AZAMSHAR		
	DUMMY_FC	-0.0061	0.3918
	FAREA_PC	0.0175	0.4922
	HHAGE	-0.0004	0.4306
	HHED	0.0068	0.2071
	CAJSHARE/DUMMY_CJ	0.0986	0.0280
	LNTOTEXP	-0.0708	0.0000
	HMEM	0.0121	0.0123
	DUMMY_GR	-0.0072	0.7891
	Constant	0.9670	0.0000
	Adj. R Sqr.	0.1228	
EHBSHARE			
	DUMMY_NT	0.0170	0.0290
	PWMHH	-0.0359	0.1168
	AZAMSHAR		
	DUMMY_FC	0.0029	0.3991
	FAREA_PC	0.0017	0.8881
	HHAGE	0.0002	0.4107
	HHED	-0.0035	0.1674
	CAJSHARE/DUMMY_CJ	-0.0312	0.1429
	LNTOTEXP	0.0064	0.3675
	HMEM	0.0017	0.4531

	DUMMY_GR	-0.0136	0.2907
	Constant	-0.0688	0.4358
	Adj. R Sqr.	0.0805	
OTBSHARE			
	DUMMY_NT	0.0426	0.0528
	PWMHH	0.0635	0.3246
	AZAMSHAR		
	DUMMY_FC	0.0020	0.8306
	FAREA_PC	-0.0159	0.6442
	HHAGE	-0.0018	0.0145
	HHED	-0.0025	0.7239
	CAJSHARE/DUMMY_CJ	-0.0656	0.2740
	LNTOTEXP	-0.0482	0.0168
	HMEM	0.0030	0.6451
	DUMMY_GR	0.0782	0.0324
	Constant	0.6825	0.0069
	Adj. R Sqr.	0.1068	

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