



Market potential for Portuguese vinho verde

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MARKET POTENTIAL FOR PORTUGUESE VINHO VERDE

by

Aida Maria Gonçalves da Silva

A Thesis Submitted to the Faculty of the
DEPARTMENT OF AGRICULTURAL ECONOMICS
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA

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This thesis has been approved on the date shown below:

Eric A. Monke
Eric A. Monke

6-11-89
Date

Associate Professor of Agricultural Economics

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ABSTRACT

To evaluate the effects of recent legislation (1980's) and changes in economic incentives in the future performance of the vinho verde industry, three factors were examined: past trends in both production and consumption, past changes in prices for different qualities, and comparisons of the profitability of alternative technologies.

It was concluded that there is a free potential for future growth in the quality sector. Price trend analysis for different qualities is consistent with the expected growth. Envisaged changes in production patterns will bring increased revenues for the industry. However, if government intervention goals are to increase substantially industry profitability and farmers income, a balance between government incentives to expand the area of quality wine and government and private investment in market promotion are required. The non-adoption of marketing strategies to increase demand or a failure to promote quality wine demand will have negative effects on prices and on the industry profitability.

CHAPTER ONE

INTRODUCTION

1.1 PROBLEM STATEMENT

The vinho verde grape and wine sectors have been affected in the 1980's by new legislation and by changes in economic incentives designed to modify the structure of production at both the grower and processor level. Policy interventions, such as control over production potential and control over wine quality, are considered necessary, in part to rectify past policies that allowed a deterioration in wine quality. The new policy recognizes the international market and increasing demand for quality wines. Wine quality is considered by government and by agricultural technicians as the principal way to increase returns to farmers and processors in the sector.

Since the demarcation of the vinho verde region in 1908, the industry has been characterized by small growers, highly fragmented and diversified. Of the total wine production declared, more than 50 percent of grape growers in the region produce less than 25 hectoliters per year and more than 45 percent produce less than 10 hectoliters per year. In years of low production, the percentages can reach 90 and 50 percent respectively (Castro, 1984). These farmers produce a wide range of grape varieties, and wines have substantial variation in flavor, sugar, and alcohol content.

Some indication of the dispersion of quality is given by alcohol content. Rough estimations made of the 1981-82 harvest (CVRVV 1985) indicated that six percent of wine declared for sale had less than seven percent alcohol content. Under European Community (EC) regulations this

wine can only be used for home consumption, for the production of concentrated must or for distillation. Approximately sixty percent of the wines had alcohol contents between seven-eight and one-half percent for white and seven-nine percent for red. This wine can only be sold as ordinary table wine, and will not benefit from the VQPRD (Vin de Qualité Produit dans une Région Demarqué) designation. Thirty percent of the wines produced had more than eight and one-half percent alcohol for white and nine percent for red. Assuming that all other requirements are met, only this latter category of production is ready to be sold as a quality wine. These data underestimate the prominence of low quality, because only approximately 60 percent of production is declared. Most undeclared production is believed to be of very low alcohol content, and used only for home consumption.

New policies attempt to increase uniformity and quality by emphasizing vineyard registration. Vineyard registration is considered the key to the control of production and the monitoring of compliance with government regulations. The Comissão de Viticultura da Região dos Vinhos Verdes (CVRVV) is the official entity to enforce and implement policy. In the past, such policies have been unsuccessful, because growers have maintained traditional practices and wine producers have been oriented primarily toward local markets.

1.2 OBJECTIVES

One of the objectives of this thesis is to evaluate the relationships between consumer preferences, prices, and relative costs of producing different qualities. If quality has economic significance, then a separate demand schedule exists for each quality. Price

differentials between different qualities will be the result of levels of demand and supply for different qualities. If profit differentials are small, growers will respond with less concern for quality and will remain attached to traditional vine varieties and cultivation methods. If profit differentials are significant, the gains from adopting improved varieties will justify the investment needed for change.

A second objective of the thesis is to assess likely changes in future grower prices and the consequent implications for the profitability of grape production in the Entre-Douro e Minho region. Adopting improved varieties will lead to increased supply of higher quality wines, and therefore tend to lower all prices as well as change the price differential between qualities. A decline in the market price will have repercussions on grower incomes. To gain insight into these issues, the thesis provides an empirical description of the vinho verde industry at both grower and wine processor level. Trends in vinho verde production and consumption are then assessed, with special emphasis given to the export market. This information is used to analyze past price patterns by wine type and quality, and to make price forecasts.

These aforementioned estimates are complemented with estimates of the unit output cost of grapes produced under two different cultivation methods--the traditional "ramada" and the modern "cordão"--and estimates of unit processing cost for the main wine producing systems existing in the region--individual producer-bottler, cooperative winery, and private commercial firm. These estimates allow calculations of returns to growers from conversion to the various qualities that are likely to offer the most promising opportunities for growth.

1.3 SCOPE OF THE STUDY

The nature of wine as a product and the considerable product differentiation which characterizes the vinho verde industry give rise to a number of complications for the analysis. In the vinho verde region there are about 213,000 grape growers with an estimated area of 73,000 hectares. Wine production averages 460 million liters per year. Of total production, more than one-third is for home consumption (177 million liters) and about two-thirds (282 million liters) is marketed. About 56 percent of total sales is marketed without the official seal of the vinho verde commission, the entity that coordinates and control wine production in the region, (Table 1.1). The focus of this study, due to lack of access to reliable data, and to the relevance for industry performance, will be directed to production for the market.

The next chapter identifies the many factors affecting the vinho verde market. Included among these are the industry and market structure in grape production, wine processing, and wholesale and retail trade, and the nature of government intervention in production. Chapter three gives an overview of the conceptual economic theory needed to analyze product differentiation, which characterizes vinho verde. Selected empirical studies regarding the wine demand are reviewed in the context of their contribution to vinho verde industry.

In chapter four, consumer and market demand behavior are studied. If vinho verde price differences are based on quality, then price reflect demand for different attributes. Price analysis is used to describe the behavior of prices and to determine future trends. Trends in wine

Table 1.1 Vinho Verde Production and Consumption,
Averages for 1977/78-1981/82

	Quantity (liters)	Share of Production (%)	Share of Sales (%)
Total Production	458 561 000	100.00	
Home Consumption	177 001 000	38.60	
Total Sales	281 560 000	61.40	100.00
Sales With CVRVV Seal	124 486 360	27.10	44.00
Sales Without CVRVV Seal	157 073 640	34.30	56.00

Source: CVRVV, 1985.

demand with emphasis on the export market are also examined to assess their capacity to absorb higher quality and higher priced wines.

Chapter five analyzes profitability for different processing technologies and qualities of output, using data collected from a survey of a sample of wineries. Chapter six summarizes the entire study and provides conclusions regarding the effects of government intervention in the industry. The chapter links the demand-side and the supply-side, and discusses the manner in which increased supply of quality wines from government incentives will affect prices and therefore performance of the vinho verde industry.

CHAPTER TWO

THE VINHO VERDE WINE INDUSTRY

This chapter describes the vinho verde wine industry. The intent is to provide a picture of the structure of the sector in sufficient detail to support the analysis in later chapters. Vinho verde is produced in a demarcated region, even though almost 70 percent of wine produced does not meet the official requirements of that classification. Grape production is characterized by "mixed crop vineyards," in which other crops such as corn, potatoes and fodder are intermixed with plantings of grapes. This fact associated with an inadequate processing technology explains the dominance of low quality wines in production. In the 1970's and 1980's, the weak world market in ordinary table wines led both the Portuguese government and the European Community to intervene in the sector, trying to promote the potential for high quality wines.

2.1 MARKET STRUCTURE

GRAPE PRODUCTION. The grape production sector has characteristics associated with perfect competition, but with breakdowns in some of the usual assumptions. The sector can be described as "atomistic"--a large number of producers operating relatively small units. In the region there are about 213,000 grape growers with an area of 73,000 hectares, representing 25 percent of the agricultural area in the region. The vast majority, (81 percent) of growers produce less than 25 hectoliters per year (CVRVV, 1985). Average yields are 63 hectoliters per hectare, suggesting that 81 percent of producers have less than 4000 square meters of vineyard. These data understate the fragmentation of farm

structure, because they do not recognize growers who sell their production to private commercial firms or who are members of cooperatives and do not individually declare production. Another characteristic of grape producers is fragmentation of the vineyard among multiple small parcels of land (two-three on average).

For the vertically integrated grape and wine producer firms (cooperatives included), price depends on their own winemaking performance and marketing know-how. For the grape growers, whose market outlet is the wine industry, price is either negotiated in contracts between buyers and sellers by prior agreement or is declared by the regional winemakers. Grapes are differentiated by type, by expected alcohol content, and recently by variety. Nevertheless, growers have very little bargaining power and very little chance to dictate price.

Entry into production is under government control. Attempts to avoid surpluses, to increase quality of wine production, and to create profitable farming systems have led to several Portuguese and EEC regulations to control grape production. The government considers the market with respect to demand and supply and decrees an area for new plantings annually. Since 1985, new grape growers must have 10,000 square meters of contiguous agricultural land; the land must be located in adequate conditions for vineyard cultivation --climate, sun exposure and altitude; and growers are required to use varieties and planting techniques recommended by the regional Agricultural Ministry. Priority is given to growers with the best conditions for vineyard cultivation, to growers merging their land operation to facilitate mechanization, and to private producer-bottlers that market wine themselves.

The supply of farm land to purchase or rent is very limited. Land is a scarce resource and rental policies create significant disincentives for landowners to engage in formal rental contracts. Fears of lifetime tenancy and controlled rental rates, often less than 1 percent of the prices for land, provide strong disincentives for landowners to use the legal rental system (Monke in Pearson, et al. 1987). Vineyards are perennial crops, with returns over a long planning horizon, and thus usually require long-term leases. Acreage expansion is therefore linked to ownership patterns and to the naturally occurring opportunities for consolidation and merger.

Another characteristic of the grower sector is the pattern of production. Red varieties predominate over white varieties, with a 70 percent share of total production. The production share of white varieties is 12 percent; and the remaining 18 percent of production comes from non-grafted varieties. Non-grafted varieties are technically prohibited by international agreements. Wine produced from these vines is not only of inferior quality and difficult to store, but also health-threatening. Animal experiments by Spanish, French, German and Yugoslavian scientists, and empirical observations by physicians working in regions where this wine is part of the diet, indicate that this wine is a cause of liver disease and newborn malformations.

Recently, market trends favoring quality wines--particularly medium to dry white wines--have encouraged price differentiation by grape type and by grape quality. Table 2.1 presents average price differentials for white and red grapes for the period 1982 to 1987. In general, the price ratio for white and red has been quite stable. In 1987, many

Table 2.1 Average Price of Grapes by Type, 1982-87.

Year	White	Red	Price Differential ----- (Escudos/Kg) -----	White/Red Ratio
1982	38.00	22.00	16.00	1.73
1983	50.00	32.50	17.50	1.54
1984	50.00	27.50	22.50	1.82
1985	37.50	22.50	15.00	1.67
1986	37.50	22.50	15.00	1.67
1987	37.50	22.56	15.00	1.67

Source: Winery Survey, July, 1987.

buyers began offering a premium based on the expected alcohol content (Table 2.2). Price differentials increase from red to white and from lower to higher alcohol content. The highest prices are for white grapes with expected alcohol content of 10.5 percent and the lowest prices are for red grapes with seven and one-half percent alcohol content.

WINE PROCESSING. Traditionally, farmers processed wine in their homes, and virtually every grape farm had its own winery and cellar. Production was mainly for home consumption. Currently, the wine sector is in transition. The commercial wine making sector has both private and cooperative firms.

Several systems exist (Table 2.3). Two types of small-scale farmers are present. The most numerous produce wine from their own grapes. Output is usually of low quality due to the lack of adequate technology and poor quality grape varieties. These wine producers represent over 80 percent of total farmers and produce one-third of total output. Average output is below 25 hectoliters. Wine production is essentially for home consumption.

A second group of small farmers produce grapes of reasonable quality but without bottling facilities. They sell their output to cooperatives or private firms that make allotments and bottling. These wine producers represent approximately 14 percent of producers and produce 29 percent of total output. Output ranges between 25 and 100 hectoliters. Wine is either consumed at home or in regional markets.

Medium scale farmers produce good quality grapes, and have their own bottling facilities. Successive stages of grape production,

Table 2.2 Price per Kilo of Grapes by Type and by Alcohol Content, 1987

Alcohol Content (%)	White	Red
	(Escudos/Kilogram)	
10.5	50	30
7.5	25	15
	25	15

Source: Winery Survey, July, 1987.

Table 2.3 Structure of Vinho Verde Production Declared to Commission by Volume, average 1980-83.

Volume of Production (hectoliters)	Number of Producers	Share of Total (%)	Output Declared (thousand liters)	Share of Total (%)
less than 25	55155	84.29	54951	33.53
25 to 100	8902	13.60	47263	28.84
100 to 500	1261	1.93	22455	13.70
more than 500	114	0.17	39200	23.92
Cooperatives	21	0.03	16600	10.13
Others	93	0.14	22600	13.79
Total	65432	100.00	163869	100.00

Source: CVRVV, 1983.

wine processing and marketing are linked together. Vertical integration is motivated by the desire for total quality control and to retain value added within the firm. Two percent of wine producers are within this group (100-500 hl), and they are responsible for almost 14 percent of output. In 1985, thirty of these farmers founded an association-- Associação dos Produtores Engarrafadores de Vinho Verde (APEVV)--to encourage the maintenance of quality and the individuality of prestige wines produced and bottled by the growers at their respective estates. Wine produced on the old estates (quintas) exhibit the individual characteristics of the selected grape varieties, the soil, and the micro-climate, as well as those of the particular vintage (APEVV, 1987). The association also aims to increase market power and reduce marketing costs.

Large scale firms produce more than 500 hectoliters. This group includes the cooperative wineries, the private commercial firms (including a few quinta producers), and the large independent producers. Cooperatives offer small farmers a higher quality of processing. They use modern methods of wine making that small growers can not afford, and attain a high level of consistency and uniformity in the wine produced. Refined processing technologies in the cooperative wineries may result in a vinho verde that is 50 percent more valuable than the individually home processed product (Fox and Finan, in Pearson et al., 1987).

Besides standardization and quality control, cooperatives provide access to the market for high quality wines. Cooperatives return to the grower the profits from processing and marketing, including those that can be derived from success in producing and merchandising a branded

product. However, poor management, a lack of price incentives for grapes of different qualities, and lack of know-how has caused production of low quality wines in a great majority of cooperative wineries. Consequently, grape quality improvement has been a slow process. In 1983, 21 cooperative wineries were processing 10 percent of total output declared to CVRVV.

Private commercial firms, often family owned, and large independent producers make up the remainder of the sector, processing 14 percent of total output. Some firms process exclusively grapes from their own estates (large individual producer-bottlers), some process grapes from their own estate and neighboring farmers, and still others buy all their grapes from farmers. In some cases, these firms make long term contracts with small farmers.

WHOLESALE and RETAIL TRADE. The wholesale and retail trade is characterized by a large number of consumers and a few firms that control sales. The trade can be divided into four sub-sectors (Table 2.4). The dominant core consists of large firms producing low-price brands. The firms that do not produce wine buy juice in bulk from farmers, blend and allocate it in the production of different wines, and bottle the output. They have a market share of 46 percent, accounting for 47 percent of sales in the domestic market and 36 percent of sales in the export market. Another dominant group consists of a few large private commercial firms, accounting for 38 percent of total sales. They dominate the export market with 60 percent of total sales and approximately 35 percent of domestic sales. The cooperative sector, marketing 15 percent of sales, is important in the domestic market (17

Table 2.4 Market Share for Declared Sales Vinho Verde by Type and Agent, 1983.

Market	Agent	Red (hl)	Share of Domestic Market (%)	White (hl)	Share of Domestic Market (%)	Total (hl)	Share of Domestic Market (%)
Domestic Market	Producer-Bottlers	229	0.1	3038	0.9	3267	0.6
	Cooperatives	51015	24.6	42238	12.5	93253	17.1
	Private Commercial Firms Winemakers and Bottlers	32049	15.5	156304	46.3	188353	34.6
	Private Commercial Firms Non winemakers	121564	58.6	134815	39.9	256379	47.1
	Others	2427	1.2	1157	0.3	3584	0.7
	Total	207284	100.0	337552	100.0	544836	100.0
Export Market	Producer-Bottlers	9	0.1	90	0.1	99	0.1
	Cooperatives	348	2.7	648	1.0	996	1.3
	Private Commercial Firms Winemakers and Bottlers	8729	68.6	38048	58.3	46777	60.0
	Private Commercial Firms Non winemakers	3452	27.1	24590	37.7	28042	35.9
	Others	185	1.5	1919	2.9	2104	2.7
	Total	12723	100.0	65295	100.0	78018	100.0
Total	Producer-Bottlers	238	0.1	3128	0.7	3365	0.5
	Cooperatives	51363	23.3	42885	10.6	94248	15.1
	Private Commercial Firms Winemakers and Bottlers	40778	18.5	194353	48.2	235131	37.8
	Private Commercial Firms Non winemakers	125016	56.8	159406	39.6	284422	45.7
	Others	2612	1.2	3076	0.8	5688	0.9
	Total	220007	100.0	402848	100.0	682854	100.0

Source: CVRVV, 1983.

percent of total sales) but has a very modest position in the export market (about one percent). The APEVV fringe, selling prestige labels with high quality wines, accounts for only one-half percent of total sales in the industry.

2.2 POLICY ENVIRONMENT

Vineyard cultivation is influenced by government policy in most wine producing countries. Portugal was among the first to give special attention to a wine policy. The first region in the world defined as a demarcated region was the Douro region (neighboring on the region of vinhos verdes) in the eighteenth century.

In the beginning of the nineteenth century, the government declared a wine policy based on the demarcation of regions with autonomous organizations. This policy was seen as a way to promote wine quality and to insure a fair standard of living for the agricultural community. In 1908, the vinho verde region was created, recognizing the social and economic importance of wine to the agricultural community in the Minho region. The framework for the organization of the wine production and marketing was established in Dec. 10, 1926 by Decreto-Lei (DL) 12:866. The general contents of the regulation were as follows:

- The geographical delimitation of the region and the definition of specific sub-regions (Monção, Lima, Amarante, Basto, and Penafiel).

- The legal definition of vinho verde, as the table wine produced within the geographical limits of the region. Excluded were the wines produced from non-grafted varieties.

-- The maintenance of a detail registration of vineyards and wine. Producers above 10 hectoliters were required to declare production annually.

-- The prohibition of new plantings of non-grafted varieties, followed by a five-year period in which the remaining vines were to be grafted or uprooted.

-- The movement of wine was to be monitored by means of accompanying excise certificates.

-- The CVRVV was created to monitor, control, and implement the wine policy. The Commission has the responsibility to issue seals of origin, to keep statistics on production and on the movement of wine through merchants, to satisfy the technical needs of growers, to promote wine in the domestic and foreign markets, and to help set a policy for the sector.

A second group of measures came with DL 38:525 in 1951. The law was introduced as an interim measure, with the intent to revise regulations after studying their implications for wine quality. However, such revisions were not made until 1979. Specialized vineyards were prohibited under the law, and the transfer of vines to establish a contiguous vineyard were also forbidden. However, recognizing the social and economic contribution for the profitability of the traditional mix-crop farming system, new vineyards were allowed around crop fields, in pathways, patios and next to grapegrowers homes. This cultivation method was known the "ramada" system. This regulation created incentives for further fragmentation of the fields, maintenance

of traditional cultivation patterns, and the introduction of illegal vineyards. Improvement in quality became impossible.

In 1979, a new regulation was issued to enable more efficient wine planting and to remedy past policy failures. New vineyards, replantings and transfers of vineyards encouraged specialization. Fines are applied to growers who do not legally register their vineyards. Expansion in the sector is subject to control, and allows only for the production of high quality wines. Vineyards conducive to the production of low quality wines are not allowed. The expansion of vineyard area has been extremely slow. In 1984, 100 hectares of new vineyards were authorized and in 1985, 500 hectares.

Rules for enological practices and procedures are also imposed. The minimum alcohol content for white wines not enriched with concentrated grape must is eight and one-half percent; for white wines enriched with concentrated grape must, the minimum is nine percent; and for red wines, nine percent. For the wine to be sold under the regional designation, producers must also submit wine samples for analysis by the Commission.

In 1986, Portugal became a member of EC. Community policy recognizes differences between table wine and quality wines. The EC wine market fails to balance market supply with market demand, due to high intervention prices that lead to a production surplus. The surplus in the EC is of table wines without an approved quality designation, and measures are designed specifically to affect this sector of production. Programs such as guide, intervention and reference prices, and wine storage and distillation schemes have not led, however, to a market balance, and new recent measures have been adopted. These measures

consist of subsidies for vineyard removal, a freeze on guide prices (the basis for price support levels) for all types of ordinary table wines, more stringent rules on distillation, and more effective and balanced application of compulsory distillation to discourage the production of surpluses (Commission of the European Communities, 1986 report).

Because access to the table wine subsidies are so restricted, it is in the Portuguese interest to take advantage of the demarcated designation and make the most of the region's potential to cultivate grapes and wines that can be marketed as quality wines.

CHAPTER THREE

CONSUMER DEMAND FOR WINE

Chapter three consists of three sections. The first section presents the economic theory needed to analyze the demand for differentiated products. The second section reviews the analytic literature regarding the wine industry and the results of empirical research on wine demand. The third section summarizes the likely implications of empirical research for vinho verde demand.

3.1 DEMAND FOR DIFFERENTIATED PRODUCTS

Neoclassical demand analysis begins with assumptions that products are more or less standard. Products are considered homogeneous with broad substitution and aggregated in groups such as food, wines, and clothing. Demand is estimated under assumptions that allow treatment of aggregated products as a single one. The relationship between products depends on the preferences of consumers.

Theory has become increasingly complex over time, giving increased emphasis to the composition and quality of the product. Consumer choice depends on various characteristics of the product and so they become a relevant aspect of demand theory. A product is no longer considered in aggregate terms as a homogeneous product, but is treated in a disaggregated manner as a combination of objectively measurable properties. Some of the properties do not differ among various types of a commodity and therefore are irrelevant to consumer demand patterns for that commodity. Other objective properties can be relevant to choice for some individuals but not for others.

Properties relevant to choice are called "characteristics" and they explain why some products are close substitutes in the eyes of one person and not close substitutes to others. Choice is no longer based on the product itself but on the product characteristics. According to Lancaster (1971), the relationship between consumer and product is viewed as a two stage process. The first stage is composed of the relationship between products and their characteristics (objective and technical) and the second stage considers the relationship between characteristics and people (personal, involving individual preferences).

Market price for products with characteristics is jointly determined by consumer evaluation of the individual utility provided by each characteristic and by the suppliers' offering price for each characteristic. Consumers and producers are guided in their decisions by the entire set of implicit prices of characteristics. Implicit prices of characteristics are revealed to economic agents by observed prices of differentiated products and the specific amounts of the characteristics associated with each product.

The characteristics of a product are often used as a basis for defining quality. If quality has economic significance, then a separate market demand exists for each quality. Shifts in each demand curve are associated with income and price changes. In general, there is some substitutability among different qualities of the same product, even though each has some unique characteristics. Thus, the main demand shifter for a particular product is the change in price of its closest substitutes, and these are usually the other qualities of the same product. The various qualities typically have large positive

cross-price elasticities of demand with respect to each other; hence, the demand for each quality is usually more price elastic than that for the entire product. If there is considerable substitutability among different qualities, their prices tend to move together. If there is little substitutability among the different qualities, then a distinct demand curve exists for each quality (Tomek and Robinson, 1981).

The own price elasticity for a specific quality gives a measure of responsiveness of quantity demanded to own price, *ceteris paribus*. However, because markets for different qualities are interdependent, a change in the price of one quality results in a new structure of prices for all the qualities. Prediction of the full effect of an initial price change requires knowledge of all price elasticities of demand and supply for the set of competing qualities, including the quality in question. This interrelationship among prices leads to the idea of a total demand response and to the concept of total elasticity.

If the supply of a particular quality changes, a decrease in price occurs. But prices of other related qualities are also likely to decline. This is due to the fact that changes in quantity demanded for quality i is the result of the own-price elasticity plus the cross elasticity multiplied by the elasticity of the price of Q_j with respect to changes in the price of Q_i . The total own-price elasticity is adjusted for the cross effects.

$$\frac{dQ_i}{dP_i} = \frac{\delta Q_i}{\delta P_i} + \frac{\delta Q_i}{\delta P_j} \frac{\delta P_j}{\delta P_i}$$

where:

$$\frac{\delta Q_1}{\delta P_1} < 0 \quad , \quad \frac{\delta Q_1}{\delta P_j} > 0 \quad , \quad \frac{\delta P_j}{\delta P_1} > 0$$

The total elasticity is negative but smaller in absolute value than the own price elasticity. Total demand is more inelastic than when cross effects are not taken in account.

3.2 WINE DEMAND LITERATURE REVIEW

A major obstacle for empirical evaluation of the wine market is the heterogeneity of wine. In the past, wine was considered in aggregate terms, at both producer and consumer level. Today, even the casual wine consumer will agree that wine is a differentiated product with a package of characteristics that satisfy various objectives of the wine consumer. Wine attributes, such as regions' producing characteristics (climate, soil), vine varieties, cultivation methods, vinification procedures and marketing practices, like bottle image, are some of the factors that contribute to heterogeneity in the wine industry. The Lancasterian framework is a useful way to account for the heterogeneity of wine. Wine is a product that possesses several objective properties. The deeper is the knowledge of the wine consumer, the greater are the number of objectively observed characteristics, not to mention the subjective ones, such as prestige and bottle image.

Defining characteristics is very much an empirical matter, but attention usually focuses on properties that have a relatively high

weight in preference patterns. As it is inherent to the product, the wine characteristics exist in fixed quantities and the amounts of characteristics are not proportional to the quantities of the qualities. That is, characteristics are not additive, and the optimal combination of characteristics must be in a single-unit bottle. A 0.75 liter bottle with 12 percent alcohol content is not equivalent to two bottles of 0.75 liter with six percent alcohol

Furthermore, choice among various combinations of characteristics is not continuous. Each quality has a quoted market price associated with a fixed amount of characteristics, so that product markets reveal the relation between price of the product and characteristics. Market transactions in products are equivalent to tied sales when thought of as bundles of characteristics.

Research on consumer behavior suggests that there is some segmentation in the wine market. Research done in the U.S. shows that wine consumers are differentiated by major demographic characteristics such as income, education and family size, by wine products purchased and by intended use of those products (Folwell and Baritelle, 1978). Relative to nonconsumers, wine consumers are slightly further along in their life cycles, and have smaller families, more highly educated male heads of households, and significantly higher incomes. The most relevant factors upon which consumers base their decisions are brand name, advice of friends and relatives, price, label and flavor. Advertising, advice from wine critics and place of purchase are of less importance.

Gluckman (1986) indicates that the purchase decision takes place on two levels. First there are implicit considerations, those aspects where the preference option among those available is more or less fixed. The most important implicit considerations are color, package appearance, country of origin, and size of container. Implicit considerations yields a narrower range of options within which explicit considerations come into play.

Explicit considerations are those which consumers consciously weigh at each purchasing occasion: familiarity, price, quality and reliability, taste (especially sweetness or dryness) and suitability for all tastes. Recent studies, Folwell and Baritelle (1978), indicate that wine consumers are differentiated by drinking occasions, by type (price and quality) of wines, by consumer attitude, and by demographic types. Wine is also differentiated at the producer level. The change that has occurred in demand-supply relationship during the last decade has elevated the wine consumer to a position of unprecedented sovereignty and has forced wine producers to produce wine that better satisfies consumers. Producers have also an incentive to differentiate their products in order to gain some degree of monopoly power, although this power is limited by the existence of substitutes. Differentiation is viewed today as a key way to create marketing opportunities.

Little empirical knowledge exists about the relationship among elasticities for wine quality. Nevertheless, research shows some evidence that wines are heterogeneous in consumption, with different income and price responses for different types of wines. White and Blandford (1988) made econometric estimations of U.S. import demand for

the main U.S. wine competitors (Table 3.1). Per-capita import demand was estimated for four French quality wines: Bordeaux, Burgundy, wine from other demarcated regions (other AOC) and ordinary table wine (non-appellation). Demand for all qualities appears sensitive to changes in own-price and income. Ninety percent of demand variation is explained by own-price and per capita disposable income changes. A reduction in real price generates an increase in per capita consumption as does an increase in real disposable consumer income. Bordeaux wines are the least sensitive to price changes, and wines without a quality designation (non-appellation) have the largest price and income response. According to the authors, these latter wines have benefitted from image and product characteristics associated with French wines, and by being far less expensive than their appellation counterparts.

Similar estimations were made for two Italian wines: inexpensive wines of the Lambrusco type with no quality designation and a customs value of less than US \$4 per gallon, and more expensive wines produced in demarcated regions with a customs value over \$4 per gallon. As with the French wines, variation in real prices and incomes explain more than 95 percent of the variation in per capita demand. For the inexpensive wines, changes in consumer income do not appear to have a significant impact on consumption, and changes in price have an elastic demand response. Over time (1982-1984), demand response to price changes has declined. The authors' justification of this result is that the market for low cost Italian wines has become saturated. They appear to be suffering the most from competition with wine coolers and other beverages.

Table 3.1 Import Demand Elasticities

	Whole Period Price	Average Income	1982-84 Price	Average Income
French:				
Bordeaux	-0.96	3.06	-0.39	1.97
Burgundy	-1.27	2.75	-0.80	2.12
Other AOC	-1.53	0.99	-0.78	0.70
Nonappellation	-4.69	8.14	-1.67	3.61
Italian:				
Inexpensive (<\$4/gallon)	-3.08	0	-0.69	0
Expensive (>\$4/gallon)	-2.64	3.98	-2.64	3.98

Source: White and Blandford, 1988.

For the more expensive Italian wines, demand is very responsive to income changes, a result similar to that for appellation French wines. The similarity does not hold, however, with respect to price responsiveness. Consumer demand is highly responsive to changes in price, probably because Italian wines are less well-known to U.S. consumers and lack the brand loyalty of a Bordeaux or Burgundy. Because of their weaker marketing image, Italian appellation wines have consumption characteristics which are more similar to French non appellation wines than to French appellation wines.

Folwell and Baritelle (1978) also estimated demand for some U.S. wine types using data for 7,000 households specified by region. Table 3.2 shows elasticity coefficients for three types of wine: white varietal table wine, white nonvarietal table wine and red varietal table wine.

Varietal table wines contain at least 51 percent of the juice from a given variety of grapes, have less than 14 percent alcohol by volume, and are marketed under the variety name. Usually they are named after the wine-producing region. Nonvarietal table wines are blends of various varieties of grapes. In all the regions of the country where price elasticities for white varietal wine were estimated, the market demand was found to be inelastic with respect to price. Demand response to a price change for white nonvarietal and red nonvarietal depends upon region. In the East and West North Central, and Pacific regions, market demand for both wines was found to be inelastic with respect to price. Estimated cross price elasticities are small, but indicating some degree of substitutability with coefficients between 0 and 1.0 . A one percent

Table 3.2 Estimated elasticity coefficients for white varietal wine, white nonvarietal wine, and red nonvarietal table wine by

Region	White varietal			White nonvarietal			Red nonvarietal		
	Ep	Ey	Eij PR DTNVW PR DTVR	Ep	Ey	Eij PR DTW	Ep	Ey	Eij PR DTVR PR DTW
N. England	-0.363			-0.772	0.296		-1.223	0.151	
Mid Atlantic	-0.485	0.669		-1.038	0.378	0.230	-1.233	0.130	0.225 0.428
E.N. Central	-0.774			-0.809	0.339		-0.712	0.357	
W.N. Central	-0.791			-0.961	0.276		-0.906	0.144	
S. Atlantic	-0.714			-1.197	0.154		-1.012		
E.S. Central	-----	-----		-1.039	0.444		-0.786	0.121	
W. S. Central	-0.702	0.601		-1.017	0.247		-0.936	0.296	
Mountain	-0.682		1.124 0.634	-1.003			-1.092		
Pacific	-0.648	0.338		-0.790	0.433		-0.833	0.510	

Source: Folwell and Baritelle, 1978.

increase in the price of domestic white varietal table wine has almost twice the demand impact of a one percent increase in the price of red varietal wine. For white varietal demand it was found that a one percent increase in the price of domestic nonvarietal white table wine had twice the effect upon the demand for white varietal table wine as did an increase in the price of red varietal table wines.

In the regions where significant income coefficients were found, all the coefficients were positive, and in the range of 0 to 1.0.

Labys (1976) also estimated price and income elasticities of demand for wine for several countries. Consumption variables represent aggregate wine quantities rather than quantities of a particular wine quality or type. Results, presented in Table 3.3, show an inelastic response to price, except for Belgium, Italy and for U.S. imports. Income elasticity values found in countries with high per capita wine consumption--France, Italy, Portugal and Spain have consumption levels of 120.7, 110.7, 87.0 and 60.4 liters/capita, respectively--display income elasticities below 0.28. However, Belgium, the Netherlands and the U.S., with much lower levels of consumption (8.2, 1.5, and 3.7 liters/capita respectively), all have income elasticities above 1.8.

Lindsey's (1987) doctoral dissertation estimates United States wine demand for the period 1960 to 1984. Mean values for the period are shown in Table 3.4. The consumption variable represents the share of personal consumption expenditures allocated to wine. Expenditures elasticities were found to be negative at mean values (-0.31;-0.81), but, according to the author, after 1978 they become positive. The own-price elasticities become smaller (in absolute value) over the

Table 3.3 Demand Elasticities and Consumption Levels for Selected Countries, 1954-1971.

Country	Price Elasticity	Income Elasticity	Per Capita Wine Consumption (liters)
France	-0.06	-0.15	120.7
Italy	-1.00	0.28	110.7
Portugal	-0.68	0.05	87.0
Spain	-0.37	0.14	60.4
F.R. Germany	-0.38	0.51	13.7
U.S.:			
Domestic Price	-0.44	2.35	3.7
Import Price	-1.65	3.34	
Belgium	-1.14	1.81	8.2
Netherlands	-----	2.02	1.5
Australia	-1.0 to -3.2	1.0 to 2.0	6.3

Source: W. C. Labys, 1974.

Table 3.4 U.S. Wine Demand.

Dependent Variable - Share of Personal Consumption Expenditures
Allocated to Wine

Year	Income Elasticity	Price Elasticity	Cross Elasticity
Mean *	(-0.31;-0.81)	(-1.71;-2.35)	(1.40;1.96)

*Lower and Maximum values for 1960-84 period

Source: Lindsey, 1987.

Dependent Variable - Country Shares of Total Per Capita Wine
Expenditures

Country	Expenditure Elasticity	Price Elasticity	Cross Elasticity
U.S.	0.80	-0.63	----
France	2.42	-0.73	-1.25
Italy	0.63	-2.59	0.48
W. German	2.15	-0.01	-1.02
Spain	3.37	-1.19	-2.24
Portugal	1.79	-2.50	-2.50

Source: Lindsey, 1987.

period, but in all cases indicate that United States demand for wine is price elastic. The cross-price elasticity also declined over the period, as the expenditure share increased, with means ranging from 1.40 to 1.96. The positive relationship implies a substitution effect between prices of all other goods except wine and the share of personal consumption expenditures allocated to wine.

Lindsey also estimated a set of elasticities with the country share of total per capita wine expenditures as the dependent variable (Table 3.4). The wine expenditure elasticities for United States and Italian wines were inelastic, while demand for wines from France, West Germany, Spain and Portugal was expenditure-elastic. All own-price elasticities were negative, with inelastic demand for United States, French and West German wines. The cross price elasticities showed United States wines to be substitutes for Italian wines, with the remaining wines complements.

The country share results show that a one percent change in total per capita wine expenditures will have a relatively large impact on expenditures on wines from Spain, France, West Germany, and Portugal. Wines imported from these countries will benefit the most from an increase in total per capita wine expenditures.

Own-price elasticity results reveal that, for wines from U.S., France, and West Germany, price and total revenue vary directly. A price increase will increase total revenue and vice-versa. The situation for wines imported from Portugal, Spain, and Italy is different; price and total revenues vary inversely. A price increase

will decrease total revenue, and a price decrease will increase total revenues.

Gluckman (1986) reviews the factors leading to the growth in the total volume of wine consumed in the U.K. between 1972 and 1982. The increase in total wine consumption (47%) in this period is due to two separate influences. The first is the result of the large influx of new wine drinkers from the non consumer sector of the population. The second is the shift in consumer preference for light-bodied medium or medium dry white wines. French wines have lost their dominant market position in the United Kingdom in favor of German or German-type wines.

In the United States market the demand is also shifting towards low-alcohol-content beverages, but with exotic flavors. This trend is reflected in the boom of blush wines sales and their sales competitors -- wine coolers. In an attempt to meet consumer demands for lower alcohol wine, producers remove some of the alcohol from a finished wine or pick the grapes at lower sugar levels. For either process, the result is a lower alcohol wine (about nine percent) that lacks flavor (Restaurant Hospitality, 1986).

According to the Beverage Industry (1987), the average expected yearly growth in wine demand for the period 1985-95 will be 3.2 percent. The factors contributing to growth are: the age cohort of 30 to 45 years old will grow in number, disposable income is expected to grow, and busy lifestyles will contribute to increased dining out and sales of wine.

Table 3.5 shows shares of the leading imported wine brands in 1983-84. Among the top ten are two Portuguese wines, indicating that there is a segment of consumers already preferring Portuguese wines.

3.3 SUMMARY of EMPIRICAL STUDIES

INCOME ELASTICITY. The income-quantity wine demand relationship has been studied for some countries and for some types of wines. Demand for higher priced wines with a quality image well established among consumers, such as French wines, expensive Italian wines, and U.S. white varietal table wine, is more sensitive to income changes than is the demand for inexpensive wines and nonvarietal white and red wines. Income estimation for the inexpensive Italian Lambrusco type wines showed no response in demand to income changes. Market saturation for that type of wines is a plausible explanation.

Demand by country shows an inverse relationship between per capita consumption and demand response to change in income. The negative income elasticity for France and the low coefficients for Italy, Portugal and Spain seem reasonable since consumers have achieved near saturation in wine consumption and so buy other items when income increases.

In terms of expenditures, the U.S. results show that changes in total per capita wine expenditures will have a higher impact on expenditures in imported wines from Spain, France, West Germany, and Portugal. U.S. domestic wines and Italian wines are the smallest beneficiaries from an increase in total per capita wine expenditures.

OWN-PRICE ELASTICITY. In the U.S. market, elasticity coefficient by type of wine imported show that demand for quality prestige wines,

Table 3.5 Leading Imported Wine Brands
Estimated Share, 1983-1984
U.S. Market

BRAND	1984 RANK	IMPORTER/ COUNTRY	ESTIMATED SHARE	
			1983	1984
Riunite	1	Banfi/Italy	21.5%	19.1%
Cella	2	Jos. Garneau/Italy	5.0	4.5
Canei	3	Star/Italy	3.6	4
Bolla	4	Jos. Garneau/Italy	3.3	3.1
Folonari	5	21 Brands Italy	3.6	3.1
Top 5			37.0%	33.8%
Blue Nun	6	Schieffelin/Germany	2.5	2.3
Kreusch	7	L. Kreusch/Germany	2.5	2.3
Lancers	8	Heublein/Portugal	1.8	1.7
*Mateus	9	Sogrape/Portugal	1.9	1.6
Yago	10	Monsieur Henry/Spain	1.9	1.5
Top 10			47.3%	42.7%
Giacobazzi	11	Renfield/Italy	1.8	1.3
Principato	12	Palm Bay/Italy	1.0	1.3
Freixenet	13	Freixenet/Spain	1.0	1.1
Tosti	14	Tyfield/Italy	1.0	1.1
Partager	15	Seagram/France	1.1	1.1
Top 15			53.2%	48.5%
Other Imports			46.8%	51.5%
TOTAL IMPORTS			100.0%	100.0%

Source: Beverage Industry, 1987.

that have a brand identification and are produced in demarcated regions, have the lowest price sensitivity. For the Italian Lambrusco-type wines, demand is also inelastic because the market is saturated and there is little opportunity for a further increase in the per capita wine consumption in the U.S. wine market.

In countries with high per capita wine consumption, consumers have a low response to price changes. These consumers have a stable per capita wine consumption.

CROSS-PRICE ELASTICITY. In few estimations for the U.S. wine market was the price of a substitute wine type statistically significant in explaining the variation in quantity demanded. Of interest however, prices of varietal wines, white or red, seem to have a greater influence on quantity demanded of table wines (either varietal or nonvarietal), than nonvarietal wines. The cross elasticity of wine with respect to all other goods was found by Lindsey to be a substitution relationship. Estimation of wine demand response to changes in price for U.S. imported wines, shows United States wines to be substitutes for Italian wines, with the remaining wines complements.

3.4 LIKELY IMPLICATIONS FOR VINHO VERDE

In aggregate terms, demand for lower quality table wine is decreasing in countries with high consumption and is flat in countries with lower consumption; the demand for quality wines produced in demarcated regions and for premium varietal wine table wines is increasing; the per capita demand for wine is decreasing in countries with high consumption and is flat in countries with lower consumption:

and lighter white, lower alcohol wines are gaining popularity in many markets.

While wines produced in the demarcated regions of Douro (Porto) and Madeira are well-known in foreign markets and have a stable or increasing clientele, the situation with respect to table wines produced in other demarcated regions is significantly different. Foreign consumption for the latter wines have importance usually where Portuguese migration is important. In the domestic market, high per capita wine consumption does not allow for expectations of an increasing demand. The low own-price elasticity (-0.7) and low income elasticity (0.05) suggest that a price decrease in wine will have a small impact on quantity demanded, and market saturation explains the low sensitivity of demand to income changes. But increasing demand for vinho verde can, however, result from substitution effects. If the analysis of U.S. consumer demand holds true for Portuguese wines, then white quality wines may be considered substitutes of white and red ordinary table wines. It can also be considered a substitute for German type wines either produced in Germany, Italy, Spain or Yugoslavia, with the advantage of being produced in a demarcated region and therefore carrying the quality designation. The natural sparkling, light and fruity character of vinho verde may provide an advantage in gaining greater access to the U.S. market.

In the international market, there is a surplus for ordinary table wines and a promising market for quality wines. Vinho verde with characteristics associated with a quality wine have the greatest potential for expansion. Portuguese wines will benefit from an increase

in total per capita wine expenditures in markets like the U.S. Vinho verde with characteristics of a ordinary table wine, without a quality image, will face price and income insensitive consumers. A polarization in the vinho verde sector is likely to occur. On one side will be the high quality wine but still with no consumer loyalty and characterized by consumers who are sensitive to price and income change, whereas the lower quality wines will have to compete with ordinary table wines, in a market characterized by surpluses and low prices.

CHAPTER FOUR

DEMAND FOR VINHO VERDE

Chapter four has two main sections. The first section four discusses price differences for vinho verde associated with quality. Vinho verde is a product that differs in terms of such attributes as type, origin, and alcohol content. The second section provides analysis of the market for vinho verde consumption, with emphasis on the export market.

4.1 PRICE DIFFERENCES ASSOCIATED WITH QUALITY

DEFINING QUALITY

Vinho verde quality is associated with price and price reflects the most important characteristics such as type, wine producing agent, size of container, and certification of origin.

Type. Patterns of consumption demonstrate much change over time (Table 4.1). During the twenty-five year period (1962/63) to (1982/86), red wine production decreased about 50 percent, while white wine production increased almost 70 percent. Patterns of production are following sales trends; red wine sales decreased by 31 percent while white wine sales almost doubled. This changing structure of production and sales is the result of higher prices for white wine and a decline in demand for red wine. Preferences for white wine have grown stronger, extending across nearly all consumer groups, with the exception of the Minho region. Promotion of white wines is seen as the greatest growth opportunity in the current marketplace.

Wine Producing Agent. Consumer preference is divided into two major groups. One group associates quality with the grower and

Table 4.1 Vinho Verde Production and Sales Trends, 1962-1986.

(hectoliters)

Year	DECLARED PRODUCTION			CONTROLLED SALES		
	Total	Red	White	Total	Red	White
62-66	2 686 624	2 302 332	384 292	1 260 328	983 902	276 426
67-71	2 196 473	1 781 572	414 901	1 048 906	722 307	326 599
72-76	2 237 534	1 744 541	492 993	1 000 055	603 385	396 670
77-81	1 946 376	1 373 692	572 684	1 244 863	610 708	634 155
82-86	1 792 436	1 139 864	652 572	1 226 004	682 139	543 865

Source: Data for 1962-66 until 1977-81 collected from CVRVV, 1985
 Data for 1982-86 collected from CVRVV, 1987.

therefore prefers wine produced by the grower (winery grower and private producer bottle). The other group associates quality with technology and therefore prefers wine produced by winery cooperatives and private commercial firms.

Size of Container. Regional consumers purchase wine in bulk, while urban and foreign consumers prefer bottled wine. The preponderance of bulk sales, 80 percent of red and 68 percent of white (1980-1984), reflects the importance of the traditional marketing system, where large amounts of wine are sold from barrels in restaurants and taverns. Bottled wine has become an important indicator of quality.

Certification. Consumers interpret the official seal in the neck of a bottle as a symbol of product quality. The presence of the seal guarantees that the wine is a quality wine produced in a demarcated region. Of total sales, approximately 45 percent have the guarantee seal.

The considerable growth in demand for white wine, particularly in the export market, has led to shifts in vineyard acreage. Furthermore, with the application of EC rules to the Portuguese wine market, minimum quality standards on wine production and marketing will be enforced. The characteristics most affected will be vine varieties, alcohol content, packaging and labelling. Under the new legislation, wine produced in the region will be classified in two groups: quality wines sold under the designation of the demarcated region and ordinary table wines. Both VQPRD and ordinary table wines must be produced from recommended and selected varieties using cultivation techniques and

winemaking procedures recommended for the region, and must have at least seven percent alcohol content.

Studies made by CVRVV (1985) of alcohol content estimated that of the production declared for sale only 40 percent of white wine and 20 percent of red wine production will qualify for the VQPRD designation, and that 50 percent of white wine and 75 percent of red wine will be sold as ordinary table wine. The estimates of high quality production are probably overestimates because some wine has alcohol requirements above the minimum standard but is not made from recommended and selected varieties. These wines will be categorized as low quality. The remainder (approximately 10 percent of white wines and five percent of red wines) is considered unfit for the market. That is about 37 000 hl of red wine and 33 00 hl of white wine has less than seven percent alcohol content.

4.2 THE MARKET

Vinho verde is still a traditional drink among grapegrowers. Home consumption has decreased slightly in recent years, but remains very high, accounting for 37 percent of total wine produced. Most of this helps to explain why red wine predominates in production (>60%) (Graph 4.1). Estimated per capita consumption among growers and family members in the region (250 liters) is greatly above the country average per capita consumption (70 liters in 1980). This figure reflects not only consumption of the grower's family, but also gifts to friends and relatives living and working in the cities and abroad.

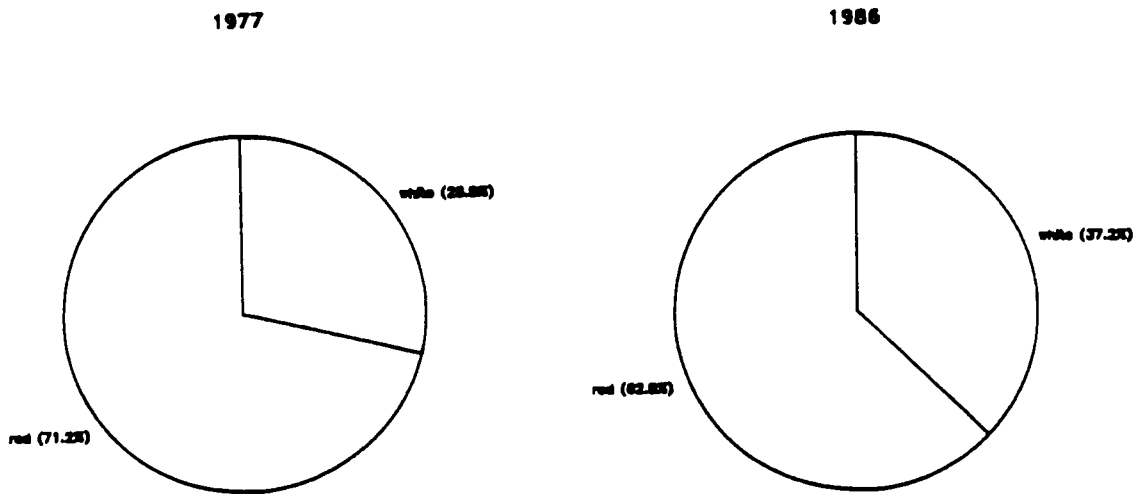
Market sales represent two thirds of production, and more than 90 percent of sales are in the domestic market. As can be seen in Graph

4.1, exports have been increasing over the 1977-86 period. In 1977 exports accounted for 2.7 percent of production; in 1986, the export share was about 6 percent. Graph 4.2 shows that the greatest part of vinho verde exports are of white wine. In 1977 the volume of wine exports was 4.5 million liters with 73 percent white wine and the remaining 27 percent red wine. By 1986 volume had risen by 125 percent, to nearly 10 million liters. White wine sales increased 83 percent and red wine sales decreased 17 percent.

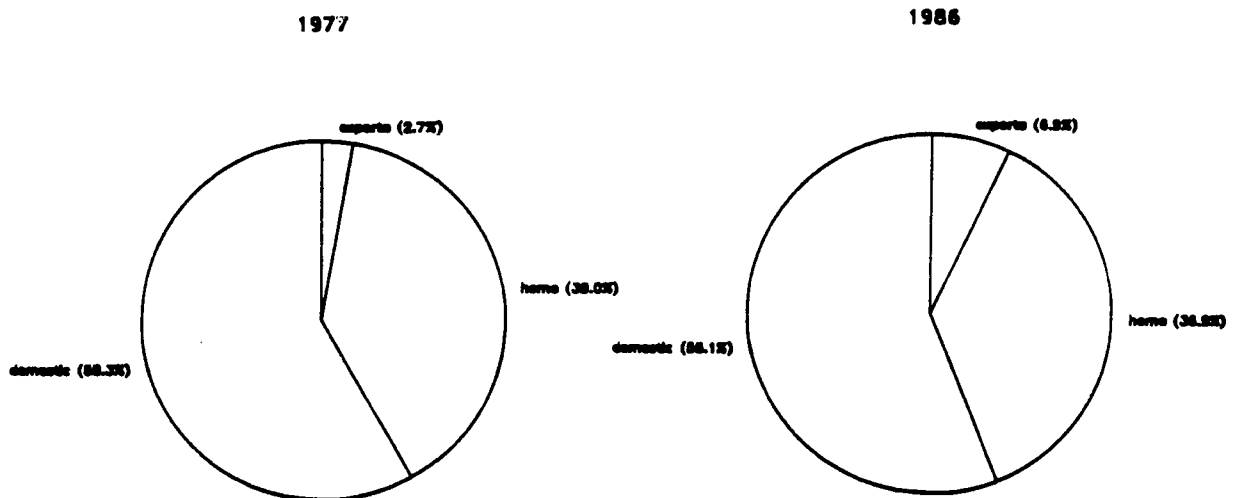
Vinho verde exports are primarily to European, American and African countries (Graph 4.3). Europe accounts for over 60 percent of total exports. With the exception of Italy, wine demand grew in most countries, particularly France and the United Kingdom. The latter two countries account for more than 50 percent of European imports. The United Kingdom change from a situation of a modest penultimate importer to second place during the period. North and South America is the second largest market, with a share of 31 percent. Brazil and the United States are the major importing countries in this group, with 82 percent of the total. Africa's market share of exports is near five percent, dominated by the former Portuguese colonies (69%) and by South Africa. Remaining imports are shared mainly by Macau and Australia. Graph 4.4 illustrates exports by continent and country.

Estimates of potential future export demand by country were calculated, based on trends in past periods. The quantity forecast used quantity as the dependent variable and time as the independent variable. The time period considered depended on how long the country has been an importer and on the availability of data. World exports

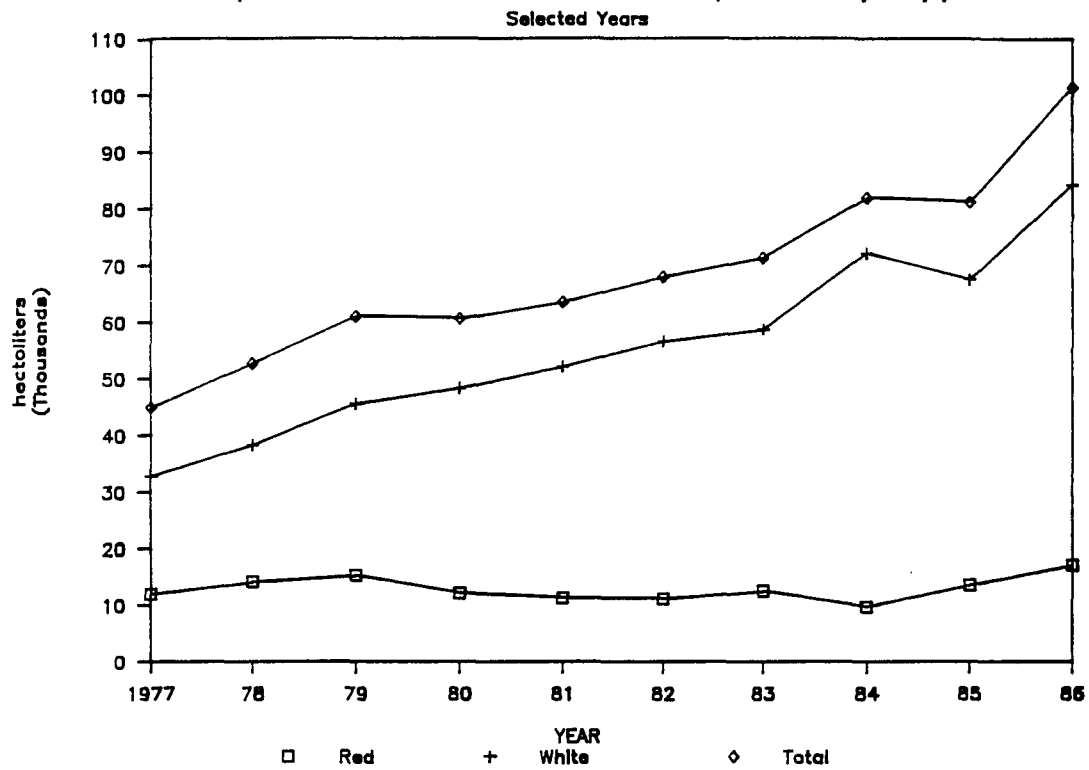
Graph 4.1
Production Share

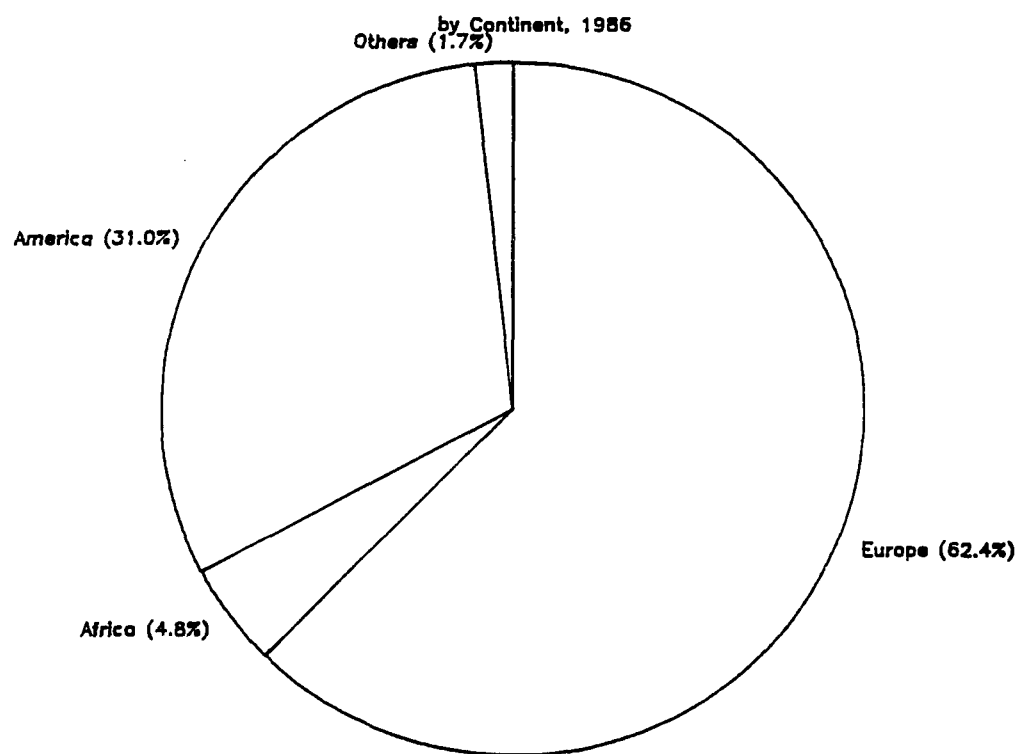


Market Share

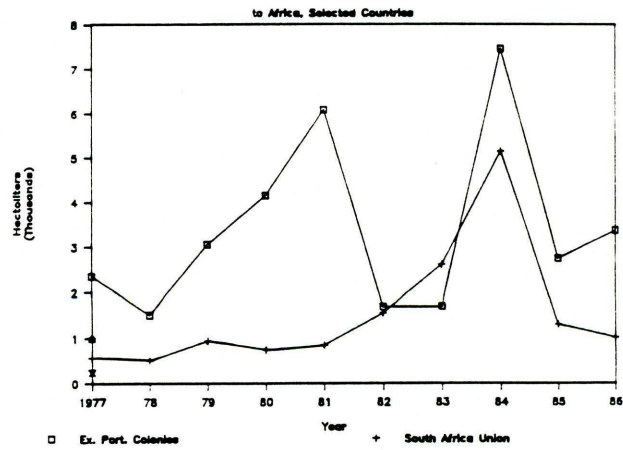
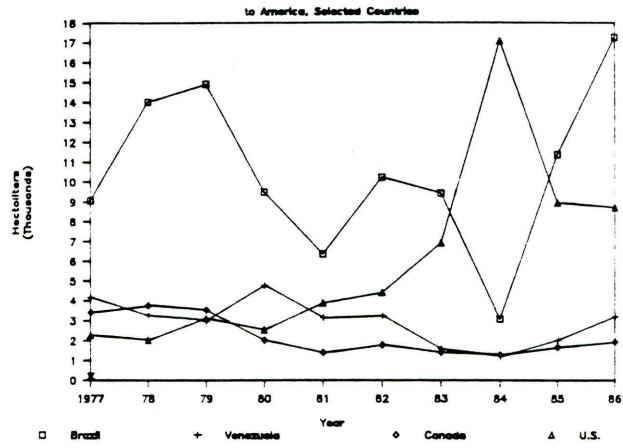
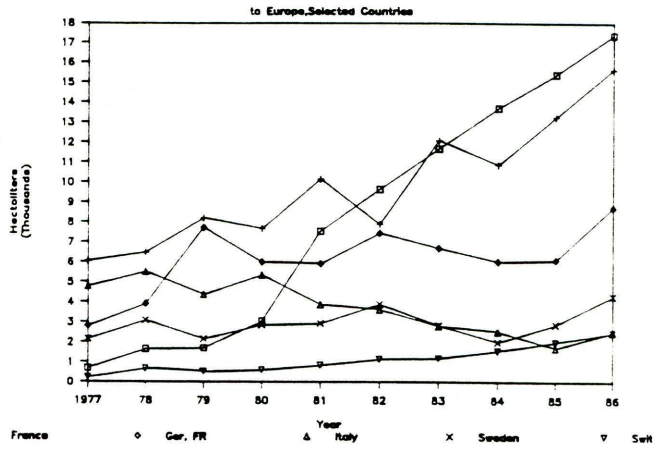


Graph 4.2 Vinho Verde Exports by Type



Graph 4.3 Vinho Verde Exports

Graph 4.4 Vinho Verde Exports
by Continent and Country (1977-86)



forecast was estimated for two situations. The pessimistic scenario uses patterns of exports for 1930-86 period. This trend probably underestimates export growth. The more optimistic forecast assumes that the recent trend (1977-86) will continue in the immediate future. Predictions of exports for 1995 are shown in Table 4.2. The more conservative scenario predicts a 13 percent increase in total export demand while the more optimistic scenario predicts an increase of 70 percent.

White wine exports are expected to account for all of the increase. Trends for red wine exports are opposite to white wine. Trends for red wine imports by country are as follows: in the United Kingdom, Italy, Sweden, Canada, and South Africa, red imports are expected to remain low or non-existent; Brazil, the only country where red wine imports ever exceeded white wines, is expected to decrease red imports; on the contrary Switzerland, a country with no red wine importing traditions, has become in the 1980's a net red wine importer (1985 and 1986); in the remaining countries the trend is either stable or slightly increasing.

The white wine export pattern is more consistent among countries. Looking at country trends, the future for white vinho verde seems promising in most major importing countries. Of particular importance are the United Kingdom and the United States markets. Regression equations results and graphic representation of world exports trends are shown in Appendix A.

Table 4.2 Actual and Projected Quantities for Vinho Verde Exports.

(hectoliters)

	Year	Red	White	Total
Actual	1985	13665	67639	81304
Estimated				
Using 1930-86 Trend	1995	18382	73165	91547
Using 1977-86 Trend	1995	14126	124125	138251

Source: Appendix A.

QUALITY DIFFERENCES IN VINHO VERDE

To select a sample of vinho verde wines, as representative as possible of the variation in the sector, specifications associated with wine producer and vine varieties were used. Five brands were selected, four white wines and one red wine. To maintain confidentiality, brand names are omitted.

Quality 1 represents wine produced by private producer-bottlers. The product is differentiated because the same entity produces the grapes, processes and bottles the wine, and markets the final product. Homogeneity and quality of grapes allows them to produce high quality wines and capture a particular segment of the market that contains high income consumers. Recently, some cooperatives have begun to engage in similar production, but only in small amounts.

Qualities 2 and 3 are produced by private commercial firms and cooperative wineries. Both differentiate their wines among multiple products. Grapes processed have a wide range of quality. Costs of production are not significantly increased by this differentiation, and processors can serve numerous segments of the market. Quality 4 represents wines produced with less quality control. Grape varieties or processing facilities are more traditional. In some cases, wines are bought in bulk from different producers and blended or bottled by the marketing agent. Quality 5 represents red wines produced by private commercial firms and cooperative wineries.

Published data about qualities is lacking, so personal estimates were made for the production declared to CVRVV in 1985.

Q1 -- 3 604 090 liters (5% of white wine declared for sale)

Q2 -- 7 208 180 liters (10% of white wine declared for sale)

Q3 -- 25 228 630 liters (35% of white wine declared for sale)

Q4 -- 36 042 300 liters (50% of white wine declared for sale)

Q5 -- 56 002 280 liters (40% of red wine declared for sale)

No information is available about whether demand for high quality wine is more or less price elastic than the demand for lower quality. However, because better quality wine has fewer substitutes, a smaller (in absolute terms) price elasticity of demand is expected. As White and Blandford show for the French and Italian wines, the higher the quality the lower is sensitivity to changes in prices. The best quality is also likely to have the largest income elasticity. Good quality wines have faithful consumers that are willing to pay the price for these wines, and their consumption is strongly affected by increases in income.

Supply is based mainly on current production and carryover from the previous year. Production tends to have substantial yearly variation because of weather and disease damage. Through time, the changing profitability of alternative qualities will also influence relative supplies. Supply of different wine qualities has been in the past highly price inelastic. The supply unresponsiveness to a fall in product prices is demonstrated by the stability over time of output of types Q4 and Q5. According to interviewees' opinions, Q4 and Q5 output remained about the same or even increased in the 1970's and early 1980's, despite the fact that prices were decreasing.

In the future, supply is expected to become more price responsive. EC aids to growers for vineyard conversion and abandonment will lead to

reduced production of low quality wines. Growers that face low market returns from grapes have an incentive to leave the sector.

Simultaneously, profitable alternatives from growing other than traditional crops in the region, and an expected increase in off-farm employment opportunities will encourage further exit of inefficient growers and further decreases in the production of low quality wines.

Expected future prices for Q1, Q2, and Q3 are likely to be increasing, at least in relative terms, and therefore will induce growers to adopt improved production techniques. Other things being equal, increasing price premia for these three qualities will shift resources towards their production. Expected low prices and wine policy will also discourage production of Q4 and Q5 varieties and wines. These variables will contribute in the long run to supply of red and low quality white wines.

PRICE DIFFERENTIALS

Time series of prices for the period 1978-87 represent the factory fob prices for a 0.75 liter bottle. Prices have increased greatly on a nominal basis over the period. Because inflation was also substantial during the same period, prices were adjusted for changes in the CPI (Table 4.3).

Year to year price variation reflects changes in annual production due to climatic conditions, changes in tastes and consumer preferences, and income changes. Quality 1 data is only available for a four year period, because previously the producer was not in the market. During that time, prices rose by 66 percent on a nominal basis and 13 percent in real terms. Qualities 2,3,4, and 5 display a different pattern,

Table 4.3 Average Nominal Prices for Vinho Verde by Quality

Quality	Volume (Liters)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
		-----Esc/.75 liter-----									
Quality 1	0.75							138.87	160.00	200.00	230.00
Quality 2	0.75	35.15	49.92	50.06	65.86	91.39	126.29	166.88	194.24	170.53	164.83
Quality 3	0.75	39.20	53.10	43.05	65.70	98.00	113.95	141.54	141.19	115.19	149.97
Quality 4	0.75	26.57	30.88	26.25	35.47	44.06	49.07	57.50	63.44	63.75	72.50
Quality 5	0.75	28.50	39.00	27.60	34.82	50.53	51.10	57.62	54.71	57.49	76.81

Average Real¹ Prices for Vinho Verde by Quality

Quality	Volume (Liters)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
		-----Esc/.75 liter-----									
Quality 1	0.75							185.68	178.83	200.00	210.39
Quality 2	0.75	160.94	184.89	158.97	174.28	197.00	217.63	223.13	217.10	170.53	150.78
Quality 3	0.75	179.49	196.67	136.71	173.86	211.25	196.36	189.25	157.81	115.09	137.18
Quality 4	0.75	121.66	114.37	83.36	93.86	94.98	84.56	76.88	70.91	63.75	66.32
Quality 5	0.75	130.49	144.44	87.65	92.14	108.92	88.06	77.04	61.15	57.49	70.26

¹ C.P.I. data from International Financial Statistics Yearbook, 1987. International Monetary Fund.

Source: Winery Survey, July, 1987.

increasing in nominal terms but decreasing in real terms. Quality 2 increases 369 percent from 1978 to 1987 on a nominal basis but declines 6 percent in real terms. Prices of quality 3 rose by about 283 percent on a nominal basis but decreased 24 percent in real terms. Quality 4 prices increased by 173 percent over the interval. After adjustment for inflation, price ended the period 45 percent below its 1978 level. Similar movements occurred for quality 5. Price rose by 170 percent on a nominal basis, but declined by 46 percent on an inflation-adjusted basis from 1978 through 1987.

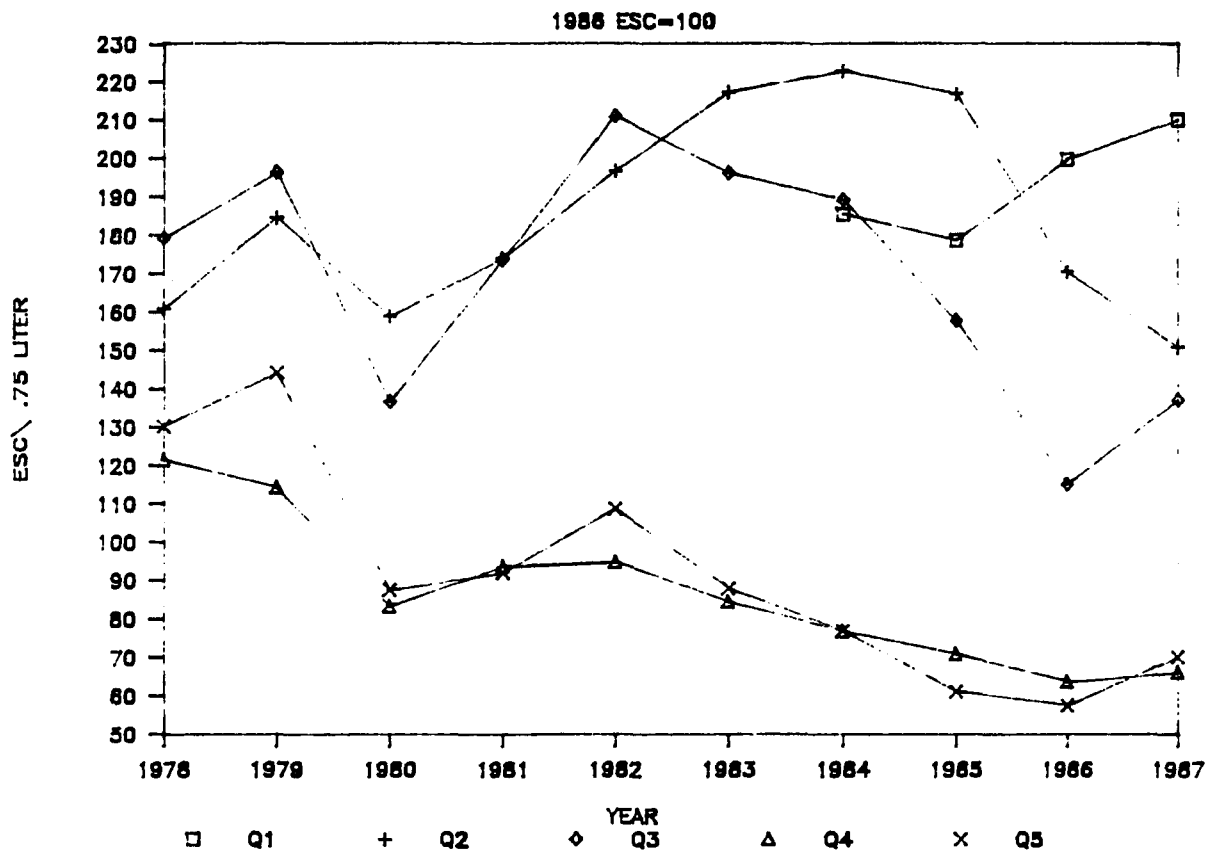
The price relationship between qualities is shown in Graph 4.5. Prices for quality 4 and 5 move together indicating that some degree of substitutability exists among them. Until 1984 red wine was preferred to the lower quality white wine, selling at a premium over white. But after 1984, red wine lost much of its popularity among domestic consumers. Red wine consumption is now limited to home consumption on the domestic market, and to the Portuguese emigrant community in the international market. Lower quality white wine appears to be suffering primarily from competition with other beverages.

To obtain an estimate of future wine prices, a quantitative analysis is based on the assumption that recent past trends will continue in the immediate future. A price forecast is done by estimating a trend with price as the dependent variable and time as the independent variable:

$$P_{q,t} = a - bT + u_t$$

where $P_{q,t}$ is the deflated (1986=100) price of wine in escudos for quality q in year t , T is the time trend, and u_t is the stochastic error

Graph 4.5 Vinho Verde Prices by Quality



term; a and b are parameters whose values are to be estimated. Ordinary least squares estimation was used. Regression results and graphical representation of actual and estimated prices can be seen in Appendix B. The prices forecast for 1995 are shown in Table 4.4.

4.3 CONCLUSIONS

Relative prices for the different qualities are following a divergent trend. In the decade 1978-87, two general movements are revealed an increasing or stable trend for high quality wines (Q1, Q2 and Q3) and a persistent decreasing trend for lower quality wines (Q4 and Q5).

The higher relative prices in the quality sector have been determined on the basis of competitive supply-demand relationships. Demand is increasing for quality characteristics, as urban and foreign consumers move away from low quality wines.

In the industry there has been a certain lag between wine prices and its influence in the quality of wines produced. The characteristic to which producers have been more sensitive is type. In the past 25 years white wine production increased by 70 percent, while red wine production delivered. As far as other quality characteristics are concerned, such as alcohol content and sugar content, grapegrowers made a trade-off between high yields and quality characteristics. Hence, although white wine production has increased, in terms of quality price has not served as a strong guide for planning future production.

In general wine drinkers are moving to quality wines produced in demarcated regions and to varietal wines. The increasing export trend for vinho verde if filled with quality wines, may capture consumers of

Table 4.4 Actual and Estimated Prices for Vinho Verde by Quality

	ACTUAL	ESTIMATED
	1985	1995
Q1	178.83	284.26
Q2	217.10	205.64
Q3	157.81	107.62
Q4	70.91	13.04
Q5	61.15	-10.50

Source: Appendix B.

similar wines or new consumers entering the market. However, in the years 1985-87, the prices of Q1, Q2, and Q3 have been decreasing slightly, and therefore it seems necessary to look for markets where the demand for vinho verde is increasing. Demand increases in these markets may keep prices from falling.

CHAPTER FIVE

WINE PRODUCTION COSTS

Production costs are fundamental to the analysis of efficiency in the wine sector. They are used to compare the expected profitability from alternative technologies and qualities of output, to detect economies of scale in operations, to understand domestic and international competition, at home and abroad, and to understand the effects of government policy on wine industry incentives.

Most small traditional farms are vertically integrated, with processing facilities for home consumption. An alternative system that has become increasingly popular among market-oriented farmers involves the separation of production and processing activities. Farmers produce grapes and leave processing and marketing to cooperatives or private commercial firms. Unit processing and marketing costs representative of these activities and for the recently created private producer-bottlers were estimated to provide inter-firm cost comparisons, to evaluate the benefits from economies of size, to analyze inter-technology differences in the distribution of the costs between farm and post-farm activities and to compare costs with those for other producing regions and countries.

5.1 REVIEW OF COST STUDIES

Pearson, et al. (1987) estimated the cost of grape production for three representative farming systems for the 1983 season. Vineyard systems were of three types. Type 1 is traditional, and the most widespread type of vineyard. It emphasizes red traditional grape varieties (90 percent of production) that are grown on elevated arbors

(ramadas). Vines are cultivated around the farm parcels or in terraces, leaving the area underneath free for cultivation of annual crops. Grapes are processed at home with a traditional technology and wine is sold in bulk in the local market. Type 2 is a farming system similar to the one mentioned above, with the difference that cultivated areas are better adapted to grape production, and grapes are processed in the local cooperative, taking advantage of improved processing technology. It is still a family labor intensive farming system. Type 3 is a cordão system, specialized in grape production. Vineyards are continuous and grow along short, vertical trellises that permit mechanization. Ninety percent of the vines are improved white varieties. Producers are market oriented, and grapes are processed in local cooperatives.

Sottomayor (1986) also surveyed three different farming systems, characterized by differences in production technology, type of grapes and ownership patterns. The methodology adopted was the same as in the previous work, but the author considered land costs in order to reflect ownership patterns. The first farming system is the most representative of the traditional systems in the region. Red grape varieties ramble over hedges, trees and patios. Landowner and tenant share output and costs (parceria). Usually the land owner is responsible for the purchase of all inputs required for the vines, except the labor that is provided by the tenant farmer and family. In exchange, the producer gives the land owner fifty percent of the grape production. For the crops cultivated underneath and between the vines the tenant usually pays a fixed rent.

In the second farm system, red grapes are cultivated with traditional technology but use the "ramada" support system. The farm is owner-operated, and labor is provided by the farmer and his family. To approximate the opportunity cost of land, the author used profits from the best alternative crop rotation (corn and rye grass). The third farming system is specialized in the production of white selected grape varieties under the cordão system. Vineyards are continuous and mechanized. Agricultural labor requirements are supplied by the local labor market. In this system, the opportunity cost of land comes from profits of an apple orchard.

Both studies show a wide gap in profitabilities among systems (Table 5.1). The highest private profits are associated with the modern production technology. In the Pearson, et al. results, specialization leads to lower per unit production costs and higher revenues. Lower costs are related to labor-savings (more than twenty percent) and to capital savings (about fifty percent) relative to the mixed-crop traditional system. Higher revenues are associated with price premiums to reflect market preferences for improved white grape varieties. The traditional family-oriented farms produce at a break-even point or at a small relative profit.

In the Sottomayor study, results are similar to those of Pearson et al. Total production costs are higher due to the inclusion of land costs. Specialized farms do not have lower production costs than the traditional systems, but still have higher profitability. The use of capital-intensive technology and the opportunity cost of land makes capital costs the highest among the systems, but these increased capital

Table 5.1 Cost Comparisons for Grapes and Wine, for Different Farming Systems in the Vinho Verde Region of Portugal

GRAPES

Source	Year	Farm System	Yield Kg/ha	Capital	Labor	Tradable Inputs	Cost	Revenues	Grape Profit	Conver. Ratio (1/kg)	Grape Profit (esc/1)
Pearson, et al.	1983	traditional ramada-home 1	11000	7.38	7.18	2.78	17.34	17.34	0.00	0.75	0.00
	1983	traditional ramada-coop 2	11000	7.59	7.26	3.44	18.29	20.81	2.52	0.75	3.36
	1983	modern cordão-coop 3	10000	3.92	5.44	5.42	14.78	39.17	24.39	0.75	32.52
Sottomayor	1985	traditional parceria ramada-home 1	10000	6.03	11.78	6.88	24.69	25.00	0.31	0.57	0.54
	1985	traditional ownership ramada-home 1	12000	11.67	9.80	8.01	29.48	25.00	-4.48	0.57	-7.86
	1985	modern ownership cordão-home 4	9000	16.06	11.38	8.13	35.57	40.00	4.43	0.58	7.64

WINE

Source	Year	Farm System	Capital	Labor	Tradable Inputs	Grapes	Cost	Revenues	Proc. Profit	Marketing Profit	Wine Profit
Pearson, et al.	1983	traditional ramada-home 1	4.91	1.73	0.86	23.12	30.62	25.65	-4.97	----	----
	1983	traditional ramada-coop 2	4.55	0.88	35.33	27.75	68.51	68.51	0	----	----
	1983	modern cordão-coop 3	4.54	0.88	35.36	52.22	93.00	93.00	0	----	----
Sottomayor	1985	traditional parceria ramada-home 1	2.48	3.18	0.09	43.86	49.61	48.14	-1.47	----	-1.47
	1985	traditional ownership ramada-home 1	2.16	2.97	1.38	43.86	50.37	48.14	-2.23	----	-2.23
	1985	modern ownership cordão-home 4	15.46	9.43	55.22	68.97	149.08	144.2	-4.88	7.56	2.68

1-vines produced under ramada system and wine processed at home

2-vines produced under ramada system and wine processed at the cooperative winery

3-vines produced under cordão system and wine processed at the cooperative winery

4-vines produced under cordão system and wine processed at home

Source: Pearson et al., 1987.
Sottomayor, 1986.

cost are more than compensated by the higher market price for selected white grape varieties relative to the price of red traditional varieties.

For traditional farmers with no off-farm employment opportunities, and with small parcels of land, the shift from traditional red grape varieties to premium white grape varieties can result in positive profits, even if technology is not changed from the "ramada" system. By maintaining the same technology, large investment costs associated with the removal of the "ramada" system structures are avoided; by shifting varieties, farmers benefit from the quality premium for white grapes.

Given these results, why has not the price system caused grape production to respond more to changes in demand preferences? According to the Pearson, et al. studies, expansion of the cordão system is constrained by both financial and ecological factors. The initial investment costs are very high, and most farmers do not possess the savings or the access to credit necessary to make these changes. Specialization in grape growing requires good farm land, a scarce resource in the Minho.

In wine processing, the traditional technology suffers negative profits. Negative profitability is caused by the low quality of production and reduced demand for red wine that is reflected in declining prices. During the first half of the 1980's, red wine was marketed at a price about two-thirds lower than white wine. Benefits will come to the farm only if wine is processed in a cooperative winery. In the Sottomayor study, negative profitability in processing is the result of less than full capacity utilization, below which costs are not

covered by revenues. Negative profits in modern wine processing are balanced by positive profits in bottling and marketing the product.

The competitive advantage of the cordão system relative to the traditional will be reinforced by expected future price changes. Prices for white grapes and quality white wine are expected to increase thereby increasing the competitiveness of modern farms and modern wineries. At the same time, the lower price level for red grapes and wine will further encourage some small farmers to stop grape production. The number of farmers that will go out of business will depend on the level and the structure of their costs. Small traditional farms in which family labor is a large component of cost may survive by "paying" themselves less than the market wage for family labor. But their significant cost disadvantage relative to modern farmers who are able to expand and specialize will lead some small farms to leave the industry.

5.2 WINE PROCESSING COSTS

The estimation of wine processing cost is fraught with difficulties. Major problems are to obtain a representative winery sample and to gather accurate data. Large producing firms regard cost and return data as proprietary and small producing units normally do not keep precise records. As Gates (1976) notes, to ask firms for their actual production costs runs the risk of providing grounds for serious concern if valuable, confidential information is divulged or inferred from the published results. To assemble the data that could fit the intentions of the study, a winery survey was made with the assistance of the CVRVV. Efforts were made to insure that the production cost data

provided by cooperating wineries would be as close as possible to reality. To minimize distortions, confidentiality was assured.

WINERY DESCRIPTIONS

Heterogeneity is a characteristic of the processing sector. Firms differ in output mix, production capacity, packaging of final output, and ownership patterns. Firms selected embody this diversity. Winery characteristics are described in Tables 5.2 and 5.3.

Firms A and B are similar. They are engaged in production of high quality white wine packaged in bottles of 0.75 liters. Both firms are vertically integrated, processing exclusively grapes produced on their own land. The major difference between these two firms resides in the winery production capacity. Firm A is a small firm, with a capacity of about 270 hectoliters; and firm B is a medium scale operation with a production capacity of 2000 hectoliters.

Firm C is a cooperative. Grapes come from cooperative members. It is a large scale operation with an annual production averaging 34000 hectoliters. Firm C produces a mixture of outputs: white wine, dry white wine, red wine, and brandy. Final output is sold either in bulk or in 0.35, 0.75, 1.00, and 5.00 liter containers.

Firm D is a private commercial firm also engaged in the production of a mixture of outputs: white wine, dry white wine, and red wine. Final output is packaged in 0.75, 1 and 5 liter bottles. The majority of the grapes processed by firm D are bought from small grape growers. This firm is a large scale operation, producing about 35000 hectoliters per year.

Table 5.2 Distribution of Output by Type of Wine and Winery, 1987

Wine Type	Winery			
	A	B	C	D
	(percentage of total output)			
White	--	--	91	28
Red	--	--	8	70
White Dry	--	--	1	--
Varietal *	100	100	--	2
Total	100	100	100	100

Source: Winery Survey, July, 1987.

Table 5.3 Distribution of Output by Bottle Capacity and Type of Winery, 1987.

Bottle Capacity	Winery			
	A	B	C	D
	(percentage of total output)			
0.35 white	--	--	1.8	--
0.35 red	--	--	2.1	--
0.75 white	100	100	22.8	7.2
0.75 red	--	--	11.4	2.9
1.00 white	--	--	5.7	79.8
1.00 red	--	--	25.1	2.5
5.00 white	--	--	0.3	5.1
5.00 red	--	--	29.2	2.6
In bulk white	--	--	0.8	--
In bulk red	--	--	0.8	--
Total	100	100	100	100

A - Small Individual Producer-Bottler
 B - Medium Individual Producer-Bottler
 C - Large Cooperative
 D - Large Private Commercial Firm

Source: Winery Survey, July, 1987.

All four wineries are involved in marketing of their output. Firm C also provides technical assistance to cooperative members and sells inputs necessary for vineyards, such as fertilizers and pesticides.

BASIC ASSUMPTIONS

For the sake of uniformity and inter-firm cost comparisons, attempts were made to standardize the cost and return data. The assumptions are that processing cost for white wine and red wine within each firm are the same; final output is sold in 0.75 liter bottles; costs other than those incurred in the processing, packaging, and marketing of wine can be omitted. Omissions included costs of vineyards for firms A and B, costs of technical assistance provided to grape growers, and costs incurred in selling agricultural products by firm C.

DATA ANALYSIS

The cost structure of wine production includes three categories of inputs: fixed input costs, intermediate input costs and direct labor costs. Fixed input costs represent the cost incurred by the firms regardless of changes in the level of activity. Firms may not produce at full capacity each year, yet fixed costs will remain constant. As production increases, the average fixed cost per unit will fall since fixed costs are spread over more units of output.

The annual capital cost of fixed inputs was calculated using the capital recovery factor method.

$$ACC = \frac{(1+i)^ni}{(1+i)^{n-1}} * \left(\text{Initial Cost} - \frac{S}{(1+i)^n} \right)$$

where i = rate of return to capital investment

n = useful life of the asset, in years

S = salvage value estimated at 10% of initial cost

ACC = annual capital cost

Processing costs are estimated under the assumption that processors are operating without any subsidy to investment. The private opportunity cost of capital is assumed to equal four percent (Pearson, Monke, and Avillez, 1985).

Intermediate input costs are costs that vary in proportion to changes in the level of activity. Intermediate input costs remain fairly constant on a per-unit basis. These costs include the annual repairs of fixed inputs, insurance, materials, and others costs related with production. It was assumed that annual repair costs are equivalent to two per cent of the total asset cost.

Direct labor includes all labor charges that are directly attributable to wine processing and marketing.

INTERPRETATION OF RESULTS

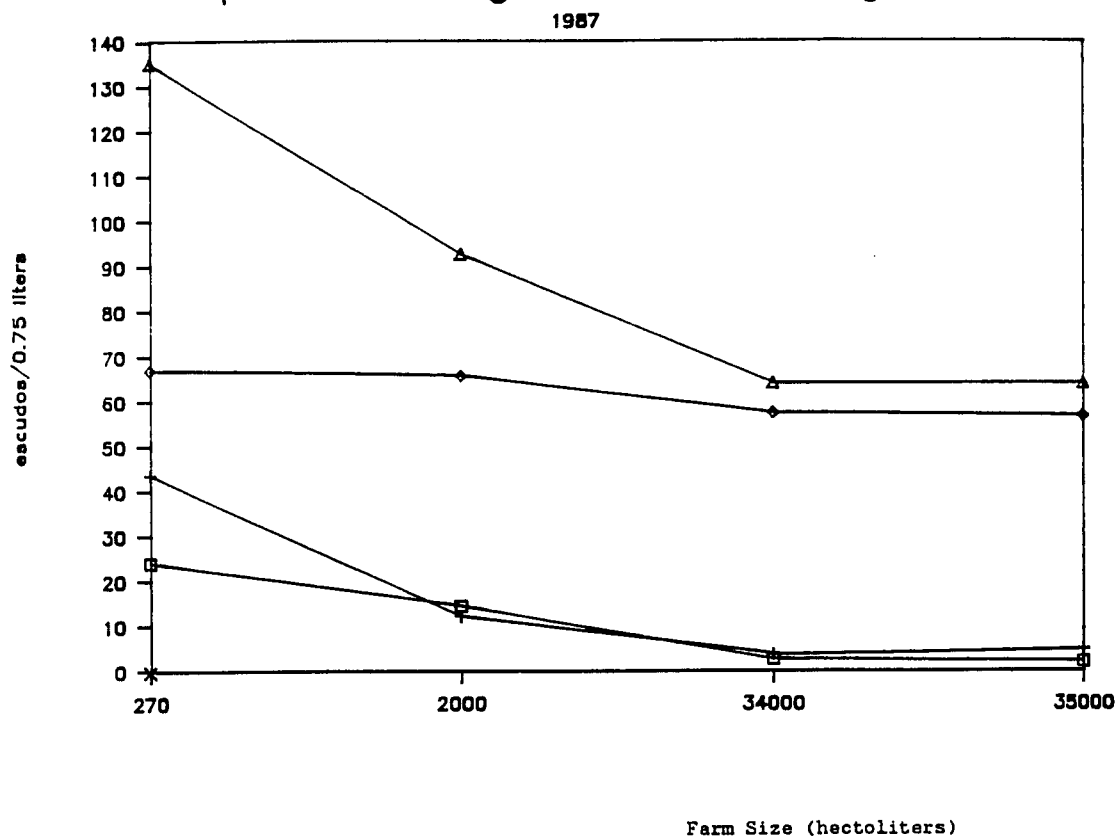
In the analysis of the cost information from the survey (Table 5.4), costs of production were found to be substantially lower for the larger firms. Large scale firms are producing at a fifty and thirty percent lower cost than the smaller firms A and B, respectively. In a graphic representation (Graph 5.1), with costs as the dependent variable and volume as the independent variable, a downward sloping cost curve is obtained. Fixed input costs and direct labor costs are the main determinants of the differences in unit cost among firms. The range in intermediate input costs (56.80-67.06) per bottle is small.

Table. 5.4 Wine Production Costs, 1987.

Firm	Output	Cost Category						
		Average Cost	Fixed Input	Share of Total Cost	Intermediate Input	Share of Total Cost	Direct Labor	Share of Total Cost
	(h1)	(Esc/.75)	(Esc/.75)	(%)	(Esc/.75)	(%)	(Esc/.75)	(%)
A	270	135.28	24.25	18	67.06	50	43.96	32
B	2000	92.84	14.66	16	65.81	71	12.37	13
C	34000	64.09	2.66	4	57.52	90	3.91	6
D	35000	64.06	2.11	3	56.80	89	5.15	8

Source: Winery Survey, July, 1987.
in Appendix C

Graph 5.1 Average Wine Processing Costs



+ Direct Labor

◇ Intermediate Input

△ Average Total Cost

□ Fixed Input

The distribution of average production costs into the three major components bears out the dominant role of intermediate inputs in processing costs, with a share higher than 50 percent. This component accounts for substantially more of the total as the volume of output increases. To obtain a competitive total unit cost, the smaller size producer must offset his higher cost of fixed and direct labor by using the winery at full capacity.

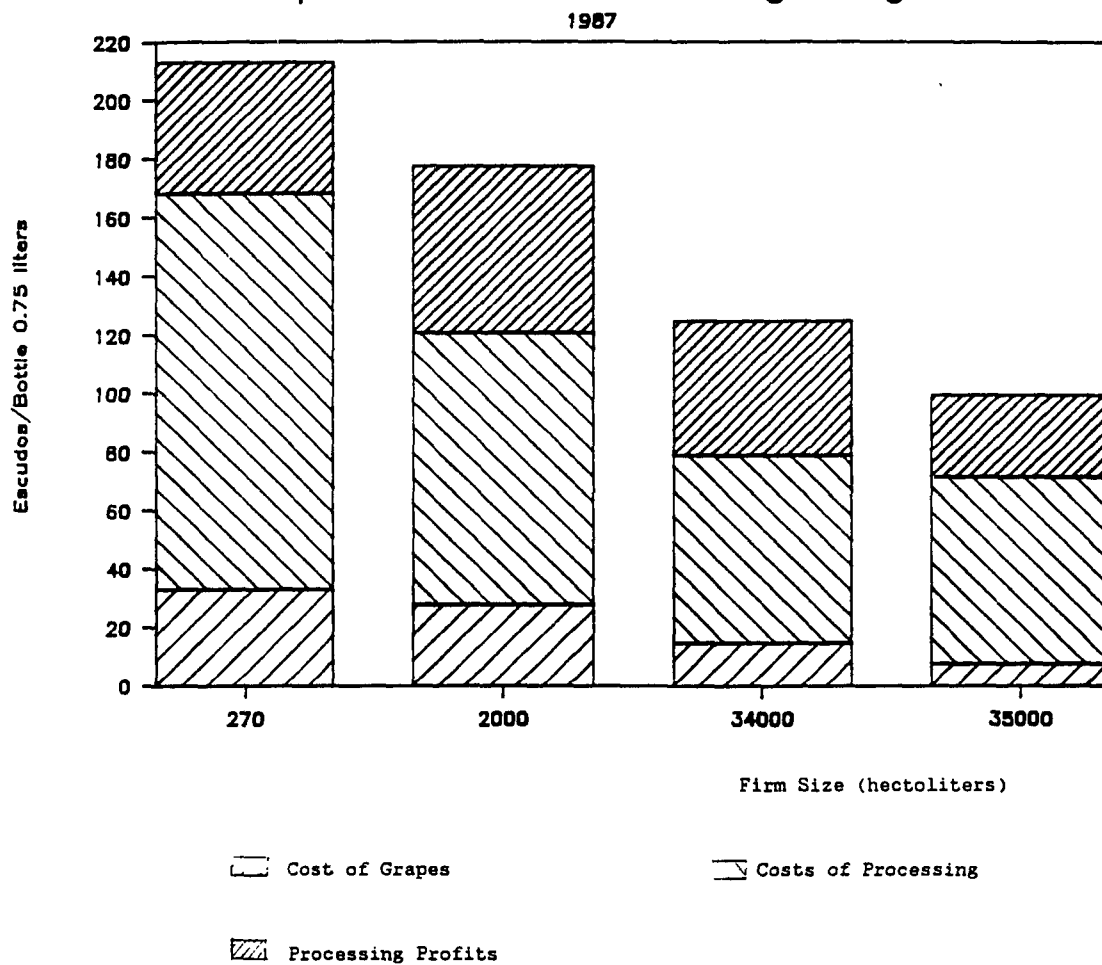
5.3 WINE MARKETING MARGINS AND FARMERS SHARE

The wine marketing margin is defined as the difference between the ex-winery price and grapegrower price. This margin is a return that the processing firm receives from transforming the raw product, grapes, into wine. As a margin, it includes profits as well as costs of fixed inputs, intermediate inputs and direct labor. Changes in processor margins reflect changes in processing cost, profits, or both.

Firms A and B are vertically integrated. Grapes are remunerated at a high price, reflecting a quality premium (50 escudos/kilogram). Gains from the value added in the processing stage also stay with the grape growers (Graph 5.2).

Grower-processor margins or price spreads are not simply the difference between the grower and processor wine price. Instead, the spread is the difference between the processor price per unit and the grower value of an equivalent amount of grapes sold by growers. In this case, the transformation ratio is 1 kilogram/.75 liter. Because wine is a highly processed product, grower margins are small relative to processor margins.

Graph 5.2 Wine Marketing Margins



The results of this study (Table 5.5) show the highest profitability for unit output for firms A and B. Vertically integrated firms producing high quality white wine earn higher profits from grape production and from processing. In the production stage, grapes receive 15 percent and 30 percent higher prices than the grapes used by firms C and D. Simultaneously, grape production costs are lower. In the processing stage firm B makes higher profits.

5.4 SENSITIVITY ANALYSIS

Because of the uncertainty about the rate of return to capital, a sensitivity analysis was done assuming an opportunity cost of capital of eight percent. In an economic growth simulation of the non-agricultural sector, Pearson, et al. (1987) argued that real rates of return to capital would be likely to increase as high as eight percent. Table 5.6 contains estimates of processing cost per bottle under the two assumptions: four and eight percent. For firms A and B, cost increments are about six percent and for the larger firms only about one percent.

Profits in the processing sector are also very much associated with utilized capacity. In 1987, firms were operating at about 50 percent of full capacity. Output expansion is a common goal for most wineries. Production costs at full capacity were estimated under the four percent rate of return to capital assumption. If firms could reach full capacity utilization, other factors remaining equal, unit production costs would be lower (Table 5.6). This is particularly true for the

Table 5.5 Costs, Returns and Profits, 1987.

Firm	A	B	C	D
	(Esc./ .75 liter)			
Winery Price	230.00	200.00	152.61	127.02
Total Cost	163.12	120.63	98.55	96.73
Total Profits	66.88	79.32	54.06	30.29
Farm Gate Price	50.00	50.00	42.50	35.00
Production Cost*	27.84	27.84	34.46	32.67
Profits	22.16	22.16	8.04	2.33
Processing Margin	180.00	150.00	110.11	92.02
Processing Cost	135.28	92.84	64.09	64.06
Profits	44.72	57.16	46.02	27.96
Grower Share of Profits (%)	33.13	27.94	14.87	7.69

Source: Winery Survey, July, 1987.

* Pearson et al., adjusted to 1987.

Table 5.6 Sensitivity Analysis: Processing Cost at Four and Eight Percent Rate of Return and at Full Capacity.

Cost	Firm	A	B	C	D
		(Esc./ .75 liter)			
Cost at 4% and 1987 Capacity		135.28	92.84	64.09	64.06
Cost at 8% and 1987 Capacity		143.80	99.21	65.06	64.79
% Change in Cost		+6.30	+6.86	+1.51	+1.14
Cost at 4% and 1987 Capacity		135.28	92.84	64.09	64.06
Cost at 4% and Full Capacity		117.34	83.51	61.57	61.44
% Change in Cost		-17.94	-9.34	-2.52	-2.62

Source: Winery Survey, July, 1987
in Appendix D.

small and medium size producers. Processing costs at full capacity decrease by 18 and 10 percent for firms A and B, respectively, and by about 3 percent for firms C and D.

5.5 FOREIGN PRODUCTION COSTS

Vinho verde produced in Portugal cannot be assumed the same quality as a table wine produced in California, Northern Italy or the Languedoc region of Southern France. Nevertheless, these wines compete in similar markets. Hence comparisons of relative production costs provide some indication of relative competitiveness.

Reviews of international grape production costs studies are provided by White and Blandford (1988). To standardize results from the various studies, White and Blandford used the following assumptions: no interest was charged on operating capital, no interest was charged on vineyard amortization, and there was no charge for land. Adjustments to land costs from different time periods were based on the Eurostat price index of purchased inputs used in farming. The 1984 exchange rates are used to generate escudo values. Grape costs for vinho verde production were adjusted to reflect the effects of inflation. Also, land costs were omitted from Sottomayor data. With this procedure, the single difference between the various cost estimates is a two percent interest charge on operating capital included in the Sottomayor cost estimation.

The results are shown in Table 5.7. With the exception of the producers in Valencia, Spain and producers in the large mechanized plain of Languedoc, vinho verde producers have costs comparable or lower than their foreign competitors. The regions shown, except for the

Table 5.7 Adjusted Cost Comparisons, Grapes for Table Wine,
1984 Escudos.

Source	Region/State/County	Cost (Esc/kg)
Caballero-Villar	Valencia, Spain	14.05
California Cooperative Extension	San Joaquin Valley, California	25.76
Commission of the European Community	Languedoc, France (large plain)	19.32
	Pouilles, Italy	26.50
Facchini	Emilia-Romagna, Italy	29.86
White	Finger-Lakes, New York	51.24
Pearson et al.	Vinho Verde region	
	traditional-ramada-home	22.35
	traditional-ramada-coop. modern cordão-coop	23.57 19.05
Sottomayor	traditional-ramada-home parceria	20.64
	traditional-ramada-home ownership	24.64
	modern-cordão-home ownership	29.73

Source: White and Blandford, 1988.
Pearson et al., 1987.
Sottomayor, 1986.

Finger Lakes region of New York, are the lowest-cost producing sites found in the survey done by White and Blandford.

Reviews of processing cost studies are provided by Shea and Moulton. Unfortunately, data for processing costs is aggregated by region or by country. Data on wine production costs for California, France, Italy, and for vinho verde is shown in Table 5.8. Vinho verde processing costs were adjusted to reflect 1986 prices. Comparative processing costs are favorable for the larger wineries of the vinho verde region. Firms C and D have an absolute cost advantage over California, France and Italy. Private producer-bottlers (firms A and B) need to increase output to generate competitive margins.

5.6 CONCLUSION

With the exception of the modern farm system, specialized in vineyards cultivated under the cordão-system, grape farming systems are not likely to offer substantial profits in the future. The traditional farm systems, with 90 percent or more of production comprised of red varieties, will face the greatest pressure to change. If the expected price decline for red wine occurs, the gradual substitution of red for white grapes and the exit from grape growing by many small farms seems likely. The changing market structure associated with EC accession provides economic incentives for quality grape improvements and technological change. Major constraints for the expansion of the cordão system will be provided by the performance of alternative crops, by land availability, and by access to credit.

Some small traditional farmers, producing low quality grapes and processing wine in their homes with inadequate technology, may be able

Table 5.8 Adjusted Cost Comparisons, for Table Wine, 1986 escudos.

	Esc/.75 1		
	Grape Costs	Processing Costs	Wine Costs
	(Esc./ .75 liters)		
California ¹	21.44	102.97	124.41
France ¹	24.93	91.87	116.80
Italy ¹	17.45	83.52	100.97
Vinho Verde ²			
Firm A	45.74	123.75	169.49
Firm B	45.74	84.92	130.66
Firm C	38.88	58.63	97.51
Firm D	32.02	58.60	90.62

Source: ¹ Moulton
² Winery Survey, July, 1987.

to avoid land and capital constraints and still produce higher quality grapes. This can be done by replacing inadequate varieties with recommended grape varieties, and keeping traditional structure, and by selling grapes to a private winery or joining a cooperative winery. Improved technology increases the quality of wine produced, hence revenues.

For the private producer-bottlers, with modern processing technology and good quality grapes, there is also room for improvement. High investments in fixed assets and variable annual production, due to crop fluctuations, exert downward pressure on profit margins per unit of production. These firms have underutilized resources, and could achieve greater economies of size with expansion. Smaller wine producers could combine into a single business, assuming that grape quality is not lost during the process. It might provide a way for two or more farmers to combine operations to achieve economies of size in processing and specialization in management.

CHAPTER SIX

PROSPECTS FOR THE VINHO VERDE INDUSTRY

6.1 SUMMARY OF MAJOR FINDINGS

Changes in the structure of demand for wine are expected to have important effects on the grape and wine industry in the vinho verde region. There are several underlying trends: the demand for low quality white and red wine is decreasing; low quality wines have a wider range of substitutes, therefore demand is more sensitive to price changes; the demand for high quality white wine is increasing; quality wines have a more inelastic demand with respect to price and have the largest income elasticity; and lighter, lower alcohol wines with similar characteristics to white vinho verde are gaining popularity in international markets. The effects on wine prices have been pronounced. Red and lower quality wine prices have decreased in recent years and the price gap between low and high quality wines has been increasing.

The grape and wine industries in the Minho region have begun to respond to these changes. However, red wine still predominates, with approximately 60 percent of production, and white wine production remains dominated by lower quality varieties. Thus traditional patterns remain well-entrenched. Meanwhile consumer's preferences are shifting away from ordinary table wines towards higher quality wines and the Common Agricultural Policy is creating more stringent rules to discourage the production of lower quality wines. The vinho verde sector will therefore face a continuation in pressure to adjust.

The quality wine sector in the Community remains self-supporting, without need for policy intervention. Fear of restrictive EC

legislation for low quality wine has prompted Portuguese policy makers to put substantial emphasis on improving the quality of vinho verde. Traditional red and white grape varieties will be replaced by government approved ones; red and low quality white wine production will decrease in exchange for an increase in the production of quality white wines. Subsidy programs and regulations are encouraging the replacement of "bordadura" systems with specialized vineyards.

Three factors have been considered in this thesis to evaluate whether the envisaged changes in production patterns will bring increased profits for a substantial proportion of the agricultural community. Past trends in vinho verde consumption, especially in the export market, give an indication of potential future growth. Past changes in prices for different qualities suggest future prices that will be consistent with this expected growth. Finally, comparisons of the profitability of alternative technologies and different levels of capacity utilization indicate the potential for cost-reducing changes in production and processing that can sustain or increase profitability.

In terms of current profitability, the traditional "bordadura" system appears at a competitive disadvantage. In large part, this disadvantage reflects the quality of grape varieties. If the "ramada" structure is kept by growers, replacement of vine varieties will result in economic profits for all systems. Keeping the same infrastructure saves some investment costs for growers, and may be particularly important for those unable to finance a completely new production technology, or for farmers lacking suitable land for a specialized vineyard. Some quality will be sacrificed with this method, because the

mixed-crop system encourages excessive water application and solar exposure is often not optimal for the production of high quality grapes. In the processing sector, with the exception of home production, profitability is positive for all systems: producer-bottler, cooperative winery, and private commercial firm. Larger scale-operations have lower costs of processing, but the relatively lower quality of wine produced leads to lower revenues and lower profits per unit of output.

Studies of wine demand have shown that there is a strong relationship between wine quality and quantity demanded. The lower is quality and the less known is the product, the more sensitive is demand to changes in own-price. This implies that the expected decrease in prices for the lower quality white and red vinho verde, with all other factors held constant, will lead to an increase in total revenues to respective processors. But along with the elastic demand comes a projected steady decrease in demand (Chapter 3). Changes in consumer preferences will shift demand and cause the lower quality white and red wine activities to become increasingly unprofitable.

The situation for higher quality wines is different. In markets where there is already a demand for the characteristics that are associated with vinho verde and where Portuguese wines are well accepted, a less elastic demand is expected. In these markets, the expected increase in demand will lead to an increase in prices and hence to increased profitability in the industry.

6.2 IMPLICATIONS FOR THE FUTURE

Price premiums for quality wines, other things being equal, will encourage resources to shift toward the production of quality wines.

Wine policy measures will further encourage increases in the supply of quality wines. In this section, different scenarios for high quality wine demand are analyzed to see the implications of expected production growth of the vinho verde industry. A baseline projection is considered first, based on the projections of price and quantity time series data for the period 1977-86 (Chapter 4). A second forecast assumes a two percent yearly increase in domestic demand and a 12 percent yearly increase in foreign demand.

Demand for ordinary white table wine is assumed to remain constant. Demand for quality white wine is assumed to increase according to the projected trend. The price differentials between qualities (Chapter 4) for each year are the result of specific levels of demand and supply for the various qualities. If variability in production due to climatic factors is omitted, then wine supply in the short run may be considered fixed and independent of yearly prices. In this situation price differentials are the result of particular levels of demand. The forecast prices for Q1, Q2, and Q3 are associated with the quality white wine sector, while the prices for Q4 are used to represent low quality wines.

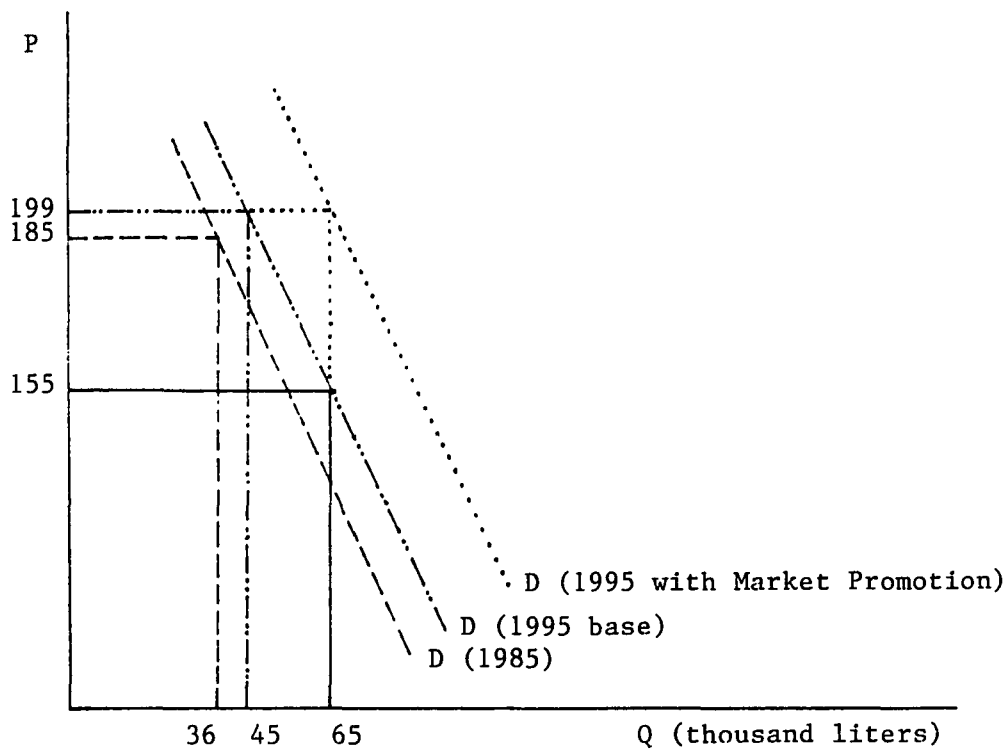
Table 6.1 presents data for vinho verde demand in 1985 and projections for 1995 under the two growth scenarios. Fig. 6.1 illustrates the market situation. In 1985, 34 percent of vinho verde demand was for white wine. The estimates for 1985 assume that half of commercial white wine production is high quality, and the other half is ordinary table wine. The baseline forecast predicts a 12 percent increase in total demand for white wines. Most of the potential growth

Table 6.1 Market Demand for White Vinho Verde under Alternative Growth Scenarios

	1985		1985 Baseline Projection			1985 Optimistic Projection			
	Quantity (liters)	Area (hec)	Quantity (liters)	Area (hec)	Change to 1985 (%)	Quantity (liters)	Area (hec)	Change to 1985 (%)	Change to Base (%)
Total Commercial Production	212 087 500	33660							
Red	140 005 700	22220							
White	72 081 800	11440	80 908 790	12840	12	100 723 570	15980	40	25
Domestic	65 317 900	10360	68 496 300	10870	5	79 687 840	12640	22	16
Foreign	6 763 900	1070	12 412 490	1970	84	21 035 730	3340	211	69
Quality Wine	36 042 300	5720	44 866 490	7120	25	64 681 270	10260	79	44
Ordinary Wine	36 042 300	5720	36 042 300	5720	0	36 042 300	5720	0	0

Source: Author's calculations.

Figure 6.1 Market Situation for Quality White Vinho Verde under Alternative Growth Scenarios. (1986 exc. = 100)



Legend:
 - - - - - 1985
 - · - · - · 1995 Base
 ······· 1995 with Market Promotion

is caused by expansion in the export market. Relative to 1985, exports are projected to increase 84 percent. Domestic market demand is practically stagnant, increasing only five percent. This corresponds to an 8.9 thousand liter increase in total demand, of which the foreign market is responsible for more than 60 percent. Simultaneously, prices are expected to increase eight percent. Expansion in the quality wine market thus brings increased revenues to producers and to the industry.

Using the average production per hectare of 63 hectoliters (CVRVV,1985), the projected increase in demand will be satisfied by an area of approximately 1,400 hectares, or about four percent of total area in commercial grape production. The market incentives from higher prices should easily be enough incentive to direct the necessary resources into the production of quality wines. The increase in white wine production is likely to be largely achieved with commensurate reductions in commercial red wine production (the demand for this quality is expected to decline sharply). These changes represent only about six percent of the area that is currently devoted to commercial red wine production.

Demand for white wine in the optimistic forecast increases by 25 percent relative to the baseline situation. Relative to 1985, foreign demand increases by 211 percent, to 21 million liters and domestic demand increases by 22 percent to 80 million liters. This amounts to a 28.6 thousand liters increase in total demand, evenly divided between domestic and foreign growth. The projected increase in demand requires an area of 4500 hectares, or only 13 percent of total commercial grape production. The changes in white demand represent about 20 percent of

the area that is currently devoted to commercial red wine production. Given the government intention to promote high quality production, such changes in supply should be easy to achieve.

Realization of the optimistic demand forecast will occur only if aggressive marketing strategies are adopted to increase the number of consumers. Otherwise, the price for quality wines will decrease. How much will depend on demand elasticity. If vinho verde is assumed to be perceived by consumers as equivalent to a nonappellation French wine or as an expensive Italian wine ($> \$4/\text{gallon}$), the price elasticity will be about -2 (Chapter 3). If the optimistic demand forecast is not realized, and the production pattern still shifts by at least 4500 hectares, then the baseline forecast of demand remains the relevant demand curve to use for estimation of the market price. In this case, real price will decrease to 155 Esc/liter, a decrease of 22 percent relative to the baseline scenario. With market prices falling, policy attempts to improve production quality will have a much reduced impact on farmer incomes.

In the quality wines, product differentiation and the ability to establish an image for consumers are important factors. Success in the industry will depend on a balance between government incentives to expand area for quality wine and government and private investment in market promotion. In many new markets, vinho verde characteristics are not yet important variables in consumer preferences. Advertising thus becomes the key for market development and market penetration, trying to attract new consumers to the product and to persuade purchasers of competitor's wines to switch.

Market growth will influence prices and thereby the level of commitment that firms and grapegrowers will make to pursue quality objectives. In 1987 and in 1995, the high profitability for firms A and B seems to create incentives to expand in quality wine. But without the major growth in demand that is envisaged in the optimistic scenario, the adverse change in prices (-22% from baseline) alters competitiveness of the processing systems. Costs, returns and profits are provided in Table 6.2. At the new wine prices, profit differentials between qualities become very small. Firms producing quality wine see their revenues approaching revenues of those (C and D) producing ordinary table wine.

If improvements in market position and profitability for quality wine are not successful, profits will be smaller, discouraging grape growers and firms from shifting to higher qualities. Policy objectives for the industry will not be achieved. Decreasing prices will affect profitability of the small producing firms the most. Two factors contribute to the higher costs in these firms: the higher costs for grapes, and the higher capital costs. The large firms C and D, achieving economies of size and producing a wider range of output are better positioned to face decreasing prices, due to lower average processing costs and to product differentiation.

Table 6.2 Costs, Revenues and Profits, 1995.

Esc/.75				
Firm	A	B	C	D
(Escudos/.,75 liter)				
Winery Price ¹	230.00	200.00	152.61	127.02
Winery Price ²	248.40	216.00		
Winery Price ³	193.75	168.48		
Farm Gate Price	50.00	50.00	42.50	35.00
Production Cost	27.84	27.84	34.46	32.67
Profits	22.16	22.16	8.00	2.33
Processing Margin	180.00	150.00	110.11	92.02
Processing Cost	135.28	92.84	64.09	64.06
Profits	44.72	57.16	46.02	27.96
Profits ¹	66.88	79.32	54.06	30.29
Profits ²	85.28	95.32		
Profits ³	30.63	47.80		

¹ Prices from Winery Survey, July, 1987.

² Prices for 1995 Base Forecast.

³ Prices for 1995 Optimistic Forecast without Market Promotion.

Source: Aghor's calculations.

CONCLUSION

In the near term, the vinho verde industry may be better off without substantial government programs to promote high quality grape production. The magnitude of shift to quality grapes needed to satisfy demand in the baseline projection is only four percent of commercial production, and this (small) change in area is probably attainable from natural responses of producers to changed price incentives. If, however, government goals are to increase industry profitability and the income of a substantial number of farmers, then a much greater coordination is needed between production and market promotion. The failure to develop marketing strategies to promote wine demand will be a major constraint to increased profitability in the sector. Without substantial growth in demand, policies that promote higher quality of production will only result in lower prices, offsetting the expected benefits from Portugal's grape production policies.

Appendix A
Exports Trend Analysis

Appendix A Regressions with Wine Quantity Exports as Dependent Variable

	CONST	TREND	² R
World Total (1930-86)	15804.18 (1.22)	1147.62 (11.02)	0.69
Red	27136.44 (2.68)	-132.65 (-1.63)	0.05
White	-11332.30 (1.37)	128026 (19.16)	0.87
World Total (1977-86)	40496.40 (8.15)	5145.05 (9.41)	0.92
Red	12529.93 (5.45)	84.08 (0.33)	0.01
White	27966.47 (7.41)	5060.97 (12.18)	0.95
France (1960-86)	-3881.69 (1.55)	554.47 (8.95)	0.76
Red	-1678.06 (1.49)	240.19 (8.62)	0.75
White	-2203.63 (1.41)	314.28 (8.14)	0.73
United Kingdom (1960-86)	-3243.04 (0.96)	497.26 (5.98)	0.59
Germany, FR (1960-86)	-2168.09 (1.62)	341.84 (10.34)	0.81
Red	-302.56 (0.79)	64.58 (6.82)	0.65
White	-1865.53 (1.53)	277.27 (9.22)	0.77
Italy (1977-86)	5863.67 (9.92)	-389.74 (-5.99)	0.82
Sweden (1977-86)	2326.47 (3.29)	109.55 (1.41)	0.20
Switzerland (1977-86)	-95.53 (-0.41)	225.37 (8.85)	0.91
Red	420.47 (-2.19)	158.59 (7.51)	0.88
White	324.93 (2.11)	66.78 (3.94)	0.66
United States (1960-86)	-1720.60 (0.66)	340.95 (5.28)	0.53
Red	-149.84 (0.72)	23.99 (4.69)	0.47
White	-1570.77 (0.63)	316.96 (5.15)	0.52
Canada (1960-86)	-161.95 (0.20)	10408.75 (5.15)	0.51
Brazil (1930-86)	15483.90 (1.66)	-154.22 (2.05)	0.07
Red	14770.07 (1.82)	-207.35 (3.18)	0.16
White	713.83 (0.33)	53.12 (3.01)	0.14
Venezuela (1960-86)	-192.79 (-0.21)	133.99 (6.00)	0.59
Red	110.39 (0.21)	52.65 (4.15)	0.41
White	-303.19 (0.57)	81.34 (6.51)	0.60
R. South Africa (1977-86)	304.33 (0.23)	224.38 (1.54)	0.23
Ex. Colonies (1977-86)	2484.73 (1.23)	170.96 (0.77)	0.07
Red	543.33 (1.77)	19.56 (0.58)	0.04
White	1941.40 (1.08)	151.40 (0.77)	0.07

Note: Figures in parenthesis are t values

Source: Aythor's calculations.

Appendix B
Price Trend Analysis

Appendix B Regressions with Wine Quality Price as Dependent Variable

	CONST	TREND	R ²
Quality ¹	112.72 (13.02)	9.53 (2.46)	0.75
Quality ²	176.66 (6.33)	1.61 (0.52)	0.03
Quality ³	196.54 (6.69)	-4.94 (1.52)	0.23
Quality ⁴	119.6 (14.78)	-5.92 (6.65)	0.85
Quality ⁵	136.74 (8.94)	-8.18 4.87	0.75

Note: Figures in parenthesis are t values.

Source: Author's calculations.

Appendix C
Processing Costs for 1987

Appendix C Vinho Verde Production Cost for Firm A, 1987.

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	2500.000	40	250.000
Fermentation Equipment	800.000	20	80.000
Storage Equipment	1312.000	20	131.200
Presses	2000.000	15	200.000
---PACKAGING			
Plate Filter	275.000	10	27.500
Bottle Filler	560.000	10	56.000
Manual Corker	6.000	10	0.600
Automatic Labeller and Capper	1350.000	10	135.000
---PROCESSING and PACKAGING			
Office and Lab Equipment	100.000	20	10.000
Cars	1500.000	10	150.000
ANNUAL REPAIRS:			
Buildings			50.000
Fermentation Equipment			16.000
Storage Equipment			26.240
Presses			40.000
Plate Filter			5.500
Bottle Filler			11.200
Manual Corker			0.120
Automatic Labeller and Capper			27.000
OTHERS:			
Chemicals			105.480
Bottles	36000	26.30	946.800
Corks	36000	9.52	342.720
Cappers	36000	2.00	72.000
Labels	36000	2.00	72.000
Seals	36000	2.00	72.000
Glue	36000	1.00	36.000
Cases (12 bottles/case)	3000	64.74	194.220
Staples	9	18800.00	169.200
Packing Tape	25	2400.00	60.000
Insurance			17.806
Cars (gas,repairs,and insurance)			78.000
Misc (water,electricity,and telephone)			72.000
TOTAL INTERMEDIATE INPUT COST			2414.286
DIRECT LABOR COST			
	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
---PROCESSING AND PACKAGING			
Manager	1	750.000	750.000
Permanent Labor	1	475.000	475.000
Seasonal Labor	1	375.500	357.500
TOTAL LABOR COST			1582.500

Source: Winery Survey, July 1987

Appendix C Vinho Verde Production Cost for Firm B, 1987.

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	18952.500	40	1895.250
Fermentation and Storage Equip	20881.000	20	2088.100
Presses	6650.000	15	665.000
Refrigeration Equipment	3325.000	15	332.500
---PACKAGING			
Plate Filter	600.000	10	60.000
Bottle Filler	1800.350	10	180.035
Corker	420.000	10	42.000
Labellers	798.000	10	79.800
---PROCESSING and PACKAGING			
Office and Lab Equipment	200.000	20	20.000
Cars	1995.000	10	199.500
ANNUAL REPAIRS:			
Buildings			379.050
Fermentation and Storage Equipment			417.620
Presses			133.000
Refrigeration Equipment			66.500
Plate Filter			12.000
Bottle Filler			36.007
Corker			8.400
Labellers			15.960
OTHERS			
Chemicals			1395.000
Bottles	266666	26.30	6969.500
Corks	266666	9.52	2522.800
Cappers	266666	2.00	530.000
Labels	266666	2.00	530.000
Seals	266666	2.00	533.332
Glue	266666	1.00	265.000
Cases (12 bottles/case)	22222	64.74	1438.652
Staples	67	18800.00	1259.600
Packing Tape	185	2400.00	444.000
Insurance			73.224
Cars (gas, repairs, and insurance)			160.000
Misc (water, electricity, and telephone)			360.000
TOTAL INTERMEDIATE INPUT COST			17549.645
DIRECT LABOR COST			
	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
---PROCESSING and PACKAGING			
Manager	1	800.000	800.000
Permanent Labor	3	475.000	1425.000
Seasonal Labor	3	357.5	1072.500
TOTAL DIRECT LABOR COST			3297.500

Source: Winery Survey, July 1987

Appendix C Vinho Verde Production Cost for Firm C, 1987

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	46427.123	40	4642.712
Fermentation and Storage Equip	22828.899	20	2282.890
Presses	20562.482	15	2056.248
Crusher Steamer	2339.441	10	233.944
Refrigeration Equipment	5962.006	15	596.201
Miscellaneous	2204.807	15	220.481
---PACKAGING			
Filters	5043.904	10	504.390
Bottle Filler	11654.069	10	1165.407
Corking Machine	2034.206	10	203.421
Labelling Machine	3576.437	10	357.644
Clarification Equipment	3439.448	10	343.945
Bottle Washer Machine	8251.059	10	825.106
Bottle Capper	2457.478	10	245.748
Caseificadores	2750.916	10	275.092
---PROCESSING and PACKAGING			
Office and Lab Equipment	2221.364	10	222.136
Cars	5994.276	10	599.428

INTERMEDIATE INPUT COST	QUANTITY	UNIT COST (Esc.)	TOTAL COST (.000 Esc.)
---PROCESSING			
Buildings			928.542
Fermentation and Storage Equipment			456.578
Presses			411.250
Crusher Steamer			46.789
Refrigeration Equipment			119.240
Miscellaneous			44.096
Filters			100.878
Bottle Filler			233.081
Corking Machine			40.684
Labelling Machine			71.529
Clarification Equipment			68.789
Bottle Washer Machine			165.021
Bottle Capper			49.150
Caseificadores			55.018
OTHERS:			
Chemicals			6667.026
Bottles	4533333	26.30	119226.658
Corks	4533333	9.52	43157.330
Cappers	4533333	2.00	9066.666
Labels	4533333	2.00	9066.666
Seals	4533333	2.00	9066.666
Gloe	4533333	1.00	4533.333
Cases (12 bottles/case)	377778	64.74	24457.348
Staples	1134	18800.00	21319.200
Packing Tape	3148	2400.000	7555.200
Insurance			283.507
Cars (gas,repairs,and insurance)			2515.743
Misc (water,electricity,and telephone)			1046.722
TOTAL INTERMEDIATE INPUT COST			260752.710

DIRECT LABOR COST	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
---PROCESSING AND PACKAGING			
Trabalhadores			17728.342
TOTAL DIRECT LABOR COST			17728.342

Source: Vinery Survey, July 1987

Appendix C Vinho Verde Production Cost for Firm D, 1987.

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	35000.000	40	3500.000
Fermentation and Storage Equip	23000.000	20	2300.000
Presses	600.000	15	60.000
Refrigeration Equipment	3500.000	15	350.000
---PACKAGING			
Filters	5300.000	10	530.000
Bottle Filler	12000.000	10	1200.000
Corking Machine	1400.000	10	140.000
Labelling Machine	4500.000	10	450.000
Bottle Washer Machine	13000.000	10	1300.000
Saturadoras	3500.000	10	350.000
---PROCESSING and PACKAGING			
Office and Lab Equipment	5000.000	10	500
Miscellaneous	700.000	10	70
Tractor	3000.000	10	300
Cars	5000.000	10	500

INTERMEDIATE INPUT COST	QUANTITY	UNIT COST (Esc.)	TOTAL COST (.000 Esc.)
---PROCESSING			
ANNUAL REPAIRS:			
Buildings			700.000
Fermentation and Storage Equipment			460.000
Presses			12.000
Refrigeration Equipment			70.000
Filters			106.000
Bottle Filler			240.000
Corking Machine			28.000
Labelling Machine			90.000
Bottle Washer Machine			260.000
Saturadoras			70.000
OTHERS:			
Chemicals			6878.972
Bottles	4666667	26.30	122733.342
Corks	4666667	9.52	44426.670
Cappers	4666667	2.00	9333.334
Labels	4666667	2.00	9333.334
Seals	4666667	2.00	9333.334
Glue	4666667	1.00	4666.667
Cases (12 bottles)	388889	64.74	25176.674
Stapples	1167	18800.00	21939.600
Packing Tape	3240	2400.00	7776.000
Insurance			215.000
Cars (gas+repairs+insurance)			520.000
Misc (water+electricity+telephone)			720.000
TOTAL INTERMEDIATE INPUT COST			265088.9268

DIRECT LABOR COSTS	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
Managers	4	1372.500	5490.000
Permanent and Seasonal Labor	37	500.810	18529.970
TOTAL DIRECT LABOR COST			24019.970

Source: Vinery Survey, July 1987

Appendix D
Processing Costs at Full Capacity

Appendix D Vinho Verde Production Cost for firm A at Full Capacity

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	2500.000	40	250.000
Fermentation Equipment	800.000	20	80.000
Storage Equipment	1312.000	20	131.200
Presses	2000.000	15	200.000
---PACKAGING			
Plate Filter	275.000	10	27.500
Bottle Filler	560.000	10	56.000
Manual Corker	6.000	10	0.600
Automatic Labeller and Capper	1350.000	10	135.000
---PROCESSING and PACKAGING			
Office and Lab Equipment	100.000	20	10.000
Cars	1500.000	10	150.000
INTERMEDIATE INPUT COST	QUANTITY	UNIT COST (Esc.)	TOTAL COST (.000 Esc.)
ANNUAL REPAIRS:			
Buildings			50.000
Fermentation Equipment			16.000
Storage Equipment			26.240
Presses			40.000
Plate Filter			5.500
Bottle Filler			11.200
Manual Corker			0.120
Automatic Labeller and Capper			27.000
OTHERS:			
Chemicals			150.220
Bottles	54000	26.30	1420.200
Corks	54000	9.52	514.080
Cappers	54000	2.00	108.000
Labels	54000	2.00	108.000
Seals	54000	2.00	108.000
Glue	54000	1.00	54.000
Cases (12 bottles/case)	4500	64.74	291.330
Staples	14	1800.00	252.000
Packing Tape	30	2400.00	90.000
Insurance			17.806
Cars (gas,repairs,and insurance)			97.500
Misc (water,electricity,and telephone)			90.000
TOTAL INTERMEDIATE INPUT COST			3486.996
DIRECT LABOR COST	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
---PROCESSING and PACKAGING			
Manager	1	750.000	750.000
Permanent Labor	1	475.000	475.000
Seasonal Labor	2	375.500	751.000
TOTAL LABOR COST			1976.000

Source: Winery Survey, July 1987

Appendix D Vinho Verde Production for Firm B at Full Capacity

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	18952.500	40	1895.250
Fermentation and Storage Equip	20881.000	20	2088.100
Presses	6650.000	15	665.000
Refrigeration Equipment	3325.000	15	332.500
---PACKAGING			
Plate Filter	600.000	10	60.000
Bottle Filler	1800.350	10	180.035
Corker	420.000	10	42.000
Labellers	798.000	10	79.800
---PROCESSING and PACKAGING			
Office and Lab Equipment	200.000	20	20.000
Cars	1995.000	10	199.500

INTERMEDIATE INPUT COST	QUANTITY	UNIT COST (Esc.)	TOTAL COST (.000 Esc.)
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ANNUAL REPAIRS:			
Buildings			379.050
Fermentation and Storage Equipment			417.620
Presses			133.000
Refrigeration Equipment			66.500
Plate Filter			12.000
Bottle Filler			36.007
Corker			8.400
Labellers			15.960
OTHERS			
Chemicals			2092.505
Bottles	400000	26.30	10520.000
Corks	400000	9.52	3808.000
Cappers	400000	2.00	800.000
Labels	400000	2.00	800.000
Seals	400000	2.00	800.000
Glue	400000	1.00	400.000
Cases (12 bottles/case)	33333	64.74	2157.978
Staples	100	18000.00	1800.000
Packing Tape	277	2400.00	664.800
Insurance			73.224
Cars (gas, repairs, and insurance)			320.000
Misc (water, electricity, and telephone)			450.000

TOTAL INTERMEDIATE INPUT COST			25835.044
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DIRECT LABOR COST	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
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---PROCESSING and PACKAGING			
Manager	1	800.000	800.000
Permanent Labor	3	475.000	1425.000
Seasonal Labor	4	357.5	1430.000

TOTAL DIRECT LABOR COST			3655.000
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Source: Winery Survey, July 1987

Appendix D Vinha Verde Production Cost for Firm C at Full Capacity.

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
Buildings	46427.123	40	4642.712
Fermentation and Storage Equip	22028.899	20	2202.899
Presses	20562.482	15	2056.240
Crusher Steamer	2339.441	10	233.944
Refrigeration Equipment	5962.006	15	596.201
Miscellaneous	2204.807	15	220.401
---PACKAGING			
Filters	5043.904	10	504.390
Bottle Filler	11654.069	10	1165.407
Corking Machine	2034.206	10	203.421
Labeling Machine	3576.437	10	357.644
Clarification Equipment	3439.440	10	343.945
Bottle Washer Machine	8251.059	10	825.106
Bottle Capper	2457.470	10	245.740
Gasificadores	2750.916	10	275.092
---PROCESSING and PACKAGING			
Office and Lab Equipment	2221.364	10	222.136
Cars	5994.276	10	599.428

INTERMEDIATE INPUT COST	QUANTITY	UNIT COST (Esc.)	TOTAL COST (.000 Esc.)
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ANNUAL REPAIRS:			
Buildings			920.542
Fermentation and Storage Equipment			456.570
Presses			411.250
Crusher Steamer			46.789
Refrigeration Equipment			119.240
Miscellaneous			44.096
Filters			100.878
Bottle Filler			233.001
Corking Machine			40.684
Labeling Machine			71.529
Clarification Equipment			68.789
Bottle Washer Machine			165.021
Bottle Capper			49.150
Gasificadores			55.018
OTHERS:			
Chemicals			10000.539
Bottles	6800000	26.30	178840.000
Corks	6800000	9.52	64736.000
Cappers	6800000	2.00	13600.000
Labels	6800000	2.00	13600.000
Seals	6800000	2.00	13600.000
Glue	6800000	1.00	6800.000
Cases (12 bottles)	566667	64.74	36686.022
Staples	1700	18000.00	31960.000
Packing Tape	4722	2400.000	11332.800
Insurance			283.507
Cars (gas+repairs+insurance)			3270.466
Misc (water+electricity+telephone)			1360.739

TOTAL INTERMEDIATE INPUT COST	388860.717
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DIRECT LABOR COST	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
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---PROCESSING AND PACKAGING			
Managers+Permanent+seasonal Labor			17728.342

TOTAL DIRECT LABOR COST			17728.342
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Source: Winery Survey, July 1987

Appendix D Vinho Verde Production Cost for Firm D at Full Capacity

FIXED INPUT COST	TOTAL COST (.000 Esc.)	USEFUL LIFE (Years)	SALVAGE VALUE (.000 Esc.)
---PROCESSING			
Buildings	35000.000	40	3500.000
Fermentation and Storage Equip	23000.000	20	2300.000
Presses	600.000	15	60.000
Refrigeration Equipment	3500.000	15	350.000
---PACKAGING			
Filters	5300.000	10	530.000
Bottle Filler	12000.000	10	1200.000
Corking Machine	1400.000	10	140.000
Labelling Machine	4500.000	10	450.000
Bottle Washer Machine	13000.000	10	1300.000
Saturadoras	3500.000	10	350.000
---PROCESSING and PACKAGING			
Office and Lab Equipment	5000.000	10	500
Miscellaneous	700.000	10	70
Tractor	3000.000	10	300
Cars	5000.000	10	500

INTERMEDIATE INPUT COST	QUANTITY	UNIT COST (Esc.)	TOTAL COST (.000 Esc.)
---PROCESSING			
ANNUAL REPAIRS:			
Buildings			700.000
Fermentation and Storage Equipment			460.000
Presses			12.000
Refrigeration Equipment			70.000
Filters			106.000
Bottle Filler			240.000
Corking Machine			28.000
Labelling Machine			90.000
Bottle Washer Machine			260.000
Saturadoras			70.000
OTHERS:			
Chemicals			10318.458
Bottles	7000000	26.30	184100.000
Corks	7000000	9.52	66640.000
Cappers	7000000	2.00	14000.000
Labels	7000000	2.00	14000.000
Seals	7000000	2.00	14000.000
Glue	7000000	1.00	7000.000
Cases (12 bottles)	583333	64.74	37764.978
Staples	1750	18800.00	32900.000
Packind Tape	4860	2400.00	11664.000
Insurance			215.000
Cars (gas+repairs+insurance)			676.000
Misc (water+electricity+telephone)			936.000
TOTAL INTERMEDIATE INPUT COST			396250.436

DIRECT LABOR COSTS	# WORKERS/ EQUIVALENT	WAGES (.000 Esc)	TOTAL COST (.000 Esc)
Managers	4	1372.500	5490.000
Permanent and Seasonal Labor	37	500.810	18529.970
DIRECT LABOR COST			24019.970

Source: Winery Survey, July 1987

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