MARKETS, MYTHS, and MIDDLEMEN

A Study of Potato Marketing in Central Peru

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The International Potato Center (CIP) is an autonomous, nonprofit scientific institution established through agreement with the Government of Peru to develop and disseminate knowledge for greater use of the potato as a basic food. International funding sources for technical assistance in agriculture finance the Center.

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The purpose of this study is to encourage debate, exchange of ideas, and advancement of social science knowledge about production and utilization of the potato. The views expressed in the study are those of the author and do not necessarily reflect the official position of the International Potato Center. Comments are invited.

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ABBREVIATIONS/ACRONYMS

CIP	Centro Internacional de la Papa (International Potato Center)
CONAP	Corporación Nacional de Abastecimiento del Perú (Agricultural Commerce Division)
CV	Coefficient of variation
DGC	Dirección General de Comercio (Marketing Division)
DGAG	Dirección General de Agricultura y Ganadería (Agriculture and Livestock Division)
EMMSA	Empresa de Mercados Mayoristas Sociedad Anónima (Wholesale Market Enterprise Stock Company)
ENAPROM	Encuesta Nacional de Hogares de Propósitos Multiples (National Household Survey of Multiple Purposes)
ENCA	Encuesta Nacional de Consumo de Alimentos (Food Consumption National Survey)
ENCI	Empresa Nacional de Comercialización de Insumos (National Enterprise for Inputs Marketing)
ENHI	Encuesta Nacional de Hogares Individuales (National Survey of Individual Households)
EPSA	Empresa Publica de Servicios Agropecuarios (Public Agricultural Services Enterprise)
ha	hectare
IBRD	Banco Internacional de Reconstrucción y Desarrollo (International Bank for Reconstruction and Development)
INE	Instituto Nacional de Estadística (National Institute of Statistics)
INIPA	Instituto Nacional de Investigación y Promoción Agropecuaria (National Institute for Agriculture Research and Extension)
JURPAL	Junta Reguladora de Precios Alimenticios (Food Price Regulatory Committee)
Kg	Kilogram
Km	Kilometer
MM#1	Mercado Mayorista #1 (Wholesale Market #1)
MOA	Ministerio de Agricultura (Ministry of Agriculture)
OSEI	Oficina Sectorial de Estadística e Información (Agricultural Sector Office of Statistics and Information)
OSPA	Oficina Sectorial de Planificación Agraria (Agricultural Planification Sector Office)

(continued)

SENAMER	Sistema Nacional de Mercados (National System of Wholesale Markets)
S	Desviación Standard (Standard Deviation)
SIMAP	Sistema de Información de Mercados Agropecuarios (Agricultural Market Information Service)
SIPA	Servicio de Investigación y Promoción Agropecuaria (Agricultural Research and Extension Service)
t	metric ton

INTRODUCTION

Peru, like many Third World nations, is characterized by strong ideological debates over economic development issues. Among these issues, the most hotly debated is the seemingly perpetual food crisis. However, here one finds a striking paradox: disagreement is rampant over the cause of domestic food production problems while there is consensus among both local and foreign observers on the nature of domestic food marketing problems. The latter, it is agreed, is characterized by activities that are disorganized, inefficient, and dominated by middlemen. The central claim of this study is that widely accepted perceptions of domestic food marketing in Peru are often unfounded and sometimes simply myths.

How can this be? One reason is domestic food marketing has escaped careful scrutiny by researchers. Numerous studies have analyzed "commercial" relations between Peru and the global economy. A growing body of literature therefore exists on such topics as the terms of trade, multinational corporations, agricultural exports, and food imports. Alternatively, various authors have examined some aspect or other of domestic food production or consumption. Studies on the internal distribution of locally produced food crops — domestic food marketing — are few and far between.

This hiatus in the literature is in itself something of a paradox, especially given the self-evident importance of the topic. One has only to scan a Lima newspaper to appreciate the general public's concern about any number of domestic food marketing problems. Questions about rural trade in food products, marketing margins, and their impact on producer incomes or consumer prices are of such obvious interest to not only marketing participants themselves but also policy makers and administrators as to make one wonder. Why are there not more studies on domestic food marketing?

The answer, in part, is that scientists, policy makers, and the general public believe they already know the answers to most questions about domestic food marketing and therefore such studies are at best unnecessary and at worst a waste of time. For example, as Babb (1982:6-7) indicates sensationalized newspaper accounts of food marketing problems frequently clamor for immediate action. Serious investigators, however, are discouraged from doing research in this area by the scarcity of relevant official statistics, the limited number of earlier studies and the restricted publication and dissemination of completed research.

Potato marketing represents perhaps the most striking example of the shortage of literature in this field. Not only is the potato of Peruvian origin but during several milennia it has been the country's most important food crop in terms of total production and contribution to the diet (Antúnez de Mayolo 1981, Amat y León and Curonisy 1981). The potato is also one of the relatively few crops that is grown nearly all over the country. It is cultivated by an enormous number of production units - most of which sell at least some of what they produce. In fact, the potato is sold in every major market of the country on practically a year round basis. Moreover, given its symbolic prominence in pre-colombian culture, its use in several recognized national dishes, and its importance as a basic food for massive numbers of rural and urban poor, the price of potatoes often serves as a bellwether of economic conditions in the country. Nevertheless, while a wealth

of publications are available on potato agronomy, entomology, and physiology (Crosby 1981), only a few published studies concern potato marketing.

Key arguments summarized

This study challenges the conventional wisdom on domestic food marketing in general and potato marketing specifically. The principal arguments of the study can be briefly summarized as follows:

1. A small number of studies, but with definitive declarations, discuss the nature of domestic food marketing. In some of these studies, food marketing is only marginally examined.
2. Two broad approaches to the study of domestic food marketing have emerged. Each approach employs its own concepts and methods. Nonetheless, both present conclusions that are striking similar - although the reasons offered are various and distinct. These conclusions, however, are not confirmed by the evidence presented. Consequently, a precise evaluation of their validity remains pending.
3. The present study of potatoes examines five ideas about domestic food marketing commonly accepted as factual. These ideas are as follows:
   a. Rural assembly is disorganized and inefficient.
   b. Rural assemblers' margins are excessive.
   c. High freight rates contribute to high marketing costs.
   d. Exorbitant margins of Lima wholesalers inflate consumer prices.
   e. Consumption of traditional food crops such as potatoes has declined in Lima.

In the specific case of potatoes and in relation with the conclusions listed above, the following specific claims are mentioned or inferred by authors of previous studies:

a. Producers have received a steadily declining percentage of the consumer price for potatoes during the last two decades.
b. A large number of middlemen separate producers and Lima wholesalers.
c. Potatoes from the Coast are steadily replacing potatoes from the Sierra in the Lima market.
d. Potato shipments are concentrated in the hands of a few wholesalers.
e. Lima consumers have progressively substituted rice for potatoes, given the strong relation between prices for the two products and their respective consumption.

Results presented in this study fail to confirm the generally accepted conclusions. Moreover, they show that several specific statements about potatoes are erroneous.

The arguments listed above are developed in the course of seven chapters. Each chapter forms part of what is intended to be an integrated view of the domestic food marketing of a single food commodity. Considered in its entirety, this view consists of the following: a literature review; an analysis of long-term trends in production, consumption, and trade; an examination of the costs and returns to production, rural assembly, transport, wholesaling, and retailing; a consideration of consumption and demand tendencies; an explanation of the data collection methods; a presentation of the secondary statistics employed; and a detailed bibliography.

Chapter I reviews the two broad approaches currently invoked to analyze domestic food marketing. Strengths and weaknesses of previous literature are identified in the process. Special emphasis is given to earlier publications on potato marketing. In such fashion, the chapter strives to put the approach of this study in perspective. This consists of both an historical examination of potato production, distribution, and consumption and a technical analysis of marketing costs, prices, and margins.

Chapter II offers an historical overview of potato production, consumption, and marketing trends. The coverage includes national, regional, and sub-regional developments during the last three decades. Developments in the central Sierra and Coast receive particular attention. This panorama indicates how current marketing patterns reflect long-term structural changes in the potato sector.

Chapters III and IV analyze the various operations involved in producing, assembling, and transporting 100 kg of white potatoes in 1979. Chapter III investigates these activities between the central Sierra and Lima. Chapter IV focuses on the channel linking the central Coast and the capital. The presentation integrates a descriptive analysis of costs, returns, and margins with a discussion of the social relations between marketing participants, e.g. how prices are agreed upon, payments made, commercial ties developed and maintained. These chapters are based on an elaborate set of formal interviews conducted especially for this study.

Potato wholesaling and retailing in Lima are treated in Chapter V. At the wholesale level, the chapter addresses a series of questions concerning the number and size distribution of potato wholesalers in the capital. Procurement practices and wholesale costs are discussed next. The chapter then briefly describes potato retailing before it examines wholesale margins in detail. The analysis once again focuses on 100 kg of white potatoes. This chapter utilizes a combination of secondary statistics, informal interviews, a review of the literature, and prices collected expressly for this particular research.

Chapter VI considers potato consumption and demand in Lima. Results of various consumption surveys are presented together to facilitate assessment of potato consumption trends both for Lima as a whole and for different groups in the capital. The chapter then investigates trends in potato shipments, retail prices and wages in an effort to explain observed consumption patterns. The effect of inflation on prices, incomes and potato consumption receives recurrent attention. A concluding section contrasts formal estimates of the relation between changes in prices or incomes and shifts in potato consumption and several commonly accepted beliefs in this regard.

The final chapter begins by briefly reviewing the key arguments presented in this study. A synthesis of the principal findings then serves as the basis for comparing results of this study with the consensus on domestic food marketing in the case of potatoes. The study concludes by considering the essential implications.

Appendix One explains field work methodology and the principal assumptions used in data analysis. Appendix Two contains the secondary data referred to in the text.

An extensive bibliography is at the end of the study.

This study does not pretend to deal in detail with economic theory and formal models related to marketing. Instead, it offers a descriptive but sorely needed analysis of the subject matter. There are two reasons for this. First, the book specifically takes issue with those previous studies that have been too abstract

and conceptual. The findings suggest a definite need for more empirically based research. Second, this is the first study of its kind on this particular crop. Considerable time and effort were required simply to collect, organize, interpret, and present basic information about potato marketing. Hopefully future studies can build on data presented to re-interpret old theories and develop appropriate models.

A second limitation is the uneven coverage and variable amount of evidence presented. For instance, little is said about retailing in Lima. Trading patterns between rural markets are largely overlooked. Moreover, in discussing topics such as producer marketing patterns, sample sizes are small. Still, the coverage presented largely reflects knowledge accumulated to date on specific topics. While sample sizes are modest, the book continually refers to results of other relevant studies to support or to qualify the findings presented. Finally, by adopting a producer-to-consumer research focus, the study enables interrelations between different activities to be identified and, in the process, makes clear areas that need greater attention in the future.

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CHAPTER I

1. Approaches to the Study of Domestic Food Marketing

Introduction

As Peru's food crisis persisted during the 1960s and 1970s various studies began to address domestic food marketing issues. Most were not strictly "marketing studies" because they focused primarily on other topics. Nor did every study say exactly the same thing for the same reasons. Hence, they cannot be rigidly classified from a marketing perspective. For critical review, however, previous relevant research can be divided into two broad approaches to the study of domestic food marketing. This chapter refers to these two different approaches as the "Historical" and the "Technocratic."

As explained in sections 1.1 and 1.2, each approach analyzes domestic food marketing from a different socio-economic perspective. Each uses different key variables and data sources. Despite their differences, both approaches characterize numerous domestic food marketing activities in similar fashion. Section 1.3 summarizes this consensus. Section 1.4 then outlines the approach utilized by this study.

1.1 Historical Approach

(i) Concepts, Methods, and Conclusions

Proponents of the historical approach discuss domestic food marketing activities from a macro-economic, global, and dynamic perspective. Their assessment is global in that it forms only part of a larger critique of international capitalism in Peru. It is macro-economic and dynamic in that it analyzes import-substitution/industrialization policies adopted by successive governments during several decades. For example, Caballero (1982:492-494) cites government food price policy, high marketing margins (due to inefficiency and high middlemen's profits), and changing demand patterns for food as the principal causes of rural poverty in the peruvian Sierra and Andean economies generally.

Adherents of the historical approach usually consider food marketing generally and domestic food marketing specifically in terms of class conflict: capitalists vs. workers and peasants. Hence, they focus on social (class) relations between buyers and sellers. Accordingly key variables in the commercial manifestation of class conflict are: (a) merchant-capital's ownership, hence control, over instruments of domestic food marketing (e.g., finance capital, transport), and the alleged (b) low producer prices and high consumer prices which facilitate capital accumulation.

Map I.1. Peru: Major ecological regions.

Proponents of the historical approach use two methods for investigating domestic food marketing activities. The first involves a high level of theoretical abstraction. Hence, observations about domestic food marketing are couched in qualitative or conceptual terms. In these instances, domestic food marketing is analyzed as part of capitalism's advance into agriculture. For example, Claverías (1979:118) insists such analysis be dynamic (*not* static) and focus on the expansion of the domestic market.

The second investigative method strives for empirical verification by employing national or regional food production, farm credit, or food price statistics to make quantitative statements or inferences about domestic food marketing. Hopkins (1981:176), for instance, notes producer prices rose slower than consumer prices in the 1950s and 1960s. On that basis, he infers, for certain products such as "milk, sugar, beans, and potatoes, there was an increase in marketing margins and/or industrial transformation . . . (author's translation from Spanish)."

Viewed from this perspective and analyzed with these methods, proponents of the historical approach consider domestic food marketing as being dominated by a mercantilist class for three reasons. First, small producers cultivate a substantial share of the marketable surplus destined for the cities (Alvarez 1980: 36-37). Second, these producers — especially in the Sierra — are geographically isolated with few potential buyers. Third, the mercantilist class controls commodity and capital markets, hence trade, for its own benefit. Therefore, as Caballero (1980:147) asserts, given the very nature of the capitalist market, market conditions are always unfavorable to peasant producers.

Proponents of the historical approach maintain that actual traders as well as rich or medium-sized producers engage in trading activities. Consequently, followers of the historical approach argue that marketing is burdened with a proliferation of middlemen.

"Agricultural production in Peru goes through a whole chain of middlemen at different levels, before being forwarded to Lima and commercialized," says Santos (1976:26).

Based on the foregoing, adherents to the historical approach conclude that: (a) rural assembly is inefficient, (b) rural traders' margins are excessive, (c) margins of Lima wholesalers inflate consumer prices, and (d) in recent years, consumption of certain traditional food commodities, such as potatoes, has declined because of declining real incomes and rising prices. They offer specific reasons for each of these conclusions.

Historical approach adherents argue that rural assembly is inefficient because too many middlemen congest distribution channels. According to Caballero (1980:126-127), ". . . one of the few activities that one can enter with a limited amount of capital (accumulated, for example, by rich peasants or medium-sized farmers) is transport and trade of peasant agricultural commodities. The flow of such small, dispersed investments . . . produces an over capitalization and atomization that raises marketing costs (author's translation from Spanish)."

Different historical proponents contend that rural food merchants' excessive profits lower producers' incomes in different ways. Some argue that traders in the Sierra earn excessive profits partly because rural commerce is highly monopsonistic.[1] According to this view, monopsony results because rich peasant/traders retain market power through control of transportation and information (see, e.g. Caballero 1980:147). Other historical approach adherents see unequal trade ar-

rangements based upon a system of producer indebtedness and usurious interest rates (de Janvry and Deere 1979). In other words, a shortage of government-supplied farm credit and rising production costs force growers to turn to middlemen for inputs and/or cash. These loans then compromise producers in negotiations over output prices (Martínez and Tealdo 1982:118).

On the Coast, rural traders' activities have received less specific attention. Nevertheless, some adherents to the historical approach imply that coastal rural traders also earn excessive margins. They argue, for example, that rural middlemen manipulate weights and measures as one means of paying lower prices and accumulating capital (see, e.g., Flores et al. 1980:76).

Lima wholesalers are believed by historical adherents to reap excessive margins both for what they do and for what they do not do. In the former instance, evidence presented is often indirect. Excessive margins at the level of Lima wholesalers are said to result from: (a) the large difference between prices paid to growers and prices received from retailers plus (b) the large volumes of food handled by a few wholesalers.

According to Santos (1976:32), "The existence of a mass of middlemen allows the survival and prosperity of a limited number of big wholesalers: the latter handle large amounts and are able to buy cheaply and sell at a high price."

Proponents of the historical approach contend that a few Lima wholesalers, "the kings: potatoes, fruits, etc." (Martínez and Tealdo 1982:180), maintain control over food shipments to the capital for four things that they *do* (op. cit.:118-119).

- by tying growers to them via production credit,
- the tremendous quantities of food that they buy and sell,
- their superior administrative ability, and
- their superior knowledge of the market.

Consequently, historical school proponents see a few wholesalers using various tactics to inflate producer-consumer price differentials, increase their volumes, and thereby earn excessive margins.

Historical adherents also consider marketing margins of Lima wholesalers excessive because they are not involved in production itself — or what they do *not* do. As Egoavil (1976:75) concludes in the case of potatoes "the business yields the wholesaler and rural middleman excellent economic results. Results which they achieve . . . without even taking part in production itself (author's translation from Spanish)." Thus, historical school proponents argue that Lima wholesalers' margins are exorbitant because, in their view, such merchants perform insignificant laboral functions.

As a corollary to the conclusion that Lima wholesalers earn excessive margins, proponents of the historical approach claim the 1970s decline in national per capita potato consumption was due to decreases in real incomes and increases in urban potato prices. For example, Flores et al. (1980:66) claim "in effect, the price of white potatoes in Lima rose from 6.80 *soles*/kg in December 1975 to 18.27 *soles*/kg in December 1978 with controlled prices. Simultaneously, potato consumption per capita went from 95 kg in 1975 to 73 kg in 1978 (author's translation from Spanish)."

(ii) Strengths of Historical Approach

Historical studies help fill a gap in the literature most notably on food production trends and the evolution of food consumption patterns. Moreover, their

analysis of production, distribution and consumption taken as a whole has some specific strengths. One strength is that they recognize the interdependent nature of domestic food marketing activities. Proponents, therefore, generally look for relations between production, distribution, and consumption rather than analyze any one independently.

Another strength is emphasis on social (versus only technical) element in domestic food marketing. In their analysis of marketing activities, these studies incorporate such factors as land tenure and income distribution. Thus, they consider different types of producers or traders and how their respective marketing activities alter and are altered by socio-economic factors apart from marketing costs and prices.

These studies also appreciate the relevance of broad, long-term trends versus isolated events in particular years. Thus, historical approach proponents rightly consider that prevailing food problems result from not only current but also long-term policies.

(iii) Weaknesses of Historical Approach

The historical approach suffers from certain weaknesses. Not every study utilizing this approach has the same defects. Rather, the most important shortcomings, according to the works cited, are discussed below.

First, proponents combine data on declining food production, relative prices, and rural poverty with conceptual claims about monopsonistic conditions in distribution channels to suggest the former is partly caused by the latter. Without case studies to support specific hypotheses, the alleged causal link between actual income levels and hypothesized trading arrangements is hard to verify or to refute. While historical studies (e.g., Caballero 1980, Santos 1976, Hopkins 1981) discuss domestic food market conditions in general (all products) or in national or regional terms (average producer prices) for specific products, they offer little micro-economic research on specific distribution channels to substantiate alleged relationships between income levels and marketing margins.[2]

Second, historical studies not only fail to research trading arrangements but also their conceptualization of distribution channels for domestically produced food commodities is too mechanistic. Proponents of the historical approach argue that small and large producers sell their market surpluses through the same general channel of producer-middlemen-urban (Lima) consumer. As food commodities accumulate in the provinces in larger and larger quantities they move inevitably in the direction of Lima. Peasant producers, though, are victimized by local monopsonists.

Effective demand in Lima no doubt exerts a major influence on rural marketing patterns. In the case of potatoes, historical school adherents in fact argue that capitalist producers now produce nearly all urban food requirements (Samaniego 1980). But this observation contradicts the claim that peasant producers supply the cities. Instead, it raises a whole series of questions about how many potatoes peasant producers actually grow, how much (if any) they sell, and where and to whom they sell them? Moreover, shifts in the organization of production probably generated shifts in the organization of marketing. Unfortunately, trade arrangements between capitalist growers and traders receive little consideration in historical studies. Thus the interaction of production and marketing arrangements is overlooked by those who espouse its central importance in research methodology.

Third, proponents of the historical approach argue inconsistently that middlemen's marketing margins are large and growing. They claim, for example, that government policy fostered a decline in real (deflated) food prices paid by consumers during the last three decades (Portocarrero and Uribe 1979). Hence, this decline suggests that producers *and* middlemen accepted less and less money for their goods and services. Still, producers' loss was consumers' gain as government policy successfully lowered the price of wage goods (staple foods). Nevertheless, for the same period, Hopkins (1981) argues that consumer prices (current) rose faster than producer prices (current) as evidence of growing marketing margins. Thus, he implies that growers lost, middlemen benefited, and government policy failed as consumer prices continued to go up. These different perspectives (deflated vs. current) and their contradictory (declining vs. growing marketing margins) conclusions might be resolved by analyzing consumer prices, marketing costs and margins in similar units of measurement.[3] Historical studies do analyze production cost increases (Martínez and Tealdo 1982). Other than freight rates, however, they make little mention of possible distribution cost increases, such as finance capital and labor. They suggest, instead, that excessive entry into the marketing chain is associated with local monopsony (e.g., Caballero 1980). Yet, excessive entry and the over capitalization of a particular sector suggest existence of destructive competition, price wars, and selling under cost, rather than monopsony profits.

Fourth, the claim that rural assemblers and Lima wholesalers earn excessive margins because they are not involved in production is too simplistic.[4] Rural assemblers and Lima wholesalers may not actually grow different crops, but they are involved in productive marketing activities (such as grading and transport). Several opposing views of traders' activities agree on this point. One view considers traders' activities as productive because they result in a combination of men, material, and ideas that otherwise would not occur (Long 1977:128). The reward for success in these tasks is profit; the penalty for failure is loss. Another view is more critical, but dismisses the idea that all trading activities are unproductive as a misapplication of the "writings of Marx on the functions of trade." (Harriss 1981:14). According to this latter view, if traders harvest, grade, pack, or transport food commodities, these activities produce "use value" (in a Marxist sense) and therefore are productive. This view also notes that "merchants' capital in the narrow definition of Marx's is an abstract category and therefore not identifiable as a concrete phenomenon. It is also difficult, in agricultural markets, to distinguish practically between trading functions that are productive of use value, those that are unproductive but necessary and those like hoarding that are both unproductive and unnecessary" (op. cit.:15). Historical studies simply overlook or fail to consider these other interpretations of trading activities.

(iv) Methodological Shortcomings

Methodological shortcomings of historical studies include:

- the varying importance given distribution activities in theory and practice, and
- their failure to consider the technocratic literature.

In theory, followers of the historical approach would seem obliged to study not only food production and consumption, but also food distribution. Such an in-

terdependent view of economic activity is the essence of this approach. As Hopkins (1981:190) states, "production is not only production in its immediate sense but in turn distribution, circulation and consumption (author's translation from Spanish)."

Nevertheless, historical studies generally rely on food production and/or consumption statistics to make inferences about distribution activities.[5] This emphasis partly reflects the relative abundance of production and consumption data compared with the scarcity of distribution statistics. Emphasis on food production in particular is also consistent with the view that an analysis of modes of production forms the basis for analyzing economic activity. Yet, different modes of production imply at least the possibility of different types of distribution. According to Long (1977:102), ". . . consideration of modes of production also leads to an analysis of the ways in which different production systems are articulated with different types of local and regional markets. Here we need to distinguish between markets of the more traditional types (e.g., *ferias* of highland Peru) which predominantly cater for exchanges among peasant producers who bring their products to the market to sell or barter for other goods, and the distribution markets which buy up local produce for sale in the major urban centers. In other situations, certain types of produce are exported directly from the farms to the cities by middlemen and wholesale merchants . . ." Yet, since historical studies fail to explore actual trading arrangements, the possible insights offered by utilizing an analysis of modes of production approach to examine marketing activities are lost. Ironically, the historical approach rarely calls into question the conventional wisdoms on marketing because the practitioners truncate their own method. Instead of studying production, distribution, and consumption, they focus almost entirely on production.

Followers of the historical approach also have failed to incorporate into their analysis the results of technocratic studies. For example, Martínez and Tealdo (1982:118-120) briefly describe marketing channels for perishable food crops but they make no mention of relevant technocratic research in this area, e.g., Shepherd (1967), Graber (1974), Medina et al. (1974). These omissions are partly understandable as literature on domestic food marketing is scarce and difficult to find; and historical studies frequently are not primarily concerned with marketing. However, if the historical thesis emphasizes the importance of exchange, then . . .

"It is for this reason that studies of entrepreneurship, of trading and market organization, and of political and cultural brokers, many of which have been undertaken from quite a different intellectual stand point, become pertinent . . ." (Long 1977:87).

The following section reviews technocratic studies.

1.2 Technocratic Approach

(i) Concepts, Methods, and Conclusions

Technocratic studies generally analyze domestic food marketing from a narrow, static, micro-economic perspective. Such research often has specific operational goals as part of a particular project. Other sectors of the economy or long-term development trends frequently are not a concern of technocratic researchers.[6] If such studies do examine trends in prices or commodity flows, then they often assume unchanged, or "static," trade arrangements between producers and middlemen.

Adherents of the technocratic approach analyze domestic food marketing to identify particular problems and proposed measures to correct them. Various technocratic studies (Shepherd et al. 1969, Fernandez 1976, Teutscher and Tello 1983) discuss, for example, problems of price fluctuations and feasibility of storage as a solution. Key variables in these studies are commodity flows, price signals, and efficiency. The technocratic approach also considers resource endowments and productivity differentials of different producers or income levels and consumption patterns of different consumers.

Technocratic researchers have used both qualitative and quantitative methods, but emphasis has been on the latter. Consequently, some practitioners (see, e.g. Medina et al. 1974, Dolorier 1975) collected primary data with structured interviews. Others (CONESTCAR 1969; Amat y León and Curonisy 1981) worked with large data sets assembled for more general purposes. A few (CONAP 1967; Graber 1974; IBRD 1975) relied almost exclusively on published and unpublished official statistics. These numbers frequently serve as inputs for regression analysis or as descriptive statistics on particular marketing phenomena. Technocratic adherents also prepared broad surveys of domestic food marketing (Zúñiga 1970; Esculíes et al. 1977) or of issues in government marketing policy (Rubio 1977; IBRD 1975, 1981).

Product by Product Approach

Since technocratic researchers frequently adopt a product by product approach in studying domestic food marketing (part of the narrow focus), their conclusions may differ from study to study. Still, proponents of this approach frequently find that (a) rural assembly is inefficient, (b) marketing margins are excessive, and (c) in recent years, inadequate production and insufficient storage have caused secular and seasonal declines in urban (Lima) consumption of traditional food crops (potatoes). These problems are seen as resulting from technical marketing deficiencies.

Technocratic studies claim that rural assembly is inefficient because the collection of crops produced on numerous technically backward farms adds additional stages — and additional costs — to food distribution channels. Technocratic researchers argue as well that this inefficiency at the producer level is aggravated by past national food policy that failed to encourage regional crop specialization. Instead, this policy tended . .

". . . to promote both regional and farm diversification rather than increased specialization, thus increasing the need for assembly or accumulation. It also tends to generate a supply problem in the sense of inadequate volumes to support the marketing functions necessary to improve marketing efficiency . . ." (IBRD 1975 Annex 6:5).

Technocratic observers also consider rural assembly inefficient because it is too bureaucratized.

"The marketing process is extremely bureaucratized, there is no free and unobstucted flow of agricultural products between municipalities or zones. Licenses to transport produce have to be obtained from the originating municipality and from the *zona agraria.* Local authorities can prevent, and have stopped, the movement of produce in towns or cities in the production zones to insure adequate supplies of food locally, very often in disregard of existing price relationships" (op. cit.:4).

Some practitioners of the technocratic approach frequently contend that the

existing production, distribution, and consumption system enables middlemen to earn excessive marketing margins. In the eyes of one observer dishonest middlemen earn "excessive profits in a very short time while the producer works his fields for long periods from planting to harvest (author's translation from the Spanish)" (Zúñiga 1970:85).

Technocratic researchers (Esculíes et al. 1977:32-39) argue that excessive margins at rural levels exist because peasant producers:

- are tied to certain rural middlemen by production loans,
- have limited experience in marketing food crops,
- are unorganized and therefore individually sell small quantities, and
- lack marketing information.

These researchers claim that excessive margins exist in Lima because urban wholesalers use their high sales volume, years of experience, and their strategic position in the bottleneck of the marketing channel to the disadvantage of producers, consumers and other merchants. These margins are especially concentrated in the hands of largest wholesalers. In the view of Esculies et al. (1977:145-146), these wholesalers, ". . . have achieved a position of ascendancy versus all the other participants in the system, including small wholesalers, and fix trade arrangements and prices to function in their interest (author's translation from Spanish)."

Followers of the technocratic approach also mention high costs as a factor contributing to excessive marketing margins. At the rural level, the laborious task of collecting small lots of food surpluses drives up costs and margins. In the absence of rural assembly centers for packing and cooling perishable produce, spoilage increases costs and contributes to high marketing margins (Watson 1975). High transport charges between production and consumption centers is mentioned as a major component of producer-wholesaler price differentials (Shepherd 1967:39-40). At the urban level, technocratic researchers point out that the proliferation of small-scale, low technology, produce vendors — with their considerable shrinkage losses — add to marketing costs and margins (Rubio 1977:296-301). Other technocratic studies (Graber 1974:55) refer to difficulties of calculating precise es nates of wholesaler profit margins without accurate farm-level data.

Inadequate Storage

Technocratic adherents also claim that inadequate production and storage is responsible for the recent decline in urban (Lima) consumption of traditional food crops. One study claims the decline in national potato production has combined with a slight, but steady reduction in potato shipments to metropolitan Lima in recent years. These developments have led to a decline in Lima's potato consumption (Teutscher and Tello 1983:9). Another study argues that seasonal shortages adversely affected coastal potato consumption in particular. In this regard, Fort (1982:9) claims that while the Sierra and Selva produce their own substitutes for potatoes in terms of shortage, (*olluco*, cassava for example) the Coast does not - requiring a reorientation of consumption.

Under such circumstances, technocratic researchers contend that the lack of production planning and crop forecasts perpetuate cyclical and seasonal food shipments to the capital.

(ii) Strengths of Technocratic Approach

The body of technocratic literature is more diverse than the historical studies. Hence, generalizations about its specific strengths and weaknesses are more difficult to make.

Technocratic studies have contributed to an understanding of domestic food marketing in three ways.

First, they contain a massive amount of primary and secondary data, information essential for marketing research. Gradual accumulation of such statistics facilitates long-term analysis of marketing activities.

Second, technocratic studies frequently include first hand descriptions of some aspect of domestic food marketing (Dolorier 1975).

Third, many technocratic studies thoroughly analyze certain, narrowly defined domestic food marketing operations such as trucking costs (Mathia et al. 1965).

(iii) Weaknesses of Technocratic Approach

Like the historical approach, the technocratic thesis also has its weaknesses. For instance, adherents to the technocratic approach often overlook the need for an explicit, comprehensive conceptual framework. Narrowly focused single commodity studies consequently ignore the relationship between a particular marketing activity (or food commodity) under scrutiny and the evolution of other food marketing operations or the rest of the economy. This can result in erroneous inferences about more general marketing developments. Teutscher and Tello's (1983) analysis of potato shipments and prices in Lima is a case in point. This study has a novel approach: how a certain mathematical function approximates potato price trends. Unfortunately, the focus is strictly on white potatoes and ignores colored potatoes supplies. Therefore, a mistaken conclusion is that "potato" shipments have declined when, in fact, total potato shipments have increased dramatically.

Similarly, technocratic researchers often present large data sets but omit any treatment of the marketing institutions or exchange relations that generated these numbers. In lieu of a well-defined conceptual framework, then, technocratic studies tend to mistakenly equate domestic food marketing with certain physical functions such as transport and storage and substantive analysis with statistical techniques, for example, regression analysis.

Several technocratic studies analyze marketing activities in an effort to assess marketing margins in food distribution channels supplying Lima. These studies are disappointingly inconclusive. Shepherd (1967) discusses producer-wholesaler and wholesaler-retailer price differentials, but concludes more research is needed to demonstrate if data are "typical." Esculíes et al. 1977 (21-22, 185-186) refer to high producer-consumer price differentials for several fruits and vegetables and conclude that certain large volume Lima wholesalers earn excessive profits. While they make descriptive claims about alleged monopoly control of wholesale trade, no estimates are presented of actual marketing margins to support their conclusions.

Estimates in another study (Medina et al. 1974) are based on structured interviews and the question "what is your margin of profit (percent)?" Thus, wholesalers' subjectivity (what each wholesaler understood as a "profit margin") or their imprecise knowledge of actual marketing costs (shrinkage losses), for example, may have biased these results.

(iv) Methodological Shortcomings

Methodological weaknesses frequently found in technocratic studies:

- limited or non-existent review of literature,
- questionable use of certain statistical techniques.

Technocratic reports often include various elaborate tables containing data for variables such as food shipments to Lima, food prices in the capital, or concentration of food sales by size of wholesaler in the capital's wholesale market. The task of collecting, organizing, and presenting this type of information is time-consuming and the data are useful. But technical studies rarely go beyond their data to comment on the accuracy of their statistics (versus those found in other studies) as indicators of actual market behavior, the appropriateness of certain data generating techniques, such as the engineering method used in Mathia et al. (1965), or how their findings relate to those of other studies.

Instead, some technocratic researchers present their numbers as an adequate basis for marketing policy. For example, an observation about tuber wholesalers in Lima's market, states that "32% of the established wholesalers control more than 100 metric tons per month, while 59% of all wholesalers manage between 40 and 100 tons monthly . . . This demonstrates a considerable concentration in the hands of small groups of wholesalers . . . " (author's translation from Spanish) (Esculies et al.1977:84-85).[7] Detailed statistics for 1973 indicate that in fact the 10 largest wholesalers received less than 15% of all potatoes shipped to Lima's market (see Egoavil 1976).

Technocratic studies also raise doubts about their research findings because they seldom refer to results in other studies (see, e.g., Medina et al. 1974) and lack a detailed bibliography (see, e.g., Amat y León and Curonisy 1981).

Another methodological weakness of certain technocratic studies concerns liberal use of statistical techniques to assess marketing activities. For example, one study used advanced econometric methods and a wealth of statistics to produce dozens of income, price, and cross-price elasticities for different food products consumed in Lima (MAA-OSP 1980). However, this study provides only a limited discussion of the statistical procedures used to generate the estimated coefficients. In this and similar instances, then, the authors suggest implicitly that the validity of their results is confirmed by the unimpeachable power of the techniques utilized.

1.3 Consensus on Domestic Food Marketing

To summarize, most studies of domestic food marketing can be grouped within either the historical or the technocratic approach (Table I.1). The historical approach views domestic food marketing from a macro-economic, long-term, global perspective focusing on capital accumulation in production and distribution. It utilizes specific concepts and principally secondary statistics in a research methodology broadly defined as class analysis. This approach sees domestic food marketing as a local manifestation of worldwide capitalist penetration into a traditional agrarian economy. The technocratic approach analyzes domestic food marketing in narrow, static, micro-economic terms. Research methods are quantitative and/or descriptive, with a focus on differences in resource endowments and productivity. This approach depicts domestic food marketing largely in the light of technical deficiencies.

Using these different concepts and methods, the two approaches, nevertheless,

Table I.1 Historical and technocratic approaches to the study of domestic food marketing.

Basic components	Approach	
	Historical	Technocratic
Perspective	Macro-economic, global, dynamic	Micro-economic, narrow, static
Key variables	Class conflict, capital accumulation, excessive profits	Commodity flows, price signals, cost efficiency
Method	Conceptual and quantitative	Descriptive and quantitative
Data sources by order of importance	Published official statistics, structured interviews	Structured interviews, unpublished official statistics, published official statistics
Principal studies	Caballero (1980;1982) Claverías (1979) Egoavil (1976) Flores et al. (1980) Hopkins (1981) Martínez and Tealdo (1982) Portocarrero and Uribe (1979) Samaniego (1980) Santos (1976)	CONAP (1967) Dolorier (1975) Esculíes et al. (1977) Graber (1974) IBRD (1975; 1981) Medina et al. (1974) Rubio (1977) Shepherd (1967) Teutscher and Tello (1983) Watson (1975) Zúñiga (1970)

Source: Elaborated for this study.

arrive at a peculiar consensus. The consensus is peculiar partly because frequently similar assessments of domestic food marketing activities result not from a clash of ideas but from approaches that fail to consider opposing views. The consensus is also peculiar because the two different approaches share common conclusions about five key domestic food marketing activities.

Common Conclusions

Although they employ different concepts and methods, historical and technocratic approaches reach several similar conclusions. Not every study concludes exactly the same thing for exactly the same reasons. But, many studies have the following conclusions in common.

1. Rural assembly is inefficient. Adherents to the technocratic approach see rural assembly as inefficient because of small-scale food production, lack of technically advanced rural infrastructure, or failure of government marketing policy to support regional production on the basis of comparative advantage (IBRD 1975). Followers of the historical approach see rural assembly as inefficient because of lack of infrastructure and either too many traders which leads to excessive marketing transactions (Santos 1976) or not enough traders which creates monopsony (Caballero 1982).

2. Marketing margins of rural assemblers are excessive. Historical proponents argue that rural traders' marketing margins are excessive because of monopsony power. Rural traders' monopsony power results from their control over credit, transport, information, as well as the geographic isolation of many small, semi-subsistence growers (Flores et al. 1980). Technocratic researchers contend that rural food merchants have excessive market margins, because either small-scale producers' are technically and organizationally ill-equipped to bargain effectively or shrinkage losses drive up assembly costs (Esculies et al. 1977). Since both technocratic and historical studies consider excessive rural marketing margins as pervasive, they both conclude such margins are a major cause of low producer incomes.

3. High freight rates contribute to high marketing costs. Historical approach adherents trace the origin of high freight rates back to local monopoly control over transportation, the powerlessness and isolation of peasant producers, and the need to ship many perishable commodities considerable distances over an inadequate road network (Egoavil 1976). Technocratic studies find high freight rates the result of rugged topography, lengthy distances to market, and the shipping and reshipping of small lots of produce (Graber 1974).

4. Exorbitant margins of Lima wholesalers inflate consumer prices in the capital. The historical approach argues that Lima wholesalers - particularly large volume wholesalers - have excessive margins because of their control over food shipments (by provision of credit), and their ability to administer prices (Flores et al. 1980; Martínez and Tealdo 1982). Some technocratic studies conclude that Lima wholesalers earn excessive marketing margins because of the concentration of sales among a few large-volume traders (Esculíes et al. 1977). Other technocratic studies address the issue but are undecided (Shepherd 1967). Still historical and technocratic schools adherents generally conclude that unnecessarily large wholesale margins drive up consumer prices.

5. Consumption of traditional food crops, such as potatoes, has declined in Lima. Followers of the historical approach imply that in recent years potato consumption in Lima has declined because of declining rural incomes and increasing prices (Flores et al. 1980). Technocratic practitioners claim that declining production and shipments to the capital have reduced Lima's potato consumption (Teutscher and Tello 1983). Futhermore, absence of adequate storage facilities perpetuates a seasonal supply problem (Fort 1982).

The consensus on domestic food marketing leads to three observations:

- Both historical and technocratic approaches can answer questions about domestic food marketing according to their respective concepts and methods. However, neither offers much supporting evidence. Instead, each perspective assumes its explanations are correct.
- Adherents to both approaches frequently fail to cite previous research. Historical followers ignore or overlook technocratic studies that offer entirely different explanations for certain domestic food marketing activities. Similarly, technocratic studies present data with limited reference to historical studies.
- This literature review points to the need for case studies on domestic food marketing for specific crops. These studies should provide empirical evidence on producer-to-wholesaler marketing patterns and incorporate findings from earlier publications. Such needed research will complement available secondary data on food production and consumption as well as contribute to an assessment of common conclusions on domestic food marketing.

1.4 Approach of This Study

This study combines elements of both historical and technocratic methods in a case study approach. It begins with an analysis of potato production, consumption, and distribution trends. It adheres to the historical approach in this respect. The study also includes a technocratic-type analysis of costs, prices, and margins in the marketing channels from the Mantaro and Cañete Valleys serving Lima. In Lima itself, the analysis concentrates on wholesalers' marketing activities. The study concludes with an examination of potato consumption trends and demand characteristics in the capital.

(i) Concepts

This approach also employs certain concepts.

Marketing refers to the preparation, transport, and sale of food commodities. Performance of these activities is strongly influenced by food production and consumption patterns as well as food marketing policies. Consequently, this study rejects the arbitrary separation of, for example, production and distribution as proposed in some agricultural marketing texts. In so doing it adopts a broad view of marketing research that includes consideration of agronomic, social, and political factors that help shape marketing activities.[8]

The analysis of potato distribution is oriented around the concept of a **marketing channel:** a series of stages, or activities, through which a product passes in going from producer to consumer.[9] An important characteristic of marketing channels is the interdependence of their respective stages. Sequential operations in a given marketing channel are interrelated and interdependent. Different channels may have different numbers of stages and a different combination of marketing agents. While some producers may market a commodity through one channel, others may ship the same commodity through another channel (Figure I.1).

Two types of marketing activities are: physical and exchange. **Physical activities** refer to tangible actions associated with distribution of a commodity such as harvesting, grading, assembling, and transporting. **Exchange activities** refer to intangible relations between producers, assemblers, truckers, wholesalers, and retailers that govern transfer of property rights in the control of a commodity (Schmid and Shaffer 1964). The principal exchange activities are negotiation procedures for trade and form of payment.

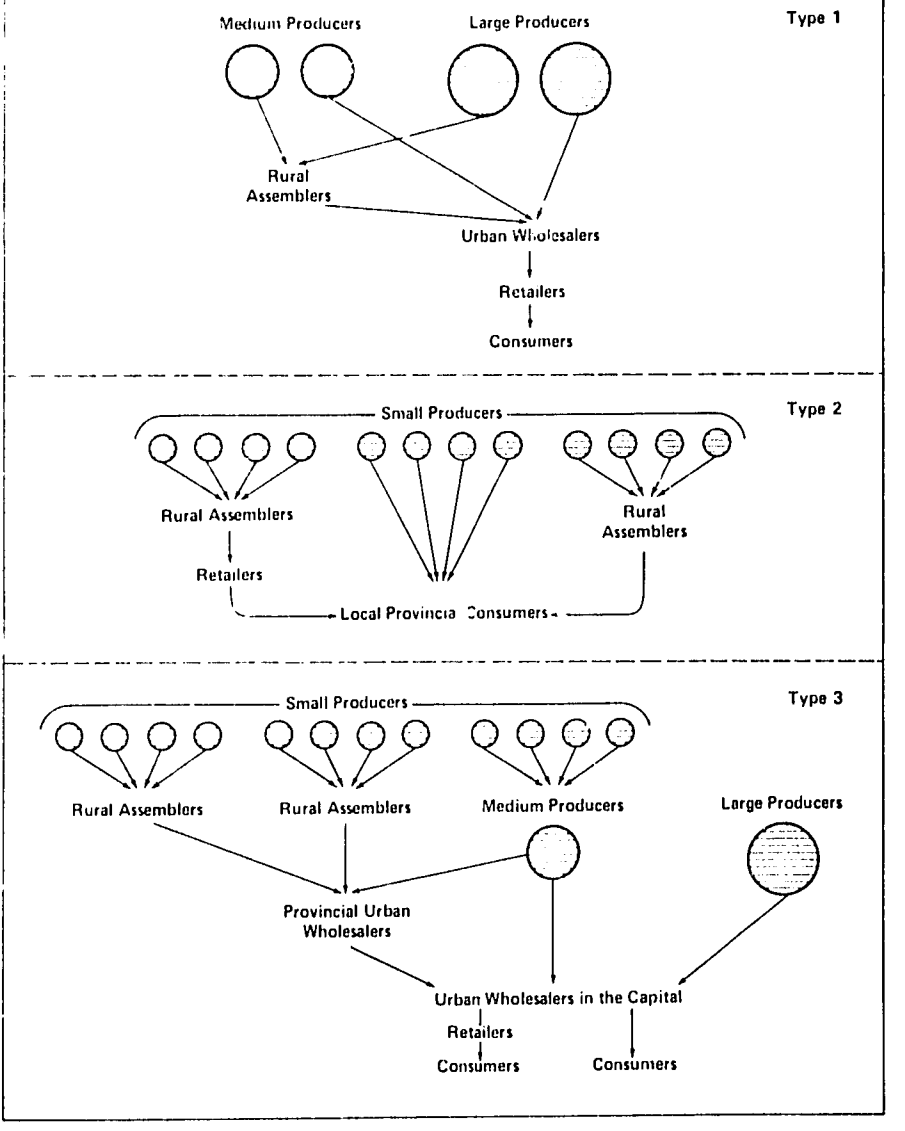
(ii) Research Sites

Growing areas in the central Sierra and Coast, and Peru's capital — Lima — are logical choices as focal points of this study. The two principal farming regions cultivate a substantial share (40%) of national potato production and supply 90% of all potatoes sold in the capital city. Lima is Peru's dominant food market.

Within the central Sierra and Coast, research sites selected were the Mantaro and Cañete Valleys. Situated some 300 kilometers southeast of Lima, the Mantaro Valley[10] has historically been a major area of potato production and marketing in the central Sierra (IDS 1954). In recent years, potato production trends in this valley have been representative of those in the central Sierra.

The Cañete Valley[11], situated 145 kilometers south of Lima, has long dominated potato production on the entire central Coast *(Actualidad Economica del Perú* 1978:10).

Figure I.1. Types of marketing channels.



An additional reason for selecting these two particular research sites is that recent field work by International Potato Center (CIP) social scientists provided an excellent source of background data.[12]

(iii) Data Collection Procedures

Several primary data collection procedures were used. The descriptive analysis of potato marketing channels emerges from formal interviews with 56 potato producers in the Mantaro Valley and 29 in Cañete; with 20 Huancayo wholesalers and 16 rural assemblers in Cañete; and with 100 truckers from the

central Sierra and 60 from central Coast. See Appendix One for details of sampling procedures, interview techniques, and data verification. Results of these surveys were checked against data collected in other field studies

Primary data were also gathered by informal interviews, participant observation, and systematic collection of potato prices. Informal interviews involved extension agents, administrative personnel of the Ministry of Agriculture and Agrarian Bank in Lima and the Mantaro and Cañete Valleys, as well as with rural assemblers, truckers, and Lima wholesalers. This information complemented and clarified certain issues raised in structured interviews.

The author participated directly in various potato marketing activities and made numerous visits to Huancayo's wholesale market and to weekly village fairs throughout the Mantaro Valley. He rode in trucks hauling potatoes from the Mantaro and Cañete Valleys to Lima. Numerous visits were made to Lima's wholesale market (MM#1) on a 24-hour basis to directly observe potato marketing. Research assistants systematically gathered potato prices. Prices were recorded on a weekly basis for the first 8 months of 1979 in three weekly fairs and in the wholesale market in Huancayo. Wholesale potato prices were also recorded in Lima from late January 1979 through early 1980.

Collection of secondary data (particularly those presented in Chapters II, VI, and Appendix Two) required additional research procedures. A thorough review of the literature was conducted. Official statistics were collected and analyzed. Different sets of figures were checked and re-checked against alternative estimates obtained from different sources. Appendix Two contains these statistics, their sources, and references to alternative estimates.

Notes

[1] Monopsony is defined as "the situation in which there is only a single buyer in a market." see Bannock et al. (1972).

[2] Egoavil (1976:61-62) presents such calculations, but only for two truckloads of potatoes.

[3] This cannot be done with available information because the studies do not provide the data, sources, and methods used in their calculations.

[4] In the author's view, one may be productive by growing or making a particular good or by providing services that enable that food to be distributed and consumed. Historical studies focus almost entirely on the former activity partly because they mistakenly equate being productive with the act of making a particular good.

[5] The study of Egoavil (1976) is an exception.

[6] Commodity projections (see CONESTCAR 1969) and commodity flow studies (see CONAP 1967) are exceptions to this rule.

[7] Escalies et al (1977:84-85) do not indicate the date or source of these statistics.

[8] In so doing, it follows the description of agricultural (food) marketing put forward in Harrison et al. (1974). Other observers also suggest a similar broad definition of agricultural marketing activities (Metcalf 1969:85; Bateman 1976; and Mendoza 1980:4).

[9] See Mendoza (1980) for a more detailed discussion of this and other marketing concepts.

[10] Mayer (1979) defines the "Mantaro Valley" as extending from Uocllapampa, adjacent to Jauja in the north, to near Pazos in the south, and San José de Quero in the west, to Raura in the east. Some authors define the valley in terms of the provinces of Jauja, Concepcion and Huancayo. These provinces actually encompass a much larger area than the "valley" as defined for this study.

[11] The Cañete Valley extends from Quilmana Alta in the northeast to Nuevo Imperial in the southeast, then from Imperial in the east across to San Vicente in the west. In geopolitical terms, the Cañete Valley consists only of Cañete province.

[12] See D. Horton (1984) for a summary of this research.

CHAPTER II

2. Structural Changes in Potato Production, Consumption, and Marketing

Introduction

This chapter reviews trends in the potato sector since 1945 both *within* and *between* geographic regions[1]. Thus, the chapter sets the context, in both historical and spatial terms, for the study of potato marketing in central Peru which follows.

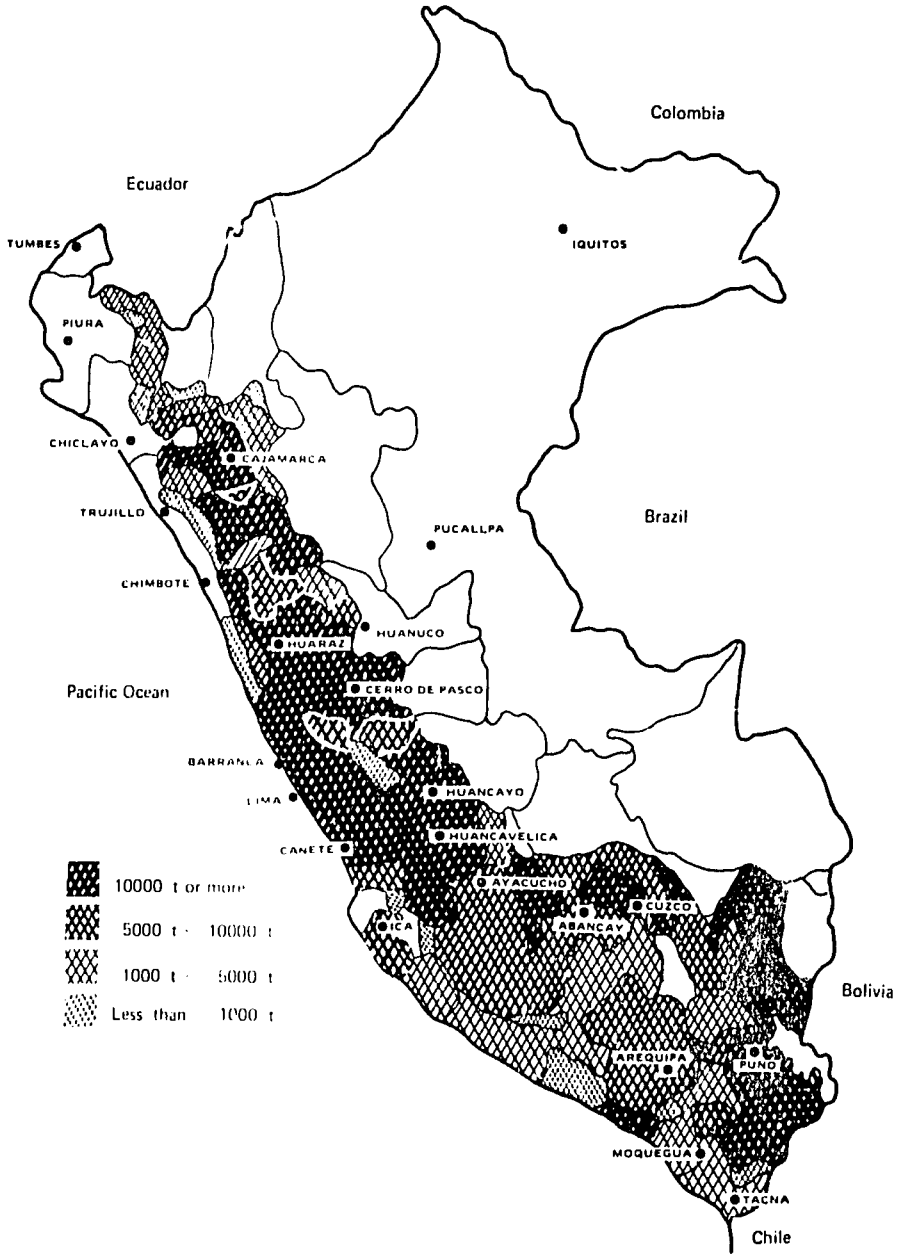
Trends based on aggregate statistics of potato production, consumption, and marketing invite simple, albeit misleading, generalizations. For instance, comparing statistics for the late 1940s with those for the late 1970s, national potato production shows seemingly unmistakeable signs of stagnation (Table A.1). Furthermore, national production patterns combined with demographic changes resulted in sharply reduced national per capita availability (Table A.9). Yet, it would be highly inaccurate to conclude that national (or even regional) potato production stagnated throughout the period or that potato availability declined throughout the country. These long-term trends overlook important short-term changes. They also neglect regional and sub-regional variations. Disaggregate developments merit closer examination because they provide a more accurate picture of the potato sector during the 1950s, 1960s, and 1970s.

2.1 Potato Production

About 90% of Peru's potatoes are produced in the Sierra and 10% on the Coast (Map II.1, Table A.2).[2] Potato production in the Selva accounts for less than one percent of total output.

(i) National Production

National potato production growth averaged 0.5% per year from 1948/58 to 1977/79. However, this low, long-term growth rate hides a series of peaks and valleys in post-war potato production (Figure II.1). From 1948 to 1954, steady increases in the volume of potatoes harvested culminated in the spectacular harvest of more than 1.75 million tons in 1954 (Table A.1). Potato output expanded during this period as part of a general production increase for most major food crops in the decade after World War II as return to a peace-time economy spurred demand for basic staples. However, a drought in the Sierra led to a 30% decline in total potato production in 1956 and 1957 (Hopkins 1981:179). Production recovered somewhat in 1958, but then stagnated for nearly a decade; annual potato output remained about 1.5 million tons as average yields stayed slightly



Map II.1. Peru: Location of potato production.

under previous levels and considerably below apparent potential (Eastman 1977: 11-13, 19).

National potato production increased sharply again in the late 1960s reaching a second, record high plateau from 1969 to 1971, when nearly 2 million tons of potatoes were dug annually. The first of these bumper crops was largely due to a 20% jump in land area harvested. By 1970 potatoes covered 300,000 hectares, or

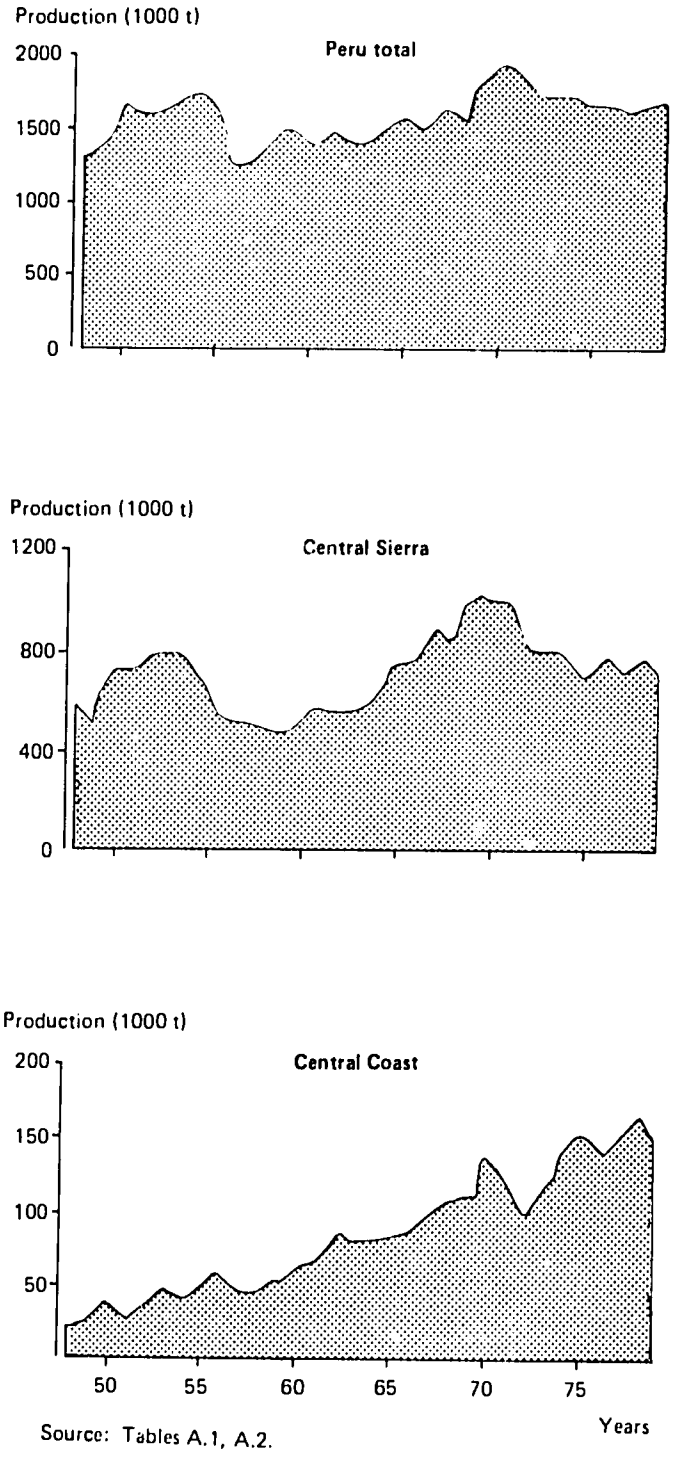


Figure II.1. Peru: Potato production in total, central Sierra, and central Coast: 1948-79.

almost 30% of land under crop cultivation in the Sierra. Yields also improved 10% in 1970 and 1971.

For the remainder of the 1970s, however, total potato production hovered around 1.7 million tons. Area harvested decreased slightly and yields increased slightly during this period.

Preliminary estimates for the 1980 crop indicate a 20% contraction in potato production to less than 1.4 million tons as a result of drought and frost (Fort 1982:3). However, total potato output recovered to 1.7 million tons in 1981 (op.cit.:3). In wake of these production trends, aggregate potato supply projections for years 1975, 1980 and 1985 appear too optimistic (Table A. 5).

In an effort to explain potato production trends, Hopkins (1981:180-181) noted a consistent relationship between food production trends and relative prices from 1944-1969. A strong inverse relationship between Lima potato prices and national potato production from 1958-83 was also detected by Teutscher and Tello (1983:5-6). However, several authors (Twomey 1972:68; Alvarez 1980:58) argue that government intervention, geographic diversity, differences in production organization and a strong subsistence orientation of many producers vitiate this type of analysis because it assumes an unrealistic degree of market integration. Graber's (1974:42) correlation analyses of potato prices among 14 cities show that certain markets are isolated from one another.[3] Thus, a discussion of potato production at regional and sub-regional levels is essential to comprehend national output patterns.

(ii) Sierra Production

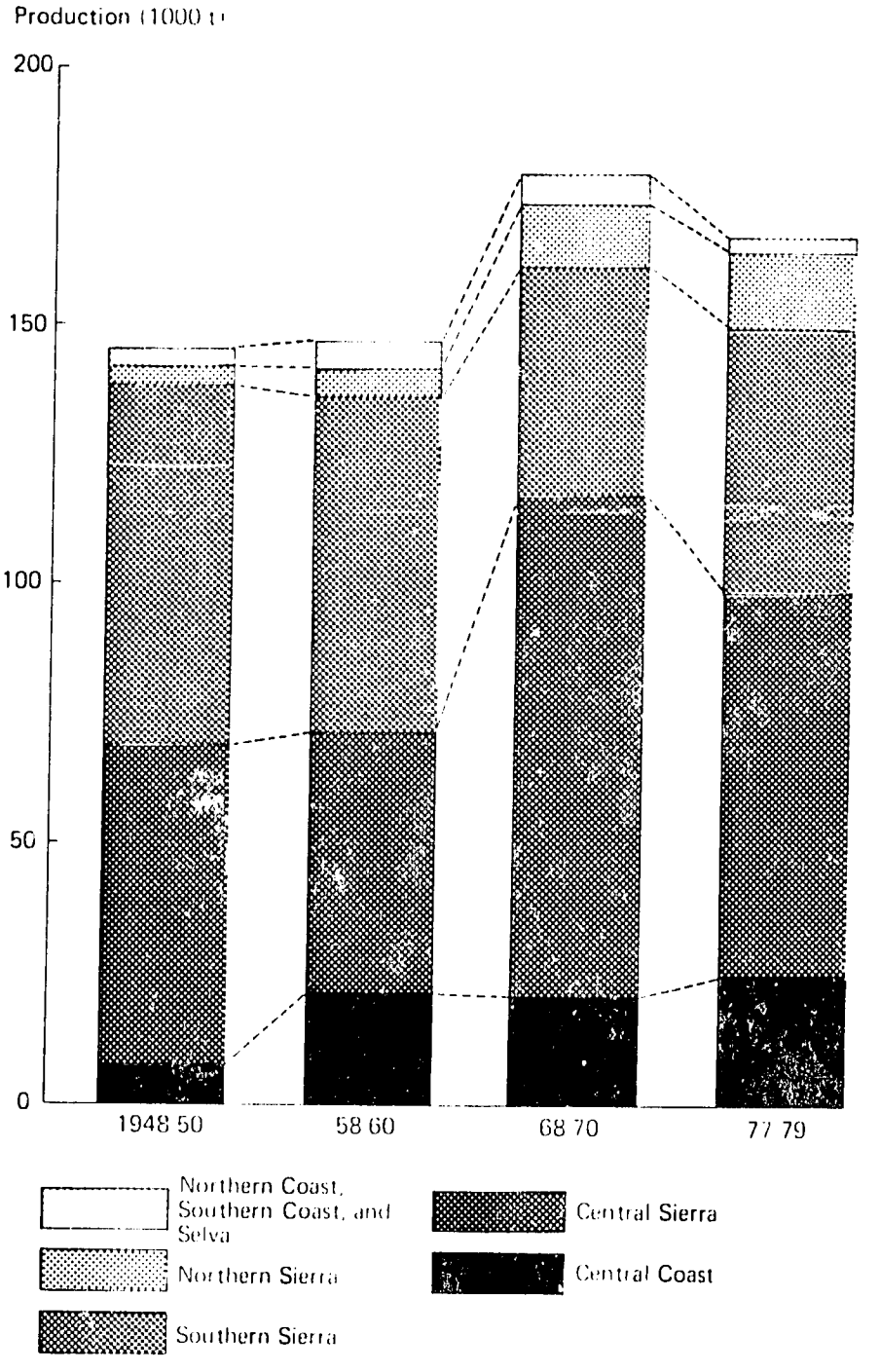
Sierra potato production remained about 1.45 million tons for most of the last 3 decades (Figure II.1). However, this aggregate trend masked sharp variations in production within the region over time. Each sub-region therefore requires separate treatment.

Southern Sierra

In the southern Sierra, growth rates for potato production, area, and yields were near or below zero for most of the last 3 decades. Consequently, production in this region fell from 50% of the national total in 1948/50 to about 30% by 1977/79 (Figure II.2). Various factors contributed to this stagnation. First, thousands of small-scale farmers produce potatoes in this sub-region (see Franco, Moreno and Alarcón 1983). Three southern Sierra departments alone contain more than 40% of the nation's potato producers (Figure II.3). Second, annual per capita potato consumption in this sub-region is more than 200 kg (Table A.10). Production, therefore is largely subsistence oriented. Third, this sub-region is also among the poorest (Amat y León and León 1979:30-31), most geographically isolated, and most neglected by government programs (Hopkins 1981:137). As a result, southern Sierra producers have few resources and limited incentives to increase potato production.

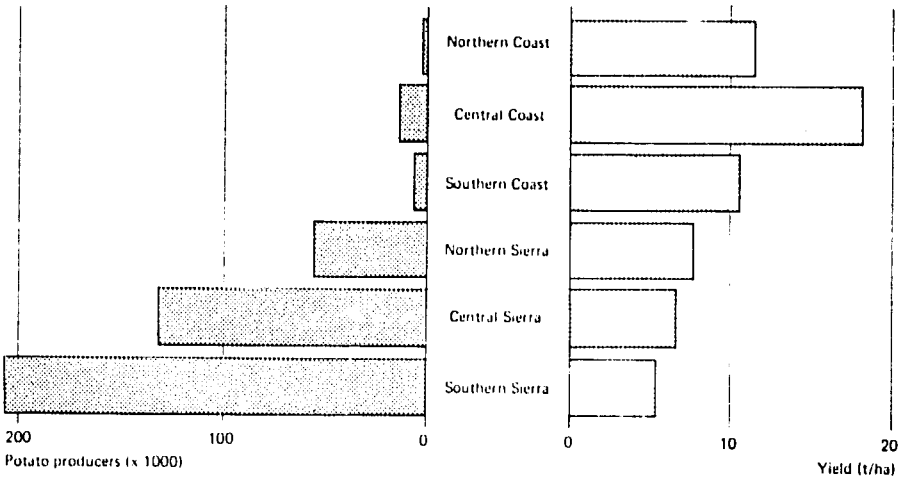
Northern Sierra

Trends in potato production in the northern and central Sierra differed sharply from those in the south. During the 1950s, potato production nearly tripled in the northern Sierra (Table A.2). Graber (1974:1) attributes this rapid expansion largely to the region's favorable agronomic conditions. In the late 1960s, northern Sierra potato production began to decline due to disease problems. This sub-region subsequently was handicapped by a quarantine to avoid the spread of



Source: Table A.2.

Figure II.2. Peru: Sub-regional distribution of potato production: 1948-79.



Source: Number of producers, Censo Agropecuario 1972; yields, Table A.4.

Figure II.3. Peru: Number of potato producers and yield by region.

bacterial wilt *(pseudomonas solanacearum)* to other parts of the country. Production recovered briefly in the mid-1970s but then dropped again at the end of the decade partly because of severe drought (Fort 1982:3). Northern Sierra output now accounts for about 15% of national potato production compared to 5% in 1950 (Figure II.2).

Central Sierra

The most perplexing production trends in all of the Sierra during this period were in the central sub-region. Output declined sharply in the 1950s, expanded rapidly in the 1960s, and fell again during the 1970s. Consequently, the average growth rate in potato production for the central Sierra during the last 3 decades was just 0.6%. Production in this sub-region remained about 45% of the national total (Figure II.2).

Information about central Sierra potato production in the 1950s is scarce. Output was adversely affected in 1956-57 by lack of rain (see Scott 1981:197) and some farmers were hurt by price fluctuations early in the decade (IDS 1954:230). The drastic drop in production in 1959/60, however, is not discussed in the literature. Moreover, there is no evidence that shipments to Lima from this sub-region dropped sharply or that prices in the capital shot up (Sánchez 1960:7,45). Revised statistics, in fact, show less pronounced production declines.

During the 1960s access to credit, extension, and research results all motivated farmers to expand potato production (Fano 1983:74-75). Nevertheless, in the 1970s, potato production in the central Sierra once again declined and then stagnated. Prominent factors contributing to stagnation were:

- A rise in production costs (e.g., fertilizer, Figueroa 1979; Van Liemt 1978:44), difficulties in securing official farm credit from the Agrarian Bank (Flores et al. 1980:200) and agro-climatic risk (Rice 1974:316-317);
- Dismantling of the national extension service/agricultural research complex left farmers generally (IBRD 1981:41) and potato growers specifically without adequate technical assistance (Flores et al. 1980:211-220);

- Unfavorable terms of trade for Sierra potatoes (Martínez and Tealdo 1982:94-95) adversely affected commercially-oriented growers (see, e.g., Lafosse 1983).

In other words, potato production in the central Sierra declined during the last decade due to a rapid increase in production costs, unfavorable terms of trade and inadequate programs to improve productivity.

Coastal potato production trends were quite different from those in the Sierra.

(iii) Coastal Production

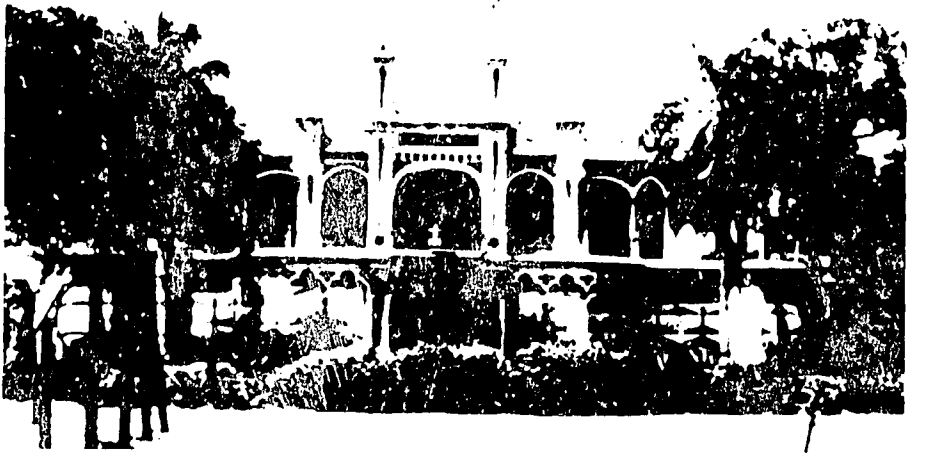
Coastal potato production, expanded rapidly over the last 3 decades due to increases in both area and yield (Table A.2-A.4). More rapid increases in output were during the first two decades as growth rates averaged 9.3% and 7.9%, respectively. In the 1970s, growth rates for production, area, and especially yields slowed. Still average coastal yields were markedly higher than highland yields (Fano 1983:196-197) and over the last 30 years, coastal potato production expanded from less than 3% to more than 10% of national output (Figure II.2).

As in the Sierra, growth in potato output on the Coast was uneven. Annual production expanded steadily on the central Coast, but remained below 5,000 tons for much of the period on the northern Coast. Southern coastal production expanded briskly in the 1950s, then stagnated, and finally fell back to mid-1940s levels — about 15,000 tons annually, by the late 1970s.

Central Coast

While potatoes were grown on the central Coast as early as 1929 (Twomey 1972:14), the rapid increase in output, area, and yields in the post-war period resulted from a covergence of factors. In the late 1940s and early 1950s, several new, high-yielding potato varieties were introduced (Fano 1983:74). At this time, commercial growers were also eager to find a substitute cash crop for cotton.

Entrance to former *hacienda* on central Coast converted to production cooperative. (Photo by Rhoades).



Using Andean foot plow, *chaquitaclla*, for cultivating slopes of central Sierra. (Photo by Horton.)

With a production infrastructure — irrigation, roads, and telecommunications — in place, relatively easy access to credit, and favorable weather conditions, growers were ready to exploit improved potato technology. Additionally, these coastal growers could supply a nearby, rapidly expanding, urban market at a time of year when Sierra potatoes were scarce and expensive.

In the 1970s, growth in potato production on the central Coast slowed considerably. A key reason was that the agrarian reform converted the large coastal farms into production co-operatives which suffered from managerial problems. Government mandated food production targets (*pan llevar* laws) also prompted these growers to plant more potatoes (IBRD 1975 Annex 6:5). However, few new farms were offered the technical assistance necessary to improve yields.

Other economic and political developments also discouraged potato producers on the central Coast during the last decade. Abundant harvests, especially for

1970 and 1971, plus the associated crash in farm-gate prices (Graber 1974: 55-56) were largely responsible for the 1972 drop in area planted and production. At decade's end, unfavorable producer prices (*Actualidad Económica del Perú* 1978: 10), elimination of government subsidies on fertilizer (IBRD 1981:65-66) and substantial hikes in interest rates for government farm credit resulted in a renewed decline in area harvested and production. Nevertheless, annual growth rates for both potato production and area on the central Coast exceeded 3.0% for the last decade. These production trends had important implications for potato consumption and marketing.

2.2 Potato Consumption

Information on potato consumption is even less abundant than that on potato production. Nevertheless, two general observations are substantiated by available publications (Amat y León and Curonisy 1981, MAA-DGC 1979). First, the quantity and type of potatoes consumed and the forms in which they are eaten vary sharply between regions. Second, national potato consumption levels are influenced by — *but by no means identical to* — national potato production. Seed use (20%) plus shrinkage and marketing losses (10%) annually reduce total apparent availability to 70% of national output.

(i) National Consumption

Estimated national per capita potato consumption (availability) fluctuated between 85 and 105 kg from the mid 1950s to the early 1970s (Table A.9).[4] Then during the 1970s, per capita consumption declined steadily to about 60 kg. These estimated national consumption levels resulted from changes in domestic production and population growth. Sharp decreases, (1956-1957), or increases (1969-1971) in per capita consumption during this period corresponded to fluctuations in total potato production. Similarly, stagnant or declining potato production and relentless population growth have resulted in a 35% drop in the level of per capita availability since 1970. Alternative estimates or roughly 100 kg for 1960/64 (CONESTCAR 1969:27,88) and of 82 kg for 1971/1972 (CONVENIO MEF-MA 1975:2) do differ from corresponding official estimates (Table A. 9).[5] Nevertheless, all estimates indicate recent declines in national potato consumption. Annual revised data show an average rate of change - 2.1% over the last 2 decades (1958/60-1977/79).

Although the recent evolution of production suggests important changes in potato consumption, the only data available for the nation as a whole indicate potatoes provide roughly 20% of the bulk, 10% of the calories, and 12% of the protein consumed on an average daily basis (Table A.11).[6] Thus, while per capita consumption has fallen in recent years, potatoes are still the country's most important food in terms of kilos consumed (Hopkins 1981:154). Given the potato's role as a staple in the national diet, estimated income elasticities are generally positive and between .3 and .5 (Table A.12).

These changes in the quantity of potatoes available had little impact on the form in which they are consumed. Generally, Peruvians continue to eat fresh, not processed, potatoes. Traditional processed products, *papa seca* and *chuño*, remain of minor national importance (Table A.10). Cottage industry or imported potato chips as well as dehydrated potatoes became increasingly available in Lima and provincial cities, but are negligible in most diets. High prices for

potatoes relative to corn also discourage use of potatoes in the manufacture of starch (MA-DGAG 1982:28-35).

(ii) Sierra Consumption

Population in the Sierra grew — albeit slowly — during the last 2 decades, while potato production fell and potato shipments to the Coast expanded (Table A.29). Hence, per capita potato consumption in the Sierra declined. Consumption was estimated to be 175 kg in 1964 (CONESTCAR 1969),[7] compared to 130 kg in 1971/72 (Table A.11).[8] Foods produced on the Coast, such as rice, or imported from abroad increased their importance in the highland diet (Ferroni 1982). Two key reasons for declining consumption of traditional foods such as potatoes in the Sierra were: limited government support for production of traditional food crops — in the form of greater production infrastructure, credit, research and extension — and a food price policy that subsidized imported cereals (Ferroni 1979; Figueroa 1979).

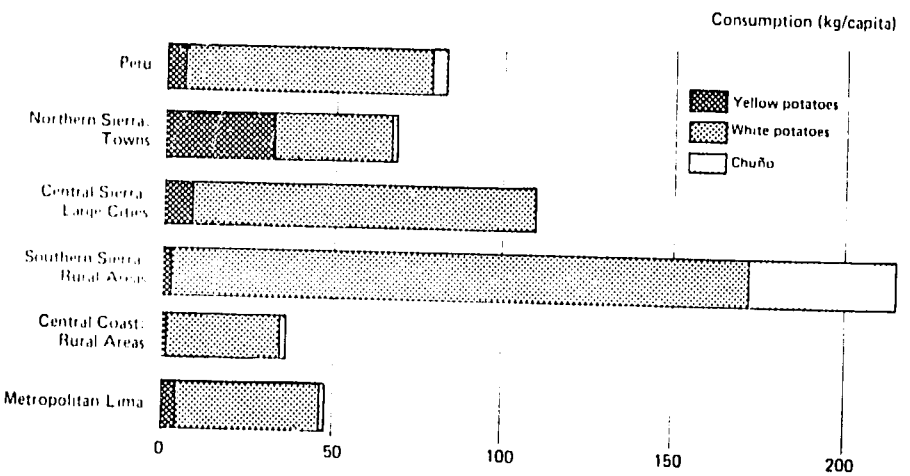
Sierra potato consumption preserves its traditional nature in two respects: preference for native varieties and consumption of processed potatoes. Native varieties continue to be a more important component of total consumption in the Sierra than elsewhere in Peru (Figure II.4 and Table A.8). Even highly market-oriented Sierra producers grow native varieties for home consumption (Franco et al.1979:42-44,58,96). Superior taste overrides any other consideration.

Traditionally processed potatoes also maintain an important place in the Sierra diet (Werge 1979). Traditionally freeze-dried potatoes — known as *chuño* — represent less than 6% of national average potato consumption, but 20% in the rural southern Sierra (Figure II.4). Agro-climatic conditions suitable for growing and processing bitter varieties plus the strong subsistence orientation of production in this sub-region contribute to this distinctly regional potato consumption pattern.

(iii) Coastal Consumption

Coastal potato consumption has evolved quite differently from that in the Sierra. For the period 1960-1968, coastal potato consumption was projected to

Figure II.4. Peru: Annual per capita potato consumption for selected areas.



Source: Table A.10.

Making **chuño** in the Sierra. (Photo by Horton).

expand as rapidly as consumption of any other major food crop (CONESTCAR 1969: 84-85). In fact, despite rapid population growth, coastal per capita potato consumption increased from about 32 kg in 1964 (op. cit.) to approximately 38 kg in the early 1970s (Table A.11). Recent research in selected coastal cities also indicates a modest, but continued increase in per capita potato consumption (MAA-OSEI 1978b). The propensity to spend a major share of household income on food, increases in regional production, and declining real potato prices have all contributed to this trend (Portocarrero and Uribe 1979).[9]

Coastal potato consumption patterns differ from Sierra patterns in two other respects. First, price, more than taste, has had a greater impact on consumption habits. Therefore, except for the northern Coast, cheaper modern varieties have long surpassed native varieties in dietary components (Sánchez 1960:7; Graber 1974:36). Second, very small quantities of processed potatoes are consumed on the Coast (Figure II.4). The small amounts of traditionally solar-dried potatoes — *chuño* and *papa seca* — that enter coastal markets (Benavides and Horton 1979) are generally consumed only on special, festive occasions (Werge 1979).

In response to lower prices resulting from recent tariffs cuts, some wealthier consumers now buy imported processed potatoes. However, the vast majority of Peruvians continue to consume locally produced, fresh potatoes because of their lower price, general availability, and superior culinary qualities.

Apart from regional demographic trends, differences in purchasing power, and variations in production, potato consumption has also been influenced by the evolution of potato marketing.

2.3 Potato Marketing

Over time, national potato production has become more market-oriented as subsistence sub-regions, such as the southern Sierra, declined in relative importance (Figure II.2). As roads have been built and improved, intraregional as well as interregional trade have expanded. As urban demand grew and trade volumes increased, various official measures have been applied to improve marketing. Their impact has been mixed.

(i) National Marketing

Few potatoes were exported or imported in Peru during the last three decades (Table A.9).[10] Neighboring countries produce considerable quantities of this crop and have no need to import Peruvian potatoes (CIP 1982). Freight costs and trade barriers discourage potato shipments to or from more distant markets (Twomey 1972:68). Consequently, sale of Peruvian potatoes has been restricted to the internal market.

During this same period, potatoes have evolved from an overwhelmingly subsistence food crop to become an increasingly commercial farm commodity.[11] Samaniego (1980:228) cites the growing use of production credit as one indication of this trend. Expansion of commercially oriented production on the central Coast is another (Figure II.2). Statistics on potato shipments to Lima are additional evidence that an increasing share of national potato production is marketed (Table A.14).

Interregional marketing patterns also have become well-defined. In the Sierra, some potatoes are harvested nearly every month of the year (Table A.7), but most are harvested and dominate national distribution channels from January to July (Sánchez 1960:59-64; Graber 1974:38, MAA-DGC 1980). In these months,

Retailer and consumer weighing potatoes in Huancayo. (Photo by Espinoza).

Map II.2. Peru: Potato marketing flows.

Sierra producers ship both seed and table potatoes to markets throughout the country (Map II.2). In contrast, coastal growers sell most of their potatoes from August to December.

(ii) Sierra Marketing

Three trends characterize marketing of Sierra potatoes since the late 1940s:[12]

First, potato trade has increased in both absolute terms and as a percentage of regional production. During the last decade, available data suggest potato shipments from the central Sierra to Lima increased (Table A.29) as regional potato production declined (Table A.2).

Second, a transportation revolution occurred which resulted in a larger

number of bigger vehicles transporting potatoes and other commodities.[13] Potatoes once shipped to Lima by train or small, gasoline-powered vehicles (Sanchez 1960; CONAP 1967:102-104) are now transported by larger, often diesel-powered trucks.

Third, urbanization within the central Sierra spurred proliferation of local, daily markets and weekly fairs (see, e.g., Uribe 1979). Five principal central Sierra departments went from one-third urban and two-thirds rural in 1961 to 50% urban and 50% rural in 1981 (INE 1981:45).[14] As a result, cities and towns which were once mainly assembly points for shipments to the Coast evolved into centers of intraregional trade and important markets in their own right.[15]

Thus, Sierra potato marketing became characterized by rising trade volumes, growing importance of commercial production, technical improvements in the freight system, and a proliferation of local markets which supplied the area's consumers.

Coastal potato marketing evolved quite differently.

(iii) Coastal Marketing

Coastal potato production has always been market oriented. Already in the late 1940s, most potatoes produced in this region were harvested for sale. And by in the late 1950's, coastal production already accounted for more than half of the potatoes consumed in Lima (Sánchez 1960:62-65). This percentage has remained virtually unchanged since then (Table A.29).

As agrarian reform coverted the coastal estates into production cooperatives, small and medium-sized private farms began increasing their potato production and shipments to Lima.

Government Marketing Programs

As the volume of potato trade expanded and cities' dependence on food shipments increased, various reforms have been proposed to improve marketing efficiency and reduce alleged profiteering (IDS 1954:160-161, 183-184; Shepherd et al.1969; Bustamante and Williams and Associates 1972; Watson 1975). Most of the subsequent programs, however, have not lived up to the expectations of their proponents. Govenment initiatives adopted during the last two decades included production regulations, price ceilings, government potato purchase and storage programs, regulated freight rates, anti-speculation and hoarding laws, and regulated marketing margins.[16] While the implicit assumption behind such initiatives was that producer prices could be raised and consumer prices lowered without fundamental changes in supply and demand for food (Cleaves and Scurrah 1980:208-209), their rationale was that distribution channels for potatoes were unorganized, inefficient, and dominated by exploitative middlemen.

Responsibility for administering these programs was divided among national, regional, and local authorities and enforcement of these measures, often proved difficult (Graber 1974:57-58; Alvarez 1980:41-45). Government personnel frequently lacked the experience, information, incentives, and resources needed to achieve program objectives. For example, potato prices were difficult to control because, unlike the case of wheat or rice, the government never purchased (or imported) many potatoes (Heredia 1980).

More fundamentally, interests of various groups involved often diverged. For example, in times of local scarcity municipal authorities often imposed price ceilings and prohibited shipping potatoes out of the area. These measures, which

benefited local consumers, hurt local growers and consumers elsewhere. Due to strong and conflicting interests, public interventions were often short-lived and poorly enforced. Consequently, most marketing decisions continued to be made primarily by producers, truckers, and middlemen in the country's fields and marketplaces.

By the late 1970s, due to problems of administration and enforcement, most of these measures had been scaled back or abandoned. For example, committees charged with regulating prices and margins were dissolved. Given available human and financial resources and the broader institutional framework, such forums could not function (Alvarez 1980:46). Potato prices, therefore, were deregulated. Yet, when shortages occurred, price ceilings occasionally were arbitrarily re-imposed (Orden et al. 1982:45, MAA-INIPA 1983:5). Similarly, direct state procurement from potato growers gradually evolved into regular purchases from established Lima wholesalers. The direct purchase and storage program fell victim to excess capacity and managerial and financial difficulties (Werge 1977:30). New, state-owned storage facilities were built only to stand empty through successive potato harvests.

2.4 Summary

A comparison of national potato production statistics at the beginning and end of the last 30 years suggests output stagnated. This observation is misleading. In fact, national potato production evolved in a series of peaks and valleys. After reaching record highs around 1970s, national potato production declined over the next 10 years. This decline has attracted growing public attention and official concern.

National trends in potato production mask divergent tendencies both within and between the Sierra and Coast. As production in the northern Sierra expanded in the 1950s and 1970s, central Sierra output fell. In the 1960s, the opposite occurred. On the Coast, expansion was especially marked in the central subregion. Production in the northern and southern coastal growing areas was more volatile. As a result, coastal potato expanded from less than 3% to more than 10% of national output.

Annual national consumption changes closely paralleled national potato production movements. Per capita potato availability remained between 85 kg and 105 kg until the early 1970s, but population growth and stable production over the last decade resulted in a decline in average per capita availability to about 60 kg.

Traditional processed potatoes and native varieties are much more important in the Sierra than on the Coast. Average potato consumption has fallen in the Sierra while potato consumption on the Coast has increased slightly.

During the last 30 years, the volumes of potatoes marketed grew substantially, and the marketable surplus expanded sharply as a share of total output. Potatoes, therefore, changed from a subsistence crop to an increasingly commercial crop.

In the wake of declining per capita production and growing urban food demand, various government measures sought to improve marketing of domestic food crops including potatoes. Limited success of these initiatives raised ques-

tions about long-held assumptions concerning potato production, consumption, and marketing.

Ironically, few detailed studies of these topics exist. As emphasized throughout this chapter, regional disparities characterize potato production, consumption, and distribution. For this reason, the analyses which follow refer specifically to potato marketing in central coastal and highland Peru.

Notes

[1] Brief references made to potato production, consumption, and/or marketing prior to 1945 are found in the *Censo Agropecuario* (1929) as cited as Twomey (1972), Christiansen (1967), Twomey (1972:10-16), Mayer (1974a), Maletta (1980:27), Scott (1981:38), Fano (1983).

[2] Earlier studies noted inconsistencies in official potato statistics (Hopkins 1981:19-56; Maletta and Foronda 1980: 215-216). This analysis of production trends is based on a thoroughly revised set of production statistics prepared by Fano (1983).

[3] The case study by Fonseca (1972) and price comparisons in Van Liemt (1978:49-50) corroborate Graber's findings.

[4] Unlike household consumption surveys, balance sheet figures described here do not actually measure how much food was eaten. Thus, specialists prefer to speak in terms of availability rather than consumption when using this method to estimate potato intake (Poats 1983). Hopkins (1981:152) cites data from Rose Ugarte (1945) indicating national potato consumption averaged 67 kg in 1943.

[5] In addition, another source (MA-DGAG 1982:22) estimated national per capita potato consumption "... varies between 98 kg in the cities and 150 kg in the countrysides ..." (author's translation from the Spanish) but no data or references were cited.

[6] These estimates are for 1971/72. Given the tremendous potato harvest in 1971 (Table A.1), it is not clear to what extent the relative importance of the potato may have been overestimated by ENCA. Unfortunately, earlier studies (Graber 1974:20-30, FAO 1977, all refer to the period 1969-1971 when potato production was unusually high. More recent estimates (MAA-OSE1:1978b) are for major cities only.

[7] This estimate was derived using CONESTCAR (1969) data as follows: population estimates (op. cit.: 15) were divided into apparent human consumption (op. cit.:88) and then multiplied by the regional indices of potato consumption (op. cit.:35).

[8] There are no annual official estimates of regional potato consumption, only distribution targets (see, e.g. MAA-DGC: 1980). As Hopkins (1981:150-159) notes, the few studies done (Rose Ugarte 1945, Collazos et al. 1960) lack similar geographic and/or product coverage as well as similar methodologies.

[9] Chapter VI contains a review of potato consumption trends in metropolitan Lima.

[10] A few studies briefly discuss potato trade with Bolivia (Wales and Preston 1972) and Chile (Graber 1974:6).

[11] Annual statistics on the marketable surplus of potatoes do not exist. Flores et al. (1980:59) calculate that about 40% of national potato production went for subsistence, 30% for traditional exchange and 30% for the market in 1977. Watson et al. (1976:232-235) estimate that 46% of national potato production went for on-farm consumption, 10% for seed, and 44% for sale. Both sets of figures, however, are essentially educated guesses.

[12] Sierra potato marketing has received little attention by researchers and government statisticians. Although southern (Wales and Preston 1972, Appleby 1976, Fernández Baca 1978, *Sur* 1981:29-39, Franco, Moreno and Alarcón 1983) and northern (Acevedo 1976, Neco H. et al. 1978, Pontoni 1982) sectors are mentioned occasionally, meager evidence refers almost exclusively to the central Sierra.

[13] Another change was a shift from the use of jute bags (Sánchez 1960:29) to plastic sacks.

[14] The departments were: Ancash, Huancavelica, Huánuco, Junín and Pasco.

[15] Sánchez (1960:40) indicates that 100 to 300 tons of potatoes annually were shipped by train from the Coast to the Sierra as early as 1955.

[16] Díaz (1980:125-135) partially lists laws for the period 1969-1977 and Merino Reyna (1982) briefly reviews measures undertaken in the 1970s.

CHAPTER III

3. Potato Marketing in the Mantaro Valley[1]

Introduction

Researchers and policy makers frequently characterize food marketing in the Sierra as follows: thousands of semi-subsistence producers selling their limited surpluses in a single, chaotic marketing channel and being paid low prices fixed by middlemen. Chapter I initially questioned this characterization by noting the lack of research and frequent inconsistencies between meager evidence and broad conclusions in literature on this topic. Chapter II suggested further that in the case of potatoes, structural changes in production, consumption, and marketing also raise doubts about the consensus view. Chapter III now begins our assessment of the consensus on domestic food marketing at the micro-level. This chapter analyzes prevailing potato marketing patterns in the Mantaro Valley.[2] By studying both potato production and distribution, Chapter III addresses issues of the organization of rural trade, marketing margins, and freight rates.

Breaking ground for planting in the Mantaro Valley. (Photo by Horton).

3.1 Potato Producers

Understanding potato marketing in the Mantaro Valley begins at the farm level with potato production and producers for 2 reasons. First, some producers plant potatoes for sale, others grow them to meet household food requirements. Second, production costs (hence, net revenues) vary across producer types.

Some farmers sell few potatoes because they plant their land mainly for on-farm consumption. Once this is achieved, then household cash needs influence the timing and volume of potato sales. If these growers sell potatoes, they look for a special type of buyer: someone who pays cash for small-scale, infrequent potato sales. Potential buyers thus may include other producers, local consumers (non-producers), itinerant retailers, truckers acting as traders, or even provincial wholesalers.

Other growers plant potatoes to make a profit. These growers seek a preferably well-established outlet for large quantities of potatoes. At a minimum, this eliminates one logistical problem at harvest — continually seeking new buyers for every shipment — and it allows more time to concentrate on arranging transport or to find labor for digging. Capable buyers most likely to be interested would be wholesalers in major cities.

Considering production costs enables better comparative analyses of marketing revenues for producers, truckers and wholesalers in Lima. In this regard, some farmers may earn low or even negative net revenues because they have relatively high unit production costs. Thus, low returns for potato production may be due more to production than marketing constraints.

(i) Types of Producers[3]

From the marketing perspective, 3 types of producers planted potatoes in the Mantaro Valley by the end of the last decade. (Table III.1)

The most numerous type (roughly 90% of the valley's potato farmers) is the "small" category. These producers are "small" partly because they plant and sell small quantities of potatoes. Their individual land area in potatoes is also small, less than .75 hectare. Moreover, they plant potatoes in combination with various other food crops on several small plots each of only a few hundred square meters.

Table III.1. Characteristics of potato producers in the Mantaro Valley, 1979.[1]

Characteristic	Producer type		
	Small	Medium	Large
Land area in potatoes	Less than .75ha	.75-3 ha	3-100 ha
Type of production	Mixed farming	Table potatoes combined with a few other crops	Specialized in seed and table potato production
Primary purpose of producing potatoes	Subsistence	Profit	Profit
Estimated percent of all potatoes producers[2]	90	10	1
Number interviewed	29	14	10

[1]Definitions and numbers interviewed are used in all later tables in Chapter III.
[2]Based on Franco et al. 1979 and Appendix One.
Source: Elaborated for this study.

Table III.2. Average production costs per 100 kg of potatoes in Mantaro Valley, 1979.

Input	*Soles*			%		
	Producer type			Producer type		
	Small	Medium	Large	Small	Medium	Large
Family labor	738	475	38	25	21	3
Hired labor	198	145	213	8	10	13
Animal horsepower	256	129	25	10	7	1
Tractor horsepower	47	68	211	2	5	15
Seed	526	346	422	19	19	27
Chemical fertilizer	223	273	183	9	15	12
Animal manure	340	185	125	13	9	7
Liquid pesticide	43	38	45	1	2	3
Solid pesticide	148	104	142	7	5	9
Land	164	62	35	6	4	2
Interest	0	61	97	0	2	6
Other	35	21	47	0	0	2
Total	2716	1910	1582	100	100	100

Source: Farm survey for this study.

Since their modest potato harvests are primarily used for subsistence, their marketable surpluses are also a small percentage of total production.

The most impressive type of potato producer in terms of marketable surpluses is the "large" category. These "large" growers plant extensive land areas — from 3 to 100 hectares — in both seed and table potatoes. They plant some other crops and tend some livestock on relatively large tracts of land. However, they are essentially large potato farmers in that they specialize in the sale of large quantities of this one crop. About 1% of the valley's potato farmers are in this category.

Between "small" and "large" a third type of producer also plants potatoes. Medium producers cultivate 0.75 to 3 hectares of potatoes in addition to a number of subsistence crops. Although they sell a large percentage of their potatoes, they are "medium" in that they produce and market intermediate amounts of potatoes. About 10% of Mantaro Valley potato producers are medium growers.

In addition to land area planted in potatoes and market orientation, production costs also differentiate producers in the Mantaro Valley.

(ii) Production Costs

Average costs for producing 100 kg, or one sack, of white potatoes in the Mantaro Valley vary considerably from small to large producers (Table III.2). Average unit costs are lowest for large growers and highest for small producers.[4] Various factors, such as input use, access to credit, and scale of farm operations, contribute to these differences. It is beyond the scope of this study to assess the independent impact of each of these factors. Nevertheless, the following review treats them separately to clarify how each consistently differentiates large and small producers. Note that these factors not only influence production costs but also help determine net revenues for different types of producers.

Input Use

The type and quality of physical production inputs, such as seed and fertilizer, perhaps most directly affect production costs.[5] Different types of valley producers tend to use the same type of inputs. Even small farmers employ chemical fertilizers and pesticides. However, quantity of inputs varies considerably between farm types. Large farmers, in particular, use more seed and fertilizer per hectare than smaller growers (Scott 1981:84-90). They also use less seed and fertilizer per 100 kg than other potato producers. This suggests that large producers have lower costs in part because they reach a level of input use where inputs convert to outputs at a more productive rate.

Differences in input use across producer types are partly a function of access to credit and attitudes toward risk. Of those contacted for this study, nearly all large farmers receive a crop loan for potatoes.

Thus, large farmers were more capable of purchasing additional inputs because they had the financing to do so. In contrast, a third of 14 medium farmers received such loans and not a single small producer had one.[6] In fact, the Agrarian Bank in Huancayo makes few loans to producers with less than one hectare of a given crop.[7] Most of the valley's small producers were therefore ineligible for farm credit. However, this did not appear to be the main reason that small producers did not take out such loans to purchase more inputs. Most small producers seemed reluctant to assume the risk involved. As a result, small producers seldom borrowed money and if they did most "loans" were interest-free advances from other family members. Only one producer in the Mantaro Valley contacted for this study received credit from a Lima wholesaler to help cover production costs.[8]

Land also helps to differentiate potato producers in the Mantaro Valley. Large producers, on average, farm many more potato parcels and also more of their land is on the fertile valley floor. Furthermore, these farmers rent 53% of their crop land, compared to 14% for medium growers and only 5% for small producers.[9] Smaller producers cultivate fewer, smaller plots situated in fewer microecologies. As a result, large growers have several subtle land-related advantages over other growers.

Two reasons for these advantages are:

First, as large farmers have many potato fields in different locations, they spread out agronomic risk. Poor climate in one part of the valley is much less likely to damage their entire potato crop.

Second, as most of their holdings are on the valley floor, large growers cultivate relatively flat land. Consequently, their fields are less susceptible to erosion and more conducive to labor-saving, mechanized production. In particular, large producers, on the average, farm more irrigated parcels (2.71 hectares) than their medium (1.0) or small (.5) rivals. Therefore, their yields are less affected by the region's capricious rainfall patterns.[10]

Economies of Scale

Production data also (Table III.2) indicate costs per 100 kg are inversely related to land area in potatoes. Such a relation cannot be conclusively substantiated with available information.[11] Still, various factors taken together strongly suggest economies are associated with large-scale potato production in certain parts of the Mantaro Valley.

Tractor plowing fields in the Mantaro Valley. (Photo by Horton).

One cost reducing measure associated with size of potato operations is greater specialization. This is manifest in numerous ways. Larger producers are more involved in farming as a principal source of income. They concentrate a greater percentage of their cropland in potatoes.[12] They also plant fewer varieties.[13] As large producers direct all their energy on this single crop, they no doubt become more proficient in the allocation of labor, utilization of fertilizer, and the identification and control of diseases.

Large land areas in potatoes also facilitate purchase of a tractor and other equipment (Mayer 1979:94). As most large growers own their own machinery, they are not as dependent on the availability of rented equipment as smaller producers (Franco et al. 1979:41). Ready availability, in turn, helps increase yields and lower unit production costs because larger growers can perform farm operations on a more timely basis.

Large-scale potato producers are also capable of achieving certain managerial economies. These growers can afford to hire their own agronomist (Mayer 1979:94) and tractor drivers. Large commercial growers, therefore increase their yields and reduce their costs because they have their own technical personnel where and when they need them.

Size of potato fields is another factor that contributes to scale economies. Small producers plant potatoes on small plots of about 1,500 square meters. Medium and large commercial producers grow potatoes on larger plots averaging 3,500 square meters and 11,500 square meters, respectively. Cultivating larger plots reduces production costs because added expense of working a slightly larger land area is relatively small once labor and equipment are already in the field.

Larger growers also have better access to loans from the Agrarian Bank. In 1979, these loans had a nominal interest rate of 30%. Since the inflation rate was 70%, these loans were heavily subsidized. Larger producers thus not only had

preferential access to production credit but also could borrow money to buy more production inputs at negative real interest rates.

Yields

Apart from these input-related factors, large and medium commercial producers have lower average unit costs per 100 kg because they have higher average yields. As larger farmers use more seed and fertilizer per hectare equivalent and as they farm more irrigated potato plots, higher average yields represent the combined results of their quite different production practices. In fact, large growers' yields were 13.5 t/ha compared with 10.7 and 6.0 tons for medium and small growers, respectively. Since they spread their total production costs over more units of output, their costs of production per 100 kg consequently are lower. These differences in yields also influence producers' potato marketing.

3.2 Producers' Marketing Activities

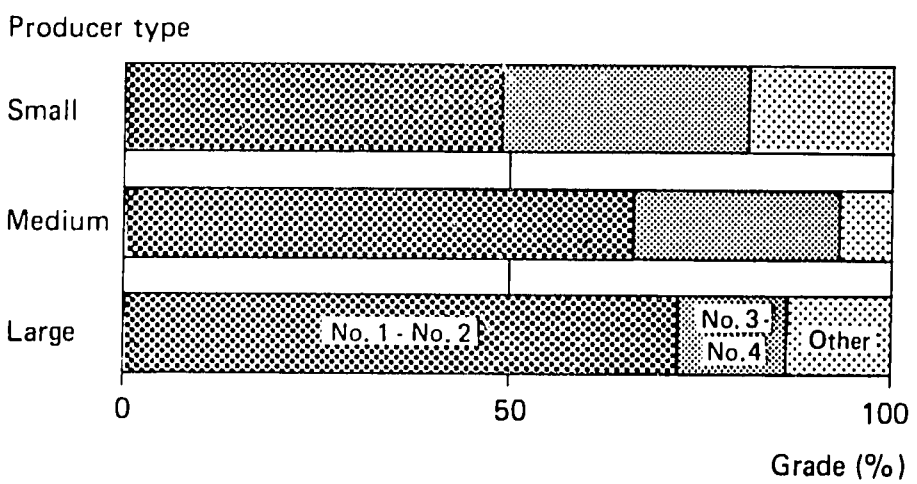
Potato producer's marketing activities in the Mantaro Valley are clearly related to their respective production goals. In effect, distinct marketing strategies are complementary to the distinct production strategies of different potato producers. These strategies include the quantity of potatoes sold, timing of potato sales, location of sales, and producer-buyer contacts.

(i) Quality and Quantity of Sales

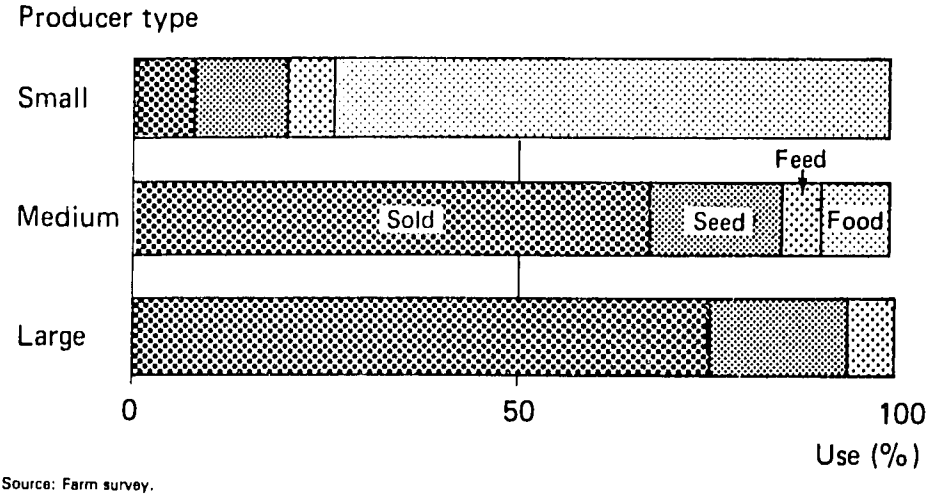
Large and medium producers in the valley not only plant more potatoes but also have higher quality yields per 100 kg (Figure III.1)[14] Larger growers thus have tremendous volumes of high quality potatoes to sell, even after they provide for their food and seed requirements (Figure III.2). In contrast, small producers have little land area in potatoes, their yields are lower, and their potatoes are of poorer quality. Small producers sell less than 10% of their potatoes on average.[15]

In fact, over half the 250 Mantaro Valley growers interviewed in 1978 reported not selling any potatoes (Scott 1979). Results from these interviews also show that half the potatoes produced in the valley were sold and half went for on-

Figure III.1. Marketable grade of potato yields in Mantaro Valley, 1979.



Source: Farm survey.



Source: Farm survey.

Figure III.2. Utilization of potato yields in Mantaro Valley, 1979.

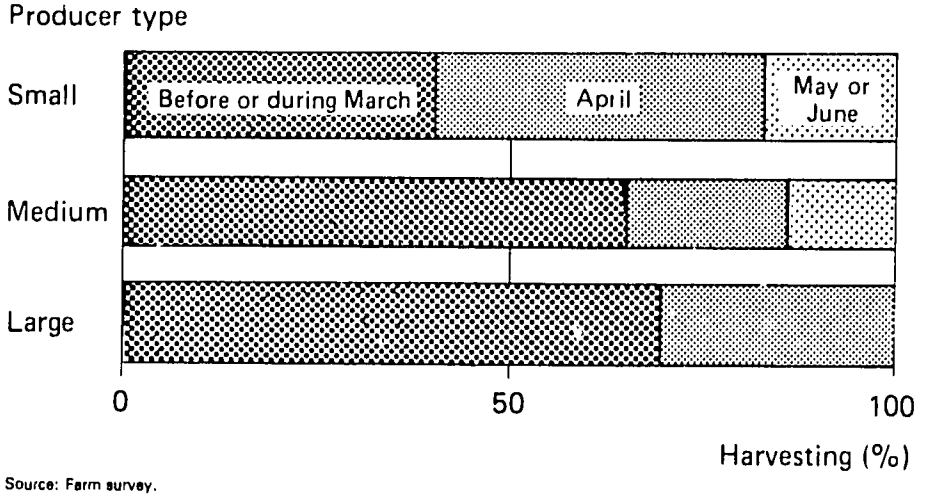
farm use. But, less than 10% of all growers (mostly medium and large farmers) sold over 70% of all these potatoes.

(ii) Timing of Sales

Differences in land area planted and yields also affect the timing of producer marketing. Most large and marginal commercial growers begin their potato harvests (sales) in March (Figure III.3). This strategy is a calculated risk. Potatoes planted for early harvest can be damaged or completely destroyed by adverse weather. However, early harvest of at least some potatoes places commercial growers in a better position to capture higher prices often prevalent at this time of year (see Chapter VI).

Small, subsistence producers cannot afford to gamble. In spite of capricious climatic conditions, their small holdings must meet the household's potato con-

Figure III.3. First month reported harvesting in Mantaro Valley 1979.



Source: Farm survey.

sumption requirements as well as cash needs. Rainfall patterns and temperature changes generally favor a production calendar that ends in April and May. Consequently, ecological factors lead small producers to begin harvesting in these months (Figure III.3), peak harvest time in the valley (Franco et al. 1979:78-80). Small producers therefore prepare to sell potatoes when prices are traditionally lowest.[16]

Number of Months Selling

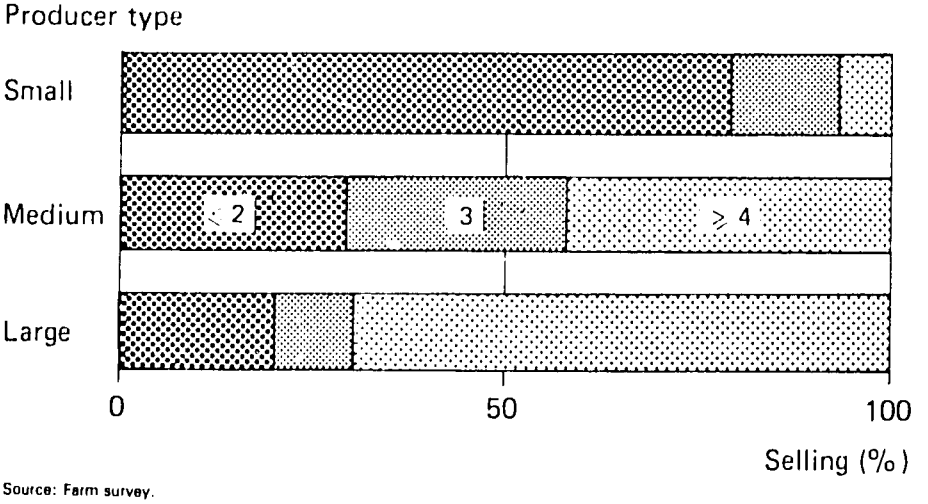
Large and medium commercial growers spread their risks by selling potatoes over a period of time (Figure III.4). This marketing strategy reduces the impact that capricious climatic conditions or momentarily unfavorable price movements might have on their entire harvest. It also enables them to "work around" labor shortages in peak harvesting periods by staggering operations over several months. Additionally, by marketing potatoes over several months, they establish themselves as a steady, reliable source of supply. Prolonged participation in the potato market enables them to develop commercial contacts. Over the years, these growers accumulate greater knowledge and experience of the peculiarities of potato marketing. Hence, they become better informed about potato prices in different markets and more adept at negotiating a particular potato sale than are smaller producers.

Small producers sell potatoes during a shorter time period.[17] Their limited market participation is partly explained by smaller harvests and the minor percentage of production available for sale (Figure III.2). Unfortunately, this practice makes them more vulnerable to short-term, local price movements. It also contributes to their lack of knowledge about market conditions or alternative sales outlets. For example, in comparison to larger, more specialized producers, small farmers generally are less knowledgeable about current potato prices and the number of traders not only in Lima but also in markets around the Mantaro Valley (Scott 1981:147-150).

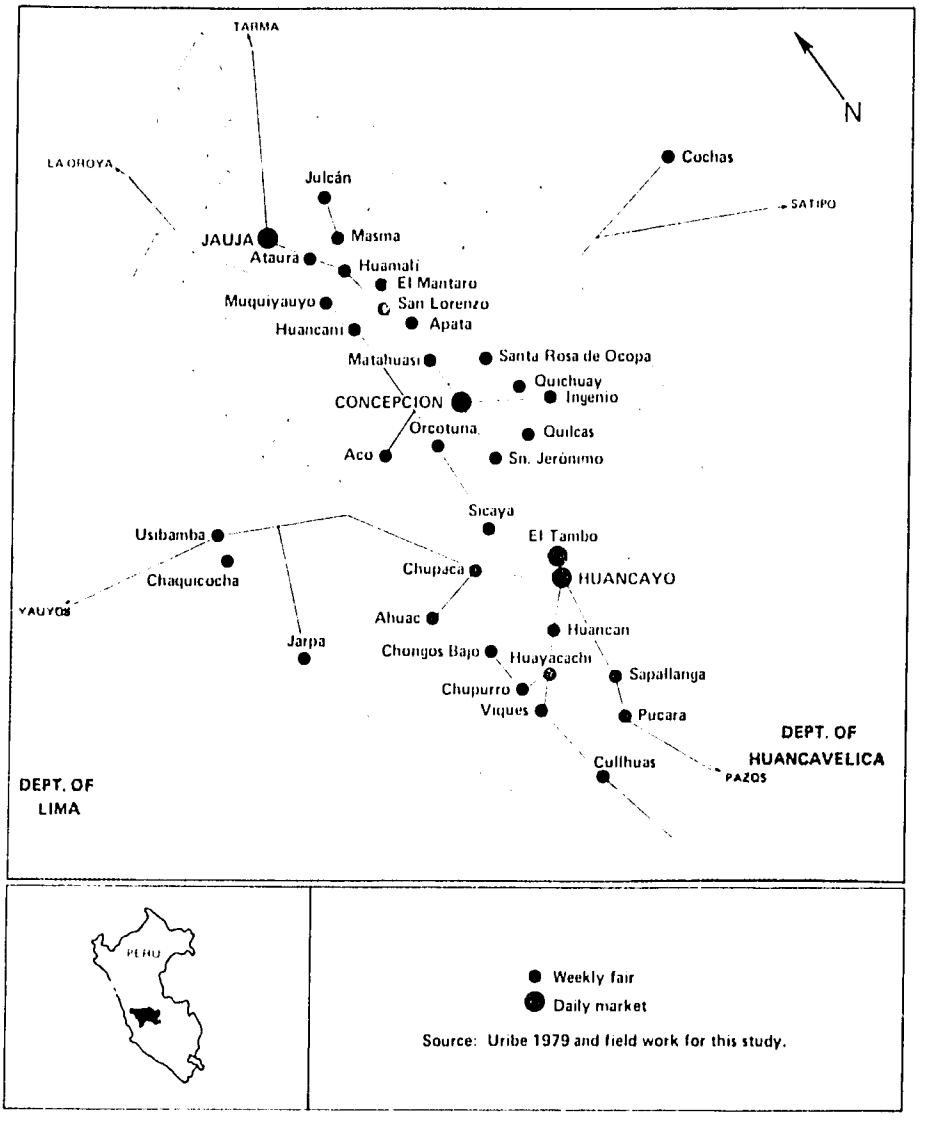
(iii) Location of Sales

Size of marketable surpluses has a major influence on location of potato sales.

Figure III.4. Number of months reported selling potatoes in Mantaro Valley, 1979.



Source: Farm survey.



Map III.1. The Mantaro Valley: Weekly fairs and daily markets.

For instance, large and medium growers generally ship large surpluses directly from the field to Lima. According to these growers, local demand cannot absorb large volumes on a regular basis since two or three truckloads of potatoes delivered to any one local fair or daily retail market would cause prices to collapse. Hence, larger growers generally prefer to ship to the capital where prices are less affected by a truckload of potatoes.

In contrast, small producers frequently sell their potatoes in weekly fairs or daily markets (Map III.1).[18] These growers rarely sell their potatoes out of the field. However, this does not necessarily imply a fixed place of sale. Instead, they patronize different fairs or markets in the valley to sell their crop. For example, small producers who often trade in more remote villages such as Cullhuas, also

travel to larger markets, e.g. Huayucachi and Huancayo, to make occasional potato sales.

(iv) Bargaining Procedures

As a related strategy, large and medium potato producers negotiate their sales in a *"precautious"* fashion. This "precaution" consists of digging up only a few potatoes and taking them to prospective buyers to solicit competitive bids, inviting merchants to visit their fields and to bargain there, shipping potatoes to Lima only after visiting the wholesale market and conferring with several wholesalers. These farmers, particularly large growers, rarely haul their potatoes to market to negotiate with buyers on the scene. According to these growers, this practice is avoided partly because it makes them too vulnerable to buyers' demands.

While their primary motivation for selling potatoes is to periodically acquire small amounts of cash, small growers often lack the incentive and/or the resources to follow the "precautious" bargaining procedures of larger specialized growers. In other words, small farmers sell small quantities of various farm products (including potatoes) to make necessary household purchases rather than sell large quantities of one farm product to make a profit. Because the individual small producer is uncertain of marketable surpluses, he or she has little incentive to seek out prospective buyers prior to harvest. Instead, if and when he (or his wife) exchange potatoes for currency, he may survey prevailing prices by walking around the marketplace or talking to other farmers before entering into negotiations. Yet, on other occasions, he may be rushed into selling his potatoes to the first buyer encountered either for the need to catch transport back to his village or to get on with the day's obligatory purchases. For various reasons, then, small growers rarely negotiate their potato sales prior to actual arrival in the marketplace.

(v) Producer-Buyer Contacts

More importantly, large and medium farmers generally sell to merchants whom they know or with whom they have established *"confianza."*[19] *"Confianza"* means that buyers and producers have a mutual respect for one another based on years of doing business together. This respect, in turn, entails reciprocal marketing responsibilities including the exchange of information about market conditions or buying and selling potatoes together at times of peak supply and demand.

Some large growers use their greater volumes to sell to several buyers in the same market (Lima) at the same time to prevent any buyer from attaining a monopsony. Others sell some table potatoes simultaneously in Huancayo and in Lima or sell both table and certified seed potatoes to different buyers. Large and medium growers watch interregional price differentials and relative (seed versus table potato) production costs to exploit their marketing alternatives accordingly.[20]

Small subsistence growers lack the long-standing commercial contacts of the larger growers. They do not always sell their potatoes in the same location nor on a regular basis. Instead, they market their potatoes to whomever happens to be in the marketplace where and when they want to sell (see, e.g., Swindale 1983). Their buyers might be an itinerant retailer one week and a consumer the next.[21] In any event, many of their potato sales are to strangers and not to regular buyers.

Street vendors selling potatoes and other Andean tubers in Huancayo. (Photo by Espinoza).

(vi) Producers' Marketing Costs

Prevailing potato marketing patterns are such that producers normally assume most rural marketing costs. However, specific bargaining arrangements or supply and demand conditions can influence payment for grading, bagging, and trucking. Some growers prefer that buyers assume or share part of these costs. Buyers do this by sending workers to help with grading and bagging and/or by providing the necessary sacks. When supplies are tight, however, buyers—even from Lima—may need to pay most rural marketing costs to secure any potatoes.

Average rural marketing costs increased with size of the potato producers in the valley in 1979 (Table III.3).[22] Differences in labor costs reflect the medium producers' personal involvement in marketing activities. According to these growers, they often ride to Lima in the truck with their potatoes. Material costs vary across producer types because small growers often sell their potatoes but keep their sacks. Freight costs are higher for large commercial growers because they are most likely to ship their potatoes out of the valley to Lima themselves.

Table III.3. Average rural marketing costs per 100 kg of potatoes in Mantaro Valley, 1979.

	Soles			%		
	Producer type			Producer type		
Marketing cost	Small	Medium	Large	Small	Medium	Large
Family labor	52	38	3	48	19	3
Hired labor	1	19	10	1	7	6
Materials	13	38	54	12	19	22
Freight	44	112	171	40	55	69
Total	109	206	248	100	100	100

Source: Farm survey.

Analysis of production and marketing at the producer-level indicate two distinct potato marketing channels in the Mantaro Valley. Small subsistence farmers sell only a few potatoes, primarily in local fairs and markets. Large and commercial growers sell large volumes of potatoes primarily for direct shipment to Lima. The following sections now consider potato marketing activities of rural assemblers and truckers.

3.3 Rural Assemblers

The predominant importance to the Lima marketing chain of larger, more commercially oriented growers in the Mantaro Valley raises questions about other possible participants in these activities. For example, do rural assemblers ship potatoes to Lima? And if they do, then where are these potatoes produced? This section extends our analysis of potato marketing between the Mantaro Valley and Lima by addressing questions about the role of rural assemblers.

(i) Rural Assembler: A Definition

For this study, a rural assembler is someone who either resides at or travels to farms or rural markets to purchase, transfer, and later (re)sell potatoes in another locale. This activity may involve purchase of truckloads of potatoes from one or more growers and/or may encompass purchase of small lots of potatoes from several growers at the same time. In any event, an individual who merely transports potatoes (trucker) from the countryside to the city is not a rural assembler. Nevertheless, some truckers may engage in rural assembly as well as trucking. Likewise, a producer who grades, bags, and hauls his potatoes from his farm to urban markets acts as his own rural assembler. However, growers who only harvest, grade, and bag their potatoes are not rural assemblers according to this definition, nor are traders who buy potatoes in an urban market and then ship them to some other area. As indicated below, similar distinctions can be made between provincial retailers and wholesalers.

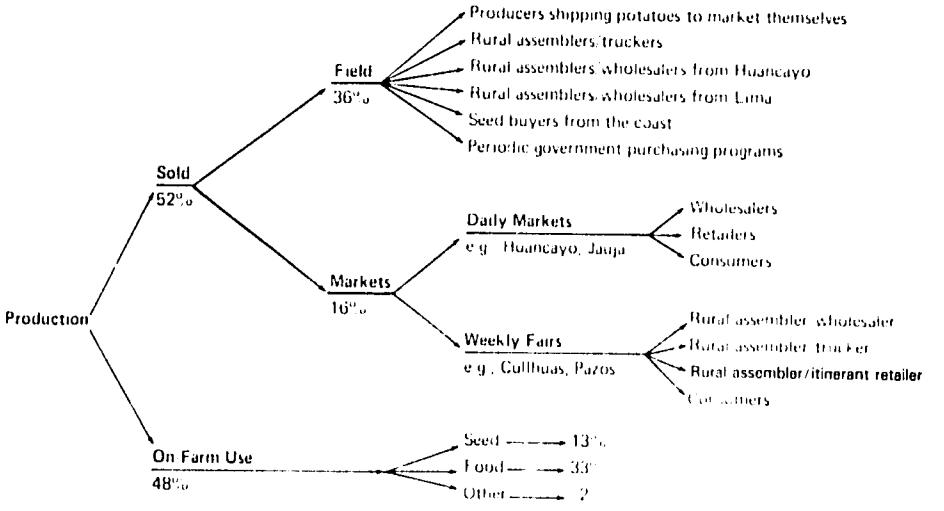
(ii) Types of Rural Assemblers

Various individuals work as rural assemblers of farm products in the Mantaro Valley (Figure III.5): producers themselves, small-scale itinerant traders, seed potato agents from the Coast, Lima wholesalers, and those based in Huancayo.

Numerous small-scale, itinerant traders are perhaps the most conspicuous group.[23] They purchase several sacks of potatoes in one weekly fair or daily market and retail them later in another. Women frequently participate in potato marketing in this way. Informal interviews indicate that many of these women participate in potato marketing activities only as time permits and/or as household cash needs require. In any event, although some small-scale rural assemblers haul potatoes to towns outside the valley, they rarely market potatoes in Lima. Casual empiricism suggests their weekly volumes are relatively small, one or two tons maximum.

Other buyers purchase relatively few table potatoes in the valley. Seed potato agents from valleys on the central Coast also purchase a few table potatoes. However, they do so infrequently (see Chapter IV). Although government agencies bought potatoes in the valley in the early 1970s, they now make their purchases directly from potato wholesalers in the capital (Scott 1981:48).

Lima-based potato wholesalers or their agents sometimes act as rural assemblers in the valley, especially when supplies are limited in the capital (Dolorier 1975: 111). During the 1979 harvest, a few Lima wholesalers occa-



Source: Elaborated for this study based on Franco et al. 1979 and field work for this study.

Figure III.5. Potato marketing channels in the Mantaro Valley.

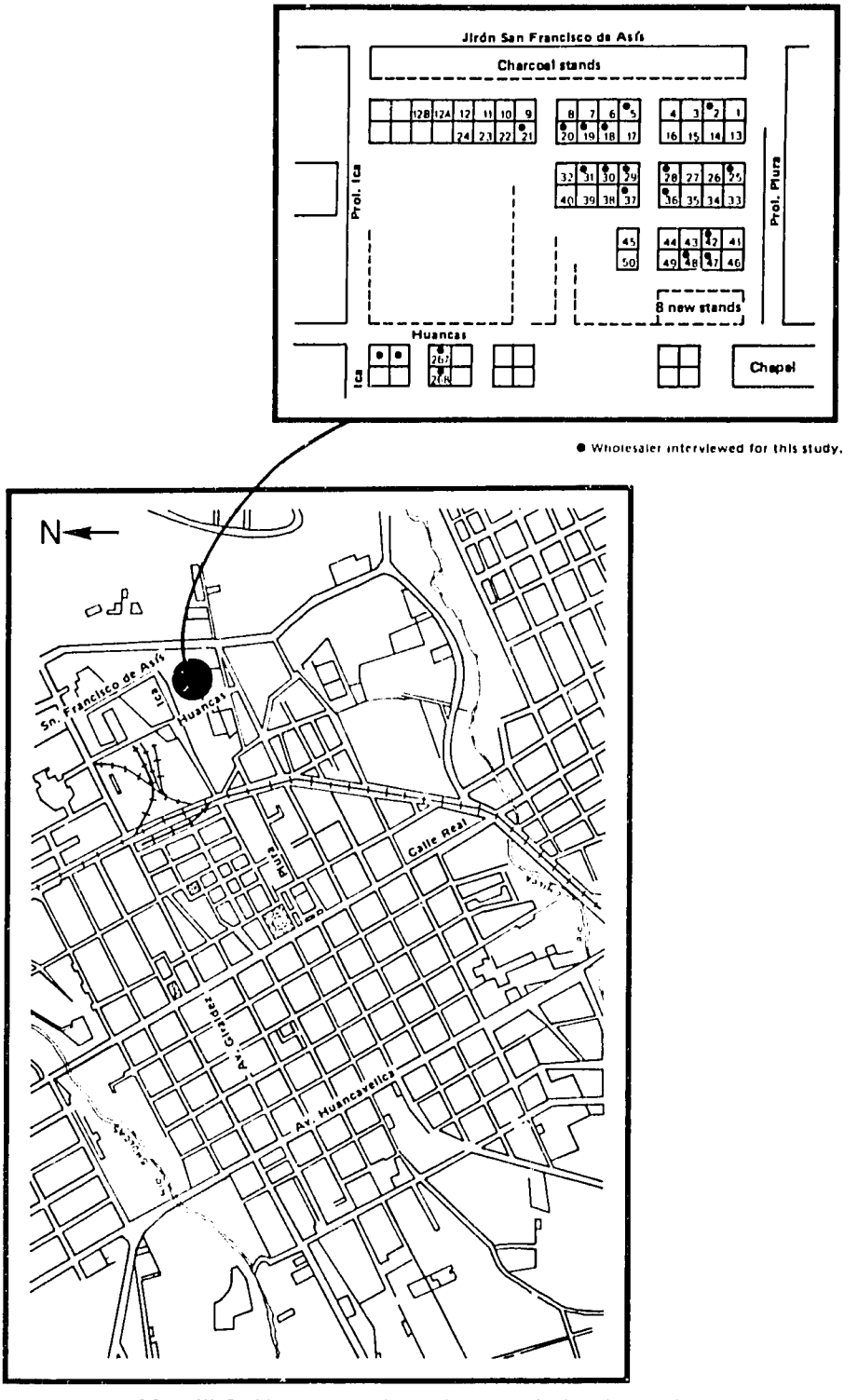
sionally made potato purchases in the Huancayo wholesale market. In so doing, they avoided logistical problems associated with riding around the countryside looking for producers ready and willing to sell. However, it is more common for Lima wholesalers to wait for potatoes to be shipped to them either from farmers' fields or from the Huancayo wholesale market (see Chapter V).

Based on previous studies (IDS 1954:159, Graber 1974:84), the most prominent group of rural assemblers based in the valley are traders in the Huancayo wholesale market. These merchants either buy potatoes at their stalls in the market or they go on regular trips to purchase potatoes in the countryside. For example, two or sometimes three Huancayo wholesalers act as rural assemblers at weekly fairs in nearby Cullhuas and Pazos. These potatoes are then re-sold wholesale in Huancayo. Since Huancayo wholesalers also ship considerable volumes of potatoes to Lima, their various buying and selling activities are now examined in greater detail.

(iii) Huancayo Wholesalers as Rural Assemblers[24]

Huancayo, a major potato shipping point for decades (see IDS 1954:162), has about 60 potato rural assemblers/wholesalers working out of its wholesale market (Map III.2).[25] This group is the largest concentration of potato traders in the valley. According to local tradition, there were only 20 potato wholesalers in the Huancayo marketplace until 1978. The merchants then organized among themselves, designated a construction committee, and built some 40 new stalls to allow for the present number of traders. Many of the newer, younger wholesalers, however, were simply relatives who had apparently outgrown their "apprenticeships" and were eager to start trading on their own.

Most of the 20 Huancayo potato merchants contacted in this study buy and sell less than 40 tons of potatoes per month during the Sierra harvest (December to July).[26] Two traders market more than 150 tons per month during this time.



● Wholesaler interviewed for this study.

Map III.2. Huancayo: Location of wholesale market.

Potato marketing in Huancayo. (Photo by Espinoza).

According to these wholesalers, capital and contacts are the two most important factors that influence the volume of potato purchases. Cash is necessary for outright purchase of potatoes. Contacts and "confianza" facilitate regular purchases and buying on short-term credit. Although some traders own a truck, most contract trucking services when necessary. Trucker contacts are claimed to be useful as one source of market information. During the 1979 crop year, less than half the traders grew potatoes themselves and almost all were exclusively for home consumption.

Most Huancayo wholesalers procure a major portion of their potatoes outside the Mantaro Valley. They do so for several reasons. Some wholesalers said they buy potatoes elsewhere because fewer are available locally than in the past. They attribute this shrinking marketable surplus to a decline in local potato production.[27] Others said they travel to more distant areas to escape competition from the growing number of local buyers.[28] According to some more established traders, several new entrants practiced aggressive —"cut-throat" — marketing behavior.[29] Huancayo wholesalers also complained about the limited quantities of potatoes that are sold in regional fairs and markets, e.g. in Jauja and Concepción. Rather than waste time visiting these locations to buy a few potatoes, they prefer to go where they can be assured of buying larger quantities.

Huancayo potato wholesalers generally bought their potatoes directly from producers. Conversely, most traders buy few, if any, potatoes from truckers, from traders residing in the countryside, or from one another. As a result, Huancayo wholesalers generally make their larger purchases on the farm and do their smaller-scale buying in the market proper. According to these wholesalers, purchases are typically arranged by a visit with the farmer around harvest time. The deal might be sealed by a cash advance, a drink together, or the provision of sacks for bagging. While a few traders help finance from 15 to 30 hectares of table potatoes, they claimed to be doing so less than in previous years because of the

risks involved and their reluctance to tie up their capital.[30] Most purchases are concluded with a cash payment once the potatoes are loaded in the field or delivered in Huancayo. If the wholesaler and grower know each other well, actual payment sometimes occurs a few days after the potatoes are delivered.

Huancayo traders generally work as a husband and wife team. While the husband is out arranging shipments and buying potatoes, the wife works in Huancayo receiving shipments and selling potatoes. These sales are generally for cash to local retailers,[31] or to traders who come to the marketplace from cities outside the valley such as Lima, Puente Piedra and Ica. However, when the morning's wholesale trade in the market slackens off, these merchants begin to sell retail or they send their inventory, along with that of several others, in a shipment to Lima. Seven of the 20 Huancayo wholesalers interviewed have relatives who are Lima potato wholesalers. The other Huancayo traders have regular buyers in the capital. Both types of buyers facilitate potato sales by exchange of information about prices and product flows. Several wholesalers also claim such contacts are necessary so as not to be taken advantage of by Lima buyers. In addition, these commercial ties make credit sales possible from Huancayo to Lima during the local harvest and from Lima to Huancayo during the coastal harvest.

On buying trips outside the city, Huancayo traders sometimes ship potatoes directly to Lima from that area. These potatoes are not routed through their stalls in Huancayo for two reasons:

First, unloading and reloading potatoes in Huancayo costs time and money. Delays due to traffic congestion around the market increase the likelihood of shrinkage. Unionized workmen charge a flat fee for loading potatoes. The city of Huancayo also levies a small tax on every sack that enters the market.

Second, a system of freight rates prevailed in the Mantaro Valley which favored long hauls. A short trip to Huancayo cost perhaps only 1 or 2 *soles* per kg while freight to Lima, some 300 km distance, cost 3 or 4 *soles* per kg. Thus, if they buy potatoes in the countryside to be marketed in Lima, Huancayo wholesalers have similar incentives as local large commercial growers to ship directly from the field. Interviews with the truckers themselves further corroborate these findings.

3.4 Truckers

Apart from producers and Huancayo wholesalers, truckers play an important, often misunderstood, role in potato marketing between the Mantaro Valley and Lima. For example, some recent reports (Flores et al. 1980:80) describe potato shipments by both road and rail between the two points. The author's field work indicated that all potatoes arrive in the capital's wholesale market by truck. In addition, past village-level research highlighted the role of truckers as potato buyers in the central Sierra (Mayer 1974b:311-312). Structured interviews with truckers operating throughout the central Sierra show that potato purchases are a minor activity for most truck operators. Furthermore, past studies of rural-urban freight rates have focused largely on shipping costs (Mathia et al. 1965). Present research indicates that truckers' role in potato marketing, in fact, involves several other physical and exchange functions. Most importantly, truckers' activities offer additional confirmation concerning the nature of potato marketing channels between Mantaro Valley producers and Lima wholesalers.

(i) Truckers' Marketing Activities[32]

After analyzing potato marketing by producers and Huancayo rural

assemblers/wholesalers, attention now focuses on the truckers' role. Basic questions here are:

- Do truckers add an additional middleman to the marketing chain by buying as well as transporting potatoes?
- How do potatoes reach Lima wholesalers direct from farmers' fields or via some intermediate assembly point?
- Who do truckers haul potatoes for: growers? rural? assemblers? Lima wholesalers?

Answers to these questions help explain the role of truckers in potato marketing channels.

Most central Sierra truckers restrict their operations to hauling potatoes.[33] Some truckers act more like rural assemblers in that they purchase *and* transport potatoes Still, less than 40% of truckers interviewed reported buying potatoes. Furthermore, even these purchases are infrequent—one or two every 10 trips—and therefore serve merely to top off an occasional shipment.

Although the railroad was once used to transport potatoes from Mantaro Valley to Lima (Sánchez 1960: 39-40), trucks now do all the hauling.[34] Truck transportation of potatoes to the capital begins with loading. According to truckers, loading generally is in the field or along the roadside (see Scott 1981:236). This confirms statements by rural assemblers and larger commercially oriented producers discussed previosly. Growers, rural assemblers and truckers thus concur: **Marketing of most potatoes from the central Sierra to Lima is not characterized by numerous disorganized steps, but by only one—field to market.**[35]

Central Sierra truckers generally haul potatoes for only one or two owners.[36] Most importantly, the majority of these potatoes are owned not by traders or truckers, but by producers themselves (see Scott 1981: 239-240). [37] Potato shipments to Lima, then, are not dominated by rural assemblers who buy a sack or two of potatoes from numerous, semi-subsistence farmers, and then send them off to the capital. In fact, these results indicate that many central Sierra truck owners (40%) are also potato farmers. Thus, **on many occasions for Lima shipments, these truckers ship their own potatoes, in their own vehicles, and direct from their own fields.** In so doing, these producers direct rural assembly of potatoes in the central Sierra for sale in the capital.

Additional Responsibilities

Central Sierra truckers assume additional responsibilities besides loading and transporting. They secure the shipping permit from the Ministry of Agriculture and pay all road tolls. They cover cost of weighing-in and weighing-out of Lima's wholesale market. Finally, they pay for unloading potatoes at the wholesaler's stall.

According to truckers contacted, they are paid either after unloading or the day after delivery in Lima as standard procedure. As they often personally know their shippers (producers) and receivers (wholesalers), truckers run no unusual risks by operating on a such basis. Nevertheless, truckers help finance potato marketing because they exchange their services for a delayed payment.

(ii) Truckers' Marketing Costs

Shipping costs for hauling 100 kg of potatoes between the central Sierra and Lima vary by type of truck (Table III.4).[38] Fixed costs per trip (depreciation, interest, major repairs) spread over the estimated number of trips during the life of

Table III.4. Average trucking costs per 100 kg of potatoes per hour traveled between central Sierra and Lima, 1979.

	Truck Type			
	Gas		Diesel	
Trucking cost	*Soles*	%	*Soles*	%
Fixed costs per trip	13	21	13	28
Variable costs per trip	6	10	5	11
Variable costs per distance	40	69	27	61
(Including fuel)	(21)	(36)	(7)	(17)
Total	59	100	45	100

Source: Trucker survey.

the truck, are nearly identical. Variable costs per trip (loading and unloading) are also similar. The principal difference in costs between gas (n = 40) and diesel (n = 53) trucks in 1979 was the variable cost per distance for labor, fuel, tires, maintenance and, in particular, fuel.[39] Although gasoline-powered trucks used about the same amount of fuel as diesel vehicles (6 to 7 km per gallon), their costs per 100 kg per hour on the road were one-third higher.[40] The reason was that gasoline cost about twice as much per gallon as diesel fuel.

3.5 Estimated Revenues

The organization of potato production and distribution strongly influences rural potato marketing revenues. Net revenues per 100 kg were positive for most potato marketing participants in 1979. The size of these revenues, however, varied considerably. In addition, small producers on average "lost money" on potatoes. Both prices received and costs incurred influenced these estimates.

(i) Producers' Revenues

Average gross revenues, costs, and net revenues per 100 kg for different types of potato producers are in Table III.5.

Large growers have the highest gross revenues for several reasons:

- They sold a larger percentage of top grade potatoes (Figure III.1), thus reflecting higher prices for better quality potatoes.

Table III.5. Average production revenues and costs (in *soles*) per 100 kg of potatoes in Mantaro Valley, 1979.

	Producer type		
	Small	Medium	Large
Gross revenue[1]	1713	1768	2256
Less:			
Production costs[2]	2716	1910	1582
Marketing costs[2]	109	206	248
Net revenue (loss)	(1112)	(348)	427

[1]Potatoes not sold were valued based on prices in nearby markets at harvest time.
[2]Family labor costs assumed equal to the market wage.
Source: Farm survey.

- These growers generally assume costs of grading, bagging, and frequently shipping their potatoes to market. High revenues were then partly due to the higher value added that these producers contributed to their potatoes.

Large growers, on average, received a higher price because of the time and location of their potato sales. These growers sold in both peak harvest months and before and after this period when seasonal prices are generally higher. Large growers also were most likely to sell in Lima where value added (transport costs) and strong effective demand push up potato prices relative to those in the Mantaro Valley.

Small producers had the lowest estimated revenues for the opposite reasons.[41] On average this group harvested lower quality potatoes than commercial producers. They also harvested and sold their potatoes as the bulk of the potato crop was dug. While this timing is thoroughly justifiable from a food security point of view, it means they enter the market when prices are lowest and their revenues are affected accordingly. Furthermore, small subsistence producers often sold their potatoes in local markets in semi-graded form: they poured out contents of their sacks which they retained for future use. Hence, producer prices in these markets reflect the small value-added embodied in potatoes sold there.

Considering both revenues and costs in 1979, large and medium producers generally had positive net returns. Small producers had negative net returns. Higher prices alone would do little to change small producers' average net revenues because of their high unit production costs. In fact, differences in production costs across producer types were at least twice as large as the differences in gross marketing revenues (Table III.5).[42]

(ii) Rural Assemblers' Revenues

This study did not focus on the marketing revenues of Mantaro Valley rural assemblers because interviews with producers, Huancayo wholesalers, and truckers consistently found that most potatoes from this area go around local traders and directly to Lima.[43] Therefore, marketing revenues for rural assemblers are of minor importance in the Mantaro Valley-to-Lima potato marketing channel. While Huancayo wholesalers ship potatoes to Lima from their stalls, these shipments generally consist of potatoes procured on buying trips outside the valley. A thorough examination of the marketing revenues for these sales is beyond the scope of this study.

(iii) Truckers' Revenues

Estimated net revenues for most diesel powered trucks operating between the central Sierra and Lima were positive in 1979 (Table III.6). Returns for most gasoline powered trucks (n = 40) were negative. Their respective marketing net earnings reflect differences in gross revenues and costs. Diesel trucks (n = 53) had higher average gross revenues for two reasons. First, diesel trucks generally hauled potatoes over greater distances to Lima. Since diesel trucks were usually larger than gasoline-powered vehicles, they probably had larger fuel tanks. With more fuel and better mileage, they evidently were better suited to longer distance trips. In any event, in 1979 diesel truckers received higher average freight rates (4.79 *soles*/kg versus 3.87 *soles*/kg). Second, diesel trucks haul more cargo back to the provinces for greater distances. As a result, average gross revenue from backhauls was higher.

Table III.6. Average trucking revenues and costs (in *soles*) per trip per 100 kg of potatoes hauled from central Sierra to Lima, 1979.

	Truck type	
	Gas	Diesel
Gross Revenue:		
From potatoes shipped to Lima	387	479
From backhauls	187	268
Total	574	747
Less:		
Operating costs		
Fixed costs per trip	143	169
Variable costs per trip	58	60
Variable costs per distance	461	365
Total	662	594
Net Revenue (loss)	(88)	153

Source: Trucker survey.

Apparent minor differences in cost per 100 kg per trip between gasoline (662 *soles*) and diesel trucks (594 *soles*) obscured an important distinction. Diesel trucks had lower costs for hauling a larger load of potatoes longer distances. According to truckers surveyed, the average trip for diesel trucks was 13.7 hours versus only 11.4 hours for gasoline trucks. Consequently, as diesel trucks use cheaper fuel, they actually go farther for less money than gasoline trucks.

Although truckers operating gasoline-powered vehicles apparently "lost money" in 1979, they may continue to transport potatoes for various reasons. Their freight operations may help cover fixed costs, especially if the truck is essential for other activities such as hauling farm supplies. Alternatively, since gasoline trucks were twice as old (6.3 years) as diesel trucks (3.3 years), perhaps owners stopped accounting for depreciation and interest. More likely still, they eventually replace their uneconomical gasoline truck with a diesel powered vehicle (or engine) as the age structure and composition of the sample by truck type suggests.

3.6 Summary

Analysis of potato marketing patterns at the producer level suggests two distinct marketing channels exist in the Mantaro Valley. In one channel, small growers sell few potatoes in local fairs and markets. In the other, large and medium producers sell large volumes direct to Lima. Subsequent analysis of potato marketing activities by rural assemblers and truckers confirms this observation. Rural assemblers such as the Huancayo wholesalers ship potatoes to Lima, but these shipments are procured outside the valley. Similarly, truckers buy relatively few potatoes. They concentrate instead on transporting potatoes. In fact, most Lima-bound potato shipments go direct from farmers' fields to the capital. Thus, the combined evidence suggests well defined, albeit informal distribution networks organize the flow of potatoes from farmers' fields to markets in and out of the Valley.

Large and medium growers often assume themselves the role of rural assembler and thereby earn the associated marketing margin for potato shipments to Lima. Small farmers sell to local consumers and rural assemblers.

While their net revenues from potato production are negative, small farmers generally sell few potatoes and in such a fashion that production costs incurred influenced their net returns to potato cultivation far more than market prices received.

Freight rates between the Mantaro Valley and Lima are influenced by a variety of factors. Still, truckers often appear to subsidize potato marketing activities. While most trucks earn some profits hauling potatoes, many barely break even or lose money. These findings suggest freight rates are not an excessive portion of marketing costs. Final evaluation of this conclusion is contingent upon analysis of Lima marketing activities. Before turning to this subject, the study first examines potato marketing on the central Coast.

Notes

[1] This chapter is based on field work in the Mantaro Valley and Lima from August 1978 to March 1980.

[2] A selected list of previous socio-economic studies of potatoes in the Mantaro Valley by subject area includes: ecology and farming systems—IDS (1954: 1-82), Mayer (1979), Rhoades (1981), Rhoades and Recharte (1982); seed potato production—Franco et al. (1979: 54-63), Breña (1980), Monares (1981:97-152), Franco, Vilca, and Niño (1983), and Auroi and Vilca (1984a); table potato production—Ninahuamán (1972), MAA-OSEI (1978a:62), Franco et al. (1979), Benavides (1981), Flores et al. (1980), Horton et al. (1980), Scott (1981:79-104), Fano (1983), and Cotlear (1984); post harvest utilization—Werge (1977, 1979), Benavides, Recharte, and Rhoades (1982); distribution—IDS (1954: 159-160), Sánchez (1960:74-81), Barkley (1967), Graber (1974), and Scott (1981:135-157, 180-207; 1982; 1983).

[3] Procedures used to identify these producer types are explained in Appendix One. Mayer (1979) presents a detailed discussion of land use patterns for all farmers in the valley.

[4] This study valued all inputs (purchased or not) at market prices. This procedure was adopted because there was a market for all inputs, farmers knew these prices, these prices seemed reasonable, and any other procedure would have been highly subjective.

[5] Input prices increased considerably during the 1978/1979 crop year due to inflation. However, at any point in time, they were similar regardless of the quantity purchased.

[6] This is corroborated by Flores et al. (1980: 200-203). They note a growing concentration of production credit for potatoes in the Mantaro Valley among large growers during the 1970s.

[7] Access to production credit for small farmers in general (Salaverry 1982:293) and to produce potatoes in the Mantaro Valley specifically (IDS 1954:230-235; Scott 1979) is not a recent or isolated problem. When interviewed for this study, loan officers in the Huancayo branch of the Agrarian Bank were somewhat vague on whether the hectare minimum was official policy or merely standard procedure. However, production credit and financial risk have assumed growing importance as production costs per hectare have increased rapidly and those for potatoes are higher than all other food crops in the valley (Horton et al. 1980:66).

[8] Medina et al. (1974:49) also found that Lima wholesalers made less than 10% of their tuber purchases by financing production. Pontoni (1982:90) reports similar results for northern Sierra potato traders.

[9] The Agrarian Reform Law, D.L. 17716, made land rental illegal in theory, but large farmers still rented land in practice (Mayer 1979: 92-94). In contrast, medium producers owned 81% of their cropland, rented 14% and sharecropped 5%, with small growers owning 77%, renting 5% and sharecropping 18%.

[10] Average annual rainfall on the valley floor was 735 mm. from 1922 to 1977, but with a standard deviation of 109 mm. Although most rainfall occurred from October to April, the distribution of rain within the year could also shift dramatically from year to year (Scott 1981: 196-198) with possible serious implications for potato production (Horton et al. 1980:13).

[11] Caballero (1981:188-193) outlines the difficulties in assessing whether such economies exist. He is sceptical that they do. However,

production cost data in Horton et al. (1980) for the 1977/78 crop year, converted from the cost per hectare to the cost per 100 kg, also support the economies of scale argument presented here. Moreover, these findings are based on an even more minuscule calculation of costs for various producer types than the method discussed in this study. Potato production cost estimates presented the MA-OSEI (1978a:55-63) contain mixed results on the economies of scale issue.

[12] Percentage of cropland in potatoes by producer type was large (41%), medium (30%), and small (26%).

[13] Franco et al. (1979:58,77) reported that the largest producers plant 70% of their land in five hybrid varieties and that smaller producers, especially at higher elevations, plant a more equal distribution of hybrid and native varieties.

[14] Admittedly grades are not well established, but these averages are based on producers' declarations.

[15] These sharply different marketing patterns for potato producers in the Mantaro Valley are corroborated by studies in earlier crop years (Werge 1977:19; Franco et al. 1979:102; Horton et al. 1980:34).

[16] This observation about seasonal price movements in the valley is based on Graber (1974:79) and prices collected by CIP social scientists during the 1978 and 1979 calendar years.

[17] Fourteen of 29 small subsistence producers reported months in which they sold potatoes. Fourteen reported not selling in any month, and one farmer could not be contacted again to ask him this question. Answers often were changed from "never" or "not at all" to the months reported when the question was rephrased from "In which months do you sell potatoes?" to "Let's suppose you sold potatoes, when would you sell?"

[18] The argument that small versus large Sierra farmers sell in different locations is also supported by Werge (1977:12-13) for the Mantaro Valley, Egoavil (1976:35) for Huasahuasi-Palca, Franco, Moreno, and Alarcón (1983:100-102) for the Cuzco region, and Pontoni (1982:86-88) for the northern Sierra.

[19] Similarly, Medina et al. (1974:50-51) found that most (61.9%) Lima tuber wholesalers had suppliers with whom they had done business with for years and nearly all (90.5%) wholesalers had friends among the producers they work with.

[20] Few farmers regulate their market participation by storing potatoes. Small subsistence producers store potatoes primarily for on-farm use (Werge 1977:16-20). Large and marginal commercial farmers do not store for several reasons. They need to pay back their production loans at harvest. Storage and speculation are not always clearly distinguishable in the eyes of public authorities. Uncertainty about price movements and/or government price intervention makes even black market profits dubious. Instead, large farmers regulate their potato sales by leaving part of the crop in the field for a longer time or by staggering their planting dates (Franco et al. 1979:61-62).

[21] Eleven small-subsistence growers reported selling to consumers, 12 to middlemen and four to both. Two producers did not answer this question.

[22] Procedures used for estimating marketing costs were essentially the same as those used for calculating production costs. However, for producers who did not sell potatoes, the questions about labor, materials, etc., were made on a hypothetical basis.

[23] This description of itinerant retailers acting as rural assemblers is based on visits to more than two dozen weekly fairs and daily markets in the valley.

[24] This section is based on structured interviews with 20 Huancayo potato wholesalers. See Appendix One for details about sample selection, interview techniques.

[25] The wholesale market *("el mercado mayorista")* in Huancayo is different from the city's famous Sunday fair at which few, if any, potatoes are traded (Map 3.2).

[26] These volumes were computed by multiplying the number of sacks wholesalers reported selling per week by 100 kg and then multiplying that total by four (weeks) to estimate volume per month. Huancayo wholesalers also sell table potatoes produced on the Coast from September to December. Prices for coastal potatoes in late 1979 made such shipments uneconomical that year.

[27] This observation is substantiated by statistics that show a sharp drop in potato production in the 1970s (Fano 1983).

[28] Some wholesalers also admitted that in these distant areas it had been easier to fool producers (buying potatoes by the sack instead of by weight and then providing larger and larger sacks).

[29] For example, an unwritten rule among these wholesalers is not to break into negotiations between another trader and farmer in the

marketplace. New entrants apparently did this, offering higher prices in the process.

[30] Pontoni (1982: 90) makes the same observation for the northern Sierra. "It is probable that the truckers and middlemen are also reluctant to advance money for repayment at harvest due to the high risk involved . . ." (author's translation from Spanish).

[31] With more than 200,000 people and annual per capita consumption of 100 kg (Table A.10), Huancayo is a substantial market for potatoes.

[32] Findings on trucker marketing activities, costs, and marketing revenues are based on structured interviews with roughly 100 central Sierra truckers. See Appendix One for details. Some 40% of the truckers interviewed were from the Mantaro Valley.

[33] Egoavil (1976:42) also implies that truckers are not directly involved in buying potatoes in the Huasahuasi Palca region.

[34] According to Lima wholesalers, rail shipments from the Mantaro Valley require hauling potatoes to the depot there, reloading for the 10 to 12 hour journey to Lima, and then reloading and re-hauling the potatoes from the Lima station to the wholesale market. Consequently, the gradual introduction of larger trucks into the Sierra makes the central assembly of large quantities of potatoes for eventual shipment by rail unnecessary and uneconomical.

[35] Other studies report similar shipping patterns for potatoes produced in the Sierra and sent to Lima (Tullis 1970: 174, 190; Dobyns et al. 1971:142-143).

[36] Interviews with these drivers showed truck owners operated only one vehicle. This result must be considered preliminary because in most cases the person interviewed was the driver and not the owner, the driver may not have known about all trucks that the owner may have owned.

[37] CONAP (1967:116) reported similar findings.

[38] Assumptions and procedures to calculate these costs are explained in Appendix One.

[39] In riding down to Lima from the Mantaro Valley with one of these trucks, the author discovered that trucking costs also include a "wash down" of the load in the middle of the night after passing Tielio. While it may seem unnecessary, this wash wets down the potatoes and thereby insures similar cargo weights at arrival as at departure.

[40] Because preliminary work showed type of fuel to be a more discriminating variable than truck capacity, it was singled out in the final analysis. See Appendix One for details.

[41] These findings are consistent with results for other years (Horton et al. 1980:36).

[42] One might argue that small producers do not loose money because they undervalue their labor and non-purchased inputs. This approach seems perfectly legitimate. However, this does not necessarily mean that peasant producers' surplus value is then transferred out of agriculture by monopsonistic middlemen. It is argued here instead that since peasant potato producers generally sell such a small percent of the potatoes they produce, they "internalize" most of this surplus value or it is expropriate by employer's who pay them a less than subsistence wage (see Lehmann 1982 for a discussion of these issues).

[43] Long (1977:90-91) noted a similar pattern for trade in general in his research on the Mantaro Valley.

CHAPTER IV

4. Potato Marketing in Cañete[1]

Introduction

The review of domestic food marketing literature in Chapter I noted the lack of field research on the rural Coast. Instead, studies have focused largely on the rural Sierra, perhaps because domestic food production is concentrated in that region. Yet, Chapter II indicated coastal growers send Lima roughly half its yearly supply of potatoes. This observation suggests that for the Lima market, potato marketing on the Coast is no less important than such activities in the Sierra. Chapter IV now extends the analysis to include potato marketing in Cañete. Principal issues once again are the organization of rural trade, marketing margins, and freight rates.

4.1 Potato Producers

During the last decade, potato production and potato producers on the central Coast in general and in the Cañete Valley in particular attracted considerable attention (Map IV.1).[2]

Three different developments generated this interest:

(1) Unlike the-decline-then-stagnation in potato production throughout the Sierra, output on the central Coast had a positive annual growth rate during the 1970s.

(2) For climatic reasons, coastal potatoes are cultivated only during the cool winter months. However, given Coastal growers' high yields and strong commercial orientation, they supply half the potatoes annually shipped to Lima.

(3) Agrarian reform simultaneously led to the organization of large cooperatives on former *haciendas* and the creation of numerous, small family farms. By the late 1970s, three different types of potato producers emerged in the Cañete Valley.

(i) Types of Producers[3]

Potato production in the Cañete Valley is split between small, medium and large private farms and vast production cooperatives (Table IV.1).

Several hundred small family farms produced potatoes in 1979, normally planting less than 5 hectares each. Potatoes are the most important cash crop, but they also grow others for agronomic reasons and to spread out financial risk. Many of these farmers are first or second generation residents of Cañete. Their ancestors migrated from the Sierra. Many also own land as a result of the recent agrarian reform. Although their farms generally have poorer soils and less reliable access to irrigation water (Rhoades and Benavides 1980), small farmers are eager to make intensive use of their family labor and newly acquired land. Thus, a labor-intensive, short duration crop such as potatoes is particularly at-

Table IV.1. Characteristics of potato producers in Cañete, 1979.[1]

Characteristics	Producer type		
	Small	Medium	Cooperative
Land area in potatoes	Up to 5 ha	more than 5 ha	40 ha and above
Type of production	family farm	family farm, agribusiness	large-scale production cooperative
Primary purpose of producing potatoes	major cash crop	high risk/ high pay-off venture	minor cash crop
Estimated percent of all potato producers[2]	70%	30%	1%
Number interviewed	6	10	5

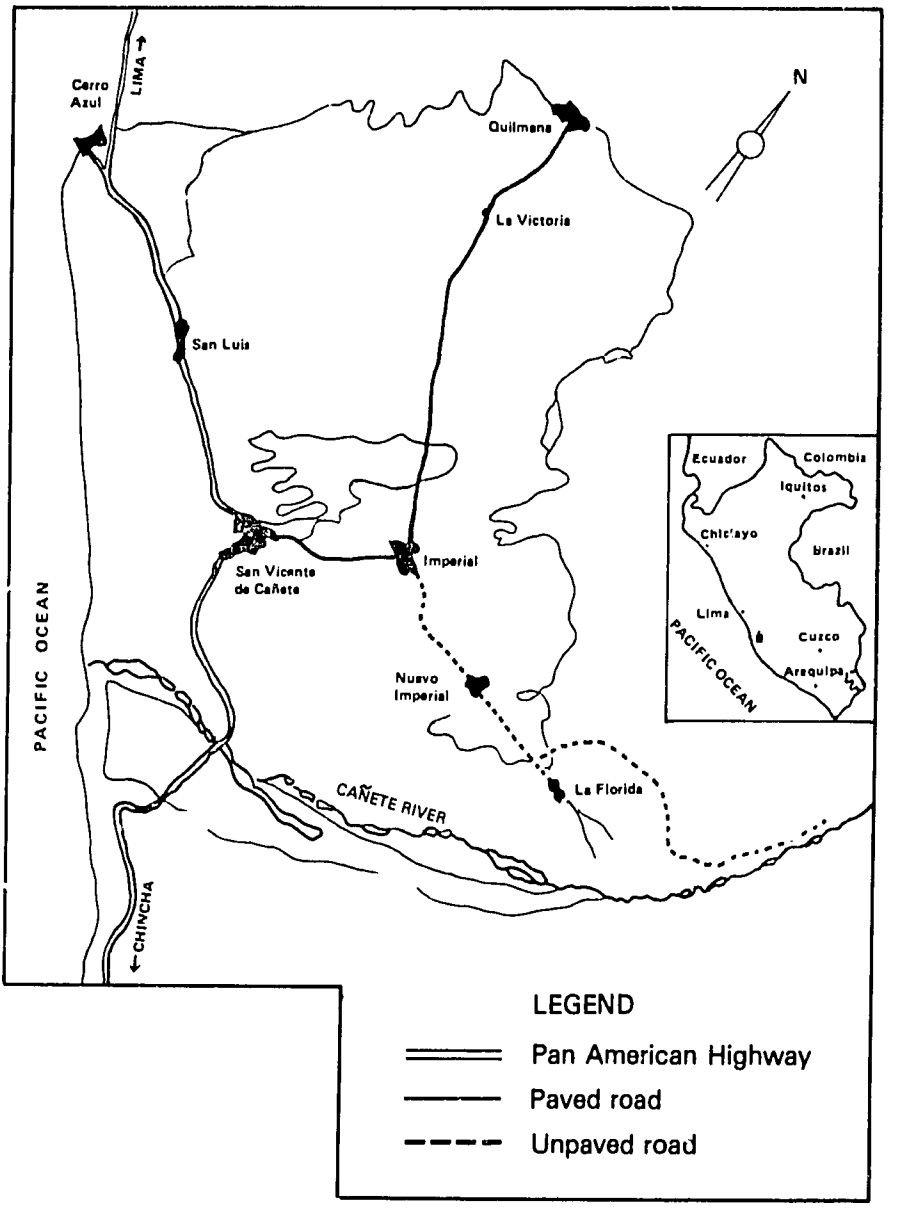
[1]Definitions and numbers interviewed are used in all later tables in Chapter IV.
[2]Based on Ministry of Agriculture data and Appendix One.
Source: Elaborated for this study.

tractive. Many small farmers also secure production loans from the Agrarian Bank. They also put all of their time and energy (and that of their immediate family) into commercial farming.

"Medium"—private farms in the Cañete Valley also cultivate potatoes as part of a multiple cropping pattern (Vargas 1983: 66-67). Many of these (about 150) medium production units consist of the best fields from former large *haciendas* broken up by agrarian reform. Medium farmers traditionally plant cotton or other crops well-suited to land-extensive, mechanized farming. They often describe potatoes as a potentially high pay-off gamble. If prices and yields are favorable, then returns from potato production can be extremely lucrative. If market conditions or productivity levels are poor, farmers are lucky to break even. Depending upon how much they are prepared to risk, they cultivate potatoes on any where from 5 to 50 hectares.[4] Medium producers are descendants of a long line of technically sophisticated farmers. Hence, they manage their potato production with the same commercial acumen that they employ in all their agribusiness activities.

All 14 production co-operatives in the Cañete Valley also have substantial potato acreage. These farms are former haciendas converted into production co-operatives by agrarian reform. Although the co-operatives, on average, planted about 60 hectares of potatoes in 1979, they grow this vegetable as merely a convenient transition crop between cotton and maize or maize and cotton. According to co-op farm managers, volatile producer prices ar l high production costs discourage more extensive potato cultivation. Conversely, cotton costs less to produce per hectare and is sold at fixed prices. Co-op units are also irrigated and the same varieties are used as planted by private producers. These units, owned and managed by former *hacienda* workers, were devoted entirely to crop production, although some members maintained livestock, such as goats, chickens, and guinea pigs.

In summary, potato producer types in the Cañete Valley have many characteristics in common as well as important differences. On the one hand, they all plant a minimum amount of land in potatoes on irrigated fields, using the same varieties, and for sale rather than for on-farm consumption. Moreover, all



Map IV.1. The Canete Valley

units are involved in crop production year-round. Yet, the relative importance of potatoes varies considerably on these different farms. Small farms plant proportionally more potatoes to make more intensive use of their land and family labor than medium farms and co-op production units. As is demonstrated below, these similarities and differences have important implications for production costs and marketing revenues.

(ii) Production Costs

Data on average production costs per 100 kg of potatoes for different types of producers in the Cañete Valley in 1979 have three notable features (Table IV.2).[5] First, small producers have production costs as low or lower - given the difficulties in determining the appropriate costs of non-monetary inputs - than medium and co-op farms. Second, the distribution of costs varies across producer types. Third, progressively large units have progressively higher average production costs per 100 kg. In other words, there probably are no economies of scale in potato production in the Cañete Valley. These three features of potato production costs reflect patterns of input use, different costs for inputs, access to credit, and land-related cultivation practices.

Input Use

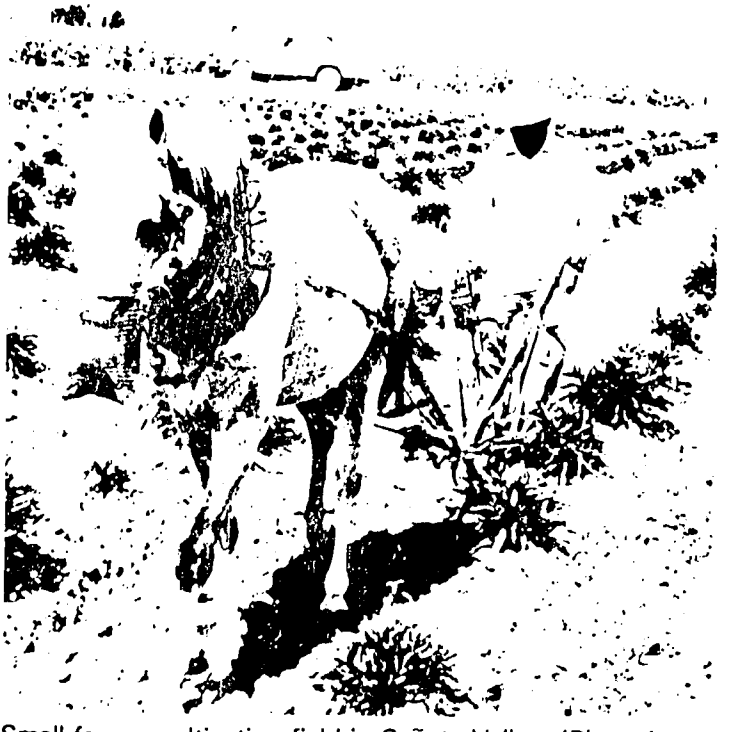
Average production costs are as low on smaller farms as on larger units partly because different producers use relatively similar quantities of key inputs.[6] For example, in contrast to sharp differences between growers in the Mantaro Valley, Cañete Valley potato producers generally use similar amounts of seed and fertilizer (on a per hectare basis).[7] Similar seeding rates probably result from the strong market orientation of all farms and the associated use of identical hybrid varieties.[8] Similar fertilizer applications are explained in part by widespread use of soil tests.[9]

On the other hand, differences in cost per 100 kg are particularly notable in the case of labor (family vs. hired), traction (animal vs. tractor horsepower), and land.

Table IV. 2. Average production costs per 100 kg potatoes in Cañete, 1979.

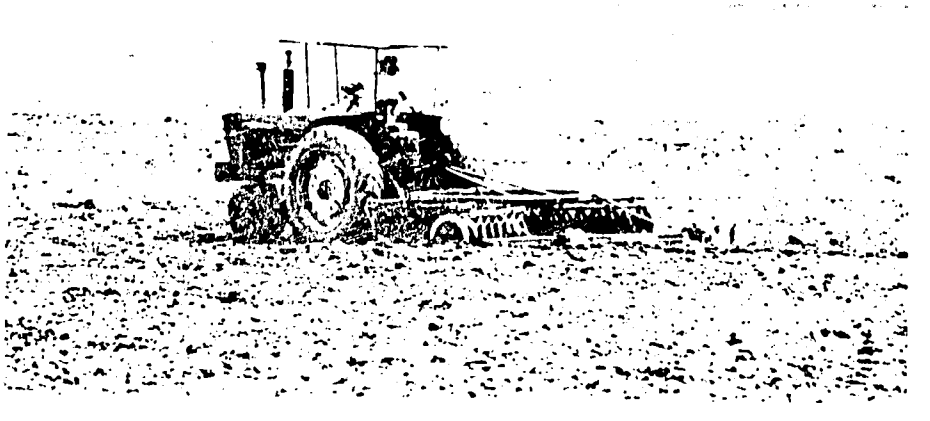
	Soles			%		
	Producer type			Producer type		
Input	Small	Medium	Large	Small	Medium	Large
Family labor	52	19	0	4	1	0
Hired labor	95	118	162	7	7	9
Animal horsepower	53	17	0	4	1	0
Tractor horsepower	68	175	295	5	11	15
Seed	468	461	460	34	29	24
Chemical fertilizer	225	233	257	16	15	13
Animal manure	18	23	15	2	1	1
Liquid pesticide	60	150	99	5	9	6
Solid pesticide	61	86	120	4	5	5
Land	121	177	306	9	11	16
Interest	135	133	185	9	9	10
Other	25	19	12	1	1	1
Total	1382	1611	1911	100	100	100

Source: Farm survey for this study.



Small farmer cultivating field in Cañete Valley. (Photo by Rhoades).

Cultivating fields of production cooperative in Cañete Valley. (Photo by Rhoades).



These differences are real in some instances and they are probably overestimated in others. For example, small producers utilize more family labor and animal horsepower, while larger farms employ hired labor and tractors. The average wage rates paid daily workers on small farms were lower than those paid permanent employees or co-op members. This contributed to lower production costs on the smaller farms (see Scott 1981: 116). However, the average estimated rental rates for a tractor on cooperative units was nearly twice as high as that reported on small farms. This difference is probably exaggerated given that the co-ops were not accustomed to rent tractors and therefore had difficulty in estimating an appropriate rental rate. The estimated opportunity cost of land (based on the estimated cost of rental) were also much higher for the co-operatives for similar reasons. Consequently the resulting differences in costs per 100 kg are real but smaller than the data themselves would suggest.

Input Use

Relative uniformity in potato production costs also results from relatively equal access to credit. Most Cañete Valley growers take out crop production loans from the Agrarian Bank. Even small farmers receive credit to produce potatoes (Vargas 1983:76). Production costs per hectare in 1979 were so high that farmers could not grow potatoes without such financing. On the other hand, small farmers applied for and received production credit because local Agrarian Bank policy established a relatively low eligibility ceiling for securing a production loan; only one-half hectare in potatoes was sufficient. Loan administrators also have fewer potato producers to serve than their counterparts in the Sierra. Consequently, loan procedures are less time-consuming because they involve well known clients.

Land-related growing conditions in the Cañete Valley also contribute to relatively similar average unit production costs. Small, medium, and co-op potato producers are all on the Valley floor where fields are flat and conducive to mechanization. Also, all producers plant potatoes at sea-level instead of widely

View of farmer's field in Cañete. Note flat terrain, rectangular plots, and gravity flow irrigation. (Photo by Rhoades).

varying altitudes as in the Sierra. Although some fields are more centrally located than others, every farm in the Valley can be reached easily over the extensive road network. Most important: all Valley potato producers plant irrigated fields.[10]

Economies of Scale

A comparison of average unit production costs across producer types also suggests there are no economies of scale in Cañete Valley potato production. Three principal factors support this conclusion.

First, even small producers plant several cash crops in succession throughout the calendar year (Vargas 1983:66-67). Thus small farmers spread out their agronomic and financial risks as do the larger farm units (op. cit.: 66).

Second, minimum access to extension, credit, and production infrastructure also helps small farmers cultivate potatoes even as do their larger counterparts.[11] For example, in addition to local extension agents, a privately supported rural development group based in San Vicente provides the valley's potato farmers — especially small producers—with technical assistance. In addition, many small growers not only receive farm credit as do medium and co-op farms but also the quantity of money loaned per hectare is also similar across producer types (Vargas 1983: Table A.19).

Third, although small producers plant fewer hectares in potatoes, they actually specialize at least as much in farm production as medium and co-op production units.[12] They depend on crop production (to a large extent potatoes) as a major source of income. Thus, small farmers have equally strong incentives to lower unit production costs.

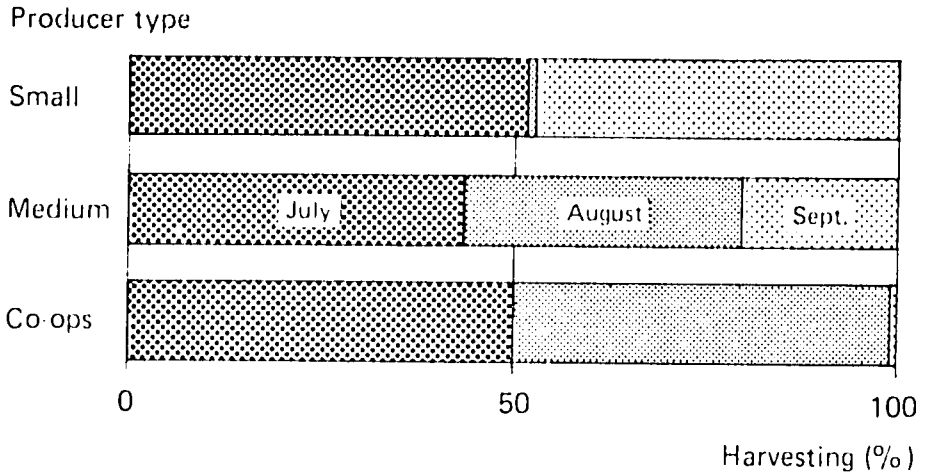
Apparent diseconomies associated with large-scale potato production in the Cañete Valley result partly from the small producers' greater reliance on family and (daily) hired labor.[13] In doing so, small growers are not legally obliged to pay the higher wage rates of permanent workers and co-operative members employed on larger farms.[14]

The reduced size of their farming operations also mean small growers can provide more intensive, personal management of their potato cultivation. Thus, in spite of their poorer soils and less favorable access to irrigation, small growers used seed more efficiently than larger units (Alarcon, 1980:44).[15] This result is particularly important because seed is a major component of potato production costs.

Small producers had higher average potato yields (22.4 t/ha) than medium (20.4 t/ha) or co-operative producers (21.8 t/ha) in 1979. While these yield differences were not substantial, they reflect the tendency for small producers to perform many necessary farm operations themselves. For example, they insure all potatoes are gleaned from the field at harvest because they participate in the digging. Larger farmers, in contrast, delegate these responsibilities to hired workers.[16]

4.2 Producers' Marketing Activities

The previous section emphasized similarities in potato production goals and strategies across Cañete Valley producer types. Production practices, therefore, are said to be similar but not identical. The same observation applies to potato marketing. Thus, while all growers are market-oriented, small farmers adopt slightly different marketing practices, such as timing of potato sales, than medium and co-operative growers.



Source: Farm survey

Figure IV.1. First month reported harvesting in Cañete, 1979.

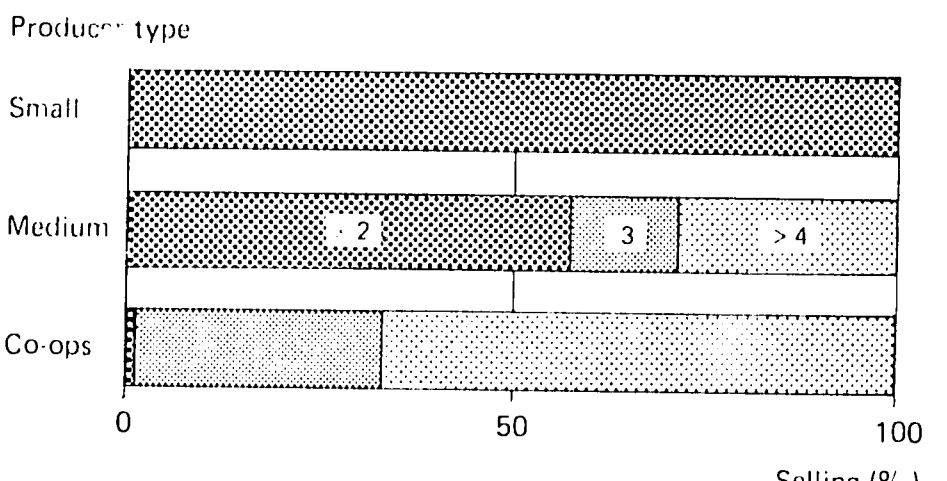
(i) Quality and Quantity of Sales

All Cañete Valley potato producers harvest yields of similar market quality. Average grades for the 1979 crop year were virtually identical.

Two reasons account for uniformity in market quality: (1) a small number of hybrid varieties are grown by all producers, (2) coastal soil and climatic conditions produce large tubers.[17]

Individual medium and co-operative farms plant and therefore sell considerably more potatoes than small producers. Nevertheless, all producer types in the valley sell a high percentage (up to 98%) of their potato harvest. Because even the smallest growers have a considerable harvest, household consumption needs are met by a minimal percent of total production.[18] Farmers keep few potatoes for seed because coastal growing conditions favor use of seed from the

Figure IV.2. Number of months reported selling potatoes in Cañete, 1979.



Source: Farm survey

Sierra.[19] They also must repay production loans. Thus, the share of total potato sales by different valley producers reflects their respective share of total potato production.

(ii) Timing of Sales

Potato marketing in the valley includes both early, *"papa criolla,"* and late, *"papa serrana,"* sales.[20] Producers market early potatoes beginning in July and continue selling up to late August or early September. Late potatoes are sold from mid-September to the end of December. Timing of sales is comparable for the three producer types in that they sell similar percentages of early (15%) and late (85%) potatoes. Although small producers begin marketing sooner than larger units (Figure IV.1), their relatively small land area in potatoes weakens their bargaining position and makes them less able to seek out higher off-season prices than their larger counterparts.

Duration of producer market participation depends mainly on area planted in potatoes (Figure IV.2). Small producers sell potatoes during fewer months than larger growers because they have fewer hectares of potatoes to harvest. In contrast, larger producers deliberately spread out their potato sales over both early and late crops. This strategy enables them to avoid being forced to supervise the harvest and sale of numerous hectares of potatoes all in short succession. Thus, it reduces demands on their farm management capabilities. In addition, this strategy makes their potato revenues less vulnerable to short-term price movements. It also gives these production units greater leverage in negotiation of a given sale. From accumulated knowledge of marketing activities, larger producers know that their capacity to supply potatoes on a continuous basis offers prospective buyers added convenience.

(iii) Location of Sales

Both small and large producers in the valley sell potatoes directly from the field. Flat terrain, arid growing conditions, and an extensive road network facilitate on-farm sales. Most growers sell their output by the truckload. Even small producers have sufficient land in potatoes and high enough yields to make central collection of less-than-truckload quantities unnecessary. Also, as local small towns are served by daily retail markets incapable of absorbing great quantities of potatoes, nearly all valley production is trucked to Lima or more distant cities for wholesale distribution.

(iv) Bargaining Procedures

Valley producers employ various potato bargaining procedures. Prior to negotiations, producers collect information about marketing conditions. For example, valley growers frequently discuss prices and quantities for Lima-bound potatoes with other local farmers or truckers. Some producers visit Lima's wholesale market in person to assess potato marketing conditions. Others simply telephone from their farms to relatives, acquaintances, or business associates in the capital and/or in other coastal valleys to get the latest potato market information. Moreover, since early morning radio broadcasts from Lima can be heard in Cañete, small producers in particular listen to the daily news reports for possible mention of potato prices.

As harvest approaches, valley growers either seek out or are contacted by various potato buyers. These individuals generally are not relatives, but someone with whom the growers have done business for years. Some producers occasionally market table potatoes through the same buyer that supplies them with Sierra seed.[21] Most producers are wary of any commitment—formal or infor-

mal—that ties them to a particular trader prior to harvest. Instead, they establish commercial contacts at the time potatoes are ready to be dug.

After a visit to the farmers' fields to inspect crop quality, buyers and growers often bargain over lunch in a local restaurant or during the ride around the countryside. The standard division of labor between producers and buyers means that no discussion is necessary about who does the grading, bagging, and shipping. Buyers automatically assume these responsibilities. Negotiations therefore focus on the selling price per kg for top quality potatoes.

Many larger producers negotiate with several buyers before finalizing a sale. Some event sell part of their harvest through one buyer and part through another to maintain additional leverage. By deliberately doing business with several individuals at the same time, larger growers believe they are less dependent on any one. According to these growers, this strategy also promotes greater competition among buyers and keeps them honest. If one buyer fails to meet the terms of sale, he knows in advance that he can be easily replaced by any other already working in the producer's fields.

Valley producers often insist on a cash guarantee or advance as part of the selling arrangement. This money is deposited with the producer before any potatoes leave the field. Depending upon the trader, this guarantee serves different purposes. If the trader is well known, then the advance is used to either help cover last minute production costs or to finalize potato negotiations. If farmers are unsure about someone, they demand a guarantee to separate "serious" traders from imposters, or to provide security against the possibility of theft. Growers also insist on a final cash payment for their potatoes, claiming it necessary to avoid bureaucratic delays or financial risks associated with accepting a check.[22]

(v) Producer-Buyer Contacts

In addition to these precautions, producers rely on *"confianza."* Valley growers agree to wait 2 or 3 days after their potatoes leave the field to receive payment without any invoice or formal contract because a cash deposit and their working relationships with the rural assembler is sufficient. In absence of written records, a reliable trader also prevents disclosure of growers' marketing transactions to creditors. Valley producers also ship potatoes through people they know even in good years, perhaps at a slightly lower price, partly because the same individual is expected to market all their harvest in bad years when prices are unusually low.

(vi) Producers' Marketing Costs

All valley producers normally incur only incidental potato marketing costs, such as telephone calls or a trip to Lima to check on wholesale prices. With the exception of a few small farmers who may occasionally grade, bag, and transport their own potatoes to market, valley producers generally leave marketing to local rural assemblers.

Why don't valley producers market potatoes themselves? Growers and co-op farm managers offer various explanations. Some producers say they have tried to do this but the increase in revenue did not compensate for logistical problems involved.[23] Others claim they can grade, bag, and ship the potatoes but they have difficulty selling them in Lima. This discourages them from becoming their own rural assemblers. However, most growers said they avoid involvement in marketing because they prefer to concentrate on production. Results of inter-

views conducted by Rhoades and Benavides (1980:4-6) confirm Cañete growers concern with production, as opposed to marketing, problems.

4.3 Rural Assemblers

Division of labor in the Cañete-Valley-to-Lima potato marketing channel means that rural assemblers have a well-defined role.[24] Rural assemblers' customary role includes providing a cash advance or guarantee before harvest, recruiting and paying a qualified crew of potato graders, supplying necessary marketing materials, and arranging transport from the field — including an occasional cash advance to the trucker for fuel. Beyond these customary responsibilities, the exact extent of each rural assemblers' business operations varies depending on the type of rural assembler.

(i) Types of Rural Assemblers

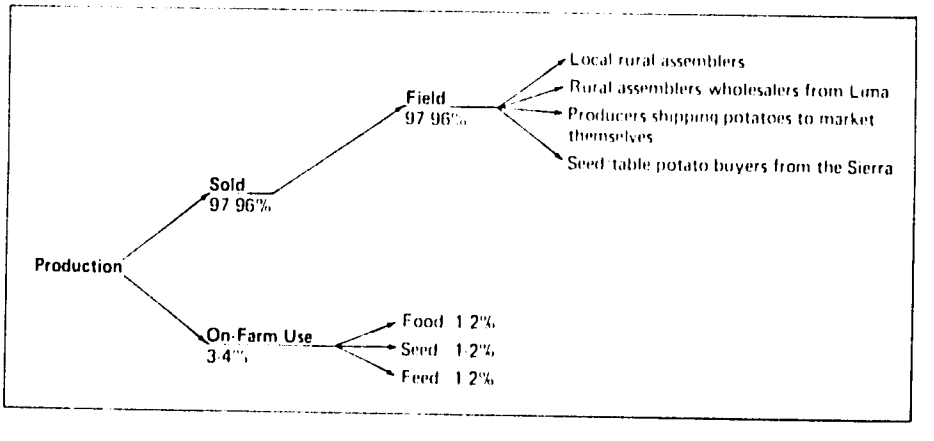
While all involved in Cañete Valley rural potato assembly perform a similar role, four different types are distinguishable, largely on the basis of their most important commercial undertakings (Figure IV.3.). These four types of rural assemblers are:

- local commission agents,
- Lima wholesalers' or their agents,
- producers, and
- buyers from the Sierra.

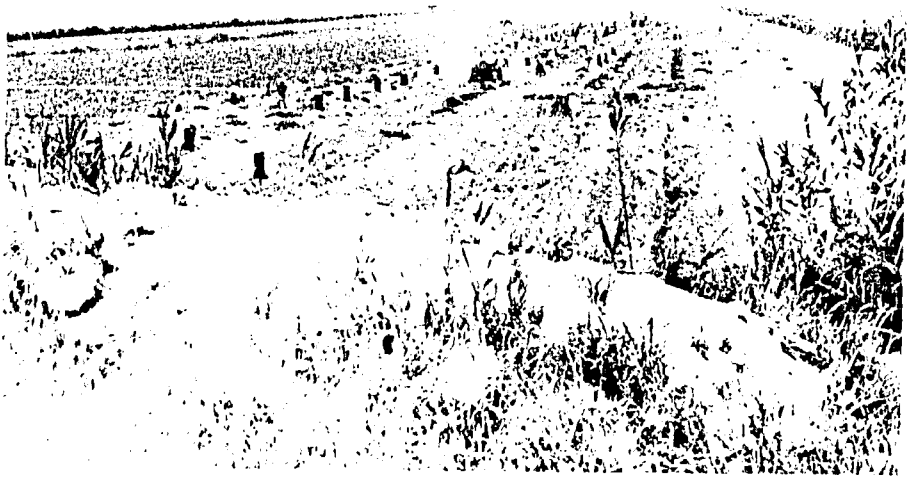
The dominant group of valley rural assemblers are the local commission agents (*comisionistas*). *These individuals do not buy potatoes but assemble and ship them for a commission, or fee.*[25] Local commission agents have lived and worked in the area for years (Dolorier 1975:113-115). Doing business as seed suppliers, assembling cotton, squash, and corn as well as potatoes, and also planting potatoes on their own farms, they gradually developed strong commercial ties with the community's growers. Valley commission agents normally assemble their own potatoes and for a great majority of potato producers in the valley. Exceptional market conditions, however, sometimes alter this practice.

If a shortage of potatoes develops in Lima and prices rise accordingly, then Lima wholesalers (or their agents) go to Cañete to purchase potatoes in the field.

Figure IV.3. Potato marketing channels in Cañete.



Source: Elaborated based on field work for this study.



Panorama of potato harvest in Cañete (note the back end of truck in the field). (Photo by Gutierrez).

Lima wholesalers are generally reluctant to do this. Local commission agents provide stiff competition because they enjoy greater *"confianza"* (Dolorier 1975:115-116). Moreover, by attempting to outbid Cañete-based traders, Lima wholesalers place their normal working relationship with these agents in jeopardy. The cash necessary to finance such additional, rural buying activities is also a constraint. For example, truckers insist that unknown clients pay them cash in advance for hauling potatoes.

Conversely, if a glut occurs in Lima and prices collapse, some growers will try to assemble and ship their own potatoes. Under such circumstances, producers will even take the potato shipments to Lima themselves in an effort to persuade wholesalers to accept their crop on consignment. If Lima prices are unfavorable, then some growers also ship potatoes to provincial markets or even out of the country.[26] As a final resort, Cañete growers will assemble and store their table potatoes for use or sale as seed.[27]

Buyers from the Sierra occasionally become involved in rural potato assembly in the Cañete Valley. These traders buy potatoes in farmers' fields when price differentials between Sierra cities and coastal farms permit. However, prices in the valley and freight rates to the Sierra often make coastal potatoes too expensive for sale to low income highland consumers. These factors discourage Sierra buyers from the direct rural assembly of potatoes in the valley. Perhaps, more importantly, traders from the Sierra must pay cash before loading if they assemble potatoes in the valley themselves. Rather than do this, buyers from the Sierra usually prefer to receive their coastal potatoes on credit from Lima wholesalers.

(ii) Valley Commission Agents as Rural Assemblers

About 30 commission agents reside in the valley.[28] Weekly fairs or daily wholesale markets are not held in the valley, so central gathering places for conducting trade do not exist. Valley agents, therefore, often work out of a converted room in their home or retail business and generally have one or more

trucks. Several reported supplemental sources of cash to finance their operations. Most traders (87%) use their own money to participate in potato marketing.[29]

Conditions of Entry

Most agents interviewed for this study claimed there were more rural potato traders in the valley in 1979 than 5 years earlier. This claim is supported by the fact that 20% of agents interviewed had 5 years or less experience. When asked what it takes to be in this business, valley agents most frequently mentioned cash and experience. Producers in the valley are reluctant to market potatoes on credit through unknown traders.[30] Thus, new entrants need cash for direct purchases. Similarly, a new entrant needs at least minimal experience to identify different potato varieties, their corresponding prices, and acceptable grading procedures.

Most valley agents handle less than 1000 tons of table potatoes during the entire coastal harvest.[31] However, four traders handled some 65% of all potatoes marketed by agents contacted for this study. Valley traders generally begin their table potato marketing in July and finish by November or December. Smaller volume agents, however, are more likely to market potatoes for a few months beginning in August or September. Nearly all small traders produce some potatoes, so their own production serves as one source of supply. In any event, small traders entry into and exit from potato rural assembly coincide approximately with the valley's peak harvesting period. At that time, larger volume agents—many also growers—probably have more potatoes potentially to assemble than they can properly manage.

Valley traders buy nearly all their potatoes locally. A few buy insignificant quantities in other coastal valleys, but most agents concentrate efforts in Cañete for several reasons. First, they live in, many have retail businesses in, and nearly all have farms in the valley. Second, valley agents assemble other crops beside potatoes for local growers. In other words, their marketing operations extend across farm commodities rather than across geographic areas. Third, valley agents also supply production inputs such as seed potato and in some instances help finance potato production on farms.[32] These activities give them added interest in local table potato marketing.

Valley commission agents work with growers they have known for years. These commercial contacts frequently developed through seed potato sales. Some agents work mostly with private producers. Others do business primarily with production co-operatives. In either instance, they work with persons they know.

Once details of a particular potato sale are agreed upon and the deal closed by posting the guarantee, the agent becomes directly involved in the rural assembly process. On the day of harvest, he alerts his field supervisor to hire a crew of graders and proceed to the field. After the producer and his crew of female field workers collect potatoes into every sixth or seventh row, the field supervisor and his crew begin grading and bagging. In the meantime, the agent finalizes transport arrangements. Toward the end of the day, agent and farmer normally meet at one of the valley truck scales. After the truck weighs in empty in the presence of both parties, it proceeds directly to the field for loading. When full, the truck returns to the scales for weigh-out. The agent's final payment is based on the difference between the first and last weight.[33]

Once potatoes leave the field, they go directly to market. Valley agents do not wash or process potatoes. The value that they normally add to the crop is grading, bagging, and shipping. Some agents store a few potatoes in the local cold

store for sale later as seed. However, because the valley has no major urban areas, almost all its potatoes go to Lima.[34]

Valley agents do most of their potato business with wholesalers whom they know in Lima's wholesale market # 1. One agent regularly ships several truckloads of potatoes to relatives in the capital. While most agents apparently do not market potatoes through family members, they do business with Lima wholesalers on the basis of "confianza." This type of well-established commercial contract also facilitaties exchange of market information.

Although some small-scale valley rural assemblers work alone, most agents operate as a team, consisting of two family members. One member is in charge of operations in the field; the other travels back and forth to Lima. Regular visits to the capital are necessary to monitor market conditions as well as settle outstanding accounts. Some valley agents send potatoes to Lima for cash on arrival. However, the more common practice is to collect payment 1 or 2 days after delivery. This procedure partly explains why valley producers receive delayed payment and why agents nearly always ship potatoes to known wholesalers.

(iii) Rural Assemblers' Marketing Costs

Average marketing costs for valley commission agents were about 350 *soles* per 100 kg in 1979 (Table IV.3). While this estimate is based on structured interviews with commission agents, it also uses the following four assumptions:

1. A sack of potatoes is assumed to weigh an average of 100 kg. Most local potato marketing participants either work with a similar figure in mind or consider this a reasonable approximation. Thus, the cost of materials — sack, tops, and string — are for 100 kg; the piece rate paid graders for grading and bagging amounted to about 40 *soles* per 100 kg sack.

2. The freight rate estimate is based on conversations with producers, agents and area truckers. Normal practices is for the trucker and his crew to assume

Grading potatoes in the Cañete Valley. (Photo by Gutierrez).

Table IV.3. Average rural marketing costs (in *soles*) per 100 kg of potatoes in Cañete, 1979.

Marketing cost	Amount
Sacks, tops, and string	95
Field labor	40
Freight	184
Miscellaneous, e.g., field supervisor, gas expenses, telephone, cost of capital	32
Total	351

Source: Rural assembler survey.

loading responsibilities as part of the freight service provided. Thus, freight costs are assumed to cover the cost of loading the truck in the field.

3. Miscellaneous costs such as payment of the field supervisor and transport expenses for visiting producers' fields, are assumed to be an additional 10%. This estimate is based on interviews with agents and on previous studies (Dolorier 1975:127-131).

4. Valley agents do not buy potatoes in the countryside on short-term credit. Thus, these rural assemblers have no capital costs to finance procurement of potatoes. However, agents need a sum of money to cover day to day cash expenses. These cash expenses include cost of providing the guarantee or deposit. This "cost of capital" is assumed to be equivalent to the interest lost on one half million *soles* deposited for 6 months at 30.5%. Total "capital cost" is divided by the average total volume per potato harvest (1,000 tons) to arrive at a cost per 100 kg or 8 *soles*. For accounting purposes, this study includes these financial costs under miscellaneous.

Many findings concerning Valley agents' marketing activitites were confirmed in interviews with area truckers.

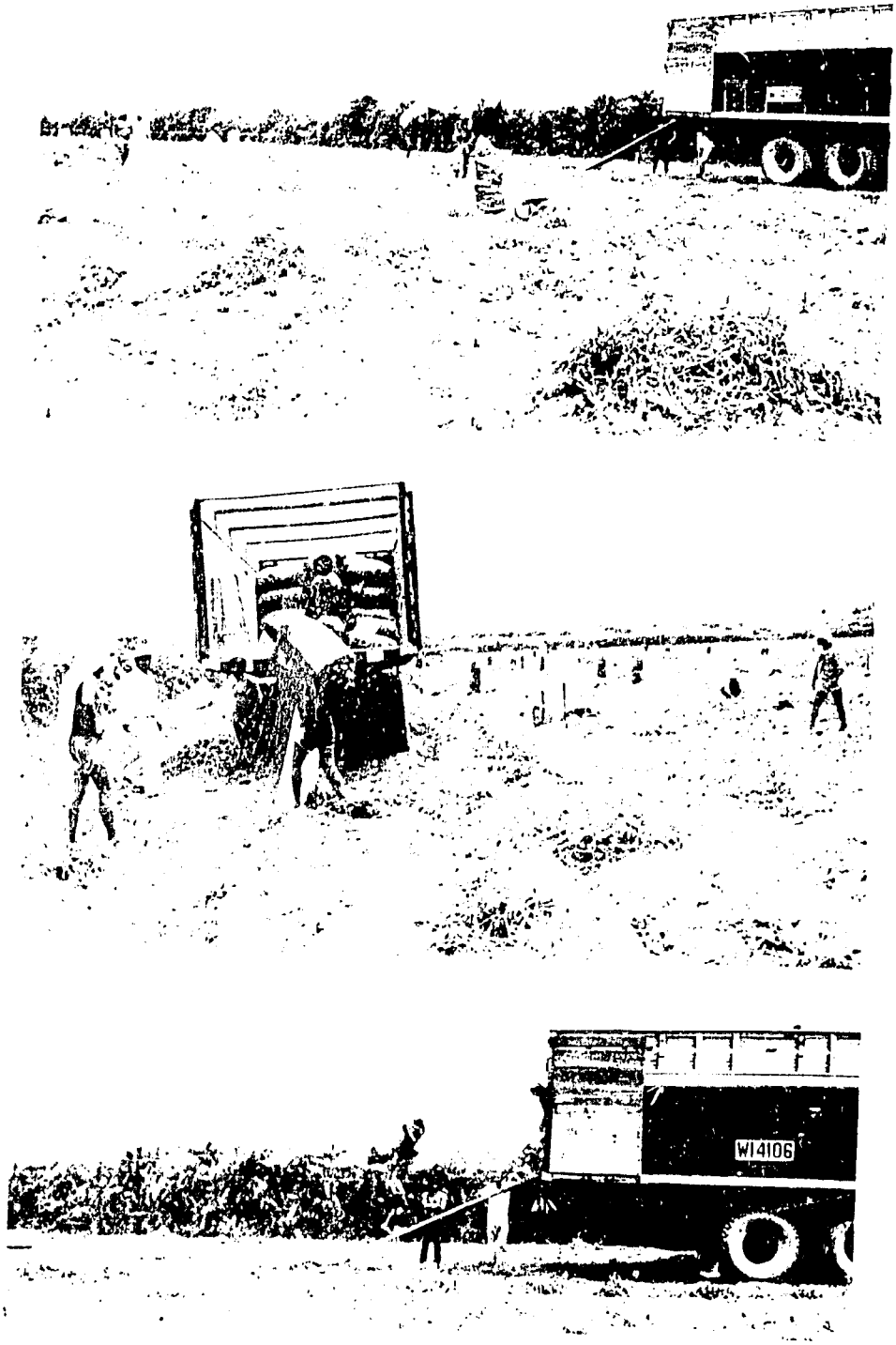
4.4 Truckers

Truckers play an especially important role in the Cañete Valley-to-Lima potato marketing channel.[35] Producer marketable surpluses are large and local daily markets are small. Potatoes therefore must be hauled to relatively distant urban areas to be sold. Trucks are the only transportation capable of carrying such quantities over long distances on a regular basis. However, truckers do more than simply carry freight between two points: they perform several physical and exchange functions as part of their potato marketing activities.

(i) Truckers' Marketing Activities

Truckers' marketing activities in the valley begin with loading, an operation which always takes place in the field. Observing truck movement during the valley potato harvest, it is clear the extensive network of roads and the dry, level fields greatly facilitate loading. Most importantly, this finding corroborates reports by producers and agents concerning the organization of valley rural potato assembly. **Potatoes are shipped directly from farms in Cañete to wholesalers in Lima.**

Potato shipments between production zones in the central Coast, including Cañete Valley are nearly always for a single owner.[36] Since the size of even the smallest farmer's marketable surplus is more than adequate to fill the cargo



Loading potatoes on the truck in the field in Cañete Valley. (Photos by Gutierrez).

capacity of the average size truck, these owners were generally potato producers themselves (see Scott 1981:238-239). This result confirms the role of coastal rural assemblers as commission agents who do not assume ownership of the crop.

Besides loading, truckers hauling potatoes in the central Coast also pay for shipping permits and all road tolls. Truckers cover weigh-in, weigh-out, and unloading charges at the wholesale market in Lima as well. Truckers usually are paid either the day after unloading or by the week. In other words, truckers implicitly provide financial services to some of their clients as well. They are willing to do this partly because they work quite often with both producers and wholesalers whom they know.[37]

(ii) Truckers' Marketing Costs

Average operating costs for a truck carrying potatoes between the central Coast and Lima vary by type of truck (Table IV.4). In 1979 diesel trucks had considerably lower average costs than gasoline-powered vehicles for several reasons. Diesel trucks had lower fixed costs per 100 kg. Because they were larger, they hauled more potatoes per trip. Their trips also averaged greater distances. With larger cargo and fuel capacity, diesel trucks were better suited for longer trips than gasoline trucks. Consequently, fixed costs were spread over more units of freight and more operating time per year than similar costs for gasoline trucks.

Diesel trucks had lower variable costs per distance than gasoline trucks due to better fuel economy. They used less fuel per kilometer because they are newer and travel longer distances per trip. They have lower fuel costs per gallon because they pay less for diesel versus than for gasoline.

4.5 Estimated Revenues

Most producers, rural assemblers and diesel truck operators had positive net revenues for potato marketing operations during 1979. However, almost all gasoline powered trucks had negative net revenues. While different revenue and cost considerations influenced potato marketing revenues at each stage of the channel, average net revenues per 100 kg were higher for producers than for either commission agents or truckers.

(i) Producers' Revenues

Co-operative units averaged 20% higher gross revenues than other farms in the Valley in 1979 (Table IV.5). This was largely because they received higher

Table IV.4. Average trucking costs per 100 kg of potatoes per hour traveled between central Coast and Lima, 1979.

	Truck type			
	Gas		Diesel	
Cost category	*Soles*	%	*Soles*	%
Fixed costs per trip	58	32	21	32
Variable costs per trip	27	15	11	17
Variable costs per distance	88	54	35	52
(Including fuel)	(34)	(22)	(11)	(16)
Total	174	101	66	100

Source: Trucker survey.

Table IV.5. Average production revenues and costs (in *soles*) per 100 kg of potatoes in Canete, 1979.

	Producer type		
	Small	Medium	Large
Gross revenue	2380	2583	3078
Less:			
Production costs	1382	1611	1911
Marketing costs[1]	...	...	...
Net revenue	998	972	1167

[1]Producers in the Cañete Valley had no marketing costs. See text for details.
Source: Farm survey.

average potato prices per kg (32.0 *soles*) than small (24.3 *soles*) or medium (26.1 *soles*) producers. One factor that influenced these average prices was a tendency for co-operative farms to sell potatoes over a longer period of time (Figure IV.2). Two of the co-operatives, in particular, sold potatoes late in the season, when prices rose unexpectedly due to shortages in Lima. Another factor was relative market power of larger farms. Since co-op units offered an enormous, steady source of supply, they pressured local agents to pay them a premium price to handle their potatoes.[38]

Co-operative producers had sufficiently higher average gross revenues that their average net revenues exceeded those of the more cost-conscious small and intermediate producers. Nevertheless, estimated net revenues per 100 kg for small, medium, and co-op producers averaged 1000 *soles*.

(ii) Rural Assemblers' Revenues

Net marketing revenues for Cañete agents averaged roughly 99 *soles* per 100 kg or 1 *sol* per kg in 1979. These net marketing revenues were a tenth of those of producers on a per kg basis. This is consistent with grower claims that local rural assemblers have modest net revenues from their marketing activities.

While net revenues per unit of valley agents are modest, it is sometimes suggested that their total net revenues are substantial. For example, if an agent shipped 1,000 tons of potatoes in 1979 his total net revenues would be roughly a million *soles*. These traders have neither fixed costs in the form of equipment nor "capital costs" in the form of money tied up buying and selling potatoes.

Still, total net revenues of valley agents constitute both a return to management and pure profit. In other words, from this one million *soles* must be deducted monthly salaries for the two member team of commission agents and the cost of trips to Lima. These individuals work full time as commission agents during the potato harvest. If they pay themselves the minimum daily wage in Lima (Table A.27), they each earn about 50,000 *soles* per month or 600,000 *soles* for the 6 months. In addition, if they make two trips to Lima per week during the 26 week harvest at a cost of 4,000 *soles* per trip, their travel costs represent another 200,000 *soles*. These managerial expenses suggest that Valley commission agents earn considerably less pure profits than their total revenues alone might imply.

(iii) Truckers' Revenues

Although most diesel trucks earned a profit from hauling potatoes between

Table IV.6. Average trucking revenues and costs (in *soles*) per trip per 100 kg of potatoes hauled from central Coast to Lima, 1979.

	Truck type	
	Gas	Diesel
Gross Revenue:		
From potatoes shipped to Lima	140	189
From backhauls	6	17
Total	146	206
Less:		
Operating costs		
Fixed costs per trip	59	70
Variable costs per trip	26	33
Variable costs per distance	106	116
Total	191	219
Net Revenue (loss)	(45)	(13)

Source: Trucker survey.

central Coast and Lima, both diesel and gasoline truckers *on average* had negative net revenues in 1979 (Table IV.6).

Meager revenues from backhauls had an important influence on this result. Population distribution on the Coast is such that rural areas have a much smaller demand for freight services from the capital than to the capital. As a result, most trucks return empty to potato growing areas such as the Cañete Valley and revenues suffer accordingly.

Did all these truckers then lose money on their potato hauling operations in 1979? Average net revenues presented in Table IV.6 may be deceptive if some truckers did not consider fixed costs as part of their actual operating expenses. For example, gasoline-powered trucks had an average age of 8.7 years. Consequently, their owners may not have included such things as depreciation, interest, and salvage value in a calculation of costs and revenues. Alternatively, agents or Lima wholesalers who own trucks may have accepted certain low or even negative returns on their freight operations to carry out other potato marketing activities.

4.6 Summary

Potato marketing in the Cañete Valley is highly organized for three reasons.

First, producer potato marketing is uniform. Similar production orientation, similar varieties, and similar market outlets contribute to this tendency.

Second, both producers' production and marketing activities are well disciplined. Irrigation and mild climatic conditions facilitate a tightly scheduled succession of crops during the calendar year. Marketing infrastructure, such as roads, truck scales, and telephone service, enable the systematic transfer of potatoes from producers' fields.

Third, a well defined division of labor exists between producers, rural assemblers and truckers. Producers concentrate on potato cultivation largely because they prefer to specialize in crop production. Rural assemblers take responsibility for grading, bagging, and selling potatoes. Truckers transport potatoes to Lima. As a result of these standard procedures, potatoes go direct from farmers' fields to the wholesale market in Lima.

Valley producers and local commission agents acting as rural assemblers received quite different net revenues in 1979. Net production revenues for small, medium, and co-op producers, were, with one exception, positive. Although small producers' production costs were as low or lower than those of medium and co-op producers, their gross revenues were lower. In any event, average net revenues for all producer types were roughly 1,000 *soles* per 100 kg. Commission agents earned one tenth this amount or roughly 100 *soles* per 100 kg.

Although most diesel trucks earned a profit from hauling potatoes along the central Coast to Lima, *average* net revenues for gasoline and diesel trucks were negative in 1979. All coastal truckers' revenues suffered for lack of backhauls. In addition, however, gasoline trucks used more expensive fuel. They also tended to be older and therefore used more fuel to travel similar distances as diesel trucks.

With this review of provincial potato marketing operations in the central Sierra and central Coast complete, the focus now turns to wholesale and retail trade in the capital.

Notes

[1] This chapter is based on field work in the Cañete Valley and Lima from June 1979 to March 1980.

[2] A selected list of these studies arranged by subject area include: ecology and farming systems—Castillo (1976), Fonseca and Mayer (1976), Alarcón (1980), Rhoades and Benavides (1980), Rhoades and Recharte (1982); seed production—Monares (1979, 1981), Franco et al. (1983); table potato production—Miranda (1969), MAA OSEI (1978a:54), Flores et al. (198, Scott (1981:105-123), Vargas (1983), Fano (1983); post harvest utilization—Benavides, Recharte, and Rhoades (1982); and distribution—Dolorier (1975: 105-100), Scott (1981:157-172, 207-222; 1982), and Fano (1983).

[3] Procedures to identify producer types are explained in Appendix One. A detailed discussion of historical land use patterns for all farmers in the valley is contained in two references: Castillo (1976), Rhoades and Recharte (1982).

[4] Some *haciendas* managed to avoid the full force of the agrarian reform by, for example, dividing up land ownership among family members.

[5] Appendix One offers a justification for analyzing potato production costs on the basis of a unit of output (per 100 kg), rather than a unit of input (per hectare). Since most potatoes are planted using seed from the Sierra, these costs are for the "Sierra" potato crop.

[6] Appendix One explains how quantities and prices of inputs were estimated.

[7] While they may be differences in input use within individual producer categories, other studies also find several similarities in *average* input use across producer types (Vargas 1983:70-73).

[8] An estimated 75% of all hectares planted in potatoes in the Cañete Valley in 1977 used three hybrid varieties: Mariva, Ticahuasi, and Yungay; in 1978, 83% of all potato hectares used Mariva, Ticahuasi, and Revolución (Campos 1979). Vargas (1983:68-69) also notes that in 1979 most farmers in each category planted only two varieties.

[9] A local privately-funded institution provides soil tests for farmers at a nominal charge and in 1979 was inundated with business. Nevertheless, several examples were noted of producers using excessive quantities of nitrogen (Scott 1981:108-115; Devaux et al. 1980:24).

[10] Some researchers argue that small producers are on land with marginal soils and have unequal access to irrigation water (Rhoades and Benavides 1980). These observations seem certain. However, results from various studies (Alarcón 1980:44-46; Scott 1981; Vargas 1983:74-75) indicate small growers manage to overcome these handicaps and harvest equally high or higher yields.

[11] This argument does not intend to suggest that small farmers have equal access to credit, for example, or that all farms might not benefit from improvements in these areas. Rather, it implies that with more equal access to resources, small growers such as those in the Cañete Valley are at least as efficient in production of potatoes as larger farmers.

[12] On average in 1979, small producers had 35% of their land in potatoes compared with medium producers (43%) and co-operative farms (9%).

[13] Although only medium and co-operative production are included, ministry research also found evidence of diseconomies of scale for potato production in Cañete (MAA OSEI 1978a:54). See also Maletta and Foronda (1980:242-243).

[14] Farm labor laws effective in 1979 stipulated that all production units over a certain size had to employ a permanent farm worker(s). Permanent workers received a daily wage and compensation to cover such things as social security. A daily worker was entitled to these additional payments only if he worked at least 21 days per month on the same farm.

[15] Data showed a similar ratio of seed planted to seed harvested across producer types, but the larger sample (using a slightly different definition of small farmer) indicated the following ratio of production to seed by producer type: small farmer 9:1, medium 7:9, large 8:1, and co-operative 8:3.

[16] Possibly other producers leave more potatoes in the field for collection in a customary post-harvest digging by the valley's poorer urban residents.

[17] For certain years, Graber (1974:53) notes that grades are partly affected by supply and demand conditions.

[18] For example, if a small producer has 1.5 hectares of potatoes and his total yield is roughly 30,000 kg, then 2% of total output was 600 kg. Similarly, if a medium farmer has 10 hectares of potatoes and his total yield is 200,000 kg then 3% of potato production is 600 kg.

[19] Coastal soil, climate and diseases are such that growers have difficulty maintaining the productiveness of potatoes harvested in this region. Relative prices and productivity favor annual purchase of seed produced in the Sierra. Limited capacity of local refrigerated storage facility, producer preoccupation with production in lieu of marketing, and uncertainty about post-harvest price movements in relation to government food price policy, also mean that few producers view storage as a means of regulating table potato sales. See also Fernández (1976) and Benavides, Rhoades and Recharte (1982) on this issue.

[20] *"Papa criolla"* refers to potatoes grown from coastal seed. This crop is usually planted from late March to mid-April to enable early harvest when prices are favorable. *"Papa serrana"* refers to potatoes grown from highland seed. This crop is usually planted after the harvest in the Sierra (late April to early June) once the potatoes have been brought down to the Coast and dormancy broken.

[21] This issue is discussed in greater detail in Section 5.3 (ii).

[22] Growers were not enthusiastic about selling their potatoes to a government agency such as EPSA partly for this reason. An official check frequently took weeks to negotiate. They also mentioned that government agencies expected growers to grade the potatoes themselves in small (50 kg) bags, and with only high quality potatoes. Growers were frequently left with lower quality potatoes they could not sell.

[23] One farmer put it this way: "To go to La Parada from 3 to 8 in the morning to sell a few sacks of potatoes to various retailers is not the work of a gentleman rancher."

[24] This role is well defined within table potato marketing, but did not prevent personnel from performing other activities such as seed potato sales, growing potatoes, or operating non-potato related businesses such as a lumber yard.

[25] This fee was not a fixed percentage or a flat sum, but tended to vary.

[26] For example, when 1978 potato prices in Lima were considered low, ministry records in Cañete indicate that some local potatoes were shipped to Moquegua, Arequipa, and as far away as La Paz, Bolivia.

[27] To circumvent government regulations restricting the shipment of potatoes from the Coast to the Sierra, some coastal growers send table potatoes to the Highlands where they are regraded and the smaller ones used as seed.

[28] This estimate is based on conversations with rural assemblers, potato producers, and local ministry personnel. The highest number of traders reported was 50 to 60 and the lowest was 10. This section is based on structured interviews with 16 Cañete commission agents.

[29] Several agents delayed re-payment of a production loan, for example, to help finance rural assembly activities.

[30] As an indication of the capital required in 1979 to enter this business, 10 tons of potatoes (plus grading, bagging and shipping) cost about 300,000 to 500,000 *soles* cash.

[31] These estimates must be interpreted with caution. Some agents reported sales per week. These figures were converted into sales per month (assuming 4 weeks per month) and multiplied by the number of months they

reported trading potatoes during coastal harvest. Other assemblers simply quoted a flat total for the entire harvest.

[32] Cañete potato traders contacted for this study helped finance about 35 producers on 134 hectares. This credit frequently consists of potato seed which growers are unwilling or unable to pay for at planting time. These growers market at least part of their crop through the trader/seed supplier and pay for their seed in the process. Nevertheless, these producers and their land area constitute a minor percent of the growers and hectares in the valley.

[33] Thus, an *"al barrer"* purchase is not based on estimated quantities of potatoes in the field as argued by Flores et al. (1980:76) but on estimated weight of potatoes as determined by the truck scales. Moreover, many of these truck scales are owned and operated by medium and co-operative farm units themselves. Manipulation of weights and measures by coastal middlemen is possible, but unlikely.

[34] Based on statistics for 1977 and 1978, about 80% of the potatoes produced in the valley were shipped to Lima.

[35] This section is based largely on structured interviews with some 60 truckers who hauled potatoes from production areas on the central Coast to Lima's wholesale market. Several, but not all, of these trucks came from the Cañete Valley. See Appendix One for details.

[36] Twenty-nine gasoline truckers reported 97% of shipments for a single owner; 19 diesel truckers confirmed that 85% of their shipments were for a single owner.

[37] Seventy percent of both gasoline and diesel truckers haul potatoes to people in Lima whom they know.

[38] Several private farmers interviewed said that the cooperatives received higher prices for their potatoes.

CHAPTER V

5. Potato Marketing in Lima

Introduction

Among all aspects of domestic food marketing, Lima wholesaling has received the most attention.[1] As Chapter I noted, however, this attention did not generate an abundance of marketing studies. On the contrary, limited literature on this topic of tremendous social and political importance is, in itself, a paradox. More perplexing still, previous studies frequently assert Lima wholesalers' earn excessive margins but they rarely supply direct evidence to justify this claim.

In the case of potatoes, previous studies usually offer only possible scenarios as arguments to demonstrate that wholesalers earn excessive margins. One argument commonly advanced concerns wholesalers' alleged procurement practices and buying procedures; it is referred to here as the "trade arrangements" argument. For example, Lima wholesalers are said to procure potatoes at the farm gate. Hence, they impose low prices on growers and thereby reap exorbitant margins. Another asserts that Lima wholesalers earn excessive margins because a few big merchants allegedly monopolize potato trade in the capital—the "monopoly control" argument. Or, it is argued as well that differences between farm-level and Lima prices combined with allegedly negligible wholesaling costs is sufficient to infer wholesalers' margins are excessive—the "price differential-wholesaling cost" argument. Chapter V examines these separate, but related arguments by analyzing potato wholesaling in the capital. It also briefly discusses Lima potato retailing. In so doing, this chapter extends our micro-level assessment of the domestic food marketing consensus beyond rural assembly and transport to include Lima potato marketing and, in particular, wholesalers' margins.

5.1 Lima Wholesalers

Analysis of Lima potato wholesaling begins with consideration of these questions:

- How many individuals/institutions wholesale potatoes in Lima?
- Do a small percentage of these individuals/institutions wholesale most of the potatoes sold in the capital?
- What factors prevent (force) new (old) traders from entering (out of) Lima potato wholesaling?

Answers to these questions help assess past claims that monopoly control of potato wholesaling results in excessive margins. Later sections provide grounds for evaluating assertions that unfair trade arrangements or large price differentials contribute to excessive margins as well.

Overhead view of wholesale market #1 in Lima. (Photo by Espinoza).

(i) Number of Wholesalers

Most studies usually base estimates of Lima potato wholesalers on numbers of potato traders in the *Mercado Mayorista #1 (MM #1.)*. Four reasons for this are:

(1) Potato wholesale trade in the capital has traditionally taken place at this site[2]

(2) From 1971 to 1980 all potatoes entering Lima were legally required to pass through MM #1[3] and wholesale trade outside this market was illegal.

(3) An individual can only wholesale potatoes in this market by leasing or renting a stall.[4]

(4) Only occupants of the 215 stalls in the tubers section of MM #1 are authorized to sell potatoes.

Based on this reasoning, about 215 traders wholesale potatoes in Lima. However, two offsetting considerations make this a less than definitive estimate. On one hand, not every tuber stall occupant in MM #1 is an independent potato wholesaler.[5] Some of these individuals are merely employees or relatives of other tuber stall operators. Additionally, some may wholesale only sweet potatoes and *olluco* (a plant with edible tubers). This would reduce the number of potato wholesalers.

On the other hand, estimates are lacking on numbers of merchants who, for example, in 1979 illegally traded potatoes wholesale at other locations. Furthermore, throughout the last decade various local (see Dolorier 1975: 130-131) and national public institutions (see Graber 1974: 57-58; Scott 1981:49) participated in Lima potato wholesaling on an intermittent basis. This augments the number of potato wholesalers. Still, without definitive statistics, 215 is the current estimate of Lima potato wholesalers.

(ii) Quantities Purchased by Different Wholesalers

Annual published statistics do not exist on distribution of potato volumes bought in MM #1 by different wholesalers. Graber (1974:52) estimates that the

18 largest potato wholesalers purchased about 37% of the total volume in 1971. Egoavil (1976) calculates that the 16 largest wholesalers received some 14% of all potatoes during 1973.

Because potatoes represent 75% to 80% of all tubers shipped into MM #1, size distribution of potato wholesalers can also be approximated by unpublished data on volume of tubers received by each trader.[6] This information was recorded on a stall-by-stall basis for 1972 to 1977. Most tuber wholesalers, in fact, received less than 200 tons per month in each of these years (Table V.1). The ratio of maximum to minimum average monthly volumes varied between 30 tons and 400 tons during these 6 years. Nevertheless, the share received by the 10 or even the 25 largest volume wholesalers was only 15.5% to 18.5% of all tubers shipped into MM #1 in any one year (Table V.1.)

From 1972 to 1977, the percentage of tubers received by largest wholesalers did increase but only from 15.5% to 17.6%. Furthermore, this percentage did not markedly change with sharp fluctuations in the total volume of tubers (Table V.1). These statistics suggest that a few wholesalers do receive many more potatoes than others, but their quantities are a minor percentage of all shipments.

One may argue that such figures fail to reflect the actual concentration of shipments because the figures are inaccurate or they do not take account of commercial ties between wholesalers, i.e., several wholesalers in business together could receive a considerable percentage of total shipments.[7] Still, these figures — however inexact — are the only data available on this issue. Moreover, while ties between wholesalers exist (see Sec. 5.2), their impact on the concentration of shipments could not be measured. Instead, the study now analyzes the alleged barriers to entry, trade relations between growers and wholesalers, and marketing margins.

(iii) Barriers to Entry

Irregardless of their number and size distribution, Lima potato wholesalers are still said to control prices and margins by promoting exit or preventing entry into this business.

Two trends support this argument:

(1) Total number of potato wholesalers has steadily declined from 266 in 1967 (CONAP 1967: 63) to 234 in 1972 (Dolorier 1975: 67), to 215 in 1979 (Scott

Table V.1. Distribution of tubers annually received among Lima wholesalers of different sizes: 1972-77.[1]

	1972	1973	1974	1975	1976	1977
Wholesaler category (t/month)						
0 - 100	80	68	58	53	45	61
100 - 200	17	28	36	39	38	29
200 - 300	2	3	4	5	10	8
300 - 400	.	1	1	2	1	.5
400 - 500	1	1	.5	.5	.	.5
above 500	.	.	.5	.5	2	1
share (%) received by:						
10 largest wholesalers	16	16	18	18	19	18
25 largest wholesalers	29	29	31	32	33	33

[1]Based on data for 189 of 215 tuber wholesalers in the wholesale market #1.
Source: MAA-DGC.

1981). One might expect that sharp increases in potato volumes shipped through MM #1 during the last decade (Table A.14) would have resulted in more, rather than fewer wholesalers.

(2) Almost all wholesalers who occupied tuber section stalls have been there since the re-modeled market opened in 1970.[8] Past official attempts to remove certain potato wholesalers met with organized opposition by the wholesalers' association.[9] In other words, not only were there fewer wholesalers in total but also no new traders emerged among this declining number. Absence of entry into potato wholesaling contrasts with a key prerequisite of perfect competition: mobility of resources through continuous entry and exit of firms (wholesalers). Two questions arise: Are there barriers to entry into Lima potato wholesaling? Are these barriers the result of traders' decisions?

Four Barriers to Entry

The answer to the first question above, regarding barriers, is definitely "yes." Four prominent barriers restricted entry into Lima potato wholesaling during 1979: (1) legal "locational" monopoly, (2) access to physical space, (3) access to capital, and (4) access to information. A municipal resolution made it illegal to transport potatoes to Lima without going through MM #1. A legal wholesaler had to buy and sell potatoes from a stall at this site.[10] This resolution constituted a barrier to entry because traders with stalls in MM #1 had a legal locational monopoly.

Access to physical space within the city's single wholesale market constitutes a barrier to entry for several reasons. Wholesalers with stalls in this market benefit from the customary practice of producers, rural assemblers, retailers and consumers to make their purchases or sales at this location. They also have the advantage of a place of business where information about potato supply and demand conditions is continuously exchanged. Their presence in this market is partly maintained by the potato wholesalers' association. This organization collectively has resisted eviction of any member from his or her stall. In so doing, it also prevents new competitors from occupying space in the market. Furthermore, only authorized traders can wholesale potatoes even within the market because market regulations restrict wholesalers to particular product lines.

Access to capital is also a barrier to entry because new entrants need cash to compete with established potato wholesalers.[11] In other words, veteran wholesalers are often extended credit by producers, commission agents or truckers, but new, unknown wholesalers must prove creditworthiness through a series of successful cash transactions. In 1979, if a new entrant bought only 40 tons of potatoes per month—less than half the monthly average received by Lima tuber wholesalers from 1972 to 1977—then he would have purchased 250,000 to 500,000 *soles* worth of potatoes per week. Some appreciation for the magnitude of these sums can be derived by comparing the cost of a truckload of potatoes (350,000 *soles*) with the estimated 1,000 *soles* daily wage in Lima during 1979. Lima wholesalers therefore need substantial amounts of money to conduct business — a situation made more difficult by the reluctance of the Agrarian Bank to make marketing loans for potatoes.

Access to information is perhaps the most formidable barrier to entry into Lima potato wholesaling. Unlike some public or private corporations, potato wholesalers issue no year-end financial statements or annual reports. As a result, prospective entrants cannot review statistics about operating expenses, revenues,

and profit rates in this line of trade. These data are proprietary in nature. Moreover, information about actual potato wholesaling activities—including harvest dates, farm-level prices, freight arrangements, product flows—is not readily available to the general public. The importance of information, in the form of gradually acquired knowledge, is manifest in that practically all potato wholesalers in MM #1 have at least 10 years experience in the trade (Dolorier 1975:70). They have slowly developed their own "data banks" and the experience to exploit such information. Consequently, the shortage of information necessary to operate a potato wholesale business discourages potential new entrants from competing with experienced traders.

Responsibility for Barriers

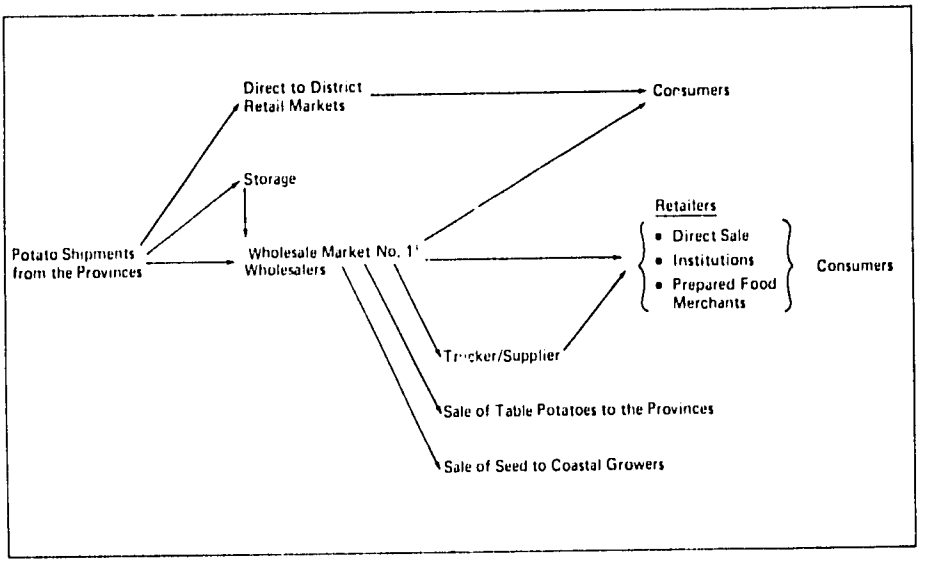
Evidence on the second question—the responsibility for these barriers to entry—is mixed. Established potato wholesalers do resist eviction from stalls in the MM #1. Thus, they have been partly responsible for the "access to physical space" barrier to entry. Nevertheless, this resistance did not prevent at least some prospective new wholesalers from renting stall space in the market nor did it impede market administrators or state enterprises from wholesaling potatoes in times of shortage (see Dolorier 1975:130-131).

Prevailing marketing regulations and policies were mainly responsible for existing barriers. A municipal resolution legalized the locational monopoly. Prospective wholesalers at other markets around the city could not compete with traders in the MM #1 because it was against the law. MM #1 regulations limited authorization to sell potatoes to certain stalls. Thus, potential competition within MM #1 itself was thwarted for lack of access to physical space where potato wholesaling was authorized. Similarly, the capital requirements barrier to entry emerged partly because Agrarian Bank programs lent few funds to finance agricultural marketing.[12] Likewise, the shortage of information resulted in some measure from a government decision to dissolve SIMAP. In other words, barriers to entry into Lima potato wholesaling in 1979 resulted mainly from official decisions intended to strictly discipline some middlemen and to eliminate others—in part to promote smaller margins through greater competition. Ironically, these measures discouraged new entrants who might have provided the sought-after competitive pressure on established traders. In any event, these barriers were not a consequence of existing wholesalers' control over potato marketing.

5.2 Lima Wholesalers' Marketing Activities

Apart from allegations of monopoly control, earlier studies claim that Lima-based potato wholesalers earn excessive margins through unfair trade arrangements. Lima wholesalers are at the geographic and commercial hub of the potato distribution channel (Figure V.1). Nevertheless, their marketing activities vary in scope depending on supply and demand conditions and their respective resources. A general list of Lima wholesalers' functions—as potato traders—includes:[13]

- purchase potatoes in the provinces,
- provide market information to producers, rural assemblers, and provincial wholesalers,
- sell seed potatoes to provinces,
- sell table potatoes to provinces,



Source: Elaborated based on field work for this study.

Figure V.1. Potato marketing channels in Lima.

- sell table potatoes in Lima (wholesale and retail), and
- finance potato retailing by provision of credit.[14]

All Lima wholesalers perform basic exchange functions. They furnish market information. They receive table potatoes and sell them to local retailers or consumers. These activities involve solving a formidable set of managerial problems that are perhaps overlooked because they are not easily associated with specific marketing costs.

Lima wholesalers coordinate complex networks of people (growers, rural assemblers, truckers, retailers, family and hired labor), products (potatoes of various types, qualities, and origin), and money. They strive to insure that potatoes of good quality are available for their customers at competitive prices. At the same time, they seek to maintain good commercial relations with their suppliers as well as to supervise properly their own family and hired labor. Cash dispersements for potatoes delivered or trucking services provided must also be effectively co-ordinated with money received for potatoes sold on a regular or credit basis. In order to accomplish these exchange functions, Lima wholesalers not only work in their stalls but also outside the wholesale market, for example, making regular phone calls to the provinces or meeting with truckers. These activities all are essential to insure the normal progression of potato marketing activities in the capital.

Lima potato wholesalers normally perform only limited physical functions.[15] They are responsible primarily for bulk-breaking, or buying potatoes in large quantities (by the truckload) and selling them in small lots (a few sacks). Lima wholesalers do little grading, bagging, storing, or processing. Most physical functions are performed instead by producers, rural assemblers, and retailers (Graber 1974:52). Still, a critical question is: Do Lima wholesalers control prices by procurement practices like buying most of their potatoes at the farm gate?

Unloaded potatoes in wholesale market #1 in Lima. Note wholesaler and scale in foreground of top photo. (Photos by Scott).

(i) Procurement Practices for Central Sierra Potatoes

Different-sized Lima wholesalers have specific procurement practices for potatoes from different parts of the country.[16] For example, for central Sierra potatoes received from January/February to June/July, most medium and large wholesalers attach primary importance to producer-commissioned direct shipments. This practice is based on long-standing consultations between producers and wholesalers on quantities, varieties, and grades of potatoes that the wholesaler can expect to receive. Such consultations facilitate trade arrangements because producers do not always travel with their potatoes to Lima and wholesalers do not physically inspect every bag they receive.

Small potato wholesalers depend more on other wholesalers to supply them with Sierra potatoes for various reasons. According to Dolorier (1975:79-90), small wholesalers have less cash, fewer rural buyers, and are less likely to own a truck or to be extended credit by producers for the purchase of potatoes. In other words, small wholesalers lack financial resources or commercial reputation to trade directly with growers on a continuous basis.

It is noteworthy that Lima potato wholesalers—especially large and medium traders—assign little importance to nonconsigned shipments by producers or supplier from truckers, rural assemblers, or cooperatives. These findings corroborate independently tabulated responses by producers, truckers, and rural assemblers when they were asked for their description of the same marketing channel. Although Lima wholesalers buy some potatoes at the farm gate during the central Sierra harvest, their on-farm purchases are relatively unimportant.

(ii) Procurement Practices for Central Coast Potatoes

During the potato harvest on the central Coast, large and medium wholesalers attach major importance to rural assembler shipments. These shipments are supplemented by direct purchases in growers' fields. Larger wholesalers generally work with regional rural assemblers because many coastal producers harvest and sell more potatoes than even a large wholesaler can handle at one time (Graber 1974:51). Still, some Lima wholesalers specialize in marketing coastal potatoes. Over the years, they have developed strong contacts with producers, for example, by selling them seed. These ties enable wholesalers to buy some potatoes directly in producers' fields.

Small wholesalers depend largely on other wholesalers for coastal potatoes. Their sales volume is insufficient to require truckloads of potatoes on a regular basis. Instead, small wholesalers apparently tailor their potato procurement to supplies available in the MM #1 or to special purchases in farmers' fields.

Neither large nor small Lima wholesalers report receiving many shipments direct from coastal producers. Most potatoes are sent from coastal growers' fields, by way of local rural assemblers, direct to Lima's MM #1. Thus, Lima wholesalers' accounts of potato procurement practices during the coastal harvest correspond to reports received separately from producers, rural assemblers, and truckers indicated in Chapter IV.

In summary, Lima wholesalers normally purchase their potatoes in the capital from either growers or rural assemblers. Thus, they do not control prices in central Sierra or on the central Coast by buying potatoes at the farm gate.

(iii) Buying and Selling Procedures[17]

Buying procedures for Lima potato wholesalers include:

- Production credit *(habilitación),*
- Advance at harvest,
- Cash in farmers' fields, a provincial market, or on delivery in Lima,
- Consignment, and
- Commission.

Do Lima wholesalers control potato shipments by purchasing most of their potatoes from growers to whom they offer production credit? Some purchases still may be made by providing production credit, but this is an unusual (Dolorier 1975:111) and unimportant practice for most wholesalers (Medina et al. 1974:49). Consignment purchases also are infrequent in a normal supply period (op. cit.:49). Wholesalers do this type of buying during an abundant harvest as a form of protection against sudden, sharp drops in prices.

Lima wholesalers generally receive potatoes on a commission basis or they pay cash (Dolorier 1975:84-86; 109-110). In either case, actual payment is nearly always in cash. Payment by check, bank draft, or money order is uncommon. Some payment arrangements involve partial exchange in kind, for example, production credit purchases involving supply of seed. However, Lima potato wholesalers work mostly in cash. Thus, Lima wholesalers do not use advances of cash or inputs to control potato shipments to the capital.

Selling Procedures

Once potatoes are unloaded in MM #1, they are sold almost immediately. Lima wholesalers leave grading and packaging to others so they have no need to keep potatoes in their stalls. More importantly, product perishability (especially during the coastal harvest), limited storage space, and risk of unfavorable price fluctuations are ample reasons to sell potatoes promptly after delivery. Economic intuition also suggests that Lima wholesalers want to turn over their capital as rapidly as possible.

Wholesaler at his stall selling potatoes in wholesale market #1 in Lima. (Photo by Espinoza).

Sales Outlets

Most Lima wholesalers normally sell two to five sacks of potatoes per customer; a few sell as many as six to 10 sacks per sale (Graber 1974:54). These small-scale transactions result from clients' (buyers) needs, municipal or market regulations, and the wholesalers' own business requirements.

The vast majority of Lima's potato retailers are street vendors or merchants in a district market. These clients probably prefer to purchase small quantities of potatoes on a regular basis, for example, to limit their shrinkage losses from holding stocks.

Dolorier (1975:119-120) observes that during potato shortages municipal authorities have imposed rationing. Potato wholesalers then must limit sales to only one or two sacks per authorized retailer. Furthermore, since by market regulation, no loading can take place in MM #1 itself, large-scale purchases by retailers are difficult.

Dolorier (1975:121) also notes that practically all wholesalers extend short-term credit to their retail clients. Wholesalers probably use small unit sales as one means of regulating credit to individual retailers. Alternatively, variable weather conditions and communication problems with the provinces mean daily volumes of potatoes received in MM #1 can fluctuate greatly. Large wholesaler-to-small wholesaler distribution allows large wholesalers to: (a) smooth out labor requirements and keep them at a minimum, (b) continue to receive unanticipated or additional potatoes beyond their weekly needs and thereby maintain "confianza" with producers, and, (c) manage the irregular flow of potatoes within MM #1 limited to stall and storage space. Finally, wholesaler-to wholesaler distribution means that even large volume wholesalers can rapidly sell tons of potatoes in times of surplus and discourage cut-throat competition in times of shortage (Graber 1974:51-52).

Most Lima wholesalers, nevertheless, have steady sales clients. Large volume potato wholesalers in particular have a relatively higher percentage of sales to regular customers in part because they sell some of their potatoes to medium and small wholesalers in MM #1 itself.

Provincial sales include seed shipments to coastal growers and table potato sales to wholesalers in other cities such as Huancayo and Trujillo. Various sources estimate the magnitude of these shipments between 5% (Graber 1973) and 15% (Bustamante y Williams y Asociados 1972) of all unloads in MM #1.

Weighing potatoes for sale in wholesale market #1 in Lima. (Photo by Espinoza).

Table V.2. Average daily costs (*soles*) of potato wholesalers in Lima estimated by month, 1979.

Cost	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Labor											
Wholesaler	1290	1366	1442	1454	1490	1506	1626	1748	1948	1958	2048
Hired worker	645	683	721	727	745	753	813	874	974	979	1024
Watchman	150	150	150	150	150	150	150	150	150	150	150
Infrastructure											
Stall	70	70	70	70	70	70	70	70	70	70	70
Electricity	10	10	10	10	12	12	12	12	14	14	14
Telephone	220	220	220	240	240	240	260	260	260	280	280
Materials	40	40	40	50	50	50	50	50	60	60	60
Capital	793	907	819	847	819	847	847	847	819	847	819
Shrinkage	816	962	961	1084	1050	940	1014	1097	1205	1191	1371
Total	4034	4408	4433	4632	4626	4568	4842	5108	5500	5549	5836
Per kg	1.25	1.26	1.13	1.18	1.22	1.33	1.34	1.30	1.26	1.57	2.11

Source: Elaborated for this study, see section 5.2 (iv) for details.

(iv) Wholesalers' Marketing Costs

During daily buying and selling activities within MM #1, Lima wholesalers incur certain marketing costs (Table V.2)[18] including:

- Labor,
- Infrastructure (stall rental, electricity),
- Materials,
- Interest, and
- Shrinkage.

Certain assumptions are made in this study to estimate average costs on a daily basis during 1979. For example, the figure for labor costs assumes two full-time workers per stall: the wholesaler himself and his wife or employee. Services of a night watchman are also part of labor costs. Labor costs for the wholesaler and his hired workers are based on the prevailing daily minimum wage (Table A.27). Given the wholesalers' experience, his wage is assumed to be twice that of his assistant.

Infrastructure costs refer to stall rental and electricity. This study used average fixed rental rate charged all wholesalers. Telephone costs are included because a few wholesalers have a telephone in their stall; others use public telephones. These costs are assumed to have risen during the calendar year.

Material costs are for such items as string, or receipt books.

It is assumed that Lima wholesalers have no depreciation costs. Wholesalers in MM #1 have only one piece of equipment in their stalls: a second-hand scale so old that depreciation is considered negligible.

Lima wholesalers also have capital costs. Although they normally receive potatoes on short-term credit, Lima wholesalers need operating capital to sell potatoes on credit to retailers. Moreover, Lima wholesalers buy some potatoes in the provinces, especially in times of scarcity. They need cash for these purchases and for expenses such as grading, bagging and freight to Lima. This study assumes that Lima wholesalers average one million *soles* in operating capital.

Thus, wholesalers' daily capital costs are assumed to vary with changes in interest rates for ordinary bank deposits and the number of days in the month.

Shrinkage represents another cost for Lima wholesalers. Potatoes are a semi-perishable commodity and some de-hydration is inevitable. However, Lima wholesalers buy potatoes three or four times a week precisely to avoid this type of loss. Hence, the study assumes that these losses constitute 1% of daily average unloads.[19] Shrinkage costs are estimated by multiplying 1% of average daily shipments per wholesaler by cost of the potatoes, that is, average monthly wholesale price (Table A.15) less the wholesalers' estimated nominal gross revenue per kg (Table V.3).[20]

These figures indicate that total daily wholesalers costs rose steadily during the year. Available evidence suggests that such increases are inevitable for two reasons: (1) 30% of wholesale marketing costs is the individual's own labor. As daily minimum wages went up with inflation, wholesalers probably also paid themselves more money; (2) an additional 40% of wholesale marketing costs are capital costs and shrinkage. Capital costs are tied to interest rates that rose with inflation during the year. Shrinkage costs rise with the price and quantity of potatoes delivered in the wholesale market. Previous discussion of producer potato prices in the Cañete Valley indicated they rose sharply at the end of the calendar year.

Also noteworthy is that potato volumes have both a cost-increasing and cost-decreasing impact on wholesalers' net margins. On one hand, by buying and selling more potatoes wholesalers can spread out labor and capital costs over more units of sale.[21] On the other hand, as they receive and dispatch more potatoes, wholesalers' shrinkage losses actually go up. Thus, all wholesalers' costs do not decline and their net margins simultaneously expand as potato volumes increase. Before estimating wholesaler net revenues, the analysis briefly examines potato retailing.

Unionized stevedore with cart for transporting potatoes out of wholesale market #1 in Lima. (Photo by Espinoza).

5.3 Lima Retailers

The following concise consideration of potato retailers has two purposes.[22] (1) it completes analysis of potato marketing in Lima and consequently enhances our understanding of potato wholesalers' marketing activities there, and (2) it concludes the review of producer to consumer potato marketing channels.

This section focuses on the following questions:

- Who sells potatoes retail in Lima?
- What does potato retailing involve?
- How many potato retailers are there?

(i) Types of Retailers

Lima potato retailers are frequently portrayed in a stereotyped fashion as mobile street vendors. Although many Lima potato retailers do fit this description, a more accurate typology includes these three categories (Figure V.1):

- Direct sale retailers,
- Institutional retailers, and
- Prepared/processed food retailers.

A direct sale retailer is defined as someone who sells potatoes in an unaltered form, or directly as purchased. Direct sale retailers do not wash, peel, cook, or process their product. Instead, they buy and sell fresh potatoes. Direct sale potato retailers include: mobile street vendors, stall operators in district markets, supermarkets and neighborhood shops.

Institutional potato retailers are organizations (public or private) that regularly sell potatoes to specialized clients as a service. For example, these outlets often prepare potatoes in meals for which they charge a price. However, while the potatoes are sold, they are not distributed primarily for profit but rather as a service to a restricted group of consumers. Institutional retailers refer to hospitals, schools, company cafeterias, churches, clubs, and military installations.

Prepared food potato retailers sell processed or cooked potatoes (principally) retail to the general public. Prepared food potato retailers that process potatoes are primarily rustic or cottage industry establishments.[23] They prepare peeled potatoes, potato chips, and *papa seca* for sale both wholesale and retail (Horton and Benavides 1980). The more numerous group of prepared food potato retailers include restaurants, hotels, and mobile food vendors. As an exhaustive analysis of all three types of Lima potato retailers is beyond the scope of this study, the remaining discussion is limited to direct sale potato retailers.

(ii) Retailers' Marketing Activities

Potato retailers' marketing activities vary depending on the quantity purchased and sold, two examples being mobile street vendors and supermarkets. Mobile street vendors generally buy potatoes in MM #1 in small lots of one or two bags several times a week, and frequently on short-term credit. Their limited working capital dictates that these retailers adopt such purchase arrangements partly to limit spoilage losses due to lack of proper storage. Small, frequent purchases also help minimize inventory costs and the risk of being caught with considerable supplies after a sharp decline in prices.

Mobile street vendors perform certain physical marketing functions. For instance, they do bulk-breaking (selling potatoes in small quantities of 1 to 5 kg)

Street vendor selling potato dishes in Lima. (Photo by Espinoza).

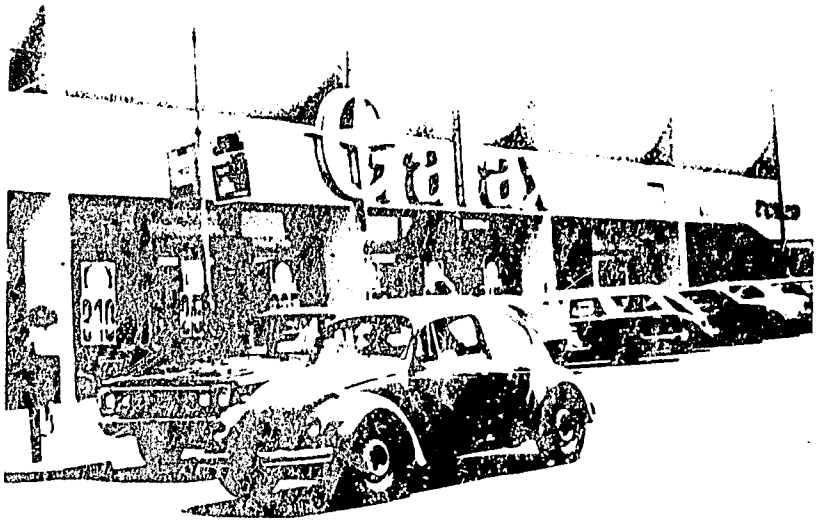
rather than by the 100 kg sack. They may also grade potatoes. Finally, these vendors perform a basic marketing task of transporting potatoes from MM #1 to consumers' doorsteps.

In contrast, supermarkets buy potatoes 10 to 20 sacks at a time, once or twice a week, and frequently on credit of 15 days or more. These purchases are arranged either by visiting MM #1 or by telephone to a regular wholesaler/supplier. The wholesaler is then responsible for delivering potatoes to the supermarket chain's central warehouse. From there they are redistributed to individual supermarkets within the chain. Some Lima supermarket chain's formerly purchased potatoes direct from nearby production co-operatives during the coastal harvest. However, such purchase arrangements proved difficult to maintain because of logistics—delays associated with payment by check were unacceptable to the co-ops.

Supermarkets also perform a set of physical marketing functions. They do bulk-breaking, but, in addition, they grade and package the potatoes into 1 to 5 kg plastic bags. Furthermore, while they do not offer locational convenience like mobile street vendors, their longer business hours (and vast production selection apart from potatoes) provide a different sort of service to consumers.

(iii) Number and Location of Retailers

Current information on number and location of direct sale potato retailers in metropolitan Lima is not available. Graber (1974:53) estimates some 11,000 vegetable and/or potato vendors operated in Lima in 1972. About half were in permanent or semi-permanent stalls in municipal markets, and the other half were mobile street vendors.



Consumers and mobile street vendors in Lima street market. (Photo by Espinoza).

A survey in 1980 indicated that more than 15,000 retail stalls sell produce such as potatoes in the various Lima districts (O'Phelan 1984). Even these data, however, are only suggestive of distribution by type and location of potato retailers. Some outlets—for example, neighborhood shops—are not included in the survey. Those retail outlets which are listed may or may not regularly sell potatoes. Evidence on numbers of potato retailers in Lima leads to two observations:

(1) many more individuals probably entered potato retailing than potato wholesaling during the last decade, and

Lima supermarket. (Photo by Espinoza).

(2) the ratio of potato retailers to legal potato wholesalers was roughly 75 to 1 in 1979.

The question then emerges: Did the relatively few Lima wholesalers exploit their favorable bargaining position *vis-á-vis* potato retailers (and/or producers) to earn excessive marketing revenues?

5.4 Estimated Revenues

Gross and net marketing revenues of Lima wholesalers varied during 1979. Still, average net wholesale revenues were positive. Perhaps more thought provoking, gross revenues were smaller for wholesalers than for retailers. Various factors influenced these estimates as is indicated below.

(i) Lima Wholesalers' Revenues

Based on field data for this study, Lima wholesalers' gross revenues per kg during 1979 averaged 2.36 *soles* for potato shipments from the Mantaro Valley and 2.35 *soles* from the Cañete Valley[24]. Wholesalers' gross revenues were higher than 6 *soles* per kg in some instances (Figure V.2). Thus, the claim of excessive wholesale revenues is, at times, substantiated by these results. However, the majority of observations indicate that wholesalers' gross revenues were generally less than 3 *soles* per kg for shipments from either valley.[25]

Given the modest magnitude of these gross revenues, it might still be argued that wholesalers control potato prices because such revenues increased rather than decreased with increases in supplies and/or they actually rose over time (in deflated terms). Month to month changes in white potato shipments in MM #1 compared with average monthly gross revenues per kg during 1979 indicate mixed results (Table V.3). Still, average gross revenues per kg generally went down

Table V.3. Monthly shipments of white potatoes and estimated revenues of Lima wholesalers, 1979.

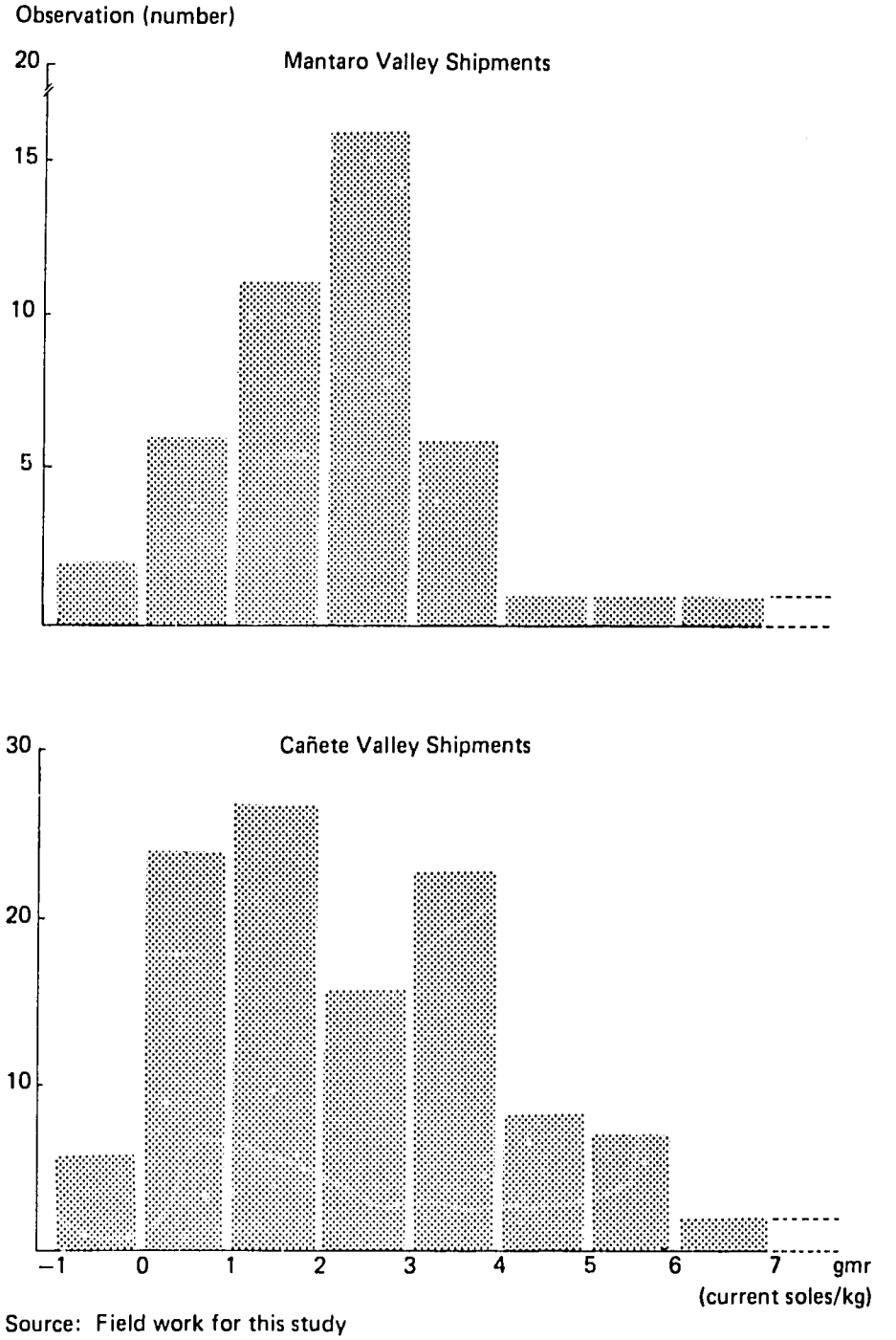
Month	White potato shipments (1000 t)	n[1]	Nominal average gross revenue (*soles*/kg)	Deflated average gross revenue[2] (*soles*/kg)
January	11.2	3	1.08	1.40
February	10.1	5	1.61	1.97
March	12.5	5	2.52	2.94
April	13.3	11	2.28	2.53
May	13.9	8	1.91	2.05
June	11.2	6	2.55	2.66
July	13.4	21	3.62	3.51
August	17.9	30	2.33	2.19
September	18.2	43	2.55	2.31
October	15.8	17	1.38	1.20
November	12.5	8	1.47	1.22
December	11.6	n.a.	n.a.	n.a.

n.a. not available.

[1]Number of wholesaler transactions used to estimate wholesaler gross revenue per kg.

[2]Nominal gross revenues adjusted by consumer price index (Table A.26).

Source: White potato shipments (Table A.17), revenues elaborated for this study.



Source: Field work for this study

Figure V.2. Lima wholesalers: gross marketing revenues (gmr) (*soles* per kg) for potatoes shipped in 1979.

with increases in supplies and up with declines. Similarly, deflated gross revenues fluctuated rather than increased during 1979. The issue of changes in deflated (versus current) wholesalers' average gross revenues probably needs a longer time frame to detect genuine shifts.

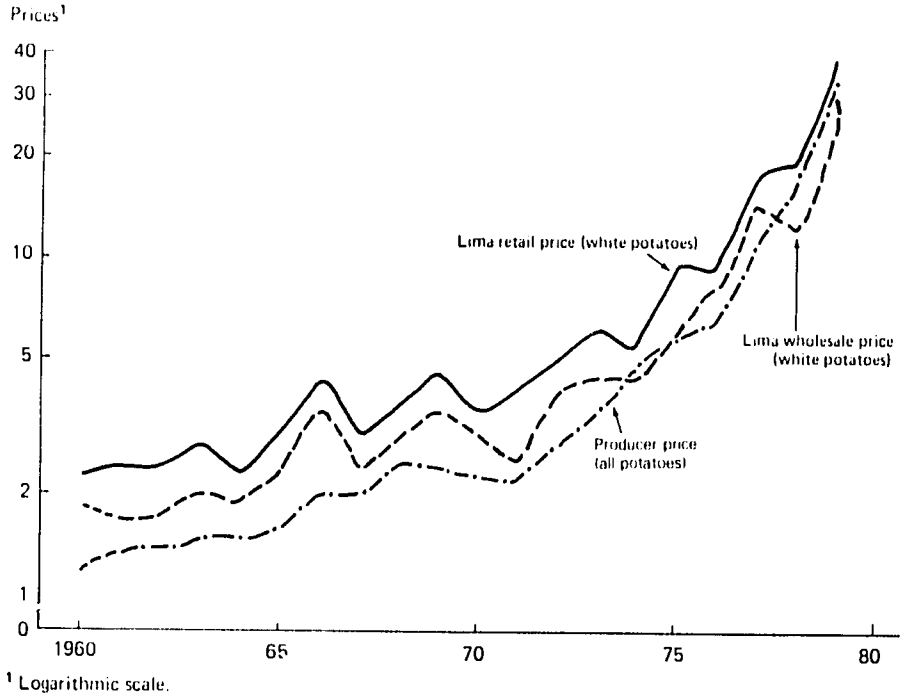
Annual statistics on potato marketing margins do not exist. However, it is sometimes suggested that these margins increased over time because wholesale prices increased as producer prices declined. What, in fact, happened to producer versus wholesale potatoes prices between 1960 and 1979?

A 20-year comparison of annual average potato prices received by producers (see Fano 1983) with those received by Lima wholesalers (Table A.5) indicates three things (Figure V.3). First, there are the traditional data problems present in comparing averages. For example, in certain years producer prices appear higher than those of Lima wholesalers. Second, a general tendency exists for these prices to rise together. Third, producer prices tended to climb at a faster rate than wholesale prices. In other words, the only available data fail to show a growing gap between producer and wholesaler prices so often assumed to exist.

Net Revenues

Average monthly net revenues per kg for Lima wholesalers varied during 1979 (Table V.4). Although wholesalers had negative net revenues in certain months, they probably just undervalued their own labor in such instances to at least break even. Average net revenues per kg therefore were .76 current *soles* calculated by simple arithmetic average or .789 *soles* calculated as a weighted average.

Figure V.3. Average annual potato prices received by Lima retailers, Lima wholesalers and producers (Peru average): 1960-79.



[1] Logarithmic scale.

Source: Retail and wholesale prices (Table A.15, A.16), Producer prices (Fano 1983).

Table V.4. Monthly estimated revenues and costs (*soles*/kg) of Lima wholesalers, 1979.

Month	Gross revenues	Costs	Net revenues
January	1.08	1.25	-.17
February	1.61	1.26	.35
March	2.52	1.13	1.39
April	2.28	1.18	1.10
May	1.91	1.22	.69
June	2.55	1.33	1.22
July	3.62	1.34	2.28
August	2.33	1.30	1.03
September	2.55	1.26	1.29
October	1.38	1.51	-.19
November	1.47	2.11	-.64
December	n.a.	n.a.	n.a.

n.a. = not available.
Source: Gross revenues (Tables V.3); costs (Table V.2).

Based on these calculations, five observations about wholesalers' net revenues are:

First, Lima wholesalers' net revenues were less per kg than most medium and large producers in the Mantaro Valley and nearly all production units in the Cañete Valley. Hence, in spite of prevailing barriers to entry into Lima potato wholesaling, established wholesalers lacked the alleged market power "to fix" prices so as to capture producers' net revenues themselves.

Second, some observers might contend these results are only valid for a particular year. One study of the terms of trade for potato producers during the last decade (Martínez and Tealdo 1982: 92-95) implies that producers' revenues were, in fact, unusually favorable in 1979. However, this same study demonstrates that prices were also favorable in 1974, 1975, 1977, and 1980 for Sierra producers and in 1977 for coastal growers. The variability in producers' revenues thus suggests that growers are not perennially subjected to the market power of rural and/or urban monopsonists. If this were the case, then these monopsonists would force down growers' prices so as to capture themselves benefits of annual price movements. Available information instead points to the impact of other, more important factors such as input costs, supply and demand conditions on grower returns to potato production.

Third, these figures may actually underestimate Lima wholesalers' net revenues because they over-estimate their costs. Dolorier (1975), for example, implicitly assumes that Lima wholesalers have no capital costs and have daily unit labor costs below the prevailing minimum wage. Even adopting these assumptions (and ignoring all others), net revenues of Lima wholesalers still average about 1.2 current *soles* per kg or, again, less than revenues of most commercial growers in the Mantaro and Cañete Valleys. However, Dolorier also assumes a higher shrinkage rate (1.5%) than does this study. Thus, his lower labor costs raise net revenues, but his higher shrinkage costs lower them. Furthermore,

although he observes that Lima wholesalers frequently buy potatoes on short-term credit—hence the absence of capital costs—he also notes that they work with their own capital to meet day-to-day expenses (op. cit.: 83-89, 128-130), implying that they do have some capital costs as suggested here. Consequently the wholesalers' principal basis for higher revenues is paying themselves, and possibly other family members, a lower daily wage.

Fourth, while net revenues per kg for Lima wholesalers were negligible, their total revenues for 1979 were roughly 220 million *soles*.[26] This total averages 84.000 *soles* per wholesaler per month. If one assumes that Lima wholesalers have no other operating expenses, such as trips to the countryside, and that their return to management equals the minimum monthly salary, about 35,000 *soles*, then their return to capital is about 50,000 *soles* or 60% per year.[27]

Fifth, average net revenues for Lima wholesalers constituted some 2% of the average monthly retail price for white potatoes in 1979 (Table A.16). Therefore, these net revenues had a negligible impact on consumer prices.

(ii) Lima Retailers' Revenues

Average retailer gross marketing revenues per kg ranged between 5 and 8 current *soles* during 1979 (Table V.5). Different sources, however, indicate different average revenues in each month and over time, particularly during the year's last quarter. Most differences are minor. They result from different methodologies used to measure wholesale and retail white potato prices as well as the actual prices being measured. For example, Lima supermarket prices are those charged by particular wholesalers in particular sales; SIMAP's average wholesale prices

Table V.5. Monthly average wholesale prices (*soles*/kg) of white potatoes and estimated revenues (*soles*/kg) of Lima retailers, 1979.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average wholesale price by source:												
INE	26	27	29	29	30	30	32	30	25	25	25	53
SIMAP	26	29	29	30	30	30	32	30	30	35	51	60
Lima supermarket	27	28	29	30	30	29	32	30	30	32	41	42
$\bar{X}$	26.3	28.0	29.0	29.7	30.0	29.7	32.0	30.0	28.3	30.7	39.0	51.7
Retailers' gross revenues by source:												
INE-INE[1]	8	8	5	6	6	5	5	6	11	12	34	11
SIMAP -INE[2]	8	6	5	5	6	5	5	6	6	3	8	1
Lima supermarket[3]	6	5	5	5	5	6	5	7	5	5	5	4
$\bar{X}$	8.0	6.3	5.0	5.3	5.6	5.3	5.0	6.3	7.3	6.7	15.7	5.3
% wholesale price	28	22	18	19	18	18	16	21	26	24	55	11

[1]INE wholesale price (Table A.15) less INE retail price (Table A.16).
[2]INE retail price less SIMAP wholesale price.
[3]Wholesale price paid less retail price charged.
Source: INE, SIMAP, and records of Lima supermarket.

are based on those charged by a representative group of wholesalers to the general public.

Large discrepancies between sources at the end of the year are more difficult to explain. The supermarket's wholesale price in November was partly based on purchases from a regular wholesale supplier and partly on purchases from ENCI at an official fixed price. However, INE wholesale prices for September, October, and November were below those received by Cañete Valley growers who were interviewed for this study. Consequently, INE prices tend to exaggerate retailers' gross marketing revenues.

Although an exhaustive treatment of retailer gross revenues is beyond the scope of this study and this stage of the marketing channel is not among principal topics for examination, two observations are in order:

First, if Lima wholesalers' control producer-consumer potato marketing channels, then they might attempt to receive larger gross revenues than Lima retailers. Higher gross revenues, all other things being equal, mean larger gross marketing margins and the possibility of higher profits per kg. Still, gross revenues of Lima retailers were nearly always higher than those of Lima wholesalers (Table V.5). Similar results are reported by Shepherd (1967:18), for 1965, Graber (1974:55-57) for 1967-71, Egoavil (1976:67) for 1974, and Watson et al. for 1975 (1976:221/5). By deducting transport costs and rural assemblers charges as well as producer prices from wholesale prices—all reported by Sánchez (1960:37, 39, 72-86)—then retailer gross revenues exceeded those of Lima wholesalers in 1960 as well.[28]

Second, do wholesalers "fix" retailers' gross revenues in that, for example, as one increases the other increases? Available 1979 data indicate that wholesale prices and retail gross revenues sometimes increase together but, generally move in opposite directions. Other factors besides wholesale prices influence retailers' gross revenues.[29] Factors include: consumer willingness to pay higher potato prices, competition among retailers, sales volume of products other than potatoes, and retailers' opportunity cost of labor.

5.5. Summary

In spite of its critical importance, domestic food marketing in Lima has not generated an abundance of publications. Although the limited available literature makes claims about Lima wholesalers' marketing margins, they contain little evidence to justify their assertions. This chapter analyzed potato wholesaling and retailing. In so doing, it considered various arguments presented to demonstrate that Lima potato wholesalers' earn excessive margins.

One argument suggests that through "monopoly control"—a small number of independent wholesalers, a skewed distribution of yearly volumes handled, and barriers to entry—wholesalers receive excessive margins. Evidence is scarce on numbers of independent potato wholesalers in Lima and annual volumes traded by each. While the number of wholesalers apparently declined during the last two decades, it remained over 200 by the late 1970s. Available statistics on tubers sold by each wholesaler in MM #1 are imprecise. Still, they fail to show a few wholesalers make nearly all sales. Available estimates indicate an opposite tendency. Furthermore, existing barriers to entry into potato wholesaling in 1979 resulted more from official decisions than alleged market power of wholesalers.

Another argument claims wholesalers' exorbitant margins are a consequence of unfair trade arrangements. In other words, wholesalers allegedly use procurement practices, such as buying potatoes at the farm gate, or buying procedures, such as providing production credit, to inflate margins. However, results presented in this chapter confirm findings in Chapter III and IV. Wholesalers buy most of their potatoes in Lima. In addition, they generally purchase potatoes for cash, hence seldom provide production credit.

A final argument infers wholesalers' margins are excessive from producer-wholesale price differentials and allegedly negligible wholesaler costs, yet a detailed comparison of over 100 producer-wholesale prices for this study found most differences were less than 3 *soles* per kg in 1979. A few producer-wholesaler price differences were unusually high. But, gross revenues per kg were smaller for wholesalers than for retailers. In 1979 and various other years for which data are available. Moreover, average marketing revenues per kg were smaller for Lima wholesalers than for most commercial producers (in either the Mantaro or Cañete Valleys) or rural assemblers. Finally, net margins for Lima wholesalers were 2% of the consumer price.

Notes

[1] Previous references to Lima's potato wholesale trade and/or Lima's wholesale market (La Parada) are found in: IDS (1954:160), Sánchez (1960), CONAP (1967), Patch (1967), Shepherd (1967), Bustamante y Williams y Asociados (1972), Graber (1974), Medina et al. (1974), Dolorier (1975), Egoavil (1976), Watson et al. (1976), Santos (1976), Esculíes et al. (1977), MAA-DGC (1979, 1980, 1981e), Spliet (1981), Scott (1981, 1982), Fort (1982); Martínez and Tealdo (1982).

[2] Historical information on Lima's wholesale (potato) trade is in Dolorier (1975: 46-47) CONAP (1967), Bustamante y Williams y Asociados (1972), and Medina et a' (1974: 12-14).

[3] *Resolucion Prefectural de Lima* #6 of October 25, 1971 was the legislation which was repealed in 1980.

[4] Based on conversation with MM #1 administrative personnel. See Medina et al. 1974 (13-14) for additional details about regulations which affect the organization of trade.

[5] Some stall occupants sell potatoes in such small quantities that they function more as retailers than as wholesalers. Other studies (CONAP 1967, Dolorier 1975) have also noted the difficulty of determining how many stalls serve as retail rather than wholesale outlets. Market administrators report some stall occupants work for others.

[6] MM #1 data indicate that about 75% of all tubers entering the market are potatoes (Medina et al. 1974:44). Larger volume tuber wholesalers handle primarily potatoes (Dolorier 1975: 72-74). Market records for more recent years indicate this tendency still prevails.

[7] Some ministry personnel claim that tuber unloads in the market are not a true indicator of the distribution of volumes among MM #1 wholesalers because large volume wholesalers sell some of their potatoes to small volume wholesalers before they enter the market (see also Esculíes et al. 1977:59). Hence, true volumes are not reflected in statistics on potato shipments received in MM #1. Graber (1974:52) reports such sales. However, Dolorier (1975:122) observes that actual redistribution takes place after the potatoes enter the market and are registered as received by the large volume wholesalers.

[8] This observation is based on conversations in 1979 and 1980 with MM #1 administrative personnel. Moreover, potato volume data indicate continued presence of six specific merchants among the 10 largest each year from 1972 to 1977.

[9] This observation is based on statements by ministry personnel who participated in an official commission to improve market organization during 1978.

[10] Prior to the revocation of this resolution in 1980, some trucks hauling potatoes entered Lima's municipal markets illegally. However, farmers and traders were reluctant to do this

either for fear of fines and confiscation of their potatoes or for the logistical problems associated with selling potatoes in small lots directly to retailers. Other trucks passed through MM #1 without unloading by obtaining a special pass from ministry offices in Lima which allowed them to do so. Still, even with this pass, MM #1 adminstrators reserved the right to force unloading in the market if supplies were limited. No estimates are available on the quantity of potatoes that enters Lima but does not pass through MM #1.

[11] Established potato wholesalers are extended credit by producers or by other wholesalers (Dolorier 1975: 84-86) or they rely on their own capital (Medina et al. 1974:57-58).

[12] Agrarian Bank records show that these funds normally go to finance coffee marketing in the Selva (see Scott 1981:389 and Salaverry 1983:164).

[13] Interviews with market administrative personnel and supermarket purchasing agents confirm that some potato wholesalers trade other agricultural commodities outside MM #1.

[14] This type of service function is epitomized by the Lima wholesaler, who, according to supermarket representatives contacted for this study, (1) had potatoes to sell when many other wholesalers did not, (2) guaranteed the supply of at least some potatoes even in period of seasonal shortage, (3) delivered potatoes to supermarket warehouses, (4) sold them at a discount for larger volumes, (5) agreed to wait 15 days for payment with no interest charge, and (6) would replace damaged or inferior potatoes.

[15] Limited stall space and storage facilities in MM #1 discourage these activities.

[16] This and the following sections rely heavily on Dolorier (1975) and Graber (1974). While their findings were for the early 1970s, they were substantiated by informal interviews with ministry personnel, market administrators and individual wholesalers during 1979 and 1980. These studies indicate a large wholesaler sells more than 240 tons per month, a medium wholesaler 100 to 240 tons, and a small wholesaler less than 100 ton.

[17] A key distinction between these buying procedures is when the buying price is fixed in relation to the transfer of goods and timing of payment. For example, when wholesalers pay cash in a farmer's field, a buying price is finalized at the moment the potatoes are received and payment made. In cases of production credit or an advance at harvest, wholesalers make (some) payment before they receive the potatoes and/or establish a purchase price. A consignment or a commission purchase is for payment after potatoes have been delivered and sold. The former purchase is at no pre-determined price, but whatever wholesalers can sell the potatoes for minus their costs and profits. The latter purchase is for a fixed or approximate price agreed upon prior to actual transfer of potatoes.

[18] These costs are only for potato sales. It is assumed that total costs would be higher if costs for marketing sweet potatoes and *olluco* were included in this calculation (for example, shrinkage costs would increase).

[19] This loss refers to weight loss or spoilage in the market itself. Medina et al. (1974:59) estimates this at about 1.5%, Dolorier (1975: 116-177) at roughly 1%, Watson et al. (1976) at 2%. Average daily unloads are assumed to be total unloads divided by 2.5 wholesalers, divided by 365 days. The value given shrinkage costs is the average price for white potatoes, based on monthly wholesale price data from SIMAP. Implicit in all these calculations is the assumption that cost of shrinkage is roughly equivalent for white, colored, and yellow potatoes.

[20] Average daily shipments per wholesalers are calculated by dividing total monthly potato shipments by days in the month and by the number of potato wholesalers (215).

[21] Large-volume wholesalers employ more assistants than small-volume wholesalers because of added responsibilities involved in handling more potatoes.

[22] Retailers are among the most understudied participants in the marketing chain connecting producers and consumers. General references to this topic include: Ferroni (1976: 66-67), Esculíes et al. (1977: 89-124), Rubio (1977:296-301), Geng (1979) and Babb (1982).

[23] Industrial processing of potatoes for food or non-food use is negligible in Peru (MADGAG 1982:28-34).

[24] In the Mantaro Valley case, comparisons included Huancayo wholesale market prices and prices in Lima.

[25] A series of checks ensured accuracy of these figures. For example, in the Mantaro Valley estimates were calculated by using the price in the field one day plus freight to the capital and the price in Lima's MM #1 the next day. Producer prices were taken directly from on-farm interviews. Growers' estimates of freight rates were checked against information recorded in the survey of potato truckers. In the Cañete Valley, a similar checking procedure was used. However, in this instance,

average charges for rural assembly were added to producer prices. In Lima, SIMAP records of daily prices for No. 1 grade white potatoes were checked against the study's own twice weekly, year-long survey of wholesale potato prices.

Interestingly, the slight difference between prices nearly always reflected different times the two prices were collected and the seasonal supply-demand for potatoes.

[26] This estimate was calculated by multiplying total shipments of all potatoes to MM #1 (Table A.14) by .99 (to allow for shrinkage) and then by .79 per kg.

[27] This minimum monthly salary estimate is based on Ministry of Labor estimates. It differs from figures used for Cañete rural assemblers because it covers the entire year.

[28] Sánchez (1960) exaggerates the wholesalers "margin" by not subtracting trucking costs and rural assembler charges from the difference between producer and wholesale prices.

[29] See Chapter VI and O'Phelan (1984) for a discussion of retail price formation in Lima.

CHAPTER VI

6. Potato Consumption and Demand in Lima

Introduction

Previous chapters focused on commonly held assumptions about rural potato assembly and Lima potato wholesalers' marketing margins. This chapter assesses the commonly held assumption that potato consumption declined in Lima during the 1970s. The chapter also examines the following explanations for the alleged decline in potato consumption in the capital:

- Potato prices increased rapidly over the period 1960-79.
- Low-income households, in particular, consumed progressively less potatoes.
- Seasonal movements of potato prices became more erratic.
- People increasingly substituted rice for potatoes because rice had become cheaper.

These issues are considered in light of available statistics, earlier research, and statistical work done especially for this study. The chapter begins with a review of statistics on potato consumption in the capital. It then gives reasons for the changes in potato consumption by considering factors such as availability of potatoes, potato prices, prices for other foods, and income levels. The chapter also reviews estimates of price and income elasticities of demand for potatoes. As will be shown below, neither the commonly held assumption about declining potato consumption nor related explanations are supported by available evidence.

6.1 Estimates of Potato Consumption

Two sets of information are available to estimate potato consumption in Lima: household budget surveys and annual potato shipments to the capital. Household budget surveys provide the more precise estimate of potato consumption. Their major disadvantage is that they are undertaken infrequently and, therefore, are not ideal for detecting trends in potato consumption. Moreover, the methodology employed may vary from study to study; hence, even relatively precise estimates must be compared with caution.

In contrast, annual potato shipments provide a comparable statistic for many years in succession. Their drawback, however, is the imprecise relationship between such shipments and actual consumption levels. No one really knows how many of the potatoes shipped to Lima are consumed by local residents, lost in spoilage or shipped somewhere else for sale as food or for use as seed. Both sets of estimates are now presented as together they offer a more complete picture of changes in potato consumption in Lima.

(i) Household Surveys

What, in fact, has been the level of potato consumption in Lima? According to Hopkins (1981:152), Rose Ugarte estimated annual potato consumption in 1943-44 at 43 kg. per capita. More recent research found that it was 45 kg in 1971-72. Consumption levels then fluctuated for the remainder of the decade (Table VI.1). The method, coverage, and frequency of these studies do not allow for precise comparisons. Nevertheless, potato consumption in Lima did not decline throughout the 1970s. Rather, despite the fluctuations, available evidence suggests the level of annual per capita potato consumption was higher at the end of the decade than at the beginning.

Table VI.1. Estimated potato and rice consumption in Lima: selected years.

	Potatoes		Rice	
Year	Average annual consumption (kg/capita)	Share of diet (%)	Average annual consumption (kg/capita)	Share of average diet (%)
1943-44	43	9.5	39	8.6
1971-72	45[1]	12.2	32[2]	8.6
1976	46[3]	13.1	33[3]	9.3
	57[4]	18.9	35[4]	11.4
1977	38[3]	11.1	29[3]	8.4
	51[4]	16.1	36[4]	11.3
1978	45[3]	12.4	30[3]	8.1
	53[4]	17.9	34[4]	11.3
1979	51[3]	13.7	36[3]	9.8
	52[4]	17.5	36[4]	12.2
1980	48[4]	16.4	39[4]	13.4

[1]Disaggregate figures for potato consumption in 1971-72 are: high income consumers 36.9 kg; middle income consumers 46.0 kg; low income customers 47.2.

[2]Disaggregate figures for rice consumption in 1971-72 are high income consumers 27.8 kg; middle income consumers 34.7 kg; low income consumers 31.2 kg.

[3]Figures are for middle income consumers. Annual estimates based on average daily family consumption multiplied by 360 days and divided by average family size.

[4]Figures are for low income consumers. See previous note for how estimates were calculated.

Source: 1943-44 (Rose Ugarte 1945, as cited in Hopkins 1981:152); 1971-72 (Convenio MEF-MA 1975); 1976-77 (MAA-OSEI 1978b); 1978-79 (MAA-OSEI unpublished statistics); 1980 (ENHI unpublished statistics).

Note: Potato consumption figures in 1943-44 are for "potatoes" in general; for all other years, the figures are for white, colored, and yellow potatoes as well as *chuño*.

Rice consumption figures in 1943-44 are for "rice" in general; in 1971-72, 1976, 1977, 1978 and 1979 for regular and fine rice; and in 1980 for regular rice only.

Share of diet equals kg of potatoes (or rice) consumed divided by total kg of food consumed.

1943-44 estimates based on figures for the department of Lima, see Rose Ugarte (1945) as cited in Hopkins (1981: 151-156).

Figures for 1978 are based on January to June only.

Mother nursing baby while eating potatoes in Lima. (Photo by Poats).

These same consumption studies also suggest that potatoes increased their share in the average diet (Table VI.1). Again this result must be interpreted with caution because the various studies appear to have designated a somewhat different set of foods for measuring the diet. Rose Ugarte estimated that average total food consumption in 1943-44 was 453 kg per year (Hopkins 1981:154), notably higher than the 315 kg in 1977 reported by Ministry of Agriculture (MOA) surveys of low income households (MAA OSEI-1978b)[1]. Nevertheless, the growing relative importance of potatoes in the diet is consistent with the modest increase in potato consumption.

Did Lima consumers substitute rice for potatoes during the last decade? Substitution of one for the other certainly seems plausible for both rice and potatoes are starchy staples. Migrants from the Sierra during this period probably consumed relatively less potatoes and more rice in the capital than they had in the provinces. Available information indicates, however, that Lima consumers generally consumed more of both products over the period 1971-80 (Table VI.1). In some years, such as 1977, potato consumption by low income consumers fell slightly and rice consumption rose; in other years (1978) just the opposite occurred. Creed de Kanashiro (1982: 476-477) also has noted a decline in rice consumption and a slight increase in potato utilization among a group of particularly poor households in the capital. Still, the general tendency was for increased consumption of both foods.

It also is sometimes contended that low income Lima consumers progressively consumed less potatoes over the last several years. If one considers the unusually high consumption of 1976 as the base year, then potato consumption did drop slightly in the ensuing 4 years among that group of households (Table VI.1). Still,

average annual potato consumption among low income consumers was slightly higher (50 kg) in 1979-80 than in 1971-72 (47.2 kg). Moreover, in each year for which data are available low income consumers ate more potatoes than middle income consumers. In other words, poorer Lima households ate *more, not less* potatoes than their higher income counterparts and their level of potato consumption remained high during the 1970s.

(ii) Potato Shipments to Lima

Estimates of annual per capita availability in Lima also suggests that potato consumption in the capital increased during the last 30 years (Table VI.2). While these estimates vary, reflecting in part yearly changes in potato production, they offer a more complete long-term picture of estimated potato consumption than infrequent household budget surveys. Furthermore, although these estimates generally exceed those based on household budget surveys, they do provide additional evidence that the recent trend in potato consumption has been upward.[2]

Data on per capita availability indicate an additional trend that remains obscured in the consumption statistics of recent household surveys.[3] Results of these surveys frequently group all types of potatoes together while potato availability, hence consumption, appears to have become more diversified in the last 10 years. Annual shipments now include a substantial quantity of colored, as well as white and yellow potatoes (Table A.14). The shift in availability to some extent represents improved record keeping. Statisticians no longer classify all types of potatoes that enter the MM #1 as simply white potatoes. Moreover,

Produce stall inside district retail market in Lima. (Photo by Espinoza).

Table VI.2. Estimated annual availability (kg/capita) of different potatoes in Lima: 1951-79.[1]

Year	Type of Potato			Total
	White	Yellow	Other	
1951	34.0	0.7	n.a.	34.7
1952	40.7	1.2	n.a.	41.8
1953	43.9	.6	n.a.	44.5
1954	37.1	3.4	n.a.	40.5
1955	44.8	2.1	n.a.	46.9
1956	45.6	1.8	n.a.	47.4
1957	45.3	1.3	n.a.	46.5
1958	46.3	1.5	n.a.	47.8
1959	42.7	1.4	n.a.	44.1
1960	43.6	1.4	n.a.	44.9
1961	44.1	1.3	n.a.	45.4
1962	39.8	.8	n.a.	40.6
1963	40.6	.9	n.a.	41.4
1964	57.8	2.1	n.a.	59.9
1965	55.5	1.0	n.a.	56.5
1966	52.8	.5	n.a.	53.3
1967	59.1	.5	n.a.	59.6
1968	53.5	.4	n.a.	53.9
1969	57.7	1.1	n.a.	58.8
1970	63.0	1.5	n.a.	64.6
1971	61.0	2.8	8.6	72.2
1972	30.2	4.3	14.2	48.6
1973	29.5	3.2	20.0	52.8
1974	36.7	2.4	21.5	62.0
1975	25.7	4.4	30.1	60.1
1976	34.9	2.3	31.8	69.0
1977	22.9	2.5	33.6	59.0
1978	34.6	2.1	35.5	72.3
1979	37.9	1.5	25.4	65.0

n.a. = not available

[1]Total annual potato unloads in Lima's MM#1 divided by estimated population for Metropolitan Lima. For the period 1951-59 estimated population was derived using data for 1940 and annual growth rate of 5.1% (INE 1981:26). For the period 1960-79 estimated population is based on figures for month of June listed in Table A.28.

Source: Potato shipments (Table A.14); Population (INE 1981, A.28, see note above).

Monares (1981:44-54) has pointed out the numerous new potato varieties that have been released by Peruvian scientists during the last 30 years. Many of these potatoes have achieved major commercial importance (Table A.8). Consequently, Lima consumers not only ate more potatoes in the 1970s, but also more of different types of potatoes.

A similar revision of statistics on potato shipments to the capital also tells something about the origin of potatoes now being consumed in Lima. Expansion in coastal production has been such (Table A.2) that it appears potatoes from this sub-region may have captured a rising share of the Lima market (Caballero 1984:16). A growing proportion of potatoes eaten by consumers in the capital may therefore be "large, watery, insipid potatoes" from the Coast. From August to December, traditionally months of the coastal harvest, white-skinned, hybrid potato varieties do appear to make up a disproportionate percentage of total supplies (Table VI.3). In addition, shipments of native yellow potatoes have remained fairly stable, but those of white potatoes have grown tremendously (Table A.14). Nevertheless, data for years 1960 to 1979 indicate that, in fact, potato availability continued to be evenly divided between potatoes from the Sierra and from the Coast (Table A.30).[4] Thus, the origin of potatoes being eaten by Lima consumers remained unchanged in this respect.

6.2 The Influence of Prices

While a variety of social and economic factors affect the demand for potatoes, prices have perhaps the foremost impact. Changes in current, relative, or seasonal prices for potatoes can influence the demand for this food crop. The following discussion of retail potato prices in Lima during the 1960s and 1970s addresses three basic questions:

- Did potato prices increase during the last two decades after accounting for inflation?
- Did seasons variations in potato prices become more unstable?
- Did potato prices rise faster than those of other basic foods?

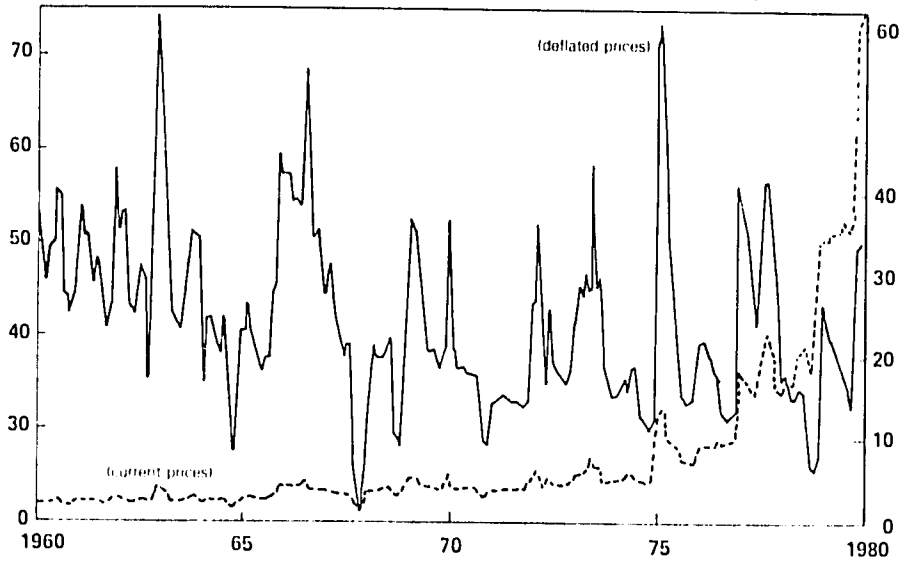
Answers to these questions help assess the influence of prices on the demand for potatoes in Lima.[5]

(i) Current vs. Deflated Prices

Current monthly retail prices for white and yellow potatoes, for example, rose spectacularly between January 1960 to December 1979 (Tables A.16 and A.19). These rising prices imply that potatoes became more expensive and—all other things being equal—demand weakened. However, retail potato prices deflated by the consumer price index demonstrated a considerably different tendency (Figure VI.1). Deflated prices drifted steadily downward from the early 1960s to the early 1970s, then rose during the late 1970s. Nevertheless, deflated retail prices for white potatoes in Lima were lower in 1979 than in 1960.

Are these trends in deflated prices consistent with findings on potato consumption and availability? Declining deflated retail prices for potatoes is compatible with the rapidly growing volume of potatoes shipped to Lima during the 1960s and early 1970s (Table A.14). Graber (1974:30) has noted that such shipments increased at an annual average rate of 9.0%, or in excess of the demand for potatoes resulting from population growth (6.0%), income changes (1.0%), and relative retail price changes (1.5%). In this sense, trends in potato prices for this period generally reflected shifts in supply and demand.

The rise in real prices for white potatoes in more recent years is explicable using similar reasoning. Lima's population continued to grow by more than 3% per year during the 1970s (INE 1981:15). Moreover, declining real incomes and shifts in relative prices (see Sections 6.3 (i) and 6.2 (ii) below, respectively) also increased the demand for potatoes. Yet, growth in white potato shipments to the capital was less robust at the end of the decade, particularly in comparison to the



Source: Tables A.16 and A.26.

Figure VI.1. Average monthly retail prices (current and deflated) of white potatoes in Lima: 1960-79.

previous decade (Table A.14). Shipments of other potatoes probably did offset this shortfall to an extent.[6] Still, it appears that as total demand for potatoes increased particularly rapidly from 1975 to 1980, total supplies grew less swiftly and prices for potatoes rose accordingly.

The evidence also shows that there were acute increases in deflated potato prices in certain months during the 1960s and 1970s (Figure VI.1). In this sense, the findings are not entirely inconsistent with the claim that potato prices rose during this period (Flores et al.1980:66). Consumers were probably especially sensitive to particularly pointed price hikes as potatoes became an increasingly important part of their food expenditures. Nevertheless, these occasional, abrupt increases did disguise the more fundamental tendency of potato prices to decline.

(ii) Seasonal Prices

Seasonal price movements adversely affect demand for potatoes in many developing countries. Is this the case in Lima? One possible scenario can be briefly stated as follows. As market surpluses increase from year to year, then potato prices become more unstable. As potato prices become more unstable, consumers purchasing patterns become increasingly disrupted. Consequently, consumers would be inclined to consume fewer potatoes and more of those foods with less variable prices. One critical question here then is: Did seasonal potato prices become more unstable as total potato shipments to Lima increased?

A comparison of seasonal indices of deflated monthly retail prices in 1960-62 with those in 1977-79 show that periodic price changes declined for white and yellow potatoes (Table VI.4).[7] In the case of white potatoes, the magnitude of the difference between highest and lowest average monthly indices within the year contracted.[8] More importantly, the coefficient of variation *(cv)* for the seasonal indices was smaller in 1977-79 than in 1960-62 for both types of potatoes at the wholesale and retail levels.[9] While the reduced variation was moderate for retail prices *(cv* = 98.01 in 1960-62 vs. 73.38 in 1977-79 for white potatoes and *cv* = 57.75 in 1960-62 = 40.96 for yellow potatoes), the decline was particularly pronounced in the case of wholesale prices for white potatoes (*cv* = 193.2 in 1960-62 vs. 28.1 in 1977-79).

The apparent narrowing of seasonal price fluctuations may merely have resulted from official efforts to dampen them. It is difficult to assess the influence of price controls and price ceilings for potatoes sold in Lima during the 1970s on the observed changes in seasonal price movements. For instance, while seasonal indices of wholesale prices for white potatoes contracted substantially, seasonal indices of wholesale volumes exhibited an opposite tendency. The coefficient of variation for volumes went from 91.2 for 1960-62 to 219.04 for 1977-79. Still, shipments of colored potatoes appear to have compensated for much of the seasonal shortage of white potatoes (Table VI.3) and stabilized prices accordingly. Moreover, retail prices for yellow potatoes *(papa amarilla)* were not controlled nearly as vigorously as those for white potatoes and seasonal movements in yellow potato retail prices also shrank. The findings on declining seasonal movements in potato prices presented above are also supported by three additional considerations.

First, many discussions of seasonal price movements for potatoes overlook the highly varied agro-ecological conditions in Peru. With a vast array of microclimates, potatoes are being harvested somewhere in the country all year long (Table A.7). These staggered harvesting dates help reduce seasonal price movements.

Second, as potato production has become more commercially oriented, particulary in the Sierra, farmers have become increasingly price conscious. Evidence from the Mantaro Valley presented in Chapter III indicated, moreover, that commercial growers tended to spread out their harvests over many months. One reason offered for this behavior was to reduce the risk of unusually low prices during traditionally peak harvest months. Alternatively, these farmers are eager to try and sell some potatoes when prices are unusually high.[10] Thus, the changing structure of the potato sector would appear partly responsible for the narrowing of seasonal price movements for potatoes in Lima during the last two decades.

Third, observations about month to month changes in potato prices are frequently made on the basis of changes in current prices. The generally high level of inflation in Lima in recent years obscures seasonal changes in real prices of potatoes. While current prices for potatoes varied considerably over the last two decades—implying seasonal prices became more unstable—deflated prices maintained a 3-year cycle (see Teutscher and Tello 1983). The regularity of this cycle is additional evidence, albeit indirect, that seasonal potato prices did not become more unstable during the 1960s and 1970s.

(iii) Relative Prices

A related question is whether Lima consumers ate fewer potatoes in the 1960s and (particularly) 1970s because potatoes became more expensive than other foods during this period? The impact of changes in the relative price of potatoes vs. other foods on consumption patterns is rather complicated. In the words of CONESTCAR (1967:57) ". . . large year to year fluctuations in relative prices make it difficult to detect reliable long run trends in relative prices." There is still the empirical question of what actually happened to relative prices for potatoes during these two decades: Did the price of potatoes increase more or less rapidly than the price of cereals?

Graber (1974:23-28) analyzed retail price movements for white potatoes versus cereals (in general), beans and lentils, vegetables, and other tubers from 1960 to 1972. His findings indicate that potato prices rose less rapidly than other foods for this 12-year period. However, the relative price of rice vs. potatoes varied considerably from 1.8 in 1964, to .9 in 1966, to 2.3 in 1968 (Table A.16 and A.23). Potato prices were particularly low in 1969-71 (Figure VI.1) due to sharp increases in production (Table A.2) and particularly large shipments to the capital (Table A.14). In addition, official rice prices were raised abruptly during 1968 (Table A.23). Graber concludes (p.23), "Even cereal prices, which to a large extent are subsidized, have increased more rapidly than potato prices."

Potato prices also rose slower than the prices for other major foods during much of the 1970s (MAA-OSP 1980a: 23-26). For example, while the index of potato prices (1972 = 100) rose from 190 to 343 for the period 1972 to 1978, the index for rice went from 150 to 425. If one begins these calculations with the unusually low potato prices of 1970-72 (Figure VI.1), then potato prices did grow

Street vender selling dish with potatoes to pedestrians in Lima. (Photo by Poats).

faster than those of rice by 1977-79. Still, in spite of this and the subsidized prices for cereal products (see Parillón et al. 1983:61-65), retail prices for potatoes were lower than for rice or for noodles at the end of the decade (Table VI.5).

Rice was not only more expensive than potatoes on a fresh per kg basis at the end of the 1970s but also was relatively more expensive than it had been 20 years previously (Table VI.5). It still might be argued that rice is a cheaper source of calories than potatoes. This was true for the period 1969-71 (Graber 1974:24). It was also the case for the late 1970s (MAA-OSP 1980a:114). However, in light of changes in relative prices during the last two decades, the relative price of 100 calories from rice vs. 100 calories from white potatoes went from .3 in 1960-62 to .37 in 1977-79.[11] This evidence contradicts the idea that people substituted rice for potatoes during the 1970s because rice became cheaper.

6.3 The Influence of Incomes

Apart from prices, incomes are the most important economic determinant of consumption patterns. The precise relationship between income levels and the consumption of particular foods, however, can vary considerably from product to product (see Apaza 1983:32-36) or even between different types of the same product. For example, in 1971-72 per capita consumption of white potatoes in Lima was highest among low income households, while per capita consumption of yellow potatoes was highest among high income households (CONVENIO MEF-MA 1975). Thus, generalizations about the influence of income levels on potato consumption in Lima are in need of more precision than may first appear. As the evolution in potato consumption has already been considered, discussion now focuses on income trends.

(i) Income Trends

While statistics on income levels in the capital are limited, monthly estimates based on Ministry of Labor data for the daily minimum wage serve as a reasonable proxy (Table A.27). These figures deflated by the consumer price index indicate that real incomes remained fairly constant from early 1960 to late 1971, then rose sharply until late 1975 (Figure VI.2). As the rate of inflation in the capital accelerated from 1975 to 1978, real incomes dropped precipitously (MAA-OSP 1980a:18). Although real incomes recovered slightly in late 1979, they remained below levels attained twenty years earlier.

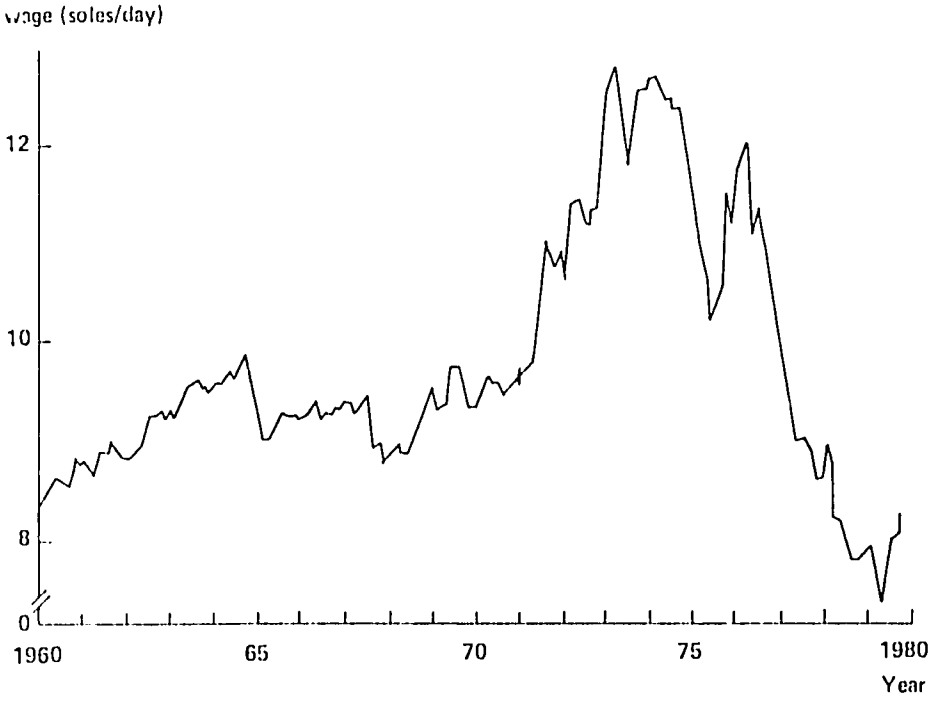
Available evidence, albeit indirect, also suggests that the incomes of low and middle income groups were especially adversely affected during the late 1970s (IBRD 1981a:12).[12] Their incomes fell steadily in relation to those of high income groups.[13] From this perspective, the decade witnessed two related income trends in Lima: average incomes declined and the distribution of income became more unequal.

(ii) Share of Budget Spent on Potatoes

How did these income changes affect consumer expenditures on potatoes? The conventional wisdom is that Lima consumers spent less on potatoes and more on other foods such as rice. A precise evaluation of food expenditures over the last 20 years is not possible. Data are not available for every year and results of the different studies conducted are not readily comparable.[14] Nevertheless, available evidence indicates that expenditures increased for potatoes, particularly for low income households.

While data presented in Table VI.6 should be interpreted with caution, it appears that potatoes occupied a more important place in the food budget in the late 1970s than in the mid 1960s or early 1970s. This trend is consistent with the

Figure VI.2. Monthly estimates of the average daily wage (deflated) in Lima: 1960-79.



Source: Tables A.26 and A.27

slight rise in potato consumption during the last decade. It also conforms to the observed tendency for real incomes to decline for the period 1975-79. In other words, consumers had more limited food budgets, they ate more potatoes, and therefore the share of the budget spent on potatoes went up.

It is also noteworthy that the potato's share of the food budget grew similar to that of rice during the late 1970s. While the figures for potato and rice expenditures 1964-65 vs. 1976-80 do not permit strict comparison, they nonetheless suggest a relatively higher share of budget was spent on potatoes for the latter period. It seems that as real incomes fell, the tendency for potato prices to increase more slowly than prices for other foods — especially from 1972 to 1978 — probably prompted consumers to buy marginally greater quantities of potatoes than of more expensive food items.

Low income households, in particular, spent more of their incomes on potatoes at the end of the last decade (Table VI.6). If real incomes declined and those of low and middle incomes consumers declined disproportionately, then low income households were especially hard pressed to meet food requirements in the late 1970s. While it may appear paradoxical that low income consumers ate more potatoes as their price went up, prices of other food products rose even faster, lowering incomes, and leaving the poorest households with less purchasing power. As a result, potatoes become a more important part of their diet and accounted for a larger percent of their food expenditures.

Table VI.3. Average shipments (tons/day) to Lima by type of potato for selected months, 1979.

	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					White Potato Shipments						
Average	382.67	408.76	447.90	459.58	399.60	443.93	581.61	625.50	533.70	450.86	419.09
S (tons/day)	74.19	76.03	89.02	97.18	89.39	125.44	218.18	187.45	193.84	216.17	217.10
					Colored Potato Shipments						
Average	387.60	371.02	395.39	351.09	350.70	328.45	236.09	327.03	238.21	157.46	168.67
S (tons/day)	74.35	66.56	80.31	67.75	65.39	103.20	81.12	94.96	121.38	60.69	81.54
					Yellow Potato Shipments						
Average	15.39	10.08	28.41	18.39	16.53	19.35	21.70	8.53	11.20	24.56	27.37
S (tons/day)	10.75	9.04	56.20	10.69	8.44	7.40	10.93	7.62	10.55	34.40	17.92
					Total Potato Shipments						
Average	785.85	792.22	868.38	829.12	776.80	791.74	839.41	960.78	783.18	672.23	634.90
S (tons/day)	134.50	122.96	168.36	140.68	106.46	202.86	256.92	248.03	268.24	259.61	297.20

Source: SIMAP.

Table VI.4. Average monthly indices of seasonal prices (yearly average = 100) for white and yellow potatoes in Lima: 1960-62 vs. 1977-79.[1]

Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					White Potato (Retail)							
1960-62	111.9	118.6	112.0	98.3	96.1	92.9	97.2	102.4	91.5	88.9	87.3	103.0
1977-79	112.6	113.1	109.2	103.5	100.3	101.5	99.9	100.5	94.7	88.6	90.1	86.3
					Yellow Potatoes (Retail)							
1960-62	100.6	96.7	96.4	95.3	93.4	91.9	95.9	95.5	101.3	109.5	118.4	104.1
1977-79	103.1	101.7	100.5	102.0	97.3	91.1	86.8	98.3	101.0	108.6	110.0	99.7
					White Potatoes (Wholesale)							
1960-62	129.0	118.6	109.1	96.3	90.7	94.0	108.1	95.4	84.6	83.6	89.4	102.5
1977-79	106.9	109.7	105.3	103.0	99.0	96.1	98.8	99.2	90.4	97.2	96.8	97.3
					Yellow Potatoes (Wholesale)							
1960-62	103.7	98.2	97.5	95.9	94.9	89.7	95.2	95.8	100.8	109.5	115.3	103.2
1977-79	100.5	107.6	102.4	102.2	94.5	93.3	91.1	94.4	98.1	110.8	106.4	99.7

[1] Price indices are based on deflated wholesale and retail prices, i.e. prices in current *soles* (Table A.15, A.16, A.18 and A.19) divided by the index of consumer prices (Table A.26).
Source: Elaborated for this study.

Table VI.5. Relative retail prices for white potatoes vs. selected food products in Lima: 1960-62 and 1977-79.

Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						White Potatoes vs. Sweet Potatoes						
1960-62	2.25	2.78	2.81	2.59	2.66	2.81	2.81	2.36	2.22	1.81	1.76	2.02
1977-79	1.49	1.52	1.55	1.56	1.62	1.60	1.70	1.84	1.74	1.58	1.63	1.52
						White Potatoes vs. Cassava						
1960-62	1.03	1.19	1.14	1.07	1.09	1.06	1.25	1.22	1.03	0.87	0.92	1.17
1977-79	1.11	1.04	1.10	1.04	1.03	1.05	1.10	1.19	1.09	0.86	0.84	0.81
						White Potatoes vs. Rice						
1960-62	0.77	0.79	0.76	0.69	0.71	0.68	0.74	0.74	0.67	0.61	0.64	0.79
1977-79	0.70	0.69	0.60	0.59	0.60	0.60	0.55	0.60	0.60	0.60	0.57	0.62
						White Potatoes vs. Noodles						
1960-62	0.50	0.48	0.47	0.43	0.43	0.43	0.46	0.46	0.42	0.38	0.39	0.46
1977-79	0.50	0.44	0.43	0.41	0.37	0.36	0.34	0.39	0.39	0.37	0.43	0.41
						White Potatoes vs. Chicken						
1960-62	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.08
1977-79	0.12	0.11	0.12	0.11	0.11	0.11	0.11	0.10	0.10	0.11	0.11	0.10

Source: Table A.16, A.21, A.22, A.23, A.24, A.25.

Table VI.6. Estimated share (%) of food budget spent on potatoes and rice by Lima consumers: selected years.

Year	Potatoes	Rice
1964/65	3.9	7.8
1971/72	3.9	4.7
1976	7.9[1]	7.3[1]
	5.4[2]	6.2[2]
1977	9.2[1]	8.2[1]
	6.3[2]	5.9[2]
1978	7.2[1]	8.4[1]
	4.3[2]	4.9[2]
1979	8.2[1]	9.6[1]
	5.9[2]	6.6[2]
1980	10.5[2]	9.3[2]

[1]Figures are for low income consumers. See previous note for how estimates were calculated.

[2]Figures are for middle income consumers. Annual estimates based on average daily family consumption multiplied by 360 days and divided by average family size.

Source: 1965 (CONESTCAR 1969:184-186); 1971/72 (calculated on the basis of Amat y León and Curonisy 1981:217), 1976-77 (MAA-OSEI 1978b); 1978-79 (MAA-OSEI unpublished statistics); 1980 (ENHI unpublished statistics).

Note: Figures are not strictly comparable because the food budgets are defined somewhat differently. For example, 1965 figures are based on food budgets definitions which do not include alcoholic or non-alcoholic beverages or food consumed outside the home. Figures for 1971/72 are for food budgets definitions which include principal food products and "other foods."

6.4 Demand Elasticities

Several studies have used statistics on food consumption, prices and food expenditures to estimate demand elasticities for potatoes.[15] An income elasticity of demand concerns "the proportionate change in the quantity demanded of a given commodity divided by the proportionate change in income which brought it about" (Bannock et. al. 1972). Similar calculations involving potato prices and quantities as well as prices and quantities of other foods were used to estimate direct price and cross price elasticities of demand respectively. These estimates were employed to project future demand for potatoes in Lima (see CONAP 1967:159-168, 323; MAA-OSP 1980:5-18, 182; Apaza 1983:116-128, 207). Questions of particular interest here are:

- What is the effect of changes in incomes on potato consumption in Lima?
- How do changes in potato prices affect the quantities demanded?
- Do prices for rice influence the demand for potatoes?

(i) Income Elasticities

Most estimates of income elasticities of demand for potatoes in Lima are positive and less than one. This implies that — all other things being equal — for a 1% increase in real incomes, expenditures on potatoes will also increase but by

less than 1%. Still, the estimates themselves have varied (see Table A.12) because — among other things — they were calculated at different times or used different statistics to measure income and consumption.

CONAP (1967:319) lists income elasticities for various fruits and vegetables including white (.48) and yellow (.49) potatoes. These elasticities were calculated using total expenditures to estimate incomes.[16] They also represent an average for all income groups in metropolitan Lima. A similar figure — .48 for tubers — is reported in CONESTCAR (1969:44) and by Graber (1974:28). This latter estimate was an expenditure elasticity based on household surveys carried out in 1964-65.

Amat y León and Curonisy (1981:107) calculated the income elasticity of demand for potatoes at .16 for all Lima consumers. They based their calculations on results from the National Food Consumption Survey (ENCA) carried out in 1971-72. MAA-OSP (1980:33) stratified the results from the ENCA survey to compute income elasticities for low (.8), middle (-.7), and high (.04) income households. Apaza (1983:141) also used data from the ENCA survey, but disaggregated the figures for Lima households into 10 different levels of income and potato consumption. He then calculated an income elasticity of demand for potatoes in each. These elasticities are progressively lower for low (.7 to .2), middle (.2 to -.02) and high (-.1 to -.3) income levels.

Generalizations about the income elasticities of demand for potatoes based on these studies are hard to make because the data, calculations, and precise focus of each of the studies varied considerably. Still, available estimates suggest that while average income elasticities are positive, those for low and high income households are probably quite different. Those households with the lowest incomes simply have yet to satisfy all their food wants. Thus, in contrast to the behavior of high income households, low income households continue to increase their expenditures on potatoes as their incomes increase.

All of these estimates, unfortunately, are based on survey data that are at least 10 years old and that do not reflect the different income and consumption patterns of more recent times. Consequently, it is somewhat inappropriate to compare these estimates with the observed behavior of Lima consumers during the last decade. Nevertheless, as real incomes for middle and low income households fell, these households were probably pushed into low and lower income strata respectively, thereby raising the overall average income elasticity of demand for potatoes. This influence would partly explain why the projection by MAA-OSP (1980) and Apaza (1983) considerably underestimated demand for potatoes in Lima throughout the 1970s. Estimates of income elasticities based on more recent food expenditures and consumption patterns are needed to analyze effectively future demand for potatoes in the capital.

(ii) Price Elasticities

It is often suggested that prices for potatoes may rise or fall but the quantities demanded will remain fairly stable (see Eastman 1977:22). In economic jargon, the direct price elasticity of demand, that is, the proportional change in quantity demanded divided by the proportional change in price for potatoes, is said to be equal or close to zero. This may be true for some parts of Peru. Yet, the weight of the evidence suggests a rather different conclusion in the case of Lima.

Most estimates of the direct price elasticity of demand for potatoes in Lima are greater than -.6, which implies a change in price does affect the quantity demand-

ed. CONESTCAR (1969:175-177) estimated average direct price elasticities in 1964 for five principal cities using data from household expenditure surveys. This estimate (-.96) was for tubers. Graber (1974:28) reports the same result.

MAA-OSP (1980:36-47) computed price elasticities for potatoes in general for various household income levels in Lima. They stratified data from the 1971-72 ENCA survey into high, medium, and low income families, then estimated a direct price elasticity of demand for each. These estimates were -.129 .067 and .091 for high, medium, and low income households respectively. The positive sign of the elasticities for medium and low income households seems incongruous — the price of potatoes rises and the demand for potatoes increases. However, both statistics are close to zero. Thus, in 1971-72 when real incomes were relatively high (Figure VI.2) and deflated retail prices for potatoes relatively low (Figure VI.1), a change in prices for potatoes may, in fact, have had little impact on the quantity demanded.

Graber (1974:28) cites the findings of a study of annual time series data for 1960-71 which generated an estimate of the direct price elasticity of demand for potatoes equal to -.49. Shepherd et al. (1969:20-21) plotted monthly quanitites of potatoes shipped to Lima and wholesale prices for white potatoes from years 1958 to 1968 to estimate a direct place elasticity of demand of roughly -1.0. Perea (1973:57-58) used monthly data on wholesale potato prices and unloads in Lima MM #1 to estimate annually average price elasticities of demand for potatoes for years 1960-71. These estimates varied between -1.07 and -5.29 for white potatoes.[17] Teutscher and Tello (1983:7-8) used similar data for years 1958-82.[18] They computed direct price elasticities of demand for potatoes in Lima between -.6 and -1.6.

Two observations concern these estimates of direct price elasticities of demand for potatoes in Lima. First, remarkably few studies have attempted to compute an estimate of this extremely important statistic. Furthermore, no such study has taken account of the growing importance of colored potatoes in annual Lima supplies. Without more precise knowledge of the effect of changes in potato prices on changes in the quantity demanded, storage programs and price stabilization policies — among other possible government initiatives — are severely handicapped for lack of information.

Second, available estimates are generally higher than most commonly believed. However, most of those computed used data that are now over 10 years old. The estimates of Teutscher and Tello (1983) based on long-term monthly data are less vulnerable to this type criticism. Still, these elasticities are for the wholesale level. It is not inconceivable that wholesalers and consumers respond quite differently to price changes such that the former have relatively high elasticities and the latter have relatively low elasticities. Available information suggest otherwise, but more research definitely is needed in this area.

Cross Price Elasticities

One of the most controversial issues in the area of government price policy during the last 20 years concerns the effect of subsidized prices for cereal imports on consumption of domestically produced food crops. In the case of potato consumption in Lima, the question arises whether the subsidized price for imported rice reduces the demand for potatoes? The unstated assumption behind such a question is that rice and potatoes are both starchy staples, so whichever one is cheaper will be substituted—depending as well on tastes and preferences, eating

habits, etc.—for the other. In economic jargon, this implies that the cross price elasticity of demand for rice and potatoes is positive (CONESTCAR 1969:64).

The meager evidence available on this critical issue is, in itself, surprising. Moreover, the findings suggest that the relationship between potatoes and rice in Lima diets is more complex than may often be assumed. Estimates of cross price elasticities calculated by CONESTCAR (1969:65) using survey data on household expenditures in 1964-65 are negative (-.21) for cereals and derivatives vs. tubers and roots.[19]

MAA-OSP (1980:36-47) presents estimates of cross price elasticities which are practically zero, implying rice prices have little effect on the quantity of potatoes demanded. For high income households, the cross price elasticity of rice vs. potatoes is negative -.017 and for other cereal products also negative or close to zero.[20] For middle and low income consumers, the cross price elasticity is positive: .044 and .063 respectively. In the case of low income households in particular, the figure for rice is considerably lower than that for wheat grain (.231), sweet potatoes (.235), or cassava (.240). These estimates are based on ENCA survey data and therefore indicate that in 1971-72 other cereals or root crops—not rice—served as substitutes for potatoes. Conversely, these elasticities tend to confirm the findings based on the evolution of rice and potato consumption throughout the 1970s (Section 6.1), namely, that these two foods appeared in Lima diets more as complements than as substitutes.

These cross-price elasticities are in need of revision with the changes in real incomes and relative prices during the last decade. Available estimates of cross prices elasticities nonetheless suggest rice and potatoes act more as complements than as substitutes.

6.5 Summary

While it is commonly assumed that potato consumption has declined in Lima, particularly during the 1970s, evidence presented in this chapter does not support this supposition. Data from household budget surveys indicate that the level of annual per capita potato consumption was nearly the same in 1971-72 (45 kg) as in 1943-44 (43 kg). Although consumption levels moved up and down in the late 1970s, the statistics indicate most Lima residents ate more potatoes at the end of the decade than at the beginning. Estimates of annual per capita availability also suggest potato consumption in the capital increased during the last 30 years.

Changes in potato prices were largely consistent with the evolution of potato consumption from 1960 to 1979. Rapid growth in potato shipments to Lima in the 1960s and early 1970s exceeded the steady expansion of potato demand. Thus, current prices for potatoes rose, but deflated (real) prices for potatoes declined. In the late 1970s, prices for potatoes rose as shipments, especially of white potatoes, failed to meet mushrooming food requirements in the capital. Occasional sharp increases in real potato prices obscured firstly their initial steep decline and secondly the fact such prices were lower in 1977-79 than in 1960-62.

Seasonal price movements also seem to have favored greater potato consumption. Seasonal indices of monthly prices for white and yellow potatoes narrowed 1960-62 vs. 1977-79 at both the wholesale and retail level. Agro-ecological conditions — potatoes are grown and harvested year-round in Peru — and the chang-

ing structure of the potato sector appear responsible for this trend. The generally high level of inflation in the 1970s also probably clouded consumers' perceptions of actual seasonal price changes.

Trends in real incomes were especially conducive to increased potato consumption. Real incomes varied considerably from 1960 through 1979. However, they dropped precipitously from 1975 to 1978. As the rate of inflation quickened, increases in wages simply did not keep pace. The distribution of income also became more unequal. As consumers' real incomes shrank, their food budgets also contracted. Consequently, they spent more money on starchy staples such as potatoes.

The evidence does not support the view that demand for potatoes in Lima is highly inelastic. Most estimates of income and price elasticities of demand for potatoes in Lima are considerably greater than zero. These figures are now rather dated. But they are the only available results and they imply price and income changes do affect the quantity of potatoes demanded in the capital.

Notes

[1] This estimate for total annual food consumption was arrived at by multiplying average family total daily food consumption by 360 days, and then dividing this figure by average family size.

[2] A simple linear regression using estimates in Table VI.2 shows a positive slope (.9334) and R^2 = .7685.

[3] Information about white and colored potatoes is grouped together under white potatoes in the results of recent household surveys.

[4] More potatoes did come from the Coast than from the Sierra in some years, but potatoes from the former region are not steadily replacing those from the latter in the Lima market.

[5] Since colored potatoes have only recently assumed importance, historical series of colored potato prices are short and therefore not considered. Moreover, the only price series available for colored potatoes are "controlled," or official ceiling prices, as opposed to actual prices (see MAA-DGC 1980). This discussion also abstracts from the problem of different prices for different types of white potatoes, e.g. fresh vs. stored, Sierra vs. Coastal potatoes, or one variety vs. another (see Sánchez 1960:44-46, Graber 1974:61-62 for discussion of these issues.)

[6] The precise effect of colored potato shipments on white potato prices has not been explored partly for reasons mentioned in previous footnote.

[7] See Perea (1973:12-40) for discussion of seasonal indices.

[8] Other studies also show that seasonal price movements for fruits and other vegetables have been considerably greater than those for potatoes (see Perea 1973:76-80; MA-DGC 1981b).

[9] The coefficient of variation, a measure of relative dispersion, represents the square root of the standard deviation, divided by the mean and multiplied by 100 (See Perea 1973: 17-32).

[10] It is sometimes suggested that increased commercial use of storage is largely responsible for the decline in seasonal price movements for potatoes. Limited available evidence suggests farmers store few potatoes for later sale (see Werge 1977, Scott 1981:143-144, and Egoavil 1983). The aggregate impact on Lima prices of the minor quantities stored by individual peasant producers is hard to measure.

[11] These figures are based on prices in Tables A.16 and A.23 and the calculations of 3590 and 780 calories per kg of rice and potatoes respectively.

[12] This observation is based on statistics for Peru in general, but when considered in terms of additional information by region and by location (urban vs. rural) it is consistent with the facts available.

[13] For a discussion of the various factors which caused these changes in real incomes see IBRD (1981a:71-87) and MAA-OSP (1980a:16-28).

[14] Definitions of expenditures vary and the disaggregation by type of product is not always identical.

[15] One such study by Apaza (1983:32-36) includes definitions for the various demand elasticities under discussion here.

[16] These estimates are based on an early study by J.D. Cottey (1964). *Elasticidad de la demanda para el Perú.* La Molina, as cited in CONAP (1967:159).

[17] Estimates for yellow potatoes varied between 5.27 and 13.74.

[18] Unfortunately, Teutscher and Tello (1983) do not provide a definitive source for the wholesale prices of white potatoes from 1971 to 1982 which they used in their calculations.

[19] Graber (1974:28) used average annual prices for 1960 to 1971 and detected a similar (.21) cross price elasticity for fresh vegetables and potatoes.

[20] Cross price elasticities for cereals vs. potatoes are: oats (-.001), hard corn (.002), soft corn (.002), and wheat grain (.009)

CHAPTER VII

7. Summary, Conclusions and Policy Implications

Introduction

Much of the public debate about food problems in Peru during the last two decades is based on the assumption that marketing arrangements are seriously deficient. It is believed that producer incomes are low, consumer prices are high, and food shortages are created because domestic food marketing is disorganized and monopolistic. Conclusions presented in this detailed case study of potato marketing in central Peru contradict this assumption.

The conclusions offered are based on three separate claims. First, although "conventional wisdoms" about food marketing in Peru are widely accepted as factual, a search of the literature reveals that few studies have systematically investigated this topic. Available publications can be divided into two types: those using a technocratic approach and those using an historical approach. Surprisingly, despite their different concepts and methods, both types repeat the following observations:

- Rural assembly is disorganized and inefficient.
- Rural assemblers' margins are excessive.
- High freight rates contribute to high marketing costs.
- Exorbitant margins of Lima wholesalers inflate consumer prices.
- Potato consumption in Lima has declined partly due to higher prices.

Second, as shown in Chapter I, the studies on domestic food marketing have several weaknesses, including little evidence based on a study of actual arrangements. They generally rely instead on assumptions, inferences, or an analysis of secondary data and moreover, their conclusions are not always consistent with the evidence presented. The consensus view of domestic food marketing therefore is highly suspect. Most importantly, little is actually known about the domestic marketing of Peru's major food crops — particularly potatoes, the most important in terms of production and contribution to the diet.

Third, arguments in Chapters II to VI suggest that many popular perceptions of domestic food marketing activities may be erroneous or simply myths. A synthesis of the results presented serves as a basis for evaluating popular opinions about this topic in the case of potatoes in central Peru.

7.1 Potato Marketing in Central Peru: A Synthesis

The separate findings in each of the Chapters II-VI are now considered together to provide an integrated view of potato marketing in central Peru. The guiding thread of this discussion is the extent to which the analysis of trends in potato production, consumption, and marketing at the macro-level is consistent with the analysis of developments in potato marketing at the micro-level.

Structural Changes in the Potato Sector

Total potato production stagnated during the previous three decades according to the long term, aggregate trend. While this calculation is correct, analysis of trends by ten year intervals and by region and sub-region reveals a strikingly different picture of the potato sector. Instead of simply prolonged stagnation, there is considerable dynamism. Rather than homogenity or simplistic differentiation of the Sierra and Coast, there is remarkable variability between and within regions. Furthermore, in lieu of just the persistence of subsistence production, a variety of indicators point to the increasingly commercial orientation of the sector. Most importantly, a detailed analysis of macro-trends serves as the basis of a clearer understanding of marketing activities and their interrelation with potato production and consumption.

Production in the central Sierra, for example, rose quickly in the 1960s, then declined and eventually stagnated in the 1970s. While factors such as rising production costs discouraged increases in production in this sub-region in the last decade, potato shipments to the capital grew in absolute terms and became an increasing percentage of area output. The rise and fall of potato production in the central Sierra, therefore, concealed a steady shift from subsistence to commercial potato farming.

On the central Coast, the combination of new, high yielding varieties, existing production infrastructure, and a rapidly expanding consumer demand in Lima generated spectacular increases in potato production from the late 1940s to the late 1960s. By the mid 1970s, however, the growth rate in potato production on the central Coast slackened. Policy decisions to reduce subsidies on fertilizer and production credit were partly responsible. Year-to-year oscillations in producer prices also dispirited growers. The central Coast nevertheless still produced a rising share of national output and supplied roughly half of all the potatoes annually received in Lima's wholesale market.

Annual estimates of national potato consumption continued to be based on yearly fluctuations in domestic productions and per annum population increases. Foreign trade remained negligible. Thus, as total production leveled off in the 1970s - while population grew continuously - estimated per capita availability shrank accordingly. Nonetheless, potatoes maintained their role as the most important domestic food crop in terms of kilos, calories, and protein consumed.

Potato consumption trends in the Sierra and Coast differed considerably. As population in the Sierra grew modestly during the last two decades, regional potato production rose and fell, and potato shipments to Lima increased. Consequently, per capita availability of potatoes in the Sierra decreased. At the same time, subsidies on imported cereals served to promote consumption of potato substitutes. Shrinking supply and weakening demand together then led to declining potato consumption in the Sierra.

Potato consumption on the Coast increased slightly despite rapid population growth. Principal contributing factors on the supply side were the increase in potato availability due to growth in regional production and expansion of potato shipments from the Sierra. On the demand side, the tendency for potato prices to remain low (in part due to the growth in supply) and a propensity among the rapidly growing, urban population to spend a high share of income on basic staples stimulated potato consumption.

Various trends confirm the growing commercial orientation of potato production at the national level. Overwhelmingly subsistence regions such as the

southern Sierra declined in relative importance as commercially oriented production on the central Coast expanded its share of total output. Area planted by growers - essentially commercial producers - utilizing production credit rose in relation to total area under cultivation in potatoes. Potato shipments to Lima also increased in relation to total production.

In the central Sierra, the increase in shipments to the capital and the proliferation of daily fairs and weekly markets within the sub-region itself reflected a trend towards production for the market. On the central Coast, all producers remained market-oriented even as the agrarian structure shifted from private estates to a combination of family farms and production cooperatives.

With the decline in per capita production of potatoes and the growth in urban demand for food, various government measures sought to improve marketing of domestic food crops including potatoes. Committees to regulate prices and margins were set up, then dissolved. A government purchasing program for potatoes was begun, then discontinued. Various laws and regulations were declared, tried, then abolished. Many of these measures had minimal impact partly because government personnel lacked the training, experience, and funds necessary to carry them out (see, e.g., Medina 1985). More fundamentally, the shortage of detailed studies severely handicapped policy planning and implementation. Potato marketing consequently remained in the hands of producers, traders, and truckers around the country.

Potato Marketing in the Mantaro Valley

Potato marketing in the Mantaro Valley is characterized by several tendencies which confirm and help explain the broader trends in the central Sierra described above. Variable climatic conditions, high (relative to other food crops) and rising production costs, and the associated financial risks discourage small producers from growing potatoes. Moreover, most small producers interviewed for this study had estimated negative net revenues for potato production in 1979. This implies that small producers could buy potatoes cheaper than they could produce them and at a time when subsidized prices for imported cereals induced consumers - in this case small producers - to eat other foods.[1] In summary, a series of economic factors have pressured small farmers to reduce potato production.

The weight of the evidence from the Mantaro Valley also suggests medium and large commercial growers sell the largest share of marketable surpluses sent to Lima. In other words, potato shipments to the capital continued to increase while central Sierra production rose and fell during the 1960s and 1970s because commercial growers increased production as small producers reduced output. Three tendencies described in this study support this view.

First, the average small farmer in the Mantaro Valley sells a minor percentage of his annual potato harvest. Consequently, as small growers as a group cut back potato production for the reasons cited above, their share of total marketable surpluses probably fell accordingly.

Second, medium and large commercial growers produce a disproportionate share of all potatoes. These producers achieve higher yields than small producers because they have better access to government production credit programs, they are more likely to cultivate irrigated land, and they are more specialized in commercial potato production. Medium and large producers therefore produce large volumes of potatoes. Furthermore, they sell most of what they produce, thereby enhancing their relative percentage of marketable surpluses.

Third, most medium and large producers were encouraged to increase (as small producers were encouraged to reduce) production. On one hand, their higher yields help generate considerably lower unit production costs. On the other hand, their marketing procedures, such as selling potatoes over an extended period each growing season, also serve to raise revenues. Most medium and large growers contacted for this study had positive net returns from potato production in 1979.

These tendencies at the farm level were complemented by developments off-the-farm in the Mantaro Valley. For instance, the growing availability of larger, diesel-powered trucks facilitated larger-scale, commercial potato production for direct shipments from farmers' fields to Lima. If larger growers produced these surpluses, as is argued above, then they could be served more efficiently and directly by larger trucks. Cost estimates based on survey data gathered for this study show that larger, diesel trucks are more economical to operate than smaller, gas-powered vehicles. Survey findings also indicate that most truckers transport potatoes from the farm to Lima for growers themselves.

The evidence also highlights the importance of two principal marketing channels. Most commercial growers report selling potatoes direct to Lima wholesalers. Specialized growers with substantial surpluses combined with improved telecommunications, roads, and larger trucks reduce the need for middlemen to assemble small lots of potatoes for shipments to the capital. In addition, the spread of daily markets and fairs throughout the valley itself means small growers can conveniently sell their small lots of surplus potatoes to local buyers for local consumption.

Potato Marketing in the Cañete Valley

The overwhelmingly commercial orientation of all potato producers in the Cañete Valley also substantiates the macro-level description of potato production on the central Coast. Potato shipments to Lima from this sub-region continued to increase in 1960s and 1970s, despite changes in the organization of production. One reason for this was the numerous, new small farms had sufficient area under potato cultivation and high enough yields so as to harvest a truckload or more of marketable surplus per farm.

The highly commercial orientation of all farmers is partly a reflection of the much greater similarity across producer types — relative to the Mantaro Valley —in such things as varieties planted and access to official credit. In other words, with sufficient resources even small farms in Cañete can produce marketable surpluses. Furthermore, production cost estimates based on survey data gathered for this study show small producers were encouraged to do so because they could produce potatoes as cheaply, if not cheaper, than larger farms.

The Central Coast continued to produce roughly half of Lima's annual supply of potatoes because in places like Cañete growers maintain a tightly scheduled year-round production cycle in which potatoes remain only a part. Growers' strict self-discipline in production activities carries over into marketing operations. Potatoes are shipped to Lima in a single marketing channel characterized by a widely accepted separation of responsibilities. Growers harvest, rural assemblers grade, bag, then facilitate sale, and truckers transport potatoes.

Both producers' professional predilections and the evidence on rural assemblers' margins support the logic of the established trading pattern. The vast majority of Cañete growers prefer to let someone else market their potatoes because they would rather concentrate on production where their specialized knowledge can be most effectively applied. Furthermore, Cañete commission

agents earned relatively minor margins in 1979 and growers' percentage share of the wholesale price in Lima remained fairly constant during the last two decades.

The lower operating costs (than gas-powered vehicles) and positive net revenues of most diesel trucks on the central Coast are consistent with the findings in the central Sierra. Once again this suggests that less fuel efficient vehicles are being replaced by more economical forms of transport. In addition, the vast majority of shipments go direct from the field to Lima.

These findings on potato marketing in the Mantaro and Cañete valleys shed additional light on potato production trends in the central Sierra and central Coast. They imply that the organization of rural marketing channels and the size of rural marketing margins probably were not responsible for dampened growth rates in production during the last decade. Rather, the evidence presented is consistent with the macro-level findings that rising production costs, the shortage of technical assistance, subsidies for imported cereals (especially in the Sierra), and year-to-year changes in supply and demand conditions were the principal factors influencing the evolution of potato output in these sub-regions.

Potato Marketing in Lima

Various arguments intended to show a few traders monopolize wholesale trade in the capital are not supported by the evidence. While the number of independent potato wholesalers is not precisely known, the only available statistics indicate a broad distribution - rather than concentration - of potato shipments received by them. Thus, if the concentration of shipments would support the argument that monopoly control exists, then the broad distribution of potatoes received implies at least a potential for competition among Lima potato wholesalers. The declining number of wholesalers suggests that competitive forces drove some traders out of business.

Trade arrangements are such that few wholesalers advance growers production credit or purchase potatoes in the field in an effort to restrict producers' marketing alternatives and thereby impose prices at harvest. On the contrary, the rising importance of larger, commercial growers in the central Sierra combined with the gradual development of area trading centers suggest producers in this sub-region acquired a degree of countervailing power in price negotiations with Lima wholesalers. The modest differentials between producer and wholesale prices in the Mantaro Valley in 1979 and the parallel rise in producer and wholesale prices during the last two decades corroborate this assessment of trade arrangements.

Throughout the 1970s various government measures also constrained wholesalers' ability to set marketing margins. Ceiling wholesale prices were set weekly by the local JURPAL. "Reasonable" marketing margins were declared, if only periodically enforced. Subsidized prices for imported cereals also applied a form of indirect pressure on wholesale margins for products such as potatoes. In other words, rather than a series of measures to keep urban food prices low that affected only growers, government policy squeezed various participants in potato marketing. Certain rural assemblers in the central Sierra became expendable. Truckers with gas-powered vehicles suffered financial losses. Some Lima wholesalers went out of business.

Potato Consumption and Demand in Lima

Estimated increases in potato consumption on the Coast calculated at the macro-level are supported by statistics on per capita potato consumption in the

capital during the last several decades. The rising availability of potatoes and their modest prices were two major contributing factors. The growth in potato supplies is consistent with the earlier mentioned shifts in the orientation of production in the central Sierra combined with continued commercial production on the central Coast. Moreover, the increase in shipments received together with pressure on various marketing chain participants to improve efficiency helped maintain a low level of prices and thereby facilitate a slight increase in per capita consumption in Lima.

Potato consumption trends also appear consistent with trends in deflated incomes particularly in the late 1970s. As inflation continued to accelerate faster than wages, consumers' real incomes shrank, consequently their food budgets contracted. As a result, they spent more money on starchy staples such as potatoes.

The evidence does not support the view that demand for potatoes is highly inelastic. The only available estimates of income and price elasticities of demand for potatoes in Lima are considerably greater than zero.

Furthermore, surprisingly little is known about the effect of changes in the price of rice on potato consumption. The few estimates of the cross price elasticity of demand for these two products are consistent with the rising consumption of both staples among low income households in the last decade.

In summary, potato marketing in central Peru is best understood in the context of the evolution of production and consumption. Policies that induced shifts in the location and orientation of production as well as in the nature and level of consumption also affected marketing activities. Marketing participants were pressured to adjust their behavior or become increasingly marginalized. The end result was a set of marketing arrangements that served to reinforce prevailing production and consumption policies.

7.2 Consensus and the Evidence

To evaluate the consensus view of domestic food marketing in the case of potatoes, five important observations of earlier studies are now reconsidered. After briefly stating each and the reasons offered for it, a summary of the relevant empirical evidence is presented.

(i) Is Rural Assembly Disorganized and Inefficient?

Rural assembly of farm products is generally viewed as disorganized and inefficient. Three key reasons (or symptoms) of this are: (a) an alleged excessive numbers of traders, (b) a mis-allocation of labor and capital, and (c) a lack of technically sophisticated infrastructure. In the specific case of rural assembly for the Lima market, the consensus view sees an extended and inefficient chain of middlemen separating growers in the provinces from consumers in the capital. The present analysis of potato marketing in central Peru indicates that, in sharp contrast to the consensus view, rural assembly is highly organized.

Results of interviews with producers, Huancayo wholesalers, and truckers consistently indicate that two well-defined, albeit informal, marketing channels exist. Small growers sell their potatoes in local fairs and daily markets in one channel; medium and large growers ship most of their potatoes to Lima in the other. Interviewees responded that most potato shipments to Lima go *directly* from farmers' fields to the capital's wholesale market. Hence, there is no long, inefficient chain of market intermediaries separating Mantaro Valley growers and Lima wholesalers.

Interviews in Cañete pointed to the existence of a single, highly organized marketing channel. Nearly all of the valley's growers are commercially oriented and ship their surpluses to Lima. Ecological conditions and marketing infrastructure foster a tightly scheduled crop rotation and a sharp division of labor between producers, rural assemblers, and truckers. Potatoes are hauled direct from growers' fields to the capital.

(ii) Are Rural Assemblers' Margins Excessive?

Many studies claim that producers' incomes are low because rural assemblers' margins are excessively high, but few present estimates of margins. Instead, they usually make inferences about margins on the basis of rather sketchy reasoning about grower returns or marketing logistics. For example, rural traders are said to impose on growers prices below production costs, through provision of credit or the exercise of monopsonistic market power. Alternatively, rural traders allegedly charge high margins to cover the high operating costs of their inefficient operations.

Evidence from interviews with growers, rural assemblers, and truckers does not support the consensus view. Potato farmers in the Mantaro Valley rarely borrow money from rural traders. In fact, peasant producers seldom borrow at all because they want to avoid financial risks. Commercial growers who do use credit generally do not borrow from merchants.

In the dual structure of central Sierra potato marketing, rural traders' margins have little effect on most producers' incomes. Potatoes sold to Lima are produced mainly by medium and large-scale growers. Since these producers generally ship their own potatoes directly from the field to Lima's wholesale market, rural assemblers' margins do not affect their prices or returns. The margins of rural assemblers have only a minor impact on the incomes of small growers because these growers sell only a fraction of their harvest.

Evidence from Cañete also contradicts the consensus view on rural traders' margins. Most production co-operatives and medium-sized private growers as well as many small producers receive loans from the Agrarian Bank. Local commission agents provide inputs on credit to only a few growers. At harvest, producers generally solicit bids from, and sometimes trade with, several rural assemblers. Consequently, individual rural traders cannot impose prices and earn excessive margins.

Most Cañete growers generally leave grading, bagging, and transport to local commission agents because they consider rural assemblers' charges modest for the work involved. Average net revenues for Cañete growers in 1979 were roughly 10,000 *soles* (US$ 44.44) per ton in 1979.[2] In contrast, commission agents earned 1,000 *soles* (US$ 4.21) per ton.[3] Gross and net margins of Canete assemblers were about 13% and 3% of Lima retail prices, respectively. In contrast, gross and net margins for Cañete growers were roughly 65% and 28%.

(iii) How High Are Trucking Costs?

It is commonly believed that local monopolistic control over transportation results in high freight rates. Long distances to market, re-shipment of small lots of produce, and other technical problems are also cited as the causes of high freight rates. Evidence in Chapters III and IV does not support these views.

Some truckers (especially those with gasoline powered vehicles) lost money hauling potatoes from the central Sierra to Lima in 1979. This was due to low revenues from return journeys to the Sierra and high fuel costs. In fact, estimates

based on this study suggest many truckers made cash but on paper they were actually losing money. In other words, their estimated revenues were insufficient to pay all costs including depreciation. Although freight rates for central Sierra truckers represented 11% to 14% of the retail price of potatoes in Lima, these charges barely covered total operating expenses.

Data gathered for this study also suggest many coastal truckers lost money in 1979. Revenues from transporting goods from Lima on their return journeys were particularly low because there are no large provincial population centers near the capital that generate demand for trucking sevices. Consequently, freight rates from the countryside to Lima are the major source of revenue for the round trip. In spite of this, coastal freight rates represented less than 8% of the retail price for potatoes sold in Lima.

(iv) Are Margins of Lima Wholesalers Exorbitant?

Three possible scenarios are offered in historical and technocratic studies to support the conclusion that Lima wholesalers' margins are exorbitant. First, a few Lima wholesalers are said to monopolize the capital's potato trade by creating barriers to entry into this line of business. Second, it is argued that these wholesalers take advantage of the difference between producer and wholesale prices to reap exorbitant profits. Third, Lima wholesalers are also alleged to employ unfair trade practices.

No one knows precisely how many Lima wholesalers there are, but current estimates are on the order of *200*. It is often said that a few traders sell nearly all Lima's potatoes; but statistics on tubers sold in Lima's wholesale market indicate that sales are broadly distributed among wholesalers. Similarly, while barriers to entry into potato wholesaling create conditions for high profits, they have resulted more from previous official regulations than from wholesalers' maneuvering.

Differences between producer and wholesaler prices were generally less than 3 *soles* per kg (US$ 0.013) throughout 1979. The estimated return to capital of 60% per year was equal the prevailing inflation rate. Indices constructed from producer and wholesale prices indicate that average producer prices rose as fast or faster than prices of Lima wholesalers over the last two decades. Hence, producers' share of the retail price i.e. their marketing margin, was as large, if not larger, in the late 1970s as in the early 1960s.

Net margins for Lima wholesalers in 1979 were estimated to be less than one *sol* per kg or 2% of the consumer price, Thus, Lima wholesalers' margins had negligible impact on consumer prices for potatoes.

(v) Is Potato Consumption Falling in Lima Due to Rising Prices?

It is often stated that, in response to shrinking real (deflated) incomes and rising prices, potato consumption in Lima fell during the 1960s and 1970s. Increased price instability is also offered as a reason for declining consumption. In fact, estimated Lima potato consumption increased modestly from *43* kg per capita in 1943, to *45* kg in 1972 and to *48* kg in 1980.

Retail potato prices in Lima - calculated in real terms - fell in the 1960s then rose in the 1970s. Nevertheless, they were lower in 1977-79 than in 1960-62. Over the same period, reductions in real incomes appear to have stimulated potato consumption, particularly since 1975. Evidence from household budget surveys show that Lima families with the lowest incomes continue to consume the most potatoes.

Finally, evidence does not support the claim that persistent or increased seasonal price instability discouraged potato consumption. While monthly fluctuations in *nominal* retail potato prices in Lima increased over time, fluctuations in real prices actually fell. In other words, after deflating prices for the effect of inflation, seasonal prices actually became slightly more stable in recent years.

7.3 Policy Implications

Two types of policy implications emerge from this study: one directed at marketing research in general, and the other specifically at the potato sector.

More studies need to be made on domestic food marketing because of the dearth of information, so that policy makers can improve future decision-making. This problem is by no means peculiar to Peru. Rather, it merely reflects the situation in many developing countries where, given the shortage of reliable data and the limited amount of previous literature, the internal marketing of locally produced food crops has been largely overlooked by researchers.

This present study was only on potatoes and only in central Peru. The number of farmers interviewed was small, and retailing in Lima was largely overlooked. In order to promote the same advances sought by production research, a policy decision is needed to institutionalize marketing research within the Ministry of Agriculture.

A policy decision also has to be made as to which type of marketing research should be carried out. Much marketing research of possible policy relevance is devoted almost entirely to proposing elaborate, often technically sophisticated alternatives (see, e.g., Watson 1975) without first understanding how and why actual marketing take place. This approach seems doubly inappropriate. First, it often erroneously assumes that certain marketing problems exist. Second, it assumes solutions are readily on hand and do not require further research. Future marketing studies should focus more on actual marketing problems (e.g. the need for low-cost storage) and less on idealized trade arrangements.

Past studies have tended to be either rather abstract, only occasionally referring to secondary data on production or consumption, or too quantitative, overwhelming the reader with numbers that have little apparent conceptual framework. Both approaches would benefit from greater consideration of producers', traders', and truckers' actual marketing strategies. This task is not easy. However, the potential benefits are considerable; patently erroneous conceptualizations could be quickly discarded and secondary data could be more realistically interpreted.

An additional implication of this study concerns the use of available literature. There is a strong temptation to believe that since one is doing research on a previously neglected topic, one's results will be the only available. In fact, a major methodological challenge is to incorporate into future research the findings of past studies on the same or similar topic. This is particularly true for food marketing research where earlier studies are scarce and, therefore, hard to find.

Implications for the Potato Sector

Misconceptions about the potato — from its erroneous classification as an inferior good based on the famine in Ireland in 1845-1849 (see Dwyer and Lindsay 1984) to its underestimated current potential as a food crop in developing countries (see Horton 1981) - are being reported in studies around the world. One common feature of these findings in countries as varied as Bhutan (Scott 1983),

Bolivia (Jones 1985), and Burundi (Ndimira and Christensen 1983) is the remarkable extent to which long held opinions about potato marketing have only been recently examined by researchers. The introduction to this study indicates a similar situation prevails in Peru.

In the specific case of potatoes in central Peru, findings in this study suggest that many so called "marketing problems," are actually symptoms of more fundamental difficulties. For peasant producers in the central Sierra, for example, the evidence repeatedly shows that production constraints are more important than marketing problems. Estimated incomes of peasant producers are low because their resources are limited and their yields are meager. Peasant farmers produce so little that they need nearly all their output for home consumption. Consequently, government efforts to raise output prices would affect only a minor share of their total production and have only a minimal effect on their incomes. In this sense, continuous discussion of marketing problems distracts public attention from the more fundamental needs of most small potato farmers in the central Sierra.

Marketing Policy

These observations are not intended to suggest that there are no potato marketing problems or that present marketing arrangements could not be improved upon. However, while public officials are quick to enumerate marketing deficiencies, they rarely mention the legitimate employment opportunities existing trade arrangements offer thousands of unskilled Lima workers. Furthermore, while simplistic proposals to eliminate all middlemen are habitually repeated, the absence of pragmatic schemes to improve traders' managerial ability or their elementary technology is increasingly apparent.

Government marketing policy could assist commercial growers in central Peru market their potato surpluses by reducing uncertainty and rationalizing marketing programs. Government intervention that is inconsistent, intermittent and unpredictable complicates producers' decisions about what, when, and how to sell. The resulting uncertainty also demoralizes growers. For example, in 1979 the Huancayo JURPAL suddenly declared a temporary embargo on potato shipments out of the valley. While the JURPAL was justifiably concerned about the shortage of potatoes in Huancayo's wholesale market, their decision took little account of the effect their action would have on current growers' prices for potatoes or on planting decisions the following year. A similar observation applies to intermittent price controls for potatoes in Lima. Much individual and institutional energy could be brought to bear on potato marketing problems such as storage or losses in handling and packaging. But without greater stability in government policies the necessary investments are not likely to be forthcoming.

In more pragmatic terms, government policy makers could reduce uncertainty by improved efforts to inform potato marketing participants about basic developments such as: (1) the number, date and location of potato hectares under cultivation in the principal production areas (2) prevailing producer prices at harvest and freight rates from growing regions to major urban markets, (3) supply/price projections for principal consumption centers that incorporate cyclical changes. Critics might argue that such information costs time and money to collect. This study suggests that much of this data is already available, but not effectively disseminated.

Concerning the rationalization of marketing policies, in the 1970s different potato marketing policies often worked at cross purposes. For example, for

farmers to secure a marketing loan from the Agrarian Bank, they had to first pay back their production loan. But to do so they had to sell their potatoes and no longer needed the marketing loan. Similarly, ministry officials frequently complained that Lima wholesalers had a monopoly position, but it was the municipal authorities - not the traders - that made wholesaling outside the wholesale market illegal. Efforts to improve co-ordination of these various official initiatives could greatly enhance marketing performance.

Notes

[1] Valdés and Alvarez (1984:91) also report that farm-gate prices for potato producers in the Sierra declined relative to their opportunity cost as wage earners during the period 1950-76.

[2] The exchange rate rose steadily during 1979 from roughly 200 *soles* = $US1 in January to roughly 250 *soles* = 1 US dollar in December.

[3] The average exchange rate rose from roughly 225 *soles* = 1 US dollar in July to roughly 250 *soles* = 1US dollar in December. This calculation is for the last six months of the year.

APPENDIX ONE

Field Methods and Analysis of Primary Data

The author and his field workers conducted over 300 formal interviews to generate the primary statistics on producers, rural assemblers, and truckers reported in Chapter III and IV. This appendix briefly explains how these data were collected and analyzed. Scott (1981) contains additional information about producer (op. cit.:67-77), rural assembler (op.cit.:180-185), and trucker (op.cit.:230-236, 242-255) surveys.

1. Data on Producers

1.1 Selection of Producers

Mantaro Valley

Procedures used to select farmers for interviews in the Mantaro Valley began with a revision of an earlier survey of 249 table potato producers (see Franco et al. 1979). Review of the completed questionnaires indicated two types of producers grew potatoes in the valley: those who sold large amounts and those who sold few if any. The author then decided to select a new sub-sample from the earlier group of 249 producers. Moreover, this same sub-sample was to include farmers from diverse growing conditions so that estimated costs and returns would be reasonably representative for all valley producers.

Before starting the survey, the author decided not to contact table potato growers located above 3,950 meters. Earlier survey results showed the few growers there accounted for only a small percent of total local production. Instead, seed potato producers were included. CIP personnel had indicated that these producers sold large quantities of table potatoes. Hence, some seed growers also previously interviewed by CIP researchers (Franco et al. 1979:54-63) were re-contacted for this study.

In the field, practical problems of selecting a random sample of producers from different altitudes, soils (irrigated versus rain fed), and market orientation soon emerged. For example, some farmers reported they no longer grew potatoes. A few simply refused to be interviewed. Nevertheless the author and his principal assistant eventually completed a set of interviews with 56 Mantaro Valley producers. A breakdown of this sub-sample by geographic location and by producer type is as follows, with the number of interviews in the original survey by Franco et al. in parenthesis: (1) table potato producers, below 3,450 meters, small growers 17 (102), medium growers 11 (24); between 3,450 and 3,950 meters left bank of the valley 13 (59), right bank of the valley 9 (46); above 3,950 meters 0 (18); (2) seed potato producers 6 (20); eliminated in processing and analysis 3 (24).

Cañete Valley

Prior to gathering any data in Cañete, the author hypothesized different kinds of production units (individually owned versus production co-operatives) and different sized farms would have different costs. However, a number of problems developed when it came time to select a sample of production units which reflected these various considerations.

The author had neither time nor resources to carry out his own random selection. Moreover, a random selection of farmers had just been conducted to generate data for another thesis. In practical terms, it meant those farmers already selected could not be expected to answer a battery of new questions on potatoes. A separate group of CIP personnel were conducting a series of agro-economic experiments that generally reflected the valley's diverse producer types and ecological conditions. The author therefore decided to work with these agronomists to gather data on Cañete producers.

Once field work in Cañete began, it became clear that the CIP experiments did not include a sufficient number of producers in each of the prevalent producer categories to complete this sample. As a result, additional farmers were selected from lists of producers who reported planting potatoes to local Ministry of Agriculture (MOA) irrigation personnel during the on-going crop year. All together, the author and his principal assistant interviewed 21 Cañete producers. The composition of this sample was as follows, with the number of farmers selected from MOA records in parenthesis: small 6 (0), medium 10 (3), and cooperatives 5 (1). Ten farmers appear in the "medium" group because the results of interviews with medium and large private farms were combined to simplify presentation of the findings.

1.2 Design and Execution of Producer Questionnaires

Questions posed to farmers about potato production and marketing reflected a review of the literature — especially Shwedel (1977) — an earlier CIP survey prepared principally by Efrain Franco, and advice received from CIP social scientists who had conducted similar field work. These latter observations were particularly useful.

Questions about costs and revenues in the producer questionnaires focus on white potatoes for several reasons. The literature indicated prices for different potatoes varied considerably, but white potatoes were considered the most important commercial type. Studying one type of potato allowed for easier and more meaningful comparison of results for different types of producers. The author considered the differential between potato prices producers received and Lima consumers paid particularly important for this study. This differential could be estimated more accurately by focusing on one, rather than several, type of potato.

Little was done by way of a formal pre-test for producer questionnaires. In the Mantaro Valley, a large number of the questions had already been tested in previous CIP surveys. In addition, specific responses recorded in earlier questionnaires were compared with those given for this study as part of post-test procedures. In Cañete, unusual farmer responses were checked against the field observations of CIP agronomists. Furthermore, producers in both valleys participated in a series of interviews. This procedure allowed time to establish rapport and to clarify questions that might have been misunderstood or overlooked in a single interview.

Most farmers were interviewed a total of four times — twice on production and twice on marketing. In most instances, farmers were initially contacted to confirm their willingness to participate in the study. The next visit usually involved an interview of 40 minutes to an hour on production costs. These sessions normally took place at the farmer's home or in one of his fields. The second interview normally began by reviewing production costs that had been incurred since the first interview. If the farmer's potatoes had not been harvested by the second interview, the third interview began by recording final production costs before going on to utilization and marketing. Interviews were deliberately carried out during the cropping season so farmers could answer the questions based on their recent experience.

1.3 Analysis of Producer Data

Producer Typologies

Mantaro Valley producers were classified into three groups: small, medium, and large based on — among other things — total amount of land in potatoes. Various data checks showed land in potatoes was strongly correlated with other variables such as total marketable surplus, size of average sale, etc.

MOA lists were used to construct a typology of potato producers in Cañete. MOA figures for separate periods during the planting season were combined into a master list. As with the Mantaro Valley figures, the precise amount of land in potatoes that separate "small" from "medium" private farmers in Cañete was based on what appeared reasonable given the information available.

Relative Importance of Different Producer Types

Inferences about the relative importance of different Mantaro Valley producer types were based on the following assumptions. First, the sample selected by Franco et al. (1979) was assumed representative. Second, their category, "medium producer in the low zone" consisted of 24 out of 249 growers interviewed, or roughly 10 percent of all producers. It was assumed to be equivalent to the category "medium producer" in this study. Third, all other strictly table potato producers Franco et al. interviewed represented nearly 90 percent of all growers. This category was assumed equivalent to the category "small producer" in this study. Fourth, seed potato producers constituted some one percent of all Mantaro Valley growers. This group was assumed to be roughly equivalent to the category "large farmer" in this study.

Results of this study — based on the findings of Franco et al. 1979 — are presented along with those of the 1972 Agricultural Census in the following table.

Distribution (%) of potato producers in the Mantaro Valley.

	1972 Census Size of producer			This Study Size of producer		
	< 1ha	> 1ha < 5ha	> 5ha	< .75ha	> .75ha < 3ha	> 3ha
Number of producers	21.9	66.8	11.3	90	10	1
Area harvested	8.6	58.3	33.1	54	22	24
Total production	9.6	51.7	38.7	41	22	37

These two sets of data differ in the definition of "small," "medium," and "large" producer, in the methodology utilized to collect and analyze the data, in their respective definitions of the "Mantaro Valley," and in the time the study was carried out. Moreover, the Census appears to have underestimated the number of small producers. Nevertheless, both sets of figures show the relative importance of medium and large producers in the production of potatoes, hence their predominant role in the sale of marketable surpluses as indicated in this study.

Estimates of the relative importance of different producer types in Cañete were based on the distribution of growers in the master list constructed from MOA records, as well as findings presented in Alarcón (1980:44-48) and in Rhoades and Benavides (1980). MOA data (Scott 1981:72) probably underestimated the number of small potato producers as Alarcón (1980) probably overestimated their relative importance.

The classification of potato producers in the Cañete Valley as presented in this study are compared with similar results from the 1972 Agricultural Census in the following table.

Distribution (%) of potato producers in the Cañete Valley.

	1972 Census Size of producer			This Study Size of producer		
	< 5ha	> 5ha	Coops	< 5ha	> 5ha	Coops
Number of producers	51	38	11	70	30	1
Area harvested	9	46	45	20	40	40
Total production	5	44	51	20	40	40

Despite the differences in definitions, producers, area covered, and time conducted, these statistics confirm the shifts in the relative importance of small and co-operative farms alluded to in this study and reported by others (see Rhoades and Benavides 1980:3-4).

Cost and Revenues per 100 kg

This study presents producers' costs and revenues on a per 100 kg basis for three reasons. First, this study concerns itself, albeit not entirely, with economic efficiency, a trait traditionally measured in terms of costs per unit or output. Thus, other possible measures of production costs, e.g. total costs per hectare, seemed less appropriate. Second, 100 kg is roughly equivalent to the weight of one sack of potatoes. This common unit of account enabled easy comparison of costs from producer through to wholesaler, i.e. instead of costs per hectare (producer), costs per truckload (trucker), cost per day (wholesaler). Third, calculation of costs and returns per 100 kg greatly facilitated comparative analysis of growers' versus, for example, Lima wholesalers' marketing margins because these margins are calculated on a price per unit sold basis.

Procedures used to calculate particular costs and returns were based on those employed in earlier CIP reports (see Horton et al. 1980). Principal assumptions are explained in the text and footnotes. However, interested readers should contact Scott (1981) for more detailed information.

2. Data on Rural Assemblers

2.1 Selection of Rural Assemblers

Mantaro Valley

In studying the role of rural assemblers in potato marketing, the author chose to interview wholesalers in the Huancayo wholesale market for three reasons. First, although Mantaro Valley producers sold their potatoes in a variety of locations and to a variety of individuals, earlier studies highlighted the importance of the Huancayo market as a shipping point for potatoes sold in Lima. Second, the author visited over a dozen fairs and markets in the region. On that basis, he noted that the volume of potato trade in the Huancayo wholesale market was much higher than in any other regional market. Third, a CIP field worker had been monitoring potato prices in the Huancayo wholesale market during the previous 12 months and had already established rapport with certain wholesalers. She introduced the author and one of his assistants to these individuals.

Wholesalers within the Huancayo market were selected for formal interview as follows. An experienced interviewer visited the market once a week to record prices for this study. Through gradual acquaintances with the traders, this interviewer estimated that around 60 wholesalers operated stalls in the market. A sample of 20 wholesalers was selected for interview. This number was primarily based on cost constraints and the ability to establish rapport.

Cañete Valley

Procedures used to select and interview rural assemblers (commission agents) in the Cañete Valley were straightforward. Nearly all such individuals were well known by area producers and resident MOA personnel. Moreover, the author had access to a list of names of Cañete commission agents prepared by a Peruvian student who had contacted these traders about seed potato marketing 6 months previously. These names were compared with those mentioned in producer interviews and in informal conversations with extension personnel to prepare a revised list of approximately 30 rural assemblers.

With the help of MOA personnel and area producers, the author and his assistant located and interviewed 16 commission agents. Nevertheless, some results in the text are for only 15 traders. One of the traders interviewed did not market table potatoes in 1979.

2.2 Design and Execution of Rural Assembler Questionnaires

Questions posed in rural assembler interviews were based on Dolorier (1975:164-176) and Shwedel (1977). Moreover, several specific questions were similar to those asked producers and truckers. This procedure was adopted deliberately to help assess the consistency of responses by different types of participants in potato marketing.

Rural assembler questionnaires, however, did not concentrate just on white potatoes. Field work indicated that Huancayo wholesalers did not buy many local potatoes for sale in Lima. Thus, their marketing margins were not the focus of detailed inquiries in this study. Questions about potato marketing in general were much more relevant. In Cañete, growers, extension agents, and local commission agents all agreed that marketing costs and returns were calculated identically for white or colored potatoes.

A Peruvian interviewer employed by the author independently interviewed 20 Huancayo wholesalers. Questionnaires were reviewed for completeness and clarification of specific responses. Some answers were also checked against the notes prepared a year earlier by the previous CIP field worker. The author himself then supplemented the formal interviews by informal conversations with the wholesalers, a selective post-test involving roughly five wholesalers, and dozens of visits to the Huancayo wholesale market simply to observe trading activities.

Interviews with Cañete commission agents generally were completed in a single session of approximately 30 minutes at the commission agent's home or place of business. The findings were then checked by selective inquiries with knowledgeable producers, MOA personnel, local truckers, and by occasional comparison with thesis data on seed potato marketing.

2.3 Analysis of Rural Assembler Data

Analysis of rural assembler data was relatively easy. In comparison with producer or trucker data, there were fewer, less elaborate questionnaires. Furthermore, the results from the rural assembler interviews did not require a typology or complicated calculations.

Most important assumptions employed in analyzing rural assembler data are explicitly stated in the text and footnotes. However, interested readers may wish to consult Scott (1981) for additional information.

3. Data on Truckers

Mathis et al. (1965) used an engineering approach and an accounting framework to analyze trucking costs for all types of farm products and for all Peru. This study employed a similar framework, however the author procured the data through formal interviews with truckdrivers.

3.1 Selection of Truckers

The process of selecting the number and type of trucks to be analyzed for this study began with defining the two populations of trucks that entered Lima with potatoes from the central Sierra and central Coast. The author initially assumed that these two populations could be estimated by studying truck arrivals at Lima's MM#1. He then assumed that the distribution of trucks entering this market during the weeks of April 8 to 15 and October 14 to 20, 1979 respectively also corresponded to the populations in question. These weeks were chosen because they occurred at the peak of the potato harvest in each of the subregions.

These two distributions of trucks were stratified, first by place of origin. For example, based on a check of license plate numbers and official records, 488 of 522 different trucks that entered the MM#1 in April 1979 came from the central Sierra. The distributions were broken down secondly by make and model. Composition of both distributions appeared reasonable by either criteria. These estimated populations therefore were used as reference points in selecting the actual truckers to be interviewed.

A total of 116 drivers were interviewed whose trucks hauled potatoes from the central Sierra; 64 were from the central coast. Of these totals, 23 were eliminated

from the Sierra and 16 from the Coast due to errors in data collection. Although the composition of the two samples actually surveyed closely resembled the estimated populations (see Scott 1981:230-234), the samples were not selected randomly. Instead, they were constructed from interviews with truckers who were willing and able to participate in the study.

3.2 Analysis of Trucker Data

In analyzing survey results to estimate cost and revenues for hauling potatoes, the author made a number of simplifying assumptions. First, he assumed that the trucks studied hauled only potatoes. This was necessary to avoid estimating separate costs and revenues for each commodity transported. Second, he assumed each truck carried a similar amount of potatoes per trip as was reported for the one trip discussed in the interviews. Third, the author assumed the trucks transported potatoes from the same place to Lima. In other words, he assumed they worked a regular route during the period January to June for the central Sierra and July to December for the central Coast. Fourth, he assumed that freight rates were established on a harvesting period basis. In other words, he calculated that freight rates for transporting potatoes to Lima experienced little variation during the harvesting period in each sub-region. Fifth, the author assumed estimated costs and revenues could be compared for different type trucks operating within the same sub-region, but not for different (or even the same) type trucks in different sub-regions. Truckers in the Sierra and Coast not only hauled potatoes over different distances and road conditions but also their operations were affected differently by inflation.

The procedure for actually adding up trucking costs and revenues originally involved stratifying the two samples according to size. However, exploratory computer analysis indicated that a division according to type of fuel was more informative. The author utilized four accounting categories to calculate costs and revenues. They included: (a) fixed cost per trip, (b) variable costs per trip, (c) variable costs per distances, and (d) revenue per trip.

Fixed costs as defined in this study are: depreciation and interest, insurance, taxes, administrative costs (e.g. bookkeeping), and major repairs. The share of these costs charged to each trip in the calculations is based on the number of trips drivers reported making during the six months under study.

Variable costs per trip are defined as those that changed with the quantity of potatoes hauled, but are independent of the distance transported. These costs include: shipping permits, loading in the provinces, unloading in Lima, use of truck scales in the MM#1, garage costs, trucking agents' commission and/or finder's fees, and loading and unloading for backhauls.

Variable costs per distance are those that change with the potato quantities shipped and the distances they are transported. In this study, variable costs per distance are defined as: wages paid to the driver and his assistant, fuel, oil and filter, tires and tubes, maintenance, tolls, and miscellaneous.

Revenues per trip represents the charge per kilo that truckers reported receiving for transporting potatoes to Lima and other cargo back to the provinces. These charges were multiplied by the cargoes that the drivers reported they transported to and from the capital. Additional assumptions necessary to estimate these costs and revenues are explained in Scott (1981:242-259).

APPENDIX TWO

SECONDARY DATA AND SOURCES

1. General Notes

This appendix contains secondary data cited throughout this study. As a reminder: previous studies consistently note that agricultural statistics in Peru suffer from a variety of deficiencies. This appendix does not intend to suggest that data listed are accurate in some extraordinary sense. Rather, this appendix is intended to provide a convenient synthesis of the multitude of statistics — official, revised and their respective sources. Additional observations about these statistics are listed below.

Limitations of the Data

By "data limitations" the author means that earlier potato statistics differ from more recent figures in the same series for one or more of the following reasons:

- Methodology employed to measure the same figure, e.g. shipments of white potatoes to Lima's wholesale market, have varied over time. For example, white potatoes from the Sierra were counted at 80 kg/sack in the late 1950s to early 1970s by one office and at 100 kg/sack by another. Graber (1974) revised the figures from 1959 to 1971 so that all are tabulated on a 100-kg-per-sack basis. Since 1971, the methodology for calculating the weight of these sacks, hence of potato shipments, appears to be varied.
- Degree of disaggregation in the presentation of the data has differed. Using the same example, for earlier years statistics on white and yellow potato shipments were the only ones available. Recently, disaggregate information for shipments are available, see Table A.14.
- Geographic scope of the statistics has changed. For some years, information on potato shipments is available by province, by department, and by month of arrival. For other years, only total shipments each month are available, see Table A.29.
- Responsibility for collection of potato statistics has shifted from one official agency to another. For example, in certain years, statistics were compiled by SIMAP, in others by EMMSA. Moreover, in some years, two or more offices tabulated these figures independently; while in other years, only one office prepared these statistics.

Given these limitations, alternative estimates are often referred to when discussing a particular historical trend to see whether, in fact, they alter the conclusions stated. In many instances, these alternative estimates do not appreciably alter the substance of what was said, but merely modify the results to a degree.

However, for the reader to judge the importance of these differences, alternative estimates frequently are either cited or listed in the tables themselves.

Geographic Regions

Several tables present data organized according to geographic region or sub-region. Unless otherwise indicated by a footnote in the table itself, these geographic regions consist of the following departments:

North includes: Amazonas, Cajamarca, La Libertad, Lambayeque, Loreto, Piura, San Martin, and Tumbes.

Central includes: Ancash, Huancavelica, Huanuco, Ica, Junin, Lima, Callao, and Pasco.

South includes: Apurimac, Arequipa, Ayacucho, Cuzco, Madre de Dios, Moquegua, Puno and Tacna.

A distinction is also made in various tables between "the Sierra" and "the Coast." In most instances, the tables have simply adhered to the definitions for these geographic regions implicitly assumed by studies cited. In certain instances, though, some precise clarifications are offered (Tables A.29 and A.30).

2. Comments on Specific Data Sets

(i) Production, Area, and Yield Data

Revised annual potato production, area, and yield data (Tables A.1 to A.5 and A.9) are taken from Fano (1983). The interested reader should consult that publication for information concerning the methodology employed to generate these statistics. It should be pointed out here, however, that these revised statistics do differ considerably from data previously published in Graber (1974), who also grouped the departmental data slightly differently, in Hopkins (1981), who used a different methodology for revising official figures, or in past bulletins published by different government offices. In recent years, production statistics issued by Ministry of Agriculture's statistics (OSEI) and marketing (DGAC) departments have not been identical. Production projections are the domain of the Ministry's planning office (OSPA).

(ii) Consumption and Demand Data

National and regional potato consumption data (Table A.10 and A.11) are based on the 1971-72 national food consumption survey (ENCA), sponsored by the Ministry of Economics and Finance in cooperation with the Ministry of Agriculture. More recent potato consumption figures for Lima (and regional cities) were generated in smaller, urban surveys carried out by the Ministry of Agriculture (see MAA OSEI 1978a) and INE (ENAPROM). These figures are apart from the national consumption estimates derived in balance sheet fashion from MA-DGAC's data on national production, seed use, marketing losses, and trade which until recently were published in annual marketing surveys (see MAA DGC 1979).

Demand projections for potatoes (Table A.13) are primarily the responsibility of the Ministry of Agriculture's planning office (OSPA).

(iii) Price Data

Average monthly price data (Tables A.15, A.16, A.18, A.19, and A.21 to A.25) are based on figures published in various INE bulletins. In every instance, an effort was made to use the final revised figures. In addition, discrepancies between different INE price series (see Table A.15) are pointed out.

Potato prices — white, yellow and colored — for much of the 1970s were apparently collected by the Lima price regulatory committee (JURPAL) as well. These prices were used to arrive at a weekly official, or controlled, ceiling price. These controlled prices were published in annual official potato marketing bulletins (see MA-DGAC 1980). However, the JURPAL in Lima and other provincial cities were dissolved in 1978.

Average monthly wholesale prices for white and yellow potatoes in Lima for the years 1953-72 and 1956-72 respectively, as prepared by the Agricultural Production Division (DGPA) of the Ministry of Agriculture, are presented in Graber (1974: 78,82). The figures are identical to the INE data. Teutscher and Tello (1983) cite "Ministry of Agriculture" for a different set of monthly wholesale prices in Lima from 1971-82 but they give no more precise references. In early 1979 SIMAP was re-established within the MA-DGAC. For several years since then, SIMAP has also collected daily wholesale and retail potato prices in Lima. SIMAP's prices are not always similar to INE data.

(iv) Potato Shipment Data

Potato shipment have been the responsibility of more offices than any other data. For this reason, perhaps, these figures suffer from the greatest inconsistencies. All these figures (Table A.14, A.17, A.20, A.29, and A.30) are based on data recorded in MM#1. But the offices in charge shifted from the Department of Supply in the Ministry of Agriculture in the 1950s to the Agricultural Research and Extension Service (SIPA) at one time in collaboration with the Agricultural Commerce Division (CONAP 1967) and later with the Agricultural Production Division from the late 1950s to mid 1960s (Graber 1974: 69), to the Agricultural Market Information Service (SIMAP) from 1966 to 1973 (op. cit: 69), to the Lima office of the National System of Wholesale Markets (SENAMER) and OSEI of the Ministry of Agriculture from 1974 to 1978, back to SIMAP since 1979, and most recently by SIMAP and EMMSA.

The other difficulty with potato shipment data is that unlike statistics on potato production, consumption, and prices, these figures have not been regularly published since the early 1970s. Thus, it was necessary to ferret out available information from various government offices. For several more recent years, even the unpublished government records are incomplete. Having said this, the information in these tables represents the author's best efforts to check and recheck sources, make inconsistencies explicit, and compile the most complete set of data available.

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Table A.1 Potato production, area, and yield: 1948-81.[1]

Year	Production (000 t)	Area (000 ha)	Yield (t/ha)
1948	1314.8	191.5	6.9
1949	1361.1	217.3	6.3
1950	1665.2	248.6	6.7
1951	1617.8	263.9	6.1
1952	1604.9	263.4	6.1
1953	1690.3	259.8	6.5
1954	1773.5	267.7	6.6
1955	1695.2	255.8	6.6
1956	1236.8	244.6	5.0
1957	1277.2	239.0	5.3
1958	1491.9	237.3	6.3
1959	1485.4	241.3	6.2
1960	1397.8	254.0	5.5
1961	1492.3	258.2	5.8
1962	1416.2	252.8	5.6
1963	1426.9	254.4	5.6
1964	1531.1	261.5	5.9
1965	1568.2	251.1	6.2
1966	1498.9	254.6	5.9
1967	1711.7	271.9	6.3
1968	1526.2	250.9	6.1
1969	1855.5	303.5	6.1
1970	1896.4	288.6	6.6
1971	1880.0	286.0	6.6
1972	1713.4	270.9	6.3
1973	1713.1	267.7	6.4
1974	1722.4	267.9	6.4
1975	1639.6	250.7	6.5
1976	1667.0	252.8	6.6
1977	1615.6	246.8	6.5
1978	1695.3	247.2	6.9
1979	1695.1	242.0	7.0
1980[2]	1379.6	194.1	7.1
1981[2]	1678.6	199.3	8.4

1 Production may not equal area times yield due to rounding errors.

2 Preliminary figure.

Source: 1948-79 (Fano 1983); 1980-81 (MA-OSE 1981, 1982).

Note: numerous alternative estimates are cited in earlier studies, see Fano (1983).

Table A.2 Potato production (000 t) by region: 1948-79.[1]

Year	Sierra				Coast				Coastal production as % of national potato production
	North	Central	South	Total[2]	North	Central	South	Total[2]	
1948	57.6	585.1	621.6	1264.3	0.1	21.0	14.2	35.3	2.7
1949	81.8	515.0	715.9	1312.7	2.1	26.5	10.7	39.3	2.9
1950	78.2	741.4	785.4	1605.1	2.0	36.5	11.5	50.1	3.0
1951	75.3	717.5	770.8	1563.5	1.9	25.9	17.5	45.2	2.8
1952	90.5	774.3	672.6	1537.4	1.3	39.4	14.4	55.1	3.4
1953	87.1	797.1	733.2	1617.4	.7	45.8	9.0	55.5	3.3
1954	100.1	778.3	821.1	1699.6	.5	39.4	19.5	59.4	3.3
1955	105.6	642.0	855.3	1602.9	.8	56.5	20.5	77.8	4.6
1956	159.4	517.6	470.6	1147.5	2.5	56.6	19.7	78.9	6.4
1957	164.4	517.3	513.6	1195.3	4.9	44.4	18.6	67.9	5.3
1958	178.0	507.3	721.8	1407.1	5.2	45.5	20.2	70.9	4.8
1959	212.6	474.2	704.7	1391.5	6.3	57.4	17.6	81.3	5.5
1960	230.2	517.0	537.6	1284.9	2.8	62.8	22.6	88.2	6.3
1961	266.0	557.3	567.8	1391.1	7.5	65.6	19.8	92.9	6.2
1962	232.8	547.5	518.3	1298.6	6.3	83.7	15.1	105.0	7.4
1963	255.2	527.0	529.4	1311.6	6.9	80.6	15.4	102.8	7.2
1964	259.7	657.5	509.9	1427.1	7.4	84.9	11.9	104.1	6.8
1965	213.1	726.7	510.1	1449.9	14.5	83.5	20.3	118.4	7.6
1966	220.7	767.7	398.6	1387.0	3.1	86.8	22.1	112.0	7.5
1967	219.5	902.0	460.1	1581.6	5.1	98.3	26.8	130.2	7.6
1968	184.1	839.9	362.1	1386.1	5.0	108.5	26.6	140.1	9.2
1969	208.8	1066.6	449.7	1725.1	4.0	110.4	15.9	130.3	7.0
1970	227.7	999.8	508.6	1736.0	3.0	141.8	15.5	160.3	8.5
1971	249.1	984.0	514.0	1747.2	1.3	118.0	13.5	132.8	7.1
1972	277.7	801.3	516.6	1595.6	1.3	96.2	12.8	110.3	6.4
1973	273.4	790.3	507.2	1570.9	1.0	118.1	16.0	135.1	7.9
1974	268.3	790.0	491.5	1549.8	1.0	146.0	15.5	162.6	9.4
1975	289.4	692.5	482.6	1464.5	1.0	147.8	20.5	169.3	10.3
1976	273.4	737.9	488.1	1499.8	.8	136.9	19.2	156.9	9.4
1977	268.6	698.2	478.1	1444.9	1.2	150.9	12.8	165.0	10.2
1978	233.6	729.8	540.3	1503.7	1.6	165.7	18.0	185.3	10.9
1979	237.7	751.5	539.3	1528.5	1.0	143.5	17.0	161.5	9.5

1 Regions are defined in Appendix two. Production for Sierra and Coast may not equal national totals (Table A.1) because: (a) rounding errors, (b) regional figures do not include small production in the Selva.

2 Figures may not sum due to rounding errors.

Source: Fano (1983).

Note: Numerous alternative estimates are cited in earlier studies, see Fano (1983).

Table A.3 Potato area (000 ha) by region: 1948-79.[1]

Year	Sierra				Coast				Coastal area as % of national potato area
	North	Central	South	Total[2]	North	Central	South	Total[2]	
1948	10.5	75.7	97.6	183.8	0.0	2.3	1.8	4.3	2.2
1949	15.1	86.2	109.6	210.8	0.4	3.1	1.3	4.9	2.3
1950	14.7	101.5	123.9	240.1	0.4	4.8	1.6	6.8	2.7
1951	14.8	112.2	128.5	255.5	0.4	4.2	1.9	6.5	2.5
1952	15.8	106.1	132.3	254.2	0.4	4.3	1.8	6.4	2.4
1953	15.9	107.0	127.4	250.3	0.2	4.9	1.3	6.4	2.5
1954	17.5	105.1	136.3	259.0	0.0	4.0	2.0	6.1	2.3
1955	18.7	92.1	134.9	245.8	.2	5.4	2.0	7.6	3.0
1956	25.6	76.1	132.9	234.6	.5	5.4	2.0	7.9	3.2
1957	29.6	77.7	121.4	228.7	1.0	5.2	1.8	8.1	3.4
1958	29.8	73.5	124.3	227.6	1.1	4.6	2.0	7.7	3.2
1959	34.3	70.0	125.9	230.2	1.0	5.7	1.8	8.6	3.6
1960	37.1	80.3	123.5	240.9	.4	5.3	3.3	9.0	3.5
1961	36.7	80.4	130.8	247.9	1.1	5.5	2.1	8.6	3.3
1962	35.3	80.9	124.2	240.4	1.1	6.6	1.9	9.6	3.8
1963	38.4	77.0	126.9	242.3	1.2	6.3	1.9	9.4	3.7
1964	36.1	104.8	112.8	255.7	.9	5.8	1.2	7.8	3.0
1965	32.4	105.2	104.4	242.0	1.5	5.7	1.9	9.1	3.6
1966	28.7	127.2	90.7	246.6	.5	5.6	2.0	8.1	3.2
1967	30.4	137.5	94.1	262.0	.7	6.7	2.5	9.9	3.6
1968	25.9	136.1	79.5	241.5	.6	6.5	2.3	9.3	3.7
1969	28.1	175.7	90.9	294.7	.5	6.7	1.7	8.8	2.9
1970	27.9	155.8	95.6	279.3	.2	7.6	1.5	9.3	3.2
1971	32.2	156.8	90.1	279.0	.1	5.6	1.2	7.0	2.4
1972	37.1	125.4	100.3	262.8	.1	5.4	1.2	6.7	2.5
1973	36.4	123.7	98.0	258.2	.1	6.6	1.5	8.2	3.1
1974	35.8	123.5	97.2	256.4	.1	8.2	1.4	9.7	3.6
1975	38.8	105.6	94.3	238.7	.1	9.1	1.9	11.0	4.4
1976	37.1	108.8	93.8	239.7	.1	9.5	1.8	11.3	4.5
1977	38.5	103.9	92.9	235.2	.1	9.3	1.2	10.6	4.3
1978	33.9	105.5	96.0	235.4	.1	9.1	1.4	10.7	4.3
1979	32.5	105.9	93.3	231.7	.1	8.1	1.2	9.4	3.9

1 Regions are defined in Appendix two. Area for Sierra and Coast may not equal national totals (Table A.1) because: (a) rounding errors, (b) regional figures do not include small production in the Selva.

2 Figures may not sum due to rounding errors.

Source: Fano (1983).

Note: Numerous alternative estimates are cited in earlier studies, see Fano (1983).

Table A.4 Potato yield (t/ha) by region: 1948-79.[1]

Year	Sierra				Coast				Coastal ave.yield as % of national average yield
	North	Central	South	Average[2]	North	Central	South	Average[2]	
1948	5.5	7.7	6.4	6.9	3.4	8.4	8.1	8.3	120.3
1949	5.4	6.0	6.5	6.2	4.8	8.4	8.0	8.0	127.0
1950	5.3	7.3	6.3	6.7	4.4	7.7	7.2	7.4	110.4
1951	5.1	6.4	6.0	6.1	4.5	6.2	9.1	7.0	114.8
1952	5.7	7.3	5.1	6.0	3.6	9.2	8.1	8.6	141.0
1953	5.5	7.5	5.8	6.5	4.5	9.3	6.9	8.7	133.8
1954	5.7	7.4	6.0	6.6	.6	10.0	9.6	9.8	148.5
1955	5.6	7.0	6.3	6.5	5.4	10.5	10.1	10.3	156.1
1956	6.2	6.8	3.5	4.9	5.3	10.4	9.9	10.0	196.1
1957	5.6	6.7	4.2	5.2	4.7	8.6	10.2	8.4	138.5
1958	6.0	6.9	5.8	6.2	4.9	9.8	10.0	9.2	146.0
1959	6.2	6.8	5.6	6.0	6.1	10.0	9.6	9.4	151.6
1960	6.2	6.4	4.4	5.3	6.6	12.0	6.8	9.8	178.2
1961	7.2	6.9	4.3	5.6	7.1	12.0	9.6	10.8	186.2
1962	6.6	6.8	4.2	5.4	5.8	12.6	8.0	10.9	194.6
1963	6.6	6.8	4.2	5.4	5.9	12.8	7.9	10.9	194.6
1964	7.2	6.4	4.5	5.6	8.6	14.8	9.9	13.3	225.4
1965	6.6	6.9	4.9	6.0	9.6	14.6	10.5	13.0	209.7
1966	7.7	6.0	4.4	5.6	6.8	15.5	10.8	13.9	235.6
1967	7.2	6.6	4.9	6.0	7.5	14.6	10.8	13.2	209.5
1968	7.1	6.2	4.6	5.7	8.1	16.8	11.8	15.0	245.9
1969	7.4	6.1	4.9	5.9	8.9	16.4	9.6	14.7	241.0
1970	8.2	6.4	5.3	6.2	13.5	18.5	10.7	17.2	260.6
1971	7.7	6.3	5.7	6.3	11.9	20.9	11.2	19.1	289.4
1972	7.5	6.4	5.2	6.1	11.7	18.0	10.3	16.4	260.3
1973	7.5	6.4	5.2	6.1	9.9	17.9	10.9	16.6	259.4
1974	7.5	6.4	5.1	6.0	9.3	17.9	10.8	16.7	260.9
1975	7.5	6.6	5.1	6.1	11.0	16.2	11.3	15.4	236.9
1976	7.4	6.8	5.2	6.3	10.3	14.4	11.0	13.9	210.6
1977	7.0	6.7	5.1	6.1	12.3	16.2	10.7	15.6	240.0
1978	6.9	6.9	5.6	6.4	13.1	18.2	12.5	17.4	252.2
1979	7.3	7.1	5.8	6.6	11.7	17.8	13.8	17.2	245.7

1 Regions are defined in Appendix two.

2 Average yields are simply calculated using total area and production for each region.

Source: Fano (1983).

Note: Numerous alternative estimates are cited in earlier studies, see Fano (1983).

Table A.5 Projections vs. actual potato production and area by region: selected years.[1]

Year	Projection	Sierra		Coast		Total	
		Production (000 t)	Area (000 ha)	Production (000 t)	Area (000 ha)	Production (000 t)	Area (000 ha)
1970	1	1441.3	267.2	98.3	6.9	1539.6	274.1
	2	1548.7	...	107.9	...	1656.6	...
	3	1675.9	...	116.6	...	1792.5	...
	Actual	1736.0	279.3	160.3	9.3	1896.4[2]	288.6[2]
1975	1	1483.8	279.2	91.6	5.8	1575.4	285.04
	2	1675.9	...	106.7	...	1782.6	...
	3	1905.5	...	121.0	...	2026.5	...
	4	...	...	...	...	2039.8	...
	5	...	...	...	...	2077.4	...
	Actual	1464.5	238.7	169.3	11.0	1639.6[2]	250.7[2]
1980	1	1499.5	5.2	90.9	286.4	1590.4	291.4
	2	1760.7	...	112.2	...	1892.4	...
	3	2126.5	...	133.5	...	2260.0	...
	4	...	...	...	...	2272.3	...
	5	...	...	...	...	2330.9	...
	6	...	...	...	...	2170.0	267.4
	Actual	n.a.	n.a.	n.a.	n.a.	1380.0	194.1
1985	4	...	...	...	...	2504.8	...
	5	...	...	...	...	2584.4	...
	6	...	...	...	...	2513.0	310.2

n.a. = not available.

1 Projections 1-3 are for years 1970, 1975, and 1980 only. Projections 2-3 are for production only. Projections 4-5 are for years 1975, 1980 and 1985 only; they are for national production only.

2 Since actual regional figures do not include small quantities in the Selva, these totals may not equal actual national production or area.

Source: Preliminary figure projections 1-3 (CONESTCAR 1969); 4-5 (Graber 1974); 6 (Fernández 1976). Actual (Tables A.1, A.2, A.3 also, and MAA-OSE 1981).

Table A.6 Potato production credit by region (millions of soles and 000 ha): 1968-79.

Year	Sierra						Coast				Total	
	North[1]		Central[2]		South[1]		North and South[1]		Central[2]			
	soles	ha	soles	ha	soles	ha	soles	ha	soles	ha	Soles	ha
1968[3]	31.2	3.1	48.8	5.0	24.6	2.0	n.a.	n.a.	49.6	3.2	154.2	13.2
1969	46.7	4.3	102.9	8.4	42.2	2.9	n.a.	n.a.	59.4	3.3	251.2	18.9
1970	46.7	4.0	79.3	6.2	66.0	3.9	n.a.	n.a.	102.3	4.9	294.3	19.0
1971	20.3	1.8	52.5	4.3	55.4	3.5	n.a.	n.a.	78.9	4.3	207.3	13.9
1972	15.9	1.6	73.9	6.1	37.1	5.7	n.a.	n.a.	78.4	4.5	205.3	13.0
1973	20.7	1.6	99.4	6.4	50.4	2.4	11.5	0.6	120.2	4.8	291.0	15.3
1974	43.3	2.5	171.2	8.7	122.9	4.5	23.5	0.9	176.0	5.8	513.5	21.7
1975	68.6	2.9	259.4	8.9	288.1	6.9	50.2	1.1	439.5	9.5	1,055.7	28.3
1976	109.5	3.5	299.6	7.4	334.7	6.7	45.5	0.9	670.3	11.8	1,414.2	29.6
1977	199.2	4.4	602.8	8.3	637.1	9.0	59.0	0.9	875.9	9.3	2,315.1	31.0
1978	262.8	3.3	929.8	9.6	977.2	9.1	140.0	1.2	1,381.4	9.2	3,551.4	31.4
1979	n.a.	n.a.	1,467.6	10.4	n.a.	n.a.	671.2	0.9	1,575.8	6.8	5,128.8	29.3

n.a. = not available.

1 Figures for North and South are respectively total Sierra less central Sierra and total Coast less central Coast. More precise information is not available. For years 1968-72, figures for North and South assume all credit for potato production went to the Sierra and none to the Coast.

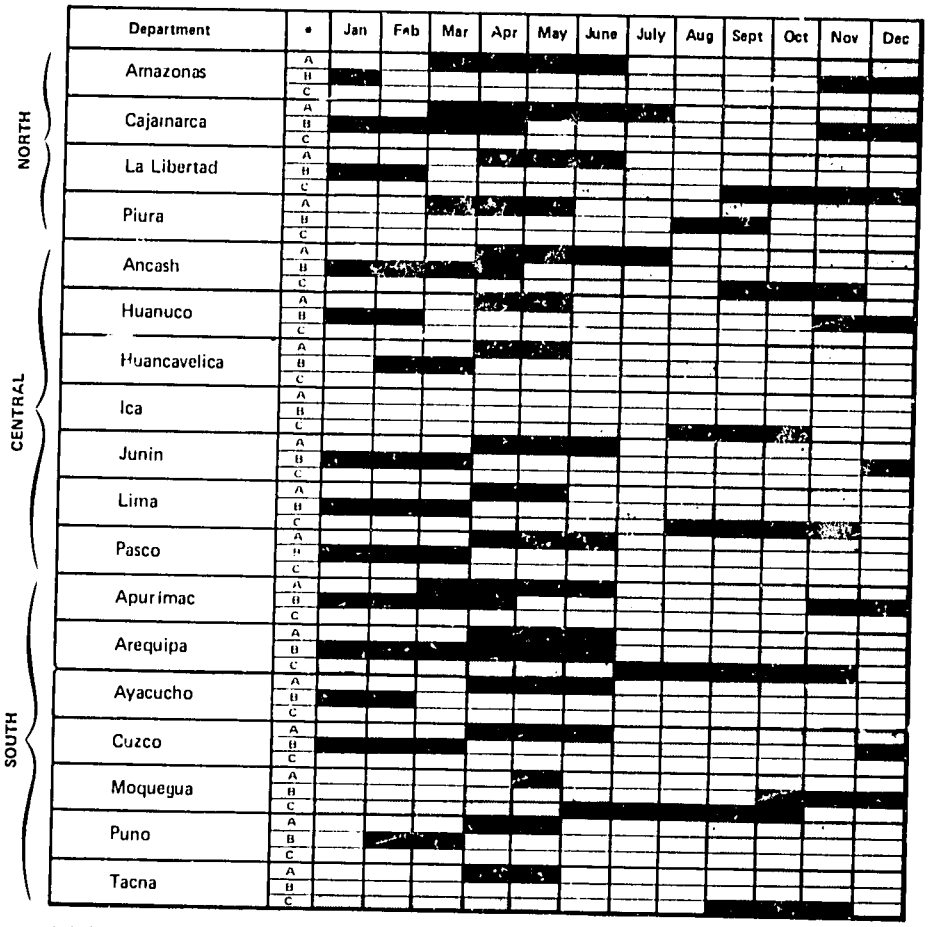
2 Central Sierra assume all loans for Ayacucho, Huancavelica, Huánuco, Junín and Pasco. More precise information is not available. Central Coast includes Lima and Ica departments.

3 Data are for period October 1 to September 30 in 1968 and 1969, data are for January to December in all other years.

Source: Agrarian Bank.

Note: Since private banks made few production loans during this period, the information from the Agrarian Bank covers most institutional production credit (Alvarez 1980:70-71; Hopkins 1981:119-132).

Table A.7. Monthly calendar for potato production by department.



* (A) Rainfed Potato Production in the Sierra; (B) Irrigated Potato Production in the Sierra; (C) Irrigated Potato Production on the Coast.

Planting Harvesting

Source: Servicio de Investigacion y Promocion Agraria, Ministry of Agriculture, 1961.

Table A.8 Principal potato varieties: agronomic and commercial characteristics.

Name	Type Variety	Vegetative Cycle[1]	Yield[2]	Culinary Traits	Storability[3]	Commercial Class[4]
Antarqui	Hybrid	Short	Very good	Fair	Fair	White
Amarilla	Native	Long	Low	Excellent	Good	Yellow
Ccompis	Native	Medium	Low	Very good	Good	...
Chata Blanca	Native	Medium	Good	Very good	Good	White
Cuzco	Hybrid	Short	Very good	Fair to bad	Good	Colored
Huagalina	Native	Long	Low	Excellent	Good	...
Huayro	Native	Medium	Low	Excellent	Good	Huayro
Mariva	Hybrid	Medium	Very good	Very good	Fair	Colored
Merpata	Hybrid	Medium	Very good	Good	Very good	...
Mi Perú	Hybrid	Medium	Very good	Good	Very good	Colored
Molinera	Hybrid	Short	Very good	Good	Poor	Colored
Renacimiento	Hybrid	Long	Very good	Good	Good	White
Renovación	Hybrid	Long	Very good	Fair	Very good	White
Revolución	Hybrid	Short	Very good	Very good	Very good	White/colored[5]
Sapa	Native	Long	Low	Fair	Fair	...
Shiri	Native	Short	Low		For chuño	...
Sipeña	Hybrid	Long	Very good	Very good	Good	...
Ticahuasi (mexicana)	Hybrid	Short	Very good	Very bad	Bad	White
Tomasa Condemayta	Hybrid	Medium	Very good	Very good	Fair	Colored
Yungay	Hybrid	Medium	Very good	Very good	Fair	White

1 Long, more than 150 days; medium, 130 to 150 days; short, less than 130 days.

2 Very good, more than 20 tons in farmers' fields; good, 10 to 20 tons in farmers' fields; low, less than 10 tons in farmers' fields.

3 Storability also refers to ability to withstand transport.

4 These classes are those used by wholesale and retail merchants to categorize different groups of potatoes.

5 If supplies are tight, Revolución will sell at a higher price as a "colored" potato.

Source: Girón (1976), revised with comments from Carlos Vise of MOA and Drs. Nelson Estrada and Alan Merendez of CIP.

Table A.9 Potato production, trade and utilization: 1955-81.

Year	Total Production (000 t)	Potato Flour Imports[1] (000 t)	Total Apparent Supply[2] (000 t)	Shrinkage and Marketing Losses[3] (000 t)	Seed[4] (000 t)	Apparent Human Consumption[5] (000 t)	Estimated Per Capita Availability[6] (kg)
1955	1695.2	6.9	1702.1	170.2	306.4	1225.5	142.4
1956	1236.8	8.1	1244.9	124.5	224.1	896.3	101.9
1957	1277.2	9.6	1286.8	128.7	231.6	926.5	103.1
1958	1491.9	10.6	1502.5	150.3	270.4	1081.8	117.8
1959	1485.4	10.2	1495.6	149.6	269.2	1076.8	114.7
1960	1397.8	13.2	1411.0	141.1	254.0	1015.9	105.9
1961	1492.3	12.7	1505.0	150.5	270.9	1083.6	109.4
1962	1416.2	14.6	1430.8	143.1	257.5	1030.2	101.1
1963	1426.9	15.7	1442.6	144.3	259.7	1038.6	99.0
1964	1531.1	17.9	1549.0	154.9	278.8	1115.3	103.3
1965	1568.2	15.2	1583.4	158.3	285.0	1140.1	102.6
1966	1498.9	12.0	1510.9	151.1	272.0	1087.8	95.2
1967	1711.7	13.9	1725.6	172.6	310.6	1242.4	105.6
1968	1526.2	9.4	1535.6	153.6	276.4	1105.6	91.4
1969	1853.5	8.3	1861.8	186.4	335.5	1341.9	107.8
1970	1896.4	9.2	1905.6	190.6	343.0	1372.0	108.0
1971	1880.0	7.6	1887.6	188.8	339.8	1359.0	104.0
1972	1713.4	17.9	1731.3	173.1	311.6	1246.6	92.1
1973	1711.1	14.4	1727.5	172.8	310.9	1243.8	89.5
1974	1722.4	0.8	1723.2	172.3	310.2	1240.7	87.1
1975	1639.6	0.0	1639.6	164.0	295.1	1180.5	80.7
1976	1667.0	0.0	1667.0	166.7	300.1	1200.2	80.0
1977	1615.6	0.0	1615.6	161.6	290.8	1163.2	75.6
1978	1695.3	0.0	1695.3	169.5	305.2	1220.6	77.3
1979	1695.1	0.0	1695.1	169.5	305.1	1220.5	75.3
1980	1379.6 [7]	2.0	1381.6 [7]	138.2 [7]	248.7 [7]	994.7 [7]	59.8 [7]
1981	1678.6 [7]	0.0	1678.6 [7]	167.9 [7]	302.1 [7]	1208.6 [7]	71.0 [7]

1 From 1955-71, these refer to imports of potato flour converted to fresh potato equivalents. 1 Kg of flour equal to 4.75 Kg of fresh potatoes (Graber 1974: 21). From 1971, they refer to fresh and flour potato imports, converted to fresh potato equivalents. These figures do not take account of the very limited potato exports by Peru in years 1968, 1969 (Graber 1974), nor in years 1971, 1972, and 1978, listed in FAO Trade Yearbook Vol. 26 and Vol. 32.

2 Total apparent supply equals production plus potato flour imports. From 1955-71, total apparent supply includes small quantities of imported seed (Graber 1974:21).

3 Shrinkage and marketing losses estimated to be 10% of total apparent supply (MA-DGAC 1981c).

4 Seed estimated by (a) substracting shrinkage and marketing losses from total apparent supply, and (b) multiplying net available supply by .2 (MA-DGAC 1981c).

5 Apparent human consumption equals total apparent supply less (a) shrinkage and marketing losses and (b) seed. Food for livestock and industrial consumption believed to be negligible.

6 Per capita availability equals apparent human consumption divided by estimated national population. Population estimate based on INE (1981), interpolating between census years according to published growth rates.

7 Provisional estimate.

Source: Production (Table A.1). Potato Flour Imports, 1955-71 (Graber 1974); 1972-81 (MA-DGAC 1981c). See footnotes above for remaining figures.

Table A.10 Residence, annual family income (soles) and per capita potato consumption (kg) by region and type: 1971/1972.[1]

Residence	Sierra				Coast			
	Family Income	White Potatoes	Other Potatoes[2]	Total Potatoes	Family Income	White Potatoes	Other Potatoes[2]	Total Potatoes
Greater Lima								
Low Income	...	...	...	...	1770	44.8	2.4	47.2
Med. Income	...	...	...	...	5800	41.1	4.9	46.0
High Income	...	...	...	...	20240	31.9	5.4	37.3
Large Cities[3]								
North	...	...	...	...	6180	21.4	12.0	33.4
Central	5690	101.2	6.7	107.9	6780	34.8	5.1	39.9
South	5030	47.0	3.2	50.2	6280	30.8	1.6	32.4
Towns								
North	3940	35.6	31.4	67.0	5220	12.8	8.5	21.3
Central	5040	137.2	5.0	142.2	5960	50.5	2.6	53.1
South	2720	79.4	26.5	105.9	5570	51.9	2.2	54.1
Rural Areas								
North	1790	102.2	5.3	107.5	2950	10.4	12.5	22.9
Central	2530	138.3	2.5	140.8	4010	32.9	.9	33.8
South	1360	170.8	43.8	214.6	3500	44.0	1.4	45.4

1 August, 1971 to August, 1972.

2 Yellow Potatoes and chuño consumption was less than 1 kg per in every sub-region except Southern Sierra towns (26.5 kg) and rural areas (43.8 kg).

3 Large cities does not include Lima.

Source: Family Income (Amat y León and León 1979); Potato Consumption (Convenio MEF-MA 1975).

Table A.11 Composition (%) of the diet and of food expenditures by region: 1971/1972.[1]

Food Group	Sierra		Coast		Peru	
	Diet	Food Expenditures	Diet	Food Expenditures	Diet	Food Expenditures
Tubers & Root Crops (Potatoes)	43.5 (32.4)	25.6 (16.4)	13.8 (9.9)	5.8 (4.2)	32.2 (19.3)	17.0 (8.1)
Cereals	25.6	29.1	24.1	20.5	23.9	24.4
Sugars	4.1	3.2	6.4	3.5	5.0	3.4
Vegetables	10.7	9.5	14.9	10.4	12.1	9.8
Fruits & Nuts	2.0	1.7	8.9	6.1	5.1	3.6
Meat & Fish (Meat)	4.6 (4.0)	16.2 (16.2)	11.8 (7.6)	30.6 (26.9)	8.1 (5.7)	23.6 (22.9)
Eggs	0.3	1.5	0.9	2.4	0.6	2.0
Milk & Derivatives	4.4	5.2	11.6	10.1	7.1	6.9
Oils & Grains	0.9	2.7	2.7	4.8	1.7	3.6
Spices	1.1	0.7	1.2	1.3	1.1	1.0
Beverages	2.7	4.5	3.7	4.8	3.1	4.7

1 August 1971 to August 1972.

Source: ENCA as cited in Quintanilla (1978).

Note: Absolute totals for the diet (kg) are Sierra-394, Coast-387, and Peru-398. Absolute totals for food expenditures (soles) are Sierra-2925, Coast-4896, and Peru-3903.

Table A.12 Income elasticities of demand for potatoes.[1]

Study #	Year or Data Base	Product	Elasticity	Residence/Region
1	1957/1964-1965	Potatoes	.41	Urban
		Potatoes	.50	Rural
		Potatoes	.52	Urban Coast
		Potatoes	.50	Rural Coast
		Potatoes	.43	Urban Sierra
		Potatoes	.50	Rural Sierra
		Potatoes	.49	Peru
2	1964-1965	Tubers	.48	Lima
3	n.a.	Potatoes	.45	Peru
4	n.a.	White potatoes	.46	Lima
		Yellow potatoes	.49	Lima
		White potatoes	.87	Peru
		Yellow potatoes	.87	Peru
5	n.a.	Potatoes	.47	Peru
6	n.a.	Roots and tubers	.35	Peru
7	1971-1972	Potatoes	.16	Lima
		Potatoes	.43	Large cities
		Potatoes	1.00	Towns
		Potatoes	1.00	Rural areas
8	1971-1972	Potatoes	.8	Lima (low income)
		Potatoes	-.7	Lima (med. income)
		Potatoes	.04	Lima (high income)
9	1971-72	Potatoes	.2 to .7	Low income
		Potatoes	-.02 to .2	Middle income
		Potatoes	-.3 to -.1	High income
10	n.a.	Potatoes	-.1	Peru

n.a. = not available.

1 Studies 1, 2, 4, 7 and 8 used expenditures to estimate income elasticities; for other studies information about income variable was not available. Studies 1, 2, and 6 used double log functional form; study 6 used a double log inverse and study 9 a semi:log. For other studies this information was not available.

Source: 1, CONESTCAR (1969:44); 2, Amat y León (1970); 3, cited in Wood, Jr. (1972); 4, cited in CONAP (1967:319); 5, cited in Graber (1974:28); 6, FAO 1971; cited in Quintanilla (1978:26); 7, Amat y León and Curonisy (1981:107); 8, MAA-OSP (1980:33); 9, Apaza (1983:141); 10, FAO unpublished statistics.

Table A.13 Projections vs. actual potato demand (000 t): selected years.

Year	Projection[1]	Shrinkage and Market Losses[2]	Industrial Use	Seed	Human Consumption	Total Domestic Apparent Demand[3]
1970	1	268.9	.8	297.4	1310.9	1752.3
	Actual	190.6	0.0	343.0	1372.0	1905.6
1975	1	195.5	1.2	285.8	1478.8	1957.3
	2	...	...	560.9	1526.6	2087.5
	3	...	...	560.9	1607.9	2167.9
	4	.5	1.1	187.1	1401.6	1590.4
	Actual	164.0	0.0	295.1	1180.5	1639.6
1980	1	220.4	1.8	307.8	1676.3	2206.3
	2	...	...	629.3	1778.3	2407.6
	3	...	...	629.3	1956.2	2588.5
	4	.6	1.0	169.0	1648.5	1819.1
	5	...	...	...	...	2307.7
	Actual	138.2[4]	0.0	248.7[4]	994.7[4]	1381.6[4]
1985	2	...	...	697.8	2071.9	2769.7
	3	...	...	697.8	2380.8	3078.6
	4	.6	.9	145.1	1962.8	2109.6
	5	...	...	...	...	2888.5
1990	4	.7	.9	124.6	2368.9	2495.1

1 Projection 1 is for 1970, 1975, and 1980 only. Projections 2 and 3 are for 1975, 1980, and 1985 only. Projection 4 is for 1975, 1980, 1985, and 1990.

2 Projections 2 and 3 include estimated shrinkage and marketing losses in seed category.

3 Totals may not equal the sum of sub-totals due to rounding errors.

4 Preliminary figure.

Source: 1 (CONESTCAR 1969), 2-3 (Graber 1974), 4 (MAA 1976), 5 (Fernández 1976); Actual (Table A.9).

Table A.14 Annual potato shipments (000t) to Lima by type: 1951-82.[1]

Year	Type of Potato[2]			
	White	Yellow	Other[3]	Total[4]
1951	37.9	.8	n.a.	38.7
1952	47.7	1.4	n.a.	49.0
1953	54.1	.7	n.a.	54.8
1954	48.1	4.3	n.a.	52.4
1955	60.9	2.9	n.a.	63.8
1956	65.2	2.5	n.a.	67.8
1957	68.1	1.9	n.a.	69.9
1958	73.2	2.4	n.a.	75.6
1959	73.1	2.6	n.a.	75.7
1960	75.9	2.4	n.a.	78.3
1961	81.1	2.4	n.a.	83.5
1962	77.1	1.5	n.a.	78.6
1963	83.0	1.8	n.a.	84.7
1964	124.7	4.5	n.a.	129.2
1965	126.1	2.3	n.a.	128.4
1966	126.7	1.2	n.a.	127.9
1967	149.5	1.2	n.a.	150.7
1968	142.7	1.2	n.a.	143.9
1969	162.5	3.0	n.a.	165.5
1970	187.1	4.6	n.a.	191.7
1971	190.9	8.9	27.0	226.3[5]
1972	99.6	14.1	46.7	160.5[6]
1973	101.3	11.0	68.6	180.9
1974	130.4	8.4	76.4	220.4
1975	94.7	16.2	110.9	221.5
1976	133.4	8.9	121.5	264.0
1977	90.8	10.0	133.1	233.9
1978	142.3	8.8	145.8	297.1
1979	161.6	6.2	107.9	276.4
1980	151.9	7.9	83.2	244.9
1981	194.2	7.2	78.9	280.1
1982	191.0	7.1	80.4	278.4

n.a. = not available.

1 Figures cited here are not always identical with those cited in other studies for a variety of reasons. For example, during the 1950s and 1960s, different offices assigned different average weights to sacks of potatoes entering Lima's wholesale market from the Sierra, see Graber (1974:36; 69). While the figures reported above appear most reasonable, other statistics are found in Sanchez (1960:7), for 1959-60 in Shepherd et al. (1969:11) for white potatoes only from 1958-68 in CONAP (1967:173, 191-192) for 1957-65; in Flores et al (1980:71) for 1971-77 for total potatoes only; in Teutscher and Tello (1983) for 1971-82 white potatoes only, and from EMMSA for 1973-74 and 1977-79.

2 Prior to 1971 potatoes unloaded in the MM # 1 were classified either as "white" or "yellow". According to Graber (1974:36), shipments of "other" potatoes e.g. colored varieties like Mariva were small and included as part of "white" potatoes. From 1971, potatoes are now classified as "white", "yellow", "colored" and occasionally "chancho" or "otras". The last two categories generally refer to low grade i.e. very small and/or damaged potatoes sometimes used for animal feed.

(continued, next page)

3 Graber (1974) claims that the increase in "other" potatoes shipped to Lima in 1971 and 1972 was partly due to more refined statistics and partly the result of farmers switching to colored varieties for which there were less rigorous price controls.

4 Sum of the separate types of potatoes may not equal the total indicated due to rounding errors. These totals may differ slightly from totals in Tables A.17 and A.20 on account of rounding errors.

5 Figures for 1971 do not include 12,800 tons of white potatoes, 1400 tons of yellow potatoes and 1500 tons of colored potatoes respectively that were shipped through Lima's MM # 1 to destinations out of Lima (Graber 1973).

6 Figures for 1972 include neither potatoes shipped through Lima's MM # 1 nor 13,000 tons of potato imports most of which were sold in Lima.

Source: all potatoes 1951-58 (Sánchez 1960:7), 1959 (Graber 1974:36); white and yellow potatoes only 1960-79 (Tables A.17 and A.20 respectively); 1980-82 (EMMSA); other potatoes 1973 (SIMAP), 1974-75, 1980-82 (EMMSA); 1976-79 (Market administration MM # 1).

Table A.15 Average monthly wholesale price (soles/kg) of white potatoes in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	2.15	1.93	1.67	1.61	1.65	1.91	2.38	1.96	1.61	1.74	1.69	1.67
1961	2.18	2.07	2.00	1.97	1.88	1.85	2.07	1.57	1.26	1.12	1.14	1.28
1962	2.17	2.04	1.87	1.49	1.51	1.53	1.88	1.87	1.47	1.59	1.91	2.62
1963	3.17	2.94	2.42	1.84	1.62	1.73	1.74	1.77	2.08	2.22	2.18	2.23
1964	2.51	2.19	2.07	2.11	1.97	1.83	1.84	1.86	1.71	1.42	1.33	1.84
1965	2.01	2.12	2.57	2.36	2.22	2.10	2.23	2.31	2.35	2.50	2.75	3.63
1966	3.31	3.74	3.50	3.48	3.50	3.41	4.12	4.46	3.64	3.45	3.07	2.92
1967	2.85	3.02	2.72	2.58	2.54	2.41	2.65	2.63	1.96	1.55	1.45	2.47
1968	2.80	2.99	3.09	2.96	2.99	3.14	3.52	3.44	2.40	2.24	2.70	3.34
1969	4.06	4.54	4.42	4.01	4.00	3.50	3.35	3.11	2.98	2.77	3.33	3.79
1970	5.17	5.64	5.04	2.86	3.00	3.28	3.07	3.03	2.35	1.95	1.60	1.69
1971	2.04	2.08	2.27	2.43	2.85	2.89	2.80	2.73	2.52	2.49	2.85	3.62
1972	4.15	4.28	4.30	4.00	3.70	4.20	4.16	4.15	4.12	4.11	4.17	4.13
1973	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40
1974	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40
1975	4.40	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
1976	6.85	7.90	6.55	8.20	7.85	7.50	8.75	8.50	8.50	8.50	8.90	9.35
1977	12.36	14.12	13.77	12.52	12.22	12.47	14.30	16.94	18.57	16.00	15.47	14.11
1978	8.88	10.63	10.43	12.35	11.72	11.72	11.72	11.72	12.00	14.50	14.50	16.00
1979	25.50	27.00	29.00	29.15	29.65	30.00	31.75	30.33	25.00	25.00	25.00	53.00

1 These prices for "papa blanca criolla" are from "Fórmula B" records at INE. These prices differ from those in Teutscher and Tello (1983) especially in years 1972 and 1977 to 1979. INE prices were used for this study because they are generally considered the most reliable and it was impossible to locate the original source for other prices.

Source: 1960-72 (June) (Graber 1974); 1972 (July) -79 (INE).

Note: For the period January 1973 to November 1977, INE also has records for wholesale prices for "papa blanca" in the "Hoja de Trabajo, Base 1960." These latter prices are reproduced here for clarification.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1973	5.65	4.75	4.75	4.40	5.35	6.85	8.05	8.05	5.05	4.25	3.65	3.40
1974	3.65	4.15	4.65	4.90	5.50	5.95	5.55	4.20	4.10	3.75	3.80	5.85
1975	7.35	9.25	9.65	8.50	7.00	7.20	6.45	5.55	5.00	4.65	4.10	4.25
1976	7.50	8.00	8.20	8.00	7.50	7.50	8.75	6.34	6.95	7.44	7.88	8.33
1977	12.36	14.12	13.77	13.44	13.20	12.47	12.35	12.35	12.50	16.00	16.30	...

Table A.16 Average monthly retail price (soles/kg) of white potatoes in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	2.40	2.45	2.25	2.10	2.30	2.30	2.60	2.60	2.10	2.10	2.00	2.05
1961	2.56[2]	2.61	2.47	2.50	2.45	2.24	2.39	2.24	2.07	2.01	2.14	2.99
1962	2.65[2]	2.78	2.81	2.29	2.23	2.22	2.32	2.52	2.43	1.88[2]	2.18[2]	2.87
1963	4.06	3.69	3.46	2.58	2.34	2.26	2.25	2.27	2.52	2.70	2.91	2.98
1964	2.99[2]	2.05	2.47	2.55	2.45	2.37	2.32	2.64[2]	2.10[2]	1.71	1.73	2.24
1965	2.71	2.73	3.02	2.84	2.78	2.70	2.61	2.71	2.70	3.30	3.41	4.47
1966	4.30	4.35	4.36	4.17	4.21	4.14	4.71	5.43	3.97	4.03	4.09	3.95
1967	3.54	3.85[2]	3.62	3.33	3.26	3.12	3.25	3.25	2.35[2]	2.12	1.92	3.06
1968	3.44	3.61	3.87	3.71	3.74	3.81	4.07	4.18	3.11	2.89	3.29	3.76
1969	5.17	5.57	5.48	5.29	4.85	4.32	4.14	4.10	4.15	3.87	4.09	4.27
1970	5.87	4.24	4.04	4.06	4.09	4.05	4.04	4.04	4.03	3.76	3.30	3.24
1971	3.72	3.89	3.94	3.98	4.01	3.99	4.00	3.99	3.96	3.95	3.99	4.08
1972	5.51	5.56	6.54	5.42	4.38	5.59	4.82	4.71	4.66	4.63	4.49	4.63
1973	5.33	5.63	6.12	6.08	6.56	6.35	8.40	6.53	6.84	5.46	5.27	5.14
1974	5.01	5.16	5.12	5.69	5.52	6.21	6.22	5.51	5.25	5.12	5.13	5.41
1975	12.53	13.68	14.19	10.93	10.11	9.57	9.09	7.82	7.21	7.05	7.14	7.22
1976	8.34	9.37	9.31	9.44	9.28	8.87	9.94	9.34	9.31	9.49	9.72	10.00
1977	18.65	17.81	17.08	16.19	15.51	15.52	17.64	22.72	23.21	21.48	20.31	16.10
1978	15.62	16.95	16.62	16.41	18.66	20.18	20.97	21.68	20.22	18.19	17.97	19.95
1979	33.95	34.75	34.33	35.23	35.23	35.23	36.99	36.61	35.71	37.21	59.00	64.36

1 Alternative estimates for years 1971 to 1979 are in MA-DGAC (1981c). However, these prices appear to be regulated, or official, prices not actual prices, see MAA-DGC (1980).

2 This price was taken from Graber (1974), it differs from prices published in INE as follows 1961 - Jan. 2.36; 1962 - Jan. 2.95; Oct. 2.40, Nov. missing data; 1964 - Jan. 3.19, Aug. 2.49, Sept. 2.22; 1967 - Feb. 3.05, Sept. 2.55.

Source: INE.

Table A.17 Monthly shipment (tons) of white potatoes to Lima: 1960-1979.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	5602	5359	6048	5788	6477	5327	5437	7290	7368	7565	7058	6584
1961	5969	6372	6371	5964	6521	6724	6742	6821	7074	8017	7598	6957
1962	5886	5377	5284	6158	5493	5723	5953	6892	8621	8120	7123	6481
1963	4866	4962	7366	6977	7277	7319	7577	7306	7532	8084	7161	6532
1964	6172	7321	10824	11249	11377	10612	11208	10531	10393	12172	11617	11195
1965	9617	8650	10367	11022	10122	9341	10065	10961	11942	13070	11009	9914
1966	9560	8817	10739	11515	11950	12375	11773	4242	7461	12984	12771	12534
1967	12029	11489	13413	11858	10854	10749	12497	12556	14652	15441	12920	11050
1968	9775	9455	10440	11330	11625	10802	10231	12481	14127	16775	13579	12069
1969	12769	11305	11208	13444	12257	13361	14181	14593	15740	17143	14053	12488
1970	7959	12905	15639	14213	15845	13720	14147	16220	16773	20398	19444	19788
1971	15936	14139	14053	15800	16638	17535	14996	15560	16885	17379	17295	14761
1972	13244	9944	6333	9454	10290	8365	6622	6283	6752	6954	8227	7122
1973	5465	5342	6891	6515	7165	4231	4427	6646	11437	14739	15093	13372
1974	9027	8651	10710	10751	10878	6655	9710	12292	12570	16403	14689	8080
1975	2802	1070	2937	2510	3993	4488	7895	12580	14249	17236	13538	11388
1976	12147	9441	11728	11716	11337	12155	13487	11754	11532	11538	8801	7715
1977	4222	4106	7045	8782	9499	8430	6914	6779	8149	8494	9193	9150
1978	8410	8714	10450	11133	11305	9511	11440	14594	14765	14567	13873	13509
1979	11210	10054	12549	13266	13935	11249	13402	17921	18163	15807	12515	11561

1 Several studies publish data on monthly white potato shipments to Lima (see CONAP 1967, Shepherd et al. 1969, Fort, 1982, Teutscher and Tello 1983). Figures listed are considered the most reliable. See introduction to Appendix Two.

Source: 1960-71 (Graber 1973); 1972, 1974-79 (Market Administration MM # 1), 1973 (estimated on the basis of SIMAP and EMMSA statistics).

Note: Monthly figures listed above are identical to EMMSA data for years 1971 (except September), 1972, 1974 (except January and June), 1975-79.

Table A.18 Average monthly wholesale price (soles/kg) of yellow potatoes in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	2.77	2.78	2.87	2.70	2.96	2.54	2.88	2.99	3.16	3.11	3.68	3.15
1961	3.14	3.58	2.97	3.21	2.65	2.72	2.89	2.60	2.64	3.26	3.71	3.82
1962	3.51	2.67	3.22	3.02	2.96	3.06	3.18	3.49	3.96	3.93	3.93	3.44
1963	3.50	3.31	3.25	3.22	3.17	2.96	3.14	3.03	3.05	3.61	3.45	3.23
1964	3.23	3.05	3.05	3.10	2.93	2.86	2.82	2.85	2.92	2.94	2.89	3.27
1965	4.01	3.23	3.58	3.45	3.39	3.19	3.31	3.60	3.35	3.96	3.01	4.34
1966	4.36	4.15	4.08	4.15	3.03	3.55	3.48	3.01	4.69	3.36	3.27	4.48
1967	3.87	4.05	4.51	4.26	3.62	3.93	4.25	3.08	3.76	3.14	4.66	4.84
1968	5.16	4.97	4.96	4.48	4.68	4.76	3.53	3.50	3.44	3.67	3.82	4.94
1969	4.59	5.15	5.13	5.06	5.16	4.93	4.74	4.98	5.11	3.42	3.05	3.26
1970	7.13	5.77	5.44	5.30	5.17	5.19	5.32	5.84	5.86	5.81	5.65	5.73
1971	5.93	5.30	5.20	5.40	5.32	5.11	5.75	5.65	5.05	5.05	4.68	4.93
1972	5.65	5.78	6.00	6.10	5.80	6.15	6.44	6.39	6.12	6.04	5.77	5.52
1973	6.30	6.40	6.50	6.40	6.25	6.25	7.00	7.00	7.00	6.85	6.65	6.00
1974	5.85	6.00	6.40	6.40	6.40	6.45	6.60	6.60	6.70	6.95	6.90	7.15
1975	8.40	9.00	9.40	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	11.00
1976	11.50	12.00	12.00	12.00	12.25	12.00	13.00	13.00	13.00	16.00	16.00	15.75
1977	16.40	17.49	17.26	16.15	15.54	15.77	16.16	18.30	20.14	22.83	21.18	17.70
1978	14.59	14.26	15.55	19.34	16.76	16.76	16.76	16.76	17.00	17.00	17.00	23.00
1979	31.50	33.50	35.00	38.25	31.85	38.00	40.75	51.33	79.25	79.25	79.25	75.00

1 Prices for 1973 through 1979 were taken from "Fórmula B" records at INE.

Source: 1960-197? (June) (Graber 1974); 1972 (July) -79, (INE).

Table A.19 Average monthly retail price (soles/kg) of yellow potatoes in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	3.60	3.60	3.60	3.45	3.60	3.35	3.60	3.60	3.85	3.85	4.50	3.80
1961	3.45[2]	3.52[2]	3.66	3.92	3.53	3.43	3.45	3.35[2]	3.55[2]	3.61[2]	4.68	4.73
1962	4.23	3.80[2]	3.71	3.96	3.79	3.84	4.31[2]	4.31	4.61	4.90	4.92	4.35
1963	4.36[2]	4.18	4.08	3.98	3.84	3.75	3.71	3.69	3.87	4.56	4.65	4.20
1964	4.07	3.94	3.85	3.75	3.58	3.54	3.52	3.50	3.53	3.52	3.55	3.78[2]
1965	4.56	3.91	4.46	3.24	4.19	4.14	4.13	4.31	5.90	7.14	6.39	5.17
1966	5.27	5.07	5.15	5.09	5.69	6.13	6.20	6.17	5.17	4.97	5.76	5.47
1967	5.25	5.68	5.81	5.48	4.91	4.87	5.22	5.94	6.16	6.19	6.45	6.12
1968	6.24	6.21	6.24	6.19	5.87	5.87	6.07	7.23	6.71	7.15	7.51	6.93
1969	6.07	6.37	7.10	6.91	6.25	6.13	5.74	5.97	6.69	6.59	6.71	7.35
1970	8.90	7.31	6.53	6.72	6.45	6.58	6.63	6.70	7.09	7.15	6.70	7.13
1971	7.41	7.08	6.86	7.00	6.73	6.53	6.62	7.05	6.65	6.52	6.79	6.86
1972	7.35	7.47	8.49	7.74	7.01	7.12	6.99	7.17	7.55	8.62	7.95	8.18
1973	8.08	8.40	8.56	8.13	7.98	8.13	8.73	9.16	10.19	8.95	8.41	7.62
1974	7.56	7.63	8.09	8.26	8.43	8.49	8.82	9.11	9.19	9.26	9.51	9.49
1975	10.67	11.57	13.03	14.65	14.20	12.45	12.79	13.64	13.99	15.04	14.58	13.40
1976	13.61	13.35	13.56	13.60	13.45	13.33	14.11	14.48	16.24	22.60	19.89	18.69
1977	22.70	22.91	23.14	22.45	21.40	20.55	20.88	24.99	28.54	29.82	30.17	28.83
1978	26.96	26.51	27.29	29.56	30.68	32.34	31.72	34.71	34.65	36.19	39.18	39.27
1979	44.64	47.47	46.41	50.63	52.27	50.65	54.05	60.61	103.85	116.75	134.63	127.93

1 Alternative estimates for years 1971 to 1979 are in MA-DGAC (1981c). However, these prices appear to be regulated, or official, prices not actual prices, see MAA-DGC (1980).

2 This price was taken from Graber 1974, it differs from prices published in 1966 monthly bulletins as follows: 1961-Jan. 3.25, Feb. 4.19, Aug. 3.64, Sept. 3.94, Oct. 4.05; 1962-Feb. 3.77, July 3.81; 1963-Jan. 4.66; 1964-Dec. 3.78

Source: INE.

Table A.20 Monthly shipment (tons) of yellow potatoes to Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	291	254	243	384	369	281	130	61	97	100	39	158
1961	486	236	271	370	215	197	231	79	75	98	5	109
1962	153	172	196	149	162	169	164	58	58	43	93	120
1963	136	142	286	178	203	95	73	127	129	111	119	166
1964	356	206	535	441	663	416	518	321	296	329	228	231
1965	74	178	253	304	351	357	224	108	82	156	72	115
1966	55	61	69	234	124	90	85	79	96	87	137	82
1967	52	43	51	87	83	73	92	64	52	161	179	257
1968	43	35	42	55	52	46	147	104	84	160	177	254
1969	207	169	203	229	216	191	371	261	211	248	276	396
1970	231	188	226	422	399	352	446	314	254	484	538	771
1971	742	460	652	522	682	666	637	635	903	705	1110	1225
1972	1204	863	1518	1343	891	1311	1264	863	448	715	1496	2214
1973	1070	826	888	872	1055	933	756	522	408	735	1372	1608
1974	959	757	679	589	674	510	530	319	297	815	1108	1191
1975	909	1357	1711	2998	1988	1696	1948	577	429	522	790	1270
1976	1245	873	591	805	674	766	683	479	288	495	849	1172
1977	1219	926	739	648	694	634	867	1009	527	729	707	1267
1978	1151	730	680	608	654	558	588	747	555	720	894	948
1979	724	441	335	498	609	514	608	707	258	289	536	682

1 These figures are based on unloads of potato sacks in Lima's MM # 1. Over the last twenty years, various government offices issued estimates of yellow potato shipments to Lima. While most of these differences were minor, alternative estimates are as follows: in 1973-Jan. 1070; in 1974-Aug. 1452, Oct. 293, Nov. 757; in 1975-March 1273, April 2599, Dec. 37; in 1977-Jan. 1546.

Source: 1960-1966 (CONAP 1967); 1967-1970 estimated on the basis of Graber (1974); 1971 (Graber 1973); 1972, 1974-1979 (Market administration MM # 1); 1973 (SIMAP).

Table A.21 Average monthly retail price (soles/kg) of sweet potatoes in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	.90	.85	.80	.80	.80	.80	.80	.80	.80	1.00[2]	1.10	1.25[2]
1961	1.20[2]	1.15[2]	1.17	1.19	1.16	.95	1.17	1.45	1.22	1.29[2]	1.39	1.36
1962	1.30[2]	.81	.69	.66	.66	.65	.63	.87	.95	1.03	1.10	1.28
1963	1.17	1.08	.99	.98	1.14	1.08	1.15	1.21	1.39	1.50	1.24	1.21
1964	1.08	.91	.85	.83	.80	.80	.80	.98	.97	1.08	1.04	1.16
1965	1.24	1.05	1.09	1.07	1.09	1.40	1.33	1.37	1.20	1.37	1.29	1.48
1966	1.42	1.43	1.30	1.17	1.23	1.18	1.18	1.42	1.43	1.62	1.52	1.62
1967	1.58	1.46	1.44	1.38	1.29	1.24	1.18	1.13	1.16	1.46	1.69	1.82
1968	1.89	2.04	1.90	1.85	1.88	1.99	2.79	3.33	3.88	4.24	3.91	3.35
1969	3.07	2.46	1.55	1.55	1.52	1.40	1.31	1.49	1.53	1.53	1.53	1.53
1970	1.72	1.65	1.66	1.56	1.43	1.45	1.46	1.45	1.91	2.20	2.32	2.35
1971	2.45	2.57	2.57	2.41	2.28	2.12	1.98	1.84	2.01	2.57	2.67	2.75
1972	2.92	3.20	3.02	2.64	2.57	2.63	2.70	2.74	2.94	3.30	3.34	3.05
1973	2.95	2.95	2.63	2.44	2.56	2.37	2.45	2.47	2.47	2.49	3.01	3.24
1974	3.76	3.77	4.05	3.97	4.10	4.12	4.18	4.62	4.74	5.01	5.51	5.48
1975	5.64	5.87	5.80	5.84	5.57	5.12	4.56	4.60	4.50	4.68	4.89	5.42
1976	5.78	5.93	5.64	6.05	6.15	6.14	6.21	6.14	6.41	7.09	8.55	9.94
1977	11.67	11.18	10.67	10.07	9.23	8.88	8.96	9.00	8.90	9.04	9.46	9.67
1978	10.03	10.22	10.07	9.93	10.29	11.60	12.11	14.01	17.26	19.71	22.71	23.57
1979	25.65	25.76	25.30	24.62	24.64	25.78	25.83	25.13	23.52	22.64	25.44	25.67

1 Prices are for camote amarillo (yellow sweet potato) 1960-1972 and for camote (sweet potato) all other years.

2 This price is an early estimate; it differs from the one listed in later, 1966 monthly bulletins as follows: in 1960-Dec. 1.20; in 1961-Jan. 1.19, Feb. .81, Oct. 1.40; in 1962-Jan. 1.13.

Source: INE.

Table A.24 Average monthly retail prices (soles/kg) of chicken in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	35.00	35.00	35.00	35.00	34.00	34.00	34.00	34.00	36.00	36.00	35.00	35.00
1961	35.00[2]	34.39[2]	33.80	33.82	33.56	34.02	34.03[2]	34.31	34.86	34.74[2]	34.63	34.68
1962	34.75	34.50	34.52	34.83	34.71	34.83	34.77	34.69	34.70	34.70	34.74	34.64
1963	34.52	34.59	34.58	34.68	34.65	34.50	34.81	34.80	34.93	34.75	34.79	34.73
1964	34.86	35.00	35.16	35.08	35.25	35.16	35.62	36.92	37.28	37.40	38.36	39.24
1965	39.83	40.37	40.31	39.53	39.71	39.18	39.47	39.30[2]	39.13	38.95	39.09	39.23
1966	38.67	38.67	38.67	38.67	38.67	38.67	38.67	38.67	38.67	38.67	38.67	38.67
1967	38.67	38.67	38.67	38.67	38.67	39.00	39.00	39.00	39.00	43.00	43.17	43.75
1968	43.83	43.50	44.25	44.25	44.50	44.25	44.33	44.17	44.50	44.42	44.00	44.17
1969	44.42	46.33	41.17	50.42	50.58	49.33	48.67	48.67	48.67	48.83	50.00	51.25
1970	54.96	56.03	55.69	55.50	53.13	51.63	52.05	52.25	52.44	55.78	56.77	58.24
1971	60.17	60.91	60.69	61.43	61.96	62.10	64.71	67.63	64.89	65.28	66.94	66.19
1972	66.83	67.22	68.85	69.84	69.91	69.81	69.44	69.73	68.84	68.34	67.35	68.72
1973	42.86	43.99	46.59	47.17	53.20	53.47	55.71	56.80	56.37	57.38	57.72	59.40
1974	57.20	58.40	59.72	58.88	59.63	60.49	59.74	60.91	61.70	63.01	63.96	64.14
1975	69.91	72.86	74.88	75.29	77.81	78.47	80.89	82.93	81.26	81.04	81.63	82.51
1976	93.16	93.91	92.84	90.48	80.83	69.91	99.98	97.28	99.41	104.91	107.90	117.07
1977	119.64	118.33	120.54	120.69	119.65	113.47	123.82	146.90	148.38	150.31	150.02	157.25
1978	177.22	185.41	175.00	169.88	181.21	188.14	207.87	232.47	268.02	294.41	299.56	306.17
1979	324.38	332.83	318.42	324.39	326.37	367.62	437.15	483.79	500.70	360.00	436.20	428.83

1 Prices are for carne de gallina (chicken meat) 1960-72 and for pollo (chicken) 1973-79.

2 This price is an early estimate; it differs from the one listed in 1966 monthly bulletins as follows: in 1961-Jan. 34.78, Feb. 34.16, July 34.09, Oct. 34.61; in 1965-Aug. 39.00.

Source: INE.

Table A.25 Average monthly retail prices (soles /kg) of noodles in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	6.00
1961	6.00	5.60[2]	5.22	5.22	5.23	5.23	5.22	5.23	5.22	5.22	5.21	5.23
1962	5.24	5.22	5.21	5.20	5.22	5.21	5.20	5.20	5.20	5.20	5.63	5.65
1963	5.63	5.62	5.64	5.65	5.61	5.64	5.64	5.64	5.65	5.65	6.11	6.21
1964	6.20	6.22	6.50	6.61	6.61	6.62	6.60	6.63	6.63	6.63	6.63	6.62
1965	6.60	6.64	6.64	6.63	6.64	6.63	6.63	6.64	6.59	6.62	6.63	6.61
1966	6.63	6.60[3]	6.63[3]	7.10	7.08[3]	7.15[3]	7.15	7.17[3]	7.16[3]	7.19	7.19[3]	7.17[3]
1967	7.10	7.05[4]	7.03[4]	7.10	7.10[4]	7.13[4]	7.20	7.94[4]	9.00	9.00	9.03[4]	9.17
1968	9.50	9.70	9.70	9.70	9.70	9.72	9.72	9.72	9.72	9.83	9.83	9.83
1969	9.83	9.82	9.82	9.82	9.82	9.82	9.82	9.78	9.77	9.77	9.77	9.77
1970	9.77	9.77	9.80	9.80	9.80	9.82	9.82	9.82	9.82	9.82	9.83	9.83
1971	9.83	9.83	9.87	9.87	9.87	9.87	9.87	9.87	9.87	9.95	10.11	10.21
1972	10.26	10.31	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33
1973	10.87	11.01	10.73	10.89	10.92	10.93	10.95	11.01	11.05	11.07	11.07	11.08
1974	11.35	14.39	14.56	14.56	14.77	15.07	15.48	15.49	15.49	15.49	15.49	15.50
1975	16.70	18.28	18.22	18.32	18.50	18.56	18.56	18.48	18.40	18.31	18.41	18.38
1976	19.83	21.06	21.10	21.05	21.14	21.12	24.96	26.69	27.02	27.01	27.01	27.01
1977	27.00	28.37	29.61	29.61	29.61	34.06	35.70	32.61	32.67	32.72	32.71	32.71
1978	40.60	47.76	47.67	47.67	69.50	71.49	74.46	74.42	74.45	74.45	74.45	74.45
1979	74.61	94.26	95.11	95.36	95.37	95.38	128.27	128.27	128.27	128.27	128.27	128.27

1 Prices are for fideos (noodles) 1960, 1968-1979 and for fideos a granel (noodles in bulk) in other years.

2 Missing data in early bulletins; replaced with estimate for this study. Later bulletin lists price as 5.21.

3 Missing data in Jan. 1967 bulletin; prices listed are from Dec. 1966 bulletin.

4 Missing data in INE bulletins; replaced with estimates calculated for this study.

Source: INE.

Table A.22 Average monthly retail price (soles/kg) of cassava in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	2.80	2.35	2.45	2.25	2.25	2.25	1.80	1.80	1.90	2.30	2.25	2.15
1961	2.25[2]	1.96[2]	1.75	1.83	1.82	1.82[2]	1.87	2.01	2.27	2.29[2]	2.40	2.28
1962	2.33	2.26[2]	2.32	2.37	2.33	2.31	2.21	2.21	2.21	2.27	2.23	2.29
1963	2.40	2.41	2.57	2.60	2.64	2.42	2.39	2.38	2.47	2.49	2.50	2.45
1964	2.41	2.27	2.04	1.94	1.89	1.82	2.00	2.07	2.07	2.07	2.06	2.11
1965	2.18	2.12	2.17	2.42	2.62	2.71	2.72	2.67	2.81	3.04	3.05	3.27
1966	3.33	3.76	4.20	4.14	3.98	3.54	3.52	3.79	3.88	3.94	3.94	3.88
1967	3.89	3.78	3.85	3.60	3.62	3.58	3.27	3.03	2.78	2.97	2.24	2.71
196	2.64	2.69	2.85	2.86	3.02	3.27	3.51	3.70	4.05	4.58	4.75	4.86
1969	5.22	5.84	6.59	6.94	6.38	5.79	5.20	5.28	5.36	5.48	5.78	5.94
1970	6.22	6.02	5.76	5.43	4.82	4.49	4.36	4.32	4.19	4.28	3.89	3.90
1971	4.19	4.37	4.35	4.11	3.89	3.75	3.87	3.90	3.93	3.97	4.54	4.58
1972	4.27	4.39	5.86	5.39	5.15	5.36	5.08	5.07	5.27	5.37	5.47	5.69
1973	5.85	5.88	6.19	6.34	6.30	6.13	6.15	6.05	5.98	5.87	5.62	5.19
1974	5.11	4.86	6.03	5.57	5.19	5.65	5.28	5.55	5.63	5.83	6.03	6.22
1975	8.49	8.69	10.24	10.10	9.97	9.52	9.45	10.11	10.40	10.31	10.91	10.76
1976	11.13	10.97	11.14	10.71	11.14	10.81	10.67	10.67	11.15	11.05	11.08	10.98
1977	13.32	13.13	13.26	13.12	12.89	12.81	13.51	13.92	15.10	16.05	17.48	16.58
1978	16.74	16.24	16.22	16.33	18.12	18.25	18.23	19.31	20.58	24.26	27.67	28.94
1979	34.12	36.48	36.64	39.66	39.86	39.95	41.08	42.17	45.93	63.70	77.97	77.97

1 Prices are for yuca blanca (white cassava) 1961 to 1965, 1977 to 1979 and for yuca (cassava) all other years.

2 This price is an early estimate; it differs from the one listed in later, 1966 monthly bulletins as follows: in 1961-Jan. 2.78, Feb. 1.73, June 1.85, Oct. 2.36; in 1962-Feb. 2.20.

Source: INE.

Table A.23 Average monthly retail price (soles/kg) of rice in Lima: 1960-79.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1961	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1962	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1963	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.39	3.80	3.80	3.80
1964	3.80	4.12	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.27	4.21
1965	4.20	4.23	4.20	4.30	4.29	4.30	4.30	4.30	4.30	4.30	4.30	4.30
1966	4.30	4.30[2]	4.30[2]	4.30	4.30[2]	4.30[2]	4.30	4.30[2]	4.30	4.30	4.30[2]	4.30[2]
1967	4.30	4.30[2]	4.30[2]	4.30	4.30[2]	4.30[2]	4.30	4.30[2]	4.30	4.30	4.30[2]	4.30
1968	6.50	6.98	7.47	7.95	7.95	8.80	8.80	8.80	8.80	8.80	8.80	8.80
1969	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80
1970	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80
1971	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80
1972	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80
1973	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80	8.80
1974	10.08	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60
1975	11.86	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30
1976	15.19	16.50	16.50	16.50	16.50	16.50	20.00	20.00	20.00	20.00	20.00	20.00
1977	20.00	20.00	23.50	23.50	23.50	25.75	28.00	28.00	28.00	28.00	28.00	28.00
1978	31.25	34.50	34.50	34.50	34.50	34.50	37.00	39.50	39.50	39.50	39.50	39.52
1979	48.00	48.00	59.00	59.00	59.02	59.03	80.00	80.00	80.00	80.00	80.00	80.00

1 Prices are for arroz (rice) 1961-65 and 1968-70 for arroz nacional (national rice) in 1966 and 1967, and for arroz corriente (ordinary rice) all other years.

2 Left blank in Jan. 1967 bulletin; listed as 4.30 in Dec. 1966 bulletin.

Source: INE.

Table A.26 Monthly index (1979=100) of consumer prices in Lima: 1960-79.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	4.61	4.61	4.61	4.58	4.59	4.59	4.63	4.69	4.73	4.78	4.73	4.69
1961	4.77	4.79	4.86	4.92	4.96	4.89	4.92	4.96	5.00	4.97	5.02	5.10
1962	5.16	5.20	5.23	5.25	5.25	5.28	5.29	5.25	5.24	5.29	5.31	5.34
1963	5.43	5.43	5.53	5.53	5.52	5.48	5.54	5.57	5.60	5.68	5.76	5.81
1964	5.90	5.92	5.96	6.01	6.07	6.08	6.12	6.23	6.24	6.25	6.24	6.47
1965	6.64	6.76	6.91	7.13	7.19	7.17	7.20	7.21	7.20	7.29	7.37	7.43
1966	7.48	7.57	7.60	7.65	7.66	7.68	7.79	7.89	7.88	7.95	7.94	8.00
1967	8.01	8.01	8.08	8.12	8.25	8.29	8.33	8.36	8.85	9.12	9.21	9.51
1968	9.66	9.72	9.82	9.90	9.97	10.23	10.36	10.42	10.38	10.40	10.40	10.44
1969	10.48	10.53	10.68	10.85	10.86	10.83	10.82	10.78	10.74	10.80	10.88	11.04
1970	11.11	11.07	11.13	11.18	11.16	11.28	11.30	11.34	11.44	11.53	11.58	11.66
1971	11.71	11.77	11.86	11.88	11.93	11.99	12.18	12.26	12.19	12.29	12.40	12.55
1972	12.62	12.74	13.28	12.91	12.79	12.96	12.88	12.92	13.06	13.14	13.05	13.09
1973	13.21	13.35	13.61	13.74	14.03	14.22	14.36	14.48	14.70	14.76	14.88	14.89
1974	15.16	15.51	15.74	15.98	16.38	16.76	16.89	16.96	17.16	17.18	17.50	17.75
1975	18.24	18.90	19.16	19.55	19.84	20.17	21.16	21.46	21.67	21.88	21.96	22.01
1976	23.53	24.02	24.41	24.57	24.72	24.86	28.27	29.37	30.38	31.07	31.36	31.84
1977	32.97	33.47	34.18	34.71	35.34	37.91	39.00	40.08	40.68	41.11	41.71	42.17
1978	45.32	47.38	48.76	49.94	56.57	59.19	61.49	64.20	67.45	70.12	71.73	73.24
1979	77.45	81.51	85.55	89.76	92.97	95.77	103.02	106.14	110.79	115.20	119.75	122.09

Source: INE.

Table A.27. Monthly estimates of average daily wage (soles) in Lima: 1960-79.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	40.3	40.7	41.0	41.3	41.7	42.0	42.3	42.7	43.0	43.3	43.6	44.0
1961	44.3	44.6	45.0	45.3	45.6	46.0	46.3	46.7	47.0	47.3	47.7	48.0
1962	48.3	48.6	49.0	49.3	49.6	50.0	50.4	50.8	51.3	51.7	52.1	52.5
1963	52.9	53.3	53.8	54.2	54.6	55.0	55.6	56.2	56.7	57.3	57.9	58.5
1964	59.1	59.7	60.2	60.8	61.4	62.0	62.6	63.2	63.7	64.3	64.9	65.5
1965	66.1	66.7	67.2	67.8	68.4	69.0	69.6	70.2	70.7	71.3	71.9	72.5
1966	73.1	73.7	74.2	74.8	75.4	76.0	76.4	76.8	77.3	77.7	78.1	78.5
1967	78.9	79.3	79.8	80.2	80.6	81.0	82.3	83.5	84.8	86.0	87.3	88.5
1968	89.8	91.0	92.3	93.5	94.8	96.0	97.3	98.5	99.8	101.0	102.3	103.5
1969	104.8	106.0[2]	106.3	106.5	106.8	107.0[2]	111.0[2]	110.7	110.3	110.0[2]	109.8	109.5
1970	109.3	109.0[2]	110.5	112.0	113.5	115.0[2]	114.0[2]	114.3	114.7	115.0[2]	116.2	117.4
1971	118.6	119.8	121.0[2]	122.0	123.0	124.0[2]	129.7	135.3	141.0[2]	141.0	141.0	141.0[2]
1972	143.3	145.7	148.0[2]	150.0	152.0	154.0[2]	153.7	153.3	153.0	153.7	154.3	155.0[2]
1973	161.0	167.0	173.0[2]	178.3	183.7	189.0[2]	186.0	183.0	180.0	184.7	189.3	194.0[2]
1974	198.3	202.7	207.0[2]	210.7	214.3	218.0[2]	218.9	219.7	220.6	221.4	222.3	223.1
1975	224.0	224.9	225.7	226.6	227.4	228.3	229.1	230.0[2]	236.5	243.0[2]	253.8	264.6
1976	275.4	286.2	297.0[2]	301.7	306.3	311.0[2]	326.7	342.3	358.0[2]	357.8	357.7	357.5
1977	357.3	357.2	357.0[2]	359.0	361.0	363.0[2]	371.7	380.3	389.0[2]	391.3	393.6	396.0[2]
1978	414.0	432.0	450.0[2]	472.0	494.0	516.0[2]	533.7	551.3	569.0[2]	581.7	594.3	607.0[2]
1979	645.0	683.0	721.0[2]	737.0	745.0	753.0[2]	813.3	873.7	934.0[2]	979.0	1024.0	1069.0[2]

1 Metropolitan Lima.

2 Ministry of Labor figure. See note below.

Source: Elaborated for this study.

Note: These estimates were calculated using estimates of daily wages published periodically by the Ministry of Labor. Annual estimates for 1960 to 1966 were assumed to refer to June. Later, estimates were for specified months. Interpolation was used to generate other monthly figures.

Table A.28 Monthly estimated population (000) of Lima[1]: 1960-79.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960	1704	1712	1719	1727	1735	1742	1750	1758	1766	1774	1781	1789
1961	1797	1805	1813	1821	1830	1838	1846	1854	1862	1871	1879	1887
1962	1896	1904	1913	1921	1930	1938	1947	1956	1964	1973	1982	1991
1963	2000	2008	2017	2026	2035	2044	2054	2063	2072	2081	2090	2100
1964	2109	2118	2128	2137	2147	2156	2166	2175	2185	2194	2205	2215
1965	2224	2234	2244	2254	2264	2274	2284	2295	2305	2315	2325	2336
1966	2346	2357	2367	2378	2388	2399	2409	2420	2431	2442	2453	2464
1967	2475	2486	2497	2508	2519	2530	2541	2553	2564	2575	2587	2598
1968	2610	2622	2633	2645	2657	2669	2680	2692	2704	2716	2728	2741
1969	2753	2765	2777	2790	2802	2815	2827	2840	2852	2865	2878	2891
1970	2903	2916	2929	2942	2956	2969	2982	2995	3008	3022	3035	3049
1971	3062	3076	3090	3103	3117	3131	3145	3159	3173	3187	3201	3216
1972	3230	3244	3258	3273	3289	3303	3313	3323	3333	3343	3353	3363
1973	3374	3384	3394	3405	3415	3425	3436	3446	3457	3467	3478	3488
1974	3499	3510	3520	3531	3542	3553	3563	3574	3585	3596	3607	3618
1975	3629	3640	3651	3662	3674	3684	3696	3707	3718	3729	3741	3753
1976	3764	3775	3787	3798	3810	3822	3833	3845	3857	3868	3880	3892
1977	3904	3916	3928	3940	3952	3964	3976	3988	4000	4012	4024	4037
1978	4049	4061	4074	4086	4099	4111	4124	4136	4150	4151	4174	4196
1979	4199	4212	4225	4239	4251	4254	4276	4290	4303	4315	4329	4343

1 Metropolitan Lima.

Source: Elaborated for this study.

Note: These monthly estimates were developed using census data for Metropolitan Lima for July 1961, June 1972, and July 1981, along with estimated growth rates between years all stated in INE (1981).

Table A.29 Annual potato shipments (000 t) to Lima by region: 1959-79.[1]

Year	Sierra[2] North[3]	Sierra[2] Central[4]	Sierra[2] South[5]	Sierra[2] Sub-total	Coast[2] North[3]	Coast[2] Central[4]	Coast[2] South[5]	Coast[2] Sub-total	Other origin	Total
1959	1.2	36.8	.2	38.2	---	37.5	---	37.5	---	75.7
1960	2.7	36.0	*	38.7	---	39.6	---	39.6	---	78.3
1961	4.4	39.5	*	43.9	---	39.4	---	39.4	---	83.5
1962	3.1	35.8	.1	39.0	---	39.6	---	39.6	---	78.6
1963	3.0	47.3	.3	50.3	---	34.1	---	34.1	---	84.7
1964	6.3	75.8	.7	82.8	---	46.4	---	46.4	---	129.2
1965	10.5	70.1	.4	81.0	---	47.4	---	47.4	---	128.4
1966	30.6	49.9	.9	81.3	---	46.6	---	46.6	---	127.9
1967	24.1	65.9	1.2	91.3	---	59.4	---	59.4	---	150.7
1968	12.9	63.4	.4	76.6	---	67.2	---	67.2	---	143.9
1969	20.4	71.9	3.0	95.3	---	70.2	---	70.2	---	165.5
1970	22.9	79.0	4.2	106.1	---	85.6	---	85.6	---	191.7
1971	10.9	123.4	2.4	135.8	---	106.2	---	106.2	---	242.0[6]
1972	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1973	2.5	92.9	3.2	98.6	---	85.2	---	85.2	0.0	183.7
1974	.2[7]	45.8[7]	1.5[7]	47.5[7]	0.0[7]	96.9[7]	--- [7]	96.9[7]	.2[7]	144.6[7]
1975	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1976	3.5	119.5	5.0	127.9	4.1	128.0	0.1	132.3	4.4	264.6
1977	6.4[8]	94.6[8]	2.4[8]	103.5[8]	1.7[8]	106.7[8]	0.1[8]	108.6[8]	.2[8]	212.5[8]
1978	2.8	137.3	4.6	142.7	1.6	151.8	1.7	155.1	.6	296.9
1979	7.3	139.6	5.8	152.7	1.3	120.4	1.8	123.5	.7	277.0

* Less than 100 tons.

n.a. = not available.

1 Regions are defined in Appendix two.

2 For years 1959-70, the data includes white and yellow potatoes only; for 1971-79 all potatoes.

3 For years 1959-70, north Sierra includes Ancash, Cajamarca, La Libertad, Lambayeque and Piura; available data for north Coast indicates no potatoes were shipped to Lima in this period. For years 1971-79, north Sierra also includes Loreto and San Martin and north Coast includes Lambayeque, Piura and Trujillo (July-December only for north Coast).

4 For years 1959-70, central Sierra includes Junin, Huancavelica, Huanuco, Lima (just Canta and Huarochiri provinces) and Pasco; central Coast includes Ica and Lima (except provinces included in central Sierra). For years 1971-79, besides the departments already mentioned for both regions, central Sierra includes Ancash (except Casma and Santa provinces) and central Coast includes Casma and Santa.

5 For years 1959-70, available data for south Coast indicate no potatoes were shipped to Lima, south Sierra includes Apurimac, Cuzco, Ayacucho and Arequipa (just the provinces of Caylloma and Arequipa). For years 1971-79, south Coast includes Arequipa (except Caylloma and Arequipa) and south Sierra includes the same departments as the period above.

6 Includes potatoes reshipped from Lima to the provinces.

7 Data for the following months only: January, May, June, July, August, September, October, and November.

8 Data for all months except April.

Source: 1959-70 (Graber 1973); 1971 (EMMSA); 1973 (SIMAP); 1974-79 (Market administration MM #1).

Table A.30 Annual potato shipments (000 t) to Lima by department: 1959-79.

Year	Department									
	Huanca-velica	Hua-nuco	Ica	Junin	La Li-bertad[1]	Lima	Pasco	Other Depts.[2]	Unknown origin[3]	Total[4]
1959	*	10.5	1.3	22.3	n.a.	36.8	.8	1.4	2.6	75.7
1960	*	9.7	1.2	21.8	n.a.	39.8	.6	2.6	2.4	78.3
1961	*	10.8	2.6	23.6	n.a.	38.4	1.3	4.4	2.4	83.5
1962	*	9.9	3.0	22.4	n.a.	38.0	.5	3.2	1.5	78.6
1963	.2	8.0	2.1	34.9	n.a.	33.7	.8	3.2	1.8	84.7
1964	.7	17	2.2	51.9	n.a.	45.2	2.1	7.0	4.5	129.2
1965	.7	10.8	3.0	46.8	n.a.	46.2	1.8	10.9	2.3	128.4
1966	1.3	14.7	2.3	29.6	n.a.	45.5	1.9	31.5	1.2	127.9
1967	1.3	14.7	3.5	46.1	n.a.	56.3	2.2	25.3	1.2	150.7
1968	1.3	14.2	2.7	44.4	n.a.	65.0	1.9	13.3	1.2	143.9
1969	1.4	17.3	4.6	47.2	n.a.	67.2	1.5	23.3	3.0	165.5
1970	3.2	23.1	7.1	44.7	n.a.	76.7	3.3	26.9	4.6	191.7
1971	10.0	28.9	6.4	67.9	10.1	102.9	10.9	5.0	---	242.0[5]
1972	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1973	7.8	27.7	11.6	41.0	2.5	73.6	16.1	3.5	---	183.7
1974	3.5[6]	8.9[6]	14.4[6]	25.9[6]	.2[6]	84.3[6]	5.6[6]	1.7[6]	.2[6]	144.6[6]
1975	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1976	14.4	23.5	14.3	63.6	7.5	115.0	15.2	6.2	4.4	264.1
1977	8.1[7]	4.0[7]	16.8[7]	44.1[7]	7.7[7]	90.5[7]	15.1[7]	5.9[7]	.2[7]	212.5[7]
1978	13.0	20.8	22.3	76.6	4.3	131.0	21.5	6.8	.6	296.9
1979	13.9	18.2	22.0	78.9	8.0	99.4	26.9	9.0	.7	277.0

* Less than 100 tons.

n.a. = not available.

1 For years 1959-70, La Libertad shipments are included in "other departments".

2 For years 1959-70, "other departments" includes Ancash, Apurimac, Arequipa, Ayacucho, Cajamarca, Cuzco, Lambayeque, La Libertad and Piura. For years 1971-79, "other departments" includes Amazonas, Ancash, Apurimac, Ayacucho, Cajamarca, Cuzco, Lambayeque, Loreto, Madre de Dios, Moquegua, Piura, Puno, San Martin, Tacna, and Tumbes.

3 For years 1959-70, unknown origin refers to yellow potatoes from the north, central, and south Sierra. For years 1971-79, "unknown origin" refers to "other origin" or "unknown origin" in the annual records.

4 Sub-totals may not sum to equal total due to rounding errors.

5 Includes potatoes reshipped from Lima to the provinces.

6 Data for the following months only: January, May, June, July, August, September, October, and November.

7 Data for all months except April.

Source: 1959-70 (Graber 1973); 1971 (EMMSA); 1973 (SIMAP); 1974-79 (Market administration MM #1).