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LTC Research Paper

Agro-Exports and the Rural Resource Poor in Latin America:

Policy Options for Achieving Broadly Based Growth

by

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FOR ACHIEVING BROADLY BASED GROWTH**

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TABLE OF CONTENTS

	<u>Page</u>
List of tables, figures, and diagrams	v
Executive summary	vii
1. Introduction	1
1.1 Sectoral, macroeconomic, and intrahousehold effects of agro-export growth	2
1.2 Organization and overview of paper	3
2. Impact of agro-export growth on the rural resource poor: Linkages between small farm production, employment generation, and induced structural change	4
3. Economics of export-crop profitability and induced structural change in dualistic agrarian structure: Identifying levers for policy	7
3.1 Potential farm-size biases in production of exports crops	7
3.2 Contract farming, sharecropping, and mitigation of small-farm bias	11
3.3 Short-term effects of agro-export growth: Adoption and employment decisions	13
3.4 Competitiveness regime and willingness to pay for land: Land market and medium-term effects of agro-export growth	15
3.4.1 Capitalization of income value into a reservation price for land: Competitiveness regime	15
3.4.2 How land markets work	17
3.5 Summary: Points of policy entry	17
4. Agro-export growth in Chile, Guatemala, and Paraguay: Heterogeneous sectoral impacts on the rural resource poor	18
4.1 Exclusionary growth in Paraguay	20
4.2 Broadly based growth in Guatemala	22
4.3 Ambiguous growth in Chile	23
5. Policy options for achieving broadly based growth	25
5.1 Getting prices and institutions "right": Minimalist policy, but it takes more than free markets	27
5.2 Picking winners for public investment	29
5.3 Land market reform: Perhaps necessary, but not sufficient for rural resource poor	30
5.4 Closing the competitiveness gap with factor market reform: Capital-insurance nexus	32
6. Bringing activist policy back in for broadly based growth	34
References	73

Annex A	Chile's fruit-export boom and its impact on the employment opportunities and land access of the resource poor	37
A-1	Background	37
A-2	Adoption of export crops	37
A-3	Effects of adoption on the agrarian structure	38
A-4	Impact of nontraditional export agriculture on labor absorption	40
A-5	Conclusion	41
Annex B	Impact of nontraditional agricultural exports on agrarian structure and labor absorption in the Highlands of Guatemala	49
B-1	Background	49
B-2	Scale of production and labor absorption in different crops	50
B-3	Adoption and accumulation patterns in Guatemala's latest agro-export boom	50
B-4	Nontraditional exports, agrarian structure, and labor absorption dynamics	52
B-5	Conclusions	52
Annex C	Small-farm "competitiveness gap" and exclusionary agro-export growth in Paraguay	59
C-1	Background	59
C-2	Evolving agrarian problem in Paraguay: Land hunger in the midst of rapid agro-export growth	60
C-3	Resource allocation, labor absorption, and the small-farm competitiveness gap	64
C-4	Land market and structural change	65
C-5	Policies to resolve exclusionary growth	66

LIST OF TABLES, FIGURES, AND DIAGRAMS

Table 1	Summary of literature on labor intensity of export crops	5
Table A-1	Size distribution of fruit-growing farms	42
Table A-2	Distribution of land by farm size, 1976 and 1991	42
Table A-3	Sale of <i>parcelas</i> , 1991	42
Table A-4	Hectares dedicated to fruit plantations	43
Table A-5	Changes in land area dedicated to fruit plantations	43
Table A-6	Total sales of <i>parcelas</i> , 1975-1991	43
Table A-7	Total sales of <i>parcelas</i> , 1975-1991	44
Table A-8	Percentage of land dedicated to fruit and vegetables by farm size	44
Table B-1	Regression results on labor absorption by crop	54
Table B-2	Land allocated to nontraditional exports: Tobit estimates	55
Table B-3	SUR results on land accumulation per-year and adoption, pre-boom and boom	56
Table B-4	Simulation results on labor absorption, 1987, 1991, and 1995	56
Table C-1	Fundamental regressions	67
Figure 1a	Export versus traditional crop labor absorption	14
Figure 1b	Value of land	14
Figure 1c	Land accumulation	14
Figure 2	Welfare impacts of agro-export growth on the rural resource poor	19
Figure A-1	Distribution of land in Cachapoal, 1977	45
Figure A-2	Distribution of land in Cachapoal, 1991	45
Figure A-3	Distribution of land in Nuble, 1976	46
Figure A-4	Distribution of land in Nuble, 1991	46
Figure A-5	Percentage of total sales, 1978-1991	47
Figure A-6	Labor absorption by scale of operation, Cachapoal	47
Figure A-7	Labor absorption by scale of operation, Nuble	48
Figure B-1	Labor absorption by operational size	57
Figure B-2	Farm size and adoption of nontraditional exports	57
Figure B-3	Estimated land accumulation trajectories: Initial land endowment, 2 cuerdas	58
Figure B-4	Estimated land accumulation trajectories: Initial land endowment, 30 cuerdas	58
Figure C-1	Labor absorption per hectare	69
Figure C-2	Marginal value of land	69
Figure C-3	Annual land accumulation	69
Figure C-4	Real land appreciation	70
Figure C-5	Economic competitiveness reservation purchase prices	70
Figure C-6	Land price and lot size	71
Diagram 1	Economics of the impact of agro-exports on the rural resource poor	8
Diagram 2	Continuum of policies for achieving broadly based growth	26

EXECUTIVE SUMMARY

Drawing on extensive field research, this paper carefully takes apart several agro-export booms in Latin America in order to identify their direct (adoption of export crops and land access) and indirect (labor absorption) effects on the rural resource poor. Across countries and regions, these effects have been heterogeneous and at times even socially problematic in ways that could threaten the stability of emerging democratic polities. The principal findings of this study are:

1. The experience of agro-export growth is heterogeneous; it neither automatically nor necessarily includes disadvantaged groups and in some cases has affected them negatively. The challenge is to understand and learn from this heterogeneous experience; in this spirit, the paper puts forward policy options for attaining more broadly based agro-export growth.
2. Broadly based agro-export growth will usually require more than market liberalization and an outward-looking policy orientation. Without a more activist policy, a number of economic factors conspire against the direct participation of small-scale producers in agro-export production. While the rural resource poor can indirectly benefit from employment generated by agro-export growth, policy that leaves small-scale producers uncompetitive in export production is liable to witness medium-term, induced, structural changes that diminish the land access of the rural resource poor and dampen net employment effects.
3. The policies needed to generate broadly based growth are to an extent conditional or dependent on the specific economic context in which growth is to occur. However, two policies that emerge as unambiguously important are those that improve the small farmer's access to capital and to insurance. Without such policies, small farm participation in agro-export production will be nonexistent or muted at best, except in very special circumstances.

In summary, people-friendly—but not market-naïve—liberalization must bring back a degree of microeconomic activism if low-income agrarian economies are to follow paths of sustainable development with equity.

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1. INTRODUCTION

The economic crisis of the 1980s and the shift to outward-looking development strategy ignited interest in agricultural export promotion throughout Latin America. Export strategies continue to dominate agricultural development discussion in the region. In many countries, extraordinarily rapid agro-export growth has been achieved. From the mid- to late-1980s, nontraditional agro-export production grew at 222 percent in Chile, 78 percent in Guatemala, and 348 percent in Costa Rica. During the otherwise difficult decade of the 1980s, agricultural exports nearly tripled in Paraguay, Latin America's most agrarian country.

Surrounding these export booms is a literature rich in commodity studies that identify and evaluate export market niches. While an important component of the export promotion and support policies that have been pursued in the region, this literature is relatively quiet concerning the U.S. Agency for International Development's (AID's) fundamental strategic objective of supporting broadly based economic growth.² *This paper examines agro-export growth and policy from the perspective of the strategic objective of broadly based growth that underlies AID's commitment to agricultural export promotion.* Drawing on extensive field research, this paper carefully takes apart several agro-export booms in order to identify their direct (adoption of export crops and land access) and indirect (labor absorption) effects on the rural resource poor in Latin America. Across countries and regions, these effects have been heterogeneous and at times even socially problematic in ways that could threaten the stability of emerging democratic polities. The principal findings of this study are:

The experience of agro-export growth is heterogeneous; it neither automatically nor necessarily includes disadvantaged groups. In some cases, it has affected them negatively. The challenge is to understand and learn from this heterogeneous experience; in this spirit, this paper puts forward policy options for attaining more broadly based agro-export growth.

1. Figures from Barham et al. (1992b) and Weisskof(1992).

2. See the USAID (1992) strategic planning document.

2. Broadly based agro-export growth will usually require more than market liberalisation and an outward-looking policy orientation. Without a more activist policy, a number of economic factors conspire against the direct participation of small-scale producers in agro-export production. While the rural resource poor can indirectly benefit from employment generated by agro-export growth, policy that leaves small-scale producers uncompetitive in export production is liable to witness medium term, induced structural changes that diminish the land access of the rural resource poor and dampen net employment effects.
3. The policies needed to generate broadly based growth are to an extent conditional or dependent on the specific economic context in which growth is to occur. However, two policies that emerge as unambiguously important are those that improve the small farmer's access to capital and to insurance. Without such policies, small farm adoption of agro-export crops will be nonexistent or muted at best, except in very special circumstances. Unfortunately, the same information costs that underlay the failure of competitive markets to provide small farms with access to capital and insurance also confront public policy efforts. In the final analysis, broadly based agro-export growth requires nontraditional capital and insurance access, such as that afforded by group lending programs.

This paper will develop these points in detail against a theoretical background which renders them intelligible. Before turning to this task, it is useful to identify the full range of levels at which agro-export growth can affect the welfare of the rural resource poor and to place this work in context.

1.1 SECTORAL, MACROECONOMIC, AND INTRAHOUSEHOLD EFFECTS OF AGRO-EXPORT GROWTH

The full impacts of agro-export growth on the well-being of the rural resource poor occur at three levels. The most fundamental is the sectoral level at which agro-export production takes place. Radiating upward from this level are secondary, macroeconomic effects; radiating downward are intrahousehold effects. An exhaustive accounting of the impact of agro-export growth on the well-being of the rural resource poor would therefore require questions at three levels:

1. **At the sectoral level**, how broadly based and inclusionary of the rural resource poor is the agro-export growth process itself? Export growth might work to include or exclude the disadvantaged directly as producers or indirectly as labor. It could also change land access and prices in ways that affect smallholders.
2. **At the macroeconomic level**, what are the secondary employment, income, and price effects generated across the economy by the changes in income, savings, employment, and traditional crop production in the agricultural sector?
3. **At the household level**, whom does export growth benefit? That is, how are the benefits and costs of the agro-export growth distributed among household members? Export growth can have a major impact on returns, resources, and time allocation of different household members in ways that redistribute the welfare effects of the aggregate income change observed at the household level.

This paper concentrates on the fundamental sector-level impacts that shape the nature of agro-export growth. Conclusions drawn from this sector-level analysis thus carry the caveat that they ignore higher-level multiplier effects. This is a minor limitation, however, inasmuch as the policy interest in specifically agricultural growth is motivated by a desire to directly reach the disadvantaged rural groups in which Latin American poverty is disproportionately concentrated. The demonstrated sluggishness of secondary trickle down to these groups ratifies the wisdom of this desire.

While concentrating on the sectoral mechanics of agro-export growth, this paper will indicate how intrahousehold impacts fit into the analysis put forward here. Related work (for example, Carter and Katz, forthcoming; Katz 1992; Csete and Woldt 1993) considers the intrahousehold impacts in detail.

1.2 ORGANIZATION AND OVERVIEW OF PAPER

The remainder of this paper is organized as follows. Section 2 introduces the conceptual framework needed to understand the sectoral impacts of agro-export growth on the rural resource poor. Those effects can be divided into a small-farm adoption effect, a land-access effect, and a labor-absorption effect. Section 2 argues that all three effects are ultimately interlinked.

Section 3 explores the economic forces that shape the magnitude of the direct (adoption and land access) and indirect (labor absorption) effects of agro-export growth. Its chief message is that the agronomic and economic characteristics of agro-export crops interact with the intrinsic imperfections of rural factor markets to create **farm-size** biases—biases that are frequently tilted against small farm production. Given this interaction, a noninterventionist approach to agro-export promotion is likely to bypass the rural resource poor as direct producers and generate muted labor absorption effects. While necessary for understanding fully the argument of this paper, the reader can bypass the detailed economic argumentation in this section without loss of continuity.

Section 4 then summarizes this project's coordinated empirical, farm-level research on agro-export booms in Chile, Guatemala, and Paraguay. Analysis of these very different growth experiences helps give form to the largely theoretical economic argument in section 3. In particular, this research documents the interacting nature of the direct and indirect effects of agro-exports on the rural resource poor. Most importantly, microeconomic review of these three experiences establishes this paper's finding of the heterogeneity of contemporary Latin American agro-export growth. Three appendices included in this paper further summarize our research findings on agro-export booms in these countries.

Section 5, the centerpiece of the paper, analyzes the range of policy available to foment broadly based growth. In order of increasing policy activism, policies are divided into those that (1) get prices and institutions "right"; (2) pick winners for public investment; (3) reform land markets; and (4) reform information-constrained markets. While the complexity of the problem forbids any simple policy slogans, section 5 does argue that capital and insurance market reforms will almost always be necessary if agro-export growth is to be broadly based.

Finally, section 6 closes the paper with a brief reflection on the desirability of promoting broadly based growth: Is pursuit of broadly based growth worth it given the likely complexity of the recommended factor market interventions? While this is a highly complex and value-laden question, section 6 suggests perspectives from both the U.S. domestic and low-income country policy contexts that make broadly based growth a goal worth pursuing.

2. IMPACT OF AGRO-EXPORT GROWTH ON THE RURAL RESOURCE POOR: LINKAGES BETWEEN SMALL FARM PRODUCTION, EMPLOYMENT GENERATION, AND INDUCED STRUCTURAL CHANGE

Agrarian growth processes can become socially problematic and of questionable social sustainability to the extent that they bypass and even negatively affect large segments of the rural population—more specifically, the rural poor. A growth boom can affect individuals **directly** by increasing revenues when they adopt export crops or by changing their access to land and other resources, and **indirectly** by changing their access to employment opportunities. More precisely, at the sectoral level, growth is more or less broadly based, or inclusive of the rural resource poor, depending on:

- 1) whether small-scale units participate directly in the production of the export crops and enjoy the higher incomes generated from it—the **small farm adoption effect**;
- 2) whether it induces a pattern of structural change that systematically improves or worsens the access of disadvantaged groups to land—the **land access effect**; and
- 3) the degree to which it absorbs more or less labor of landless and part-time farming households—the **labor absorption effect**.

In a simple world of identical farmers and scale-neutral markets and technologies, the impact of lucrative export crops on the rural resource poor would be relatively easy to conceptualize, measure, and deal with. Large and small farmers would be equally able to participate in the boom, and no producer stratum would be disadvantaged by land prices that are driven up by an economic opportunity beyond its reach. In this simple world, agro-export growth would not induce a pattern of structural change that systematically affects the access of the rural resource poor to land. Labor-absorption effects would be similarly easy to understand since all producers would produce the export crop with the same mix of land, labor, and capital. Comparison of labor absorbed³ per hectare under the pre-boom cropping pattern with boom-crop labor absorption would suffice to predict the **net** employment impact on landless and part-time farming households.

Much of the discussion about the nature of agro-export growth takes place in these simple terms, taking structure as static and labor absorption as technically determined. Table 1 gives some idea of the labor intensity of export crops in Latin America based on studies culled from the literature. As can be seen, the variation in the numbers is staggering, ranging from lows of 20 to 30 person-days per hectare (broccoli, melons) to highs of 200 to 300 (grapes, asparagus), up to even 600 (snow peas) person-days per hectare. Information on labor absorption generated for traditional,

3. The term "labor absorption" is used instead of "employment" since much of small-farm labor used is actually self-employed. Labor absorption thus refers to the total labor used, be it hired or own labor.

nonexport crops is rather scarcer, but figures in the range of 100 to 120 person-days per hectare would be reasonable for smaller-scale producers in Central and South American agricultural economies.⁴ Based on these figures, the labor absorption effect of export growth could thus itself range from large positive to large negative numbers.

TABLE 1 Summary of literature on labor intensity of export crops

SOURCE	CROP	LABOR REQUIRED	SEASONALITY/OTHER
Young (1987)	cauliflower	21.4 man-days/hectare	89% in 3 months
	broccoli	27.2 and/ha	92% in 3 months
	tomatoes	91.3 and/ha	51% in 3 months
	asparagus	324.0 and/ha	69% in 3 months
	strawberries	300.4 and/ha	51% in 3 months
Cruz (1992)	fruit (grapes-kiwi)	150-200 and/ha	2/3 temporary work
Weller (1992a,b,c)	strawberries	150 and/ha	high seasonality
	pineapples	100 and/ha	many permanent jobs
	melon	100 and/ha	high seasonality
	yucca-papaya	50 and/ha	labor at harvest
	mangoes	<50 and/ha	mostly permanent
Noe-Pino and Perdomo (1991)	melon	210 and/ha	highly seasonal
	shrimp (artisanal)	109 and/ha	4-month cycle only
Glover and Kusterer (1990)	asparagus	133 and/ha	mostly permanent
Goldberg (1974)	cucumbers	105 and/ha	50-50 seasonal
	honeydew	28 and/ha	most at harvest

While the figures reported in table 1 are informative, reality is in fact complex in ways that limit their usefulness as guides to the labor absorption effect of agro-export growth. In the first instance, farmers, especially in the dualistic agrarian structures characteristic of Latin America, are heterogeneous, perhaps in terms of their behavioral logic, but almost certainly in terms of their access to (or the effective prices they face in) factor and product markets. Because of this producer heterogeneity, there is no such thing as **the** labor intensity of an export crop, as the figures in table 1 seem to imply.

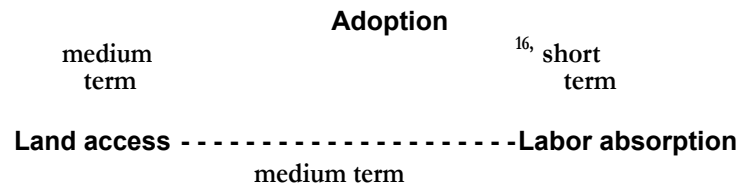
Because producers are heterogeneous (in the sense just described), structure of production is **welfare-relevant**, meaning that it affects the efficiency and equity of agro-export growth. Who produces the boom crops determines how intensively they are produced, that is, how much land is allocated to them and how much employment is generated. Thus, while the different effects of agro-export booms are to a degree separable (for example, buoyant employment growth could offset the potentially negative consequences of large-scale displacement of small farmers), over time, the magnitude of adoption, labor absorption, and land access effects become inherently linked:

4. See figures below, as well as Carter (1989) on Nicaraguan food-crop production and von Braun, Hotchkiss, and Im-mink (1989) for highland Guatemalan food crops.

In the **short term**, the employment generated by an export boom depends on the size distribution of the farms that initially adopt the production of export crops. As a massive body of theoretical and empirical literature indicates, large farmers are likely to produce any given crop with less labor per hectare than would a small farmer.

In the **medium term**, an agro-export boom could induce a pattern of structural change that in turn generates further changes in net employment by systematically shifting land from more to less labor-absorbing large-scale producers.

Diagrammatically, the linkages appear as follows:



The impact of export growth on the rural resource poor in the real world thus depends critically on the interacting effects of differential adoption, induced structural change and labor absorption. The interaction can be positive, with structural shifts in land to small-scale producers who thus benefit directly and who also generate more employment per hectare. The interaction can also be negative, as it was in seventeenth-century United Kingdom and mid-twentieth-century Central America, where an unsavory interaction of diminished land access for the rural poor and weak labor absorption surrounded rapid agrarian growth with social controversy and political instability. The growth booms of contemporary Latin America present a varied experience, which includes both broadly based and highly exclusionary growth processes. The goal of the next section is to understand the factors that underlie this heterogeneous experience.

3. ECONOMICS OF EXPORT-CROP PROFITABILITY AND INDUCED STRUCTURAL CHANGE IN DUALISTIC AGRARIAN STRUCTURE: IDENTIFYING LEVERS FOR POLICY

What are the factors that determine the direction and magnitude of the short-term and medium-term effects of an agro-export boom on the rural resource poor? How can policy modify those effects? This section develops the economics of export-crop profitability and induced structural change in order to answer these questions.

Diagram 1 summarizes the argument of this section. Starting on the left are characteristics of crops that can become bases for a farm-size bias depending on the nature of factor and product markets (see section 3.1 for details). Institutions like cooperatives and contract farming can mitigate some of the biases against small farms (section 3.2). The overall set of prices in the economy shape how important different farm-size biases are economically. The net result is a set of countervailing biases and, in general, differential profitability of export production across different operational farm sizes. Together, these factors determine the short-term effects of export growth: which producers adopt the new crops and the labor absorption effects of their doing so (section 3.3).

The pattern of land use creates, for each producer, a shadow or "willingness to pay" value for land. Willingness to pay determines the producer's competitiveness in the land market (section 3.4.1). To the extent that some producers value land much more highly than others, economic incentives are created for land transfers and induced structural change. How the land market works given the transactions costs and other constraints confronting participants in that market shapes the medium-term effects of induced structural change and indirect labor-absorption effects (section 3.4.2). Prices and initial land distribution in the economy will effect the operation of the land market.

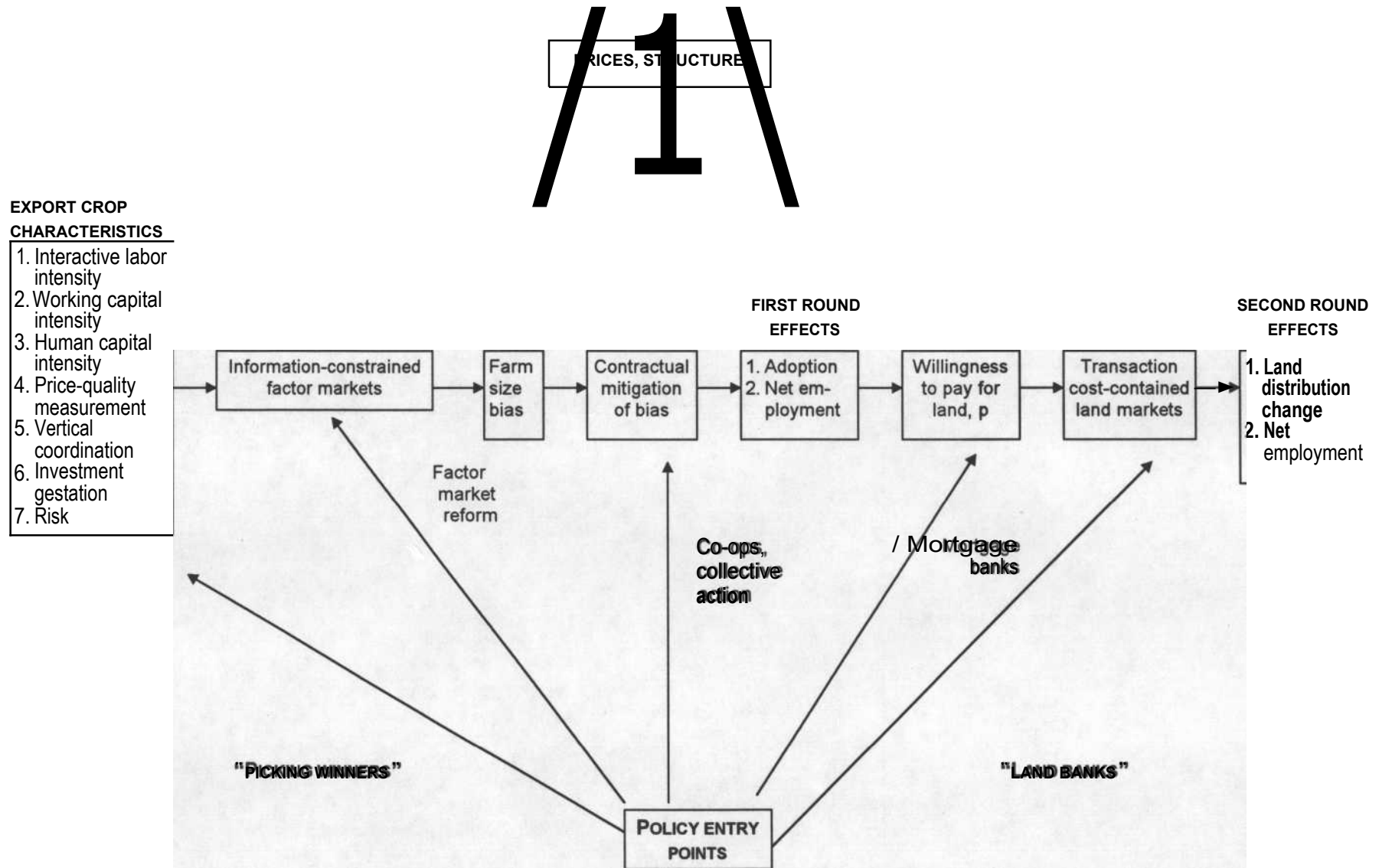
Finally, diagram 1 indicates the points of policy entry, that is, the points where policy can potentially reshape the nature of agro-export growth. Introduced in section 3.5, below, policy options are discussed in detail section 4 of this paper.

3.1 POTENTIAL FARM-SIZE BIASES IN PRODUCTION OF EXPORTS CROPS

This section outlines characteristics that may economically distinguish export crops from food crops and that may distinguish different export crops from each other. In the fictional world of full and complete markets, these characteristics would all be scale neutral and should have no particular importance in shaping the impact of agro-exports on the rural resource poor. However, in the actually existing world of transactions costs and intrinsically missing and imperfect markets, the characteristics of an export crop will shape **who** can grow the crop, **how** they grow it, and, ultimately, how broadly based export growth is.

There are seven characteristics that, **in the presence of information-constrained markets**, create "farm-size biases," meaning that they render a crop relatively more profitable when cultivated at one operational farm size than at another. The discussion in this subsection presumes that farms

DIAGRAM 1 Economics of impact of agro-exports on rural resource poor



operate independently. The subsection that follows considers the degree to which contractual partnerships (for example, sharecropping, contract farming) can mitigate farm-size biases.

The basic crop characteristics that can produce biases are:

1. **"Interactive labor" intensity.** Some crops are highly responsive to interactive labor, meaning that the quantity or quality of output can be notably increased when laborers make constant and careful **interactive** choices. A careful snow pea harvest requires the laborer to constantly decide whether to harvest a particular plant, and particular pods on a plant, now or later. This crop characteristic creates a potential farm-size bias because labor markets are intrinsically imperfect in the sense that it is costly, potential farm-size bias because labor markets are intrinsically imperfect in the sense that it is costly, if not impossible, to enforce a contract requiring laborers to make all interactive choices with all due diligence and care.

Supervision of "interactive labor" is extraordinarily costly because a supervisor, in the case of a snow pea harvest, would have to constantly monitor which pods were harvested and which were left on specific plants. For other crops, interactive labor is unimportant. Manually harvested sugarcane is an example of a crop that, while labor-intensive in the usual sense, does not require labor to make interactive choices. Cane cutters can be paid a piece rate, and it is costless to oversee if they did the job correctly—either the field is empty of cane or it is not.

Small, family **labor** farms differ from large, labor-hiring farms in that family laborers are motivated by their ownership of the residual claims to the production processes.⁶ Put more simply, family labor is self-supervising, whereas labor on larger farms is not. It is likely that all crops have at least some production stage that can benefit from attentive, interactive labor. How much of an **economic** advantage this feature creates for family-labor over labor-hiring farms depends on the overall interactive labor intensity of the crop and the set of relative prices that value output, labor, supervisors, and so forth. For example, if labor is so plentiful that even supervisors are cheap to hire, then self-supervising labor offers little cost advantage over hired labor, which must be supervised. For this reason, overall prices and agrarian structure (which influences relative prices) impact on the economic valuation of the technical interactive-labor intensity of a production process.

2. **Working capital intensity.** Because of rigid product quality and uniformity standards, many export crops require large amounts of purchased inputs and large amounts of working capital to finance those purchases. High working-capital requirements of export crops create a farm-size bias to the extent that capital markets favor one size of farm over another. While not always the case, even competitive capital markets tend to favor larger producers with better access to more and cheaper capital,⁷ and create a bias against small farms in the production of crops with large working-capital requirements.
3. **Human capital intensity.** The technical complexity of export crops and their associated inputs may create high returns to managerial ability and other "human capital" attributes. If operators of smaller units are on average less educated and technically skilled than operators of larger units and

5. The benefits of the increased quantity or quality of output that results from interactive labor can, of course be foregone. A snow pea field, for example, could be harvested all at once, as if it were sugarcane, using either machinery or "non"-interactive labor. The gross value of the produce would be less than that producible with an interactive labor harvest.

6. Ignoring here complications introduced by intrahousehold phenomena.

7. Most theories of preferential large-farm capital access are built around the dual problems of limited collateral of small farmers and the fixed costs of information.

if managerial skills are difficult to purchase on the open market, then crops intensive in human capital may be biased against small farmers. Small farmers' purchase of managerial and technical assistance on the market may be hampered by both incentive problems (purchasers of technical and managerial services may find it difficult to ascertain the quality of the product they bought) and indivisibility problems (that is, it costs the same amount to receive advice on a 1-hectare plot as on a 10-hectare plot).

4. **Price-quality measurement.** As mentioned, export crops often face rigid product-quality requirements, with prices heavily discounted for inferior-quality products. Because of their ability to mobilize self-supervising, interactive labor, small family-labor farms may be able to produce higher-quality output. However, the relative smaller scale of family-labor farms becomes a liability to the extent that ascertaining product quality is relatively expensive. Detection of pesticide residues, for example, can be rather costly. An intermediary or a cooperative assembling small lots of output from multiple small producers may find it prohibitively costly to spot-check the production of each producer for such residues or other quality attributes. It thus becomes impossible to completely internalize the incentives to produce a high-quality, pesticide-residue-free product. In effect the fixed costs of information (it costs as much to spot-check a large lot as a small lot) can create a bias against small-farm production of export crops: exporters might rather deal with larger producers whom they can penalize for low quality.
5. **Product perishability, processing throughput, and gains from vertical coordination.** Sugarcane is an example of a crop that is economically perishable in the sense that it loses its value very quickly if it is not processed soon after harvest. If, in addition, the facilities to process a crop are costly and fixed in the short run (for example, a sugarcane mill, a vegetable freezing plant), then product perishability creates gains from vertical coordination that can schedule agricultural production in such a way as to guarantee smooth processing throughput and economic use of installed processing capacity. Such gains from vertical coordination are argued by many to create a bias in favor of large-scale production in some export ("plantation") crops
6. **Investment gestation period.** Fruit trees and other crops requiring large initial investments that pay off only after a period of years pose special problems to small farmers. In the first instance, access to loans to finance the initial investment is likely to be problematic. In addition, individuals whose savings portfolios are small relative to the minimum size of investment needed to create a viable orchard are likely to find self-finance of long gestation-period investment projects unattractive because self-financing locks savings up in a very illiquid form (trees), making it useless as a device to finance unexpected consumption and other needs. A "portfolio-size bias" is thus created against small farmers.
7. **Output and relative price risks.** Export crops are potentially risky compared to traditional food crops in two ways. First, they may be subject to large fluctuation in output quantity or quality. When working capital requirements are high, output fluctuations create large financial risk. Second, the export price relative to food and other consumer prices may also vary. This "relative price risk" is especially important when the export crop is not edible or storable. Absent a complete set of insurance and future markets, the risk an individual faces of a consumption shortfall is tied directly to his or her wealth, savings, and self-insurance capacity. In this imperfect market context, risk creates a bias against small farmers.

To summarize, while most, if not all, agricultural production processes exhibit constant returns to scale as usually defined, the information-constrained nature of the various ancillary markets that surround agricultural production tend to create farm-size biases. For any particular crop, some

biases may favor larger units while others may favor smaller production units. The net economic valuation of these potentially offsetting biases creates the profitability-farm-size relationship for the crop. Those size units that enjoy greatest profitability for the crop would be expected to adopt the crop more frequently and more intensively than farms against which the biases are more severe. The spillover from differential profitability and agrarian structural change will be discussed momentarily.

3.2 CONTRACT FARMING, SHARECROPPING, AND MITIGATION OF SMALL-FARM BIAS

As shown in diagram 1, the competitive disadvantages of small farms can be mitigated by contractual relationships, which establish partnerships between them and larger-scale agents who enjoy more favorable access to markets. Much of the classical writing on sharecropping (see Jaynes 1982) portrays that contractual form as a partnership between one individual who has access to cheap (interactive) family labor and a second individual who has access to cheap capital.⁸ By dividing the claim on final output (that is, making each partner a partial residual claimant on the production process), sharecropping creates incentives for each partner to diligently provide the input for which he or she has an economic advantage. An important theoretical paper by Eswaran and Kotwal (1985) carefully examines the economics of sharecropping as a partnership. They make two points that are important to the issues considered in this paper. First, they show that while sharecropping is often the optimal way to organize agricultural production, it remains hampered by imperfect incentives—it is not a "first best" arrangement. Second, sharecropping will not universally dominate other forms of production, including large-scale, wage-labor production. Thus, while in some environments sharecropping may permit small-scale producers to be competitive, it may not do so at all times and in all places.

This same contingent optimality of sharecropping carries over to the efficacy of other forms of partnership, especially contract farming, which may be used to bring small farmers into capital-intensive, export-production processes. Under contract farming, an exporter or other contracting agent provides working capital and technical assistance to smallholders, who are disadvantaged in accessing these goods independently in the markets. The bundling (or interlinking) of these services involves the contractor in the production process, making it possible for the smallholder to credibly use a standing crop as collateral for the credit and other services provided. Note that involvement of the exporter or processor in the agricultural decision-making makes it possible to realize some of the benefits of vertical coordination. Along a number of important crop-characteristic dimensions, contract farming offers mitigation of small-farm biases. Like sharecropping, contract farming may permit a small farmer to exercise his or her labor-cost advantages in a production process that might otherwise require more working or human capital than the small farmer can mobilize.

Despite the important economic advantages offered by contract farming and other contractual partnerships, these arrangements are frequently criticized in the literature as being decidedly small-

8. Much of the more contemporary writing examines sharecropping more narrowly as a device to bring labor and land together, without any consideration of additional factors of production.

farmer unfriendly (for example, Clapp 1988; Watts 1991). Indeed, under pressure from the farm community, the Wisconsin (state) department of agriculture recently issued guidelines regulating the contracts between farmers and processors. At the root of these criticisms of contract farming is the risk to which contract farmers are exposed. Unfortunately, the risk exposure of contract farmers is not an accidental attribute of contractual partnership. As the economic theory of incentives makes clear, in environments of imperfect information, incentives require risk exposure. In other words, it would be impossible to remove the risk borne by contract farmers without also destroying the incentives that are needed to make the contractual form work. Like sharecropping, contract farming is a compromise of multiple market imperfections.⁹ And, like sharecropping, its ability to competitively bring small farmers into an agro-export boom as direct producers is contingent—it may be possible in some places, or for a while, but it cannot be counted on unconditionally to assure positive direct effects of agro-export production on the rural resource poor.

An example of the changing "contingent optimality" of contract farming comes from the experience of highland Guatemala export vegetable production. At least one major exporter shifted from large-scale direct production to direct contracts with small farmers after discovering that the labor-cost advantages of the small farmer overwhelmed whatever problems there were in scheduling production, delivering working capital, and providing technical assistance to multiple small producers. While the contract farming regime thus appeared as the competitively dominant way of organizing export vegetable production, that dominance may prove to be short-lived. Interviews with exporters in late 1990 revealed that some exporters were planning to shift away from contract farming, at least with the very small-scale producers, because of the increasing expected economic cost of that form of production organization. Pesticide residue problems on Guatemalan exports were at that time threatening the price and entry of Guatemalan products to the U.S. market. The exporters felt it necessary to more intensively supervise the production process. Unfortunately, intensive supervision of smallholders was seen to be economically infeasible, moving producers toward either direct production or contracts with larger growers.¹⁰

The point of this story is not that contract farming cannot work, but that it belongs to the class of second best ways to organize agricultural production. While farming contracts and other forms of partnership and cooperation can help mitigate some of the disadvantages small holders face as completely independent producers, it would be incorrect to assume that farming contracts can unconditionally be expected to render small-scale, family labor farms as the competitively dominant mode of producing. In summary, as diagram 1 shows, contractual devices may reshape the relation between operational farm size and economic returns.

9. Thus, as we will see below, even contract farmers may vigorously pursue self-insurance strategies in a way that reduces their competitive position in land markets.

10. The same problem has confronted the famous 4 Piños cooperative, which has been so successful at integrating smallholders into agro-export production. At the root of the problem for both the cooperative and the export firms are the fixed costs of information discussed in section 3.1.

3.3 SHORT-TERM EFFECTS OF AGRO-EXPORT GROWTH: ADOPTION AND EMPLOYMENT DECISIONS

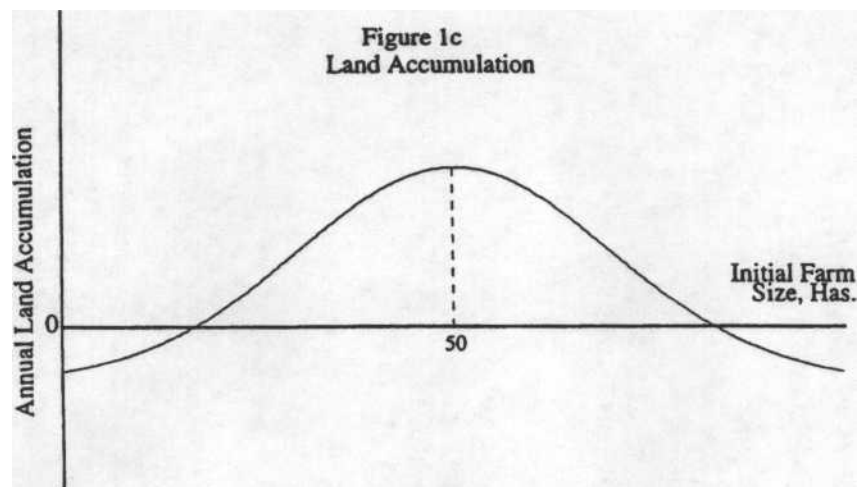
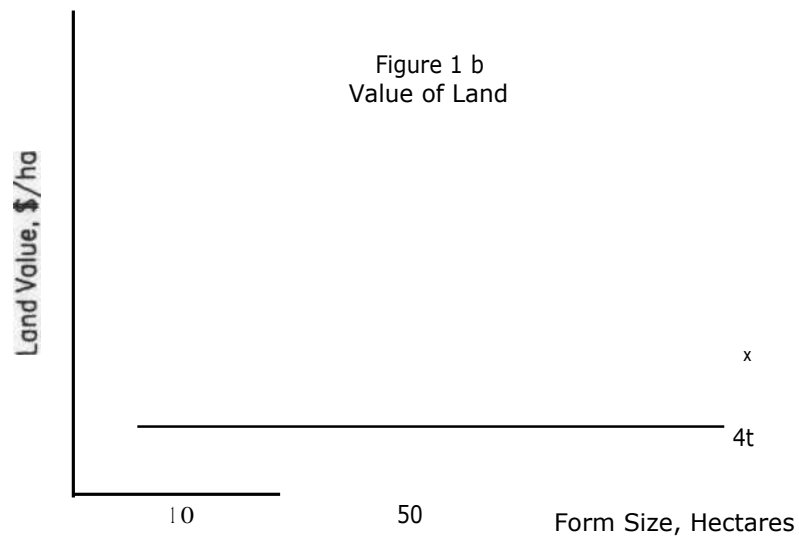
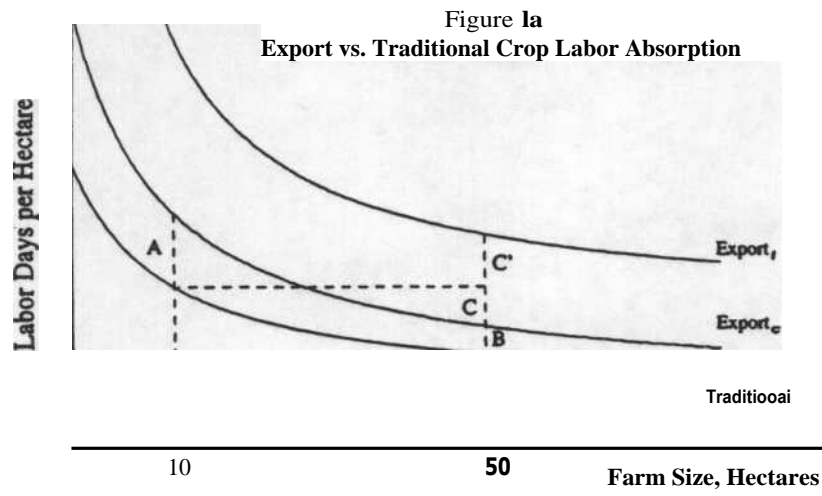
It is now possible to use the discussions in sections 3.1 and 3.2 to assemble a conceptual framework that links the adoption, labor-absorption, and land-access effects of export growth. For illustrative purposes,¹¹ figure 1a displays the sorts of relationship that would be expected between labor absorbed per hectare and size of operational farm unit. The curves are downward sloping for both traditional and export crops, reflecting the expectation that smaller farms will produce any particular crop with greater labor intensity than will larger operational units.¹² In addition, for each farm size the export crop is presumed to be more labor-intensive. For instance, on a 10-hectare farm, a shift from traditional to export crops would increase labor use 20 person-days per hectare, as shown by the vertical distance labeled "A" in figure 1a. For a 50-hectare farm, a shift of 1 hectare to export crops would increase labor absorption by 10 person-days, distance "B".

For a **given** agrarian structure (that is, for a given distribution of land across agricultural units), information of the sort displayed in figure 1a could be used to calculate the labor-absorption impacts of an export cropping boom under a variety of actual and counterfactual assumptions about export crop-adoption patterns. Intensive adoption by small operational units would create very large employment effects, but holding structure constant, any adoption pattern would have unambiguously positive indirect effects on the rural resource poor under the situation portrayed in figure 1. Which farm units actually adopt the export crop would be expected to depend on the relative profitability of export versus traditional production activities.

As discussed above, diagram 1 indicates how crop characteristics, interacting with the information-constrained factor markets and mitigating contractual devices, come together to determine the economic returns to export crops on different operational farm sizes. For any given farm, the export crop-adoption decision depends on whether returns are higher for traditional or for export crops. In the example displayed in figure 1b, the two lower curves represent the single-year marginal-income value of an additional hectare of land allocated to traditional crops (A_t) and export crops (O_x) for farm units of different sizes. In a simple world of homogeneous producers and size-neutral markets and technologies, these curves would be flat, horizontal lines. However, because of the farm-size biases discussed earlier, small farms may find the export crop relatively unremunerative to produce, as illustrated in figure 1b. In this

11. The curves in figure 1 are only hypothetical and are used here to clarify the underlying issues. Later sections of this paper will present actual estimates of these relationships for Chile, Guatemala, and Paraguay.

12. Such a relationship would be expected from a variety of theoretical perspectives (see section 3 below) and is in fact confirmed in the empirical analysis (see section 4 and the appendices). For any given crop, large farm units are likely to employ less labor per hectare than smaller farm units. Effective factor prices are different for large farms than for small farms. The cost of labor, in productivity or efficiency units, is relatively low on small farms (because residual claimancy makes family labor self-supervising), while the cost of capital tends to be relatively high. The opposite configuration holds for larger farm units, which depend on hired labor but which are large enough to overcome the fixed costs of information, which increase the cost of capital for smallholders. Given these differences in effective factor prices, it is not surprising that large and small farms produce the same crop with different production techniques and labor intensities, as displayed in figure 1a.



example, farm units below 10 hectares in size would not find it economic to adopt the agro-export crop given the configuration of crop and market characteristics which shape economic returns functions for export and traditional crops. Under this hypothetical scenario, the direct, small-farm adoption and income effects of the export boom would be negligible. Moreover, while the short-term net-employment effects would be positive, they would be less than they would have been had small farms adopted export production. The indirect employment effects thus are linked to the direct adoption effects.

3.4 COMPETITIVENESS REGIME AND WILLINGNESS TO PAY FOR LAND: LAND MARKET AND MEDIUM-TERM EFFECTS OF AGRO-EXPORT GROWTH

The short-term effects of agro-export growth are those small-farm-participation and net-employment effects that take place given a static distribution of land. Over time, differences in economic returns across different-sized farms might be expected to induce structural change in the ownership distribution of land. Any induced changes thus create the medium-term effects of changes in land access and further net-employment effects.

Incentives for induced structural change are driven by the **competitiveness regime**, that is, by the differential valuation of land by different-sized farms. In the hypothetical example in figure 1b above, farms below 10 hectares in size would assign the marginal income value to land indicated by the A curve. The larger, export-adopting farm units would assign the land the marginal income value shown by the A_x curve. Whether and in what direction induced structural change occurs depends on two processes:

- 1) how individuals capitalize their marginal income value of land into a willingness to pay, or reservation price for land, and
- 2) how land markets work.

These two factors will now be discussed in turn.

3.4.1 CAPITALIZATION OF INCOME VALUE INTO A RESERVATION PRICE FOR LAND: COMPETITIVENESS REGIME

The upper curve (labeled p) in figure 1b illustrates the price for land purchase that the different-sized farms would be willing to pay given the single-year income value of land. Assuming an infinite planning horizon, p , the capitalized value of the expected returns from an additional unit of land, can be written as:

$$p = E:(A) / [1 + rr]$$

where " t " denotes years, " A " denotes the increment in income that can be earned in year " t " when the individual allocates an additional unit of land to the privately more remunerative of traditional or export crops, and " r " is the rate of interest used to discount the stream of future income. The

discounted sum given by the equation is a **reservation** price for land in the sense that it represents the maximum amount the farm could pay for the unit of land without losing money.¹³ If the market price is actually below an individual's reservation price, then the individual would be made better off purchasing the land.

As drawn in figure 1b, the 50-hectare farm would have the greatest incentives and economic capacity to absorb additional land. Both larger and smaller units might be expected to shed land to those intermediate-sized units. Whether and how quickly they do ultimately depends on how the land market works. Postponing that discussion momentarily, and assuming that these incentives indeed induce structural change, then figure 1 c indicates the sort of induced structural change that would be expected for our hypothetical example. Figure 1c shows the per-year change in land as a function of pre-boom farm size. As drawn, the middle range of farms show positive land accumulation, while both smaller and larger units display land de-accumulation. Such a pattern of induced structural change implies a negative land-access effect for disadvantaged groups.

Under this specification of land-market demand, individuals who are tightly constrained in factor markets or otherwise disadvantaged will be unable to adopt export crops and will thus have fairly low *A*s and *p*s. Similarly, individuals who may adopt export cropping (because it is more remunerative than traditional cropping) may still have relatively low *A*, *p* combinations if they are limited in their adoption, or compelled to use an expensive production technique. This latter characterization might apply to large farms which rely on expensive (in efficiency terms) hired labor. Thus, the illustration in figure 1b shows that *p* is relatively low for larger farms. It is precisely this efficiency labor-cost advantage of family-labor farms versus larger, labor-hiring farms that underlies theories of the economic dominance of family farms (for example, Binswanger, Deininger, and Feder 1993; Schmitt 1992). However, as should now be apparent, a theme of this paper is that the family-labor farms of the rural resource poor in Latin America are sufficiently small that the fixed costs of information, which shape the way many markets work, create countervailing economic disadvantages that potentially overwhelm their labor-cost advantage.

Carter and Mesbah (1993) and Carter and Zimmerman (1993) analyze the reservation price for land in some detail. They note that another factor that is likely to further distort the shape of the reservation price function is the interest rate used in the equation above to discount the stream of future income for land. Individuals who lack access to long-run capital, or who must pursue costly self-insurance and autarkic savings strategies, will discount the future income from land at a higher rate than would an individual well integrated into formal financial markets. The higher the rate of discount, the lower is the reservation price, or the closer the *p* curve in figure 1b is pulled down toward *A*. To the extent that the rural resource poor are less well integrated

13. Over an infinite horizon, $E_{t,} 1 / [1 + r]t = 1 / r$. If the annual income increment is \$500 and the discount rate is 5 percent, then the reservation price would be \$10,000 ($500/.05$). If land is then bought at a market price "*p*" of exactly \$10,000, then interests payment on a \$10,000 loan to buy the land (or, alternatively, the opportunity cost of the savings tied up in the land) would be $10,000 \cdot 0.05$ and would exactly equal the income increase. In this case, the individual would be neither better nor worse off with land, and in that sense the reservation price represents the maximum amount he or she would be willing to pay for land.

into financial markets, the more likely it is that this differential discount phenomenon will make them relatively less competitive in land markets.

3.4.2 How LAND MARKETS WORK

For any land-market competitiveness configuration (as represented by the p function in figure 1b), whether and how quickly structural change occurs depends on how the land market itself functions. Transactions costs are a key consideration, particularly in agricultural production where very large and very small units coexist. Transactions costs may make it very costly for smallholders to buy a small piece of land from a much larger unit because of subdivision and legal costs. Similarly, wealthier individuals who wish to buy large pieces of land may find it extremely costly to consolidate a single holding out of multiple small holdings.

Such transactions costs can be sufficiently high to actually **segment** the land market, meaning that the market for a small piece of land is really a different market than the market for a large piece of land. The price of land may be different in the two markets. In addition, land-market segmentation poses a barrier to induced structural change, whether it be a shift to large or to small-scale farmers. Carter, Luz, and Galeano (1992) present evidence consistent with land-market segmentation in Paraguay.

In terms of figure 1c above, the actual pattern of induced structural change will thus depend on the interaction of the competitiveness regime, represented in figure 1b, with the reality of transactions costs that may pose barriers to fundamental structural change. If structural change is induced (as it in fact has been in the three cases of agro-export growth to be examined momentarily), then **medium-term** effects of agro-export growth occur. As discussed above, a new land distribution will generate further changes in net employment as the pattern of adoption changes and as the pattern of employment changes from that on the pre-existing farms to that on the newly formed farm units.¹⁴ The precise nature of these second-round effects in terms of their impacts on the rural resource poor depends on the direction of the induced structural change.

3.5 SUMMARY: POINTS OF POLICY ENTRY

This section has thus explored the economic factors summarized in diagram 1. Implicit in much of the discussion so far have been points where policy might influence the causal chain of events represented in diagram 1 that shape the impact of agro-export growth on the rural resource poor. The points of potential policy entry are:

- 1) facilitate those crops that are most likely to generate positive impacts on the rural resource poor;
- 2) address imperfections in fundamental factor markets, such as capital and risk markets, which inhibit small-farm adoption of nontraditional export crops and ultimately render them uncompetitive;

14. The new land distribution could also induce changes in the wage rate and other prices. Karl Kautsky (1988) and de Janvry (1981) after him have prominently argued that changes in structure induce changes in the wage rate that tend to reduce incentives for further structural change.

- 3) address the long-run mortgage-finance problems that may constrain smallholders' ability to capitalize a competitive advantage in production into a competitive land market advantage; and
- 4) address transactions costs that may prevent small farms which are competitive in the land market from being able to purchase land from larger holdings.

After discussing the three cases of agro-export growth, this paper will return in section 5 to discuss the efficacy of the alternative policy options.

4. AGRO-EXPORT GROWTH IN CHILE, GUATEMALA, AND PARAGUAY: HETEROGENEOUS SECTORAL IMPACTS ON THE RURAL RESOURCE POOR

In an effort to understand the impacts of agro-export booms on the rural resource poor, a coordinated program of primary data collection and analysis has been undertaken in Chile, Guatemala, and Paraguay. In each country, two types of data have been collected from stratified random samples of agricultural producers drawn from a broad size range of operating farms units:

- 1) production data sufficient to identify current patterns of resource allocation, productivity, and income, and
- 2) retrospective information on the land purchases, sales, rental, and other transactions needed to identify life-cycle patterns of land access and accumulation.

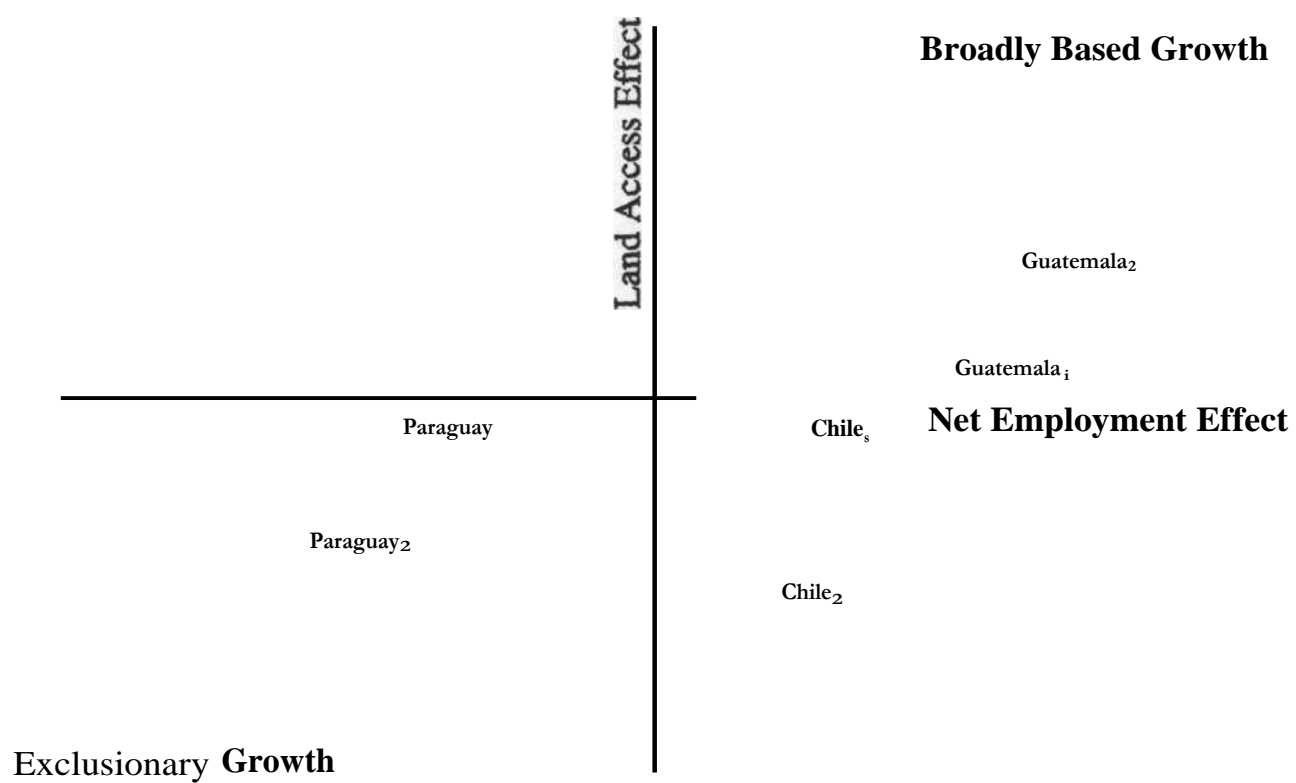
Using these data, it is possible to explore the changing patterns of land access and labor absorption in the context of the farm-level constraints and production decisions that determine differential profitability and expansion capacity.

Figure 2 presents a qualitative summary of the research findings.¹⁵ The horizontal axis in figure 2 measures the employment impact of agro-export growth. Values to the left of zero indicate decreases in total labor absorption, while positive values indicate increased labor absorption. The vertical axis indicates changes in the land access of the rural resource poor. Values below zero indicate that the agro-export boom induced structural change that diminished the land access of the mass of small farmers and the rural resource poor. Positive values indicate improved land access for the rural resource poor. Agro-export growth trajectories that move the economy into the northeast quadrant of the figure thus represent broadly based growth experiences that have unambiguously positive effects on rural resource-poor households.¹⁶ In contrast, the growth trajectories that lead to the southwest quadrant are exclusionary and have negative sectoral consequences for the rural resource poor. Trajectories into northwest and southeast quadrants are in general ambiguous with respect to their welfare effects on the rural

15. Interested readers are referred to the three annexes attached to this paper, which report in greater detail the findings for each country separately. As discussed in the introduction to this paper, it should be stressed that the focus here resides on the sectoral effects and leaves out both the macroeconomic and the intrahousehold levels that potentially modify the welfare effects of the primary-sector-level impacts.

16. Of course, a growth boom that positively affects the rural resource poor household may have ambiguous effects on some individuals within the household, as Katz (1992) and Carter and Katz (forthcoming) analyze in the case of the Guatemalan agro-export surge.

Figure 2: Welfare Impacts of Agro-Export Growth on the Rural Resource Poor



resource poor. A priori, a trajectory into the northwest quadrant seems very unlikely inasmuch as it would imply a shift of land to smallholders and a decrease in labor intensity.

Displayed on figure 2 are the trajectories taken by the agro-export booms in Chile (fruit), Guatemala (vegetables), and Paraguay (soybeans and wheat). In keeping with the discussion in section 2, each country's experience is broken up into short- and medium-term effects. The illustrated trajectories are approximate or qualitative summaries of the quantitative estimates reported in the annexes. Immediately striking in figure 2 is the **heterogeneity** of the three agro-export experiences. Subject to caveats to be described momentarily, the Paraguayan experience appears highly exclusionary, the Guatemalan very broadly based, and the Chilean boom ambiguous, with diminished small-farm land access but employment increases. While frustrating for those in search of simple lessons and policy rules, this heterogeneity signals the potential existence of space for policy to have a real effect on the nature of agro-export growth. Following a brief description of each country's experience, the next section will return to the question of policy choices and design.

4.1 EXCLUSIONARY GROWTH IN PARAGUAY

The rapid growth of soy and wheat export production along Paraguay's frontier with Brazil has taken place on large, highly mechanized farms, creating the exclusionary trajectory shown in figure 2. The relationship between the number of labor days absorbed per hectare and operational size of farms, estimated for a sample of producers in the region, shows that labor absorption falls sharply as operational farm size increases, from 150 labor-days/hectare to 30 labor-days/hectare as one moves a unit of land from a 5-hectare to a 100-hectare farm. Given this sharp difference in choice of technique between small and large farms, any structural change that shifts land from the small- to the large-farm sector will have severely negative labor-absorption effects. Yet, over time, it has been precisely these large farms that have increased in numbers and come to dominate the agrarian structure of the region.

Carter, Luz, and Galeano (1992) have estimated the marginal economic value of land for farms of different sizes, controlling for labor, machinery, and animal stock (see annex C for details). Unlike other regions of Paraguay, where the marginal value of land slopes downward as a function of farm size, the estimated economic value of 1 hectare of additional land in the frontier region increases by a factor of 10 as farm size increases from 10 to 100 hectares. Even without considering the biases against small farms in the land sales markets (see Binswanger, Deininger, and Feder 1993), this estimate of the relationship between farm size and land-value function points to a strong competitive disadvantage for small farmers in this export-boom region. Not surprisingly, estimates of land accumulation over time have shown (as detailed in annex C) that larger farm units are accumulating land rapidly—on average, at a rate of nearly 20 hectares per year.¹⁷ This pattern of unequal land accumulation is visible in the national agricultural census figures discussed by Galeano

17. Smaller farm units are also estimated to modestly accumulate land over their life cycle. It should be stressed that the estimates presented in annex C come from data with a severe sample-selection problem in the sense that only those farm units that actually survived the competitive reallocation process made it into the sample.

(1992), which show that the percent of land in large farms increased over the 1980-1990 period in this boom region.

The microeconomics of production in the frontier region of Paraguay thus create the foundation for the strongly exclusionary growth trajectory hypothesized by Galeano (1992). Larger farm units are much more competitive than small farms in terms of their marginal land evaluation. At the same time, the farm-size differentiated patterns of labor absorption indicate severe declines in labor demand as land competitively shifts from small to large units.

Why has growth in this agro-export boom taken this exclusionary form? Paraguayan smallholders are highly capital constrained (Carter, Luz, and Galeano 1992), a factor that makes their direct participation in working-capital-intensive export production difficult. Small farms enjoy privileged access to cheap-efficiency labor, and larger units—particularly the much better capitalized immigrant Brazilian farmers who were attracted by the region's very low land prices—enjoy privileged access to capital.¹⁸ While recent economic theory of agrarian growth suggests that in general it is not possible to say which of these countervailing privileges will dominate (Carter and Zimmerman 1993), evidence on the rapid land accumulation of large farmers leaves no doubt that capital access advantage dominates in the case of Paraguayan wheat-soy growth boom.

The nature of the pre-boom land distribution in the frontier region also helps to explain the exclusionary character of the boom. Unlike the long-settled, core *minifundia* regions of Paraguay, settlement in the frontier region took place through colonization projects, which typically endowed smallholders with 20-hectare plots. Land in this region was thus not highly fragmented, and yet much of that land was assigned in blocks too large for smallholders' ability to capitalize and effectively use. The land market in this area was probably not held up by the sorts of transactions costs that would have been the case in a traditional *minifundia* area.

To summarize, a microeconomic reality of unequal, size-differentiated capital constraints underlies the exclusionary, socially problematic export boom in Paraguay. Some smallholders have been out-competed in the land market by large farms; others have simply sold out. While there is no reason to question the private rationality of these decisions, the systematic shift in agrarian structure has created externality effects on the *minifundia* sector as more and more resources have been shifted to less labor-absorbing forms of production. Unfortunately, as the history of Latin American—especially Central American—agriculture shows, this exclusionary experience is far from being a special case (Williams 1986; Brockett 1988; and Grindle 1986).

18. Sen (1981) stresses that large farms often circumvent their high-efficiency cost of labor by employing machinery. In this region of Paraguay, mechanization may also help circumvent problems created by the seasonality of agricultural labor demand.

4.2 BROADLY BASED GROWTH IN GUATEMALA

The highland Guatemalan experience stands in sharp contrast with the Paraguayan phenomenon, and indeed with the past incidence of agro-export growth on the Pacific coast of Guatemala. As detailed in annex B, Guatemalan smallholders have, within limits, adopted production of nontraditional export crops. While the labor intensity with which these crops are produced declines rapidly with respect to operational farm size, both of the primary export crops (broccoli and snow peas) are between 50 percent and 300 percent more labor intensive than the traditional activities they displace. In addition, estimates of land accumulation over time indicate that the export boom has induced a transfer of land from modestly larger to smaller farms. As shown in figure 2, this induced structural change seems to intensify the labor-absorption effects as well as broaden the direct participation of the least-well-endowed rural households in the agro-export boom.

Key features behind this more broadly based growth pattern are: (1) the very high labor intensity of the new export crops; (2) the nature of the contractual linkages which in some instances have helped small farmers overcome working-capital constraints; (3) the very brief gestation period of the export crops; (4) the small farmers' ability to pursue self-insurance strategies without compromising their access to land; and (5) a highly fragmented pre-boom land distribution which insulated small farmers from direct competition with large-scale production units.

While the highland Guatemalan agro-export boom has been broadly based, the research identifies three dynamic processes that temper its impact on rural resource poor households. First, as the annex details, the labor-absorption effects have been relatively muted by smallholders' reluctance to devote more than 0.5 hectare of land to the labor-intensive export crops. Simulation of the longer-term labor-absorption effects thus shows that the total employment growth is unlikely to rise above a modest 15 percent.

The pattern of limited adoption itself seems to be explained by the limited ability of smallholders to capitalize and bear the risk of larger extensions of the export crops. It is striking that small-farm financial-market constraints appear so pervasive even in a region where these farms have adopted boom crops and done well in the short and medium term. Unfortunately, these constraints caution about the prospects for a second dynamic (long-term structural change), which could undermine broadly based growth. As shown in annex B, at farm sizes in excess of 10 hectares, area devoted to agro-export crops climbs sharply. A complementary, but non-random, sample of larger producers (30–200 hectares in size) in the highland area identified a class of producers who devote 100 percent of their cropped area to the export crops. This same subsample has also been accumulating land at a very rapid rate. Analysis of this subsample is as yet incomplete. However, as shown in annex B, the labor intensity of production falls off sharply even as farm size increases, modestly over the 1–4-hectare range. It therefore seems likely that a longer-term shift of land to this class of seemingly well-capitalized and insured producers would undercut both land-access and employment-generation aspects of the export boom.

Finally, increasing problems with pesticide residues threaten to introduce a third dynamic into the evolution of the sector. At the international market level, exporters bear the risk that crops will be rejected for high pesticide-residue levels. One Guatemalan export firm declared its intention to contract only with larger-scale producers who could be monitored on a cost-effective basis.

While the research reported in annex B does not reveal any systematic evidence that these new dynamics have fundamentally impinged on the broadly based characteristic of the Guatemalan export growth process, they signal the sorts of microeconomic constraints that might tilt the competitive advantage of export crop production away from small farmers.

4.3 AMBIGUOUS GROWTH IN CHILE

Figure 2 displays the Chilean fruit-boom growth trajectories as heading into the southeast quadrant, with positive employment effects but negative land-access effects. Our experiences in the field confirm that fruit crops appear to be more labor absorbing than traditional field crops at any given scale of cultivation, though we lack data on larger-scale nonfruit cultivation in some areas. Medium-term labor-absorption effects, irrespective of the adoption pattern, are thus positive, as shown in figure 2.

Adoption of fruit cultivation is strongly skewed toward larger, better capitalized holders. Our sample shows that very few smallholders, whether *min/indistas* or recipients of the more generously sized agrarian-reform parcels, have participated in the fruit boom as direct producers. Several key characteristics appear to generate this "farm-size bias" in fruit production. Large initial investments with long gestation periods and large amounts of working capital needed for the standardized production and packaging of export crops create a bias against smallholders to the extent that they are disadvantaged in capital markets. Smallholders also lack the entrepreneurial ability to deal with institutions, such as banks and export firms, involved in export production. Finally, export firms, which often supply credit to producers, are not greatly interested in working with small farmers, who are thought to be greater risks and cause higher transaction costs.¹⁹ Even in the southern part of the Central Valley, where the production for export of shorter-cycle crops such as asparagus and raspberries is taking off, smallholders have found it difficult to participate in that market for reasons of both capital access and risk management.²⁰

While the differential adoption of export crops by medium and large farmers versus smallholders would be expected to create strong incentives for structural change in land access, the rapidity which the fruit boom has induced a restructuring of land access is remarkable. As detailed in annex A, land structure has become increasingly polarized, with some holdings selling land to larger, more capitalized (in both human and financial terms) individuals and retreating to smaller

19. Many export farms establish a minimum size for the fruit orchards with which they will transact.

20. When a small group of land-reform parcel beneficiaries was able, with the help of bank credit negotiated through a nongovernmental organization (NGO), to embark on a small-scale production of raspberries, labor-shortage and management problems at harvest time and the marketing difficulties of a highly perishable crop eventually forced every participant in the program to abandon the effort. Burdened by the heavy debt incurred from the project, a number of the growers were forced to sell part of their land.

min *ndia*. The net result, in the fruit-growing northern Central Valley, is a structure with more mid-sized (12-40 BIH²¹) and small (less than 8 BIH) farm units. It is this stark and rapid restructuring that has led a number of observers (Jarvis 1989; Cox, Nino de Zepeda, and Rojas 1990; Ortega 1988) to comment on the exclusionary nature of Chile's agro-export growth experience.

The employment effect of this induced structural shift preliminarily appears to be positive, as the disappearing farm units were apparently less labor absorbing than both the smaller *min* *ndia* and larger, better capitalized, fruit-producing farms which have replaced them. Figure 2 displays these medium-term effects with the solid arrow heading off into the southeast quadrant.

While this southeastward direction adequately captures the experience of the northern Central Valley where the fruit boom is most developed, newly emergent export growth in the southern part of the Central Valley may be taking a somewhat different shape. The process of land polarization appears even more acute in the southern part of the Central Valley, where traditional crop agriculture and animal husbandry continue to predominate. As detailed in annex A, preliminary estimates of labor absorption and structural change indicate that land in the south is moving toward units that are both absolutely larger in size than the expanding units in the northern Central Valley and possibly less labor absorbing than the units they are replacing. In the southern Central Valley, land transactions are shifting property from land-reform parcel holders to both the 12-40 BIH farms and to those exceeding 40 BIH. The impact of these structural shifts on labor absorption remains unclear: 12-40 BIH farms display the lowest employment levels of all farm units while—with the exception of the smallest farms—farms greater than 40 BIH have the highest labor-absorption level. Further work needs to be done to untangle the marginal labor absorption of the expanding farm units, but preliminary estimates point toward medium-term effects that move the growth path toward the southwest in figure 2. Too much more should probably not be made of this preliminary result at this time.

21. A basic irrigated hectare, or BIH, is a unit of land of uniform productive capacity.

22. This growth experience is not fully exclusionary by the definition used in this paper given the positive effects from increased employment. However, the fact that the new employment generated by fruit production appears to be more highly seasonal in nature adds another dimension to the problem. While total hours of labor absorbed have increased, reliance on temporary labor use has increased substantially (Ortega 1988; Gómez and Echenique 1988). Furthermore, much of the employment created by the expansion of fruit production is for women who did not participate in the labor market in the past.

5. POLICY OPTIONS FOR ACHIEVING BROADLY BASED GROWTH

The impact of agro-export growth on the rural resource poor in Latin America has been heterogeneous, ranging from highly exclusionary, which has displaced small farmers and generated little compensatory employment increase, to broadly based, in which smallholders have participated as direct producers and net employment expansion has been positive. This heterogeneity characterizes even the so-called nontraditional export products. Indeed, the case of nontraditional vegetable exports from highland Guatemala (section 4.2, above, and annex B) is one of the few contemporary Latin American nontraditional export booms that has primarily rested upon small-farm production.

From a policy perspective, the heterogeneity of agro-export growth belies any presumption that promotion of nontraditionals will necessarily engender broadly based growth. "Nontraditional exports" is not an incantation which automatically links agrarian growth and rural poverty reduction. The experience of the Chilean fruit boom (section 4.3 and annex A) is instructive in this regard. While not as broadly based as export growth in highland Guatemala, Chile's sustained export boom generated much more employment than, say, the highly exclusionary growth trajectory along Paraguay's frontier with Brazil (section 4.1 and annex C). Nonetheless, Chile's intermediate growth trajectory generated political demands for policy to broaden the base of agricultural growth, demands which gained voice following the redemocratization of the Chilean polity (see Carter and Mesbah 1993, and the citations therein). Figures on the **doubling** of rural poverty in Chile over the 1970–1987 period of rapid agro-export growth (CEPAL 1991) buttress the perception that nontraditional export growth—even of the intermediate Chilean style—is not synonymous with broadly based growth.

While agro-exports booms and broadly based growth are not synonymous, neither are they antonymous. The heterogeneous impact of agro-export booms on the rural resource poor also suggests that there is space for policy to broaden the base of that growth. Diagram 1 (p. 7, above) identified a number of potential entry points for policy interested in broadening the base of agro-export growth. Diagram 2 reorganizes those policy points into a continuum of policy options ranging from least to most activist. Short of asset redistribution, the major groupings along the continuum are as follows:

DIAGRAM 2 Continuum of policies for achieving broadly based growth

Laissez faire

- Prices and institutions "right"
 - a. Nondistorted price signals
 - b. Secure property rights to enhance investment incentives
- 2. Picking winners for public investment
 - a. Agronomic and commercial constraints
 - b. Technical indeterminacy
- 3. Land market reform
 - a. Land taxation
 - b. Land banks to eliminate transactions costs and market segmentation
 - c. Mortgage banks to provide long-run finance
- 4. Reform of information-constrained markets
 - a. Nontraditional capital access
 - b. Insurance substitutes
- 5. Asset redistribution
 - a. Land-holding ceilings
 - Land-to-the-tiller and other reforms

Dirigisfa

- Level 1 getting prices and institutions "right";
- Level 2 picking winners for public investment;
- Level 3 land market reform; and
- Level 4 reform of information-constrained markets.

These four groups are a subset of the full range of agricultural policies which stretches from *laissez faire* to centrally planned, *dirigista* regimes. All four are consistent with reliance on nondistorted, price-making markets and decentralized decision-making. They are all potentially relevant to the **direct** effects of ago-export growth on the rural resource poor, namely, the small-farm adoption and land-access effects. Subsequent discussion will focus on which of these policies is likely to work.

While the nature of these direct effects shapes the buoyancy of ago-export employment generation, the policy map becomes greatly simplified if we eschew any effort to have positive direct effects on the rural resource poor. In this case, policy would need only to (1) get prices right (avoid

artificially cheapening capital), (2) make a good-faith effort to pick labor-absorbing commodities, and (3) assure that tenure rights are secure and marketable so that markets can move the land to those who can adopt export crops.

The danger in such a policy is that it may engender a persistent drift over time to increased land concentration, decreased labor absorption, and increased inequality in income distribution. Thus, while a noninterventionist policy approach may suffice to realize agro-export growth, the social stability of such growth is questionable. More sustainable, broadly based growth may require positive direct effects and more activist policies to bring them about. It is necessary, therefore, to get a handle on the small-farm competitiveness factors that shape the adoption and land-access effects of agro-export growth.

This section offers a broad-ranging evaluation of the policy continuum for assisting the rural resource poor, drawing on the evidence and theoretical organization of prior sections. *The chief conclusion that emerges is that level 4 policies must be part of a broadly based agro-export growth strategy.* The next four subsections take apart each policy group in turn, evaluating the contribution each has to realizing a "broadly based" growth process.

5.1 GETTING PRICES AND INSTITUTIONS "RIGHT": MINIMALIST POLICY, BUT IT TAKES MORE THAN FREE MARKETS

A policy package that eliminated price distortions, which favor large farmers (for example, capital subsidies), and that legally solidified the property rights of small farmers (for example, land titling) would constitute a minimalist approach to achieving broadly based growth. Historically, price distortions have played an important part in enhancing the relative competitiveness of larger farm units in Latin America. Indeed, some authors argue that elimination of such distortions suffices to create poverty-reducing agrarian-growth trajectories (de Janvry and Sadoulet 1993; Binswanger, Deininger, and Feder 1993).

While there is no doubt that elimination of price distortions that favor large farms and discourage labor-intensive forms of production is important, the contemporary experience of agro-export growth strongly suggests that simply "getting prices right" is insufficient to generate broadly based growth. Both that experience (see section 4) and the economic theory of information (see section 3) suggest that there are **intrinsic** market imperfections that hamper small-farm competitiveness and create exclusionary growth trajectories. This is especially the case for markets characterized by a highly dualistic distribution of landownership.

Because smallholders often lack legally well-defined property rights to land, policies such as land titling constitute a second component of a minimalist policy approach. Provision of land titles thus appears attractive as a way to provide institutional preconditions for broadly based growth. However, three observations question the necessity for "getting property rights right" as a precondition for broadly based growth:

1. Current smallholders may already have localized, but nontransferable, tenure security.²³
2. While land titling may make localized tenure security transferable (and thus valuable as a collateral), this may not by itself suffice to improve the capital access of current smallholders.
3. Making tenure security transferable may have its largest impact by enhancing the marketability of smallholder land to other, better capitalized farmers.

Observations (1) and (2) suggest that a careful look be given to the nature of localized tenure security and the nature of the financial system before land titling is pursued as a device to enhance the direct participation of small farmers in a growth process.

Observation (3) indicates that when the existing distribution of land constrains the adoption of high-growth-potential crops—as it would if current landholders cannot capitalize the new crop production—titling and land market activation may speed the displacement of current smallholders. While such policies may be very important in activating agrarian growth, they may mitigate the objective of **broadly based** growth. This may well be the lesson from the Chilean experience. Once smallholder land titles were made fully secure and transferable by the Pinochet government, land sales very rapidly shifted land to modestly larger and better capitalized units, which have been the most successful in the production of fruits for export. The efforts of the Aylwin government in Chile focused on implementing policies to broaden the base of that agrarian growth.

In summary, while a policy of getting prices and institutions right is attractive in the sense that it is relatively straightforward and consistent with the general tenor of a market-oriented development strategy, the analysis here suggests that policy must progress beyond this laissez-faire level if agro-export growth is to be broadly based.

23. While there can be no doubt that insecure property rights truncate investment incentives and therefore may dampen smallholder competitiveness in the production of crops that require long-term investment (for example, fruit trees), it is important to note that security of the current occupant may be very different from the security that a potential future occupant would enjoy. The dismal experience of land-titling programs that expend large amounts of money to establish a land registry only to see the registry quickly become outdated when no one bothers to record land transactions when they occur indicates that current occupants often feel quite secure in their property rights as defined by their customary system. The need to provide tenure security to enhance the competitiveness of current smallholders should not be taken for granted—it is an empirical question which needs to be carefully evaluated on a case-by-case basis.

24. Land without legally clear title may offer little security and have diminished economic value to potential occupants from outside the local social context. In this instance, land securely held by the current occupant may have relatively little collateral value to a formal financial system. Low collateral value may thus impinge on the ability of smallholders to participate in working-capital-intensive export production. However, the primary question remains an empirical one inasmuch as formal financial institutions often show no interest in lending to smallholders even when the latter hold land titles, and smallholders often find the fixed transactions costs associated with formal loans sufficiently large to discourage them from demanding formal credit. A recent review of the impact of land titling programs in Latin America and the Caribbean by the Land Tenure Center of the University of Wisconsin concluded that titling, in and of itself, has not improved credit access for smallholders (for further details, see Shearer, Lastarria-Cornhiel, and Mesbah 1991).

5.2 PICKING WINNERS FOR PUBLIC INVESTMENT

Public investment sometimes plays a role in facilitating the growth of agro-exports through the creation of infrastructure, identification and development of product markets, development of crop varieties suitable to the local environment, and establishment of rural credit facilities (see Williams 1986). A modestly activist approach to creating broadly based growth would try to target public investment on crops that are most likely to conform to the economic capacity of small farmers and that are most likely to generate significant employment increases. In the language of the industrial policy debate, this policy approach would try to "pick winners" by investing in those activities most likely to generate broadly based growth.

To give an example, the broadly based nature of the growth path generated by the agro-export boom in highland Guatemala appears to be explicable in terms of the extreme labor intensity and short gestation period of the exported specialty vegetable crops. The less broadly based agro-export boom in Chilean fruit would seem to be explained by the fact that the long investment gestation period of fruit trees (five years) militates against smallholder production in a way that the short-cycle Guatemalan vegetable crops (three months) do not.

However, there are two questions that confront the effectiveness of a "picking winners" approach to broadly based growth. The first is a technical question: Do agronomic and commercial realities grant policy any degrees of freedom to choose among alternative export crops? The second is an economic question: Can alternative crops be unconditionally and meaningfully ranked in terms of their potential for generating broadly based growth?

Section 3 argued that most crops are technically scale neutral—that it is the structure of markets and prices that twists crop characteristics into farm-size biases. While the Guatemalan agro-export growth trajectory testifies to the importance of technical crop characteristics, these characteristics alone cannot explain the broadly based nature of growth in highland Guatemala. The broadly based growth of highland Guatemala (in which smallholders cautiously adopted export crops and maintained their land access despite severe capital constraints) cannot be understood apart from the fragmented nature of landholdings in highland Guatemala. The pre-existing land-distribution and transactions-costs barriers to land consolidation, in other words, could play an important role in explaining the more inclusionary Guatemalan growth path. In a different land-market environment, the Guatemalan boom crops may have created a much less broadly based pattern of growth. Had the capital-constrained and cautious highland Guatemalan producers been located in Chile's Central Valley, with legal and easily transferrable title, the nature of the export boom might have been quite different.

The partial nature of crop characteristics as a determinant of the impact of agro-export growth on the rural resource poor is highlighted by the Paraguayan experience. The field crops (wheat and soy) that form the basis for the Paraguayan boom are surely quite scale neutral. Yet, it has been the boom in precisely these indeterminate crops that has taken a most exclusionary form, as the discussion in section 4 indicated.

The conclusion to be drawn from this is not that crop characteristics are unimportant in shaping the impact of an agro-export boom on the rural resource poor. There are some crops that are more labor intensive than others, and, as such, they offer advantageous direct and indirect effects. But policy interested in shaping broadly based agro-export growth cannot afford to think about crop characteristics in isolation from the factor-market structures that shape who eventually grows the crops and how they get grown. There are few crops that cannot be grown on large farms, and most crops, when grown on large farms, are grown with much less labor intensity than they are grown on small farms. In the end, a policy focus on "picking winners" means carefully thinking through those crops and crop characteristics in the context of existing market and agrarian structures. Crops that seem intrinsically labor intensive and size neutral may well turn out not to be if capital, insurance, and output quality factors are skewed against small-scale producers. This would imply that a policy approach that gave up on direct participation by small-scale producers would also be likely to generate less labor absorption than might have otherwise been obtained. While public investment in agro-export promotion implies a responsibility to consider the nature of the growth it will engender, it is not a consideration that can take place in isolation from the level 4, activist policies discussed below.

5.3 LAND MARKET REFORM: PERHAPS NECESSARY, BUT NOT SUFFICIENT FOR RURAL RESOURCE POOR

As shown in diagram 1, land market reform refers to a set of policies that directly affect either the valuation of land itself (land taxation) or the cost of transacting in the land market. While a relatively activist policy in microeconomic terms, land market reform is in practice fairly simple because it does not affect the constellation of factors (access to technology, capital, labor, and so on) that determine productive returns to land and that in turn affect the land market indirectly. Small-farm technology and extension policies can, of course, be implemented as a potential complement to land-market reform policies, as has happened recently in Chile.

The menu of land market reform measures are:

1. **Land taxation.** Taxation with progressively higher rates as size of ownership holding increases has been argued to provide large landowners with the incentive to sell part of their land in order to escape the higher tax rates (Strasma et al. 1987). This market reform measure is anticipated to increase the amount of land available for purchase by different strata of producers.
2. **Mortgage banks.** The majority of the landless and the land-poor do not have the savings or access to the financial resources necessary to convert an economic desire to own land into effective demand. Modeled on successful farmland mortgage systems in industrialized countries, mortgage banks make loans to individual peasants, or groups of peasants, to finance the purchase of land. By providing the landless and land-poor with the long-term loans required for farmland purchases, these land-financing systems are expected to increase their participation in the land market and enhance their bargaining position.
3. **Land banks.** Because transactions costs may make large owners reluctant to subdivide their properties into the small lots appropriate for purchase by smallholders, mortgage banks supplying credit for land purchases may be ineffective. Land banks, on the other hand, purchase large estates, which they then subdivide into family-sized farm units and resell to landless and land-poor families. By assuming the

transaction costs involved in the breakup of large holdings into small units that the poor could purchase, land banks are hypothesized to improve the latter's access to these lands.

The expectation that these land-market reform policies can reverse the observed pattern of land market transactions and shift land to the resource poor relies on the presumption that the resource-poor do not suffer a fundamental competitive disadvantage in the sphere of production that affects their potential for participating in the land market. If such a large "competitiveness gap" exists, then neither politically feasible progressive land taxation nor putting the resource poor on an equal transactions-cost or mortgage-capital basis with the better-off will achieve the desired redistributive effect. They will still be unable to earn sufficient returns to justify paying the market price for the land.

There is no evidence in contemporary Latin America of land market reforms having fundamentally altered patterns of landownership. Pilot programs such as the Penny Foundation project in Guatemala and the land-purchase financing program of the Honduran Central Bank—in which farms were purchased and subsequently resold under competitive market terms—have had a very limited impact due to the shortage of funds available.²⁵ Moreover, in Guatemala, case studies of Penny Foundation farms have shown that the typical smallholder beneficiaries may not be able to generate enough income to repay their land-purchase loans, forcing them to abandon their parcels. Studies on both the Guatemalan and Honduran land-purchase financing programs have also shown that the households most likely to survive the first years on the farms had savings to support their subsistence or other adults in the household who could contribute to family income with off-farm employment (Shearer, Lastarria-Cornhiel, and Mesbah 1991).

While both the Chilean and Paraguayan growth trajectories have seen the concentration of growth in larger operational units, the experience of neither country suggests that the arsenal of land market reforms could have reshaped growth. In both the Chilean Central Valley and the Paraguayan frontier with Brazil, smaller units already controlled significant amounts of land prior to the export boom. Land-market transactions costs or mortgage finance problems thus did not deter the entry of smaller-scale producers into the boom sector. Indeed, estimates from the frontier region of Paraguay indicate that, net of transaction costs and mortgage finance considerations, small farms are simply not competitive with larger units given the current configuration of prices and markets.

Thus, we are left with a policy package that could be a necessary part of breaking up the dualistic agrarian structure, which is so pervasive in Latin America, but will not be sufficient unless it is part of a broader package that addresses the concerns regarding scale-biased markets raised above and discussed further in section 5.4.

In summary, while work such as Carter, Luz, and Galeano (1992) identifies strong segmentation in land markets (where smaller units compete in a different land market segment, with

25. Lending institutions in the developing countries must rely on depositors and international donors to raise funds for land-purchase financing. Unless these institutions dispose of very large quantities of capital, their land-purchase funds will deplete very rapidly—after only a few land purchases—leaving them unable to finance any more transactions until those funds are replenished by borrowers (Shearer, Lastarria-Cornhiel, and Mesbah 1991).

higher prices, than do large farms), there is relatively little evidence to date to suggest that the nature of the land market per se has inhibited the realization of broadly based growth patterns.

5.4 CLOSING THE COMPETITIVENESS GAP WITH FACTOR MARKET REFORM: CAPITAL-INSURANCE NEXUS

Policies to facilitate small-farm competitiveness and land access are vital if agro-export growth is to have positive direct effects on the rural resource poor. Among the various factors that create farm-size competitiveness biases, the only one that unambiguously favors small farms is their access to relatively cheap labor (or, more precisely, cheap "interactive labor," in the language of section 3). The observation that cheap labor is the small-farm sector's **only** advantage is not meant to denigrate its potential importance. Nor does this observation deny the broad historical drift to family-labor agriculture that has characterized the economic development of now wealthier countries. However, in the context of the capital, risk, and quality requirements of export agriculture (see section 3.1 above), it is important to keep in mind the sharp difference in the **absolute** size of, say, a North American family farm and a Latin American peasant producer.

Access to cheap and well-motivated interactive family labor may indeed provide the decisive competitive advantage for a 100-hectare family-labor farm versus a 1,000-hectare wage-labor or collective farm. Both the 100- and the 1,000-hectare farms are large enough that the fixed costs of information which shape various input and output markets are irrelevant. Family farms in North America are more than large enough to deal with these information costs. The same can also be said of many of the emergent mid-sized or capitalized family farms observed to exist in central Chile and elsewhere in Latin America (see especially Scott 1985; and Lehmann 1986).²⁶ However, the same cannot be said about the 1- or 2-hectare family-labor farms in Latin America. For such farms, two orders of magnitude smaller than family farms elsewhere, the labor-cost advantage may not suffice to overcome countervailing competitive disadvantages created by the size-sensitive factor and output markets discussed earlier.

It is exceedingly important to put this last comment in context. Clearly, many East and Southeast Asian economies have developed vital, competitive agricultures based on very small family-labor farms. Yet, they have done so in structural contexts where small farms do not compete head-to-head with farms two, three, and four orders of magnitude larger, as do small farms in Latin America.²⁷ Carter and Zimmerman (1993) theoretically explore why an East Asian farm structure is likely to engender economically endogenous price reactions which enhance the long-run competitiveness of small farms while a prototypical Latin American distribution will not. A political economy perspective on the effective political demand for small-farm services would complement this contention regarding the self-ratifying competitiveness of small farms when the initial land distribution is unimodal.

26. Note that Lehmann (1986) himself indicates that growth along the capitalized family-farm path may be even more completely proletarianizing than traditional Latin American bimodal patterns of growth.

27. Postwar land reforms in East Asia established tight landownership ceilings of 2.5-3 hectares.

The agro-export growth experience in highland Guatemala highlights the importance of both structural-context and capital-market disadvantages of small farms. The analysis in annex B identifies capital and risk constraints as key factors behind the limited extent of agro-export adoption by smallholders—an aspect of small-farm behavior that stands in marked contrast to the relatively few larger-scale producers of the same crops. In a complementary analysis of the same agro-export sector, von Braun, Hotchkiss, and Immink (1989) estimate that small farmers substitute for their lack of access to insurance and capital markets by allocating their resources according to a self-insurance strategy that is economically quite costly. Both of these analyses highlight the continuing presence of binding capital constraints that dampen the competitiveness of small-scale producers, even given the existence of contract farming and cooperatives, which partially mitigates the size disadvantages of small farms. The persistence and growth of small farms **despite** their revealed competitive disadvantage is strong testimony to the importance of the initial structural context in which growth occurs. As argued earlier, the pre-existing fragmentation and heterogeneity of land in highland Guatemala presents a real barrier to the creation of larger-scale farms. In a sense, the structure of highland Guatemala approximates an East Asian land distribution in which there is relatively little short-run competition from larger farm

The same small-farm capital-access problems are evident in the agro-export boom sectors of Chile and Paraguay. But, as reviewed earlier, the structural outcome has been quite different with very rapid land concentration accompanying the export booms. Interestingly, one of the changes initiated by Chile's elected Christian Democratic government in 1990 was a massive expansion of small-farm credit and technical-assistance programs in an effort to broaden the base of what was perceived as a highly exclusionary growth process. Yet, even as these credit programs provide more working capital for smallholders, they have not addressed the risk and insurance problems of these same producers. Like the Guatemalan small farmers, Chilean *minyindistas* can and do allocate their resources in a way consistent with self-insurance. However, in the highly competitive boom land market of Chile, such conservative strategies are unlikely to generate the returns necessary to be competitive in the land market.

From a policy perspective, then, two very clear messages emerge if the agrarian-structure and labor-absorption picture of agro-export expansion is to avoid the southwestwardly drift described above in figure 2:

1. Small farmers will need improved access to both ex-ante and ex-post capital or, in other words, financial assistance to capitalize into agro-export activities and to insure themselves against stochastic shocks to their production and prices. They may also need help overcoming major informational costs that might be associated with the adoption of new agro-exports or the weak bargaining position of being an individual small grower interacting with large-scale processors or powerful input suppliers.
2. Policy can get away with doing less when structural competition is less severe.

28. Yet, even in Guatemala, there is some evidence of an evolving dynamic that will markedly reduce the competitiveness of small farmers. See the earlier discussion on pesticide residue problems and market revaluation of the optimal operational size

Unfortunately, rectifying the capital- and insurance-market disadvantages of small-scale producers is not simple, as the dismal experience with targeted credit and crop insurance programs demonstrate. The transactions costs, informational asymmetries, and weak collateral base that disadvantage smallholders in competitive markets represent real economic problems. While programs like credit unions (which reduce transactions costs and exploit informal, local information) and Grameen Bank-like group-lending schemes (which reduce lender risk and substitute peer monitoring for collateral) are promising efforts to address the underlying problems, their generalized effectiveness has yet to be demonstrated, especially in agricultural settings where covariate risk is high.

6. BRINGING ACTIVIST POLICY BACK IN FOR BROADLY BASED GROWTH

Diagram 2, introduced in the preceding section, offers a continuum of possible agricultural policies. Over the past decade, policy has swung strongly toward the laissez-faire end of that continuum. The contemporary experience of agricultural liberalization and nontraditional agro-export promotion is heterogeneous and cautions against the presumption that agrarian growth free of capital subsidies and policy distortions will be broadly based. Farm-level constraints often make effective or shadow prices size-sensitive in these markets, meaning that real economic costs and returns are systematically different for farm units of different size. When shadow prices are size sensitive, there is a danger that growth will be spread thinly across the agrarian structure, resulting in a growth trajectory that is not broadly based and that potentially induces a socially destructive structural dynamic in the longer run.

The standard, microeconomically quietist, liberalization package of right prices, right institutions, and macro stability may not suffice to include the poor in agrarian growth. Indeed, efforts such as land titling may serve only to generalize and make marketable to outsiders what had been locally secure, smallholder tenure. Perhaps useful to get growth moving, such efforts are as likely to work by moving smallholders out as by including them in.

The difficulty of incorporating the rural resource poor directly in an agro-export boom can be traced to the fact that there are a number of characteristics of export crops (working capital intensity, human capital intensity, risk and product quality standards) which are affected by the fixed costs of information that shape fundamental factor and financial markets. Given these fixed information costs, market-driven solutions rarely suffice to incorporate small-scale holders into the process, at least not when a larger-scale sector exists as an alternative. Small farms are not competitive. It is thus not surprising that small farms are left out of the export boom unless policy steps forward to address the information-costs problems that underlies this fundamental competitiveness gap.

Achievement of broadly based growth requires bringing microeconomically more activist policy back in. In terms of the policy continuum in diagram 2, the message is to avoid the market-unfriendly extreme of *dirigista* policy and to seek intermediate policy ground, which appears

necessary to achieve effective and socially sustainable growth and development. An intermediate policy strategy mandates that states, nongovernmental organizations, and other extra-market agencies necessarily have large roles to play in overcoming the microeconomic obstacles that liberalization alone cannot surmount. Assuredly, these are not the centralized roles of an earlier era, when many believed that states could quickly address the challenges facing low-income economies. But, in recent years, many liberalization advocates have promised no less a quick fix. What is needed is less disinvestment in the state and more investment in the markets that are essential to sustainable and equitable growth in low-income agriculture.

However important, addressing these fundamental factor-market problems is not easy to do, as the dismal experience of targeted credit displays. Peter Timmer (1988–89) remarks that agricultural policymaking becomes "analytically taxing" once one acknowledges the imperfections of rural markets. People-friendly (but not market-naïve) liberalization must address the challenges of missing, thin, and size-sensitive markets if low-income agrarian economies are to follow paths of sustainable development with equity.

ANNEX A

Chile's fruit-export boom and its impact on the employment opportunities and land access of the resource poor

A-1 BACKGROUND

In the face of stagnating agricultural growth in the mid-1960s, the Frei administration (1964—1973) embarked Chile on one of the most ambitious land reform programs in Latin America. The agrarian reform, extended and intensified by the Allende administration (1970-1973), expropriated 43 percent of the agricultural land in the country (in quality-adjusted terms). The land reform was abruptly curtailed by a military coup in 1973 and reformed sector land was returned to the private sector. After restoring 30 percent of the land originally expropriated to its former owners, the military gradually allocated most of the remaining land in the reformed sector to individual beneficiaries as private plots or *parcelas*. Upon the completion of the process of parcelation in 1979, 48,000 families had received plots of land averaging 10 BIH ("basic irrigated hectares").

From 1973 onward, the military also implemented a sequence of neoliberal, market-oriented, agricultural policies, seeking the greater insertion of Chile's agricultural products into the international market. Agricultural and forestry exports were greatly promoted. As a result, total area under fruit cultivation nearly tripled in the period 1974-1990, and the current dollar value of the agroforestry exports in 1990 was more than ten times as large as that of 1974. This sustained agro-export growth is the success story of the neoliberal economic strategy and has garnered widespread admiration for the Chilean policy model.

Chile's experience in the wake of agrarian reform parcelation provides a quasi-experimental opportunity to study the impact of rapid agro-export growth on the agrarian structure and labor employment. To address these important issues, this annex uses survey data gathered in 1991—1992 from a sample of 207 original *parceleros* in two regionally distinct economic environments: one where the production of fruit for export has been booming (the province of Cachapoal), and one where the production of traditional domestic market crops is still dominant (the province of Uble).

A-2 ADOPTION OF EXPORT CROPS

Shifting production to fruit plantations and forestry is a long-term process that requires large initial capital investments with no returns over a long gestation period. Export crops also require standardized production and packaging, necessitating large quantities of working capital and access to additional investment funds. Although exporter credit was available for such production in Chile, most smallholders and *parceleros* could not borrow. They were also inexperienced in fruit production and lacked the entrepreneurial ability and familiarity with the institutional framework (banks, technical agents, export firms, and so forth) that are necessary to produce successfully for the export market.

(Jarvis 1989). The lack of capital access and the absence of well-organized marketing and processing cooperatives impeded the participation of small farmers and *parceleros* in the export market.

CIREN's (1990, 1991) data on fruit producers for both Cachapoal and Ruble regions clearly reveal the low adoption rate of export crops by small farmers (see table A-1). In the Cachapoal region, where the production of fruit is widespread (covering 40 percent of the agricultural land), farms in the 0-5-hectare size category represent 57 percent of all agricultural units but only 16.2 percent of fruit growers. On the other hand, farms greater than 20 hectares—representing 14 percent of all the agricultural units in the province—make up 42.6 percent of fruit growers. In Ruble, 47.5 percent of agricultural units fall into the 0-5-hectare farm-size category. Yet, this category represents only 14.80 percent of fruit producers in that province compared to 62.3 percent of fruit growers who own farms greater than 20 hectares.¹ Fruit production is more prominent among the larger producers of either region.

A-3 EFFECTS OF ADOPTION ON THE AGRARIAN STRUCTURE

Not only were small farmers and *parceleros* generally unable to participate in the export boom, but the production of the traditional crops they most commonly produced for the domestic market became increasingly less profitable between 1973 and the severe economic and agricultural crisis of 1982/1983. Meanwhile, the fruit boom created a strong demand for high-quality *parcelero* land from those individuals with sufficient financial resources—including easier access to credit—to participate in that market. "Squeezed economically, on the one hand, and offered high prices for land, on the other, many *parceleros* chose to sell out" (Jarvis 1989, p. 242).

The number of parcel sales in the brief period since 1973 has been staggering. Available data suggest that a growing number of land reform assignees have sold their land. ICIRA's 1979 study indicated that about 15 percent of the land reform assignees had sold their land as early as June 1978. Rough estimates suggest that at least 30 percent of the *parcelas* had been sold by December 1979 (Jarvis 1981) and about 40 percent by the end of 1986 (Gómez and Echenique 1988). A recent study on *parcelero* land sales estimates that at the national level, 57 percent of the original 48,000 beneficiaries sold their land (Echenique and Rolando 1991).

Determining the impact of these transactions on the overall agrarian structure has been hampered by the lack of an agricultural census. Jarvis (1989) estimates that by 1986, land sales had increased the proportion of area in the large-farm sector from the 20 percent it constituted following the privatization of reformed sector land by the military to approximately 25-30 percent.

For the purposes of a study of the evolution of agrarian structure, we selected a sample of 13 ex-haciendas (or large estates)—6 in Cachapoal Province and 7 in Ruble Province—originally surveyed in a 1965 ICIRA-LTC study of large estates in Chile's Central Valley. Figures A-1 and A-3 represent the size distribution of the "1976 farms" created within the 1965 boundaries of our selected ex-haciendas by private subdivisions and the agrarian reform (1965-1973) and, later, by the processes of land restitution and parcelation (1973-1976). The list of current owners and farms sizes was then updated to

1. In the absence of a new agricultural census, the information on the distribution of agricultural properties in Cachapoal and Ruble is based on agricultural tax rolls for 1989.

199, with the size distributions of the new farms depicted in figures A-2 and A-4.² The degree of rapid concentration of landownership that has taken place in the short period between 1976 and 1991 is astonishing. In Cachapoal, the area controlled by farms exceeding 80 BIH has increased from about 9 percent in 1976 to 23 percent in 1991. Land sales by the land reform beneficiaries have also led to the creation of a large number of small farms: in 1976, there were no farm units smaller than 5 BIH; by 1991, farms smaller than 5 BIH made up 21 percent of all agricultural units while accounting for less than 2.5 percent of the land in our study. In Ruble, there were no farms either smaller than 5 BIH or greater than 80 BIH. The distribution of land was relatively egalitarian with 84 percent of agricultural units controlling 63 percent of the land. By 1991, 33 percent of all agricultural units are smaller than 5 BIH and control less than 5 percent of the land.

Available data show that sales by *parceleros* have been far more prevalent in the northern Central Valley, where production for export crops has been the most profitable (the so-called *fruticola* or fruit-growing zone). Land sales have been less common in areas more suited to the production of traditional crops (the *policultura* zone). Estimates from a study of *parceleros* of the metropolitan region, dominated by the production of export crops, suggest that about 74 percent had sold land by 1982 (Molina 1987). Similarly, Echenique and Rolando's (1991) study indicates that by 1989, parcel sales were far more widespread in the metropolitan region (where 70.9 percent of the beneficiaries had sold their land) than in the VIII region (44.8 percent). In our own study of *parcela* sales through 1991, the disparity in total parcels sold between the predominantly fruticultural province of Cachapoal (56.31 percent) and the province of Ñuble (46.2 percent)—while less striking than in the Echenique and Rolando study—is still significant (see table A-3).

Within each region, important intraregional differences have been observed between *comunas* that have been more involved in fruit production and those where fruit production has not yet made such an inroad. INPROA's (Instituto de Promoción Agraria) 1984 study of *parcelas* in the VI region indicates that 73 percent of the land reform plots had been sold in the *comuna* of El Olivar—located near the regional capital, close to the Pan-American highway, and highly specialized in the production of export crops—compared to a mere 13 percent in the much poorer and more isolated *comuna* of Las Cabras (Gómez 1986, p. 23). Echenique and Rolando (1991, pp. 18–19) observe a similar difference within the metropolitan region, where, by 1989, the proportion of parcels sold ranged from 42 percent in the *comuna* of Melipilla to 76 percent in the fruit-growing *comuna* of Maipo, which has some of the best land in the country. In our own results for the province of Cachapoal, the percentage of *parcelas* sold by 1991 would increase from 56.3 percent to 67.4 percent if we exclude parcels of land located in the *comuna* of Pichidegua, where fruit production has only recently become widely established (table A-3).

The timing of the sales further suggests a connection between the growth of the fruit-exporting sector and the decline in direct peasant access to land. In the southern part of the Central Valley, where the expansion of fruit production is a more recent phenomenon, land sales, too, have occurred later. The cultivation of nontraditional export fruit crops has steadily extended southward (from the northern provinces of Chile's Central Valley to Ñuble and beyond) (see tables A-4 and A-5). Data suggest that the rate of expansion of fruit production has coincided with changing rates of land sales. In the north-central province of Cachapoal, both the rate of increase in the area dedicated to fruit production and the rate of *parcela* sales have declined after 1983 (see table A-7). In Ñuble, meanwhile, the reverse has taken place. Here, the increase in fruit acreage has been spectacular (a 306 percent increase between

2. The list of "1976 farm units" was formed by reviewing the agrarian reform and parcelation case files maintained by the Servicio Agrícola y Ganadero of the Ministry of Agriculture in Santiago. The list was updated to 1991 with information obtained at the property registry offices (Conservadores de Bienes Raíces) in Cachapoal and Ruble.

1981/2 and 1991), with the greater part of this expansion occurring after 1987 (see table A-5). At the same time, the rate of land-reform parcel sales in that province experienced a great increase from 1983 onward, particularly notable after 1987 (see table A-6 and figure A-5).³

Finally, the increased revenue potential of land under fruit cultivation has driven up land prices beyond the reach of those who cannot adopt export crops. Regional differences in land prices illustrate this point clearly. In 1978, 1 hectare of irrigated land in the predominantly fruit-growing region of the northern Central Valley could command twice as much as agricultural land farther south, in regions less suited to profitable fruit production (Universidad Católica 1979). Moreover, while the annual rate of increase in the prices of agricultural land in the center-south region has reached a hitherto unprecedented 3 percent per annum, it still pales by comparison to the rate of increase in land prices for the center-north fruit region, which has multiplied remarkably from 0.5 percent per annum in 1917-1970 to 12.2 percent per annum in 1974-1978.

A-4 IMPACT OF NONTRADITIONAL EXPORT AGRICULTURE ON LABOR ABSORPTION

Chile's export boom has excluded smaller farms, which have found it infeasible to adopt fruit production (section A-2), and has been accompanied by a decline in the direct land access of the rural poor (section A-3). Such direct exclusionary effects on the resource-poor may be offset by positive indirect effects from increased employment.

Figures A-6 and A-7 display the relationship between labor absorbed per hectare and the size of operational farm unit.⁴ Both curves confirm the theoretical expectation that smaller farms (less than 8 BIH) are more labor intensive than larger operational units.

For a **given** agrarian structure, the labor-absorption impact of an export boom would depend, first and foremost, on the size distribution of the farms adopting the export crop. Farms that dedicate the greatest proportion of their land to fruit crops are units in the 12-40 BIH category in Cachapoal, and units exceeding 40 BIH in 'uble (see table A-8).⁵ These two farm categories are the most labor intensive of all but also are the smallest in their respective regions.

The full labor-absorption effect of agro-export growth will also depend on whether this development induces a pattern of structural change that systematically transfers land to producers who employ more labor. In Cachapoal, land transactions are shifting land from *parcelas* to the 12-40 BIH farms (see table A-2). With the exception of the smallest farms in Cachapoal (less than 8 BIH), farms in the 12-40 BIH category have the highest labor-absorption level (see figure A-6). In 'uble, the land market has transferred land to the 12-40 BIH farms as well as to farms exceeding 40 BIH. The impact of these structural shifts on labor absorption thus remains ambiguous: 12-40 BIH farms display the lowest employment levels of all farm units, while---next to the smallest units---farms greater than 40 BIH have the highest labor-absorption level in 'uble (see figure A-7).

3. Of land-reform parcel sales in Ruble prior to 1991, 40.68 percent occurred between 1987 and 1991.

4. The information presented in figures A-6 and A-7 and table A-7 is based on a small subsample of 24 producers and is, therefore, preliminary.

5. In Ruble, this proportion is still only 8 percent of the total land of the farms.

A-5 CONCLUSION

The impact of the fruit boom in the province of Cachapoal has been positive in terms of labor absorption and negative in terms of land access of the resource poor. The percentage of land in the large-farm area has increased significantly, yet the final outcome has not been a return to a system dominated by the large estates of the prereform era. Instead, we have noted a shift to medium-sized, capital-intensive farm units, with a high intensity of wage-labor use. Of all farm sizes, this category seems best suited to succeed in the production of fruit and vegetables for export. Many observers of the sector believe—and our experiences in the field confirm that medium-sized farms with a high concentration of capital are more efficient than the huge haciendas of the past in producing for these markets.

Land in the south-central region of Chile has been moving toward units in the 20-40 BIH category—which are less labor absorbing than the units they are replacing—and toward units greater than 40 BIH—which are more labor absorbing than the units they are replacing but larger than the expanding units in Cachapoal. The land access of the resource-poor has clearly been reduced. However, the net impact of these structural changes on labor-absorption levels remains unclear.

The greater concentration of land in the south-central region relative to the province of Cachapoal can be attributed, in part, to the continued dominance of traditional crop agriculture and animal husbandry. The expansion of fruit production is still a relatively recent phenomenon in the southern Central Valley. Fruit production covers only 8 percent of the agricultural land in the province of (CIREN 1991). The structural effects of the continued expansion of export agriculture in that region and its attendant effects on labor absorption remain to be seen.

TABLE A-1 Size distribution of fruit-growing farms

FARM SIZE	CACHAPOAL			
	No. of orchards	%	No. of orchards	%
0-5 ha	435	16.2	68	14.8
5-10 ha	498	18.6	46	10.0
10-20 ha	604	22.5	59	12.8
20-50 ha	579	21.6	89	19.3
>50 ha	563	21.0	198	43.0

Source: CIREN, *Catastro Frutícola Nacional, VI Región. Actualización 1990* (Santiago: CIREN-CORFO, 1990). CIREN, *Catastro Frutícola Nacional, VIII Región. 1991* (Santiago: CIREN-CORFO, 1991).

TABLE A-2 Distribution of land by farm size, 1976 and 1991

FARM SIZE CATEGORY	ÑUBLE				CACHAPOAL			
	% holdings		% of land		holdings		% of land	
	1976	1991	1976j	1991	1976i	1991	1976i	1991
0-5 BIH	0.0	33.1	0.0	4.9	0.0	20.8	0.0	2.4
5-8 BIH	14.3	10.5	9.8	6.5	0.0	4.0	0.0	1.3
8-12 BIH	76.8	39.1	63.0	32.0	84.4	42.4	45.7	20.8
12-40 BIH	5.4	12.8	10.2	24.7	3.9	20.8	6.3	24.2
>40 BIH	3.6	4.5	17.0	31.9	11.7	12.0	47.9	51.3

TABLE A-3 Sale of parcelas, 1991

FUNDO	No. OF ALLO-GATED PARCELS	No. OF TOTAL SALES BY PARCELEROS AND THEIR INHERITORS	% OF SALES
Cachapoal-VI Región			
• Santa Amelia (Rancagua)	6	4	66.67
• California (Requinoa)	17	13	76.47
• San Juan (El Olivar)	9	4	44.44
• Sta. Teresa de Tunca (Codegua)	10	7	70.00
• La Moranina (Rancagua)	7	5	71.43
• La Torina (Pichidegua)	54	25	46.30
Subtotal	103	58	56.31
Ñuble-VIII Region			
• Las Pataguas (Coihueco)	36	19	52.78
• El Carmen de Cato (Coihueco)	17	3	17.65
• Sta. Eugenia (Coihueco)	23	14	60.87
• El Carmen (Pinto)	5	3	60.00
• Kilmen (San Nicolas)	7	3	42.86
• San Luis (San Carlos)	9	4	44.44
• Los Galpones (San Carlos)	7	2	28.57
Subtotal	104	48	46.15

TABLE A-4 Hectares dedicated to fruit plantations

YEAR	HECTARES DEDICATED TO FRUIT PLANTATIONS	
	VI Region	Cachapoal Province
1982	27977.01	21685.45
1986/7	38043.30	29579.60
1990	46039.80	35027.60
	VIII Region	Maipo Province
1981/2	1113.11	537.07
1987/8	1736.90	1323.40
1991	2865.40	2183.00

TABLE A-5 Changes in land area dedicated to fruit plantations

YEAR	CHANGES IN LAND AREA DEDICATED TO FRUIT PLANTATIONS			
	VI Region		Cachapoal Province	
1982-1986/7	40.50%	57.83%	36.40%	59.17%
1986/7-1990	21.02%	42.17%	18.42%	40.83%
1982-1990	70.03%	100.00%	61.53%	100.00%
	VIII Region		Maipo Province	
1981/2-1987/8	56.04%	35.60%	146.41%	47.77%
1987/8-1991	64.97%	64.40%	64.95%	52.23%
1981/2-1991	157.42%	100.00%	306.47%	100.00%

TABLE A4 Total sales of *parcelas*, 1975-1991

YEAR OF SALE	CACHAPOAL			
	No. of sales	% of total	No. of sales	% of total
1975-1980	31	37.80	29	24.58
1981	10	12.20	10	8.47
1982	4	4.88	8	6.78
1983	9	10.98	8	6.78
1984	6	7.32	8	6.78
1985	4	4.88	3	2.54
1986	3	3.66	4	3.39
1987	1	1.22	10	8.47
1988	5	6.10	10	8.47
1989	5	6.10	10	8.47
1990	3	3.66	14	11.86
1991	1	1.22	4	3.39
Total	82	100.00	118	100.00

Source: Data collected at the Conservadores de Bienes Raíces, 1991.

TABLE A-7 Total sales of *parcelas*, 1975—1991

YEAR	CACHAPOAL	
1975—1983	65.85%	46.61%
1984—1991	34.15%	53.39%

TABLE A-8 PERCENTAGE OF LAND DEDICATED TO FRUIT AND VEGETABLES BY FARM SIZE

FARM-SIZE CATEGORY				CACHAPOAL		
	Veget.	Fruit	Total	Veget.	Fruit	Total
<8 BIH	0.00	0.00	0.00	32.05	0.00	32.05
8—12 BIH	0.00	0.00	0.00	0.00	11.57	11.57
12—40 BIH	0.00	1.30	1.30	26.92	32.56	59.48
>40 BIH	0.75	7.33	8.08	0.00	19.01	19.01

Figure A-1: Distribution of Land in Cachapoal, 1976

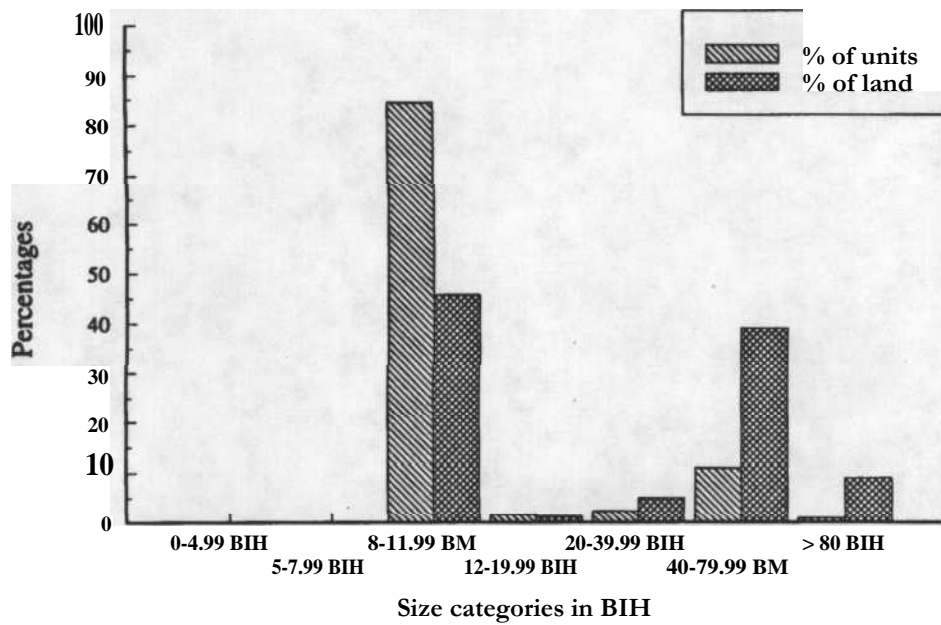


Figure A-2: Distribution of Land in Cachapoal, 1991

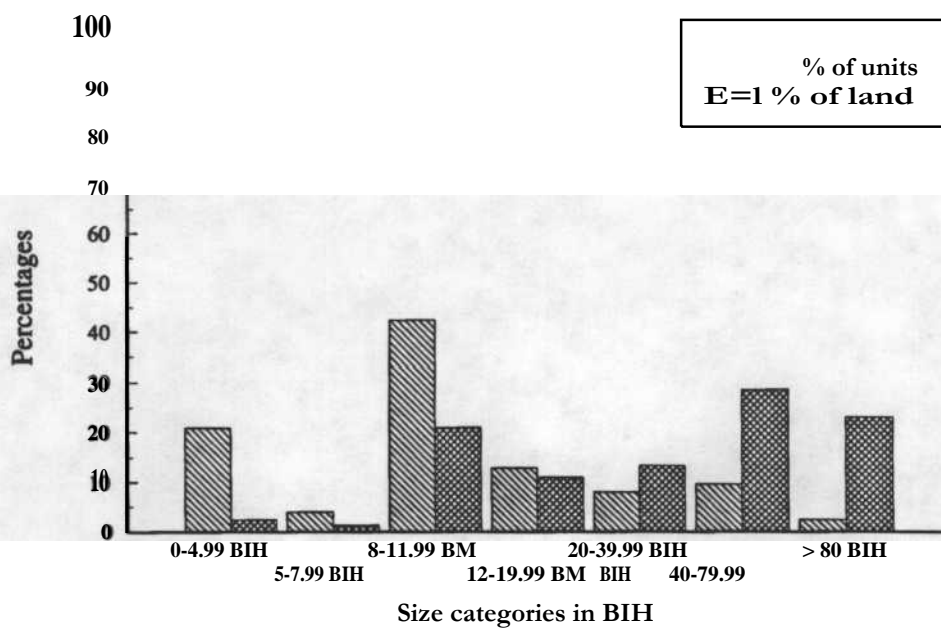


Figure A-3: Distribution of Land in uble , 1976

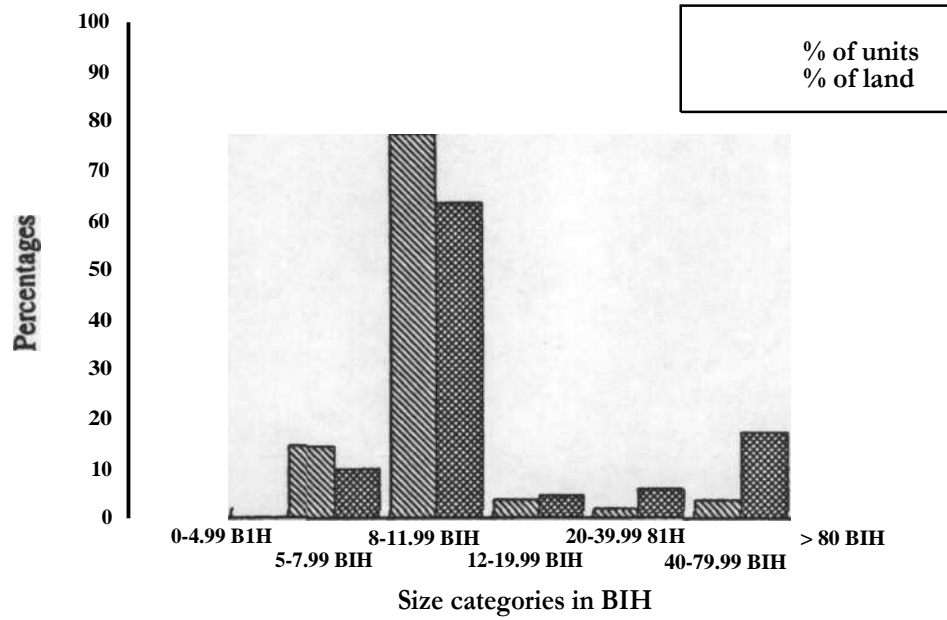


Figure A-4: Distribution of Land in uble , 1991

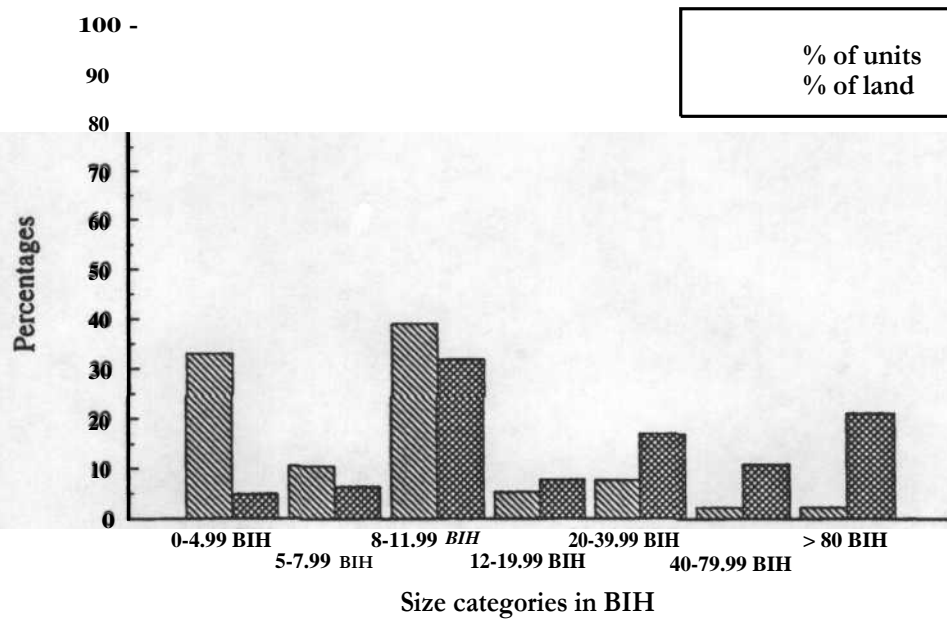


Figure A-5: Percentage of Total Sales 1978-1991



Figure A-6: Labor Absorption by Scale of Operation, Cachapoal

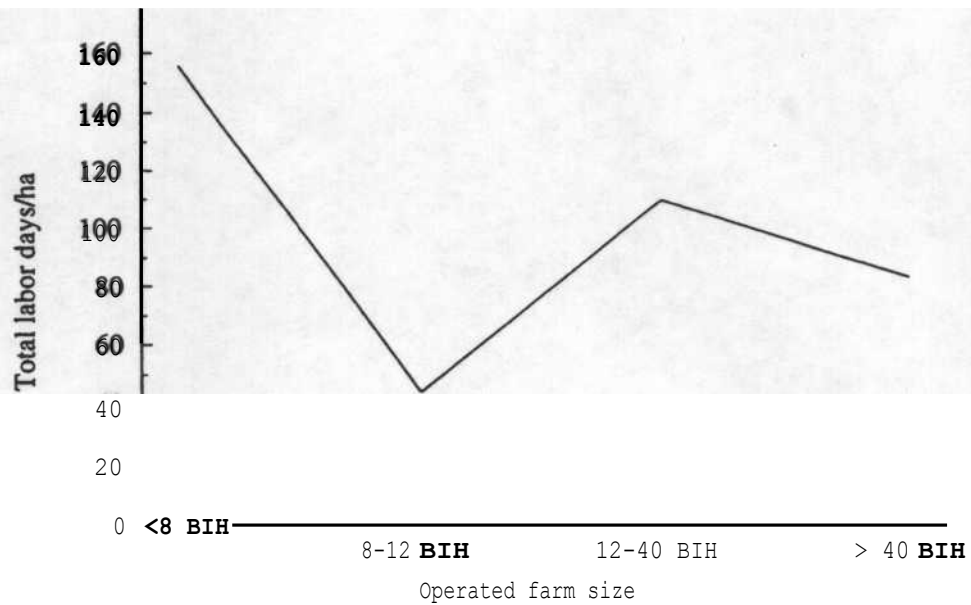
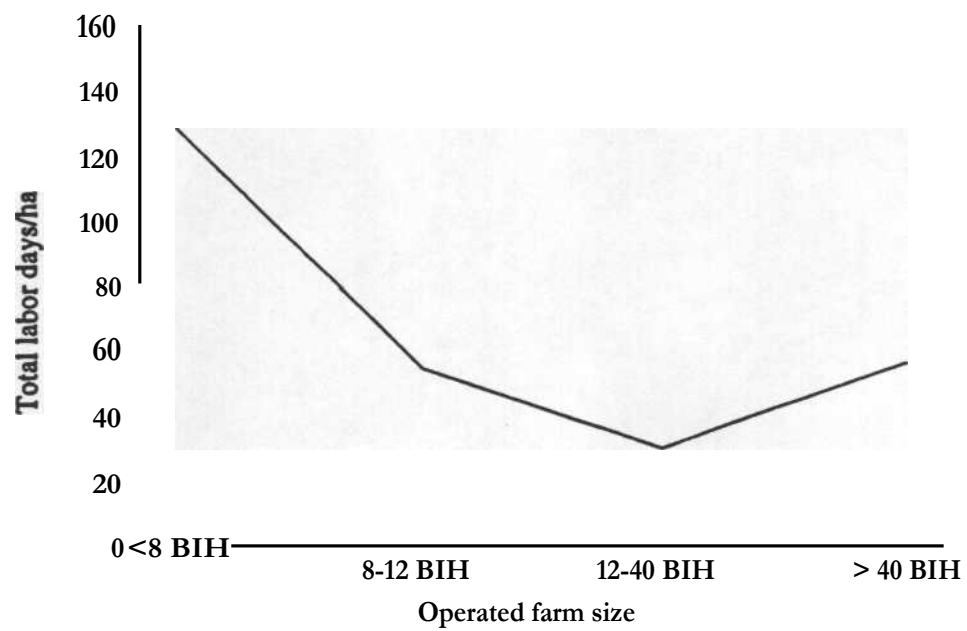


Figure A-7: Labor Absorption by Scale of Operation,
able



ANNEX B

Impact of nontraditional agricultural exports on agrarian structure and labor absorption in the Highlands of Guatemala

B-1 BACKGROUND

In the following pages, we use survey data gathered in 1990—91 from 300 households in the Central Highlands of Guatemala to examine how the adoption of nontraditional agricultural exports (NTAX) is affecting the agrarian structure and the use of labor on these farms. The two major questions are whether nontraditional exports are helping to reduce inequality in land ownership and use patterns and whether these new crops are having important labor-absorption effects. As the main body of this paper demonstrates, these two effects (land distribution and labor absorption) will be integrally linked if the scale of operation or production affects the intensity of labor utilization on farms. In this case, depending on the direction of the two effects, the evolution of agrarian structure will, over time, dampen or magnify the labor-absorption effects of nontraditional export production.

Both questions are of great importance in Guatemala, where land distribution is highly unequal (a national Gini coefficient of 0.851 in 1979); landholdings among the poor are highly fragmented in the Highlands (average size of less than 1 acre in our sample of farm households); and labor opportunities are often far from the family's small farm, requiring costly and disruptive seasonal labor migration. In other words, if adoption of nontraditional exports in the Central Highlands of Guatemala helps to improve land access of smallholders and increase labor absorption resulting from highlands agriculture, both direct and indirect benefits for the rural poor could be significant.

This appended report addresses these two questions of how nontraditional exports are affecting agrarian structure and labor opportunities in the Central Highlands using household-level data from five villages in a region where exports of winter vegetables, especially broccoli and snow peas, have been booming. The effort begins with estimating the relationship between the scale of production and the intensity of labor use for the three primary crops raised by these households (broccoli, snow peas, and corn). Next, the effects of adoption on agrarian structure are analyzed. Here, we introduce the main results from a paper by Barham, Carter, and Sigelko (1992), which examines adoption and accumulation patterns in this area. We use these results to construct a predicted land distribution for 1991 and 1995. This predicted path of agrarian structure is then combined with regression estimates that predict adoption patterns and labor-utilization coefficients for farms by scale of operation to construct labor-utilization estimates for 1987, 1991, and 1995.

The estimates for 1991 and 1995 assume that adoption patterns are similar to what they were in 1991; they are calculated according to farm size, holding all other household variables constant. For the 1987 labor-utilization estimate, households are assumed to be in a pre-NTAX era (that is, before use of

nontraditional agricultural exports) and, therefore, growing only the traditional corn crop on their farms. The final results of these estimates are summarized in the conclusion.

B-2 SCALE OF PRODUCTION AND LABOR ABSORPTION IN DIFFERENT CROPS

For broccoli, snow peas, and corn, we estimated regressions on the relationship between scale of production and labor absorption. The dependent **variable** was labor utilized in all stages of production per cuerda¹ of land, or labor intensity. The relationship between this measure and the scale of operation was tested using a range of specifications to see what offered the best prediction of how farm size affected labor absorption. We also tested the effect of **nontraditional** export adoption on labor intensity in traditional corn production.

Figure B-1 combines the three sets of results in a graph of labor use per cuerda versus scale of operation in the particular crop, and table B-1 gives the coefficients on each regression. For both broccoli and snow peas, there is a declining use of labor as the scale of production expands, while with corn there appears to be a rather constant labor-absorption coefficient. Corn is less labor intensive than broccoli and snow peas as well—especially within the scale of operation for the sample —and is not sensitive to adoption. Snow peas are the most labor intensive, averaging in our sample about 31 person-days per cuerda versus 12 person-days per cuerda for corn. Broccoli labor utilization ranges from 30 person-days per cuerda on a 1-cuerda operation to around 15 person-days on a >5-cuerda scale of operation. The average in our sample is about 15 person-days per cuerda or about 50 percent of the labor intensity of snow peas but 25 percent greater than corn. In summary, both broccoli and snow pea adoption increase labor absorption, the extent of this increase depends on the scale of production, and snow pea production has the strongest labor-absorption impacts.

B-3 ADOPTION AND ACCUMULATION PATTERNS IN GUATEMALA 'S LATEST AGRO-EXPORT BOOM

Barham, Carter, and Sigelko (1992) examine the adoption and accumulation patterns of small-farm households in the Central Highlands in an attempt to identify the determinants of adoption of nontraditional exports and the effects of adoption on agrarian structure. The regression results on these two questions are briefly reviewed here before they are put to use in predicting, first, the quantity of land dedicated by the sample farm households to broccoli, snow peas, and corn, and, second, the evolution of landholdings for the same households.

Table B-2 presents the results of the adoption regression, which predicts the quantity of land dedicated to the production of nontraditional exports (broccoli and snow peas). The strongest predictors of land dedicated to exports are farm-size variables, a land-quality index, and the age of the farm operator. As the dotted curve in figure B-2 shows, all but the smallest of farms in our sample have a high probability of adoption. A 12-cuerda or 4-acre farm has about a 90 percent probability of being an adopter, which suggests that participation in this sector is only weakly limited by scale of operation. However, the solid line depicting the expected land in nontraditional export production demonstrates the rather

1. A Guatemalan unit of land measurement, 1 cuerda equals approximately 0.33 acre.

rapid leveling off that occurs in the extent of adoption as farm size expands. That is, until farm size expands to about 45-50 cuerdas (20 acres), or beyond the operating scale of the vast majority of our sample, the expected land in nontraditional export crops does not grow much beyond 3 cuerdas.

This adoption picture has serious implications for the labor-absorption potential of nontraditional exports in a smallholder scheme. Our best guess is that the limitation on the extent of adoption for these smallholders is a credit-risk constraint rather than a problem of labor supervision. On a small sample, which we supervised, of larger farms in surrounding areas, the extent of adoption was in the 60–100 percent range; in other words, almost all the land was in production of nontraditionals. These larger farms, we suspect, did not face the credit-risk tradeoffs that confront the smaller-scale farms.

The connection between adoption and accumulation is positive and favors, in our sample, the smaller adopters. This finding, explained in more detail shortly, is quite consistent with figure B-2, which predicts that the greatest expansion in land dedicated to the high-value nontraditional exports will occur among the smaller-scale operators. Hence, it is not surprising that these operators would also be the most likely land accumulators in the sample, since they would be the most willing to pay the "opportunity cost" on the land.

The regression framework used in the analysis of how adoption impacts agrarian structure compares the "pre-boom" and "boom" land-accumulation patterns in order to distinguish sharply between the differentiation patterns that might have been occurring prior to the boom and those that did occur once the nontraditional export boom got under way. The regression was on the predicted annual change in landholdings from the inception of the farm to 1987, and then from 1987 to 1990, with 1987 being the dividing line between the pre-boom and boom periods. The independent variables were the age and age squared of the farm household, the initial farm size, and a binary variable on adoption used to shift both the intercept and the initial farm-size variable. Because of the potential correlation in errors across the two equations, the regression was specificized as a seemingly unrelated regression system.

The regression results are reported in table B-3, but figures B-3 and B-4 offer a more intuitive representation of the outcome. In particular, we use the coefficients to generate a picture of land accumulation trajectories for households over their life cycle, with a 2-cuerda and a 30-cuerda initial endowment. Each figure has four curves, two representing the adopters and two representing the nonadopters, each in their "pre-boom" and "boom" trajectories. This two-period portrayal captures the heterogeneity between the two groups by showing that even in the pre-boom era, those households that eventually became adopters were on a higher accumulation trajectory than nonadopters, and that in the case of the smaller initial farms (figure B-3), adoption of nontraditionals widens the pre-existing gap between the two groups. What we call the "structural effect" of nontraditional agricultural exports is captured in figure B-3 by the area between the two dotted curves minus the area between the two solid curves.

In terms of agrarian-structure impacts, figures B-3 and B-4 suggest that the impact of nontraditional exports in our sample is to reduce the inequality of land distribution by shifting land toward the smaller-scale producers. It is worth pointing out, however, that our sampling methods did not pick up any "large" producers, which means that we may have missed a cohort of larger-scale producers who are also accumulating land.

For the purpose of the exercise pursued in this section, we use the regression results from the 1987–1990 era as a basis for forecasting agrarian structure. The regression results for the second col-

umn in table B-3 give the predicted annual change in landholdings, and these coefficients are combined with the household characteristics of our sample in 1987 to forecast the 1991 landholdings. The 1991 landholdings are then used in a similar procedure to forecast their land accumulation to 1991. In both cases, the actual landholdings in 1987 and the estimated holdings in 1991 are first combined with the adoption regression coefficients from table B-2 to predict whether households will be adopters of non-traditional exports prior to the construction of the forecast of trajectories.

B-4 NONTRADITIONAL EXPORTS, AGRARIAN STRUCTURE, AND LABOR ABSORPTION DYNAMICS

Table B-4 reports the basic labor-absorption results for the three time periods, 1987, 1991, and 1995. Recall that for the 1987 estimate, producers are treated as if they are growing only corn; in 1991 and 1995, the forecast agrarian structures are mapped against the fitted adoption patterns and labor-absorption coefficients for the three crops based on 1991 data.

On an average farm, labor absorption increases from 100.89 person-days in 1987, to 120.79 in 1991, and to 123.14 in 1995. In other words, there is about a 20 percent expansion in the labor absorption of farms in the sample. However, broccoli and snow-pea labor absorption per cuerda are, respectively, 36 percent and 220 percent greater than that of corn, so it is also obvious that the low extent of adoption pictured in figure B-2 is holding back what would otherwise be a much stronger labor-absorption impact from nontraditionals. For example, in the 1991 data, of the 7.9 cuerdas on the average farm, only about 2 cuerdas (or 25 percent) are in nontraditionals. The rest of the land is in corn.

In our 1995 forecast, the extent of adoption rises to almost 29 percent of the average farm (an increase of 4 percent of the farm area). However, the average size of these adopting farms has also increased, which in turn reduces by about 2.6 percent and 0.5 percent, respectively, the labor intensity of broccoli and snow peas, so that the actual increase in labor absorption over the time period 1991–1995 is only about 2 percent. While the changes in this second period are small, they do demonstrate how changing agrarian structure can cut in different directions. On the one hand, expanding farm size among smaller holders is increasing the extent of adoption, since these expanding smaller producers are the most likely among this sample to increase the amount of land in nontraditionals. On the other hand, growth in the average farm size of the adopters is also leading to a lower intensity of labor absorption. These two effects are moving in opposite directions and cause the increase in labor absorption between 1991 and 1995 to be quite small.

B-5 CONCLUSIONS

Our analysis of the impact of nontraditional exports on agrarian structure and labor absorption was aimed at identifying the extent to which this phenomenon, as it has evolved through 1991 in the Central Highlands of Guatemala, is improving the basic economic welfare of the rural poor. In terms of agrarian structure, the effects appear to be positive for those smaller-scale producers who can manage to mobilize the resources to adopt nontraditionals, though the impact on their land access seems to level off with the accumulation of just a few additional cuerdas of land. This muted impact results from the limited extent of adoption, which may be a function of limited access to credit and related risk concerns.

In terms of the labor-absorption effect of the nontraditionals, several meaningful results emerge from this exercise. First, scale of production does, indeed, appear to matter to the labor-absorption potential of nontraditional exports. In particular, the larger is the scale of production of winter vegetables, the lower is the intensity of labor use. For policy purposes, it would be useful to know whether this results from increasing costs involved in supervising hired labor, overutilization of family labor on the smallest farms, or improved capital access on the larger-scale farms, but we have not yet attempted to sort this out.

The second result is that the labor-absorption effects of these labor-intensive nontraditional crops were heavily constrained by the limited extent of adoption in our sample. Only about 25 percent of the land of the sample households is dedicated to the production of nontraditionals, and this proportion falls as farm size grows. A nonrandom survey of a cohort of larger nontraditional producers elsewhere revealed a much greater extent of adoption—on the order of 75–100 percent; so it seems that one of the tradeoffs of a sector where small-scale producer participation is high is a lower extent of adoption and hence lower labor-absorption potential.

The third result is that changes in agrarian structure within the sample are encouraging further adoption of nontraditionals, because the smaller-scale operators are, on average, accumulating more land and hence, over time, are more likely to dedicate some of their land to nontraditionals. The increased extent of adoption that stems from the changing agrarian structure is not large (29 percent compared to 25 percent of total land), but this potential effect of shifting agrarian structure on adoption and hence on labor absorption is demonstrated.

A fourth and final result is that the same forces that promote increased adoption can cut in the opposite direction of increasing labor absorption. That is, as average scale of operation increases for the smaller growers, their labor-absorption coefficients will also fall because of the scale sensitivity of labor use. Thus, there is a countervailing effect to the increased adoption between 1991 and 1995, which is that the average adopter's scale of operation has also increased, resulting in a lower intensity of labor use in the production of nontraditionals. The extent of this decline is large enough almost to cancel out the predicted increase in land dedicated to the production of nontraditionals.

In the best of worlds for adoption and accumulation patterns, smaller-scale producers would be economically able to expand both the extent of their adoption and the size of their farms to overcome the "microfundization" of agriculture in the Guatemalan Central Highlands. If this were to occur, labor absorption would surely increase because of the shift toward more labor-intensive crops. It is important to recognize, though, that the extent of this increase would also appear to be quite sensitive to the average scale of operation for this "nontraditional" export sector. The data we have now have an important breach in terms of measurement at the scale of operation that we might imagine this process occurring, but, as the results of this exercise suggest, it would surely be an error to take the average today and simply apply it to this new agrarian structure. It is in this sense that the connection between agrarian structure and labor-absorption potential of different crops deserves additional attention in places where both direct and indirect effects of structural changes are of concern.

TABLE B-1 Regression results on labor absorption by crop

EXPLANATORY VARIABLES	COEFFICIENT	STANDARD ERROR
Snow peas: Dependent variable is total labor days per cuerda (cds) R² = 0.136		
Constant	81.554683	8.733104
Cds in snow peas	-13.137839	8.645849
(Cds in snow peas) ²	0.645344	1.683846
Broccoli: Dependent variable is total labor days per cuerda (cds) R² = 0.250		
Constant	51.428649	3.995827
Cds in broccoli ²	-11.040135	2.923419
(Cds in broccoli) ²	1.280456	0.554289
(Cds in broccoli) ³	-0.046573	0.028606
Corn: Dependent variable is total labor days per cuerda (cds) R² = 0.024		
Constant	14.042190	0.898239
Cds in corn	-0.487235	0.221490
(Cds in corn) ²	0.019253	0.009938
NTAX	-1.833406	1.182492
NTAX* Cds	0.468415	0.254565
NTAX* Cds ²	-0.020630	0.010628

TABLE B-2 Land allocated to nontraditional exports: Tobit estimates

Dependent variable [Land in NTAX-cuerdas] Log-likelihood = -495.66		
EXPLANATORY VARIABLES	COEFFICIENT	STANDARD ERROR
Constant	-2.569	1.483
Farm size (cuerdas)	0.9211**	0.1353
Farm size squared	-3.492E-02**	6.632E-03
Farm size cubed	4.263E-04**	0.124E-05
Land owned (proportion of total)	-0.6558	0.4972
Land quality index	0.1547**	0.0658
Household labor (adult equivalents)	0.1570	0.4521
Household labor squared	-1.331 E0-93	0.0467
Female labor (proportion of total)	-0.9334	1.188
Age	-0.577**	0.0153
Education index*	-0.0142	0.0310
Religion (1=Catholic,0=other)	0.4606	0.3545
Village dummies:		
Las Canoas*	-0.9244**	0.4022
El Tablon*	-3.1872**	0.8300
Santo Domingo*	-2.6477**	1.019
Xejolon*	1.9137**	0.5849

* The education index is constructed such that the first digit indicates the level and the second digit represents the number of grades completed at that level: level 0=none; level 1=primary, grades=1-6; level 2=secondary, grades=1-6; level 3=university, grades=1-8.

** Significant at the 95% confidence level.

TABLE B-3 SUR results on land accumulation per-year and adoption, pre-boom and boom

Dependent variable: Average annual land accumulation						
R²						
	UNCONSTRAINED				CONSTRAINED	
	Pre-boom		Boom		Pre-boom	Boom
Explanatory	Co-efficient	Standard error	Co-efficient	Standard error	Co-efficient	Standard error
Dependent variable: Land accumulation per annum						
Mean	0.2203		0.277			
Standard deviation	0.4692		1.468			
Explanatory variables						
Age	0.0503	0.0122*	-0.0260	0.0487	0.0477	0.0116*
Age squared	-0.0013	0.0004	0.0004	0.0012	-0.0012	0.0003*
Land (initial farm size)	-0.0239	0.0056*	-0.0238	0.0187	-0.0241	0.0054*
NTAX	0.1412	0.0500*	0.4483	0.2235*	0.1634	0.0577*
NTAX*Land	0.0166	0.0074*	0.0039	0.0021	0.0151	0.0068*
Variance estimates, E						
ap		0.184			-0.006	
a _B		2.046			-0.028	
6PB		-0.006				
R²						
Pre-boom		0.16			0.16	
Boom		0.04			0.03	

Figures in brackets are standard errors; * denotes significance at the 95% confidence level.

TABLE B-4 Simulation results on labor absorption, 1987, 1991, and 1995

LABOR MEASURES	1987	1991	1995
Broccoli labor days/cuerda	--	16.69	16.24
Snow pea labor days/cuerda	--	39.61	39.45
Corn labor days /cuerda	12.13	12.29	12.46
Total labor absorption	100.89	120.79	123.14

Figure B-1:
Labor Absorption by Operational Size

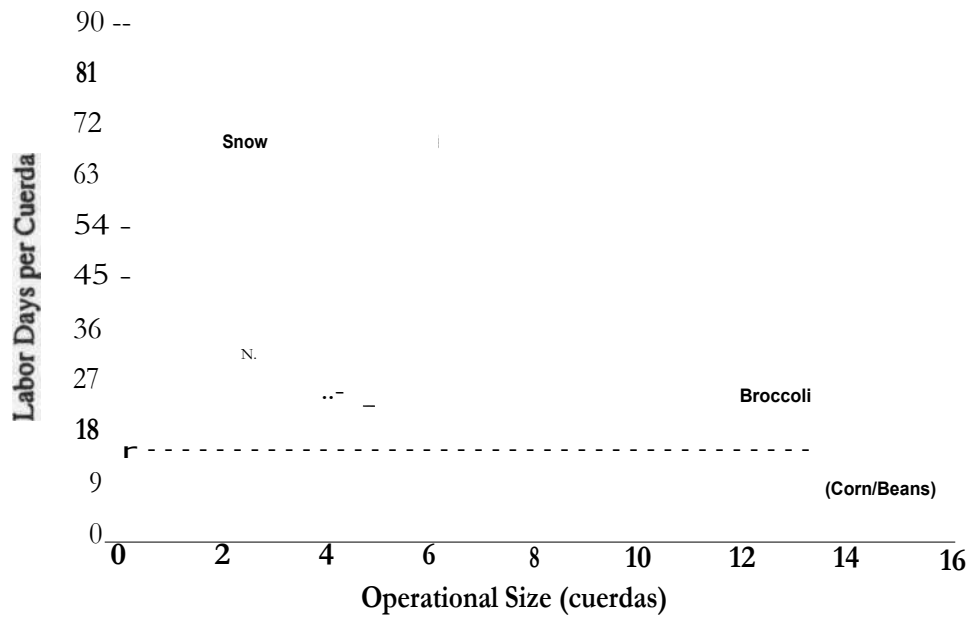


Figure B-2
Farm Size and Adoption of Non-Traditional Exports

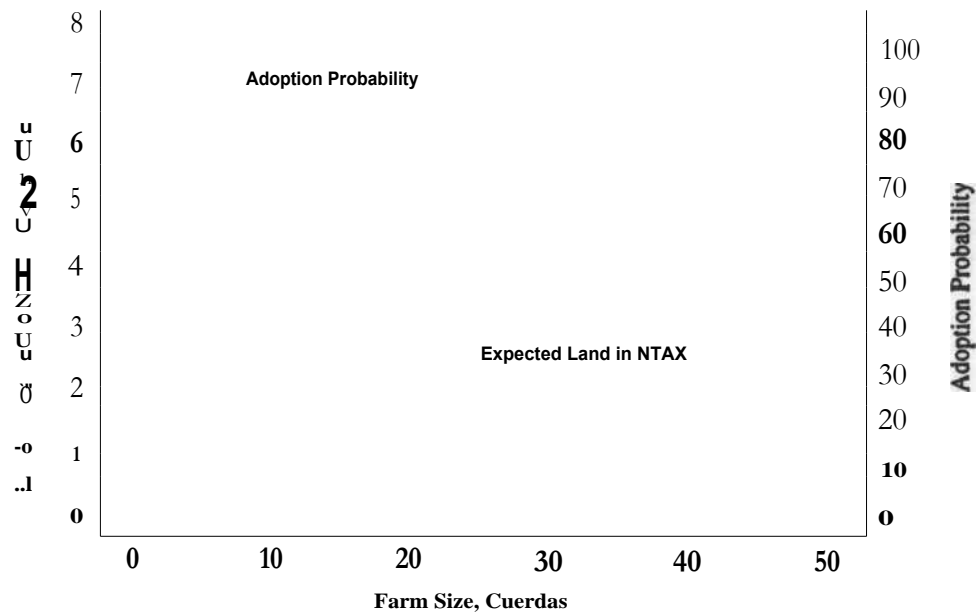


Figure B-3
Estimated Land Accumulation Trajectories
Initial Land Endowment 2 Cuerdas (0.5 acres)

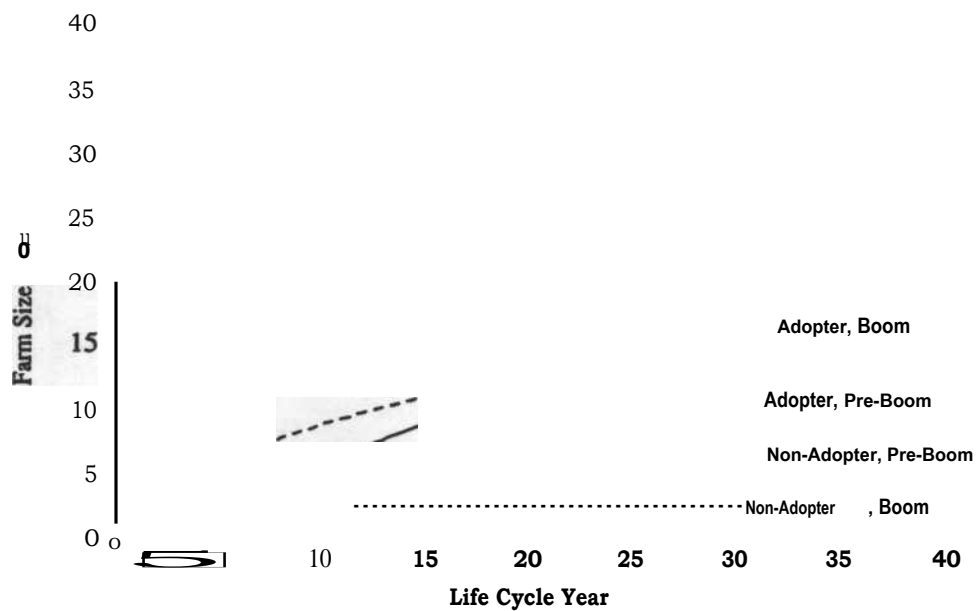
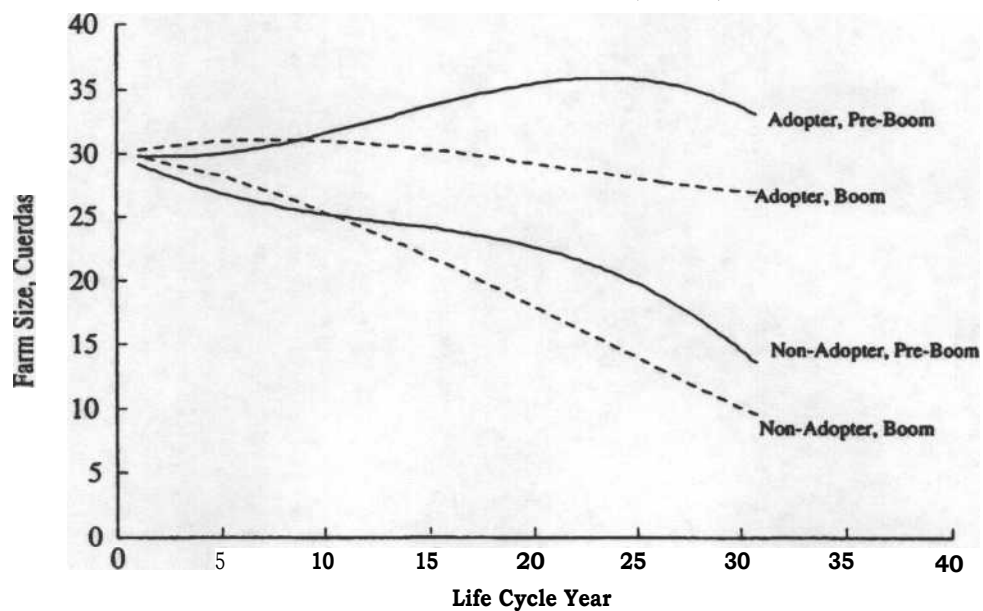


Figure B-4
Estimated Land Accumulation Trajectories
Initial Land Endowment 30 Cuerdas (8 acres)



ANNEX C

**SMALL-FARM "COMPETITIVENESS GAP"
AND EXCLUSIONARY AGRO-EXPORT GROWTH
IN PARAGUAY**

C-1 BACKGROUND

The Paraguayan economy is overwhelmingly dependent on agriculture and related activities. In 1989, a full 96 percent of total exports were accounted for by agricultural, livestock, and forestry products. While stagnant relative to the rest of Latin America up through the 1950s, Paraguay's agricultural economy has been one of fastest growing in the region since 1970. In particular, the export sector has grown rapidly over this period (FIDA 1990). While the rate of expansion slowed with recession in the 1980s, agrarian growth has remained healthy.

Unlike many other Latin American countries, Paraguay's export sector depends heavily on small-farm production. Cotton is produced primarily by small farmers—almost 70 percent of the area dedicated to cotton in 1981 was on farms less than 20 hectares in size—and cotton alone accounted for more than one-third of total exports in 1990. Despite this dependence on the small-farm sector, Paraguay has a highly skewed land distribution.¹ With almost 60 percent of the population rural, the unequal distribution of land is potentially an issue of considerable importance. Nevertheless, until recently the country had not experienced the sort of violent agrarian conflict common to many countries with an extremely skewed land distribution. Nor has Paraguay undergone the rapid, uncontrolled urbanization that has been typical of many other Latin American countries and is indicative of the rural population's losing its access to land.

One reason why concentration of landownership has not until recently proved an explosive issue is that in the past, owners of large amounts of land tolerated widespread squatting on areas that they were not using, often a major proportion of their holding. In addition to informal occupation, there were legal ways to lay claim to unused land. From the 1960s onward, an official colonization policy distributed state-owned land, much of it in remote parts of the interior and border areas, while encouraging private colonization schemes. Through the 1970s, farmers feeling the land squeeze had the option of joining one of these official colonization programs or, as many thousands more did, of simply occupying newly opened lands in the hope that their presence would convince the owner, private or public, to sell it to them, a strategy that frequently worked.

Land pressure in Paraguay has increased in recent years as the processes that mitigated land hunger have functioned less and less effectively. State-owned land available for distribution through the colonization program was significantly diminished by the late 1970s. The construction of roads into the

1. Conventional land distribution figures for Paraguay are misleading because of the extreme concentration of landownership in the Gran Chaco.

fertile eastern border areas in the late 1970s and 1980s encouraged many foreigners, especially Brazilians, to immigrate to these regions, where land was often one-tenth the price of similar land across the border (Wilson, Hay, and Margolis 1989, p. 207). While fueling an agro-export boom in the frontier area, this immigration of better-capitalized, large-scale farmers, who found Paraguayan land prices a bargain, tended to push prices up in the border areas, making land increasingly more difficult for poor Paraguayans to purchase. In addition, throughout the 1980s, population continued to grow at 3.2 percent, one of the highest rates in Latin America; but since land had become more valuable, new squatters were more often evicted. The confluence of these circumstances left the younger generation with very few options for obtaining land to farm as they entered adulthood. As a result, organized land invasions, sometimes ending in violent confrontations, became more and more common throughout the 1980s.

Following a brief review of the evolving agrarian problem in Paraguay as seen in an analysis of agricultural census data, the remainder of this appendix will devote itself to understanding the form of agrarian growth along Paraguay's eastern border. While not the only factor behind Paraguay's land problem, the exclusionary pattern taken by this growth is clearly a major contributing factor.

C-2 EVOLVING AGRARIAN PROBLEM IN PARAGUAY: LAND HUNGER IN THE MIDST OF RAPID AGRO-EXPORT GROWTH

Increasingly frequent land invasions and other land-access confrontations convincingly testify to the growing problem of land hunger in Paraguay. In an effort to understand the appearance of agrarian unrest within the midst of a growing and otherwise successful agrarian economy, a number of analysts have tried to decompose the forces behind the problematic pattern of land access. One of the latest contributions on this topic is an analysis by Luis Galeano (1992), based on preliminary statistics from the 1991 agricultural census, of changes in agrarian structure during the 1980s. This section will present Galeano's hypotheses on changing patterns of landownership at the aggregate census level as a starting point for this paper's analysis of changes in land access and ownership at the farm level.

C-2.1 IMPACT OF AGRICULTURAL MODERNIZATION AND POPULATION GROWTH ON CAMPESINO LAND ACCESS

Galeano (1992) identifies two interacting processes that have a profound effect on the ability of different classes to retain their relative shares of land over time. The first is the steady and long-term increase in land pressure due to the natural increase in the population. This process is most important among small farmers in the older and more densely populated areas of the country, specifically what is usually called the central region—the departments of Central, Cordillera, Paraguari, and Guaira—as well as the more distant departments of Concepción, Neembucn, and Misiones.

The effect this process has on farm size depends on several factors related to the possibilities of off-farm employment. Galeano (1992) describes two systems that have emerged to siphon off excess labor in the densely populated areas where land is less available. One is permanent out-migration, which can be to other rural areas, to an urban center, or out of the country altogether, usually to urban areas of Brazil or Argentina. The other is seasonal or temporary employment in agriculture, industry, or the urban informal sector. Again, this might include a short-term move out of the country; in the past, Paraguayans often worked as migrant agricultural laborers, especially picking cotton, in northern Argentina.

Nonagricultural temporary work would be most relevant closer to Asunción, which would include the department of Central and parts of Paraguari and Cordillera.

Both types of off-farm employment relieve pressure from the land market by taking some people out of competition for agricultural land on a temporary or permanent basis. When sources of such employment dry up, land pressure increases, and the result is expressed either within the *campesino* economy through minifundization, that is, the fragmentation of *minifundio* holdings, or outside the *campesino* economy in the form of land invasions of *latifundios*. Thus the effect of this process on size distribution of landholdings is quite variable, depending on the exact combination of conditioning factors: whether alternative employment possibilities exist, whether they are reliable or unpredictable, what proportion of excess labor they are capable of absorbing, the availability and affordability of additional agricultural land for small farmers, and whether there are underexploited large properties available for land invasions by those who cannot find alternative employment or their own land to cultivate.

The second process that affects the evolution of agrarian structure is the impact of the capitalist modernization of some farms on the rest of the agricultural sector. Starting in the 1970s, large agricultural enterprises using modern technology began to move into Paraguay, especially into the border departments such as Itapúa. These enterprises ranged in size from capitalized family farms in the 20–50 hectare range to agribusinesses over 1,000 hectares in size. They were differentiated from traditional Paraguayan farms not only in their use of modern technological production methods and their far greater degree of insertion into the market economy but also in the kinds of cash crops they grew—most often soybeans and to a lesser extent wheat—and the nationality of their owners, who were more likely not to be native Paraguayans. The development of this sector was accompanied, and probably accelerated, by government policies on research, credit, prices, and exchange rates that favored the crops and production technologies of this type of enterprise. The pricing mechanism for export crops provides a prime example. The price of soybeans during this period was not controlled and thus fluctuated with the price on the international market. In contrast, the price and exchange rate for cotton was set by the government each year in such a way that, according to most analysts, exporters captured most of the profit, and producers very little (Nagel 1991, p. 114; Fogel 1989, p. 35).

According to Galeano (1992), the effect of this capitalist transformation of some farms on the rest of the agricultural sector is rapid and generalized, characterized by abrupt, even erratic, changes of direction. He believes that because of this, modernization of agricultural production has resulted in accelerated socioeconomic differentiation among small farmers and may even be leading to the disintegration of the small-farm sector. Presumably, differentiation is occurring primarily because the increase in the number of modern farming operations has driven up the price of land beyond what small farmers using traditional methods of cultivation can afford to pay. Because the areas where this process is occurring tend to be located far from cities, off-farm employment is less of an option than elsewhere, and farmers must rely on their agricultural production as their main source of income. Since they cannot compete with their more technologically oriented neighbors in the land market, they either are forced into a process of increasing minifundization or else are driven to take part in confrontational activities like land invasions.

The impact of agricultural modernization on all size classes of farmers was intensified by the economic crisis of the early 1980s. The global recession of this period led to a drop in the prices of the major cash crops in Paraguay, both those for export (cotton and soybeans) and those for internal consumption (principally wheat). The recession was compounded by the ending of the economic boom that

resulted from the construction of the Itapua dam. While prices fell, the cost of imported inputs such as pesticides, fertilizer, machinery, and oil did not, leading to a greatly reduced profitability that affected all classes of farmers, albeit unequally.

The two processes described, which Galeano (1992) identifies as shaping changes in agrarian structure, tend to have their greatest impact in different parts of the country. While the first, the increasing demand for land resulting from natural increase in the population, is most important in older areas; the second, resulting from capitalist modernization of some farms, is occurring largely in areas opened to settlement more recently, such as Itapua and San Pedro. The major difference between the two processes, according to Galeano, is in the potential for small-farmer adaptation to the changes they cause. Small farmers as a class have been able to respond to changes in land availability brought about by the growing population in older areas by removing themselves temporarily or permanently from the land market through other types of employment. They have been far less able to respond adequately to the complex and abrupt transformations caused by modern capitalist agricultural production and, in the areas affected by that process, have lost ground to other classes of farmers. In these areas, Galeano hypothesizes, large agribusinesses would be expected to predominate in the long run from an economic point of view, because other types of farms are not as profitable and simply cannot compete with them in the land market. However, this conclusion might prove incorrect, depending on what effect the integration of the economies of the Southern Cone has on the competitiveness of these firms and on whether they can successfully challenge the predominance of the traditional and politically connected largeholder class.

C-2.2 CHANGING PATTERNS OF LAND ACCESS THROUGH THE 1980S

According to Galeano's 1992 analysis, the patterns of change in landholding in Paraguay are multiple and depend on a number of factors, as described above. He finds ample support for his reading of these patterns in the changes in landholding that occurred during the 1980s, captured in his comparison of the results of the 1981 and 1991 agricultural censuses.

Overall, the proportion of all farms with less than 5 hectares has increased in this period from 36 percent to 40 percent (see tables 1 and 2, in Galeano 1992), supporting a view of increasing minifundization at the national level. But the increase in this size class has been strikingly different in different regions. In areas where the transformation to modern capitalist farming has been most extensive or where the agricultural frontier has closed—and where off-farm employment possibilities are the least common—land pressure is more intense and generalized and the increase in very small plots is greatest. Thus in Itapua, plots less than 5 hectares have increased by 112 percent, and in San Pedro, by 110 percent. In older areas with no agricultural frontier and very little capitalist transformation of agriculture—but where off-farm employment opportunities are not abundant—this size class showed a moderate increase: in Concepción, 36 percent; and in Misiones, 13 percent. These areas have also experienced significant land invasions. Finally, in older areas with more nonagricultural employment opportunities, the number of farms with fewer than 5 hectares has expanded very little—in the most extreme case, only 5 percent for the department of Central.

The 5–10-hectare size class has shown similar trends. This class has expanded significantly in regions such as San Pedro and Itapua while it has diminished in both absolute and relative terms in less dynamic areas. The relative stability of this class in the older areas is consistent with the fact of numerous off-farm employment possibilities in those locales. The increase in the 5–10-hectare class in the

newer areas, Galeano speculates, may be a result of the disintegration of farms of 10–20 hectares, a common size for lots sold under the colonization program. Also, as land pressure has increased in these areas, the size of lots given out in response to land invasions has decreased, so that now they are commonly less than 10 hectares.

A 10–20-hectare lot is considered a good-sized farm under traditional cultivation methods in Paraguay, large enough to support an average family with a minimum of off-farm labor. In almost all departments in the eastern region, the proportion of farms in this class has fallen over the last ten years. Disaggregating by department, the absolute number in this class has risen in some of the more dynamic departments, especially those with the most active agricultural frontier; those whose colonization era is more remote show less of an increase in absolute numbers or none at all. In the older areas, this size class has declined in both absolute and relative numbers. The trend throughout the country toward fewer exploitations capable of sustaining an average farm family is seen by Galeano (1992) as strong evidence of a process of disintegration of the small-farm sector in face of changes that have occurred in the agricultural economy.

Farms between 20 and 100 hectares in size are difficult to exploit fully using only traditional cultivation methods and family labor; they are much more likely to be capitalized family farms, which the Paraguayans refer to, using the English, as the "farmer" type in order to differentiate them from traditional *campesino* production. Galeano finds that this class is the only one that has decreased at the national level in both relative and absolute terms during the last decade. The decline was substantial both nationally and in the areas where this stratum was most important. Nationally, the number of farms in this class shrank by 10 percent during the past decade, and in Itapúa, where there is a large concentration of capitalized family farms, the corresponding figure is 21 percent. It might seem that these larger and more prosperous farms should have been in a better position to defend themselves against the economic crisis of the 1980s than the smaller *campesino* farms, but in fact they proved more vulnerable. According to Galeano (1992), this class has experienced major profitability problems since the early 1980s. Distress sales of parts of larger farms due to these difficulties might, he believes, account for both the decline in numbers of this class and the rise in numbers of the smaller size classes in the more dynamic areas, such as San Pedro and Itapúa.

Interestingly, even the relatively large 100–500-hectare class has not expanded significantly in the last ten years, growing by only 7 percent at the national level. Those farms in this class that are largely agricultural—rather than oriented toward cattle production—have experienced the same difficulties as the capitalized family-farm sector, and the departments in which this type of farm is concentrated have shown the greatest decline of this class. In Itapúa, one of the hardest hit regions, the number of farms in this size class declined by 25 percent. Exploitations in this size class that combine cattle production with agriculture or which are wholly dedicated to cattle have, however, increased in number. This is the case in the department of Presidente Hayes in the Chaco, where the number of farms in this class rose 350 percent over the decade.

The economic crisis, which has had such a negative impact on small- and medium-sized farms, has evidently not affected the profitability of medium and large agribusinesses to nearly the same extent, at least if this impact can be measured in the increase or decrease of the number of farms in the class. In the 500–1,000-hectare class, those landholdings that rely largely on cattle production tend to use traditional methods and have shown no substantive change in numbers over the decade. But in areas where this size of farm tends to be devoted to agriculture, the number of farms has increased dramatically—by

67 percent in Itapua, for example. Similarly, the largest size class of exploitations—those with over 1,000 hectares—has not grown much in regions dominated by the traditional *latifundio/minifundio* dichotomy, except in the Chaco, where land prices are very low and the land supports only a very extensive type of cattle production. But overall, this class has grown by 39 percent nationally, with higher rates of growth in the most dynamic departments, where farms of this size are most likely to be devoted to agriculture. For example, the number of farms over 1,000 hectares grew 42 percent in San Pedro, and 51 percent in Itapua.

The picture that emerges from this analysis of the changes in landownership over the last ten years is one of a small-farm sector that is at best stagnant and at worst disintegrating; a capitalized family-farm sector unable to compete with agribusinesses; and a small agribusiness sector losing ground to larger agribusinesses—in short, an agricultural economy tending toward extremes. Galeano's 1992 analysis emphasizes several points. First, the difficult position of medium-sized farms is directly related to the economic crisis of the 1980s and particularly to the fall in world prices of Paraguay's major cash crops. If either prices or cropping patterns should change, the medium-sized farms might be able to regain the ground they have lost. Second, the stagnation and disintegration of the small-farm sector is dependent on a number of interacting conditions, especially the possibilities for off-farm employment and the existence of an agricultural frontier. Also, the sector as a whole has shown remarkable staying power due to small farmers' ability to adapt their survival strategies to changing circumstances. For these reasons, it would be premature to write off this sector as doomed to disappear. Finally, the medium- and large-scale agribusiness sector has benefited in the past from state policies that favor these farms' production methods and the crops they tend to grow. These policies have undergone some change recently and are sure to be modified further as the new government in Paraguay works out its economic strategy, which will need to chart the course both of recovery from the current economic crisis and of sustainable and stable future development. In short, the trends described in this section are not inexorable historical processes but rather are dependent on particular circumstances, which are subject to change induced by both the economic and the policy environments.

C-3 RESOURCE ALLOCATION, LABOR ABSORPTION, AND THE SMALL-FARM COMPETITIVENESS GAP

In an effort to understand the mechanics of growth and induced structural change, a comprehensive survey was undertaken in three regions of Paraguay. Details of the survey methodology are presented in Carter, Luz, and Galeano (1992). This section discusses results of analysis of the economics of production and resource allocation in the eastern frontier section of Paraguay (specifically, the department of Itapua).

Production, income, and land-transaction data from a sample of 123 producers in Itapúa were used to estimate the fundamental economic relationships that shape the direct and indirect effects of agro-export growth on the rural resource poor. (These relationships are discussed and displayed for a hypothetical case in figures 1a-1c in section 2 of the main text.) In all cases, ordinary least-squares regression was used to the relationships. The actual specification and parameter estimates are presented in a table that comes at the end of this annex.

The estimated relationships for Itapúa are displayed in figures C-1 to C-3. Figure C-1 displays the estimated relationship between the number of labor-days absorbed per hectare and the operational size

of farm.² As can be seen, labor absorption falls from 150 labor-days/hectare to 30 labor-days per hectare as one moves a unit of land from a 5-hectare to a 100-hectare farm. Given this sharp difference in choice of technique between small and large farms, any structural change that shifts land from the small- to the large-farm sector will have severely negative net-employment effects.

Figure C-2 presents an estimate of the marginal economic value of 1 hectare of land to a family (holding labor, machinery, and animal stocks constant). The displayed relationship is based on the table C-1 regression, which explains net family income as a function of land and other resource stocks. The estimated coefficients were used to calculate the marginal value of land, A (formally calculated using the derivative $\partial n/\partial T$, where n is family income and T is farm size). Unlike the other regions of Paraguay, where the marginal value of land slopes downward as a function of farm size, the estimated A increases by a factor of 10 as farm size increases from 10 to 100 hectares in Itapúa. Even without capitalizing this estimate into a willingness-to-pay measure (p in the notation of section 2), this estimated A function points to a strong competitive disadvantage for small farmers in this region.

The microeconomics of production in Itapúa thus create the foundation for the strongly exclusionary growth trajectory hypothesized by Galeano (1992). Larger farm units are much more competitive than small farmers in terms of their marginal land valuation, and the farm-size differentiated patterns of labor absorption indicate severe declines in labor demand as land shifts from small to large units.

C-4 LAND MARKET AND STRUCTURAL CHANGE

So how has this highly skewed competitiveness regime worked out over time given the incentives created by the agro-export boom in Paraguay's eastern region? Figure C-4 (taken from Carter, Luz, and Galeano 1992) confirms that real land price in Itapúa has markedly increased since the agro-export boom got under way around 1970.³ As noted in section C-1 above, the real appreciation of land was hypothesized to have put tremendous pressure on smallholders. Figure C-5 (also taken from Carter, Luz, and Galeano 1992) compares individuals' self-reported "willingness to pay for land" with actual land prices. As can be seen, producers with less than about 40 hectares are shown to be unwilling to pay the market price to acquire land. Consistent with the A function estimated from production and income information, figure C-5 indicates that the economics of agro-export production in Itapúa leave smaller-scale producers uncompetitive in the land market.

Figure C-3 is the analogue to figure 1-c discussed in section 2. Displayed in figure C-3 is the estimated average annual land accumulation for farms of different farm sizes over the 1970–1991 period. Specifically, average annual land accumulation is defined as $(T_{1991} - T_{1970})/(91-70)$, where T_{1991} is the amount of land owned by the farm in 1991, and T_{1970} is the amount owned in 1970. The regression estimates on which figure C-3 are based are reported in table C-1. Because farmers might be thought to behave differently based on where they are in their life cycles, figure C-3 displays the rate of land accumulation for different stages of the life cycle. Not surprisingly, the rates of accumulation are much

2. The actual regression results in table C-1 are for the total monetary value of labor absorbed. Figure C-1 was constructed by dividing expected monetary expenditures by the average wage and then transforming this figure to a per-hectare basis.

3. As detailed in Carter, Luz, and Galeano (1992), figure C-4 is based around regression estimates of the real land price using historical data on transactions collected from the cross-sectional sample of Itapúa producers.

higher for individuals at early points of their life cycle (5 years after they began farming) than they are later in their life cycle (25 years after they began farming).

The broad structural pattern described by Galeano (1992) and discussed in section C-1 above is indeed visible in these microeconomic data. Large farms (those that began the export boom with 50–100 hectares) accumulate land at an average rate of 15–20 hectares per year. Initially, smaller units accumulate at a much slower rate. Note that these estimates do not show the impact of those small farmers who actually exited the sector inasmuch as they were no longer operating farms in 1991 and were unavailable to be interviewed. The smaller farms in figure C-3 are thus a survivor class of sorts.

C-5 POLICIES TO RESOLVE EXCLUSIONARY GROWTH

As discussed in section 5 of the main paper, land market reform has been put forward as a policy that might alleviate exclusionary aspects of agro-export growth. Within Paraguay itself, land market reform is under discussion as a market-based alternative to traditional state-mandated, redistributive reform. Unfortunately, the analysis here suggests there is little hope for such policies by themselves to rectify the exclusionary nature of growth in eastern Paraguay.

Land-mortgage banks, one of the key policies within the land market-reform policy arsenal, make long-term finance available to smallholders at competitive rates. Such finance would be useful if small producers were fundamentally competitive in the land market (in the sense of our 0 measure) but were constrained in their land purchases by lack of savings or access to capital. However, figure C-3 strongly shows that the smaller-scale, labor-absorbing producers are not competitive.

A second land market-reform policy instrument is land banks, which are useful in a context where transactions costs essentially lead to what might be termed "land market segmentation," meaning that small purchasers cannot buy land from large holders. Essentially, smallholders are in a different market.

Figure C-6 (taken from Carter, Luz, and Galeano 1992) gives *prima facie* evidence of land-market segmentation in Paraguay. Land purchased in small units (controlling for quality) commands a higher price per hectare than land purchased in larger blocks. A land bank that publicly bore transactions costs of subdivision of large farms would permit small purchases to be made at the advantageous large-farm price.

Figure C-5, however, shows that such reform would have no effect on the land-market competitiveness of small farmers. The horizontal line drawn across figure C-5 is an estimate of the per-hectare price paid by larger farm units. As can be seen, that price still lies above the average self-reported willingness to pay of small farmers. Hence, even a land bank would do little to reshape the economic incentives that drive the induced structural-change component of eastern Paraguay's exclusionary growth process. As Carter, Luz, and Galeano (1992) document, working capital appears to be the fundamental constraint that dampens the competitiveness of small producers all over Paraguay. If growth is to be made less exclusionary, it will surely require attention to this fundamental capital-market problem.

TABLE C-1 Fundamental regressions**1) Labor absorption**

Dependent variable: Value of labor absorbed (000 of guaranies) $R^2 = 0.437$		
EXPLANATORY VARIABLES	COEFFICIENT	STANDARD ERROR
Constant	2804.12	782.21
Cultivated land	192.74	104.90
(Cultivated land) ²	-3.20	3.15
(Cultivated land) ³	0.02	0.02
Department 7 dummy	1035.62	861.47
Cultivated land • Dept 7 dummy	-121.45	106.10
(Cultivated land) ² • Dept 7 dummy	2.89	3.15
(Cultivated land) ³ • Dept 7 dummy	-0.02	0.02
Department 9 dummy	-287.38	919.70
Cultivated land • Dept 9 dummy	-48.57	119.26
(Cultivated land) ² • Dept 9 dummy	1.70	3.31
(Cultivated land) ³ • Dept 9 dummy	-0.01	0.02

2) Net family income and value of land

Dependent variable: Net family income (000 of guaranies) $R^2 = 0.614$		
EXPLANATORY VARIABLES	COEFFICIENT	STANDARD ERROR
Constant	-2965.70	2158.91
Cultivated land	344.21	256.30
(Cultivated land) ²	-1.99	7.37
(Cultivated land) ³	-5e-3	0.05
Machinery	1.12	1.16
Animal stock	0.47	0.19
Family labor stock	753.97	416.55
Department 7 dummy	3670.12	2571.20
Cultivated land • Dept 7 dummy	-348.12	259.83
(Cultivated land) ² • Dept 7 dummy	3.29	7.38
(Cultivated land) ³ • Dept 7 dummy	2e-3	0.05
Machinery • Dept 7 dummy	-1.15	1.16
Animal stock • Dept 7 dummy	-0.33	0.22
Family labor stock • Dept 7 dummy	37.92	516.08
Department 9 dummy	3661.83	2662.49
Cultivated land • Dept 9 dummy	-374.22	300.76
(Cultivated land) ² • Dept 9 dummy	4.29	7.78
(Cultivated land) ³ • Dept 9 dummy	-0.01	0.05
Machinery • Dept 9 dummy	-0.70	1.17
Animal stock • Dept 9 dummy	-0.25	0.44
Family labor stock • Dept 9 dummy	-555.00	633.80

3) Net annual land purchase or sale

Dependent variable: $(T_{92}-T_{70} / 22)$ $R^2 = 0.174$		
EXPLANATORY VARIABLES	COEFFICIENT	STANDARD ERROR
Constant	-0.11	1.99
Age	-0.01	0.21
Age ²	9e-4	5e-3
T0	0.74	0.22
T0 • Age	-0.04	0.02
T0 • Age ²	4e-4	3e-4
To	-7e-3	2e-3
To • Age	3e-4	2e-4
To • Age ²	-2e-6	5e-6
To	1 e-5	4e-6
To • Age	-5e-7	4e-7
To • Age ²	6e-11	6e-8

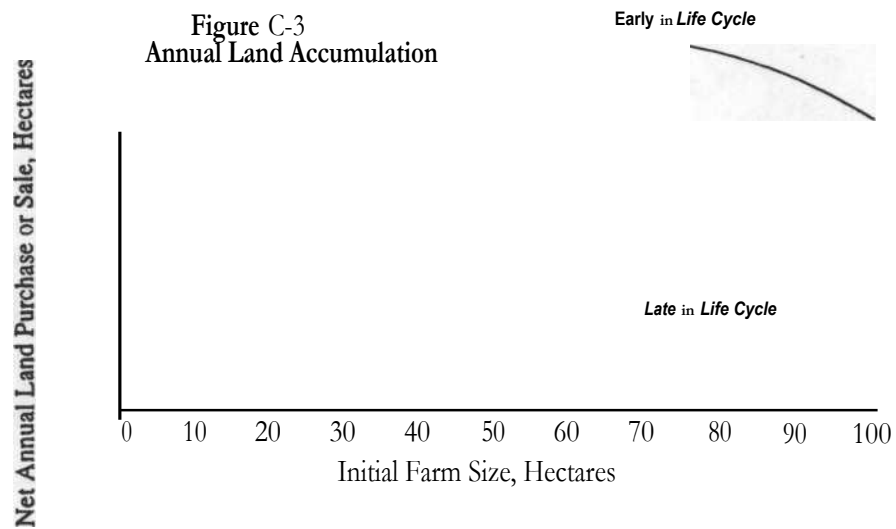
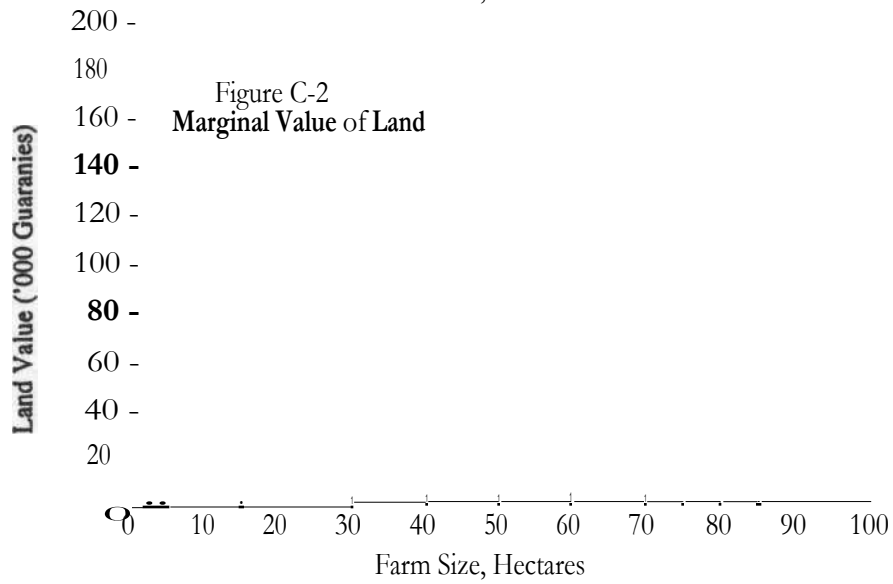
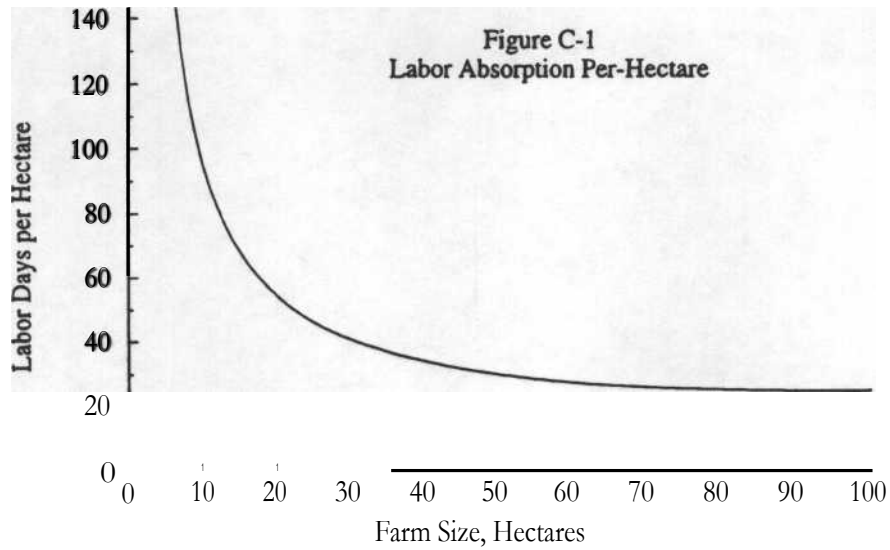


Figure C-4: Real Land Appreciation
(20 Hectare Lot, Titled, Cleared of Trees)

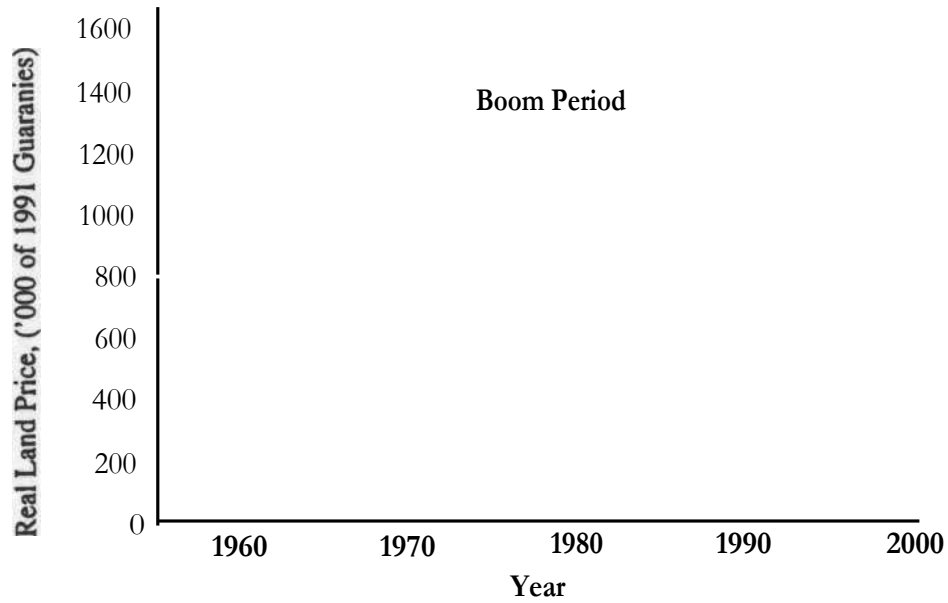
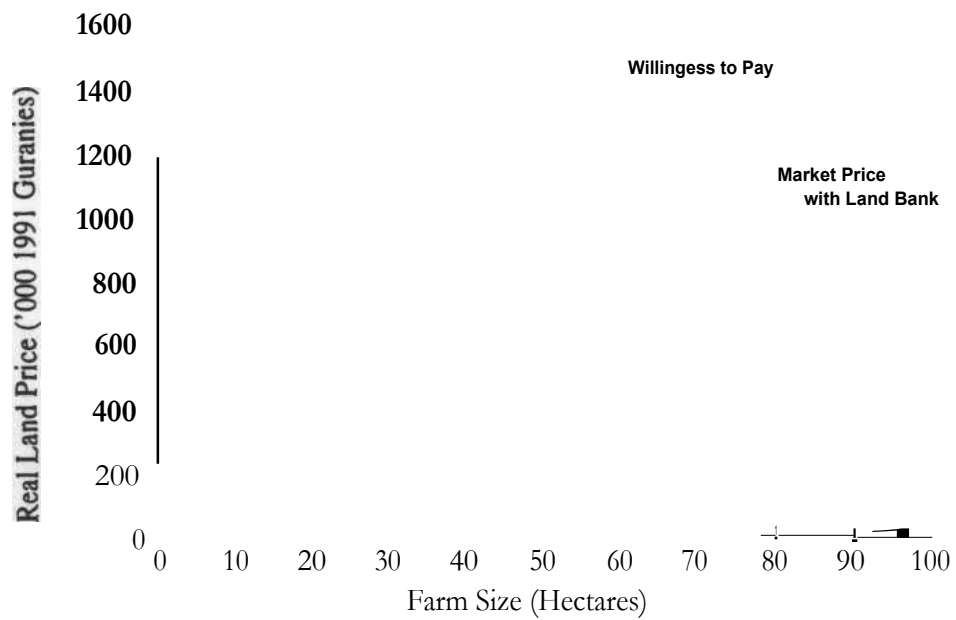
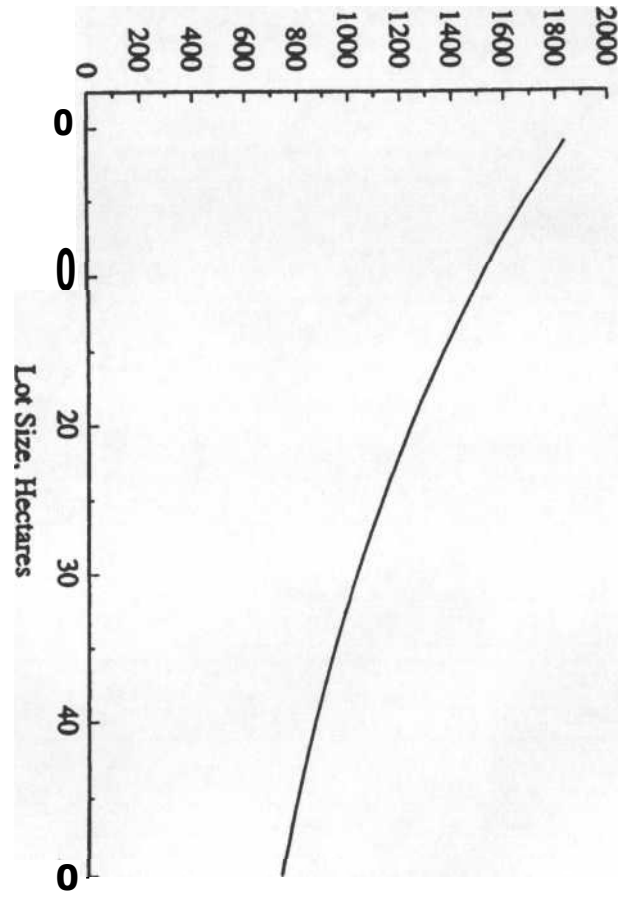


Figure C-5: Economic Competitiveness
Land Market Experiment



Real Land Price ('000 1991 Guaranies)



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