POLICY RESEARCH WORKING PAPER 1904

Ecuador's Rural Nonfarm Sector as a Route Out of Poverty

Peter Lanjouw

The nonagricultural rural sector represents a potentially important route out of poverty in Ecuador. Poverty declines as the share of income from nonagricultural sources rises. Nonagricultural employment and earnings are positively associated with better education and infrastructure access. Poverty could be expected to fall substantially with expansion in nonfarm sectors such as construction, transport, commerce, and services.

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Summary findings

Lanjouw analyzes a recent household survey for Ecuador to assess the role of the nonagricultural rural sector in reducing poverty. That sector accounts for roughly 40 percent of rural incomes in Ecuador, three-fourths of which comes from nonagricultural enterprises as opposed to wage labor. The sector provides employment to nearly 40 percent of men and 50 percent of economically active women.

The nonagricultural rural sector represents a potentially important route out of poverty: Poverty declines as the share of income from nonagricultural sources rises.

Nonagricultural employment and earnings are positively associated with higher education levels and better access to infrastructure services. Although women are more likely than men to be employed in this sector, their earnings for given education levels and other household characteristics are significantly lower.

All other things equal, the greatest fall in poverty could be expected from expanding employment opportunities in transport, commerce-related activities, and such services as administration and the hotel and restaurant trade.

This paper — a product of the Development Research Group — is part of a larger effort in the group to study the role of the nonfarm sector in the rural economy. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Peter Lanjouw, room MC3-555, telephone 202-473-4529, fax 202-522-1153, Internet address planjouw@worldbank.org. March 1998. (50 pages)

Ecuador's Rural Nonfarm Sector as a Route Out of Poverty

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I. Introduction

Poverty remains a critical issue in Latin American development. Large numbers of Latin Americans still languish far below what can be reasonably regarded as a decent standard of living. And recent gains in democratization and economic growth in the region may well be shortlived unless a way is found to relieve the pressure which widespread deprivation can put on the social fabric of Latin American societies. Throughout Latin America there is a sense of urgency surrounding efforts to respond to the challenge of widespread poverty and high, possibly even widening, inequality.

There are some who argue that poverty in Latin America is increasingly an urban phenomenon[2]. While it is clear that urbanization of the population has been substantial, a shift of attention away from

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[1] The views reflected this paper are solely my own and should not be taken to represent those of the World Bank or any of its affiliates. I am grateful to Paul Beckerman, Jesko Hentschel, Jyotsna Jalan, Jean Olson Lanjouw, and seminar participants at the University of Namur, Belgium, the Institute of Developing Economies, Tokyo, and Otaru University, Otaru, Japan, for helpful comments and suggestions.

[2] See for example, Morley (1994).

rural areas would be unwise at this stage, for a number of reasons. First, the scarcity of reliable and comparable data precludes any firm conclusions regarding the sectoral distribution of the poor in the region as a whole. Moreover, within the region there is sharp variation across countries in the sectoral composition of their populations. Second, the typical definition of urban encompasses both major conurbations and small towns. It is in the latter where the bulk of the urban population generally resides, so that many urban dwellers remain closely tied to the rural economy[3]. Finally, while the share of total numbers of poor has been rising for urban areas, the greatest degree of poverty is generally still found in the countryside in most Latin American countries.

But it is also clear that an analysis of rural poverty should encompass as broad a view of the rural economy as possible. This implies that not only should the links between rural poverty and the agriculture sector be examined, but the rural non-agricultural economy should also receive attention. This latter sector has received relatively less scrutiny in the past, and is argued by some to offer an important route out of poverty.[4]

This paper attempts to shed some empirical light on the issues surrounding rural poverty alleviation and the rural non-agricultural sector. The paper focusses on the particular case of Ecuador and is based on high-quality household survey data, modelled on the World Bank's Living Standards Measurment Surveys, for 1995. The analysis in this paper builds on a series of earlier studies of poverty in Ecuador based on data for 1994 (see World Bank, 1995, and Lanjouw, 1995).

The next section briefly reviews aspects of the rural non-agricultural sector which have received attention in previous research. It describes the potential links between non-agricultural employment and poverty, and points to those which are of particular relevance in the Latin American context. Section 3 describes the data, and provides a brief overview of how rural poverty fits into the overall assessment

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[3]. This can be contrasted with the definition adopted in Taiwan, that any community with less than 250,000 inhabitants is considered rural (Lanjouw and Lanjouw, 1995). It is interesting to reflect on how the perceived contrasting experience of "rural development" in East Asia versus Latin America might be at least in part influenced by the definition which is applied.

[4] As argued by de Janvry and Sadoulet (1993), for example, the importance to the poor in rural Latin America of non-agricultural activities is such that even extensive land reform and farm-oriented rural development are unlikely to suffice to erase rural poverty.

of poverty in Ecuador. In Section 4 the analysis focusses on the rural non-agricultural sector. Section 4.1 considers the range of activities in which the rural population is engaged, examining not only wage-employment activities outside of agriculture but also self-employment and home-enterprise activities. Attention is focussed in particular on the involvement of the poor in such activities. In Section 4.2, the importance of non-agricultural income in total income is assessed. Section 4.3 considers which individual, household and regional level characteristics influence the probability of employment in the non-agricultural sector, and the level of incomes earned from outside employment. Section 4.4 turns to the impact of an expansion of non-agricultural employment opportunities on incomes of the poor. Section 4.5 examines the impact of rural non-agricultural incomes in the distribution of income in Ecuador as a whole. Section 5 summarizes the findings.

2. A Quick Overview of the Issues

Rural off-farm employment has been traditionally seen as a low productivity sector, producing low quality goods. The sector, in this view, is expected to wither away as a country develops and incomes rise. There is thus no obvious rationale for governments to promote the sector, nor be concerned about negative repercussions on the rural non-agricultural sector arising from government policies directed at other objectives.

In recent years, opinion has been swinging away from this view, however, and there are a number of arguments which suggest that neglect of the sector is socially costly. For example, it has been argued that the sector has a positive role in absorbing a growing rural labor force, in slowing rural-urban migration, in contributing to national income growth and in promoting a more equitable distribution of income.[5] The perceived contribution of this sector to the economic achievements of the East Asian countries is receiving increased attention and this is likely to have contributed to the rekindled interest in this sector elsewhere as well[6].

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[5] Lanjouw and Lanjouw (1995) provide a recent survey of the literature.

[6] Aoki, Murdoch and Okuno-Fujiwara (1995) argue that the East Asian success in utilizing cheap labor in rural areas, in sectors outside of traditional farming, was "one of the most important elements of East Asian development" (page 40. See also Hayami, forthcoming.)

Lanjouw and Lanjouw (1995) indicate that while definitional and data-related uncertainties remain, the rural non-agricultural sector is both large and, on aggregate, has been growing over time. Hazell and Haggblade (1993) emphasize that when rural towns are included in employment calculations, the share of the rural labor force employed primarily in non-agricultural activities rises sharply. They calculate that in Latin America, 47% of the labor force in rural settlements and rural towns is employed in nonfarm activities. This can be compared to 28% when only rural settlements are included. Hazell and Haggblade also highlight the importance of female participation in non-agricultural activities: 79% of women in the Latin American rural wage-labor force are estimated to be employed in non-agricultural activities.

Productivity and Efficiency

Is non-agricultural activity more or less efficient in converting resources into output, relative to urban enterprises or agriculture? An important consideration in answering this question is how to assess the opportunity cost of factors of production. While commonly an average agricultural or urban wage is used to value labor and some common interest rate is chosen to value capital, private and social opportunity costs will not typically be reflected in these prices, and are likely to vary across localities, households, gender, etc., particularly when markets are far from perfect. If there is widespread employment rationing (due, perhaps, to oligopsonistic markets) it may be preferable to assume that labor has a zero opportunity cost - despite positive market wages. Similarly, where there are large transactions costs in financial markets, the interest rate for someone attempting to borrow may be much higher than the potential returns available to the same individual if he has some small savings. If financial markets are so imperfect that one cannot invest one's savings except in one's own enterprise, then labor use and capital use are linked. The prevalence of self-employment using exclusively own (or family) capital in rural non-agricultural activities, combined with very rudimentary or non-existent savings institutions in many rural LDC contexts, suggests that this may often be the case. Then the opportunity cost of the use of savings is zero and labor productivity may be the best measure of total productivity (see Vijverberg, 1988).

In general, small scale enterprises generate more employment per unit of capital than do large scale enterprises. Using data from Sierra Leone, Honduras and Jamaica collected in the late 1970s, Liedholdm and Kilby (1989) address the question of the relative profitability of rural small-scale firms

(with 50 employees or less) versus their large-scale counterparts in urban areas. They calculate social benefit/cost ratios for enterprises in different industries including baking, wearing apparel, shoes, furniture and metal products. The shadow price of capital was assumed to be 20 percent, unpaid family labor was (conservatively) valued at the level of wages in the small-scale sector for skilled workers, and labor in urban firms was valued at 80% of actual wages (with the latter based on survey estimates of minimum wage distortions, see Haggblade, et. al, 1986). In over two thirds of the industries the social benefit/cost ratios for the rural firms were greater than one and higher than the ratios for the urban firms in the same country and industry. The social benefit/cost ratios for the large urban firms were often less than one - that is, their production actually decreased social welfare. Similar results were obtained for industries where output could be valued at world prices - which reflect shadow values.

Equity

Non-agricultural activities can be broadly divided into two groups of occupations: high labor productivity/high income activities and low labor productivity activities which serve only as a residual source of employment - a "last-resort" source of income (Lanjouw and Lanjouw, 1995). These latter activities are common among the very poor, particularly among women. Such employment may nevertheless be very important from a social welfare perspective for the following reasons: off-farm employment income may serve to reduce aggregate income inequality; where there exists seasonal or longer-term unemployment in agriculture, households may benefit even from low non-agricultural earnings; and for certain subgroups of the population who are unable to participate in the agricultural wage labor market, notably women in many parts of the developing world, non-agricultural incomes offer some means to economic security.

It is difficult to say whether the opportunity to engage in nonfarm activities is income inequality increasing or decreasing without information about what the situation would have been in the absence of such occupations. One important consideration remains that although aggregate income inequality may widen as rural non-agricultural incomes increase, this may occur alongside a decline in absolute poverty (if, for example, all households benefit from off-farm income, but the rich benefit proportionately more).

Empirical evidence in many countries supports the notion that agricultural wages are not perfectly flexible, and that rural agricultural labor markets are segmented - with certain subgroups of the population

such as women and children unable to obtain employment at the market wage. Lanjouw (1995) found some evidence that small farms in Ecuador obtained higher yields than large farms. A possible explanation for this observations could be that small farmers apply more labor per unit of land than large farmers[7]. Family labor is applied beyond the level where the marginal product of labor is equal to the market wage, because for at least some family members the market wage is not the opportunity cost of labor. If indeed agricultural wage employment is not an option for certain family members, then rural non-agricultural employment opportunities, even if they are not highly remunerative can make a real difference - especially for those households which do not possess farm land.

Linkages

The broader relationship between rural non-agricultural activity and agriculture has recieved considerable attention in the literature. During the 1970s, Mellor and Lele (1972), Mellor (1976), and Johnston and Kilby (1975) argued that a virtuous cycle between agricultural intensification and non-agricultural activity could emerge on the basis of production and consumption linkages. Production linkages could emerge whereby for example, demand of agriculturalists for inputs such as plows and machinery repair would stimulate non-agricultural activity via "backward" linkages, or where agricultural goods required processing in spinning, milling or canning factories prior to sale and thereby stimulated non-agricultural activity through "forward" linkages. Consumption linkages could emerge as rising agricultural incomes would feed primarily into increased demand for goods and services produced in nearby villages and towns. In addition, rising agricultural productivity could release labor or raise wages for non-agricultural activities, and agricultural surpluses could provide investment funds for the non-agricultural sector.

The expanding non-agricultural sector was then thought likely to act as an impetus to further agricultural intensification, through lower input costs, profits invested back into agriculture, and technological change. The growth in these two sectors could thus be mutually reinforcing. Where this hypothesis has been examined empirically, the different linkages have been found to vary markedly in their influence in different settings. De Janvry and Sadoulet (1993) claim that while consumption linkages

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[7]. Lanjouw (1995) tries to control for land quality differences by holding crops constant. In any case, anecdotal evidence for Ecuador would suggest that large farmers possess land of better quality than small farmers.

have exerted the strongest influence in Asian countries, there is no similar linkage in Latin America. They argue that the difference is due to the much more unequal distribution of land and income in Latin America which imply that a few landowners benefit from the bulk of the income effects of agricultural growth. Those large landowners are often absentee, so that they do not demand locally produced goods, and the level of their incomes is such that they tend to prefer luxury items met by urban industries or imports. De Janvry and Sadoulet argue that a positive role of rural non-agricultural activities on poverty reduction could better be expected through the expansion of subcontracting arrangements between urban based firms and small rural household enterprises, and through the location of *maquila* industries in rural areas.

In sum, the existing literature points to a potentially strong relationship between the rural non-agricultural sector and rural poverty. Because of market imperfections and distortions, non-farm activities are likely to employ labor beyond the point where the marginal product of labor is equal to the prevailing average agricultural or urban wage. The wide-range of non-agricultural activities in terms of labor productivity suggests that for some these activities provide a last resort safety-net function, while for others they offer a genuine opportunity for sustained upward mobility. The myriad possible linkages between the non-agricultural sector and agriculture suggest that a vibrant non-agricultural sector can also contribute in an indirect way to poverty reduction via higher agricultural wages, improved agricultural productivity and higher prices for agricultural products. In this paper we attempt to shed some empirical light on at least some aspects of the relationship between poverty and the non-agricultural sector in the context of rural Ecuador.

3. Rural Poverty In Ecuador

The analysis in this paper is based on the 1995 *Encuesta de Condiciones de Vida*, a nationally representative household survey fielded in Ecuador during the months of July-September, 1995. The questionnaire follows a multi-module format modelled closely on the World Bank's LSMS household surveys. A total of 5760 households were covered.

The analysis in this paper makes use of two alternative indicators of well-being; consumption and income. Consumption expenditure is a more attractive indicator for welfare rankings than income. This is mainly for pragmatic reasons (consumption is easier to measure accurately), but is also consistent with

the view that consumption expenditures are a better proxy of permanent income than current income, because they are net of savings and dissavings. The consumption aggregates were constructed using the same methodology as was applied for the 1994 Encuesta de Condiciones de Vida, described in Hentschel and Lanjouw (1995).[8] Consumption data are available for a total of 5661 households.

Construction of the second indicator of well-being, income, is described in the Annex. This welfare indicator is used specifically for the purpose of assessing the contribution of non-agricultural incomes to total incomes. Construction of income aggregates from surveys such as the *Encuesta de Condiciones de Vida* is relatively uncommon, and various problem are certain to remain. Nevertheless, the current income measure is considerably more comprehensive than what one can obtain from employment surveys - particularly with respect to rural farm and non-agricultural incomes. In total, income figures are available for 5,018 households (see Annex).

Table 1 presents some basic summary measures of poverty (based on per capita consumption expenditure) for Ecuador as a whole. The poverty line which has been applied for this purpose was generated from the data, but follows closely the methodology applied by the World Bank (1995). In particular, the same food basket, based on the consumption patterns of the second and third quintile of the expenditure distribution in 1994, and yielding 2237 kcals per person per day, was selected, but then valued using 1995 prices.

This "food poverty line" was then inflated up to allow for consumption of essential non-food items. The scaling factor applied for this purpose was obtained by calculating how much, on average, households which were just meeting the food poverty line with their food expenditures, were spending on non-food items. The (average) share of total expenditure on non-food items of such households was then the factor used to scale up the food poverty line. Lanjouw and Lanjouw (1997) show that this methodology ensures that the incidence of poverty calculated with the 1994 and the 1995 data can be compared even though the consumption aggregates are slightly different due to changes in survey design.

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[8] Consumption figures constructed for each household by aggregating together the value of purchased and home-produced food items, basic non-food goods and services, consumption of services such as water, electricity and gas, and the imputed value of housing services and consumer durable consumption. Both consumption expenditures and incomes were adjusted for spatial price variation based on a Laspeyres food price index derived from the survey data.

The incidence of poverty in Ecuador in 1995 at this poverty line is calculated at 56%, which compares to an incidence of 52% for 1994; a small rise in poverty (which is not statistically significant at the 5% level).

As was noted in World Bank (1995) rural poverty in Ecuador is considerably higher than in urban Ecuador. This is true across the three poverty measures applied here (which correspond to the Foster-Greer-Thorbecke poverty measures with parameter estimates of 0, 1 and 2, respectively) and can also be shown to apply for a wide range of poverty lines.[9]

In terms of the number of poor in urban and rural areas, the incidence of poverty in rural areas is so much greater that although the total population of urban Ecuador is larger than in rural Ecuador, there are more poor people in the rural part of the country than in urban areas. Although about 60% of the total population of Ecuador resides in urban areas, 55% of all poor persons live in the rural areas.

Geographically, Ecuador is highly heterogeneous - with sharp agro-climatic differences between the western coast (Costa), central mountains (Sierra) and eastern rainforest (Oriente) regions which split the country into three. Ethnically and economically, the three regions are also quite distinct. In the Costa agriculture is fairly commercialized, with many large plantations and numerous cash-crop oriented small farms cultivating bananas, rice, coffee, cocoa. There is a large agricultural labor market and in this region, rural poverty is highly correlated with involvement in casual agricultural labor (Lanjouw, 1995). Indigenous farmers in the Sierra tend to market a smaller proportion of their agricultural output. Their main subsistence crops comprise maize, potato, and beans. The agricultural labor market is fairly small. The Oriente also has a sizeable indigenous population. In this region the principal crops include maize, fruit, cassava and plantain.

Despite their heterogeneity, poverty rankings across these regions depend on which poverty line or measure one applies and are therefore not robust. For example, while the incidence of urban poverty in the Costa is (just) higher than in the urban Sierra, the poverty depth is greater in the urban Sierra (Table 1). Although not shown in Table 1, with alternative poverty lines the rankings across regions also

[9] There is no intersection of the distribution functions for urban and rural areas, and this implies that urban poverty is lower irrespective of which poverty line or poverty measure one might want to apply (see Atkinson, 1987).

change.

Table 2 illustrates the relationship between per capita landholdings in Ecuador and poverty. Just over half of the rural population lives on farms with landholdings of less than one hectare per person. Poverty among such persons is markedly higher than among larger landowners or among households which are not-cultivating. While average monthly per capita expenditures are roughly $20 for people living on marginal farms, they are nearly $30 for the non-cultivating population and over $60 for the half-percent with a per-capita landholding of more than 30 hectares.

The data for Ecuador thus reveal a pressing rural poverty problem. With a highly unequal distribution of land, including a large landless population, it is difficult to see how a boost in agricultural production would eliminate rural poverty. Land reform would seem potentially important, but one should not underestimate the financial implications nor the political difficulties involved. Mass migration to urban areas is also an unappealing prospect--it would probably result not so much in a decline of total poverty as simply a shift from rural to urban poverty. This inevitably moves the spotlight onto the rural non-agricultural sector as a potential route towards poverty alleviation. The next section we examine this sub-sector in Ecuador in further detail.

4. The Non-agricultural Sector in Ecuador

4.1 Non-agricultural Activities in Rural Ecuador

Non-agricultural incomes accrue to rural households through two routes: non-agricultural wage labour and home enterprises. Table 3 provides a breakdown of non-agricultural wage-labor activities, in terms of both primary and secondary employment, by sector of employment and region[10]. In all three regions of Ecuador, the proportion of the working population employed in non-agricultural activities is substantial, ranging from just over a quarter in the Oriente to more than 43% in the Costa (although this figure includes fishing activities, which are significant in the Costa but not elsewhere).

[10] Non-farm wage labor activities include all activities which are not explicitly a home-enterprise or business activity. As such, they would include self-employment activities like petty trading in the local market.

Commerce is a sector of particular importance in the Costa. More than a third of all non-agricultural employment in the Costa comprises commerce activities, compared to roughly a fifth in the Sierra and under a quarter in the Oriente (see figures in brackets). Activities which are relatively more important in the Sierra include manufacturing[11], construction, and various service activities such as teaching and community work. In the Oriente in contrast, aside from commerce a large share of non-agricultural wage labor is employed in the wood/straw/leather craft industry and also in administration.

The non-poor are relatively more likely to be employed in non-agricultural activities than the poor. While 38% of the poor working population is employed in non-agricultural activities, more than half of the non-poor are active in this sector (Table 4). This would be consistent with the notion (although not sufficient to demonstrate) that non-agricultural employment offers a route out of poverty. Commerce activities appear to be particularly important to the non-poor, as more than one third of non-agricultural employment of those who are not poor is in this sector, relative about a quarter for the poor. In addition, the non-poor are relatively heavily engaged in transport, administration and other service activities (although not community work and domestic service). These sectors are worth noting because they would appear to be linked to the availability of marketing and transport infrastructure, and to education (see below).

Activities which are particularly important for the poor include fishing, manufacture, construction, community work, and wood/straw/leather crafts. Such activities might resemble more closely the "low productivity" options discussed in Section 2, providing incomes (albeit low) to persons who lack an alternative source of income.

The importance of off-farm employment for women can be seen in Table 5. Nearly 50% of all rural women in the wage-labor force have either a principal or secondary job in the non-agricultural sector, compared to 37% of men. The most important sector for women is commerce. Nearly two fifths of all women employed in the non-agricultural sector are employed in commerce related activities. For men, by comparison, the figure is below one fifth. Other sectors which are particularly important for women include manufacturing, community work, teaching, domestic service, restaurant/hotel and

[11] This sector includes all manufacturing which is not either textiles and garments, or wood/straw/leather crafts.

textiles/garments. For men, the principle activities include construction, manufacturing, fishing, and transport. The importance of construction among non-agricultural sectors deserves emphasis, because it lends itself more easily, perhaps, to policy intervention than most other non-agricultural sectors. Section 4.5 looks more closely at the possible impact on incomes of the rural poor of an expansion of wage employment opportunities in this, as well as other, sub-sectors.

As was mentioned in Section 2, there are reasons to think that in Latin America household enterprises are particularly important as a source of non-agricultural rural incomes. Table 6 provides a breakdown of such home-business activities as well as their contribution to family employment. In total, just under half a million small firms were estimated to be operating in rural Ecuador in 1995[12], providing employment to nearly 900,000 persons. This represents roughly 60% of the rural labor force in Ecuador.[13] Most rural businesses are quite small, with on average 1.8 workers. More than four fifths of all persons employed in home businesses are family members. On average, more than two thirds of all self-owned businesses are home based.

The total range of activities in which home businesses are engaged is quite large, but more than 40% of all businesses (and business employment) are involved in small-scale commerce, such as shops selling basic provisions, restaurants, etc. Other important sectors include agricultural goods and food processing (4% of businesses), fishing (7%), textiles and garments (9%), wood and straw crafts (4%), transport services (5%) and other services (15%).

Even leaving aside fishing-related activities, home businesses are more numerous in the Costa than in the Sierra (Table 7). More than half of all businesses (including fisheries) are located in the Costa while 40% are located in the Sierra. As was seen with employment patterns, petty commerce is a particularly important business activity in the rural Costa. In the Sierra, although petty commerce is the single most important home-business, textiles and garments businesses are relatively more important than in the other regions. Nearly 16% of all businesses in the Sierra are engaged in this sector, compared to

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[12] The household expansion factors included with the household survey were used to inflate up from the survey to the total population.

[13] Where the rural labor force is defined as that for which the *primary* occupation of the individual is (agricultural and non-agricultural) wage-employment or participation in non-agricultural home-enterprise activities.

4% in the Costa and only 1% in the Oriente. Certain areas of the Sierra, for example the rural town of Pelileo in the province of Tungurahua, are renowned for such activities. About 400 enterprises are located in the vicinity of Pelileo and are engaged in the tailoring of denim jeans. Most of these enterprises are small family based firms which tailor jeans on a sub-contractual basis on behalf of the roughly 15 or so larger firms located in Pelileo. The Pelileo jeans are sold not only in Ecuador but are marketed in Colombia, Peru, and even as far as Canada (Lanjouw and Lanjouw, 1995). Other sectors which are important in the Sierra include Wood and Straw crafts (the famous "Panama" hat originates in the Ecuadorean Sierra and is sold world-wide), and transport services.

Of the nearly 900,000 persons employed in home business in Ecuador, 55% are poor (Table 8). This incidence of poverty can be compared to the "average" incidence of poverty in rural Ecuador of 76% (Table 1) which supports the notion that non-agricultural businesses, like non-agricultural employment, point to a route out of poverty. Across sectors, however, certain activities appear less benign from an equity perspective. The incidence of poverty among those in businesses such as forestry, fishing, leather goods, wood and straw crafts and construction, is not noticeably lower than in the rural population as a whole, and is markedly *higher* than among those employed in other businesses. Once again, poverty among those engaged in commerce and in transport is particularly low.

4.2 Non-agricultural Income

As described in the Annex, total income from non-agricultural activities derives from wage employment and home-businesses. Table 9 indicates that for the rural population in Ecuador more than 40% of income derives from non-agricultural activities. This percentage is consistent with figures which have been suggested elsewhere for Ecuador, and Latin America more generally (Hazell and Haggblade, 1993). And it is interesting to note that the percentage for non-agricultural income is only a little bit lower than for farm income (41% compared to 46%). The non-agricultural rural sector in Ecuador is thus significant not only in terms of employment but also as a major source of livelihood for many of those residing in rural areas[14].

[14] Note that the definition of rural which has been adopted in the Encuesta de Condiciones de Vida is fairly restrictive; it excludes for example any rural settlement with more than 5000 inhabitants. As a result, the statistics on the importance of non-farm income provided here should be seen as fairly conservative estimates.

The importance of non-agricultural income as a route out of poverty is again suggested by the observation that across quintiles (in terms of consumption expenditure), the share of total income from non-agricultural sources rises sharply with living standards. The poorest quintile in rural Ecuador receives about one fifth of its total income from non-agricultural activities. This rises to 37% for the second and third quintiles, and is as high as 64% for the top quintile.

Between the two types of non-agricultural income sources, home enterprise income is consistently more important as a fraction of total income than non-agricultural labor income. And again, the correlation between share of income from home-enterprises and consumption rankings is marked. Non-agricultural wage income share represents only about 9% of total income on average. This source is also less monotonically linked to consumption rankings than home-enterprise income. While the poorest quintile receives 6% of total income from non-agricultural labor sources, this rises to 11% for the second quintile, falls back to 9% for the next two quintiles, and then rises back to 12% for the top quintile.

As described above, Table 9 demonstrates that the poor are relatively less likely to earn non-agricultural incomes. If consumption quintiles were not available, and one wanted to examine this question using land-holding as a proxy for poverty, a rather different picture emerges. In Table 10, landless or near landless households receive the largest share of total income from non-agricultural sources. This share declines with land-holding size. Only among farms with more than 100 ha. does the share of income from non-agricultural sources rise again (although this figure should be interpreted with some caution as only 1% of all rural households have such large landholdings). This point illustrates the dangers of equating poverty with land-holding size. As was seen in Table 2, although measured poverty is higher among small landholding households, there is a large fraction of the rural population which does not cultivate at all (and which is not markedly poorer than average). And even among those with marginal landholdings, the incidence of poverty is higher than average, but not overwhelmingly so. Thus, poverty and access to land are related but not equal. It is precisely because of the availability of non-agricultural sources of income that this correspondence is not perfect.

Table 10 offers some evidence on the extent to which non-agricultural activities have increased in importance in recent decades. Hazell and Haggeblade (1993) provide figures for rural Ecuador on the percentage of income from non-agricultural sources by landholding class in 1974. These figures are unlikely to be based on the same definition of income as has been employed in this study, and are

therefore probably not strictly comparable. However, on the basis of these figures, there is a suggestion of a significant increase in the importance on non-agricultural income over time, particularly for the smaller landholding classes. Whereas 40% of total income for the landless and near-landless came from non-agricultural sources in 1974, this percentage had nearly doubled by 1995. And among marginal landholders (with up to 10 ha.) the share of non-agricultural income total income more than doubled.

4.3 Correlates of Non-agricultural Employment, Earnings, and Enterprise Ownership

This section examines the factors which are associated with employment in non-agricultural activities, and the level of earnings that such activities generate. Table 11 presents three probit models linking the probability of having primary employment in a non-agricultural wage-labor occupation to a range of explanatory variables. In the first regression, the dependent variable takes a value of 1 if the person is primarily employed in non-agricultural wage labor and zero otherwise. The second and third models split those employed in the non-agricultural wage-labor force into two groups; those with a low-productivity job and those with a high productivity job, respectively. The distinction between low and high productivity is based on whether earnings respectively fall below, or exceed, the average earnings of someone with agricultural wage labor as a primary occupation.

Considering all non-agricultural employment together, women are significantly more heavily represented in the non-agricultural wage-labor force then men. At average values of all other variables, the probability of primary employment in the non-agricultural sector rises from 8% to 21% for a woman[15] . What is striking, however, is that after dividing the types of occupations into two groups depending on whether earnings are on average lower or higher than average earnings from agricultural labor, women are significantly *less* likely to be employed in the relatively high productivity occupations. The likelihood of being employed in a high productivity job falls from 1.2% for a man to 0.6% for women, at average values of all other variables.

Relative to the uneducated, those with education are generally more likely to find employment

[15] This calculated by evaluating the predicted values of the regression in turn when the female dummy takes a value of zero and one, respectively, and when all variables are taken at their mean values.

in the non-agricultural sector. In low productivity jobs, the only statistically significant education variable is a dummy for secondary education. The probability of non-agricultural employment in a low-productivity primary occupation rises from 7% to 11% if the individual has been educated to the secondary level (all other variables taken at their means). In the high-productivity jobs the primary, secondary, and university education dummies are all statistically significant. At average values of other variables, having completed primary education raises the probability of employment in a high productivity job from 0.3% for the uneducated to 1%. Raising one's education to the secondary level increases this probability to 5%. The probability of employment in a high productivity job then jumps to 37% when the individual's education level reaches the university level. It is important to acknowledge that the exogeneity of education in these models can be questioned, so one must be careful to refrain from concluding that improvements in education would necessarily lead to increased employment in high productivity non-agricultural occupations. However, the evidence does suggest that this question merits further research.

In all models, age is positively associated with the probability of non-agricultural employment up to about 55 years of age in the full model. Beyond that age, the probability of non-agricultural employment declines. The corresponding turning points in the low-productivity and high-productivity models are 65 and 50, respectively. Indigeneity plays a role only in the case of Shuar speakers and the high productivity jobs.

Individuals from households which report some income from cultivation are significantly less likely to be employed in all three models--presumably because for cultivating households the first call on family labor is on the farm. Per capita land ownership exercises a significant and negative impact in the full model, and in the low-productivity model, but is not significant for the high-productivity jobs. It is sometimes argued that if off-farm employment opportunities, particularly the more attractive ones, are rationed, then access might be influenced by the household's wealth and influence - and this might be correlated with landholding (see Lanjouw and Stern, forthcoming). This would imply a positive and significant coefficient on land in the case of the high productivity jobs. The evidence here suggests a weaker relationship; land is linked to economic security which makes it less likely that an individual will need to turn to low-productivity last-resort employment options.

In Table 1, rural poverty rates were disaggregated into three sub-regions; rural *periferia*, rural

amanzanado, and rural *disperso*. Rural *periferia* refers to the rural areas immediately surrounding the larger conurbations. Rural *amanzanado* corresponds to villages with some basic infrastructure but a population of less than 5000 persons. Rural *disperso* refers to the remaining, outlying rural areas. In Table 11 it appears that relative to persons living in the rural *amanzanado* areas, persons from both the urban periphery and outlying areas are less likely to be employed in the non-agricultural sector (both high and low productivity jobs). In the case of the outlying areas this is not surprising, as presumably households are more likely to be engaged in cultivation there. However, the lower probability of non-agricultural employment for persons in the urban periphery is puzzling: one would think that wage employment opportunities are relatively common in urban centres. However, we saw in Table 1 that poverty in the urban periphery is much higher than in either the *amanzanado* areas or in urban areas, implying that higher urban incomes do not necessarily trickle down to the surrounding areas. It seems plausible that transport infrastructure which provides access to such centres is poor, and as a result the close proximity of such households to towns does not translate into better access to off-farm jobs.

Relative to those living in the Sierra, the population in the Costa is more likely to be employed in non-agricultural activities. However, this is not significant in the high productivity job model, suggesting that while there may be more non-agricultural activity in the Costa, much of this is relatively low paid. This observation is consistent with the finding in World Bank (1995) that in the Costa the poor are more widely engaged in both the agricultural and non-agricultural labor markets, while the poor in the Sierra are mainly susbsistence cultivators. In the Oriente the probability of non-agricultural employment is lower than in the Sierra, particularly in the low-productivity jobs.

In Table 12 we examine earnings from non-agricultural jobs on the basis of an OLS regression for the sub-set of persons with primary employment in the non-agricultural sector. The specification for this model includes a correction for sample-selection based on the first probit model in Table 11.[16] The insignificant parameter estimate on the Mills ratio variable suggests that in the present example there are no unobserved variables which influence the probability of employment in the non-farm sector.

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[16] The identifying variables from the probit model are the dummies which break the rural areas into outlying areas, built-up rural communities, and the urban periphery. To check whether these variables in fact influence the likelihood of off-farm employment, but not the earnings from such jobs, the residuals from the model in Table 12 were regressed on all explanatory variables in that model *plus* the *disperso* and *periferia* dummies. None of the parameter estimates in this regression were significant, and the R^2 was 0.0024. See Greene (1993) for a clear exposition of the issues relating to sample selection.

As we would expect, given the different probabilities of employment in low versus high productivity jobs observed in Table 11, women earn less than men from non-agricultural jobs. Based on the parameter estimates of Model 1, a woman would expect to earn about 70% less than a man from her non-agricultural occupation[17].

Returns to education are quite substantial in the non-agricultural sector. A person who has completed primary school earns 31% more than a person who hasn't. The corresponding percentages for secondary and university education are 46% and 258%, respectively. Although only weakly significant, the returns to a post-graduate education level are even greater: nearly ten times higher for those with such an education relative to those without.

In the probit analysis of Table 11, there was at best a weak suggestion that persons with greater wealth (proxied by per-capita land holdings) might be more highly represented in high-productivity non-agricultural occupations. In terms of earnings this conjecture recieves additional support; an additional hectare increases non-agricultural earnings by 5%. Once again, however, if the household is cultivating some land, earnings decline. A person from a cultivating household earns about 37% less than if the household is not cultivating. The probable explanation for this is that a person who belongs to a cultivating household may spend at least some time helping on the farm, and this reduces his monthly income from non-farm employment, even if the latter is his primary occupation.

As suggested from the Probit models, while those in the Costa were more likely to be employed in the non-agricultural sector than those in the Sierra, they earn significantly less from such occupations. A person with a primary occupation in non-agricultural wage-employment in the Costa would earn about 22% less than a person in the Sierra. There is no significant earnings differential between the Sierra and Oriente, although the point estimates also suggest that the differential would favour the Sierra.

Table 13 returns to a probit model examination of the likelihood that a household will possess a home-enterprise. This model is at the household rather than individual level, and although roughly similar explanatory variables are applied as in the previous models, a few variables relating to

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[17]. A coefficient c multiplying a dumy variable can be interpreted as a percent change in the endogenous variable only as long as c is close to zero. For larger values, in absolute terms, the percent change in the endogenous variable is given by 100[exp(c)-1].

infrastructure access were added.

Education is again an important factor. If the most educated family member has a primary school education or a secondary school education then the household is more likely to own a business than a household where no-one is educated. The importance of some education is further supported by the variable indicating that those households in which all family members are literate are more likely to own a business than those where no-one is educated. Unlike in the case of employment, however, higher levels of education appear to be relatively less important for household business activity. This finding could indicate that those with tertiary levels of education are more likely to enter into a salaried occupation than set up a family business.

As before, cultivating households are less likely to have a home business, and landholding exercises no significant independent influence. Those residing in the rural periphery and outlying areas are once again less likely to own family businesses. And as before, the Costa region has a relatively higher incidence of family businesses than the Sierra.

Whether a household is connected to the public electricity network, and whether it has a telephone connection are important contributing factors to the likelihood of home-enterprise ownership. These factors add to the perception, already noted in the context of access between the *perferia* and urban centres, that infrastructure is an important facilitator of non-agricultural activity.

4.4 The Impact on Poverty of Growth in Off-Farm Wage Employment

In this section we attempt briefly to look ahead at the possible impact of an expansion of non-farm employment opportunities on incomes of the poor. As we are unable to directly observe the impact of changes in employment patterns from a single "snap-shot" cross-section data set, we must simulate the impact of such changes on average incomes of the poor. These simulations can be based on the relationships which we do observe in the data between earnings, personal characteristics, region of residence, sector of employment and so on. The simulation exercise is built up from the following series of steps.

First we estimate an earnings regression, as in Table 12, but over the whole population of wage-

earners in rural Ecuador.[18] We add to the specification estimated earlier a series of dummy variables indicating the sector of employment in which the individual is employed. The next step is to select from the population of wage-earners in rural Ecuador the subsample of laborers whose per capita consumption level is below the poverty line. We calculate average values of the explanatory variables which enter into the regression equation for this subgroup of wage-earners. Plugging in these mean values into the estimated regression equation then allows us to predict the earnings which accrue to individuals whose characteristics correspond to those of the poor on average. This predicted average income provides a base case against which we can compare earnings associated with our simulations.

The simulations are based simply on a postulated shift in employment patterns away from traditional rural wage-labor activities (agricultural labor, fishing) towards some alternative non-agricultural sector. For example, in the base case it appears that approximately 57% of wage labor employment in rural Ecuador occur in the traditional sector, while around 5% occur in textiles, 17% in commerce, 8% in services, etc. (Table 14). The predicted earnings in our base case reflect these percentages. We now postulate that the frequency of employment in the traditional sector among the poor declines from 57% to 47%. We examine, in turn, how predicted income changes if this 10 percentage point fall in employment in the traditional sector is fully offset by an increase in employment in a range of different non-agricultural sectors.

The first thing to note from the last row in Table 14 is that for virtually all non-agricultural sectors a shift of the poor out of the traditional sector into non-agricultural activities would imply a rise in their average incomes. Only in the case of a shift into extraction activities (such as mining) would average incomes of the poor fall, by about 5 percent. The biggest gains would come from an expansion into service sector jobs. An increase in employment by 10 percentage points in the "other" services category (comprising administration, teaching, community work, etc.) or in the hotel/restaurant trade, would raise average incomes of poor wage earners by 13-14%, other things equal.

Policymakers are not necessarily terribly well placed to intervene in a way which directly (and productively) increases the number of service sector jobs. But perhaps governments are better placed to expand employment opportunities in construction (through public works projects) or in the transport

[18] Table 12 focusses exclusively on individuals with wage employment in non-agricultural activities.

sector (via improved roads and communications infrastructure). In these two cases, a shift in employment of ten percentage points from the traditional sector into construction or transport would raise average earnings of the (initially) poor by 6% and 9% respectively. Relatively small increases in earnings would be associated with an expansion of employment opportunities in industrial and manufacturing activites, particularly garments and wood/straw product manufacture.

There are many reasons why these initial calculations should only be seen as approximates. The simulation exercise on which they are based is feasible only with a whole host of simplifying assumptions. A first assumption is that the parameter estimates of the regression equation do not change in the face of a shift of employment from one sector into another. This assumption becomes increasingly untenable the larger the postulated shift of employment. If large numbers of poor laborers shift out of traditional agriculture and into, say, construction activities, it would seem likely that wage rates in the traditional sector would rise while wage rates in the construction sector could fall. The relationship between earnings and gender, earnings and education, etc., might also change. This assumption is reasonable only if the shifts of employment are marginal.

A second assumption implicit in the analysis is that there are no second-round effects from a shift in employment patterns. A shift out of agriculture into construction, say, would presumably have further knock-on effects on employment in the non-agricultural sector via the increased demand for various inputs in the construction process, the use to which the finished project is put (roads, dams, offices, etc), and so on. Similarly, an expansion of non-farm employment opportunities might present the poor with incentives to change their household characteristics (such as education levels), which subsequently alters their ability to enter into the sector and could eventually also change returns to those characteristics. These second round effects could easily overshadow the first-round impacts, and may not necessarily move in the same direction.

There is also a fairly important set of assumptions which derive from the fact that our non-agricultural sub-sectors aggregate together possibly quite different activities. For example, the "other" services sector encompasses administration, community work, teaching, etc. The parameter estimate on this dummy variable in the regression combines the returns to these different activities to arrive at a summary "average" return for this sector. In fact, of course, the poor who are employed in the 'other services' sub-sector may not typically receive this average return because they may be under-represented

in those activities which require particularly high levels of education or some other specific attribute. To obtain an initial assessment of the impact of this set of assumptions we replicated the simulation exercise based on an earnings regression estimated for the sub-sample of poor wage-earners instead of the population of all wage-earners. In this case returns to household employment and personal characteristics, and to sector of employment, are those which apply to currently poor households rather than to the population as a whole.[19] Predictably, the simulation results from this exercise show a more muted impact of shifting employment patterns on average incomes of the poor. However, even here the general picture was one of rising average incomes of the poor following a shift in employment from traditional wage-employment activities towards the non-agricultural sector. It seems somewhat unreasonable to speculate about the impact of a shift in employment patterns while insisting that the returns to employment in the non-agricultural sectors must correspond to those received currently by the poor who are employed in these sectors. Presumably these individuals are poor, at least in part, because of the low returns they receive in the specific non-farm activity in which they are engaged. Forcing the simulations to respect this structure of earnings, as opposed to the earnings which on average accrue to employment in the various non-farm sectors would seem to understate, by construction, the contribution that non-farm activities make to poverty reduction. Most likely the truth lies somewhere between these two scenarios.

4.5 Off-Farm Income and the Distribution of Income

In this section we look at the distribution of income in Ecuador as a whole, and ask how the rural non-agricultural sector fits into this picture. The purpose of this exercise is to gain a sense of whether growth of the non-farm sector would translate into rising living standards of the poor in Ecuador, or whether, instead, growth of the sector would simply result in higher income inequality. In other words, we are asking to what extent growth of the non-farm sector can be seen as part of a "broad-based" growth process. To examine this question, we decompose income inequality by factor components to assess the contribution of sources of income to total income inequality. We are interested specifically in the

[19] Because truncating the sample in this way introduces sample-selection problems a correction term was also added to this regression. The same reasoning was applied in the search for identifying variables as was applied for the regression results in Table 12. The *disperso* dummy was strongly significant in the probit model (increasing the probability of poverty) but neither the *disperso* nor *periferia* dummies were significant in the regression of earnings conditional on wage employment for the poor. As a result these were dropped from the regression model and were used as indentifying variables for the first stage.

elasticity of overall inequality, the degree to which overall inequality changes with small changes in rural non-agricultural incomes.

Before proceeding, a word of caution is in order. The analysis in this paper is based on a single household survey, providing a "snap-shot" of the distribution of living standards, of employment activities, sources of income, and so on. We have therefore only been able to point, so far, to the *possibility* that non-agricultural employment provides a route out of poverty. As described in the previous section it has not been possible to follow households through time to compare their *ex-ante* position with their *ex-post* position. Even in such a case, we would not be able to easily determine the counterfactual of what would have been that household's living standard if it hadn't obtained access to an off-farm income. The decompositions of inequality which follow should thus be similarly interpreted with caution.

Table 15 presents the Gini coefficient for income in Ecuador as a whole (including urban areas), decomposed by income components[20]. Following Shorrocks (1982) the Gini coefficient G, can be obtained as a weighted average of 'pseudo-Gini' coefficients G_k^* for each component, where the weights are given by the share α_k of component income in total income[21]:

$$G = \alpha_1 G_1^* + \ldots + \alpha_k G_k^* + \ldots + \alpha_n G_n^*$$

The 'pseudo-Gini' coefficient for an income component is similar to the Gini coefficient for that component but with the modification that individuals are ranked in terms of their total income rather than

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[20] The overall Gini coefficient (for income) of 0.782, obtained from the Encuesta de Condiciones de Vida, is remarkably high - and is certainly higher than what studies conventionally indicate for inequality in Ecuador or Latin America in general (it compares to a Gini of 0.42 for consumption expenditures). It is however, fairly robust to exclusion of extreme values, at both ends of the distribution. As is shown in the Annex, the definition of income taken here is fairly comprehensive (although not perfectly so) in, for example, the fact that it includes labor earnings from primary and secondary jobs, self-employment and home-enterprise income, net farm income, and income from a range of additional sources.

[21]. Similar techniques for decomposition by factor components have been discussed in Fei, Ranis and Kuo (1978), Pyatt, Chen and Fei (1980) and Anand (1983).

component income.[22]

From Table 15 we see that for the distribution of income in Ecuador as a whole inequality is largely 'explained' by inequality in urban income. Farm income contributes around 12.5% to total inequality and rural non-agricultural income contributes 15.2%.

In general, the change in the overall income inequality brought about by an increase or a reduction of income from a given source will be smaller the closer the pseudo-Gini coefficient for that source is to the overall Gini. To see this, suppose we decompose income into two components:

$$G = \alpha_1 G_1^* + \alpha_2 G_2^*, \text{ where } \alpha_1 + \alpha_2 = 1,$$

so for a given change in income from the first source,

$$G' = \alpha_1' G_1^* + \alpha_2' G_2^*, \text{ with } \alpha_1' + \alpha_2' = 1.$$

This implies that

$$\Delta G = -\Delta\alpha_1 (G_2^* - G_1^*).$$

Because

$$G_2^* - G_1^* = \frac{(G - G_1^*)}{\alpha_2},$$

the change in G can be written as

$$\Delta G = -\left(\frac{\Delta\alpha}{1-\alpha_1}\right)(G - G_1^*).$$

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[22]. The 'pseudo-Gini' for a particular component divided by the true Gini for that component can be shown to be equal to the rank correlation coefficient between incomes from the component and total incomes. The lower is this ratio, the more uncorrelated are incomes from that component with total incomes. We could consider the Gini as a sum, component by component, of the product of three terms $\alpha_k.R_k.G_k$ where R_k is the rank correlation and G_K is the component Gini (see Table 14). Note also that the 'pseudo-Gini' can take a value less than zero.

The smaller the difference between the pseudo-Gini coefficient and the overall Gini coefficient, the smaller will be the impact on inequality from a change in income from that source. The elasticity of the Gini coefficient with respect to a change in income from component 1 is thus proportional to the percentage difference between the overall Gini coefficient and this pseudo-Gini coefficient:

$$\epsilon_1^G = -\left(\frac{\alpha_1}{1-\alpha_1}\right)\left(\frac{G-G_1^*}{G}\right).$$

As the pseudo-Gini coefficients for outside job income and farm income are not different from the overall Gini coefficient, changing incomes from these two sources would not have an important influence on the overall level of inequality (last row, Table 15). Note that changes in the distribution of urban incomes do play a role: a uniform increase in urban incomes of 10% would result in a 0.66% increase in the Gini coefficient (from 0.782 to 0.787), while an increase of 10% in rural non-agricultural incomes would *reduce* the overall Gini coefficient to 0.781 (and roughly the same would occur with a 10% increase in farm income). Thus, while it can't be said that an increase in non-agricultural income would reduce ovrall income inequality in Ecuador appreciably, it certainly does not seem to be the case that such an increase would contribute to a further polarization of incomes in the country as a whole.

The decomposition exercise is repeated in Table 16 for rural areas only. From this table we see that the contribution of non-agricultural income inequality to overall inequality in rural Ecuador is 52%, compared to 38% for farm income. The elasticity of rural inequality to changes in non-agricultural income is considerably higher than was the case for the country as a whole. Moreover, rather than contributing to a decline in overall inequality, increasing rural non-agricultural income would lead to an increase in overall inequality. Thus while an increase in rural non-agricultural income of 10% would lead to a marginal fall in overall inequality in Ecuador as a whole, it would *raise* the Gini coefficient for rural Ecuador from 0.785 to 0.788.

It thus appears that within the national distribution of incomes, rural non-agricultural incomes accrue, on balance, slightly more to households in the middle to lower fractiles of the income distribution than to those at the top. Increasing the incomes received by such households from this source would thus have the effect of reducing (marginally) the distance between the rich and the rest of the population, and

therefore national income inequality would fall somewhat. However, within the rural income distribution, non-agricultural incomes would appear to go primarily to the better off, so that raising non-agricultural incomes (rather than *expanding* access to non-agricultural incomes) would lead to a widening of the distance between the rich and the poor, and therefore an increase in inequality. This implies that the most significant impact on poverty from non-agricultural activities could be expected from efforts to relax constraints on access to the non-agricultural sector - so that more of the poor can benefit from non-agricultural incomes.

5. Concluding Remarks

The rural non-agricultural sector in Ecuador, and probably in most Latin American countries, is a sizeable subsector of the rural economy, in terms of employment as well as in terms of incomes. We have seen that around 40% of rural incomes come from non-agricultural sources, that 37% of the male labor force (outside the home-enterprise) has either a primary or secondary occupation in the non-agricultural sector, and that this fraction is as high as 50% for women. Finally, of the economically active population which is not engaged in own-account cultivation, about 60% (nearly a million persons) works in home enterprises.

The non-agricultural sector is heterogeneous, with employment occuring in a multitude of different activities. Alongside Ecuador's agricultural economy which varies with agro-climatic zone, certain non-agricultural activities are more important in the different regions. For example, textiles and garments, crafts, manufacturing and construction activities are relatively more important in the Sierra than in the Costa. The most common activity in all regions, however, is commerce. This observation suggests that while these may still be well below Asian levels, the linkages between the agriculture sector and the non-agricultural sector, both consumption and production, are not absent in Ecuador. However, the presence of a sizeable manufacturing sector in rural Ecuador, particularly in the rural Sierra, suggests that the sub-contracting/*maquila* model of rural industry, which links the rural economy to urban and even international markets, is also of relevance in Ecuador.

We have seen that rural non-agricultural incomes are strongly associated with higher living standards, as proxied by consumption expenditure. The poor derive a significantly lower share of income from non-agricultural sources than the non-poor. This implies that although non-agricultural activities can comprise both high-productivity jobs and low-productivity, "last-resort" occupations, it is the former

which seem to be more pertinent to the Ecuador case. One should not wish, therefore, to see this sector wither away during the development process. From the, admittedly tentative, simulation results, the impression gained is that an expansion of non-farm occupations in rural areas would significantly raise incomes not only of the population on average, but even of the poor as a specific group. From the inequality decomposition analysis, it was seen that raising rural non-agricultural incomes would contribute to, if anything, a decline in national income inequality. One can therefore interpret growth in this sector as consistent with a quest for "broad-based" development - growth which does not marginalize the poor. The key issue in this regard is less one of raising income from non-agricultural activities but rather to find ways to expand non-agricultural employment opportunities in rural areas, and to ensure that the poor are not rationed from participating in this process.

Enhancing access to the non-agricultural sector would appear to be possible via two routes, both of which are important in their own right. Although not all non-agricultural activities require high levels of education, earnings from such jobs are clearly linked to education levels. In particular, completing secondary education has the effect of signficantly raising earnings from non-agricultural activities and is also strongly associated with the likelihood that a household will engage in some home enterprise. The poor in rural Ecuador are strongly associated with high drop-out rates and repetition levels in secondary school, so improving their education levels might facilitate their access to non-agricultural jobs.

The second factor which is likely to play an important role concerns infrastructure. There have been several occasions in this paper to comment on the importance of certain infrastructure services. Commerce, as the most common non-agricultural activity throughout the country (strongly associated with the non-poor and with female employment) has clear infrastructure requirements. Transport infrastructure is critical for non-agricultural activities aimed at selling manufactured goods to urban areas and abroad. There are also indications that access to non-agricultural jobs, for both remote areas as well as settlements close to urban centers, in either small rural towns or larger urban areas is constrained by poor road infrastructure. Also, the establishment of home enterprises is strongly correlated with electrification and with telecommunications. Of course the very provision of infrastructure can also offer an important source of non-agricultural employment. Increased construction activities in rural areas could directly offer non-agricultural employment opportunities to local populations. Proper design of those projects (for example, incorporating a significant unskilled labor component into construction plans) could help to ensure that the poor are self-selected into these construction activities.

Unit costs in rural infrastructure provision are generally higher than in urban infrastructure. This, in combination with the poverty of many rural households, suggests that cost-recovery is not easy to achieve in rural areas, particularly as locations become more remote. Difficulties with cost recovery imply that private provision of these infrastructure services is not readily forthcoming. There thus seems to be grounds for continuing and even expanding public financing (although not necessarily execution) of infrastructure construction and maintenance aimed at connecting small rural towns to their surrounding areas, and linking these rural towns to the larger urban centres. These arguments are of course strengthened by the observation that rural infrastructure would not only contribute to the non-agricultural sector, but would support the agricultural sector as well.

There are a number of questions which the analysis in this paper has not been able to address. A critical issue relates to the financing of rural home enterprises. Due to data non-availability it was not possible to ascertain whether rural households face specific constraints in terms of access to credit. Anecdotal evidence for Ecuador, which is supported by investigations in other countries, indicates that many home enterprises are financed through savings rather than loans. In the township of Pelileo, government loans aimed at small enterprises can be obtained from Ecuador's Banco Nacional de Fomento, at relatively attractive interest rates. However, overall transactions costs are in fact very high, and as a consequence most of the small home-based tailoring enterprises in this community drew on savings and informal loans for financing (Lanjouw and Lanjouw, 1995). To the extent that this is a general problem, efforts are clearly warranted to address the source of the high transactions costs from formal sector lending agencies.

Although this paper has pointed to the existence of a sizeable manufacturing sector in rural areas, closer examination of how these sub-sectors operate is clearly of additional interest. How do sub-contracting arrangements get established? What particular role do such arrangements play? One possibility is that sub-contracting offers a convenient arrangement whereby urban firms can avail themselves of low cost labor, while rural households do not have to tackle the, for them, difficult problem of marketing their output. Another possiblity, is that sub-contracting is important to rural households because it offers family members, especially women, the flexibility to engage in remunerated work without compromising (excessively) their ability to carry out other duties. A better understanding of this sub-sector would hopefully provide pointers to policy makers interested in encouraging the establishment of such enterprises.

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Table 1

Poverty In Ecuador, 1995

	Poverty Measures			Population	
	Incidence	Depth	Severity	Poor	Total
Costa	0.54	0.21	0.10	3,105,719	5,758,167
Urban	0.43	0.14	0.06	1,590,866	3,739,562
Rural	0.75	0.33	0.18	1,514,853	2,018,605
Sierra	0.58	0.25	0.14	2,569,220	4,457,318
Urban	0.42	0.16	0.08	1,064,172	2,520,310
Rural	0.78	0.38	0.22	1,505,048	1,937,008
Oriente	0.65	0.25	0.13	242,502	370,487
Urban	0.47	0.18	0.09	33,437	71,966
Rural	0.70	0.27	0.14	208,565	298,521
Ecuador	0.56	0.23	0.12	5,917,441	10,585,972
Urban	0.42	0.15	0.07	2,688,975	6,331,838
Rural	0.76	0.35	0.19	3,228,466	4,254,134
Urban	0.43	0.15	0.07	2,688,975	6,331,838
Periferia	0.77	0.37	0.22	208,566	269,412
Rural Amanzanado	0.65	0.26	0.13	820,100	1,258,621
Rural Disperso	0.81	0.39	0.22	2,199,800	2,726,101

Notes

1. The poverty line applied in this table has been calculated according to the FEM methodology of Ravallion, 1994, based on a food poverty line which is identical to that applied in the Ecuador Poverty Report (World Bank, 1995).

Source: Encuesta de Condiciones de Vida, 1995

Table 2

Poverty and Per Capita Landholdings

Per Capita Land Holdings	Percent of Rural Population	Average Per Capita Expenditure (per month)	Incidence of Poverty	Poverty Gap	Poverty Severity (x100)
non-cultivators	28.4%	S. 83,657	68.9%	28.9%	15.3
0 - 1 hectares	51.2%	S. 60,435	84.1%	41.4%	24.0
1 - 2.5 hectares	9.2%	S. 73,161	76.4%	32.5%	17.5
2.5 - 5 hectares	5.3%	S. 88,073	61.3%	24.2%	12.6
5 - 30 hectares	5.4%	S.112,680	52.5%	15.9%	6.8
30+ hectares	0.5%	S.185,071	32.0%	16.7%	9.3
Rural Ecuador	100%	S. 73,089	75.6%	34.6%	19.3

Source: *Encuesta Sobre Las Condiciones de Vida (1995).*

Table 3

Non-Farm Wage Employment in Rural Ecuador (Principal and Secondary Occupations)

Percentage of Working Population Involved in:	Costa	Sierra	Oriente
Fishing	8.0 (18.3)	0.0 (0.0)	0.0 (0.0)
Extraction	0.7 (1.6)	0.9 (2.4)	0.3 (1.1)
Manufacture	4.4 (10.1)	6.7 (17.9)	2.6 (9.2)
Textiles/Garments	0.9 (2.1)	1.4 (3.7)	0.3 (1.1)
Wood/Straw/Leatherware	0.4 (0.9)	2.5 (6.7)	5.8 (20.6)
Utilities	0.2 (0.5)	0.0 (0.0)	0.0 (0.0)
Construction	3.2 (7.3)	6.2 (16.6)	2.2 (7.8)
Commerce	15.8 (36.2)	7.7 (20.6)	6.6 (23.4)
Restaurant/Hotel	1.6 (3.7)	0.9 (2.4)	0.6 (2.1)
Transport	2.1 (4.8)	1.8 (4.8)	2.2 (7.8)
Finance	0.1 (0.2)	0.0 (0.0)	0.3 (1.1)
Property/Management	0.7 (1.6)	0.2 (0.5)	0.0 (0.0)
Administration	1.3 (3.0)	1.9 (5.1)	3.0 (10.6)
Teaching	1.9 (4.3)	2.4 (6.4)	0.9 (3.2)
Social Services	0.5 (1.1)	0.6 (1.6)	0.6 (2.1)
Community Work	0.5 (1.1)	3.1 (8.3)	2.0 (7.1)
Domestic Service	1.4 (3.2)	1.1 (2.9)	0.8 (2.8)
Total	43.7 (100.0)	37.4 (100.0)	28.2 (100.0)

Note:

1. Column percentages provided in brackets.

Table 4

Non-Farm Wage Employment in Rural Ecuador (Principal and Secondary Occupations)

Percentage of Working Population Involved in:	Poor	Non-Poor
Fishing	3.6 (9.5)	2.2 (4.1)
Extraction	0.7 (1.8)	0.8 (1.5)
Manufacture	5.7 (15.0)	5.7 (10.7)
Textiles/Garments	1.2 (3.2)	1.7 (3.2)
Wood/Straw/Leatherware	2.0 (5.3)	1.3 (2.4)
Utilities	0.2 (0.5)	0.0 (0.0)
Construction	4.8 (12.6)	2.4 (4.5)
Commerce	9.8 (25.8)	18.8 (35.3)
Restaurant/Hotel	1.2 (3.2)	1.6 (3.0)
Transport	1.4 (3.7)	4.0 (7.5)
Finance	0.0 (0.0)	0.3 (0.6)
Property/Management	0.3 (0.8)	0.6 (1.1)
Administration	0.8 (2.1)	3.1 (5.8)
Teaching	1.1 (2.9)	4.1 (7.7)
Social Services	0.3 (0.8)	0.9 (1.7)
Community Work	3.8 (10.0)	4.7 (8.8)
Domestic Service	1.1 (2.9)	1.0 (1.9)
Total	38.0 (100.0)	53.2 (100.0)

Note:

1. Column percentages provided in brackets.

Table 5

Non-Farm Wage Employment in Rural Ecuador (Principal and Secondary Occupations)

Percentage of Working Population Involved in:	Male	Female
Fishing	4.6 (12.5)	1.6 (3.2)
Extraction	1.2 (3.3)	0.1 (0.2)
Manufacture	4.9 (13.3)	6.2 (12.5)
Textiles/Garments	0.2 (0.5)	2.7 (5.5)
Wood/Straw/Leatherware	1.9 (5.1)	1.8 (3.6)
Utilities	0.2 (0.5)	0.0 (0.0)
Construction	7.2 (19.5)	0.1 (0.2)
Commerce	7.0 (19.0)	18.3 (37.0)
Restaurant/Hotel	0.4 (1.1)	2.7 (5.5)
Transport	3.0 (8.1)	0.2 (0.4)
Finance	0.0 (0.0)	0.2 (0.4)
Property/Management	0.5 (1.4)	0.2 (0.4)
Administration	1.9 (5.1)	1.3 (2.6)
Teaching	1.2 (3.3)	3.5 (7.1)
Social Services	0.3 (0.8)	1.0 (2.0)
Community Work	2.4 (6.5)	6.3 (12.7)
Domestic Service	0.0 (0.0)	3.3 (6.7)
Total	36.9 (100.0)	49.5 (100.0)

Note:

1. Column percentages provided in brackets.

Table 6: Non-Farm Rural Enterprises in Ecuador

	Number of Enterprises	No. of Workers	No. of Family Workers	Percent Home-Based	Total Employment
Agriculture (sales/services)	9,056	2.37	1.44	55%	21,477
Forestry	2,152	2.37	1.53	58%	4,815
Fishing	34,440	1.89	1.28	4%	65,294
Mining/Extraction	4,319	6.61	1.63	92%	28,563
Food Processing	9,074	2.09	1.80	95%	19,027
Textiles and Garments	40,537	1.37	1.29	99%	55,513
Leather Goods	1,529	2.01	2.01	100%	3,074
Wood and Straw Crafts	20,235	1.59	1.33	85%	32,367
Paper	633	1.00	1.00	100%	633
Sound/Recording	486	1.00	1.00	100%	486
Rubber Goods	425	3.63	0.12	100%	1,544
Metals	6,466	3.06	1.83	100%	19,783
Metal Products	2,274	2.45	1.09	81%	5,570
Machinery and Equipment	573	1.00	1.00	100%	573
Automotive	727	1.94	1.94	94%	1,409
Furniture	14,250	2.11	1.81	94%	30,090
Construction	10,547	2.41	1.48	68%	25,418
Sales/Repair of Vehicles	3,312	1.25	1.00	98%	4,132
Wholesale Commerce	1,179	2.55	1.83	47%	3,008
Petty Commerce	194,760	1.72	1.56	75%	335,010
Hotel/Restaurant	13,855	2.29	2.14	81%	31,727
Transport Services	21,482	1.83	1.25	1%	39,235
Financial Intermediation	340	3.00	2.00	100%	1,020
Machinery Rental	547	2.32	1.32	32%	1,268
Administration/Managerial	3,020	1.27	1.00	59%	3,844
Teaching	2,667	1.17	1.07	100%	3,129
Other Services	71,797	1.45	1.13	69%	104,188
TOTAL	470,682	1.79	1.44	69%	842,197

Source: Encuesta de Condiciones de Vida, 1995

Table 7: Non-Farm Rural Enterprises In Ecuador

Activity	*Number of Establishments*			
	Costa	*Sierra*	*Oriente*	*Ecuador*
Agriculture (sales/services)	*2,628*	*4,130*	*2,298*	*9,056*
Forestry	*2,110*	*42*	*0*	*2,152*
Fishing	*34,353*	*87*	*0*	*34,440*
Mining/Extraction	*1,584*	*2,225*	*510*	*4,319*
Food Processing	3,238	4,351	1,485	9,074
Textiles and Garments	10,646	29,574	317	40,537
Leather Goods	809	720	0	1,529
Wood and Straw Crafts	2,407	13,073	4,755	20,235
Paper	633	0	0	633
Sound/Recording	486	0	0	486
Rubber Goods	52	373	0	425
Metals	5,733	570	163	6,466
Metal Products	843	1,431	0	2,274
Machinery and Equipment	0	573	0	573
Automotive	46	0	681	727
Furniture	4,284	7,795	2,171	14,250
Construction	5,430	3,923	1,194	10,547
Sales/Repair of Vehicles	1,969	1,343	0	3,312
Wholesale Commerce	619	560	0	1,179
Petty Commerce	112,442	72,785	9,533	194,760
Hotel/Restaurant	8,284	5,331	240	13,855
Transport Services	8,276	11,635	1,571	21,482
Financial Intermediation	0	0	340	340
Machinery Rental	0	373	174	547
Administration/Managerial	1,901	1,119	0	3,020
Teaching	1,629	1,038	0	2,667
Other Services	41,121	26,892	3,784	71,797
TOTAL	251,523	189,943	29,216	470,682

Source: Encuesta de Condiciones de Vida

Table 8: Non-Farm Rural Enterprises Owned by the Poor

	Number of Enterprises	No. of Workers	No. of Family Workers	Percent Home-Based	Employment (% of total)
Agriculture (sales/services)	5,396	1.98	1.59	41%	10,710 (0.50)
Forestry	2,055	2.27	1.54	59%	4,676 (0.97)
Fishing	26,250	1.87	1.26	4%	49,080 (0.75)
Mining/Extraction	2,114	2.83	2.29	85%	5,983 (0.21)
Food Processing	4,372	2.06	1.92	89%	9,020 (0.47)
Textiles and Garments	27,844	1.26	1.23	98%	35,029 (0.63)
Leather Goods	1,235	2.25	2.25	100%	2,780 (0.90)
Wood and Straw Crafts	14,557	1.70	1.38	86%	24,737 (0.76)
Paper	0	0	0	0	0 (0.00)
Sound/Recording	0	0	0	0	0 (0.00)
Rubber Goods	425	3.63	0.12	100%	1,544 (1.00)
Metals	3,965	3.19	1.80	100%	12,665 (0.64)
Metal Products	1,536	1.69	1.35	75%	2,590 (0.47)
Machinery and Equipment	0	0	0	0	0 (0.00)
Automotive	46	1.00	1.00	0%	46 (0.03)
Furniture	9,946	2.02	1.82	95%	20,092 (0.67)
Construction	8,989	2.30	1.57	68%	20,682 (0.81)
Sales/Repair of Vehicles	1,133	1.15	1.00	100%	1,304 (0.32)
Wholesale Commerce	0	0	0	0	0 (0.00)
Petty Commerce	100,763	1.69	1.55	74%	170,413 (0.50)
Hotel/Restaurant	8,628	2.45	2.29	69%	21,119 (0.67)
Transport Services	7,969	1.29	1.19	0%	10,245 (0.26)
Financial Intermediation	0	0	0	0	0 (0.00)
Machinery Rental	547	2.32	1.32	32%	1,268 (1.00)
Administration/Managerial	582	1.00	1.00	65%	582 (0.15)
Teaching	582	1.79	1.35	100%	1,044 (0.33)
Other Services	47,006	1.25	1.14	63%	58,923 (0.57)
TOTAL	275,940	1.68	1.44	67%	464,536 (0.55)

Source: Encuesta de Condiciones de Vida

Table 9: Sources of Income by Expenditure Quintile in Rural Ecuador

Share of Income from the Respective Sources

	Farm	Agricultural Labor	Non-Farm Enterprise	Non-Farm Labor	Non-Farm Total	Other
Poorest Quintile	69%	6%	16%	6%	22%	3%
2nd	46%	13%	26%	11%	37%	4%
3rd	46%	14%	28%	9%	37%	3%
4th	41%	8%	37%	9%	46%	5%
5th	27%	6%	52%	12%	64%	3%
TOTAL	46%	9%	32%	9%	41%	4%

Table 10: Sources of Income by Landholding Class in Rural Ecuador

Share of Income from the Respective Sources

	Percent of Households	Farm	Agricultural Labour	Non-Farm Enterprise	Non-Farm Labor	Total[a]	Other
0-1 ha.	55%	15%	6%	59%	17%	76%(40%)	4%
1-2 ha.	11%	31%	9%	48%	8%	56%(22%)	4%
2-10 ha.	20%	56%	9%	26%	6%	32%(14%)	3%
10-100 ha.	13%	70%	12%	10%	3%	13%(10%)	5%
100+ ha.	1%	23%	6%	61%	9%	70% (9%)	1%
TOTAL	100%	32%	8%	45%	12%	56%	4%

[a] In brackets are the percentage of income from non-farm sources by landholding class in in 1974 (Hazell and Haggblade, 1993).

Note

1. The row totals in the two tables do not match because the domain for quintiles corresponds to the total population while the domain for landholding categories corresponds to the total number of households.

Table 11

Probability of Non-Agricultural Employment as a Primary Occupation

Probit Model

	All Employment in Non-Agricultural Sector		Employment in Low Productivity Job		Employment in High Productivity Job	
	Estimate	Prob.	Estimate	Prob.	Estimate	Prob.
Intercept	-1.674	0.0001	-1.551	0.0001	-3.073	0.0001
Household Size	-0.006	0.5428	-0.020	0.0660	0.021	0.1111
Female	0.642	0.0001	0.852	0.0001	-0.248	0.0012
Age	0.073	0.0001	0.035	0.0001	0.101	0.0001
Age Squared	-6E-4	0.0001	-2E-4	0.0013	-0.001	0.0001
Quichua Speaker	0.102	0.3076	-0.007	0.9473	0.156	0.3296
Shuar Speaker	0.419	0.2392	0.061	0.8950	0.694	0.0894
Pre-primary Education	0.186	0.2929	0.248	0.1834	0.025	0.9253
Primary School Education	0.253	0.0017	0.053	0.5311	0.435	0.0004
Secondary School Education	0.604	0.0001	0.307	0.0066	0.669	0.0001
University Education	0.777	0.0045	-0.428	0.2268	1.299	0.0001
Other Tertiary Education	7.344	0.9986	7.493	0.9986	-5.070	0.9994
Post-graduate Education	5.592	0.9993	-5.720	0.9993	6.722	0.9995
Vocational Training	0.127	0.4244	0.118	0.4896	0.003	0.9894
Land Owned Per Capita	-0.018	0.0056	-0.025	0.0030	-0.003	0.7868
Land Owned Squared	2.3E-6	0.0394	3.3E-6	0.0171	-2E-5	0.8860
Cultivating Household (dummy)	-1.026	0.0001	-0.620	0.0001	-0.939	0.0001
Rural Periphery	-0.784	0.0001	-0.416	0.0006	-0.812	0.0001
Rural Dispersed	-0.863	0.0001	-0.646	0.0001	-0.536	0.0001
Costa	0.247	0.0001	0.293	0.0001	-0.002	0.9806
Oriente	-0.357	0.0002	-0.323	0.0035	-0.156	0.2160
Migrant During Past Decade	0.033	0.6695	-0.016	0.8497	0.036	0.7151
Log Likelihood (Model)	-1479		-1248		-815	
Log Likelihood (Constant)	-2147		-1618		-1109	
Total Observations	4523		4523		4523	
Observations at 0	3699		4001		4221	
Observations > 0	824		522		302	
LR Test (Model)	1336		740		588	
Degrees of Freedom	21		21		21	
Critical χ^2	32.67		32.67		32.67	

Note:

1. Non-agricultural employment here denotes only those indivduals with *wage employment* in the non-agricultural sector as a *primary* occupation.
2. Low Productivity and High Productivity jobs have been designated as such if the annual earnings derived from them fall below or above, respectively, the average annual per capita income from agricultural wage labor for persons engaged in agricultural wage labor as a primary occupation.

Table 12

Non-Agricultural Wage Labor Income

OLS Model

Dependent Variable: (Log) Annual Non-Agricultural Wage Income

With Adjustment for Sample Selection

	Estimate	Prob Value
Intercept	12.40	0.0001
Household Size	0.05	0.0028
Female	-1.22	0.0001
Age	0.106	0.0001
Age Squared	-0.001	0.0001
Quichua Speaker	-0.03	0.8853
Shuar Speaker	0.54	0.4498
Pre-primary Education	0.03	0.9248
Primary School Education	0.27	0.0638
Secondary School Education	0.39	0.0382
University Education	1.27	0.0638
Other Tertiary Education	-0.71	0.7443
Post-graduate Education	1.56	0.5011
Vocational Training	-0.23	0.3482
Land Owned Per Capita	0.05	0.1586
Land Squared	-5E-4	0.6561
Cultivating Household (dummy)	-0.47	0.0001
Costa	-0.25	0.0163
Oriente	-0.15	0.4359
Migrant During Past Decade	0.10	0.4580
Mills Ratio	1.0E-8	0.8892
Adjusted R^2	0.267	
Number of Observations	825	

Note:
Non-Farm incomes are calculated as earnings from individuals' primary wage employment. Household enterprise incomes are therefore not included. Incomes are expressed in annual sucres (in 1995 US$ 1.00 was approximately equal to 3000).

Table 13

Probability of Rural Enterprise

Probit Model

	Estimate	Probability Value
Intercept	-0.50	0.0003
Household Size	0.05	0.0001
Quichua Speaker	0.16	0.1080
Shuar Speaker	-0.12	0.7295
Education of Best-Educated Household Member		
Pre-Primary Schooling	-0.05	0.6478
Primary School	0.19	0.0757
Secondary School	0.20	0.0009
University Education	0.21	0.1016
Other Tertiary Education	-0.13	0.5721
Post-graduate Education	6.53	0.9987
All Family Members Literate	0.17	0.0106
Land Owned by Household	-0.00007	0.7931
Cultivating Household (dummy)	-0.30	0.0001
Rural Periphery	-0.39	0.0014
Rural Dispersed	-0.62	0.0001
Costa	0.15	0.0136
Oriente	0.15	0.1163
Migrant During Past Decade	-0.11	0.1037
Connection to Electricity Network	0.26	0.0002
Telephone Connection	0.30	0.0744
Water Connection	0.05	0.4661
Log Likelihood (M)	-1487.08	
Log Likelihood (0)	-1673.51	
Total Observations	2492	
Observations at 0	1504	
Observations > 0	988	
LR Test (Model)	373	
Degrees of Freedom	20	
Critical χ^2	31.41	

Table 14

Simulating the Impact of an Expansion of Non-Farm Employment Opportunities on Average Incomes of the Poor

Employment of Poor Wage Earners (Percent with Primary Employment Per Sector[1])	**Base** Case	*Simulations* 1	2	3	4	5	6	7	8	9	10	11	12	13
Traditional	**57.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**	**47.1**
Extraction	**0.1**	**10.1**	base	base	base	base	base	base	base	base	base	base	base	base
Food Processing	**0.8**	base	**10.8**	base	base	base	base	base	base	base	base	base	base	base
Textiles	**4.8**	base	base	**14.8**	base	base	base	base	base	base	base	base	base	base
Garments	**1.8**	base	base	base	**11.8**	base	base	base	base	base	base	base	base	base
Leather	**0.6**	base	base	base	base	**10.6**	base	base	base	base	base	base	base	base
Wood/Straw	**2.2**	base	base	base	base	base	**12.2**	base	base	base	base	base	base	base
Industry/Manuf.	**2.5**	base	base	base	base	base	base	**12.5**	base	base	base	base	base	base
Construction	**1.6**	base	base	base	base	base	base	base	**11.6**	base	base	base	base	base
Commerce	**16.9**	base	base	base	base	base	base	base	base	**26.9**	base	base	base	base
Hotels/Restaurants	**1.1**	base	base	base	base	base	base	base	base	base	**11.1**	base	base	base
Transport	**1.4**	base	base	base	base	base	base	base	base	base	base	**11.4**	base	base
Domestic Servant	**0.3**	base	base	base	base	base	base	base	base	base	base	base	**10.3**	base
Other Services	**8.2**	base	base	base	base	base	base	base	base	base	base	base	base	**18.2**
Predicted Earnings of Wage Earner With Average Characteristics of the Poor	*80,346*	*76,560*	*84,778*	*84,630*	*82,509*	*85,674*	*83,597*	*83,840*	*85,156*	*85,867*	*90,646*	*87,436*	*84,599*	*91,641*
Percentage Change in Average Earnings (Relative to Base Case)		*-5%*	*+6%*	*+5%*	*+3%*	*+7%*	*+4%*	*+4%*	*+6%*	*+7%*	*+13%*	*+9%*	*+5%*	*+14%*

[1] Wage earners are poor if their per capita *consumption* level in the base case is below the poverty line.

Note

Predicted earnings are based on an earnings regression with the same specification as in Table 12, including, in addition, dummy variables for sector of employment. Explanatory variables are set to the average values for wage earners whose per capita *consumption* level is below the poverty line. Predicted earnings are calculated by multiplying the parameter estimates from the regression model by the corresponding mean values. Simulated average earnings are obtained by recalculating predicted incomes after reducing mean employment in traditional activities by 10 percentage points, and raising mean employment in the corresponding non-agricultural activities by 10 percentage points. For futher details, see text.

Table 15

Income Inequality by Factor Components

1. Urban and Rural Per Capita Incomes in Ecuador

	Urban Income	Farm Income	Agricultural Labor Income	Rural Non-Farm Income	Other Income	Total Income
'Pseudo Gini' Coefficient (G_k^*)	0.834	0.749	0.570	0.751	0.603	0.782
Share of Total Per Capita Income (α_k)	0.596	0.130	0.028	0.158	0.088	1.000
Gini Coefficient (G_k)	0.900	1.018	0.949	0.952	0.959	0.782
Coefficient of Rank Correlation ($R_k \equiv G_k^*/G_k$)	0.927	0.736	0.594	0.789	0.629	1.000
Contribution to Overall Gini coefficient[a]	63.5%	12.5%	2.1%	15.2%	6.8%	100%
Elasticity of Overall Gini to Small Increase in Component Income	0.066	-0.006	-0.007	-0.007	-0.022	

[a] This can be calculated as the product of the corresponding entries in (1) the first two rows, or (2) the second, third and fourth rows.

Notes:

1. Gini coefficient $G = \sum \alpha_k G_k^*$, where α_k is the share of component k in total income.
2. The Gini coefficient can also be decomposed as $G = \sum \alpha_k (G_k^*/G_k) G_k$.
3. When $G = 2/n^2\mu \sum_i [r_y - (n+1)/2] Y_i$, for n households indexed i, where r_y is the income ranking of total incomes, then the pseudo-Gini, G_k^*, is obtained in the same way except with Y_{ki}, the kth component of income replacing total income Y_i.
4. The true Gini coefficient for component k is equal to neither $\alpha_k G_k^*$, nor G_k^*.
5. The percentage contribution of inequality in component k to total inequality is $[\alpha_k G_k^*]/G$.
6. It can be readily shown that G_k^*/G_k is equal to $R_k = \mathrm{Cov}(Y_k, r_y)/\mathrm{Cov}(Y_k, r_k)$, where r_k is income ranking of the kth component.
7. As shown in the text, the elasticity of the Gini coefficient with respect to a change in income from component 1 is proportional to $(G - G_k^*)/G$:

$$\epsilon_1^G = -\left(\frac{\alpha_1}{1-\alpha_1}\right)\left(\frac{G - G_1^*}{G}\right).$$

Table 16

Income Inequality by Factor Components

1. Per Capita Incomes in Rural Ecuador

	Farm Income	Agricultural Labor Income	Rural Non-Farm Income	Other Income	Total Income
'Pseudo Gini' Coefficient (G_k^*)	0.791	0.665	0.817	0.611	0.785
Share of Total Per Capita Income (α_k)	0.372	0.089	0.497	0.042	1.000
Gini Coefficient (G_k)	0.926	0.889	0.895	1.055	0.785
Coefficient of Rank Correlation ($R_k \equiv G_k^*/G_k$)	0.854	0.748	0.913	0.579	1.000
Contribution to Overall Gini coefficient[a]	38%	8%	52%	3%	100%
Elasticity of Overall Gini to Small Increase in Component Income	0.005	-0.015	0.040	-0.01	

[a] This can be calculated as the product of the corresponding entries in (1) the first two rows, or (2) the second, third and fourth rows.

Notes:

1. Gini coefficient $G = \sum \alpha_k G_k^*$, where α_k is the share of component k in total income.
2. The Gini coefficient can also be decomposed as $G = \sum \alpha_k (G_k^*/G_k) G_k$.
3. When $G = 2/n^2\mu \sum_i [r_y - (n+1)/2] Y_i$, for n households indexed i, where r_y is the income ranking of total incomes, then the pseudo-Gini, G_k^*, is obtained in the same way except with Y_{ki}, the kth component of income replacing total income Y_i.
4. The true Gini coefficient for component k is equal to neither $\alpha_k G_k^*$, nor G_k^*.
5. The percentage contribution of inequality in component k to total inequality is $[\alpha_k G_k^*]/G$.
6. It can be readily shown that G_k^*/G_k is equal to $R_k = \mathrm{Cov}(Y_k, r_y)/\mathrm{Cov}(Y_k, r_k)$, where r_k is income ranking of the kth component.
7. As shown in the text, the elasticity of the Gini coefficient with respect to a change in income from component 1 is proportional to $(G - G_k^*)/G$:

$$\epsilon_1^G = -\left(\frac{\alpha_1}{1-\alpha_1}\right)\left(\frac{G - G_1^*}{G}\right).$$

ANNEX

Calculating an Income Aggregate for Ecuador

Constructing an income aggregate from the 1995 round of the *Encuesta Sobre las Condiciones de Vida* for Ecuador involved essentially three steps. First, various components of income were calculated at either the individual (wage labor), household (family farm) or firm (home-business) level. Second, the components were converted into annual figures at the household level and then combined to yield a figure for total household income per annum. Finally, the data were lightly "cleaned" of inconsistent and problematic entries.

The notion of income employed is intended to measure the returns to land, labour and other household assets. Of course, it has not been possible, largely for data reasons, to capture this perfectly. For example, one potentially important source of income, namely income from moneylending, was not adequately covered in the survey and therefore could not be included. Input costs were subtracted from output value, including payments for labour hired, but no imputed costs for family labour were deducted. In addition, land appreciation and capital depreciation were not subtracted.

A. The Components of Income

1. *Cultivation Income*

Cultivation incomes were calculated from the agricultural module in the ECV95 questionnaire. For all households, information was collected on the harvest of each crop either cultivated by that household during the previous 12 months or grown on the land which the household had leased out during the previous year. The gross value of output of each crop could be calculated by applying the price recieved by by the farmer of that output which was sold on the market. For those farmers who did not sell any fraction of their harvest on the market, or who did not report a price received for their marketed surplus, an average price was applied. This average price was calculated as the average over the whole country recieved by farmers for that particular crop.

The share of the harvest which farmers reported having to provide in payment to their landlord, was deducted from gross output. Conversly, that fraction of the harvest which they recieved on land leased out was retained.

Gross agricultural output is likely to be mis-reported for at least some households. In the ECV95 questionnaire, harvest output per crop grown was reported in different units of output; from conventional units such as kgs and quintals, to highly specific local units such as "almud", "tercio", "monton", etc. As many as 86 alternative units of output were possible. If a household which happened to report a rather unusual unit of output also reported a price received for that unit of output, conversion of the physical output into value terms was straightforward. However, in those cases were outputs were reported in obscure units, and the household also failed to report a price per unit, then the exercise of imputing a price could become difficult (if for example, there were no other households reporting that particular crop in that unit of output, or if no households which reported that unit of output reported a price). Occasionally an obscure unit of output could be converted into some other (for example, one "arroba" is known to weigh approximately 11.5kg) and then the average price of the more common unit could be applied. In the end, output value for some 485 entries (out of a total of over 9000) could not be calculated. Total gross agricultural output for those households which grew at least one crop which could not be valued was thus under-reported. In an attempt to correct for this, gross agricultural output for households with missing crop-specific output values was scaled up by (1 minus) the ratio of reported crops which were missing to total crops grown.

An additional source of error arises from the fact that some households did not specify which crop was grown but did report a physical output. Once again, if these households also reported a price recieved per unit of that crop, then one could value the output regardless. However, as above, if the household did not report a price either, then there was no possibility of valuing the output on the basis of an imputed price. Once again, the scaling exercise described above was the only way of "correcting" for this.

To obtain net cultivated income from gross agricultural output, cultivation costs were deducted. The ECV95 questionnaire collected information on total annual outlays on seed, fertilizers, pesticides and packaging. These items were simply deducted from the total gross agricultural output per household.

Another major item to be deducted from gross output value comprise labour costs. As mentioned above, the value of family labor employed on the farm could not be established and was therefore not deducted. Hired labor costs could be calculated and these were deducted. Labor costs comprised the household's outlays on casual wage labor, on piece-rate laborers, and on permanent laborers. While information was collected on the duration of employment during the past year of permanent laborers, the ECV95 questionnaire contained information on casual and piece-rate labor employment only during the previous three months. To estimate the annual outlays on casual and piece-rate labor an assumption had to be imposed as to the number of months per year during which such labor was hired in. It was assumed that the number of months during which casual labor could be employed corresponded to the average employment duration of permanent laborers - six months. In other words, annual expenditures on casual and piece-rate labor was assumed to be twice the amount reported on the basis of the previous three months.

Finally, annual household expenditures on rental of draught animals, rental of farm machinery, and on the hiring of technical assistance, were deducted from gross output.

2. Non-crop Income from Farms

Apart from cultivation, farming households can also derive income from the sale of goods such as milk, cheese, butter, whey, eggs, wool, honey, marmelade, alchohol, and so on. The ECV95 questionnaire did not enquire about any additional costs associated with the production of these goods, and so gross value of non-crop output was simply added to net cultivation income.

3. Labor income

Calculating income from labor is a rather complex exercise in the Ecuadorean context - particularly for formal sector employment. This is because of the myriad additional payments and adjustments to which individuals employed in the formal sector are entitled. MacIsaac and Rama (1995) provide a detailed description of the labor market in Ecuador, and the various components which must be included into a calculation of labor income. The present calculation of the labor component of total household income is based closely on the MacIsaac and Rama methodology. The approach taken here differs only in that the reference period is now September 1995, rather than September 1994 in MacIsaac and Rama (1995) so that several of the "teen" payments have been updated (based on table 5.1.2 of the Central Bank's publication: *Informacion Estadistica Mensual No. 1730, April 1996*) In addition, while MacIsaac and Rama (1995) were principally concerned with hourly earnings and could therefore focus attention on primary occupations only, the interest of calculating a comprehensive labor income component here, requires one to also include earnings from secondary sources of employment.

4. Income from Self-Employment and Home-Enterprises.

The ECV95 includes a separate module on home-enterprises and businesses. For consistency with the methodology adopted for cultivation incomes, the value of family labor employed in such enterprises is not treated as a cost. Profits from self-employment and home businesses are calculated as gross revenues minus such costs as: the cost of hired labor, purchase of raw materials and inputs (such as fuel), the purchase of inventory (in the case of shops, for example), marketing costs, and tax and insurance payments.

In several cases, the home enterprise is only partially owned by the household in question. In that case, household earnings from the home enterprise are calculated as total profits times the household's ownership share.

5. Income from Transfers

Transfer income comprises funds recieved from friends and relatives (abroad as well as local) and pension income.

6. Imputed Income from Home Ownership

Households which own their own home derive an implicit income stream which can be represented by the rent which they would have to pay if they were renting their house. For owner-occupier households this income stream was added to the total income aggregate. For the majority of such households this imputed income figure was based on their response to a question in the questionnaire regarding the estimated rental value of their home. For a subset of households who were unable to offer a reasonable estimate of this likely rental value, an imputed rent was estimated based on a model regressing rent as a function of housing characteristics. For further details see Hentschel and Lanjouw (1996).

7. Residual Income

The residual income component includes a variety of income sources:
i) remittances paid by the household to friends and relatives;
ii) income from renting out property;
iii) bursuries or scholarships;
iv) interest and dividends;
v) inheritances;
vi) lotteries;
vii) accident compensation;
viii) charitable donations.

B. Compiling Income

The different components of incomes were constructed at different levels of aggregation. For example, farm incomes were first calculated at the crop level; labor income was at the level of the individual, firm income was at the level of the firm (some households

had more than one firm); an so on. For each component a measure of annual household income was constructed, and these components were then added together at the household level to derive a measure of total household income.

C. Cleaning the Data

Cleaning the data proceeded in two steps. First, at the level of each income component, the data were scrutinized for obvious punching errors, and problematic entries were deleted. Second, at the level of total household income, outliers and entries of zero income were examined. A total of 642 households for which no income was available from any source were deleted (11% of the sample with non-zero consumption information) It is possible for households to have no income during a particular year (and that they survive by running down savings, for example) but it is also possible that such households are simply refusing to provide information on income.

One or two extreme incomes were deleted. The presence of these households had a large impact on the calculation of average incomes, yet it is quite possible that they derive from some error in the original data entry. In Ecuador, given the currency which is used ($US 1.00 is approximately 3000 Sucres), it is easy to imagine that a zero may have been erroneously added or ommitted. Such a mistake is difficult to detect but could filter through to have a very large impact on the calculation of total income (through the fact, for example, that a daily wage might be multiplied by 300 or more to obtain an annual figure). Given that at the upper income level there were 7 such extreme outliers (with *per capita* incomes *per month* equivalent to between $US 8,500 - 30,000) it was decided to drop these households.

Note, while the vast majority of households earned a positive income in 1995, there is nothing which requires that incomes should be positive. Farming households can experience harvest failure such that output figures are below the cultivation costs which are generally incurred well in advance of information on the quality of harvest. Similarly, the self-employed and home enterprises may incur costs which they are not able to recoup through sales. In total, out of the 5018 households for which income figures are available, 183 (3.6%) have negative incomes.

Some basic summary statistics on income are presented below.

Annex Table 1: Incomes in Ecuador in 1995
(US$ per capita per month)

	Mean	Median	Percentile			
			99th	75th	25th	1st
Farm	11	0	248	3	0	0
Labor	26	3	390	28	0	0
Own Firm	64	1	1172	38	0	0
Transfer	3	0	77	1	0	0
House	4	2		5	1	
Residual	5	0	161	0	0	-10
TOTAL	110	31	1798	110	7	-9

Incomes provide an alternative measure of welfare to consumption. The latter is generally preferred in the analysis of poverty as it is likely to be more accurate, and is intuitively more appealing as a measure of welfare *achievement* compared to an income measure of welfare *opportunity*. Income and consumption will differ because of household savings, so it is difficult to compare one against the other. However, ideally one would like a good measure of income to yield a similar ordinal ranking of households as the consumption matrix. The transition matrix below indicates that the rank correlation between these two measures is far from perfect. There is a fair degree of correspondence between the two, but one would have to be very wary of applying these two measures interchangeably.

If income and consumption based rankings were exactly the same, the diagonal of the transition matrix in Table 2 would have entries of 1 in each cell, and all other cells would have entries of zero. The entry in each cell can be interpreted as the probability that an individual, belonging to a given per capita consumption decile would belong to the corresponding decile of per capita income represented by the columns. With perfect correspondence across welfare measures, the probability of belonging to the bottom per capita income decile given that one belonged to the bottom per capita consumption decile would be 1. If there were no correlation between income and consumption at all, then a person's position in the income scale, given his position in the consumption scale would be random, and in this case, each entry in the transition matrix would take a value of 0.1, indication a 10% likelihood of falling in any of the ten possible deciles.

As we can see, entries in the diagonal cells in the transition matrix are far from taking a value of one. However, it is not the case that all entries take a value of 0.1 either. In fact, while the entries along the diagonal are not terribly high, it is the case that if one

focusses on the diagonal cells and the column cells which are just adjacent, then one does have a reasonably high correspondence between income and consumption. For example, we will have a 42% probability that a person identified as belonging to the bottom decile in per capita consumption terms, will belong to either the bottom or second decile in per capita income terms. This probability rises to 58% if we include also the third decile of per capita incomes. At the top end of the distribution the correspondence is even closer: 48% of persons identified as belonging to the top decile in per capita consumption terms will belong to the 9th or top decile in per capita income terms. Around the middle of the distribution this correspondence is slightly weaker: only 38% of persons in the 5th consumption decile will be in deciles 4-6 in per capita income terms.

Annex Table 2:Comparing Deciles of Per Capita Consumption Against Per Capita Income

Deciles Based on Per Capita Income											
OBS	*DECILE*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Consumption	1	0.170	0.247	0.164	0.148	0.099	0.063	0.040	0.029	0.022	0.016
	2	0.096	0.102	0.153	0.200	0.144	0.120	0.096	0.053	0.024	0.013
	3	0.140	0.088	0.154	0.123	0.119	0.122	0.106	0.083	0.037	0.028
	4	0.139	0.117	0.116	0.145	0.110	0.117	0.088	0.091	0.046	0.032
	5	0.079	0.111	0.084	0.101	0.115	0.168	0.098	0.101	0.092	0.050
	6	0.067	0.062	0.078	0.097	0.108	0.103	0.156	0.142	0.108	0.079
	7	0.077	0.077	0.094	0.063	0.105	0.092	0.112	0.156	0.117	0.108
	8	0.057	0.080	0.057	0.062	0.076	0.088	0.121	0.123	0.211	0.124
	9	0.097	0.033	0.061	0.034	0.065	0.066	0.101	0.126	0.193	0.225
	10	0.075	0.084	0.035	0.028	0.058	0.060	0.084	0.097	0.150	0.327

Note: MD = 0.198

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