Urbanization, Roads, and Rural Population Change in the Ecuadorian Andes

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Like many developing countries Ecuador has experienced extensive urbanization in the past twenty-five years as well as a shift in the pattern of rural population change between the 1960s and 1970s. Rural places with difficult access to cities (without roads and located far from cities) gained population during the 1960s but lost population during the 1970s. Rural places with easy access to cities (i.e., located near cities or on all-weather roads) continued to gain population during the 1970s. The explanation for the differential ability of rural places to retain their population during the 1970s focuses on increases in labor circulation by peasants and growth in the numbers of small, urban-oriented manufacturing and agricultural enterprises in accessible rural areas. The article concludes with a discussion of the implications of these findings for policies to reduce rates of rural-urban migration.

The extensive urban growth in third world countries over the past thirty-five years has fueled intellectual attempts to understand how the growth of cities might affect the hinterland. This article addresses a series of questions about the demographic dimensions of this process. Do all rural communities lose population during periods of rapid urbanization? If some rural communities gain population, what characteristics distinguish them from places which lose population? How do the characteristics of places which gain and lose population change as urbanization progresses? What do the latter changes tell us about the way mobility processes evolve as development proceeds? This

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article reviews the migration and development literature, formulates a hypothesis which would account for recent changes in rural population dynamics, and tests this hypothesis in a preliminary way with data on population change and net migration from rural communities in the Andean region of Ecuador between 1962 and 1982.

The questions outlined above assume, along with an extensive review of the literature on rural–urban migration (Connell 1976, 4), that the attributes of villages matter as much or more than the attributes of individual villagers in determining the incidence of rural–urban migration from a place. Two distinct patterns of rural economic change, derived from development theory, have clear implications for population change in rural places. In modernization theory, industrialization creates large, urban markets for foodstuffs which in turn causes farmers to expand the scale and capital intensity of their operations. In this manner urban centers provide stimuli which transform rural areas and integrate them into the national economy (Friedmann 1961; Lerner 1965). In what has come to be known as "the retardation hypothesis" some places change more slowly. The adoption of innovations is widespread in rural places close to cities, but it occurs more slowly in peripheral rural regions, and these places experience economic stagnation and population loss (Schultz 1953, 147–151).

Analyses of city–hinterland relations in dependency theory suggest widespread population losses in rural areas. In these analyses, industrialization in urban centers initiates a set of trends which impoverish the periphery and create a polarized society of rich cities and poor hinterlands (Frank 1967; Soja and Tobin 1975; Friedmann and Wulff 1976, 19–26). Local artisan activities decline as rural households substitute urban industrial products for locally produced goods. Under these pressures, populations of small producers become differentiated; some continue as proprietors of small businesses while others become wage laborers and move to the city. In agriculturally well-endowed regions, agriculture becomes more capital intensive and farm workers lose their jobs and move in large numbers to the cities (Armstrong and McGee 1985, 15). The demographic implications of these processes suggest population loss in rural areas and population gain in urban areas, particularly in primary cities.

These extensions of modernization and dependency theories make only gross distinctions between different types of rural areas; in this sense both theories appear to be underspecified. The underspecification follows directly from what Bryan Roberts (1977, 177) has called an "overemphasis on the central determination of local possibilities." With their focus on capital intensive, industrial investments in central places, both theories have overlooked the rapid growth of small, rural, and urban enterprises which has accompanied third world urbanization. As a result neither theory explores the impact which rapid growth in small enterprises might have a rural populations.

These small enterprises would include manufacturing establishments and artisan enterprises as well as truck farms producing for urban markets.[1] They

undertake labor intensive tasks with small numbers of workers, many of whom may come from the same family. Formal sector enterprises provide an important source of income for the small enterprises by "contracting out" a wide variety of tasks (Portes and Sassen-Koob 1987; Roberts 1976, 115-117). The putting out system in textile production exemplifies this organization of work. An urban location facilitates the work of most small enterprises, but, as the putting out example suggests, these enterprises can also locate in accessible rural areas. The low wages paid workers in this sector force individuals and households to diversify their sources of income. For example, individuals may work in the city on a construction job for several months, return to work in their village at harvest time, and move back to the city after the harvest. Alternatively, an individual may work in the city during the week and return to a village on weekends to cultivate a small plot of land. In effect these workers are semiproletarians (Deere and Wasserstrom 1980).

Households find it easier to diversify their sources of income if they reside in a rural place with a road. As Howe (1984, 62) has pointed out, the construction of a road into a rural community encourages diversification in village economies by opening up markets to villagers who want to sell labor, artisan products, or agricultural produce. Under these circumstances the members of a household will often earn their livelihood from a combination of petty trade, temporary labor migration, and small scale agricultural production. The economic potential of these enterprises depends not only on access to urban centers but also on contact with the surrounding rural population. To accommodate the frequent movement of goods and people required by this pattern of activity, a region must have a dense transportation network (Roberts 1976, 118). In other words a dense transportation network facilitates semi-proletarianization in a labor force.

A detailed study of location and livelihood in rural China provides empirical support for this line of reasoning. Compared with farmers living in remote locations, farmers living close to cities, in rural areas with dense transportation networks, had higher incomes. Most of their income came from working in non-farm, industrial enterprises (Veeck and Pannell 1989, 275). Two recent studies of individual rural-urban migrants in Ecuador have suggested the importance of off-farm, rural employment opportunities in individual decisions to emigrate from a place (Bilsborrow et al. 1987, 194; Brown et al. 1988, 164). In Asian locales roads make it possible for rural workers to commute up to 40 kilometers a day to work (Prothero and Chapman 1985, 20-21). A network of rural roads also provides increased access to amenities like medical care which are located in urban areas. In a study of rural-urban migration in Colombia, rural road construction reduced out-migration by improving access to urban amenities (Udall 1981). If this analysis of the impact of urban growth on rural places is correct, population growth should occur, contrary to the retardation hypothesis, in places far from urban centers provided that they have a road.

Population growth should also occur in rural places close to cities. Locations

close to urban centers would facilitate urban-oriented economic activities. Proximity to growing urban markets should encourage the expansion of dairy farming and horticultural operations in these places. For similar reasons artisan activities such as shoemaking and textile production should prosper in these locations. A location far from urban centers in a place without a road would make it difficult to establish a commuting routine and expensive to ship goods to urban markets. Correspondingly, one might expect rural communities whose locations facilitate the shipment of goods and the development of commuting routines to retain their populations at higher rates than communities whose locations impede these activities.

While the argument outlined above is sensitive to a series of structural factors which may condition the impact of urbanization on rural populations, the discussion is ahistorical. Based almost entirely on cross-sectional studies of rural-urban migration, it fails to acknowledge that the rural population changes associated with urbanization may evolve over time. One theory about the changing patterns of personal mobility during development acknowledges the importance of rural, small scale, non-farm enterprises in this process. Rural, small-scale manufacturing should become more important as development proceeds because the growth of markets within a country coupled with the continued availability of cheap labor in rural areas would encourage the creation of small manufacturing concerns in rural areas (Brown and Sanders 1981, 184-85). There may well be a threshold effect regarding the creation of these enterprises. It is hard to conceive of small, rural enterprises becoming widespread until a country has reasonably large urban markets and a well-developed transportation system in rural areas. Similarly, labor circulation by urban oriented rural workers would prove difficult without a well developed network of roads. For these reasons urban-oriented rural population change may not appear until a country has undergone an extended period of urbanization. This article puts these expectations about the spatial and temporal dimensions of rural population change to a test with data on migration and population change in rural parishes of the Ecuadorian Andes between 1962 and 1982.

The Setting

Two circumstances make Ecuador a useful case for assessing the implications of urban growth for rural population change. First, while most developing countries collect and publish demographic data on municipalities (*cantones*), Ecuador collects these data from the parishes which make up the municipalities. The small size of these units improves our ability to detect shifts in the spatial distribution of the rural population (Williams and Griffin 1978, 15). Second, Ecuador experienced a large increase in petroleum revenues in 1972 and 1973. The tremendous increase in revenues touched off a construction boom in Quito and made it possible for the government to finance a large number of new industrial projects (Martz 1987, 122-123). The approximate

coincidence of a national census in 1974 and the beginning of an economic boom has created a quasi-experimental situation in which we can use census data from the period immediately preceding the boom, 1962–74, and the boom period, 1974–82, to trace the effects of rapid urban growth on rural populations.

Like many other Latin American countries, Ecuador experienced extensive urbanization between the early 1950s and 1980s. In 1950 only 20 percent of the country's population resided in places with more than 20,000 persons; by 1982, 48.9 percent of the country's population could be found in these communities. The rate of urbanization accelerated after 1974 when rural areas experienced a disproportionate decline in rates of population growth. While urban growth rates dropped from 5.30 percent to 4.84 percent per annum between 1962–74 and 1974–82, rural growth rates declined from 2.45 percent to 0.75 percent annually (INEC 1983).

Several trends in the agricultural economy of Ecuador's Andean region suggest the importance of trends in small-scale enterprise and labor circulation in attempting to understand population change. Despite arguments that rural emigration would lead to the consolidation of landholdings (Preston and Taveras 1980, 101–102), the smallholder sector in the Ecuadorian highlands has shown no signs of disappearing. Between 1954 and 1974 the number of small, agricultural landholdings increased from 212,153 to 251,907 (Barsky 1984, 355). Large numbers of peasants maintained these homesteads by seeking off-farm employment, most frequently in cities (Commander and Peek 1986, 80; Preston 1980, 204). A comprehensive report on peasant livelihood in the early 1980s reported vigorous growth in agricultural enterprises which serve urban consumers (dairy farms, horticultural operations) and declines in the production of crops like wheat and potatoes which peasants grow for household consumption (CESA 1981, 97; Haney and Haney 1987, 51). Together these trends signal the growth of a smallholder agricultural sector which, as argued above, has clear ramifications for patterns of growth and decline in rural areas.

Methods

Data

The argument outlined above focuses on the attributes of rural communities which affect their ability to retain their populations, so it can be assessed with aggregate data on population changes and net migration in rural parishes.[2] Because the argument requires aggregate data, early census data, which contain aggregate but not individual level data, can be used to test the longitudinal dimensions of the argument. The data on rural parishes comes from annual compilations of vital statistics and the Ecuadorian censuses of 1962, 1974, and 1982. Because topography affects the difficulty of road construction and because the presence or absence of feeder roads figures centrally in our analysis, we decided to control for the effects of topography by limiting our sample to

rural parishes in the highlands (all parishes above 500 meters in elevation). To prevent the inclusion of urban places in the sample, we excluded all seats of municipal government from the analysis. In a typical municipality (*canton*) the sample excludes the urban center and includes all of the parishes in the surrounding rural area. Because an expanding city like Quito annexes outlying parishes as they convert to urban land uses, all of the parishes in the sample contain significant numbers of farms and can be considered rural. To prevent anomalous cases from obscuring the underlying pattern in the data, three communities which experienced extremely rapid growth caused by a gold rush in one case and large construction projects in the other two have been dropped from the analyses.

The creation of new parishes and the corresponding adjustment of adjacent parish boundaries between the censuses presents special problems. Under these circumstances, a 1974 areal unit may not be equivalent to a 1982 unit, and population changes between the two dates would be easy to misinterpret. To avoid this problem, the 1982 population of a parish created after 1974 has been added to the 1982 population of the areal unit to which it belonged before its creation. This procedure makes the 1974 and 1982 populations of these units comparable. We used the same procedure to make the 1962 and 1974 data comparable. In the small number of instances where a parish became a municipality between two censuses, it has been excluded from the study.

Census takers in developing countries have frequently failed to get an accurate count of rural populations in part because peasants do not trust the census takers. While this problem raises serious questions about the accuracy of early census data, the magnitude of these problems in the most recent censuses does not appear to be great. There are no reports of underenumeration in either the 1962 or the 1974 censuses. In 1982 the residents of four parishes in the central highlands refused to cooperate with the census takers. These communities have been dropped from the analysis (CEDIG 1985, 4).[3]

Underenumeration is a potential problem with the vital statistics data which we used to calculate rates of natural increase and net migration ratios. These data are collected monthly from parish clerks (*registro civiles*) by provincial governments. When the annual record for a parish is missing data for some months, it is reported in the Anuario Estadistica (Junta Nacional . . . , 1965–82). In these instances the parish data for that year has been excluded from the analysis. Because it is impossible to correct in any systematic way for measurement error in the census and vital statistics data, we will try to counteract any measurement error by adopting the conservative practice of only assigning interpretative significance to the strongest relationships in the data ($p < .01$).

Measures

Population Change. To correct for skewness created by calculating percentage changes on small base populations, a measure of population change which

employs the natural log of the ratio of the population at the beginning and end of the time period (Shyrock and Siegel 1976, 215) was used in both the 1962–74 and 1974–82 analyses. The formula for the rate of change (r) in population takes the following form,

$$r = \frac{\log (Pn/Po)}{n \log e}$$

where Pn = population at the end of the time period, Po = population at the beginning of the time period, n = the number of years between the censuses.

Net Migration Ratios. The argument about population change and the growth of small, urban oriented enterprises in rural places implies that some rural places will be able to retain their residents to a much greater degree than other rural places. For this reason we should expect to see differences in migration rates which follow the patterns outlined above. To check for this possibility, we regress a community's net migration ratio on a set of independent variables outlined below. We use the following equations to calculate net migration and net migration ratios for the time period t1 to t2 (Stone 1967, 325):

net migration = population change − natural increase;

net migration ratio = net migration/population at t1.

Because net migration ratios are standardized for community size, they control for an additional source of variation in the data, and for this reason they have been used in the regression analyses.

The following three variables are included in the equations as controls. Their presence in the equations eliminates a number of potential confounding factors from the analysis.

Population. Because the larger places in a rural region may attract migrants for a variety of reasons, there may be a relationship between population size and change among rural parishes. To control for this effect, we have included population size in all of the equations. To correct for skewness, this variable has been logged in the analyses reported below.

Natural Increase. Regional differences in fertility and mortality rates could explain some of the differences between communities in population growth. Because the annual reports of the Junta Nacional de Planificacion (1965–82) give the number of births and deaths each year among the habitual residents of each parish, we can calculate the rate of natural increase for each community during the two time periods. By including this variable in the analysis, we can control for its effects on population change.

Drought. From the late 1960s to the mid–1970s the southern highlands experienced a prolonged drought which induced widespread emigration from the

affected region To prevent the confounding of drought–induced emigration with the migratory patterns under analysis here, we have added a dummy variable for location in the two drought afflicted provinces to our equations.

The following two independent variables indirectly measure the demographic effects of increased labor circulation and an expanding small enterprise sector.

Road Access. The presence of an all–weather road in a parish would facilitate daily, weekly, and monthly commuting to cities by the parish's population. The road would also make it easier to market perishable agricultural products in cities. Both of these attributes should improve a parish's ability to retain its population. Conversely, parishes without all–weather roads would tend to lose population. If an all weather road passed through a parish, it was scored one; if a parish contained no roads or only seasonably passable roads, it was scored zero. We determined the presence or absence of roads in a parish by consulting two maps, the 1971 official map of Ecuador (Ministerio de Relaciones Exteriores 1971) for the 1962–74 analysis and a revised 1981 map (Ministerio de Relaciones Exteriores 1981) for the 1974–82 analysis. Approximately 28 percent of the parishes in both the 1962–74 and 1974–82 samples did not have access to an all–weather road.

Metropolitan Attraction. Location close to a major urban employment center should enable rural communities to retain their population. The proximity to an urban center should make it possible for workers to participate in an urban labor market and farm a small plot of land in the village. The larger the urban labor market, the larger the number of persons from the surrounding villages who will be able to sustain themselves in this fashion. This pattern of peasant livelihood characterizes villages surrounding medium–sized provincial capitals such as Cuenca and Riobamba (CESA 1984, 208–209; Haney and Haney 1987, 48) as well as villages surrounding large urban centers like Quito. If the size of a city's population is a suitable proxy measure for the size of its labor market, then the ratio of the provincial capital's 1982 population over the distance from the village to the provincial capital should provide a gauge of the accessibility of urban economic opportunities to the inhabitants of a parish (Duncan, Cuzzort, Duncan 1961, 53).[4]

The analyses reported below regress the five variables outlined above on population change and net migration ratios in Andean parishes during the 1962–74 and 1974–82 periods.

Results

The patterns of rural population growth changed considerably between the two census periods, 1962–74 and 1974–82. A substantial portion of the decline in population growth rates evident in Panel A of Table 1 can be attributed to increased rates of rural to urban migration after 1974. The excess of out–

TABLE 1
Patterns of Population Change in the Ecuadorian Andes, 1962–1982

Panel A: Population Change and Road Access

	1962-74	1974-82
All Parishes	+29.7%	+5.3%
Parishes on All-Weather Roads	+29.8%	+8.6%
Parishes with Seasonably Passable Roads	+18.0%	-3.2%
Parishes with No Roads	+30.2%	-3.4%

Panel B: Characteristics of Rural Communities Which Gained or Lost Population during the Two Time Periods

	1962-74		1974-82	
	Gain	Loss	Gain	Loss
Mean Population	3094	3377	3869	3267
Size of Provincial Capital	136179	73919	201000	112000
Distance (kms.) to Nat. Capital	242	261	211	313
Distance (kms.) to Prov. Capital	39	43	35	53

Panel C: Rural Communities: Road Access, Population Size, and Distance from Urban Centers in 1982

	Communities with Access	Limited/No Access
Population, 1982	4394	2559
Distance (kms.) from Nat. Capital	221	329
Distance (kms.) from Prov. Capital	35	59

Panel D: Net Migration Ratios

	1962-74	1974-82
All Parishes	+.017	-.212
Parishes:		
With Road Access	+.033	-.156
With Limited/No Road Access	-.021	-.342
Within 30 kms. of City	-.033	-.097
More than 30 kms. from City	+.063	-.308

migrants over in–migrants more than doubled from the 1962–74 period to the 1974–82 period; across all parishes it averaged twenty-four persons per year during the earlier period and fifty-three persons per year during the later period (see Panel D of Table One). The most extensive outmigration occurred in rural communities without a road or located more than thirty kilometers from the provincial capital. The excess of out–migrants over in–migrants in these communities during the 1974–82 period exceeded 30 percent of these communities' 1974 population.

Population loss in a parish signifies a rate of emigration high enough to offset natural population increase. While only 14.4 percent of the Andean parishes lost population between 1962 and 1974, 39.1 percent lost population between 1974 and 1982. The low level of association (.138) between declining communities in the earlier and later periods suggests that the dramatic increase in communities losing population represents more than a continuation of earlier trends. Changes between the two periods in the type of communities

TABLE 2
Correlations, Means, Standard Deviations

Panel A: Population Change, 1962-74

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Population Change							
(2) Net Migration Ratio	.859						
(3) Population, 1962	-.248	-.174					
(4) Natural Increase	.640	.626	-.237				
(5) Road Access	-.028	.025	.229	-.058			
(6) Metro Attraction	-.029	-.068	.142	-.228	.375		
(7) Drought Area	-.079	-.103	-.053	.125	-.149	-.338	
Mean*	.687	.016	2853	.036	.704	.914	.163
St. Dev.	1.032	.988	2016	.022	.457	1.409	.370

Panel B: Population Change, 1974-82

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Population Change							
(2) Net Migration Ratio	.919						
(3) Population, 1974	.110	.083					
(4) Natural Increase	.160	-.167	-.042				
(5) Road Access	.246	.231	.186	.006			
(6) Metro Attraction	.382	.406	.232	-.088	.281		
(7) Drought Area	-.321	-.304	-.051	.022	-.167	-.249	
Mean*	.134	-.212	3275	.026	.709	1.07	.188
St. Dev.	.705	.374	2082	.010	.455	1.48	.391

* The means and standard deviations reported here have already been transformed for use in the analysis.

gaining or losing population offer further testimony to the shift in demographic patterns. During the 1962–74 period, parishes in provinces with large capitals were more likely to gain population. During the 1974–82 period these places continued to grow, but small, rural places located a long distance from any urban center showed a new tendency to lose population. The data in Panels A and C of Table 1 offer a possible explanation for these losses in population. The data in Panel A suggest that the presence of an all–weather road helped rural communities retain their populations after 1974. Those communities without all–weather roads (see Panel C of Table One) tended to be small and located a long distance from urban areas, the same places which lost population after 1974.

The regression analyses reported in Tables Three and Four provide a means of assessing the relative importance of roads and proximity to large cities in explaining patterns of rural population change. The correlation matrices presented in Table Two show only modest levels of intercorrelation between the

TABLE 3
Regression Analyses: Population Change in the Andean Parishes of Ecuador, 1962–74, 1974–82

Variables	1962-74 Population Change (1) All Places	(2) Places < 30kms of City	(3) Places > 30kms from City	Variables	1974-82 Population Change (1) All Places	(2) Places < 30kms of City	(3) Places > 30kms from City
Natural Increase	.316**	.151**	.331**	Natural Increase	.133**	.156**	.119
	.020	.043	.025		.030	.034	.049
Pop., 1962	-.559*	-.459	.725	Pop., 1974	.042	.168	-.141
	.214	.225	.401		.141	.156	.246
Drought	-.358*	.675	-.410*	Drought	-.406**	-.273	-.389**
	.117	.657	.136		.079	.228	.098
Access, 1971	-.047	-.224	.082	Access, 1981	.181*	.039	.257*
	.099	.139	.135		.069	.096	.097
Metro Pull	.072	.210**	-.039	Metro Pull	.144**	.208**	.083
	.033	.044	.058		.021	.030	.037
r =	.671	.476	.755		.501	.527	.389
r2 =	.451	.229	.570		.251	.278	.150
n =	355	173	182		416	192	224

t: The top number is the b coefficient for each variable; immediately below that number is the standard error of the b coefficient.
* $p \leq .01$, ** $p \leq .001$.

TABLE 4
Regression Analyses: Net Migration Ratios for the Andean Parishes of Ecuador, 1962–74, 1974–82

Variables	1962-74 Net Migration Ratios (1) All Places	(2) Places < 30kms of City	(3) Places > 30kms from City	Variables	1974-82 Net Migration Ratios (1) All Places	(2) Places < 30kms of City	(3) Places > 30kms from City
Natural Increase	.301**t	-.023	.353**	Natural Increase	-.052**	-.034	-.066*
	(.020)	(.025)	(.027)		(.016)	(.019)	(.026)
Pop., 1962	-2.08	-2.07	-2.93	Pop., 1974	-1.89	.814	-1.45
	(2.10)	(1.30)	(4.34)		(7.73)	(.864)	(1.31)
Drought	-.474**	.338	-.491**	Drought	-.199**	-.144	-.194**
	(.115)	(.381)	(.147)		(.042)	(.126)	(.052)
Access, 1971	.103	-.121	.236	Access, 1981	.093*	.017	.136*
	(.097)	(.081)	(.146)		(.037)	(.054)	(.052)
Metro Pull	.005	.124*	-.058	Metro Pull	.079**	.123**	.044
	(.033)	(.035)	(.062)		(.011)	(.016)	(.020)
r =	.656	.380	.745		.490	.531	.389
r2 =	.430	.144	.556		.240	.282	.152
n =	355	173	182		416	192	224

t: The top number is the b coefficient for each variable; immediately below that number is the standard error of the b coefficient.
* $p \leq .01$, ** $p \leq .001$.

independent variables, so multicollinearity should not affect the coefficients reported in the equations in Tables Three and Four.[5]

The regressions on population changes during the 1960s shows little sign of the pattern which would suggest a vigorously expanding small enterprise sector (see Table Three). Small communities which did not suffer from drought experienced the most vigorous population growth during the 1960s.[6] Easy road access had little impact on growth rates while proximity to urban centers had some influence on growth rates. The analysis of the 1974–82 period shows a different pattern.[7] Access to roads now predicts rural population change, and proximity to urban centers shows an increased ability to predict rural growth rates; it explains three times as much variance in the 1974–82 equation as it does in the 1962–74 equation. This effect varies with the rural communities' location. Proximity to urban centers only has an impact among communities within thirty kilometers of the provincial capital. Within these areas rural communities grow or decline depending on their location inside or outside a threshold defined, perhaps, by daily commuting possibilities. Access to roads only exerts an influence on population growth among communities located more than thirty kilometers from the center city. Similarly drought has a negative impact on population growth only among those communities located more than thirty kilometers from a provincial capital. This last pattern suggests that in at least some of the villages close to urban centers peasants forced out of agriculture by the drought were able to find alternative employment in nearby cities which in turn enabled them to continue living in a village. A comparison of the results from the regressions on net migration ratios (Table Four) and the regressions on population growth (Table Three) indicates that the same dynamics explain variations in net migration and variations in population growth.

Discussion

The shift in patterns of rural population growth and decline between 1962–74 and 1974–82 suggests, as argued above, that the demographic impact of urbanization on rural places changes over time. The particular nature of the urban economic boom after 1973, an influx of petrodollars, leaves open the possibility that it was the dramatic increase in urban economic activity rather than the cumulative effects of urban growth over more than two decades which accounted for the dramatic shift in the pattern of rural population change. The two lines of influence may have had a combined effect. The two decade long expansion of urban centers and the associated economic development produced the relatively dense transportation network which made it possible for the residents of many rural places to begin commuting to work in the cities when the economic boom began.

The foregoing analysis leaves unanswered several important questions about small enterprises, peasant livelihoods, and rural population change. First, the preceding analysis may render more plausible the argument connecting the

expansion of the rural, small enterprise sector to patterns of rural population change, but a conclusive test of the argument requires individual level data on employment histories and migration from villages experiencing population gains and losses. Second, the generality of the pattern of population growth in areas well served by roads or close to cities coupled with population decline elsewhere remains open to question. Extensive rural areas in the Andean highlands of Latin America have recently experienced population decline (Williams and Griffin 1978; Preston 1987, 243), but it remains unclear whether the pattern of growth and decline resembles the pattern outlined here. Similarly, one can find examples of rural population redistribution towards roads in diverse places—in Ghana (Howe 1984, 72), Zaire (F.A.O. 1981, 568), and Indonesia (Jessup 1989)—in addition to Ecuador, but the magnitude and generality of the trend remains open to question. If the argument about the timing of the shift in patterns of population change is accurate, with the shift occurring only after a period of urbanization, we would expect to see this pattern in developing countries with sizable urban economies but not in the poorest African and Asian nations which have predominantly rural economies. Third, if patterns of rural population change do originate in newly adopted labor circulation strategies and the expansion of the rural, small enterprise sector, one might ask what implications this argument has for the persistence of the demographic pattern outlined above. In this regard Brown, Brea, and Goetz (1988, 152) have argued that uncertain economic prospects in urban areas favor the adoption of labor circulation strategies over permanent migration by rural residents. In the absence of secure employment prospects, individuals and households try to maintain an economic interest in rural as well as urban places so that they can take advantage of whatever economic opportunities arise in either place. If this argument is accurate, the pattern of rural population growth near cities and along major roads may persist in the slow growing, debt ridden economies of Africa and Latin America. Further research with both individual level and aggregate data will help us determine if this pattern represents "the shape of things to come" in the distribution of rural populations in developing countries.

Finally, the pattern of rural–urban migration outlined here has interesting implications for the periodic attempts by third world governments to reduce rates of rural–urban migration. The findings underscore the importance of dense transportation networks in the livelihoods of semi–proletarianized populations. They further suggest that a dense transportation network, rather than facilitating rural–urban migration, may actually retard it in several ways. First, an extensive road network would facilitate the formation of small enterprises. By providing employment opportunities in rural areas and increasing access to urban amenities, this type of program might reduce the impetus to migrate. Second, the existence of good transportation links may permit peasants to maintain an economic presence in villages at the same time that they work in a city. These possibilities may delay or prevent a permanent move to the city. Under these conditions, peasants may find it possible, in the words

of Chinese policymakers, "to leave the land but not the township and village" (quoted in Veeck and Pannell 1989, 291). In other words the construction of a dense transportation network in rural areas might constitute an effective response to the problems of rapid urbanization in Latin America as well as East Asia.

Notes

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1. There is a broad degree of overlap, but no coincidence between the informal sector and the enterprises under discussion. While a large number of these enterprises would be included in an informal sector, the small manufacturing concerns and the farms could fall outside of the conventional definitions of an informal sector.
2. The argument developed here about population retention in rural communities is consistent with economic accounts of individual level decision making about migration (Todaro 1969). The data on rural parishes cannot be used to test individual level models. If we did so, we would run the risk of committing an ecological fallacy.
3. The 1974–82 analysis has more cases than the 1962–74 analysis because it includes new parishes which the federal government recognized during the 1972–74 period.
4. This is a commonly used measure of a place's accessibility to a population center, commonly referred to as the "population potential" of a place. The term is a misnomer in the context of this study. Here we are concerned with the movement of villagers into the city, not, as the term "population potential" implies, the movement of urban residents out to the village.
5. In our original analysis we had a variable for location within a growth corridor which we have dropped from the present analysis. One could argue that location on or close to the Panamerican highway, a trunk line which runs the length of the Ecuadorian Andes, would give small enterprises major marketing advantages and would facilitate periodic commuting by local residents to and from major cities. For both of these reasons one might expect these communities to retain their populations to a greater degree than other communities in the Andes. This variable had very little explanatory ability and proved to be collinear ($r = .7$) with the metropolitan attraction variable. Given the variable's lack of significance, we decided to drop it from the analysis to avoid even the appearance of collinearity in our equations.
6. Even though the 413 parishes under study are a population rather than a sample, we have continued to use significance tests. Under these circumstances the tests are useful for distinguishing non–random from random patterns in the data.
7. The decline in the overall r2 in Table Three from .45 for the 1962–74 period to .24 for the 1974–82 period reflects, above all, the weakened association between natural increase and population growth in rural communities. Natural increase explains three times as much of the variation in population growth during the first period as it does during the second period. The decline in the ability of natural increase to predict population growth stems from the increased rates of outmigration during the 1974–82 period. Between 1974 and 1982, outmigration was so extensive in parishes far from urban centers that there was no association between the extent of natural increase and population change in a parish!

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