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The Role of Institutions in Rural Territories that have Undergone Land Reform

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Introduction

Alexandro Schejtman and Julio Berdegué have insightfully proposed that rural territorial development be viewed as the transformation of a rural area's institutional and productive processes with poverty reduction as an aim. Transforming productive processes in this context means making local activities competitive in increasingly open markets, while changing formal and informal rules ('institutions') that tend to reproduce conditions under which poor people are prevented from participating in and benefiting from such a transformation. (2007, pp. 67) This paper examines the complex relationships between productive transformation and institutional realities, focusing on two particular territories: Daule and Cayambe in Ecuador.

The territories in question, both of which were affected by land reform in the 1960s and 1970s, are also close to major urban centres, enjoy excellent natural capital and each specializes in a product to which the State has devoted special attention and support. The process of land reform included creating irrigation infrastructure, as well as roads and communications infrastructure and both territories experienced significant increases in production and productivity, and developed links with dynamic industrial sectors. Nevertheless, the institutions designed to respond to failures in the products and credit markets, and to the high transaction costs affecting small producers, have performed differently in the two territories. As a result, the extent to which producers capture the surpluses generated by their activity is quite disparate. One of the reasons is that the institutions (i.e., sets of formal and informal rules) involved are associated with different political systems and organizational cultures within the two territories.

Ultimately, these institutional arrangements facilitate in one case, and in the other case cancel out, the opportunities for poverty-reducing growth created by macroeconomic growth. The specific elements that make the difference have to do with the products, credit, technology and insurance markets. Institutional arrangements also affect small producers' incomes and the way in which income is distributed among producers with comparable productive assets.

A first working hypothesis is that stable institutions and organizations with management skills improve productivity, increase opportunity, and improve producers' incomes in these areas – or fail to do so – as a function of their impact on elements such as technology and productive infrastructure.

A second hypothesis is that when institutions promote communication and co-operation among producers, increasing their bargaining power and giving them more favourable relationships with the industrial processing chain, the result is greater equity, whereas institutions that promote individual rather than collective relationships with non-agricultural economic agents lead to situations where the latter capture most of the surplus.

This paper analyses changes in the agricultural structure of the above-mentioned geographical areas in the context of changing territorial, national and global realities in recent decades. The first section describes the economic dynamics of the two areas, their principal activities, and the structural changes that they have undergone; the second section examines the role of local and regional institutions and their impact on the main economic variables affecting producers, using both quantitative and qualitative criteria for the assessment.

Methodology

The study begins with a retrospective analysis of land structures in the two territories (Daule and Cayambe), drawing on bibliographic research as well as interviews with qualified informants. It begins by describing the land reform carried out in Ecuador in the 1960s and 1970s. A general description of the two cantons is provided, with an analysis of the dynamics of the agricultural sector in each, and a comparison of their productive structures over the last decades. Population census data, as well data from living conditions surveys, employment surveys and farm surveys, are all considered.

The paper then examines the role of regional and local institutions in the dynamic developments that have taken place in rice production in Daule, and in dairy production in Cayambe, along with the impact of institutions on the most significant economic and social indicators. In order to assess this impact and test the first hypothesis, a logarithmic regression analysis was conducted. It provided a view of the relationship between institutional support leading to improved technological indicators on one hand, and productivity gains on the other, ascertaining the correlations between the variables, and assessing elasticity.

Yield was taken as the dependent variable, while independent variables relevant to each of the two products being examined were selected from the following list: levels of credit, availability of technical assistance; presence of irrigation; use of certified seed; use of fertilisers; use of agricultural chemicals; and presence of agricultural machinery. Separate regressions were performed in order to determine the individual effects of the correlations, other variables being equal.

The second hypothesis was tested by doing a qualitative assessment of the role of institutions in the various possible links in each productive chain, as well as a quantitative comparison of the marketing process in the two cases.

For Cayambe, it was possible to use data from a survey of small producers as input for a regression analysis that provided a measure of how prices, schooling, productivity of capital, labour productivity, and participation in institutional arrangements affect growers' incomes.

For Daule, a regression analysis was performed on the basis of data from the 2000 farm census, in order to assess the correlation between sales prices and incomes. The goal was to determine whether the limited role of institutions in the marketing process affects growers' incomes there.

The Land Structure of the Two Cantons
Cayambe and Small Dairy Producers

The canton of Cayambe, like much of Ecuador's mountainous area, was originally structured around large *haciendas*. In a peculiar twist, however, the large landholdings in the canton's northwestern section were expropriated by the State and put in the hands of various religious communities in 1912, under a so-called 'Manos Muertas' law (an arrangement of long historical precedence in which land is managed in trust by church organizations). From that time to the early 1960s, the former *haciendas* were managed by a charitable State organization, the Junta de Asistencia Social (Social Assistance Board). Most of the land was farmed on the basis of long-term leases, and a major portion of the land was dedicated to grain.

As in almost all of Ecuador's northern mountains, the *haciendas* here divided their land for two types of use: one portion was simply rented out for farming, while the other was handed over to indigenous peasants in turn for working on the *hacienda*, in a sharecropping arrangement known as *huasipungo*. The *huasipungueros* were the *haciendas*' basic workforce, in most cases supervised by *mestizo* workers; starting in the late 1940s, left-wing political parties formed unions that carried out a constant fight to improve the working conditions of the huasipungueros, which eventually became claims for the land itself.

In the early 1960s, in the context of the Cuban Revolution and the Alliance for Progress, the pressure of these demands led to the military government's conducting land reform (1964). The land of the state-owned haciendas was redistributed, and an agency known as IERAC (the Instituto Ecuatoriano de Reforma Agraria y Colonización, or Ecuadoran Institute of Land Reform and Colonization) was created. Northeastern Cayambe was regarded as a priority area for action by the agency; the old *haciendas* were turned over to co-operatives made up of the former *huasipungueros* and former hired workers, though the two groups generally organized separately. The land was handed over to them under conditions that included a long-term debt for which the recipients of the land were liable to the State.

In practice, however, IERAC itself managed the co-operatives under a scheme not unlike that of the old *haciendas*: a portion of the land was farmed collectively, with each member responsible for working a particular (varying) number of days, while another portion was for subsistence farming by the co-op members and their families. In compensation for their years of *hacienda* work, each family also had the right to use communal grazing lands on non-arable hillsides. The profits from the collective farming were used to pay off the land debt.

Carlos Furche, who studied the Cayambe co-operatives in the late 1970s and early 1980s, found that many members had managed to increase their herds significantly under this arrangement, and had improved their living conditions, though this was not equally true in all co-ops. When the land was paid off and new legislation (the Ley de Desarrollo Agrario, or Land Development Law) brought the land reform process to a close, the peasant farmers subdivided the land among themselves equally. The co-operatives thus effectively ceased to exist as productive organizations in the 1990s.

The co-ops did not disappear without a legacy, however, since many were the basis for today's dairy producers' organizations (Furche, 1980) – for example, the current Santo Domingo organization was originally a part of the San Pedro co-operative, which was created in 1978 and initially included 48 members. The land was parcelled out among 28 members in 1990,[1] each family receiving 12 hectares, including 8 hectares of farmland and 4 hectares of wooded land. Machinery was similarly distributed, and members drew lots for the commonly-owned livestock.

Daule and Rice Production

Rice production in Ecuador developed as a result of the cacao crisis of the 1920s. Many of the old *haciendas* were turned over to workers in variants of sharecropping, and the land was devoted to grain production. Output increased during World War II as a result of export demand, rice production grew from 30,000 metric tons in the 1930s to 100,000 tons in the 1940s,[2] and the number of rice farms grew to 104,000 by 1968, occupying 284,000 hectares of land, 65% of which was in the province of Guayas.

According to Valverde,[3] two types of rice growing operations were established. One consisted of traditional *haciendas*, but under a new business model that involved changes in how production was organized, technological improvements, and different remuneration arrangements. The other model was simply a continuation of traditional *hacienda* practices, based as before on precarious conditions for

1. The rest left agriculture and moved to the principal cities in search of better opportunities.
2. Barsky (1984) *La Reforma Agraria del Ecuador*, pp.169–170.
3. Valverde, Abelardo (1979) *El sistema de aparcería en el subsector arrocero ecuatoriano antes de la aplicación de la Ley de Reforma Agraria,* pp. 11.

workers;[4] 73% of the Guayas rice growers were absorbed by this system, working as landless peasants cultivating parcels lent to them by landowners in exchange for a portion of the crops. The parcels averaged four hectares, and yields were high according to contemporaneous assessments.

The precarious arrangements involved conferred no right to build a dwelling on the land being worked, or to grow subsistence crops along with the rice. This fuelled left-wing activism during a much of the 1960s, and led to serious conflicts between landowners and their precarious tenants. The conflicts were further aggravated by the efforts of many landowners to displace the peasants entirely in order to grow commercial crops such as bananas and sugar. (J. Uggen, 1993) Adding to the problem was fact that the land reform law of 1964 had not considered the problems of farming on the coast, where drought led to non-payment of rents and stalled production. Rice importation further increased the conflict. Peasants began to organize in unions and organizations that were precursors of the co-ops. Centred in Daule, such groups invaded a number of rice-growing *haciendas*, and in other cases stopped paying rent for the land they were farming.

As the land reform process that began in 1964 failed to address the situation on the coast, the government responded to the peasant mobilization with a 'law abolishing precarious work' (1970), which prohibited rentals, sharecropping, agriculturally unsustainable approaches based on land clearing and other precarious farming arrangements. The result was the transfer of thousands of hectares to peasants. The law was supplemented by a decree (Decree 1001) specifically designed to eliminate these precarious arrangements in rice farming and was perhaps the most important land reform measure in Ecuador. It declared rice-growing *haciendas* based on precarious arrangements to be of public importance, and made them subject to expropriation and immediate occupation by IERAC. As a result, over 90,000 hectares, mostly in Guayas and Los Ríos, passed into the hands of peasants.

Ecuador: Land transferred under Decree 1001

Period	Hectares
1967–1970	258
1971–1979	86,493
1980–1983	3,860
Total	90,611

Source: IERAC

Under Decree 1001, IERAC expropriated, among others, three large *haciendas* in Daule – the *haciendas* of San Gabriel, América and Aroca.[5] The land was turned over to the co-operatives then being formed (for the law stipulated that growers must participate in the land transfer through growers' organizations). The transfer occurred in the late 1970s, and involved the creation of approximately 60 co-ops in the canton. Each former precarious worker received between 8 and 10 hectares.[6] Not all of the land went to the peasants, since *hacienda* owners managed in various ways to keep smaller pieces (an average of 40 hectares). Some professional farmers not of the peasantry also managed to acquire land at this time (20-hectare parcels, on average).

During the 1970s and 1980s, the state provided strong support for peasants through a number of institutions. Peasants received credits through the national development bank (the Banco Nacional de Fomento, or BNF), and support for marketing through an agency known as the Empresa Nacional de Abastecimiento y Comercialización (national supply and marketing firm). The Ministry of Agriculture provided technical assistance and training, and promoted the use of agricultural machinery through the Programa Nacional de Mecanización (national mechanisation programme). In addition, the ministry created a rice farming programme, with a pilot project in the canton of Daule. According to Hernández and Urriola (1993), 23% of Daule's producers had access to credit by 1986, and of these, 54.5% received it from the BNF, while rice mills and intermediaries provided 40%.

The most important support, though, began in 1981, as CEDEGE (the Comisión de Estudios para el Desarrollo de la Cuenca del Río Guayas, or Commission for Research on the Development of the Guayas River Basin), the agency responsible for irrigation and drainage programmes in the Guayas River basin, which began to encourage and construct irrigation systems. CEDEGE worked with technical personnel from the Ministry of Agriculture to provide training in organizing co-operatives, in developing partnerships,

4. 'Precarious' is a general term used in the area to refer to sharecropping and other forms of farming in which peasants work for landowners without monetary remuneration. According to Barsky, 'the mode of land occupation was *aparecería*, which is a social relationship in which the landowner makes land available to a person who either works the land himself or manages the process, while capital is contributed by both parties in various different combinations. The crop is distributed in different proportions, which in practice are a function of the power relationships among the different classes.'
5. In two of these cases the owner had died and the *hacienda* was being managed by their heirs, who did not have individual title to the land, leading to IERAC's expropriating the land without compensation.
6. Among others, América, San Isidro, Señor de los Milagros, Francisco Acosta and Lomas de Papayo. According to Hernández and Urriola (1993), the average size of the parcels delivered in Daule was 9.5 hectares, though parcels in some areas were smaller.

and in leadership skills. The irrigation programme (Plan América Lomas) allowed growers to expand production considerably.

During the 1980s and 1990s, IERAC began to deliver land titles directly to co-ops. As in Cayambe, this turned out to signal the end not only of State management of the co-ops, but the end of the co-ops themselves, for shortly thereafter, the irrigation programme was transferred to users through their 'juntas de usuarios,' or users' guilds.

Cantonal Dynamics

Cayambe

General description

The canton of Cayambe lies in the eastern part of Pichincha province, Ecuador's major milk producer. Its capital is some 70 kilometres from Quito, connected via the Pan-American Highway, a primary road. The co-ops in the north-eastern part of the canton are 3 to 11 kilometres from the centre of the canton, to which they are connected by stone-paved roads. The canton's total area is approximately 1,800 square kilometres, and its average altitude is 2,800 meters above sea level. It currently has roughly 70,000 inhabitants, 49% more than in 1990, and double the amount it had in 1974.[7]

Cayambe: Economically Active Population

Type of Activity / Year	2001	1990
Total	29,101	15,049
Agriculture, Livestock, Hunting, Fishing & Forestry	14,727	6,779
Manufacturing	1,843	1,482
Construction	2,171	1,879
Commerce	3,198	879
Teaching	756	n.d.
Other	6,406	4,030

Source: INEC, Fourth Population and Housing Census, 2001–1990

Today, Cayambe is an important agricultural and agro-industrial centre, with significant activity in flower growing, dairy and associated agro-industry, horticulture, mills, and various services for producers, including banks and co-operatives, hardware stores, input providers, etc. Tourism is also a significant part of the economic mix, since the area is close to Quito. Together, these factors have made Cayambe a centre of economic, job and population growth.

In the last few decades, agricultural employment in Cayambe has grown 93%; agricultural workers represent 51% of the canton's total employment, as against 45% in 1992. A rise largely due to flower growing, and to more peasants working in the dairy production chain.

Other indicators also reflect major progress: currently, 90.5% of housing units have electricity and 62% are connected to public drinking water systems, though river water continues to predominate in rural areas. Only 22% of housing units have landline telephones, but cellular telephony has expanded considerably and today all parishes (geographical sub-units of the canton) and co-operatives have coverage. Education remains a serious problem: average schooling is only 5.7 years, barely one year more than a decade ago. Illiteracy, nonetheless, has diminished very significantly, to only 12% of the population today.

Cayambe: Additional Services

	1990	2001
Housing Units with Electricity	60%	90.5%
Housing Units with Water from Public Drinking Water Systems	59%	62%
Housing Units Dependent on River	33%	33%
Housing Unit with Telephones		22.3%
Average Years of Schooling	4.6	5.7
Iliteracy	30%	12%

Cayambe's land structure is typical of Ecuador's mountainous farming areas. Small producers with up to 20 hectares account for 97% of all farms and 35% of the land. In comparison with 1974, however, various important changes are evident in the wake of land reform:

7. http://www.edufuturo.com/educaion.php?c=2237

a) There has been a significant increase in the number of productive units (from 4,000 to 10,000), with the greatest increase in units of less than 20 hectares, the number of which has increased by more than 100%.[8]

b) Less land is concentrated in farms of over 200 hectares (51.1% as of 2001, versus an earlier figure of 78%).

c) The proportion of land in the hands of small producers doubled between 1974 and 2000. Producers with productive units of 5 to 20 hectares represented 10% of the total in 1974, and 20% in 2000. The percentage accounted for by units of more than 20 hectares has remained the same, while the percentage for units of under 5 hectares has declined.

d) There has been a slight reduction in indices of land concentration. The Gini coefficient fell from 0.92 in 1974 to 0.839 in 2000.

As regards the structure of farm output, 42% of the gross value of the canton's production comes from dairy and meat,[9] 35% from flower growing and 22% from annual crops, especially potatoes.[10] Bovine livestock is concentrated in a well-defined corridor between Cangahua and Olmedo. Flower-growing is concentrated in the centre of the canton, Otón in particular, and adjoins the flower-growing area in the canton of Quito. Cayambe accounts for 10% of the gross value of the canton's output.

Support services for production are limited, but significantly more available than they are nationwide, since 18% of producers have irrigation (a recent achievement due to pressure by farmers beginning in 2004). As the following table shows, there have also been major increases in technical assistance, mechanisation and, to a lesser extent, credit. In addition, there has been a shift of such services from the public to the private sector. 31% of credit is now provided by private banks and savings and loans co-operatives, and 20% by NGOs. Similarly, 36.5% of technical assistance comes from NGOs and 16% from other private sources.

Cayambe: Production Services (percentage of the canton's farms)

	1974	2000
Irrigation	18%	18%
Machinery	1–2%	8–10%
Technical Assistance	2%	36%
Credit	3%	9%

Approximately 19% of producers are organized, though medium-scale and large growers are more likely to be involved. The services provided by these professional organizations are minimal, their principal function is to represent the members collectively.

According to official records, poverty has declined 10% in the canton. While it affected around 80%[11] of the population in the 1990s, as measured by consumption, the figure had fallen to 64% in 2000, though poverty as measured in terms of unsatisfied basic needs as of the latter date was 70%.[12] [13]

Flower growing

Flower growing is clearly the most important economic activity in the canton today, connecting the area with dynamic foreign markets. The growth of flower exports is impressive, having grown from US$500,000 in 1985 to US$445 million as of 2006 (an increase of approximately 1,000%), and making Ecuador the third largest flower exporter in the world, after the Netherlands and Colombia. Its principal markets are in the United States and the European Union, where it enjoys the benefit of special tariff regimes (ATPDEA in the former case, SGP in the latter).

8. The quantity of small producers is greater.
9. 35% growth between 1974 and 2001
10. Major reductions in ouput and yield of crops such as barley, soft corn and wheat, which before the 1960s represented the major part of the canton's output, and hence its major income.
11. Odeplan.
12. Population and housing census, and living conditions.
13. This data is not entirely comparable given the different methods used.

Cayambe: Flower Figures

Year	Area in Hectares	Exports (metric tons)	Labour Force Female	Labour Force Male	Total Jobs
1996	252	11,088	1,841	1,227	3,068
2000	506	13,394	3,682	2,662	6,136
2003	555	12,971	3,994	2,662	6,656
2004	577	16,311	4,510	3,007	7,516
2005	581	21,492	5,942	3,962	9,904
2006	585	17,791	7,829	5,220	13,049

Source: Expoflores. Estimates.

Flower growing is a labour-intensive activity in which female workers perform approximately 60% of the work. In addition to the 13,000 individuals working directly in flower growing in Cayambe, another 4,300 work in related areas (transportation, construction, provision of inputs, etc.). In all, some 17,000 individuals are estimated to work in flower growing or related activities in the canton – i.e. 56% of the economically active population. Another important factor is that both men's and women's wages in flower growing are higher than they are in other activities, such as livestock operations, haciendas, or construction – according to a study published in 2002, between 29% and 144% higher. (Newman, Larreamendy and Maldonado, 2002, pp.17)

Dairy production

Based on 2005 figures, Ecuador's farm production contributes an average of 2.5% to the gross domestic product. Milk production has grown over the last five years, and is estimated at 1,505 million litres today. Production is concentrated in the inter-Andean region, where the largest dairy operations are located, 73% of the country's production occurs in the mountains, approximately 19% on the coast, and 8% in the east and the islands.

The structure of the dairy production chain in Ecuador derives from a traditional, closed model, in which foreign trade plays but a marginal role (dairy imports and exports together representing less than 1% of the national output). Since primary producers are widely scattered, but the processing sector is highly concentrated, there is a network of intermediaries providing interfaces between producers, industry, and consumers.

The situation becomes clear if one compares a quarter century of data on critical dairy production variables such as number of animals, number of cows milked, land area dedicated to grazing, total output, yield, and animals per hectare. From 1974 to 2000, total output rose 158%, but productivity increases (measured by yield in terms of litres/cow/day, or in terms of number of animals per hectare) do not account for most of this, as they amounted to only 13%. It was the increase in the factors of production that was primarily responsible, as grassland and herd size increased 71% and 80%, respectively.

Ecuador: Changes in Critical Variables of the Technological Package Milk production: 1974 and 2000

Variable	Unit	1974	2000	Change (%)
Herd size	Head of cattle	2,494,002	4,486,021	80%
Cows milked	Head of cattle	345,873	808,855	134%
Grasslands (including high plateau)	Hectares	2,969,254	5,087,133	71%
Daily output	Litres	1,366,095	3,525,026	158%
Yields	Litres/cow/day	3.9	4.4	13%
Animals in land area	Head/hectare	0.8	0.9	13%

Source: Second Farm Census, 1974, and Third Farm Census, 2000

The amount of the nation's milk production for which the canton of Cayambe is responsible is not high – only 2.5% – even within the province of Pichincha, Cayambe is only the fourth largest producer (14%), outstripped by the cantons of Mejía, Quito and Santo Domingo de los Colorados. Its output is 103,000 litres a day, and most of this goes to the pasteurizing plants in the canton, while smaller amounts are marketed in the provinces of Imbabura, Pichincha and Guayas. Cayambe has a number of milk processing plants, the largest are Nestlé's, with a capacity of 300,000 litres a day; other companies, such as González and some smaller firms, make cheese.

Cayambe has approximately 6,000 dairy farms, of which the 96% that are smaller than 20 hectares produce 40% of the output. Productivity varies with farm size: according to census data, the yield of small

farms averages 5 litres per cow per day, while medium-sized farms average 10 litres, and large farms 15. A number of factors are at play in this differential, the main ones being genetic lines and feed.

The canton, and especially the parishes of Ayora and Olmedo (the main milk producers), are notable for their openness to improving production practices, to making use of training opportunities, and to participating in programmes designed to increase production. In addition, producers here have more than average organizing capacity. These factors have led to farm development institutions' becoming active in the area. Farmers work their own land with their families, as is reflected in the fact that paid workers account for only 14% of the workforce, the remainder of the work being performed by unpaid family members.

Cayambe: Changes in Critical Technical Elements of Milk Production
Milk output: 1974 and 2000

Variable	Unit	1974	2000	Change (%)
Herd size	Head of cattle	19,830	44,767	126%
Cows milked	Head of cattle	5,171	12,855	149%
Grasslands (including high plateau)	Hectares	12,145	22,823	88%
Daily output	Litres	35,600	103,751	191%
Yields	Litres/cow/day	6.88	8.07	17%
Animals in land area	Head/hectare	1.63	1.96	20%

Source: Second Farm Census, 1974, and Third Farm Census, 2000

In Cayambe, farm yields are growing faster than the national average, and technical indicators are generally at better levels. On average, small producers in Cayambe have little access to credit or technical assistance (only 8% of productive units receive technical assistance); vaccination coverage is minimal (16%) in comparison with the rest of the country (70%); cows are fed on grass, as is generally the case nationwide.

The role of organizations in Cayambe

During the 1980s, the State took a large hand in the IERAC co-operatives. Decisions about what and how much to produce, and about how to produce it, were taken by a committee made up of the head of the co-operative, IERAC officials, and the Ministry of Agriculture and Livestock. The Ministry provided seed, flexible loans (through the BNF) for purchase of livestock, technical assistance, machinery, etc. During the initial years, production of wheat, barley and potatoes was encouraged, in addition to milk, with crops sold either to the mills or to intermediaries. The committee also decided how much of the surplus would be distributed to the partners, how much invested and how much allocated to paying off the land debt.

This all changed in the 1990s, as farm programmes and government priorities reflected the shift to what is generally known as the neo-liberal orientation. The state abandoned much of its direct action, including its work with the Cayambe farm co-ops. As mentioned above, co-op land was parcelled out, and members received titles to their individual portions.

With the end of state activity in this area, other types of organization became important. They included producers' organizations, NGOs, co-operation activities such as Belgium's PI-480 programme, private providers of support services for production, and agro-industrial plants. NGOs emerged strongly in the wake of the 1987 earthquake.

The mid-1980s saw the launch of the Casa Campesina de Cayambe (CCC), an NGO linked with the Salesian order. With support from Foderuma, a rural development programme that was created by the Central Bank of Ecuador in the late 1970s and lasted through the early 1990s, Casa Campesina conducted programmes that focused on improvements in productive infrastructure, genetic improvements, machinery, technical assistance, marketing support, credit, and, toward the end, support for the construction of milk storage facilities in the communities.[14]

According to information available on the CCC, it provides credit to 2,200 families in the cantons of Cayambe and Pedro Moncayo. The loans range from US$800 to US$5,000, currently at 10% interest with 5% charged for late payments. Payment periods range from 18 to 24 months, and payments are quarterly. Guarantees include cross guarantees between members of the communities, land titles, bills of exchange with personal guarantors for loans up to US$ 2,000, and mortgages on property for loans larger than that.

CCC reports its delinquent portfolio as being 1.5% of the total, a quite acceptable percentage – indeed,

14. Casa Campesina is involved in educational areas such as distance learning, maternal health and medical services, social communication through radio and construction of infrastructre such as irrigation canals, cobblestone paving, etc.

below the average for the country's financial system. The development of this credit modality has succeeded in creating a credit culture in the rural community, making it possible to replace high-cost informal loans by credit provided under more reasonable conditions.

Another important NGO is IEDECA, which has been active in the area for some 15 years. It supports construction of irrigation infrastructure, training, technical assistance, and microcredit for microenterprise initiatives. These activities include improving grazing land by providing irrigation infrastructure (sprinklers), as well as offering business training and technical assistance. A microcredit fund is devoted to improving production, financing purchase of livestock, and supporting irrigation infrastructure (sprinkler systems). Loans are provided in the form of agricultural inputs to the growers, or in the form of specialized services.

Another important actor is the Asociación de Ganaderos de la Sierra y Oriente (AGSO), a professional organization that brings together milk producers in the northern mountains with their fellows in the neighbouring Amazon provinces. AGSO contributed to creating a powdered milk processor designed to stabilize the milk market by making limited purchases when prices fall. It also provides supplies for government programmes such as the school breakfast programme. Some years ago, it began supporting co-operation programs, creation of storage facilities, and cooling tanks for small producers. One of its star projects involves small producers in Cayambe.

The Belgian co-operation programme is also important, with its Agro-pastoril and PL-480 programmes. Both have supported livestock operations in the area, and facilitated training for rural enterprises such as NUTILAC, which was created by small milk producers from the old Santo Domingo co-operative who incorporated to form a business producing a variety of diary products.

What is of particular importance is that some of these organizations began to work jointly in northeastern Cayambe in 2003 as the result of conflicts within the milk production chain that led to (a) demonstrations against imported powdered milk led by AGSO and participated in by small Cayambe dairy farmers; and (b) attempts by Nestlé to reduce the price it was paying to its suppliers. The creation of the storage facilities was the result of joint action by small Cayambe producers, Casa Campesina and AGSO.

This joint effort succeeded in installing facilities in the communities of Santo Domingo 1, Paquistancia, Turucucho, Chaupi, Pesillo, Cariacu and La Chimba, among others. These organizations are legally chartered as partnerships, corporations, co-operatives, etc., according to the preferences of the communities involved. AGSO financed the acquisition of storage tanks and cooling tanks in a number of communities, as well as training for insemination, medicine chests, grass seed and feed,[15] which are channelled through the community-based organizations. Casa Campesina provided loans to improve herds and grazing lands, while projects such as PL-480 supported the creation of small cheese plants.

The milk produced by Cayambe's small producers currently goes principally to AGSO. Smaller amounts are sold to the dairy company Floralp, and to cheese and yoghurt processing plants. A certain amount is still sold unprocessed to the market through intermediaries. To take one example, the Santo Domingo organization consists of 60 producers (50 partners and 10 outside members) who produce about 9,000 litres a day, and the organization produces 4,000 cheeses a week. It has a paid manager, as well as an accountant responsible for handling payments on all loans that the community incurs for such projects as the cooling tanks and the dairy processing plant infrastructure.

The producers pay the organization a fee to cover administrative and personnel costs for the storage facility, as well as a fee for managing the small processing operation. A board of directors meets on a bi-monthly basis, and the members meet in plenary session annually for a report on the year's income and expenditures. There is ongoing communication among the different organizations' managements when shared needs are involved.[16] The Santo Domingo organization has an agreement with a savings and loan co-operative to manage funds from the sale of milk and other products. This facilitates access to credit for members of the organization, who are able to obtain loans in amounts that correspond to guidelines.

Livestock Operations: Matrix of Characteristics of Small Producers

Province	National	Pichincha	Cayambe	Organized small producers
Credit in *UPAS* with livestock	9%	7%	2%	49%
Vaccination	70%	69%	16%	97%
Mineral Salts	66%	14%	51%	93%
Technical Assistance	8%	8%	7%	8%
Cooling Systems	0.2%	0.2%	0.2%	50%
Artificial Insemination				51%
Yields(litres/cow/day)	4	7	8	10

Source: Third National Farm Census, and Producer Survey

15. Initially, it provided technical assistance.
16. Communication by mobile telephony to set meeting times and places.

When the institutions entered the field three and a half years ago, production was between 4,000 and 6,000 litres, whereas it is currently 30,000. Growth has thus exceeded 100% a year. Current yields are between 10 and 12 litres per cow per day, as against the previous average of 8 litres for small producers. Significant levels of trust and credibility have been created between the organizations and agro-industry, largely thanks to the collaboration with AGSO and NGOs such as CCC, which has led to productive development and higher incomes.

Daule

General description

Daule is a canton in the province of Guayas, the country's second largest. It covers an area of 2,700 square kilometres, and has a population of approximately 85,000 (63% of which is rural). This population is 42% larger than in 1990, but 31% less than in 1974, due to the fact that one of the canton's parishes (Santa Lucía) became a canton of its own in 1985. Daule is roughly 50 kilometres from Guayaquil, and connects with it by a paved road, as it does with Plan América, where the old rice co-operatives are located. It enjoys good telephone service, including cellular coverage in four of its five parishes.

The canton's soil is very fertile, and with over 30,000 hectares dedicated to rice growing it is known as the country's rice capital. It exports some tropical fruits, such as mango, and also produces corn, beef and pork. Agriculture is its main activity, employing over half of the economically active population. Non-agricultural employment, in addition to activities related to rice growing (milling and financing), includes crafts and fish farming (which uses irrigation infrastructure to support shrimp and tilapia farming).

Daule: Additional Services

Type of Activity	2001	1990
Total	**28,337**	**29,109**
Agriculture, Livestock, Hunting, Fishing, Forestry	14,834	16,131
Manufacturing	1,406	1,300
Construction	1,179	976
Commerce	3,668	3,194
Other	7,250	7,508

Source: Population and housing censuses

As in much of Ecuador, many of Daule's dwellings have electricity, and at least one third are served by public drinking water supplies. Educational levels are low, and there has been little progress in this respect. Average schooling is only slightly above 5 years, though as throughout Ecuador, illiteracy has declined – from 23% to 12% of the population.

Daule: Additional Services

	1990	2001
Housing units with electricity	71%	93%
Housing units supplied by public drinking water systems	35%	38%
Housing units dependent on river water	32%	34%
Average years of schooling	4.8	5.3
Illiteracy rate	23%	12%

Source: Population and housing censuses

In 2000, Daule had 6,500 farmers, with 39,000 hectares in production. The most striking change has been in land concentration. The Gini coefficient declined from 0.90 in 1974 to 0.65 in 2000, reflecting the impact of redistributive measures in previous years. Today, farmers with 20 hectares or less control 57% of the land. Those with 3 to 20 hectares of land represent 44% of the canton's farmers, and control 45% of the farmland. Land holdings of over 100 hectares account for a mere 20% of the farmland today.

As to the nature of its farming activity, Daule is clearly rice-orientated, with 76% of the land (30,000 hectares) devoted to the crop. Rice has replaced cotton, which was an important crop in the 1970s, and coffee and citrus growing have declined as well. The smallest commercial crops today are mango (432 hectares), hard corn (123 hectares) and banana and plantain (51 hectares). Livestock is a major activity, with roughly 21,000 head of cattle (half the number there were in the 1970s) on 7,400 acres, 11,000 hogs, and 89,000 head of poultry.

Production conditions in terms of services and use of inputs and machinery have progressed in the last decades. Perhaps the most important changes were in irrigation infrastructure and soil fertilisation, as a result of public programmes by institutions such as CEDEGE, as well as the emergence of irrigation districts. In terms of support services, a greater number of producers have access to credit today, but technical assistance has declined.

Comparison of Services Provided

Variables	1974	2000
Irrigation (hectares)	19%	51%
Fertiliser (hectares)	17%	75%
Tractors (farms)	1%	1%
Harvesters (farms)	0.2%	0.3%
Technical assistance (farms)	13%	8%
Credit (farms)	30%	53%

Source: 1974 and 2000 farm censuses

Credit is not provided solely by government agencies such as the Banco Nacional de Fomento (BNF), which only accounts for 6% of farm credits today, nor are formal private-sector organizations the major players. The most important lenders are the rice mills that provide finance to growers (and are accordingly known as fomentadores) and informal lending agents. These sources account for 60% of credit, while agricultural merchants, finance firms, and processors together represent 15%. In contrast to Cayambe, NGOs are not involved in lending here, nor do they fund technical assistance, which is financed by (26% of) producers themselves. Sellers of inputs providing credit for purchases are also an important factor (25%). Marketing today is handled by intermediaries and rice mills, and ENAC is being liquidated.

Daule's producers mostly live on their farming activity. Thus, 93% obtain their income from the agricultural sector. The smaller the producer, the more agricultural income outweighs non-agricultural. In contrast to Cayambe, poverty increased between 1990 and 2000. In 1990, 76% of the population was poor in consumption terms, while by 2000 this indicator had risen to 80%, and 88% of the population had unsatisfied basic needs.[17]

The larger context: rice production on the national scale

In 2005, data shows that there were 79,400 rice growers producing roughly 1.3 million metric tons of rice in the husk on 350,000 hectares of land. Different grain-growing methods are used in Ecuador, and they influence yield. Operations that use technical or semi-technical systems obtain yields between 5 and 7.5 metric tons per hectare; traditional methods prevail in the country as a whole, however, and yields average 3.7 tons per hectare.

Small producers account for the majority of productive units, area planted and quantity produced. According to Ecuador's Third Farm Census, approximately 80% of rice farms are under 20 hectares, but they account for 50% of rice-growing land and 49% of total national output. There are 14,000 rice farms of 20 to 100 hectares, representing 29% of the land devoted to rice growing, and producing 27% of the total national volume of output. Only 2% of the farms (1,700) have more than 100 hectares of land, although these do account for a considerable proportion of the total land devoted to the crop (22%) and produce 24% of the total output.[18]

Ecuador: Changes in Production and Structure Variables
Rice production in Daule: 1974 and 2000

Variable	Unit	1974	2000	Change (%)
Area harvested	Hectares	21,757	29,030	33%
Yields	Metric tons/hectare	2.7	4.7	74%
Output	Metric tons	59,171	137,794	133%
Small producers as a proportion of all farms	Percentage	94%	96%	2%
Small producers as a proportion of harvested area	Percentage	56%	73%	30%
Small producers' share of total output	Percentage	56%	73%	30%

Source: Second Farm Census, 1974 and Third Farm Census, 2000

Rice production in Daule

Rice production is concentrated on the coast, principally in the provinces of Guayas, Los Ríos and Manabí, which together represent 89% of rice growers and 97% of output. Traditional rice growing has

17. SIISE, ODEPLAN, ECV, Censuses.
18. Around 1991, producers with under 20 hectares were calculated to account for 38.3% of the land area harvested and to produce 41% of the rice. (Hernández and Urriola, 1993)

a well-defined seasonal pattern, with two growing cycles (the winter cycle in April and May, the summer cycle in October and November). However, in Daule, where irrigation is available, up to three crops a year are harvested. Daule is the canton with the second greatest amount of land planted in rice, exceeded only by Babahoyo, producing 138,000 metric tons of rice in the husk, or 11% of total output.

Daule produces three times as much rice as it did in the 1970s, partially as a result of increased area in the crop, but principally because of increased yield. The increase is evident in farms of all sizes, but most noticeably in farms of under 10 hectares. These improvements are a function of irrigation infrastructure and use of certified seed, although only 20% of growers are using certified seed at this point. The productive structure has also varied: in the 1970s, small producers represented 50% of total output, while in the first decade of the 2000s, they have represented 73%, driven by a significant increase in production among producers growing on 3 to 20 hectares of land.

In general, significant proportions of Daule's small rice growers have access to irrigation, fertilization and phytosanitary products; a smaller number have access to credit, which to a great extent comes from informal sources. There is relatively little use of certified seed or technical assistance, which can make plant health measures less effective, affecting yields. Both machinery and productive and marketing infrastructure is minimal. Fumigation equipment is the only machinery commonly used – thus, production is basically labour intensive and un-mechanized.

Approximately 31% of Daule's rice growers belong to growers' organizations, with a higher level of membership among small growers than among medium-sized or large ones, in contrast to Cayambe. The services provided by the organizations are minimal, as they focus on providing machinery and credit, representing the growers, and purchasing inputs.

Daule's small rice-growing farms employ approximately 20,000 individuals. Owners of farms, household members who work on them, and temporary and permanent workers account for 91% of this figure.

The role of organizations in Daule

During a good part of the 1980s, and until the mid-1990s, the principal link among the Daule rice co-operatives was CEDEGE, which was responsible for the major irrigation and drainage works. As a regional development organization, its major focus was on construction of the Daule-Peripa dam, which was completed in 1992 with support from the Inter-American Development Bank and counterpart funds from the Ecuadoran government. CEDEGE's activities also included building an irrigation and drainage project on approximately 17,000 hectares on the right bank of the Daule River (though the infrastructure occupied 17,000 hectares, the amount of land actually irrigated was 10,000 hectares). This area was divided into eight irrigation and drainage zones, seven of which are independently financed; each of the eight is a separate irrigation district whose operation and maintenance can be managed autonomously.

The CEDEGE programme included irrigation and agricultural development projects in América-Lomas, Mate, Higuerón and San Jacinto. Américas-Lomas was the largest of these, irrigating some 5,315 hectares. When construction was complete, CEDEGE itself managed the irrigation canals, which included collecting fees for use of the water. With INIAP (the government's farm research organization) CEDEGE also provided farmers training through field days, demonstration parcels and the introduction of improved seed.

In the mid-1990s, this type of support began to wane as a result of the sectoral adjustment policies emerging from the Washington Consensus. What supported these irrigation activities was a project called Programa de Asistencia Técnica al Subsector Riego (Programme for Technical Assistance to the Irrigation Subsector), which was financed by a World Bank loan. Its objective was to help users rehabilitate irrigation infrastructure themselves, and assume responsibility for farm development, as well as manage, operate and maintain the irrigation districts.

Between 1999 and 2000, CEDEGE turned over management and maintenance of the Jaime Roldós Aguilera Irrigation System to four legally chartered users' guilds (San Jacinto, Higuerón, El Mate, and América-Lomas) under a *comodato*, or unpaid use agreement. The transfer was made through agreements that gave the users' groups responsibility for the use, management, maintenance and preservation of the irrigation infrastructure. In addition to the agreement signed with each group, rehabilitation and technical/economic support activities were designed as a part of the transfer. This was an attempt to strengthen the capacities of the users' groups to equip them for managing and operating the districts, as well as encourage them to take an active role in the development of the rice growing industry in a variety of ways, including introducing new technologies.[19]

Today, the irrigation districts are operated by the users' guilds, which have become the main organizations of small farmers in areas like Daule. Each guild has a board of directors composed of a president, vice-president, secretary, treasurer and two member representatives, meeting once a month in ordinary circumstances, and as much as twice or three times a month when events require it. The directors' functions include general planning and annual investment planning, collecting water-use fees, maintaining the irrigation infrastructure, and making agreements with public and private organizations for farm development activities. In addition to this organizational structure, guilds such as Américas-Lomas have a manager, accountant, assistant and a general services person, as well as operational personnel

19. The budgetary support focused in the main on rehabilitating and supplementing irrigation infrastructure (around 88% of the funds), while only 3% of the budget went to farm development.

including four canal workers, five pump station operators, four machinery operators and three harvester and tractor operators (the latter being hired as outside employees and paid per sack harvested); there are 17 permanent staff members.

The board of directors is responsible to the users' guild, to which it makes a financial report and general assessment bi-annually, with the participation of a technical specialist belonging to the users' guild. As landowners farming the land, the users have a right to use the infrastructure and the water. The only condition is that they be registered users, pay their water fees and contribute to maintenance of the canals where the canals cross their parcels.

Among the services that the guilds offer users is rental of agricultural machinery for soil preparation and harvesting under more attractive terms than available elsewhere;[20] wholesale purchase of farm inputs, with sales at a discount to the users; and technical assistance provided by a field technician – who is not, however, able to cover all of the members' needs. This limited service partially replaces the services previously provided by government agencies, although in past decades two projects of the Ministry of Agriculture – first PROTECA and then PROMSA – provided some services directly to farmers. These programmes, however, lacked continuity. Today there is no institutional support for production, whether in the form of technical assistance, development of improved seed, improvements in production infrastructure, or credit support. In contrast to Cayambe, there are no NGOs or savings and loans co-operatives, and the users' guild provides only limited support services for producers.[21]

Guilds such as América-Lomas are composed principally of small growers. According to the users' list, members' landholdings average 3.5 hectares. Nevertheless, an incipient process of land concentration is discernable. The number of individuals belonging to the guild is growing, which suggests that the co-ops are losing importance, but also reflects the phenomenon of individual land acquisition. In part, this situation is a result of the way in which local inputs, products, and credit markets operate.

America-Lomas Users' Guild
Area under irrigation
Sector 1

	2000		2006	
Co-operatives/ Users	Total hectares	Average number of hectares	Total hectares	Average number of hectares
Co-operatives	264	9	264	8
Individuals	438	8	500	8

Source: Users' Guild, 2006

In effect, the lack of formal markets for products, inputs and credit has made the appearance of 'private' institutions essential. A lack of channels for access to credit through the BNF has led to a financing agent known as a *fomentador*.[22] This is usually a rice mill (or '*piladora*') that advances money to producers in exchange for a commitment to deliver rice. The loan may include money as well as inputs, usually at prices lower than the market. According to interviews in the area, such arrangements finance 80% to 90% of the area's producers. In some cases, failure to repay these loans has led to land ownership being transferred to mills.

20. The Users' Guild charges 25% less than other producers.
21. The only NGO present is CESA, which has a seed distribution programme and a rice mill.
22. Access to the Banco Nacional de Fomento is in practice very limited, both in terms of conditions for granting loans and in terms of the time that it takes to apply for a loan and obtain approval.

Rice: Matrix of Specific Data on Small Producers

	National	Guayas	Daule	Small producers in America-Lomas
Hectares under irrigation	49%	72%	92%	100%
Hectares receiving technical assistance	5%	5%	10%	12%
Hectares receiving credit	48%	60%	68%	70%
Hectares using phytosanitary products	86%	89%	100%	100%
Hectares under fertilization	93%	94%	100%	100%
Hectares planted with certified seed	13%	15%	23%	50%
Hectares planted with improved seed	13%	11%	13%	20%
Use of vehicles	8%	5%	8%	10%
Use of harvesters	0%	0%	1%	2%
Use of fumigation equipment	47%	47%	57%	70%
Use of wheel tractors	2%	3%	4%	8%
Use of rice-drying equipment	12%	8%	3%	
Percentage of farms with land titles	55%	53%	53%	70%
Yield (metric tons/hectare)	3.55	3.7	4.88	

Source: Farm censuses, interviews with producers

Despite the limitations of these institutional responses to failures of the credit, inputs and products markets, they have permitted a certain level of innovation in production, including the use of certified seed and phytosanitary products, soil fertilization and, to a lesser degree, mechanisation. América-Lomas has better indicators in all of these areas that do small producers in other parts of the province or country. Nevertheless, poverty indicators in the area are worsening.

Results

Description of the Territories Studied

This study examined two municipalities affected by historical land redistribution measures where small farmers specialize in the domestic market, and where relatively long-standing government support dried up as a consequence of adjustment policies based on the assumption that the support role would be taken over by the market. In fact, various institutional arrangements did move into the gap left by the departure of the government, but they filled it in a different way.

General Information on the Cantons

	Cayambe	Daule
Population	70,000	85,000
Area (square kilometres)	1,800	2,700
Population density (inhabitants/square kilometre)	38.89	31.48
Number of farms	10,501	6,488
Number of hectares	82,788	39,139
Average farm size (hectares)	7.9	6.0
Area irrigated (hectares)	12,860	20,031
Small farms (%)	97%	95%
Medium-sized farms (%)	2%	4%
Large farms (%)	1%	1%
Change in poverty (1990–2000s)	-16%	3%
Poverty in 2000 in consumption terms (%)	64%	79.4%
Change in incidence of poverty from 1990 to 2000	23.4%	42.6%
Productivity of land, 2000	1,007.26	651.55
Productivity of labour, 2000	7.84	89.18
Change in land Gini (1974–2000)	-0.081	-0.25
Land Gini (2000)	0.839	0.65
Agricultural income (2000)	68%	93%
Population change (1990–2001)	22,862	19,614

The two cantons are of roughly similar size, but Daule is somewhat larger and Cayambe more populous. Both are relatively close to large cities, to which they have access via paved roads. Most of the farms are small, but land ownership is currently more concentrated in Cayambe.[23]

Despite these similarities, there are marked differences in various indicators. While poverty in terms of consumption increased in Daule, it fell very significantly in Cayambe. In terms of population, both cantons grew, but at a much higher rate in Cayambe. Both cantons show high land productivity, though the figure in Cayambe is nearly twice what it is for Daule. On the other hand, productivity per employed worker is lower in Cayambe. The fact that the productivity of labour is higher in Daule reflects the more labour-intensive nature of rice growing in comparison with dairy farming.

The Role of Institutions and Organizations in the Production Dynamic

The study shows a significant change in the productive structure in both cantons. The percentage of small farms increased as a result of better land distribution deriving from land reform. Until the mid-1980s, small growers had support from the state through various technical assistance, infrastructure investment and credit support programmes. When these programmes were dismantled with the introduction of neo-liberal structural adjustment policies and responsibility for agricultural development was handed over to the small producers themselves, however, the two cantons evolved differently. In Cayambe, a diverse alliance of organizations, including NGOs, producers' guilds, savings and loans co-ops and co-operation programmes, gradually replaced the government agencies, and supported small farmers' organizations. In Daule, the irrigation users' organization, with limited means, and support from local government, focused on managing the irrigation system, leaving productive activity in the hands of the individual producers, who resorted to traditional marketing methods and traditional means of obtaining working capital and inputs, with the dominant figure being the fomentador.

What were the consequences of these various institutional arrangements on production, yield and productivity? The study used regression analysis to explore the effect of institutional arrangements on yield, assessing the impact that different technological variables had on yields, and making the following findings.

Both in Daule and Cayambe there is a direct positive correlation between the presence of inputs (irrigation, technical assistance, credit) and yield. The coefficient of correlation between the independent variables and yield is over 90%, which indicates that differences in access to credit, vaccination, and use of certified seed directly affect yields. Furthermore, the coefficient of determination is over 90%, indicating that the variables used are indeed those that ultimately determine productivity.

In the case of Daule, though the irrigation systems managed by CEDEGE were in existence before

23. Nevertheless, there are no large properties in the parishes where the small milk producers are located.

2000 and producers were using them, they are the major element in explaining the increases in yield, as the farm census data shows (2.5 metric tons per hectare in 1974, versus 5 in 2000). It is also true that after the users' guild took over management of the irrigation system, yields increased significantly (the most efficient growers producing 9 to 10 metric tons per hectare, the average growers producing 6). This is due to the introduction of new seed varieties and improved planting practices (80% of the land is now planted with seedlings), in addition to the area's pre-existing practices of using fertilisers and phytosanitary products (82% of the cultivated land is irrigated, and 100% of the farms use fertiliser and phytosanitary products).[24] The jump in yields after 2001, however, can be explained as the effect of more efficient irrigation and the introduction of precocious varieties (3 months to maturity, rather than 4 or 5). Today, farmers produce two and a half rice harvests a year, and some more efficient farms even harvest three crops.

The determining factors in the major yield increases in Daule have to do with more efficient irrigation and the use of fertilisers and phytosanitary products. Certified seed plays a less important role, since it is less prevalent so far than the other factors. Technical assistance and credit are real but lesser factors in the increased yields. The differences in the importance of certified seed may be due to the channel through which growers obtain the seed – in some cases from local merchants, in others through the agricultural services NGO Central Ecuatoriana de Servicios Agrícolas.[25] Certified seed is used more than before (50% of the land is now planted with certified seed, versus 23% in 2000), but the practice is not universal.

In Cayambe, annual yields at the beginning of the twenty-first century were 5 litres per cow. Following technical assistance, credit, and inputs from the above-mentioned organizations, small producers in co-operatives enjoy yields of 10 to 12 litres per cow. The determining variables in this change are the provision of grass seed, use of mineral salts and vaccination. Thus, technological improvements in the treatment of the small producers' native cows in the area have raised yields. The use of machinery and the creation of productive infrastructure, on the other hand, are not important factors in yield. Storage facilities, meanwhile, have directly affected producers' incomes.

The inputs that have played an important role in improving yield are those than have been promoted by the organizations present in the respective two areas. The results support the hypothesis that the participation of the institutions in the territories' productive development has made the territories more dynamic and raised farm yields. The organizations involved are private, but work for public ends. In the case of Cayambe, they are users' guilds, NGOs, savings and loans co-ops, and co-operation programmes. In Daule, they are a mix of users' guilds and financing agents within the rice industry (*piladoras* or *fomentadores*).

Correlations and Elasticities: Institutions' Effect on Yield

Variables	Milk – Cayambe			Rice – Daule		
	Elasticity	Determination Co-efficient	Correlation Co-efficient	Elasticity	Determination Co-efficient	Correlation Co-efficient
Certified seed	na	na	na	0.44	81%	90%
Fertilizers	na	na	na	0.49	99%	99%
Phytosanitary Products	na	na	na	0.49	99%	99%
Grasslands	0.34	97%	98%	na	na	na
Mineral Salts	0.36	97%	98%	na	na	na
Vaccination	0.35	97%	99%	na	na	na
Technical Assistance	0.45	89%	94%	0.37	80%	89%
Credit	0.35	91%	95%	0.26	83%	91%
Irrigation	0.33	98%	99%	0.5	99%	99%
Machinery						
Fumigation equipment	na	na	na	0.28	65%	81%
Harvesters	na	na	na	0.38	42%	65%
Use of milking machines	0.42	28%	53%	na	na	na
Cooling tanks	0.33	37%	60%	na	nan	na

Source: Farm Censuses
The regression was run for 95% confidence (5% margin of error)

24. According to data on rice in Daule from the third farm census.
25. Producers purchase seed individually, not through the Users' Guild.

Changes in Modes of Articulation with Markets

In addition to the impact of institutional changes on yields and productivity, we must analyse how these changes affect modes of articulation with markets, for this in turn affects not only the prices of transactions, but the transaction costs borne by both producers and processors. In this respect, too, the evolution has been different in the two territories.

As the table below shows, small rice producers in Daule sold a high percentage of their crop to intermediaries in 2000, while larger producers sold to industrial processors. In Cayambe, small farmers' sales were largely to intermediaries and small cheese makers. This began to change with the support provided by Casa Campesina and AGSO in the north-eastern part of the canton. Today, approximately 70% of the small farmers' milk goes directly to the large pasteurizing firm located in Cayambe and to the AGSO plant south of Quito, while 30% goes to intermediaries and local cheese makers. The volume of milk produced by the nine producers' groups has increased to around 30,000 litres a day, far more than the 4,000 to 5,000 litres produced at the beginning of the decade. Finally, the price received by producers has risen from between 18 and 20 centavos a litre to 30–31.

The change was the result of action by organizations in the area, whose aim was to encourage both specificity and co-operation among small producers, and to ensure their future viability. The actions included financing milk storage facilities with cooling tanks in nine communities. Another factor that played a role is the fact that dairy markets are relatively closed markets, with fewer buyers. This means that both the dairy industry and producers reduced their transaction costs and were able to establish direct relationships, obviating the use of intermediaries.

Rice and Milk Marketing

Demand	Rice – Daule 2000			Milk – Cayambe 2000		
	Small producers	Medium-sized producers	Large producers	Small producers	Medium-sized producers	Large producers
Farm Consumers	2%	4%	0%	17%	4%	0%
Non-Farm Consumers	2%	1%	7%	65	2%	7%
Exporters	0%	0%	3%	1%	14%	2%
Intermediaries	59%	67%	82%	70%	50%	43%
Industrial Processors	37%	27%	8%	6%	31%	47%

In Daule, modes of marketing have not changed in major ways. Producers continue to deliver rice to *fomentadores* or *piladoras*, which advance them the resources needed to produce. As the following table shows, 62% of Daule's small producers depend on loans from agents outside the formal system, while 28% obtain financing from processors. The latter type of loan is granted in exchange for the producer's commitment to deliver all or a part of his production to the *piladora* or intermediary as repayment of capital plus 10% to 15% of monthly interest. In some cases, intermediaries even exact an additional 10% of the market price.[26] These agents replace the traditional government bank (BNF), whose role has not been filled by private banks since the BNF left the field. In Cayambe, on the other hand, these informal lenders play only a marginal role.

Like dairy production, rice production in Daule is characterized by specificity of assets. The areas planted are specifically prepared for rice growing and there is little possibility of changing crops. Rice markets are open, with many transactions in many different places, and without major uncertainties, a situation that generally encourages stable relationships between industrial firms and producers.

Sources of Credit: Small Producers

	Cayambe		Daule	
	1970s	2000s	1970s	2000s
BNF	32%	27%	64%	4%
Associations of Co-operatives	66%	13%	24%	5%
Other (processors, other banks)	8%	22%	12%	28%
Loan sharks (informal credit, *Fomentadores*)	0%	1%	0%	62%
NGOs	0%	13%	0%	0%

Source: Census

26. Personal communication from Ing. Manuel Andrade, President of the Corporación de Industriales Arroceros (the Corportation of Rice Processing Firms or CORCOM).

In the case of Cayambe's small milk producers, it was NGOs, producers' guilds, CAC and co-operation programmes that made it possible to create storage facilities in the communities, to sell to agro-industrial firms on a collective basis, to reduce transportation costs, and so on, all of which contributed to improving prices. A survey of small producers in Cayambe confirms that the participation of institutions in the marketing process and their facilitation of relationships between farmers and agro-industrial firms led to higher incomes by improving sales prices, output, and productivity of capital and labour. The Daule organization centres on managing the irrigation system, but does not involve itself in production or marketing activities.

The specificity of assets in both locales encourages vertical integration between producers and industrial firms. The greater number of transactions in the rice sector favours an open market, while the lower transaction frequency in the dairy market encourages vertical integration. Despite these differences, firms in both cases seek vertical integration with producers. In the dairy business, there are incentives for co-ordination and co-operation between producers, while in the rice market the incentives go in the opposite direction, encouraging individual relationships.

Factors Encouraging Integration Between Producers and Industry

	Milk Cayambe	Rice Daule
Specificity of assets	+++	+++
Specificity of place	+++	++
Opportunism of producers	++	+++
Transaction frequency	++	+

The Impact of Institutions and Organizations on Producers' Incomes

Finally, let us examine the effects of the differing institutional arrangements on the population's income, and consequently on the incidence of rural poverty.

In the case of Cayambe and milk production, we performed a multiple regression analysis to explore the factors influencing income.[27] The results indicate that changes in sales price, output and productivity of capital directly affect income. The participation of the Asociación de Ganaderos de Sierra y Oriente is also a strong explanatory factor. This organization worked with the Casa Campesina de Cayambe in a programme to directly connect small producers with the dairy industry. Indeed, the survey showed that producers who are members of the organizational alliance receive at least 2 centavos a litre more than those who are not, and enjoy lower production costs (0.12 as opposed to 0.l9 centavos per litre).

Variables that Contribute to Income: Cayambe – Milk

Variables	Correlation	Correlation Co-efficent
Sales price	Positive	54%
Years of schooling	Positive	18%
Level of production	Positive	99%
Productivity of capital	Positive	n.s.
Productivity of labour	Negative	n.s.
Yield	Positive	20%
Participation of AGSO in marketing	Positive	71%

Significant to 95% level (n.s. = not significant to 95% level)
Source: Census, survey

Stable relationships with agro-industrial firms are desirable for producers, since they guarantee sale at a stable price that is higher than the spot market (i.e. the price paid by intermediaries). They also lead to greater profitability, awareness of the importance of technology and productivity, and access to credit under better conditions than offered by traditional arrangements. In addition, they reduce transaction costs, The relationship with AGSO provides greater price stability for producers and eliminates income uncertainty, directly affecting living conditions. For AGSO, economically speaking, the relationship with small producers provides a flow of quality product, as well as giving the organization greater political bargaining power. All in all, AGSO's participation has had significant positive impact on producers' incomes.

The support of AGSO and other organizations in the area in the form of financing for storage infrastructure is key. It makes it possible for producers to handle their output jointly, and permits clients to purchase much larger volumes of milk, reducing storage costs, and allowing farmers' incomes to reflect their

27. Here, we used a survey of 140 small producers in eastern Cayambe that was conducted in 2006 by Anan Sandoval as research for her economics thesis. It was provided by Casa Campesina de Cayambe.

increased production (there being a 90% correlation between output and income). Today there are nine cooling tanks in the area and the number of producers using them has grown. Educational levels seem to have limited influence on productivity and income, though small dairy farmers do seem to have more schooling on average than the canton's population at large (6.6 years, as opposed to 5.7 years).

It should be noted that Cayambe's dairy farmers do not live solely on milk production. Though other farming activity seems to be marginal to them, since 92% of their land is devoted to grass, spouses and older children do other kinds of work in the neighbourhood as day labourers, employees of flower-growing firms or skilled workers such as masons, carpenters and locksmiths. These additional activities seem to significantly supplement farming income and reduce poverty.

Additional Occupations of Cayambe's Small Dairy Producers

Alternative occupation of farmer or spouse	Number of producers with additional activities	Percentage
Truck driving	4	2.86
Masonry etc.	34	24.29
Sewing	6	4.29
Services	2	4.13
Mill work	3	2.14
Flower grower	22	15.71
Day labour	40	28.57
None	29	20.71
Total	140	100

Source: Survey of dairy producers, 2006

The situation in Daule seems to be different. Examining the impact that changes in prices have on producers' incomes, the use of regression analysis to determine the effects of various factors on income (based on 2000 data and the farm census) produces varying results. Although there is a direct relationship between prices and income, with a correlation coefficient of over 90%,[28] not all price improvements translate directly into producers' incomes, since a 100% change in price translates into only a 50% rise in incomes, due to elasticity resulting from the fact that some of the price increase becomes a cost, because of the high interest charged by fomentadores and intermediaries, or because these agents take delivery of the rice at greater discounts.

In Daule, failures of the loan, products and inputs markets favour the existence of traditional institutions such as the fomentadores, which prevent higher productivity or prices from being translated into better incomes for producers. Local producers' organizations such as the users' guilds, or NGOs present in the area (CESA, etc.), have not succeeded in building alliances that change the behaviour of markets. The strength of traditional financing and marketing systems,[29] the ups and downs of public financing systems, and the absence of private banks or savings and loans co-operatives in the area may contribute to this.[30]

Unlike Cayambe's producers, the principal source of work for Daule's small rice producers is agriculture. This fact contributes to keeping them poor. Rice producers devote themselves to rice growing, and their income depends on this activity – the regional economy does not provide supplementary remunerative activities – the only way that the poorer small growers can find other work is to leave the area and migrate.

28. 5% level of significance.
29. An area manager explained that lending by different branches of the BNF followed distribution criteria that were more or less equitable in a simple sense, but not responsive to the differences in area's productive potential.
30. Other factors could be the organizations' weakness, their links with the political system and a large delinquent portfolio.

Rice – Daule: Origin of Income

	Agricultural Income	Non-Agricultural Income
Up to 1 hectare	89%	11%
1–2 hectares	92%	8%
2–3 hectares	97%	3%
3–5 hectares	98%	2%
5–10 hectares	95%	5%
10–20 hectares	92%	8%
20–50 hectares	92%	8%
50–100 hectares	85%	15%
100–200 hectares	67%	33%
Over 200 hectares	100%	0%

Source: 2000 farm census

Conclusions

Territories' institutional arrangements play an important role in explaining not only their economic development, but their ability to reduce poverty and inequality and to support their populations. Comparison of two cases in Ecuador – small producers specializing in two different foods basic to the population's diet (rice and dairy products) in areas near large urban centres, where road and communications infrastructure is good – shows that institutions are a fundamental factor in the course that poverty takes.

The study focused on two municipalities, one in the Inter-Andean Corridor, the second on Ecuador's coastal alluvial plain. In both, major redistributive measures during the 1960–1975 land reforms, as well as significant state support to start-up farmers, aided small producers during that period. These programmes were dismantled in the context of the policies that emerged from the Washington Consensus. However, protective tariffs for these products remained in place. Thus, producers are relatively sheltered from the fluctuations of the international market.

Public systems to support producers were replaced by institutional arrangements of various types. In Cayambe, joint action by private growers' groups, NGOs, industry, and savings and loan co-operatives, along with co-operation programmes, promoted various forms of co-operation between producers and encouraged stable relationships with industry. In Daule, on the contrary, the central focus was on the management of irrigation systems, attention to failures in the credit market and ways of handling product and inputs. This configuration ended up favouring traditional modes of integration between rice processors (who often finance production and are known as fomentadores in this role) and producers.

What changes in production do these systems lead to? In both cases, they have encouraged technological changes such as improved seed, fertilization, and veterinary and phytosanitary products – measures that have increased yields and productivity. In Daule, the role of the users' organizations in managing the irrigation system has clearly played a major role as well.

Analysing relationships between producers and the processing industry, we find that in both cases the industry has sought to integrate vertically with producers, but while in the case of dairy producers the system leads to formal structures and creates incentives for co-operation among producers, integration in the rice industry relies on traditional institutional relationships.

Finally, this study examined the impact of different institutional arrangements on small producers' incomes. It found that the system prevailing among small dairy producers directly affects income by increasing prices and productivity, while the gains in yield produced by the system prevalent among Daule's rice producers' are absorbed in large measure by institutional intermediation. To make matters worse, the rice producers have few work alternatives, and their exclusive dedication to rice growing means total dependence on income from that activity, whereas in Cayambe, the diversity of the area's economic activity gives producers options for other kinds of work and income.

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Interviews

- Officials and members of Daule user's guild
- Daule rice producers
- Officials of the Bolsa de Productos Agropecuarios de Guayaquil (Guayaquil Farm Products Exchange)
- President of CORPCOM
- Staff of CEDEGË
- Leaders of the Cayambe communities
- Employees of Casa Campesina de Cayambe
- Employees of the Asociación de Ganaderos de Sierra y Oriente