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AGRARIAN TRANSFORMATION IN NICARAGUA: MARKETS, PEASANT RATIONALITY AND CHOICE OF TECHNIQUES

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AGRARIAN TRANSFORMATION IN NICARAGUA: MARKETS, PEASANT RATIONALITY AND CHOICE OF TECHNIQUES

Max Spoor¹

I. INTRODUCTION

This paper analyses the effects of institutional and economic policy reforms in agrarian markets on the rationality of peasant producers in Nicaragua. The analysis is focused on the last five years of relative peace (1988–1993), during which stabilization programmes, market liberalization and the radical change in political regimes had a profound impact on agrarian markets. At a global level production and marketed output seem to have contracted.² However, if one studies the changing forms of market integration during this period at regional or micro level, there are indications that peasant farmers have responded to the radically changing market conditions, such as relative prices. This paper explores the different responses of grain producing peasant farmers and production cooperatives, relating them to peasant rationality and efficiency.

The question is raised whether peasant farmers and cooperatives in Nicaragua were inefficient and suddenly became efficient, rational, or even 'profit maximizing' producers after the market reforms.³ Were they all entrepreneurs that reacted swiftly on signals of the market and the changing set of relative prices, following a Schultzian thesis of 'poor but efficient'?⁴ Or can their behaviour be more explained by a 'survival algorithm' (Lipton, 1968; Ellis, 1988)? The paper will present arguments that in both pre- and post reform situations peasant farmers and cooperatives were in fact rational although at the surface they might first have looked inefficient. It was, however, not the peasant producer but the set of agrarian policies (and the particular conditions that the war produced) that were to blame. The insufficient working of markets was the cause of such behaviour. After the reforms markets have indeed become more efficient, although the restructuring of relative prices was a necessary but certainly not a sufficient condition for the development of agrarian markets. In order to analyze peasant rationality a case study of Nicaragua is used to show the effects of political and economic macro-events on agrarian markets, presenting a detailed empirical analysis of two farm surveys that were done in 1989 and 1993 in the northern municipalities Jalapa, Jicaro and Quilalí.

The first moment of measurement was at the end of the 1988/89 maize harvest (February 1989), when peace negotiations created conditions for researchers to penetrate these war-stricken zones. It was a crucial moment, as a full year had passed since the monetary reform of the Sandinista government. The second moment (although several selected follow-up visits were done in 1990 and 1991) was exactly four seasons (and years) later, in February 1993. By then, the UNO government (Unión Nacional Opositora) was nearly three years in power, and most of its programme of market liberalization, deregulation and privatization was well advanced. Unfortunately, these zones had again been affected by guerilla activities, this time from rural gangs formed by contras and/or government soldiers. They also absorbed a large part of the disarmed guerillas which were resettled (such as the valley of El Zungano near Quilalí), carrying the burden of the inherent social tensions of such a complicated process. In both surveys, which in terms of methodology and questionnaires were highly comparable, extensive information was collected (from private farmers and production cooperatives) about the crop mix, the use of chemical inputs, machinery services and labour, the consumer pattern and the marketing strategy. This paper limits its discussion to the data on input and output of maize production, in order to understand the impact on the choice of techniques and the development of peasant rationality.

From the outset, two propositions have to be understood. Firstly, in the highly state intervened agrarian markets in Nicaragua during most of the 1980s, cooperatives as well as private producers were involved in a number of individualized transactions with different actors. The outcomes of these transactions were often depending on the willingness of an official to deliver a service, the relation (whether or not a close relative, friend or political ally) to the client, and the time involved in queuing and passing the bureaucracy. Therefore, agrarian market transactions, while at the surface seemingly uniform and bureaucratized, were taking place in segmented, heterogenous and non-transparent markets.⁵ Overuse of chemical inputs and machinery services became a widespread phenomenon, but this was a rational reaction rather than indicating inefficient behaviour of peasant producers in this set of individualized market and non-market transactions. When analyzing the data on physical amounts of chemical inputs, one has also to understand that part was used to hoard, to speculate or trade, with substantial gains (in spite

of storage losses). Production systems appear to be inefficient when costs are measured at 'real' market price levels, as no sanction for such behaviour existed and for long most inputs were financed by subsidized credit through the impact of inflation on fixed nominal interest rates. However, decisions on input purchases and use of technology were made within an environment of deficient marketing and pricing policies, and the 'speculative paradise' conditions created by war.⁶

Secondly, in a highly inflationary situation credit loses its intermediary function and becomes purely an instrument of income transfer. The real interest rate, as the price of credit, therefore outweighs in importance the crop price for producers (Spoor, 1994). Medium and large private producers and production cooperatives (CAS or Cooperativas Agropecuarias Sandinistas) received during the 1980s greater credit subsidies for their mostly capital intensive production of grains than peasant producers. They were better off, while appearing more inefficient. Those with less access to credit were also less subsidized. Hence, private medium and large farmers used inflation in their favour. When hyper-inflation developed, they increased their dependency on bank credit, while the more risk averse peasant farmers had no access or did not manage these erratic market conditions in such a way. The CAS-production cooperatives were also subsidized because they were entangled in several state circuits, benefitting from infrastructural investments, but also squeezed because of obligatory sales at low official prices to the parastatal purchasing network.

Agricultural producers in Nicaragua were participating in inefficiently working markets during most part of the 1980s. No noticeable correlation appears to exist when one calculates the standard physical relationship between chemical inputs (fertilizers and pesticides) and maize yields, at the first moment of measurement of the comparative field survey in early 1989 (see final sections of this paper and Graph 3.1). The use of these inputs was determined by heterogeneous non-price determined market and non-market transactions of the producer. However, when in 1993 this same relationship is again investigated, a significant correlation can be observed, as indeed these market transactions have become more homogeneous and transparent. One might also expect the data to become more reliable, in the sense that the indicated physical amounts of inputs

were indeed used (and not exchanged or held in stock). Finally, strata of producers proved to have reacted in various ways on this restructuring of market transactions, as they confronted different sets of prices and sub-markets, taking into account that also their factor endowments differed substantially.

II. ECONOMIC AND INSTITUTIONAL ADJUSTMENT IN POST-WAR NICARAGUA

In order to analyze the impact of economic and institutional reforms on peasant rationality and choice of techniques one should note that during the 1979–1987 period in Nicaragua agrarian markets, particularly those for grains and traditional exports, were highly state intervened. In the domestic grain market this meant that parastatal input suppliers, crop agencies and the national development bank, in conjunction with economic policies of overvalued exchange rates, consumer subsidies and administrated producer prices contributed to the creation of a segmented and artificial set of market and non-market relations in which agricultural producers were operating. The partial liberalization of grain markets since early 1985, while the economy was in a virtual state of seige, led to increasing inflationary pressures. Market transactions became even more heterogeneous and forms of barter trade or the use of a dollar standard in informal price formation became commonplace. Although since 1985 indeed some economic reforms started to develop, they were only seriously implemented in the post-war period in Nicaragua that initiated in early 1988 (when most hostilities in fact ended, although large-scale disarmament only followed under the post-1990 UNO government). While differentiating these changes between the 1988–90 Sandinista period and the 1990–93 years under UNO rule, there is also a certain continuity of adjustment, in terms of market liberalization, privatization and state compression. The main tracks of the adjustment process, with its effects for the agrarian sector, are the following.

Changing Role of the State

The process of institutional change was dominated by the withdrawal of the state from many social and economic spheres. State compression was already introduced as an instrument to cut government expenditure during the last two years of the Sandinista regime. However, this had an induced impact on the agricultural sector through a strong reduction of extension services and agricultural research. Although it did indeed reduce a substantial amount of government

bureaucracy (such as internal trade inspectors) the process was accompanied by continuous reorganizations that hampered economic policy formulation and implementation. During and directly after the UNO government take over of power, the state apparatus even showed signs of general paralysis. For political (or personal) reasons Sandinista cadres were purged, while others preferred a transfer to the private sector, often taking with them the knowledge as well as the material infrastructure.⁷ Therefore, while this continued process of state compression was in line with the general principles of the UNO programme the state was increasingly less capable to provide even 'facilitative' support to the agrarian sector.⁸ Only during 1993, under pressure and with the financial aid of large donors, a greater streamlining of the state's future role towards the agricultural sector came on the drawing board, in which a new land register and a National Institute for Agricultural Technology are focal points.⁹

At a regional and local level these global changes were felt as an endless stream of institutional reforms, often implemented overnight. Nevertheless, deregulation and liberalization did restructure the markets of grain, inputs and machinery services. As an example the valley of Jalapa can be taken, where under the Sandinista government, apart from the regional office of the Ministry of Rural Development and Agrarian Reform (MIDINRA) the state was strongly present with the parastatal enterprise ELMA. This company not only had large areas of rice, beans and tobacco under production, but also monopolized the local market for machinery services. Furthermore, chemical inputs were mostly sold by the parastatal PROAGRO, while the rest of the market was in cooperative or private hands. By the end of the 1980s, the machinery of ELMA was to be 'privatized' and transferred to a so-called producer's controlled CDC (Centro de Desarrollo Campesino), but private interests in the parastatal and insufficient peasant pressure halted this process. When the UNO came to power, the position of the ELMA was rapidly weakened, land was sold or given back to former owners, or leased to investors from the Pacific regions. However, part of the enterprise' assets were left to its workers, who have regained some of the market in machinery services, using the enormous quantity of tractors and additional machines the ELMA had in stock.¹⁰ In both machinery services and chemical inputs the state has practically withdrawn from the market, causing that new forms of articulation arose around the use of

machinery, providing new 'market opportunities' for particularly those CAS-cooperatives that had a surplus in capital assets. The private sector in Jalapa filled much of the gap in the chemical input market, competing with the association of cooperatives (UCA or Unión de Cooperativas Agropecuarias) and the peasant store of the cooperative enterprise ECODEPA.

Domestic agricultural markets have greatly changed over the last five years, influenced by market liberalization and deregulation, and with the opening towards external markets. Already during the Sandinista adjustment programme the parastatal ENABAS lost much of its market position, when the domestic grain market was practically liberalized. However, import and export monopolies and control over food donations were left untouched. This changed further during the first years of the UNO regime, when after the 1991/92 agricultural season the state withdrew from domestic procurement and ENABAS was only used for the distribution and sales of food donations. The only remains of its initial price stabilization role was a new price band system in which a buffer was formed that has to protect the domestic market from sharp fluctuations in foreign market prices. In practice importers find ways to avoid customs controls and the system is not working very well.

New (and old) market agents have (re)appeared, but the agrarian markets (in particular for grains) are 'low volumes, high profit' markets¹¹. The influx of food aid, cheap imports, and particularly the uncertainty for the private sector have prevented investment in infrastructure, while capital flight is continuing. Therefore, in spite of market liberalization, rural markets remain underdeveloped and a hampering factor in agricultural modernization. Indeed, some new marketing agents have entered the grain market of the zones where the case study was undertaken, like those coming from Honduras or even El Salvador, but also from domestic urban centres such as Estelí and Managua. However, as transport subsidies (that were implicit in the pan-territorial pricing policy of ENABAS) have been eliminated, the region –in spite of its enormous productive capacity– has comparative disadvantages in terms of accessibility and distance to nearby market centres (Estelí and San Isidro, where a large grain terminal is in use). The main access roads are in very bad state during the rainy season and many feeder roads are not all season ones. Transport costs (and post-harvest losses) during the 1992/93 season were therefore substantial.

Resettlement and Land Disputes

The agrarian sector has felt the influence of the post-war reconstruction programme directed to the resettlement of former contra guerillas and the land disputes between beneficiaries of the Sandinista land reform and former owners. In particular in the north of Nicaragua (like in the areas of the survey such as Jalapa and Quilali) these processes have caused great tensions that until even led to armed occupations of several towns, such as Ocotal and Estelí. The economic pressure put on producers (in terms of low output prices, higher input prices and strongly reduced access to credit) also contributed to a month-long armed occupation of the local Bank office and the closing of the entrance route to Jalapa during 1992. In spite of a large-scale UN sponsored resettlement programme destined to integrate thousands of contras, the post-war period has meant a form of fragile peace, in which only a very limited stability currently can be maintained. There exist grave security problems, with a number of rural gangs terrorizing the peasantry. The lack of definite ideas and even more of managerial capacity of the government to implement a modernization programme for the agricultural sector has contributed to its depressed state, even in potentially important zones as Jalapa and Quilali.

Land disputes have also led to the returning of land from the state to former owners and increased pressure on cooperatives that lacked proper land titles, a problem that did not receive sufficient attention during the Sandinista Agrarian Reform. Cooperatives and private farmers were also forced to sell land in a process of decapitalization or to improve their cost structure. Consequently an incipient land market has developed, although still in a very segmented manner. Although most of the cooperatives of Jalapa have remained undivided, in other parts of the country many were parcelized.

Structure of Relative Prices

Relative prices of inputs, credit and crops changed rapidly during the post-1988 period. Agricultural credit, that during the years of high inflation had become a reliable income transfer for the peasantry, was already partially indexed to devaluations and consumer inflation after the Sandinista money reform. However, when the UNO second stabilization programme of March 1991 was launched, credit policy –within the course of one season– was stripped from its previous

image. By the 1992/93 agricultural season only a very limited amount of clients was still financed, a drop which was particularly felt by the large stratum of the peasantry producing maize and beans. Between the 1989/90 and 1992/93 agricultural seasons the National Development Bank (BANADES) reduced its finance for corn from 186,700 to only 19,800 manzanas and for beans from 79,100 to only 5,600 manzanas.¹² At regional level in Jalapa, Jicaro and Quilalí, some of this gap was filled by credit funds that were available for resettlement programmes such as the UN programme PRODERE (Programa de Desarrollo para Desplazados, Refugiados y Repatriados). This programme also provided credit to peasant associations in order to be able to buy the harvest and sell it to ENABAS or private traders.¹³ Furthermore, as a relatively new phenomenon, private input suppliers are providing some short-term credit to a selected group of customers, and even substitute for some of the vanished technical assistance (that was previously provided by the Ministry of Agriculture and the Bank).

Exchange rate policy drastically changed already with the money reform of the Sandinistas in February 1988, when the long time fixed official exchange rate was devaluated from 70 (Old) Cordobas to 10 (new), comparable with 10,000 (old) Cordobas.

Table 2.1: Relative Prices of Chemical Inputs for Maize (1987/88-1992/93)

Input	UM	Units	1987/88 ⁺ C\$/UM	1988/89 ⁺ C\$/UM	1989/90 ⁺⁺ C\$/UM	1992/93 [#] C\$/UM
NPK 12-30-10	QQ	2.0	1,128	13,280	400,700	51.2
Urea 46%	QQ	2.0	7,750	10,159	244,200	73.0
Decis	Lt	0.5	22,033	24,700	659,554	82.0
Filitox	Lt	1.0	8,750	9,575	291,689	46.4
Atrazine	Lb	2.0	286	2,454	83,620	13.0
Gramoxone	Lt	2.0	835	5,834	260,440	25.0
Prowl	Lt	1.0	4,400	11,165	380,470	66.0
Price Package	C\$		44,165	45,182	2,320,673	477.8
Price Maize (Dec.)	C\$		50,000	5,000	230,000	30.0
Ratio Inputs/ Output of Maize			0.9	15.4	10.1	11.9

Sources: ENIA, BANADES, ESECA, ENABAS; Own Calculations.

Notes

- ⁺ Official Prices of the parastatals ENIA and PROAGRO (Old Cordobas);
- ⁺⁺ Official Prices of the parastatals ENIA and PROAGRO (New Cordobas);
- [#] Market Prices (Gold Cordobas), taking the average of different agents.
The BANADES uses slightly different prices in its projections.

During two years of following hyper inflation devaluations the government would try unsuccessfully to 'catch up' with this whirlwind of price increases by introducing regular devaluations, a policy which was also continued during the first stabilization programme of the UNO government. Monetary stability was only reached after the introduction of the second stabilization round introduced in March 1991, that combined an economy wide money squeeze with sufficient foreign resources to close the existing macro-economic gaps. Finally, under the influence of monetary policies and the withdrawal of subsidies, the artificial relative price structure of chemical inputs and machinery services was completely overhauled, also meaning the reconstitution of the distorted (according to market prices) capital/labour price ratios.

In Table 2.1 the price changes for a standard package of chemical inputs used in maize production is shown. Nevertheless, the real recovery rate of agricultural credit during 1988 was only just more than 10 per cent (!), and in 1989 (with bank finance still covering 80-100 per cent of chemical inputs) this was still only 60 per cent. The effect of the extreme rise in nominal input prices was therefore strongly softened. Table 2.1 shows that much of the restructuring in relative input prices already took place during the Sandinista adjustment programme. This is also confirmed if one tediously calculates for each producer or cooperative in the survey the relation between chemical inputs used and the crop price received, expressing the physical units of the 1989 survey in values on the basis of December 1988 and December 1992 prices. Nevertheless, the real difference in cost structure between these moments in time was caused by the substantial implicit credit subsidies. Maize prices in real terms decreased somewhat in the 1992/93 agricultural season because of demand compression, the elimination of the premium of illegality that was levied in parallel markets and under the influence of food imports, with strong seasonal fluctuations between the harvest and non-harvest period. However, in the case of beans a substantial drop in producer price was noted in the post-1990 period, when supply increased and outlets were limited (such as exports that were hampered by still existing trade restrictions). In areas like Jalapa and Quilali, a recent strong reduction in beans production has followed, with a shift towards vegetable production, such as tomatoes.

Table 2.2: Capital/Labour Price-Ratios (1987-1992)

	December 1987	April 1988	July 1988	November 1988	December 1989	October 1992
$P(K^C)/P(L)$	0.34	2.91	5.33	6.37	5.39	3.57
$P(K^M)/P(L)$	0.96	1.48	3.21	4.67	2.77	1.86
$((P(K^C)+P(K^M))/P(L))$	1.30	4.39	8.74	11.04	8.16	5.43

Sources: BND, BANADES, ENIA;

Note : c=chemical inputs; m=machinery services;

In Table 2.2 the capital/labour price ratios are presented for the production of maize at an advanced technological level (i.e. with tractors and sufficient levels of fertilizers and pesticides). While capital was artificially cheap in 1987, there was a rapidly rising K/L price ratio for maize production after the February 1988 monetary reform, somewhat stabilizing during 1989. Nevertheless, if one would take into account the large share of implicit credit subsidy, these ratios were increasing only gradually over this period, remaining well below the 'real' level of October 1992. By then, after a period of substantial monetary stability and absence of inflation, the overall K/L price ratio was around five times the December 1987 one, with chemical inputs increasing tenfold and machinery services doubling in price with respect to labour. This development of relative prices between capital goods and labour is already indicating what is confirmed in the farm surveys. These large price increases induced a radically changed utilization of capital inputs by peasant farmers, commercial farmers and cooperatives, shifting to more labour intensive production methods, while also reducing the cultivated area of maize.

III. A COMPARATIVE FARM SURVEY: THE NORTH-EASTERN SEGOVIAS

In this section the change in choice of techniques in the production systems of grain producing peasant farmers and cooperatives is discussed on the basis of data from two comparative farm surveys that were held in -what in Nicaragua is known as- the north-eastern Segovias, and more in particular in Jalapa, Jicaro and Quilalí. These municipalities share common borders with Honduras and have for long been affected by the contra-war. Fortunately during 1988, with the peace talks in Sapoá and the truces between the Sandinista army and the counter-revolutionary forces, security improved substantially, providing an opportunity to hold the first farm survey

during February and early March 1989. After exactly four –rather moving– years, during which the Sandinista adjustment programme and the economic and political changes under the UNO government had a serious impact on the peasant economy, the region was again visited. Although officially there was no longer war, unfortunately the security situation in one of the zones, Quilalí, with the regrouping and resettling of contra forces and the existence of armed groups like the revueltos (with former soldiers and contras), caused that a number of the selected farms could not be included in the survey. However, most of the peasant farmers and cooperatives that were part of the first survey were indeed revisited, presenting an excellent opportunity to measure the consequences of agrarian transformation and market liberalization under post-war conditions.

For three reasons the region of the north-eastern Segovias and the zones involved are of interest in the Nicaraguan context. Firstly, it has all the characteristics of a typical peasant region, producing grains and export crops like coffee and tobacco (often in combination with cattle breeding). Secondly, the zones of Jalapa and Quilalí are good examples of the mainstream thinking behind the agricultural development strategy of the Sandinista government that combined socio-economic with strategic-military objectives. This broad strategy was based on state-centred accumulation, including a bias towards capital intensive production and agro-industrial development. From early 1982 onwards, large Integrated Rural Development Projects in Jalapa and Quilalí provided access to technological transfer and substantial infrastructural investments. Jicaro, a geographically isolated zone, with a lack of all season roads, a long tradition of extensive cattle breeding and a corresponding low level of social organization of the peasantry, did not benefit from this development. Thirdly, the Segovias is one of the most under-researched regions in comparison with the three regions of the Pacific coast. Previous research on peasant production in the north of Nicaragua had concentrated mostly on the arid and semi-arid zones of the western Segovias. For a long time, intensive contra activities in the mountains around the valley of Jalapa, in Jicaro and neighbouring Murra, and in the whole of Quilalí, made it difficult to penetrate the mountainous areas which contain a large number of scattered farms. Therefore, although being priority areas within the development plans of the Sandinistas, little serious research on peasant production and rural markets was undertaken during the 1980s (Spoor, 1994).

While geographically situated far from Managua, and even isolated because of the absence of sufficient all-season roads, the north-eastern Segovias are economically important in terms of agricultural production. Particularly the valleys of Jalapa and La Vigía are highly suitable for maize, rice, beans and tobacco production, while the highlands are covered with coffee or excellent grassland for raising of cattle. Specially in Jalapa the agricultural sector expanded production rapidly during the 1980s, when subsidized technology transfer, infrastructural investments and successful forms of rural cooperation contributed to a boom in maize production. During the troubled 1982/83 season (when the town of Jalapa was literally under seige) maize production was 124,000 quintals, while by the time of the first farm survey was performed (1988/89) this had more than tripled to a level of 411,000 quintals, with still 343,000 quintals in the following season.¹⁴ Because of high yields this meant a disproportional contribution of the zone to the national grain production. While these data show something of the economic potential of the region, the impact of the adjustment programmes and market liberalization has been severe, and in the recent 1992/93 agricultural season maize production dropped to a lower level than in the 1982/83 season. Unfortunately, after a short spell of relative peace in Quilalí the armed conflict has also returned which –apart from the influence of the disarticulation of government policy and changing market conditions– is hampering the exploitation of its enormous productive potential.

The 1989 Farm Survey in Jalapa, Jicaro and Quilalí

The farm survey of 1989 included the Jalapa valley (from the southern entrance of Aranjuez to the northern stretch beginning with Tauquil and Teotecacinte –near the border with Honduras, up to the eastern mountain slopes of El Carbón); two rural districts of the municipality of Jicaro, namely Susucayan on the east side and Muyuca on the north-west side; and finally in the municipality of Quilalí, the districts of Panalí, rural Quilalí and San Bartolo. The research was done in cooperation with a team of students and teachers from the Agricultural Economics Department of UNAN University in Managua. The sample consisted of 27 individual peasant farmers, small and medium ones, and 16 small, medium and large CAS-production cooperatives. Stratification was done according to three criteria, i.e. degree of specialization, cultivation and

mechanization resulting in three strata of individual farmers and three types of production cooperatives. The individual peasant farmers were categorized (see Table 3.1) as small farmers, with low or intermediate technology and largely depending on grain production (10); medium (type 1) farmers, with advanced technology and a mixed (cultivation/cattle raising) production system (8); and medium (type 2) farmers, with extensive cattle raising as basic production system, and with grains as a marginal activity (9). The production cooperatives were divided into small work collectives (3), medium and large CAS (type 1) cooperatives with mixed production systems (11), and finally large CAS (type 2) cooperatives with mainly cattle breeding (2).

Table 3.1: Stratification of Individual Farmers and Production Cooperatives.

Individual Farmers				CAS/CAP-Cooperatives			
	Number	Farm Size	Cult.Area		Number	Farm Size	Cult.Area
Small	(10) *	(10.7)	(7.9)	Small	(3)	(60.3)	(43.7)
1989		11.3	7.3			60.5	35.5
1993	6	11.3	6.7		2	46.0	31.5
Medium ¹	(8)	(79.3)	(23.1)	Med/Large ¹	(1)	(739.3)	(206.5)
1989		97.0	33.0			712.9	229.0
1993	3	95.0	31.7		7	693.9	166.4
Medium ²	(9)	(64.9)	(6.4)	Large ²	(2)	(1,270.0)	(27.5)
1989		56.8	6.6			1,240.0	38.0
1993	8	36.3	6.3		1	700.0	30.0

Sources: * Sample data from Producers' Surveys Region I, 1989 and 1993.

Note : On the basis of the full 1989 survey sample;

Medium (1) Farmers = Mixed (crop/cattle) production system.

Medium (2) Farmers = Extensive cattle breeding/low grain production.

Medium/Large (1) CAS= Mixed (crop/cattle) production system.

Large (2) CAS= Extensive cattle breeding/low grain production.

Briefly summarized, the results of this first survey were the following. Firstly, the use of subsidized technology transfer had caused that agricultural producers, in particular the capital intensive medium (type 1) farmers and the medium and large (type 1) CAS-cooperatives, were producing maize at much to high real costs. They were still not sanctioned for such behaviour as the Sandinista adjustment brought only a gradual indexation of the crucial interest rates for agricultural credit.¹⁵ Secondly, when asked to indicate a change in choice of techniques for the following season, it were again these strata that were least willing to change, specially not in the use of chemical inputs such as fertilizers and pesticides. As they were benefitting most from the impact of inflation on rural financial markets and no sanction for their behaviour was provided,

there was no incentive to change. However, the post-1990 stabilization and adjustment programmes forced them to adapt. Thirdly, in accordance with the still existing strong presence of ENABAS in the region, producers sold most of their grain at an early stage, having little option for storage, and no 'market control' by reserving substantial quantities for the non-harvest season.

The 1993 Farm Survey in Jalapa and Jicaro

Of the original sample 17 (of the 27) farmers and 10 cooperatives (of the 16) could be revisited in February 1993. The reason for this reduction of the survey sample –as mentioned above– was that those producers and cooperatives that were situated in the municipality of Quilalí could not be visited. When the team arrived in the town to start the survey, fighting between the army and groups of revueltos made the planned visits a haphazard undertaking, and were therefore cancelled. Apart from this unforeseen factor one producer was not present in his farm and another had moved outside the region. In Table 3.1 the influence of these circumstances is shown. The final division of individual producers' strata in the 1993 sample included small farmers (6), medium (type 1) farmers (3), and medium (type 2) farmers (8). The cooperatives (mostly called CAP or Cooperativas Agropecuarias de Producción) were represented with small ones (2), medium and large (type 1) cooperatives (7) and one large (type 2) cooperative.

Comparison of the surveys: The Impact of Market Reforms

Firstly, from the sample data the marked drop in farm size for the medium (type 2) farmers and in cultivated area for the medium and large (type 1) CAS-cooperatives is significant, other differences possibly having a more spurious character. This is in line with the selling of grassland as a form of decapitalization and improving liquidity, and a greater market sensitivity of the cooperatives to the market price development of some crops, in this case beans. Secondly, a rather surprising difference could be noted in the development of maize yields of private farmers and cooperatives (see Table 3.2). In fact, taking into account the small sample problem of both surveys, one can indeed observe that the production cooperatives on the whole improved yields, while there is clearly an opposite movement for the private farmers. The seemingly inefficient cooperatives –that during the in between period were strongly compressed in terms of membership-- have not only survived, but also improved their cost structure of grain production.¹⁶

Table 3.2: Maize Yields 1988/89 - 1992/93 (Quintals/Manzana)

Individual Farmers					Cooperatives				
	1988/89	1990/91	1991/92	1992/93		1988/89	1990/91	1991/92	1992/93
Small	32.6	44.4	34.8	32.2	Small	37.0	57.0	25.3	52.1
Medium ¹	46.4	56.7	54.4	41.7	Med/Large ¹	49.8	59.5	48.2	55.4
Medium ²	61.5	52.4	47.5	32.4	Large ²	37.7	37.5	37.5	62.1
Average	47.8	50.6	44.7	33.3	Average	46.0	56.5	41.9	55.4

Sources: Sample Data from Producer's Surveys Region I, 1989 and 1993.

Thirdly, the changes in relative prices during the four years between the first and the second survey greatly influenced the use of chemical inputs, specially of a variety of (previously very cheap) pesticides.¹⁷ All strata severely reduced the use of chemical inputs measured in constant (December) 1992 prices, with particularly significant reductions in the case of the medium (type 1) cooperatives. For the 1993 sample the overall yields of individual peasant farmers decreased with 29 per cent while chemical input costs per manzana dropped with 23 per cent, in comparison with the 1989 survey.

Table 3.3: Costs of Chemical Inputs (Fertilizers, Pesticides) for Maize (Dec. 1992 C\$ Prices)

Individual Farmers			Cooperatives		
	Cost/Mz	Cost/QQ		Cost/Mz	Cost/QQ
Small			Small		
1989	415.9	10.7		529.6	22.6
1993	235.8	6.1		505.9	10.6
Medium ¹			Med/Large ¹		
1989	606.4	19.0		918.6	23.1
1993	594.2	24.2		397.9	7.4
Medium ²			Large ²		
1989	382.8	6.8		196.0	5.2
1993	310.5	9.1		62.1	2.7
Average			Average		
1989	437.2	10.5		768.5	21.2
1993	335.7	10.8		384.5	7.6
Price of Quintal Maize: 30.0 C\$			Exchange Rate C\$/US\$: 5.0		

Sources: Sample Data from Producer's Surveys Region I, 1989 and 1993.

For the CAS-cooperatives there was an increase in yields of 20 per cent and a reduction of chemical input costs per manzana of 50 per cent. Analyzing the data of tables 3.2 and 3.3

according to the sample stratification the differences are even larger. In particular one can see that medium farmers have least been willing to change, presenting an increase of chemical input costs per quintal. This is a surprising result as production cooperatives encountered particular problems with obtaining credit and are confronted with continuing land conflicts. Nevertheless, production cooperatives had the advantage of using their own machinery, where small and medium farmers mostly had no such assets. It produced the phenomenon that some cooperatives are now providing machinery services (on a rental basis) to private farms in their surroundings, something that before the state enterprises had done.¹⁸ Where in other parts of Nicaragua many cooperatives have parcelized their land and disintegrated, in Jalapa, they have integrated themselves in markets in new ways using their economics of scale.

Relative Prices and Choice of Techniques

Taking the 1989 survey data, one can observe no significant correlation between the value of chemical input package that was used to grow maize and value of output per unit of land (TVP or Total Value Product measured at 1992 constant prices). In fact, with linear regression method the correlation coefficient is only 0.06 (See Graph 3.1). It is also clear that there is a cluster of cooperatives which can be defined as high costs and medium output, indicating a strong overuse of inputs in the production of maize, a phenomenon which was already indicated above. This picture changed radically in the 1993 survey results. The input/output relationship in value terms became a reasonably straightforward one (assuming that equilibrium values of this input/output relationship were not reached in our observations, as a consequence of credit restrictions and liquidity problems in the adjustment process). Graph 3.2 indicates that the liberalization of this sub-market indeed caused a substantial shift in producer's behaviour and use of inputs, in particular the group of cooperatives. The correlation coefficient, based again on simple linear regression becomes 0.78. One influential outlier (extreme observation) has been ignored in this calculation (while another was eliminated because of unreliability of the input data), but inclusion of this outlier and the application of a robust regression analysis would only marginally adjust the outcome.¹⁹ It indicates that the previously absent correlation between the value of chemical inputs and the crop output value per unit of land, was reestablished during the economic

adjustment period under study. Obviously during the 1988/89 agricultural season the chemical input prices were still highly artificial as most had been acquired just before the relative prices were really affected by the Sandinista stabilization measures or had been in stock. Therefore, the relative weights of the inputs used were not depending on their real market values at that moment, while this was the case in the 1992/93 season. The erratic use of chemical inputs (fertilizers and pesticides) in the pre-reform situation, as measured in the first farm survey, changed dramatically under the influence of market liberalization and deregulation. In particular pesticide use dropped from 289.2 C\$/unit of land (manzana) in 1989 to 110.0 C\$ in 1993, while fertilizers diminished from 277.7 C\$ to 202.7 C\$ (at constant December 1992 prices). Some of the pesticides used (like the herbicides) were substituted by labour and traditional labour intensive techniques as weeding with machete have regained space in the farming systems. However, other reductions in pesticide use have contributed to lower yields as resistant plagues could not be controlled and integrated pest management is still underdeveloped.

IV. RATIONAL BEHAVIOUR IN 'IRRATIONAL MARKETS'

The data presented from the Nicaraguan case study indicates that peasant farmers and cooperatives in the 1993 farm survey sample were using 'on average' efficiently their inputs.²⁰ There are several problems related to this conclusion, like the assumption that the sample observations are comparable (in spite of existing differentiation of soil quality), and the linearity of the correlation which was measured. It must also be stated that although the north-eastern Segovias is a very important grain producing area, it cannot be taken as representative for all peasant farmers in Nicaragua, in particular not for a large group of very small and marginal producers in the 'agricultural frontier' areas of the country. Nevertheless, while returning to the original questions raised at the outset of the paper, was the behaviour of peasant farmers in the pre-reform situation 'irrational' or 'inefficient'? The following can be concluded on the basis of the above presented arguments and empirical data. Overuse of chemical inputs which was measured in the 1989 farm survey particularly reflected that these had been very cheap until then. They were held (often too long) in stock, were sold in bulk and used in barter trade or smuggling practices. Great quantities were also actually used because resistant plagues were developing.

Peasant farmers and cooperatives were seemingly inefficient in their production cost structure (at real market prices). However, taking into account the absence of sanctions and the alternative use (hoarding, speculation, barter trade) that was given to cheap inputs, they were behaving therefore rationally within inefficiently (and even 'irrationally') working markets. It is important to note that those private or cooperative farms who received more implicit subsidies, being more capital intensive, benefited more than peasant farmers. While appearing inefficient, they were not from their perspective.

The change in relative prices (between inputs and between inputs and output) has greatly affected the utilization of these inputs. This process has been gradual during the post-1988 period when for a number of years the credit subsidies softened (or slowed down) this impact. In general a greater consciousness developed with peasant farmers and cooperatives on the actual purchase and use of inputs and their relation with output levels (or values), which had been practically absent before. This change in behaviour of peasant farmers and cooperatives is mainly caused by drastically different relative prices (input-input, input-output and output-output price ratios) and their insertion in a reformed set of market relations. These same producers act (at least in the short run) according to their form of integration and the efficiency of the markets themselves, without suddenly having left their supposed inefficiency or having embraced efficiency. A transition from non-transparent, segmented and heterogeneous towards transparent, integrated (interlinked) and homogeneous market transactions will reestablish the standard relationship between the costs of the input package and the value of crop output. However, as was stated in the beginning of this paper, the change in relative prices is a necessary but certainly not sufficient condition for the efficiency of markets. The above conclusions from the empirical data therefore cannot be used to suggest that agrarian markets in the post-reform situation in Nicaragua have already developed into integrated and competitive markets, as new tendencies of monopolization are present and there is a severe lack of new institutional frameworks that are needed for market development (Spoor, 1994).

1. This paper has benefited from the assistance of Lic. Mario López, former Director of the School for Agricultural Economics (ESECA), UNAN Managua, Nicaragua. He has been involved in the farm surveys that are analyzed here and provided valuable comments on an earlier draft.
2. Between the agricultural seasons 1988/89 and 1991/92 for most crops there was a contractionary movement, with the exception of beans. In the 1992/93 season an expansion of rice output is noticeable, to be understood as a shift away from cotton, that for reasons of reduced profitability practically ceased to exist in Nicaragua.
3. See Ellis (1988) for these different definitions of peasants and peasant behaviour like the 'profit maximizing peasant' and the 'risk averse peasant'.
4. Schultz (1964).
5. In writing this part I benefitted from a conversation with Ashwani Saith.
6. Maureen Mackintosh (1987).
7. Some of the ministries were literally stripped from their inventories by the outgoing crew. This process is known as the piñata (a children's feast) in Nicaragua.
8. The term 'facilitative' is taken from Faaland & Parkinson (1991).
9. Although the Minister of Agriculture Rondón is providing the outside world continuously with optimistic outcomes of the new policies implemented by the UNO-government it seems that MAG has very little managerial and policy making capacity left. Only the World Bank/UNDP funded projects to strengthen this capacity has created a unit within the compound of the Ministry that seems to work.
10. Field notes of Mario López made during the farm survey of February 1993.
11. See Spoor (1992).
12. One manzana = 0.7 Hectare; On average between 250,000 and 300,000 manzanas of maize was cultivated during the 1980s in Nicaragua.
13. Tendencia 2000, Bulletin of PRODERE, April-June 1992.
14. Data provided by MAG, Jalapa, quoted in Bloten (1992).
15. While these farms were spending only 9.5 per cent and 15.2 per cent of the crop price/unit of output on chemical inputs and machinery services during the 1987/88 season, this had become 79.3 per cent and 118.1 per cent during the 1988/89 agricultural season (Spoor, 1994, Chapter 7).
16. Membership of the ten cooperatives that were revisited in early 1993 was on average 32, while this had been 52 in early 1989. The reduction of membership was caused by outgoing members who returned to their (often deserted mountain) farms or who looked for other rural or urban

employment.

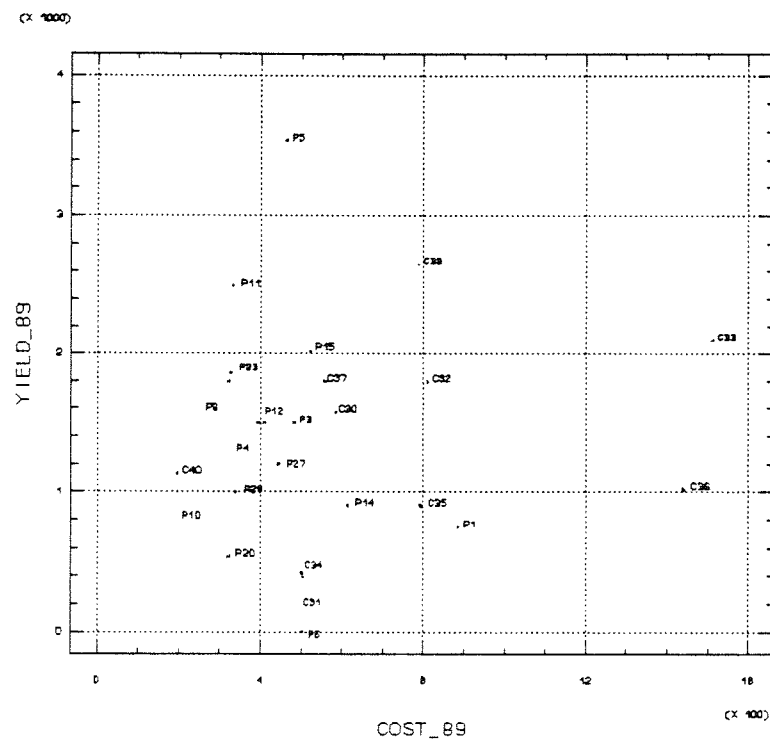
17. Note in Table 2.1 that pesticides like Gramoxone and Atrazina encountered much greater price increases than fertilizers.
18. Since the 1986/87 season the concept 'territorial enterprise' had become fashionable, in which the state enterprises would have to articulate better with the private and cooperatives sectors. It was entirely dropped when 'state compression' was introduced during the 1988-90 reforms.
19. The data can also be analyzed by a simple, one factor Cobb-Douglas production function. However, for the sake of the argument the (linear) correlation coefficient is a useful instrument.
20. See Ellis (1988) on the statistical problems connected to analyzing the behaviour of the 'average peasant'.

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GRAPH 3.1

CHEM. INPUTS vs MAIZE YIELD (1989)



GRAPH 3.2

