THE ROLE OF EMPLOYMENT AND LABOR EARNINGS FOR SHARED GROWTH:

THE CASE OF NICARAGUA

A World Bank Labor Market Study

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CURRENCY AND EQUIVALENT UNITS

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Acronyms and Abbreviations

BCN	Nicaragua Central Bank
CAFTA	Free Trade Agreement between Central America and the United States
CEPAL	Comisión Económica para América Latina y el Caribe
CPI	Consumer Price Index
EMNV	Encuesta de Medición del Nivel de Vida
EPZ	Export Processing Zone
FAO	Food and Agriculture Organization of the United Nations
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
HIPC	Heavily Indebted Poor Countries
IFC	International Finance Corporation
ILO	International Labour Organisation
INATEC	Instituto Nacional Tecnológico
INEC	Instituto National de Estadísticas y Censos (National Statistical Institute)
INIDE	Instituto Nacional para la Información del Desarrollo
MITRAB	Ministero de Trabajo (Ministry of Labor)
PRGF	Poverty Reduction and Growth Facility
RAAS	Región Autónoma del Atlántico Sur
RRR	Relative Risk Ratio

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EXECUTIVE SUMMARY

During the past decade Nicaragua has been consolidating a stable macroeconomic environment and has registered modest growth rates

1. In recent years Nicaragua has experienced modest growth rates, averaging 3.8 percent between 1998 and 2005, and 1.7 percent per year between 2001 and 2005. The country has consolidated its structural adjustment programs and completed the requirements for benefiting from the HIPC initiative, freeing the country from a debt service burden that amounted to 250 percent of GDP in 2001. This growth has been closely tied to investment and exports.

2. Despite the consolidating macroeconomic environment, macroeconomic uncertainty and instability are still reported by firms as one of the main investment climate concerns; and lack of credit is a major constraint for private investment growth.

Nicaragua is witnessing a change in its demographic structure which may provide a window of opportunity for poverty reduction

3. During this period the country has also seen an increase in the working age population as a fraction of the total population, and a growth in employment at a rate of 3.9 percent per year. This decrease in the number of dependents per working age person, generated by the increasing labor force, presents an important opportunity for poverty reduction, as each working member now has a smaller number of dependents to support. Moreover, this new labor force has managed to find employment: the share of the working age population employed increased from 62 percent to 64 percent.

Despite the increase in employment, the new employment opportunities were low paying, in particular for the poor

4. However, despite the higher employment and the lower dependency rate, headcount poverty did not change. An important fraction of the employment generated appeared to be in "bad jobs." Most of the employment seems to have been absorbed by the manufacturing and agricultural sectors.

5. Agriculture offers the lowest returns among economic activities and has historically concentrated the largest number of poor. Moreover, Value Added per worker in agriculture has decreased. These characteristics make employment growth in agriculture an unlikely driver of significant poverty reduction. However, it is still unclear as to what extent the employment growth in agriculture that has been captured through the household surveys adequately reflects the reality in this sector. It is possible that the 2001 household survey underestimates rural population, so that, when compared to the 2005 survey, it appears as if the rural population increased, which is at odds with the census trends. This dubious rise in rural population may be behind at least part of the agricultural employment growth.

6. The manufacturing sector contributed to a significant share of employment generation, but an important fraction of employment generated in this sector was not tied to better incomes. First, 45 percent of the employment generated in this sector was in family enterprises, which is, and has been, associated with low income generation. Second, a large share of the new jobs was concentrated in the food and beverage sector, which registered a decrease in wages. The clothing sector was the only sector that contributed to the generation of "good jobs." This was probably maquila employment. However, the apparent requirement that those employed in maquilas have completed secondary education may have limited the poor from benefiting from growth in this sector.

7. In addition, wages in manufacturing seemed to have decreased. This might be a response to the rising labor force and the decrease in productivity in the sector.

The very poor saw important increases in their labor income that were due to higher prices of goods produced by the agricultural poor; this growth, although important, was not enough to bring them out of poverty

8. When decomposing growth in household per capita income into its components, we find that the poorest 20 percent benefited from an important increase in the share of working age persons within the household and in the participation rates. The rise in the share of working age population as a fraction of total members in the household explains 37 percent of per capita household income growth in the lowest quintile. On the other hand, income per self-employed in agriculture contributed with 44 percent of the change in household per capita labor income. This means that the poorest basically gained because of better earnings from self-employment in agriculture, as well as from an important demographic transition.

9. The rise in agricultural income from self-employment can be attributed to better producer prices of coffee, meat, maize and beans, which are all produced by small farmers. Both yield per hectare and cultivated area remained almost constant. Despite increases in the production of sensitive agricultural products (due mainly to an expansion of harvested areas), the output growth was not sufficient to compensate the inflow of labor into agriculture, so that Value Added per worker decreased. This decrease in (constant) Value Added per worker was offset by higher producer prices. Had it not been for price increases, rural poverty would have most likely increased. In addition, the relative productivity of Nicaragua with respect to other countries in the world, and in particular with respect to its main trading partners, remains astonishingly low, especially for rice and milk.

10. There is some evidence that agricultural wages increased as well, despite the decreases in (constant) Value Added per worker. Increases in the relative prices of export goods may be behind this behavior.

Constraints to the generation of better jobs seem to lie outside the realm of labor market regulation, and there is some evidence of agricultural/non-agricultural sector segmentation

11. Labor regulation does not seem to be a hindering factor for formal employment generation. The labor regulation does not appear particularly high, neither from the perspective of employers nor compared to other trading partners and neighbors.

12. Despite this, there is some evidence of segmentation between the agricultural and non agricultural sectors. There is an important earnings premium in non agricultural earnings. An important part of this premium is the results of a selection process where more educated

individuals opt out or can access non agricultural jobs. However, even after selection effects are taken into account, there is an earning premium for working outside of agriculture, with returns to education, location, and gender explaining most of the differential for otherwise equivalent workers. Qualitative results suggest some barriers to moving outside agriculture.

13. An important earning premium of being a wage worker outside of agriculture, when compared to self employment outside of agriculture was also found. Part is explained by selection of more educated and male workers into wage employment, and another part explained by differences in returns to education for otherwise equivalent workers. Thus the earning differential between self employment and wage employment in non agricultural jobs can be potentially explained by segmentation. Although among the self employed, who are mostly informal, the majority did not choose self-employment because of lack of wage employment but rather because of schedule flexibility, for an important fraction of the unskilled (26 percent) self-employment was a response to lack of wage employment. Qualitative results also support some segmentation between wage employment and self-employment.

Geographic barriers to mobility and low levels of education constrain the rural poor from moving to better jobs

14. There is evidence of segmentation between agricultural and non-agricultural jobs. There is an important earnings premium outside of agriculture, which is mostly explainable by differences in returns to individual characteristics (controlling for selection). The most important factor determining whether workers have a non-agricultural job is having primary and secondary education and being older and more experienced. Being a male and living in the Pacific region makes it more likely for a worker to end up in agriculture.

Although education is an important determinant of being employed in a high earning sector or occupational category, there is no evidence of skill mismatch within occupational categories or sectors

15. Low levels of education among the poor seem to be restricting their access to the most dynamic sector in the economy—the manufacturing maquila sector—as employment in firms in this sector requires a completed secondary education. In addition to being important to finding employment outside of agriculture, education brings significant returns even within occupational categories and within sectors.

16. Despite the fact that education does affect earning levels, there appears to be no evidence of skills mismatch. Firms do not report skills to be a constraint for business functioning or growth. In addition, the evidence suggests that, while the demand for skills may be rising, the supply of skills is rising more than proportionally. This rise in the availability of skills is likely to reduce wages unless there is a substantial boost in production and in the demand for labor.

Exploring policy options

17. *If growth is to translate into poverty reduction, increasing the level of education of the labor force should be at the forefront of the policy agenda, in particular in the rural sector*. Despite the fact that this may exert an important downward pressure on wages, it increases the returns of the wage employment and employers in agriculture as well as the likelihood of being employed outside of agriculture. Both higher returns in agriculture and a moving out of agricultural employment are key elements for poverty reduction.

18. To prevent educational expansion from resulting in lower wages, the demand for skills must keep pace with the supply of skills. Labor regulation does not appear to pose a constraint to labor demand, and labor is cheap relative to capital. *Thus, increasing the demand for wage employment is likely to be achieved only if the most binding constraints to growth are addressed: namely, macroeconomic uncertainty and lack of credit. Fostering investment in unskilled intensive sectors, in areas outside of Managua (such as in the tourism sector)* is a policy that merits careful consideration. In addition, given the small domestic market in Nicaragua, promoting export in order to increase labor demand and reduce the downward pressure on wages will be imperative.

19. The very low levels of productivity found in the agricultural sector, together with some indirect evidence of low mobility between urban and rural areas, suggests that rising productivity in agriculture should also be at the forefront of policy initiatives. Observed income rises among the poor seem to be tied to rises in the prices of agricultural products and foreign remittances. This behavior increases the vulnerability to foreign shocks. Without *targeted investments in agricultural productivity and agricultural exports*, decreasing rural poverty in the short and medium runs seems implausible.

20. On the labor market front, the most promising route to fostering the creation of poverty reducing jobs is to identify and address the *barriers to moving out of agriculture*. Infrastructure and transport costs, land titling, information problems and education merit further study. Finally, it might be worth exploring whether *a simpler minimum wage structure* than the current multi-sector scheme might lead to fewer distortions in the labor market that may be particularly binding for the unskilled.

INTRODUCTION.

WHY DO WE CARE ABOUT EMPLOYMENT, EARNINGS AND LABOR MARKETS IN THE SEARCH FOR SHARED GROWTH?

1. The degree to which growth is able to translate into poverty reduction depends on how its benefits are distributed among different segments of society. There is little doubt that growth—measured by changes in average income—contributes significantly to poverty reduction.[1] However, it is also clear that countries differ in the degree to which income growth spells have translated into poverty reduction; and, although differences in the responsiveness of poverty to income growth account for a small fraction of the overall differences in poverty changes across countries, from the point of view of an individual country these differences may have significant implications for poverty reduction, especially in the short term.[2]

2. There is a general consensus that the availability of employment opportunities and their characteristics constitute an essential transmission channel from growth to poverty reduction and, in this way, play a key role in poverty's response to growth. For one thing, the poor derive most of their income from work, either as self-employed or as employees, so that what happens to their income and employment status seems tautologically relevant. In addition, the ease with which the poor may take up the opportunities afforded by growth may depend crucially on (i) the structure of employment, (ii) the returns to labor and their distribution, and (iii) the existence of imperfections and frictions in the labor markets. For example, one may be inclined to believe that when the poor face flexible labor markets and low barriers to mobility across labor market segments, geographic regions or sectors of production they are in a better position to take the opportunities generated by growth, by "moving" more easily to the growing sectors. Similarly, the effectiveness of growth in reducing poverty may also depend on whether growth is unskilled labor-intensive and whether the poor have or can easily acquire the skills required by the growing sectors. Moreover, there is some evidence of strong links between labor market regulations, such as minimum wages, and the incidence of poverty in developing countries.

3. The concern that employment, returns to labor and imperfections/rigidities in the labor markets play a crucial role in the poverty impact of growth has been reflected in the emphasis in the policy debate on the idea that "jobless" growth has been responsible for the disappointing

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[1] Kraay (2006) finds that in the short and medium terms income growth accounts for 70 percent of the variation in headcount poverty, and in the long run, it accounts for as much as 97 percent.

[2] See, for example, Bourguignon (2002), Kakwani, Khandker and Son (2006), Lucas and Timmer (2005) and Ravallion (2004), for evidence on heterogeneity in the poverty impact of growth. See Ravallion (2004) for a discussion of the relevance of this heterogeneity from the perspective of a country: a 1 percent increase in income levels could result in a poverty reduction of as much as 4.3 percent or as little as 0.6 percent.

results seen by some countries in the effectiveness of growth in reducing poverty. As a result, debates addressing how to foster employment-intensive growth have followed.[3] However, it is also often recognized that poverty is less an outcome of open unemployment than of adequate levels of income, and, as such, emphasis should be placed not on increasing employment levels but on increasing the productivity of the working poor.[4] The debate has also been concerned with whether policy interventions should concentrate on increasing earnings in the sectors where the poor are found (such as agriculture), or whether they should be targeted to sectors where the poor are not found, so that more of the poor can be drawn into the higher-earning sectors (Fields 2006). To date, there is very little evidence to illuminate the debate. Moreover, the questions are hard to address, because there is lack of clarity on how to achieve the alternative objectives and because it is inherently difficult to identify the costs and benefits of the possible policy alternatives.

A. THE OBJECTIVES AND SCOPE OF THIS TASK

4. The objective of this paper is to shed light on some of the issues discussed above in the case of Nicaragua, and to provide some policy guidelines for the fight against poverty. In particular, we hope to be able to identify the growing sectors, as well as the constraints faced by the poor in benefiting from this growth.

5. This paper is part of a series of studies conducted within the PREMPR, to foster our understanding of the role of employment earnings and labor markets in shared growth. In addition, this report on Nicaragua is intended to feed as a background document for the Nicaragua Poverty Assessment 2007.

B. THE STRUCTURE OF THE REPORT

6. The report is structured in five chapters. Chapter 1 briefly describes the evolution of the Nicaraguan economy, in terms of its macro indicators as well as of employment and poverty. The second chapter analyzes the profile of growth as well as the way in which it helps explain the observed behavior of poverty, using aggregate data from National Accounts and employment from household surveys. It describes growth and employment by the sector of economic activity and its employment productivity profile. It goes more deeply into the evolution of the manufacturing sector and the maquila production. Chapter 3 looks at the income profile of the population, using household surveys. Segmentation and skill mismatch are explored in Chapter 4, while Chapter 5 provides a brief statement on policy implications and further research.

7. Definitions of terms used throughout the report are presented in Box 1 bellow. Workers have been classified into 4 occupational categories: wage and wage and salaried workers, individual self employed workers, family enterprise workers and

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[3] One of the core elements of the global employment agenda "Macroeconomic policies for growth and employment" calls for addressing four key questions, one of which is "How can the employment intensity of growth be increased?" ILO (2003).

[4] ILO (2003).

employers. We believe these are qualitative distinct types of labor, across which segmentation or barriers to mobility may exist. In particular we have opted to divide the non-wage workers into the above mentioned categories for several reasons: i) employers (those who employ paid labor) receive substantially higher income than other non wage workers and are better educated. They often have assets which other non wage workers do not, ii) returns to labor, for family enterprise workers and self-employed not working with other members of the family, need different methodologies of calculation. While the income reported by the self employed working alone is the return for labor for his/her individual work, reported income for self employed workers working with other unpaid family members is the income earned by all the family members, and a methodology has to be devised to assign a proportion of household income to each member of the family and, iii) individual self employed are more prevalent in urban areas, while the family household enterprise workers are more prevalent in rural agricultural work.

Box 1: Definitions

Employment	
Labor market	The place where labor services are bought, sold, and exchanged. The labor market comprises wage and salaried workers and their employers, but also non-wage family enterprise workers and the self-employed, who make up the largest share of workers in Madagascar.
Labor force	The sum of the working age employed and unemployed.
Employed	An individual who performed market activities for at least one hour in the week prior to the survey, or who has a permanent job.
Unemployed	A working age individual who is not employed but is actively looking for work.
Inactive	A person who is neither employed nor actively looking for work.
Wage worker	A worker who has declared being salaried for his/her work. It includes those self reported as jornaleros and peones, which work for a daily or per job rate in manual agricultural labor, often only during the harvest season.
Self-employed	A self-declared self-employed person, living in a household in which there are no other self-employed or unpaid family workers.
Household enterprise worker, family enterprise worker	A self-declared self-employed person living in a household with other self-employed or unpaid family workers.
Formal employment	Employment for which social security contributions are paid by workers and firms
Working age population	The population between 15 and 64 years of age.
Child labor	A child between 6 and 14 years old, who performed market activities for at least one hour in the week prior to the survey, or who has a permanent job.
Maquila employment	The maquila sector comprises all production units located in the ‘Special Export Processing Zones’ which are clearly defined zones, often within a wired complex. Production is undertaken with mostly imported materials using local labor and all output is destined for export markets.
Earnings	
Earnings, labor income	All cash payments, payments in kind, and benefits received in exchange for labor services in wage and salaried employment, self-employment and other forms of labor exchange. “Earnings” and “labor income” are used interchangeably, although the latter is more often used when referring to the labor income of a household rather than of an individual. Depending on the context, earnings include only primary job earnings (e.g., when comparing earnings in the different sectors) or the sum of earnings in all reported jobs.

Wage earnings	Total cash and in-kind earnings as declared in the survey.
Earnings of the self-employed and employers	For non-agricultural work: it is calculated as declared in the survey For agricultural work: it is calculated as net profits using the survey's agricultural enterprise module.
Household enterprise earnings	For non-agricultural work: earnings for each individual are calculated as a proportion of the sum of earnings declared in the survey of all the workers employed in the household enterprise. In 2001 each worker is assigned a portion of earnings proportional to reported hours of work. In 2005 total enterprise income is divided equally among total number of adult workers. For agricultural work: Earnings are derived from the survey's agricultural enterprise module and divided by the number of adult household members reported as working in the enterprise.
Low earner	An employed individual whose earnings are below the national poverty line.

CHAPTER 1.
COUNTRY CONTEXT

A. MACROECONOMIC CONTEXT

1.1 Over the past 12 years, Nicaragua has witnessed a very significant transformation: from a nation torn by war, political instability and natural disasters, with its economy plunged into chaos, it has re-emerged as an inclusive democracy where the foundations for economic growth and sustainable development are being laid. Notwithstanding this progress, Nicaragua still remains among the poorest countries in the Western Hemisphere. It is classified as a lower middle income economy with a per capita Gross National of Income of US$1,000 in 2005, which is a third of the average value for the Latina American and the Caribbean Region and half the average off all lower middle income countries. It has a population of 5.1 million, with a life expectancy at birth of 70 years.

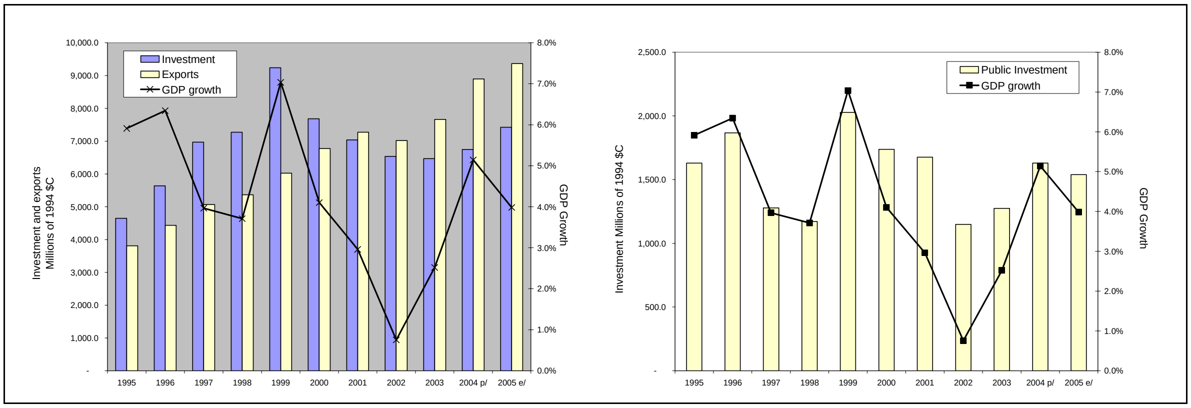
Consolidating a stable macroeconomic environment

1.2 During the past years Nicaragua has experienced modest growth rates, averaging 3.8 percent between 1998 and 2005. The country has consolidated its structural adjustment programs and completed the requirements for benefiting from the HIPC initiative, thereby freeing the country from a debt service that amounted to 9.5 percent of GDP in 2001.

1.3 Between 1998 and 2001, GDP per capita grew at an average rate of 3.8 percent, and then decelerated, averaging a per capita growth rate of 1.7 percent between 2001 and 2005. This growth has been closely tied to investment and exports (see Figure 1.1). Investment has been fueled by foreign assistance. In 1998, after Hurricane Mitch struck the country, massive reconstruction efforts were undertaken. The country received US$250 million in emergency assistance, and a further US$1.4 billion was pledged by the international community. Until 2001, recovering from the aftermath of the hurricane was a prime policy objective which, together with important flows of foreign assistance, led to an increase in public investment of 27 percent in 1999.

1.4 The last 10 years have also seen a consolidation in the IMF-led stabilization policies adopted in the early 1990s, which were concentrated in controlling hyperinflation, reducing the fiscal deficit and privatizing public utility companies. A second wave of reforms was initiated in 2002 with the signature of the Poverty Reduction and Growth Facility (PRGF) with the IMF. Its aim was to achieve fiscal sustainability through the broadening of the tax base, the elimination of tax exemptions, improved revenue collection, more effective budgeting and the improvement of the financial position of the Central Bank. The government also sought access to a HIPC initiative to gain foreign debt relief. In 2004, Nicaragua reached the completion point under HIPC, and bilateral and multilateral debt relief was granted for debt incurred prior to 2005. On the international front Nicaragua has signed several trade and integration agreements with its Central American partners, and trade with Honduras, El Salvador and Guatemala is gaining in importance, although the United States remains the main trading partner.

Figure 1.1: Investment, Exports and Growth, 1995-2005



Source: Own calculations with data from BCN.

Some important developments in an otherwise unchanging economic structure

1.5 There have been no major changes in the sectoral structure of production and in the urban/rural composition of the population. However, Nicaragua has experienced an important demographic transition as the share of working age population (15 - 64 years) increased faster than other age ranges, reducing the dependency ratio.[5] In addition, maquila and financial intermediation have experienced important developments.

1.6 Population growth has slowed down, and Nicaragua has started to see a change in its demographic structure. Between 1995 and 2005, the population grew at a rate of 1.6 percent annually, a number well below the projected growth rate of 2.04 percent. The ratio of working age population (15 - 64 years) to total population increased from 53 percent in 1998 to 55 percent in 2001 and 58 percent in 2005, significantly reducing the dependency ratio. Despite this overall demographic change, there was little gain in the share of urban population, which increased its share in total population by 1 percentage point in the last 10 years (Table 1.1).

1.7 The sectoral structure of GDP remained relatively constant during these 10 years, with the secondary sector gaining only a 1 percentage point share during the whole period. Although there were no major changes in the structure of production, within the secondary and tertiary sectors there were some important developments, namely, the growth of the maquila sector and an important surge in financial intermediation.

1.8 Financial intermediation has grown at an average annual rate of 9 percent. This increase in intermediation is an important development, as Nicaragua has the smallest banking system in Central America and as it is the main source of credit for the private sector. Still, financial intermediation is weak and accounts for only 3.6 percent of GDP.

[5] The dependency ratio is the ratio of total population to working age population, and it indicates, on average, how many persons a working adult has to support.

Table 1.1: Main Macroeconomic Indicators, 1998-2005

	1998	1999	2000	2001	2002	2003	2004	2005
GDP real growth (%)	3.7	7	4.1	3	0.8	2.5	5.1	4
Real GDP per capita growth (%)	2	5.3	2.4	1.3	-0.9	0.8	3.4	2.2
Share of Value Added in primary sector (%)	21.3	20.8	22.3	22.1	21.8	21.6	21.3	21.2
Share of Value Added in secondary sector (%)	26.7	27.5	27.1	27.5	27.1	26.8	27.6	27.8
Private consumption per capita real growth %	3	4.1	3.5	3.1	2.7	0.1	1.9	1.8
Gross fixed investment real growth %	4.3	27.1	-16.8	-8.4	-7.1	-1	4.2	10.1
Consumer price inflation (year to year % change)	13.04	11.22	11.55	7.36	3.99	5.15	8.44	9.42
Real effective exchange rate 2000=100	98.9	96.9	100	100.9	96.9	91.2	89	88.7
Urban population as a share of total population	54.9	55	55.2	55.3	55.5	55.6	55.8	55.9
Total Population (thousands)	4,579	4,655	4,733	4,812	4,892	4,974	5,057	5,142

Sources: INEC, BCN, and World Bank.

1.9 Growth in the maquila sector has had important implications in terms of the availability of foreign reserves and employment. The maquila sector, which started in the early 1990s with the development of the first public Free Trade Zone, has experienced an amazing dynamism. Between 2001 and 2005, the share of maquila exports in total exports jumped from 32 percent to 50 percent, and the sector generated a little over 53,000 new jobs during these four years. The value of transformation services in the maquila, a measure of the value of domestic inputs used in the process, reached 5.5 percent of total Value Added in 2005.[6]

B. LABOR MARKET CONTEXT

The labor market structure in Nicaragua is typical of countries with a similar level of development

1.10 The labor market profile of Nicaragua is very similar to that of low income and low middle income countries, which is characterized by low unemployment rates[7] (as defined by the ILO), low formality and waged employment rates, high shares of population working in agriculture, and relatively high child labor.

1.11 This structure of employment is mainly a reflection of the stage of industrialization of these countries. Low and middle income countries still have a large agricultural sector in which productivity is generally low and workers are mostly self-employed. Most of the population has very low incomes, so that they cannot afford to be unemployed. Instead, an important fraction of the working age population is self-employed in informal activities, many in agriculture. As industrialization progresses, the share of employment in the modern sectors, mainly manufacturing and services, rises. Industrialization spreads

[6] It corresponds to the difference between the value of imported raw materials and value of final exports and corresponds mostly with the cost of labor and utilities.

[7] ILO defines as unemployed, those not employed but who had actually looked for a job in the past week.

predominantly in urban areas, which leads to a process of urbanization, as rural workers leave low productivity jobs in agriculture in search of higher paying jobs out of agriculture.

1.12 As urbanization progresses, urban self-employment in low productivity jobs (in many cases informal) increases. The reason behind this increase is still a matter of debate and may depend on the particulars of the labor market structure and regulation. In many cases workers who are searching or "queuing" for good jobs are still too poor to afford to be unemployed and must engage in self-employment "survival activities" while they seek a job. In other cases, monopsonistic behavior by firms leads to very low wages for the unskilled, so that many low skill migrant workers find self-employment as attractive as wage employment. With urbanization, unemployment begins to be noticeable, as higher incomes resulting from higher productivity permit the luxury of shopping for good jobs.

1.13 The development of a modern sector also comes with a rise in formalization and in the share of waged and salaried employment, as modern firms grow and demand labor. The growth of the modern sector is usually also accompanied by a rise in agricultural productivity, although the links and causalities for this are less clear. In many cases purposeful investment in agriculture frees rural labor, as more productive techniques mean that fewer workers are needed to exploit the available land. This free urban labor migrates to urban markets, providing new labor that feeds the process of urbanization and industrialization. In other cases, migration to non-agricultural jobs with higher productivity and higher pay allows households to generate savings that can translate into new investments that raise agricultural productivity.

1.14 As industrialization progresses child labor may decrease, as higher incomes mean lower opportunity costs of sending children to school. Additionally, as the demand for skill increases, so does its returns, and the benefits of acquiring an education become more evident. Thus it is costlier not to send children to school.

1.15 In Nicaragua, unemployment as defined by the ILO is low, slightly less than 4 percent (see Table 1.2). Most of the employed work in the informal sector (82 percent), wage employment accounts for half of the employed, agriculture absorbs a high share of employment (37 percent) and child labor is relatively high (9 percent). Agriculture is still a sector with low returns and productivity has been declining, suggesting that employment in this sector still acts as a "last resort" option for the working population. In the discussion that follows, the labor market structure is described in more detail.

Unemployment is not a major problem among the poor and is only a minor problem for the non-poor

1.16 Table 1.2 presents the main indicators of the labor market. We find that unemployment rates according to the ILO definition are very low and that they remained almost constant during the period under analysis. The broad unemployment rate, which also includes discouraged workers, is slightly higher but its still low compared to other countries (less than 10 percent). The working age population, defined as those between 15 and 64, as a proportion of the total population increased 5 percent (or 3 percentage points). And the number of employed as a fraction of the total working age population also rose slightly. Child labor saw a small increase, from 8.7 percent to 9.2 percent. If we look at the poverty rate among unemployed workers, it stands out that it is half the overall poverty rate, which suggests that unemployment is not strongly correlated with poverty.

1.17 The table also shows the number of workers affiliated to social security, which is often a measure for formalization. In Nicaragua only some 19 percent of the labor force has social security, and this ratio decreased slightly in 2005. Finally, the table shows the number of workers holding more than one job concurrently. It has been pointed out that in many cases workers cannot generate enough income from their main job and must find additional work to complement their income, so that the share of workers holding more than two jobs concurrently is often used as a measure of the (poor) quality of the jobs. The share of workers holding two or more jobs is less than 10 percent, a figure below that of low income countries.

Table 1.2: Main Indicators of the Labor Market, 2001 and 2005

	Level 2001	***Level 2005***	**% change**
Unemployment rate*	**3.47**	**3.39**	**(2.44)**
Broad unemployment rate**	**8.07**	**6.87**	**(14.84)**
Employment-to-working-age-population ratio	**62.15**	**62.78**	**1.01**
Working age population as a fraction of total population	**55.30**	**58.22**	**5.27**
Child labor rate	**8.87**	**9.28**	**4.69**
Share of long-term unemployed***	**0.04**	**1.50**	**3,913.41**
Poverty rate among unemployed workers (national poverty line, poor)	**22.14**	**28.52**	**28.80**
Poverty rate among unemployed workers (national poverty line, extremely poor)	**6.96**	**6.69**	**(3.83)**
Poverty rate among unemployed workers (international poverty line 1$/day)	**24.76**	**28.52**	**15.19**
Share of workers holding 2 or more jobs concurrently****	**9.03**	**8.41**	**(6.92)**
Share of workers affiliated to social security*****	**19.70**	**18.05**	**(8.40)**

***** ILO unemployment definition is those not employed but that actively searched for a job in the past week.
** Broad unemployment rate also includes discouraged workers.
*** Ratio of long-term unemployed over total active labor force=(employed + unemployed), the questions are not strictly comparable: in 2001, how long have you been unemployed? In 2005, how long have you been searching for a job?
**** Defined as holding two jobs in the past week.
***** Affiliated to Social Security in main occupation.

Source: Own calculations with data from EMNV 2001 and 2005.

Agricultural jobs offer the lowest returns. Outside of agriculture, the self-employed do not earn less per hour worked than the waged employed, but they appear to earn less annually owing to shorter spells of work during the year

1.18 Table 1.3 shows the median annual labor income and median earning rates for the different employment categories. Earnings are lower for all agricultural categories, and among agriculture the lowest income is obtained by household enterprise workers and the individually self-employed. It is also obvious that wages decreased for non-agricultural employment while they increased for agricultural workers. The self-employed in non-agricultural work have similar earning rates to the wage employed, which suggests that wage employment is not necessarily a better earning option. However, yearly earnings among the self-employed are lower, which suggests that they are employed for shorter periods or work fewer hours.

Table 1.3: Earnings and Income by Employment Category, 2001 and 2005

	Level 2001		*Level 2005*		*% change*	
	Non-Agriculture	**Agriculture**	**Non-Agriculture**	**Agriculture**	**Non-Agriculture**	**Agriculture**
Wage and salaried workers						
Median annual labor income	21,064.36	10,532.18	20,844.00	11,700.00	(1.05)	11.09
Median hourly earnings rate	8.32	4.22	8.52	5.06	2.41	20.01
Low earnings rate	20.57	37.76	17.66	24.86	(14.17)	(34.16)
Individual self-employed workers						
Median annual labor income	13,374.20	6,423.42	12,000.00	6,319.25	(10.28)	(1.62)
Median hourly earnings rate	11.20	3.88	6.22	-	(44.43)	-
Low earnings rate	28.32	55.96	34.13	51.59	20.50	(7.81)
Employers						
Median annual labor income	46,809.70	9,298.00	45,000.00	31,751.19	(3.87)	241.48
Median hourly earnings rate	26.87	5.87	19.78	-	(26.39)	-
Low earnings rate	3.40	45.72	6.83	9.72	100.85	(78.74)
Household enterprise workers						
Median annual labor income	10,532.18	5,190.74	16,053.45	5,891.44	52.42	13.50
Median hourly earnings rate	10.75	4.12	8.40	-	(21.85)	-
Low earnings rate	23.40	64.36	56.95	57.70	143.36	(10.34)

Notes: Median annual labor income refers to all the occupations and includes monetary, non-monetary and in-kind earnings. The median hourly earnings rate is calculated from the main occupation only, except for the agricultural self-employed, agricultural employers and agricultural family enterprises, for which it is calculated as profits per hour worked using the agricultural enterprise module. In 2005, the agricultural enterprise module does not report hours worked, and therefore the hourly earning rate cannot be calculated for the self-employed in agriculture.

Source: Own calculations with data from EMNV 2001 and 2005.

1.19 Table 1.4 presents a description of the employment status of the population 6 years of age and above. The first column (the stub) lists the tiers, meaning the group and subgroup of labor force categories. The second column shows the number of persons under each tier for 2001. The third column shows the hierarchical rates, meaning the percentage of people in the subcategory (or tier) for 2001. The fourth and fifth columns show the equivalent numbers and rates for 2005. The last column gives the percent change.

1.20 The first three tiers (child population, population 65 and above, and working age population) illustrate the basic population structure of those 6 years and older. It is very evident that the share of the population between 6 and 14 increased its participation among the group. The population 65 and older and the population of working age reduced their shares. As noted before, the share of the working age population as a fraction of the *total population* actually increased (in other words, the dependency ratio decreased). This means that the main reason for the decrease in the dependency ratio is a reduction in the share of those 65 and older and those 6 and younger. As will be seen in the next section, this has important implications for the evolution of the labor market in the coming decade, as the cohort between 6 and 14, which represents the largest fraction of the population, will enter the labor market in the coming years.

1.21 The table further disaggregates the working age population (15 to 64) into active and inactive. The rate of inactivity has remained almost constant at 35 percent. The inactive include the discouraged workers and the seasonally inactive. As has been mentioned, the proportion of discouraged workers as a fraction of the active population has decreased. But this is also true for the seasonally inactive (from 5 percent to 1.6 percent). Among the active population, 96 percent are employed with very little change between the years.

1.22 The employed population (tier 1.3.2.2) is disaggregated into different employment categories. The bulk of the non-agricultural population is employed as wage and salary workers (43 percent in 2001). In the agricultural sector employment is evenly distributed among the individually self-employed in agriculture (11 percent in 2001), the employed in agricultural family enterprises (10 percent in 2001) and the wage and salary workers (11 percent in 2001).[8] There has been little change in this structure. Under each employment category, the share of low earners is shown. These are the workers who earn incomes below the poverty line. The highest low earnings rates can be found among those individually self-employed in agriculture (55 percent have low earnings) and those that work in household family enterprises in agriculture (40 percent have low earnings). Employment in all agricultural categories has increased. As will be discussed further, it is unclear how much of this increase might be due to errors in the urban/rural weights of the 2001 survey.

1.23 Finally, Table 1.5 shows the sector of employment and level of education of the employed population. The tertiary sector absorbs most of the employed population, namely, more than two-thirds of the employed. This share decreased slightly between 2001 and 2005, owing to the increase in employment in the primary and secondary sectors. Finally the low level of education of the labor force stands out, as nearly 40 percent of the employed have an incomplete primary education or below, and only 10 percent have a completed secondary education.

1.24 In summary, between 2001 and 2005 Nicaragua's labor markets saw either no change or very subtle changes in this labor market profile. Perhaps the important events have been the increase in the share of the working age population as a fraction of the total population and the increase in employment in the agricultural sector. In general, as industrialization progresses the share of the population in the rural sector tends to decrease. In very few cases increases in the rural population are seen as response to urban crisis. However, this has not been the case in Nicaragua, and thus the reason for this increase is yet to be determined. One possible explanation is that the population weights used in the 2001 was not in accordance with the census behavior of the population (see Box 1.1). However, it is not clear to what extent this may be affecting the results.

[8] The individually self-employed are the self-employed who do not work with other family members. The employers are those who are self-employed but have paid workers. The household enterprise workers are the self-employed who work with unpaid family members or unpaid helpers.

Table 1.4: Hierarchical Description of the Population 6 Years and Above, 2001 and 2005

	2001 level (in millions)	Hierarchical rates	2005 level (in millions)	Hierarchical rates	% change
1. Total population 6 years and above	4,154,983	100.00	4,486,708	100.00	7.98
1.1 Child population (6-14 years of age)	1,031,158	24.82	1,185,578	26.42	14.98
1.1.1 Child laborers	91,443	8.87	110,071	9.28	20.37
1.2 Population 65+ years of age	257,459	6.20	265,742	5.92	3.22
1.2.1 Employed	92,816	36.05	97,448	36.67	4.99
1.3 Working age population (15-64 years of age)	**2,866,365**	**68.99**	**3,035,387**	**67.65**	**5.90**
1.3.1 Inactive[a]	**1,020,727**	**35.61**	**1,062,846**	**35.02**	**4.13**
1.3.1.1 Discouraged	92,206	9.03	73,723	6.94	(20.05)
1.3.1.2 Temporarily Inactive	48,292	4.73	16,798	1.58	(65.22)
1.3.2 Active	**1,845,638**	**64.39**	**1,972,540**	**64.98**	**6.88**
1.3.2.1 Unemployed	**64,099**	**3.47**	**66,837**	**3.39**	**4.27**
1.3.2.2 Employed[b]	**1,781,538**	**96.53**	**1,905,703**	**96.61**	**6.97**
1.3.2.2.1 Wage and salaried agriculture	196,348	11.02	209,395.	10.99	6.64
With low earnings	72,922	37.14	52,064.	24.86	(28.60)
1.3.2.2.2 Wage and salaried non- agriculture	771,318	43.30	785,037	41.19	1.78
With low earnings	143,963	18.66	138,619	17.66	(3.71)
1.3.2.2.3 Individual self-employed agriculture	59,854	3.36	67,048	3.52	12.02
With low earnings	32,950	55.05	33,440	49.88	1.49
1.3.2.2.4 Individual self-employed non-agri.	200,874	11.28	253,125	13.28	26.01
With low earnings	58,200	28.97	86,386	34.13	48.43
1.3.2.2.5 Employers agriculture	35,707	2.00	23,957	1.26	(32.91)
With low earnings	13,592	38.07	1,315	5.49	(90.32)
1.3.2.2.6 Employers non-agriculture	36,764	2.06	57,493	3.02	56.38
With low earnings	2,288	6.23	3,925	6.83	71.51
1.3.2.2.7 In Household enterprises agriculture[c]	193,377	10.85	300,639	15.78	55.47
With low earnings	79,136	40.92	94,246	31.35	19.09
1.3.2.2.8 In Household enterprises non-agr[c]	122,007	6.85	183,949	9.65	50.77
With low earnings	32,071	26.29	104,763	56.95	226.66
1.3.2.2.9 Others	165,286	9.28	25,055	1.31	(169.20)

a The survey does not allow for a distinction between discouraged workers who are willing to work and those who are not. Temporarily inactive workers are those waiting to start a job or waiting for the harvest season to begin.

b Employed workers are sub-classified according to the main occupation. The category does not sum to total employed because other employed are classified as members of cooperative enterprises.

c Includes unpaid family members.

Table 1.5: Other Characteristics of the Employed, 2001 and 2005

	Share of total employment 2001	*Share of total employment 2005*
Sector of activity (primary occupation)		
Primary	**18.45**	**20.60**
Secondary	**11.90**	**12.56**
Tertiary	**69.64**	**66.84**
Formal schooling attainment		
No-school	**20.30**	**17.63**
Incomplete primary	**26.89**	**24.13**
Primary	**13.72**	**14.79**
Incomplete secondary	**21.45**	**22.50**
Secondary	**8.23**	**10.17**
Tertiary	**9.41**	**10.78**

Source: Own calculations with data from EMNV 2001 and 2005.

Box 1.1: Urban/Rural Population: Possible Data Problems

The table below shows the population calculated from the census and the surveys. According to the surveys, urban population increased substantially from 1998 to 2001, from 54 percent to 58 percent, and decreased afterwards between 2001 and 2005, from 58 percent to 55 percent. It is hard to estimate whether the behavior in the surveys is actually true. It is surprising that urbanization increased substantially and then reversed in such a short time. The available census information suggests that there was an increase of 1 percentage point between 1995 and 2005, but there are no data points in between to illustrate the inter-census behavior. Moreover, the 2001 population estimations used in the 2001 survey overestimate the population growth. The present report corrects the weights for this overestimation, but makes no adjustments for regional or urban/rural composition, as there were no data available to do so. It is unlikely that the population overestimation was uniform across regions or urban/rural populations.

	Census 1995	Census 2005	Survey 1998	Survey 2001	Survey 2005
Managua	25.10%	24.56%	26.06%	24.83%	24.54%
Pacific Urban	17.38%	17.13%	16.75%	17.37%	16.95%
Pacific Rural	14.16%	12.34%	15.57%	14.34%	12.38%
Central Urban	10.79%	12.21%	10.51%	12.74%	12.28%
Central Rural	20.30%	19.83%	20.82%	18.67%	19.85%
Atlantic Urban	3.89%	4.37%	5.05%	5.50%	4.39%
Atlantic Rural	8.39%	9.56%	5.25%	6.55%	9.62%
Overall Urban	54.41%	55.92%	54.35%	58.33%	55.83%

Labor regulation in Nicaragua does not seem to pose a constraint to investment

1.25 The largest share of non-labor costs corresponds to social security contributions, which amount to 15 percent of the wage. Workers contribute with 6.25 percent of their wage for social security. Workers are entitled to one month of paid vacations and an annual bonus that is equivalent to one month of work. They are also entitled to seniority bonuses. In addition to these costs, employers have to pay 2 percent of the total payroll for INATEC, the technological training institute. Moreover, there are minimum wages by sectors and there is strong support for unionization. Firms are allowed to hire temporary workers and can extend this type of contract indefinitely. The working week consists of six days and the working week can be extended up to 50 hours. Termination of the employment contract is authorized with no third party involvement, and workers are entitled to severance pay upon termination, which varies with tenure.

Table 1.6: Labor Market Flexibility. Comparative Performance

Region or Economy	Difficulty of Hiring Index	Rigidity of Hours Index	Difficulty of Firing Index	Rigidity of Employment Index
United States	0	0	0	0
Jamaica	11	0	0	4
Dominica	11	20	20	17
Chile	33	20	20	24
El Salvador	33	40	0	24
Nicaragua	11	60	0	24
Colombia	22	40	20	27
Uruguay	33	60	0	31
Latin America & Caribbean	34	34.8	26.5	31.7
Costa Rica	56	40	0	32
OECD	27	45.2	27.4	33.3
Guatemala	61	40	0	34
South Asia	41.8	25	37.5	34.8
Middle East & North Africa	29.7	44.7	32.9	35.8
Honduras	67	40	0	36
Mexico	33	40	40	38
Brazil	67	60	0	42
Dominican Republic	56	40	30	42
Sub-Saharan Africa	44.3	52	44.9	47.1
Ecuador	44	60	50	51
Bolivia	61	60	100	74
Venezuela	67	60	100	76

Source: World Bank, Investment Climate surveys.

1.26 Investment climate surveys collect information among firms of constraints to growth and business activities. The information collected includes the level of non-wage labor costs and the perception among firms of the rigidity of labor regulation. Using this information, the Enterprise Survey Unit at the IFC constructs relative hiring and firing rigidity indexes.

Table 1.6 compares the results for Nicaragua with other countries in the region (and elsewhere) and its main trading partners (shown in grey). As can be seen, Nicaragua does not appear particularly rigid when compared to other countries in the region. In fact, it appears to be one of the least rigid economies, ranking only below Jamaica and Dominican Republic and having an overall performance equal to Chile and El Salvador. It is relatively low compared to the United States, one of its main trading partners but also the most flexible economy in the world.

1.27 Minimum wages are set by the Minimum Wage Commission in which representatives of the unions, the government and the private sector negotiate their level. Minimum wages are differentiated according to sector of economic activity in an attempt to "take into account the level of education of the labor force in each sector" (see Table 1.7).

Table 1.7: Minimum Wage and Lowest Wage Paid as a Proportion of Minimum Wage, 2001 and 2005

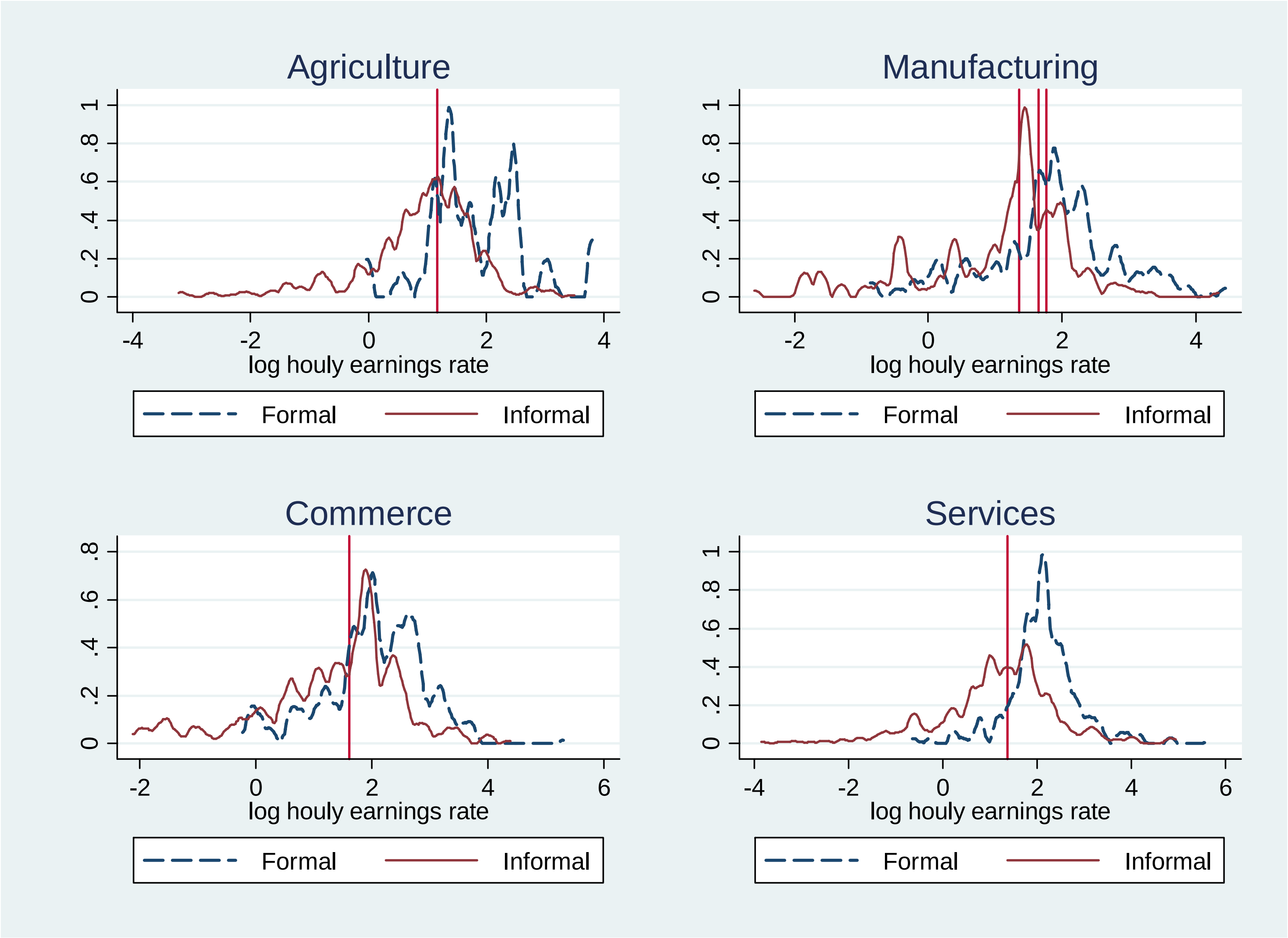
Sector	Minimum wage		Lowest paid wage as a proportion of minimum wage	
			2001	2005
Agriculture	542	736	1.23	1.17
Fishing	-			
Mining	942	1,377	2.12	1.53
Manufacturing	664	988	1.58	1.24
Electricity, Gas and Water	887	1,242	1.63	1.73
Construction	1,001	1,410	1.71	1.32
Commerce	1,292	1,752	1.01	0.98
Transport and Communications	1,001	1,410	1.39	1.22
Financial Intermediation	1,001	1,410	1.18	1.26
Services	1,110	1,752	0.88	0.70
Municipal and Central Gov.	778	1,066	0.79	0.90

Note: Monthly average minimum wage calculated as weighted average of ongoing minimum wages during the year.
Source: Own calculations based on MITRAB and BCN.

1.28 Assessing whether the minimum wage is binding in Nicaragua is a hard task. The fact that there are 12 different minimums implies that one would have to estimate separately for each sector of economic activity whether the wage is binding or not, and this would reduce the sample size and thus the reliability of any estimate. We opt for analyzing minimum wages in the four largest sectors in terms of employment: agriculture, manufacturing, commerce and community services.

1.29 A first step in analyzing minimum wages is to plot kernel density estimates of wage earnings and explore whether the distribution of earnings displays a kink at the minimum wage.

Figure 1.2: Distribution of Wages by Sector and Formality, 2001



Source: Own calculations with data from EMNV 2001 and 2005 and Nicaragua Central Bank.

1.30 Figure 1.2 illustrates the results for the log of hourly wage earnings for 2001, for both formal and informal wages. The vertical line is the corresponding log of the hourly minimum wage for the sector. In the case of the manufacturing sector there are three different minimum wages. The lowest (C$670) corresponds to the manufacturing non maquila sector. The middle wage (C$895) corresponds to the maquila sector and the highest (C$1,010) corresponds to utilities (electricity, gas and water).

1.31 As expected the distribution of formal wages is to the right of the distribution of informal wages. From the figure, there is some evidence of a kink around the minimum wage in formal agriculture, while in the informal agricultural sector minimum wages do not seem to have any effect. The maquila minimum wage is binding in manufacturing, but the non-maquila minimum wage seems to be setting the standard for minimum pay in the informal sector, although not in the form of a king, but rather by affecting the mode. The effects of minimum wages on commerce are unclear: there seems to be a slight kink for the formal sector, but results are sensitive to the assumption about hours worked[9]. Again there does not seem to be any effect on the informal sector. Minimum wages in the community services sector have no effect on either formal or informal wages; although both distributions show a kink, it is located at a higher level than the minimum wage. In any case, the distribution of wages does not show important distortions around the minimum wage when compared to other Latin American Countries. Moreover, there is no evidence of important effects of minimum wages on the informal sector. In many Latin American Countries minimum wages have been shown to leak to informal markets, suggesting that both segments are more integrated than previously thought. This does not seem to be the case for Nicaragua. This opens the possibility that minimum wages in Nicaragua are acting as a barrier to formal job creation, and may contributing to an informal sector that does not comply with minimum wage regulation. The magnitude and importance of this effect is merits further study.

1.32 It is unclear whether the current structure of minimum wages provides much benefit over a unique minimum wage. If the idea of sectoral minimum wages is to "take into account the different average skill levels of the labor force in each sector" it might be better to set a minimum wage by level of education (for the low skilled) rather than by sector. The current structure of the minimum wage might be introducing unnecessary distortions into the labor market, and might be segmenting the market according to skills. This might explain the behavior of maquila factories, which face a higher minimum wage than overall manufacturing and, as a response, may restrict employment to those with a secondary or higher education. If we assume that more productive firms have larger profits and a higher share of skills (as is often the case), the current minimum wage setting mechanism is acting more as a central collective bargaining mechanism to distribute profits between low skilled workers and firms, rather than as than as a mechanism for setting the lowest paid wage. But even if this is this were the objective of having a differential minimum wage by sectors, it is unclear what are the advantages of this centralized bargaining system over a decentralized (firm level) bargaining system.

1.33 When firms make hiring decision they compare the marginal cost of labor –i.e. the minimum wage- with the marginal product –i.e. the value of output produced by one additional worker-. More productive firms are usually more competitive, account for larger shares of employment and grow faster. In 'competitive' labor markets, if firms differ in productivity and minimum wages are higher for the most productive firms, then low skill workers (for which minimum wages are binding) will be rationed out of the most dynamic

[9] For this exercise a working week of 48 hours was assumed.

sectors of the economy. Instead a minimum wage by skill level, will mean that more productive firms will have an advantage with respect to low productive firms when hiring low skilled workers: relative to the marginal cost (i.e. the minimum wage), the marginal benefit of having an unskilled worker is larger. Therefore, high productivty firms might be more inclined to increase their unskilled labor intensity technology while workers will be equally off (for a given level of education) in any sector or firm. If on the other hand labor markets are characterized by frictions and wages are either bargained or the results of firms competing for labor (as in wage posting models), higher productivity firms will pay higher wages to equivalent workers (i.e. for the same level of education), distributing in this way profits between workers and capital, regardless of 'the average level of education' in the firm or sector, but proportionally to productivity in the firm. Under this setting it is unclear what is gained by introducing a centralized bargaining system that sets minimum wages according to the average level of education of workers in the sector. The efficiency of the outcome will depend on the bargaining power of both parties (firms and workers), but not on the average level of education of the sector or firm. Therefore there would seem no clear reason to use the average level of education in a sector as a guide to set minimum wages.

1.34 Understanding the employment effects of minimum wages and the impact of its sectoral structure on employment and the relative demand for unskilled labor is beyond the scope of this report. But it is an area that merits further research.

Table 1.8: Issues Affecting the Investment Climate

Ranking	Investment climate Issue	Percent of firms answering that it is a very severe problem
1	Corruption	38.3
2	Cost of credit	34.2
3	Macroeconomic and regulatory uncertainty	31.4
4	Access to credit	28.7
5	Macroeconomic stability	27.0
6	Non-competitive practice	26.8
7	Availability of credit	26.7
8	Efficiency of justice administration and conflict resolution	19.7
9	Crime and Violence	18.8
10	Transport	17.3
11	Electricity	17.3
12	Taxes	14.6
13	Red tape on taxes	8.4
14	Property rights	5.5
15	Skills of the labor force	5.5
16	Access to land	5.1
17	Import taxes regulation	4.9
18	Telecommunications	4.7
19	Permits and operating licenses	4.4
20	Labor regulation	3.1
21	Trade regulation	3.0

Source: Own calculations with data from World Bank Enterprises Surveys.

Investment climate constraints to increasing employment lie outside of the labor market

1.35 Nicaragua conducted an investment climate assessment for 2003. Although an investment climate assessment is outside the scope of this report, the survey can be used to pinpoint the main bottlenecks that are present and that may be hampering growth and employment generation.

1.36 Table 1.8 shows the percent of firms responding that a particular constraint was "severely" hampering business functioning and growth. Labor regulation and the skills of the labor force are among the least problematic constraints, while macroeconomic stability and uncertainty and credit issues are severely constraining business functioning and growth.

CHAPTER 2.
OUTPUT, EMPLOYMENT AND POVERTY

2.1 This chapter describes the labor and productivity profile of growth and links it to poverty reduction. It also takes a closer look at the manufacturing sector and the maquila sector. A first section describes the main trends in output, poverty and employment and a second section decomposes growth into sectoral employment and productivity changes, while a final section takes a closer look at manufacturing.

A. MAIN TRENDS IN OUTPUT, EMPLOYMENT AND POVERTY

2.2 Value added grew at an annual average rate of 4.2 percent between 1998 and 2005. Between 1998 and 2001 growth reached 5.42 percent. Growth decelerated dramatically between 2001 and 2005, reaching an average annual growth rate of 3.24 percent (Table 2.1). Agriculture, construction and services suffered the largest growth losses. Only transport and the financial sector kept their growth pace, but these sectors are small in terms of employment and output. Furthermore, the share of the poor employed in these two sectors is less than 4 percent. Despite this strong deceleration of economic activity, the manufacturing sector managed to grow at an average annual rate of 4.4 percent. As will be discussed below, this has important implications for poverty reduction. As has been mentioned, this growth was fueled in part by the reconstruction efforts after Hurricane Mitch struck the country in 1998. These reconstruction efforts meant that the construction sector grew at an average of 11 percent per year, although most of this growth was concentrated in the year after the hurricane, in which construction grew 36 percent. Manufacturing, agriculture and services also registered growth rates above the average. Growth in these sectors has important implications for both employment and poverty, as 60 percent of total employment is concentrated in these sectors and 76 percent of the poor earn their livelihood in these three sectors.

The working age population is growing, but skills remain stagnant

2.3 As has been mentioned, Nicaragua began to see an important change in the population structure, with the working age population (between 15 and 64 years of age) increasing its share in the total population. The working age population grew at an average annual rate of 2.7 percent per year, compared to a 1.7 percent average annual population growth. Figure 2.1 illustrates the significant change observed in population structure between 2001 and 2005.

2.4 This population change presents both challenges and opportunities for poverty reduction. One the one hand, a larger fraction of the population will have to find jobs. Between 2001 and 2005 the economy had an inflow of around 350,000 new workers. Had these new workers not been able to find jobs, poverty would have increased. On the other hand, each working adult now has to support a lower number of dependents, which provides an opportunity for poverty reduction if these new working adults are able to find sufficiently well-paid jobs.

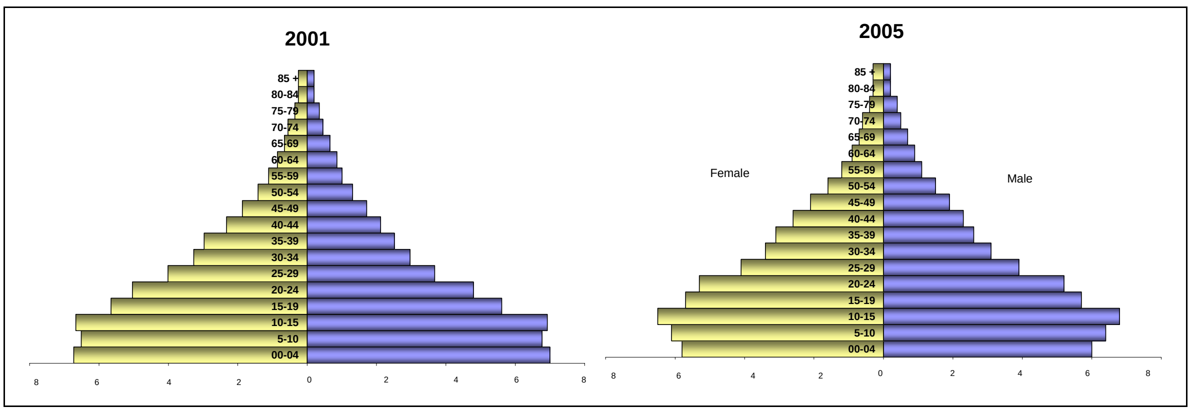
Table 2.1: Sectoral Growth, 1998-2005

	Average annual growth 1998-2001	Average Annual growth 2001-2005	Average annual growth 1998-2005
Agriculture	6.84	2.37	4.26
Mining and Utilities	5.23	3.00	3.95
Manufacturing	5.71	4.42	4.97
Construction	11.30	1.11	5.36
Commerce, Restaurants and Hotels	4.17	3.66	3.88
Transport and Communications	4.29	4.67	4.51
Services	6.22	3.07	4.41
Government	1.55	1.67	1.62
Financial Sector	8.51	9.76	9.22
Total	5.42	3.24	4.17

Source: Own calculations based on data from BCN and EMNV.

2.5 Furthermore, the cohort aged 10 to 15, which will have completed the transition to the working age within the next five years, will imply an additional 590,000 workers in the labor market.[10] Thus the opportunities and challenges offered by this population transition will continue to be present in the next decade.

Figure 2.1: Change in Population Structure, 2001-05



Source: Own calculations based on Nicaragua Census data.

2.6 Unfortunately, the level of education of this new labor force has not shown much improvement. Although higher primary completion rates were observed in 2005 compared to 2001, the share of the working age population with an incomplete secondary education or less decreased only 3 percentage points (from 68 percent of the employed working age population to 65 percent). This means that each year the share of the employed population with a less than complete secondary education decreased by only 1 percent or, equivalently, the share of the employed working age population with a completed secondary education or above increased by 1 percent. In other words, at this rate it would

[10] This increase is net of those aged 60 to 64 who will be exiting the labor market.

take 23 years to reach a stage at which at least 50 percent of the population had the level of complete secondary education or above.

2.7 Nicaragua has one of the lowest education levels in Latin America and Central America. It ranks only above Guatemala in terms of the education level of its urban and its rural populations (Table 2.2). If the population transition is to lead to poverty reduction, two policies will need to be at the front of the agenda: increasing good employment opportunities and accelerating educational achievement.

Table 2.2: Average Level of Education of Population 25 to 64

Country	Year	Urban	Rural
Guatemala	2004	6.5	2.4
Nicaragua	2001	6.9	3.1
Honduras	2003	7.5	3.5
Brazil	2005	7.8	3.8
El Salvador	2004	8.6	3.8
Bolivia	2004	8.9	4.9
Venezuela (national total)	2005	8.9	…
Dominican Rep.	2005	9.1	6.2
México	2005	9.6	6.0
Costa Rica	2005	9.6	6.8
Colombia	2005	9.7	…
Uruguay	2005	9.9	…
Ecuador	2005	10.4	5.6
Peru	2003	10.6	5.3
Panama	2005	11.1	7.0

Sources: Nicaragua's own estimations based on 2005 survey. Other data: CEPAL.

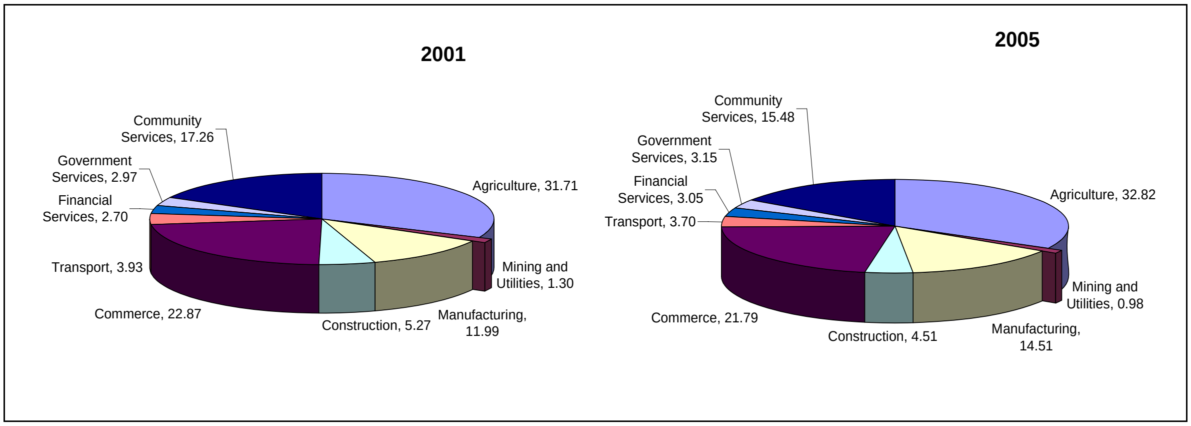
The growing labor force was absorbed disproportionately by the manufacturing and agricultural sectors . . .

2.8 All sectors, with the exception of mining and utilities, and construction, experienced positive employment growth. The average annual total employment growth was 4 percent. Moreover, the growth in employment was greater than the growth in the labor force (3 percent).

2.9 The growing labor force was absorbed by the agricultural, manufacturing and commerce sectors. These sectors accounted for around 67 percent of total employment, and they all experienced average annual growth rates above 2.5 percent, thus accounting for 84 percent of total employment growth (Table 2.3). On the other hand, community services, which is the other important sector in terms of its employment size, was stagnant, growing at an annual average rate of 1 percent. This meant that its contribution to total employment generation was a 5 percent. Figure 2.2 illustrates the sectoral shares of employment for 2001 and 2005.

2.10 Although commerce absorbed an important fraction of the new labor force, its growth rate was lower than aggregate employment growth, thus losing its participation in total employment. The third column in Table 2.3 shows the change in the employment share of each sector. The gain of 2.5 percentage points in manufacturing employment and of 1.1 percentage points in agricultural employment stands out. A further look at these sectors will be taken later in this chapter.

Figure 2.2: Share of Employment by Sectors, 2001 and 2005



Source: Own calculations based on data from BCN and EMNV.

But headcount poverty has remained stagnant

2.11 Despite the increase in the working age population and in the share of working age population employed, headcount poverty did not change. The number of poor according to the national poverty line stayed at 46 percent, and extreme poverty stayed at 15 percent. Poverty in the urban sector (29 percent) is substantially lower than poverty in the rural sector (68 percent).The incidence of poverty (the poverty gap) decreased a little less than 1 percentage point.

Table 2.3: Evolution of Employment by Sectors, 2001 and 2005

	Average annual employment growth (%)	Share of total employment generation (%)	Change in the share of total labor force (percentage points)
Agriculture	4.80	39.5	1.11
Mining and Utilities	-3.25	-1.0	-0.32
Manufacturing	8.99	29.8	2.52
Construction	-0.04	-0.1	-0.76
Commerce	2.65	15.2	-1.09
Transport	2.35	2.3	-0.23
Financial Services	7.18	5.2	0.36
Government Services	5.39	4.2	0.17
Community Services	1.13	4.8	-1.77
Total employment	3.90	100.0	0.02
Labor force	2.98		

*Source: O*wn calculations based on data from EMNV.

2.12 Table 2.4 shows the poverty rates of the working age population by area of residence and employment status. The poverty rate increased from 41 to 42 percent between 2001 and 2005. It is clear that poverty rates decreased among the employed and increased among the unemployed and inactive. The increase in poverty among the rural unemployed was particularly strong, but the unemployed in the urban sector make up less than 1 percent of the total working age population, so that this increase does not affect the overall poverty rate in any significant way. Thus, while the poverty rate among the rural employed decreased it was more than compensated by an increase in poverty among the rural inactive. As has been mentioned, the inactive include discouraged workers and the seasonally unemployed, among others.

Table 2.4: Poverty Rates of the Working Age Population by Employment Status, 2001-2005

		2001	2005
Employed	**Rural**	63	62
	Urban	25	25
Unemployed	**Rural**	48	61
	Urban	18	22
Inactive	**Rural**	66	69
	Urban	27	28
Total working age	**Rural**	64	65
	Urban	26	26
	Total	41	42
National poverty level	**Rural**	64	68
	Urban	29	29
	Total	46	46

*Source: O*wn calculations based on data from EMNV.

Table 2.5: Employment by Sector and Poverty Level, Shares of Total Employment, 2001 and 2005

	Poor		Non Poor		Total	
	2001	2005	2001	2005	2001	2005
Agriculture	53.57	55.66	16.98	17.25	31.71	32.82
Mining and Utilities	0.95	0.76	1.54	1.13	1.30	0.98
Manufacturing	8.85	11.04	14.10	16.89	11.99	14.51
Construction	5.09	3.83	5.39	4.98	5.27	4.51
Commerce	12.99	11.85	29.53	28.56	22.87	21.79
Transport	1.86	1.90	5.33	4.93	3.93	3.70
Financial Services	1.15	1.03	3.74	4.44	2.70	3.05
Gvt. Services	1.24	1.40	4.14	4.34	2.97	3.15
Community Services	14.30	12.54	19.25	17.49	17.26	15.48
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Own calculations based on data from EMNV.

2.13 Table 2.5 shows the evolution of employment by sector and poverty level. The table clearly shows that the poor are overly represented in agriculture, and this share *may* have increased from 2001 to 2005.[11] It also calls attention to the increase in the share of the poor employed in manufacturing from 8.8 percent to 11 percent, while they are losing their share in community services and commerce.

B. Decomposing per Capita Income Growth

2.15 The aim of this section is to show how growth is linked to changes in employment, productivity (output per worker) and population structure at the aggregate level and by sector. The main idea is to profile growth in per capita Value Added, to see whether growth has been accompanied by productivity or employment increases and if so in which sectors.

2.16 The change in per capita Value Added between 2001 and 2005 is decomposed into: (i) changes in the demographic composition of the population, (ii) changes in productivity, and (iii) changes in the share of working age population employed. The decomposition is performed at the aggregate level and by sectors. Per capita Value Added can change from one year to another if any of these components changes. For example, if there is an exogenous increase in productivity (Value Added per worker) for the same number of workers and for a constant population structure, the higher productivity per worker will imply more Value Added per person. Equally, there might be a change in the structure of the population so that each working person has fewer dependents; if productivity and employment do not change, then Value Added will increase as more workers are producing for the same total population. In reality, however, many factors are changing at the same time, so that it is difficult to disentangle what has happened to each component of per capita Value Added for a given observed growth. There are several techniques for decomposing and attributing to each component a share of total observed growth. The result described used Shapley decompositions which are described in Annex A in more detail.

2.17 Table 2.6 shows the change in Value Added per capita and in its main components. Per capita Value Added saw a growth of 7.14 percent for the period, while employment grew 16.54 percent, the population share of the working age population grew 3.62 percent and Value Added per worker (productivity) decreased almost 2 percent. This means that the new labor force was absorbed by employment, but at a lower productivity level (a lower level of output per worker).

Growth was employment intensive, but overall productivity decreased.

2.18 Figure 2.3 illustrates the results for the decomposition at the aggregate level. It shows that 74 percent of the change in per capita Value Added can be linked to changes in the structure of the population. In other words, had everything else stayed the same, the sole change in the number of dependents per working age person would have generated a growth equivalent to 74 percent of the actual observed growth (i.e., a total growth for the period of 5.3 percent). Changes in employment were also important, accounting for some

[11] The Household Survey for 2001 shows a rural share of the population that is inconsistent with the census. According to the Household Survey (EMNV 2001), the share of rural population increased between 2001 and 2005. The census shows the opposite. Apparently the survey of 2001 underestimates the rural population. If this is the case, the increase in the share of employed in agriculture might be due exclusively to the under-representation of rural households in the survey of 2001.

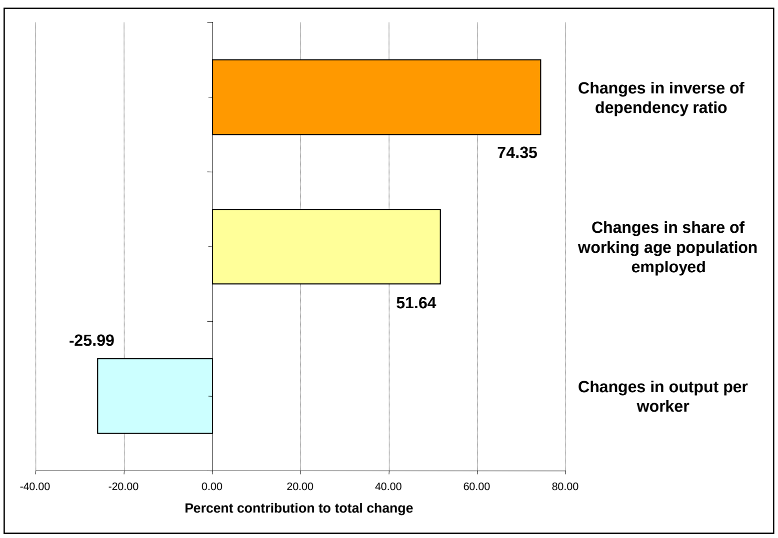
51 percent of observed growth. This means that if productivity had stayed the same and the number of dependents per working age member had also remained constant, the higher rate of employment would have generated a growth of 3.6 percent. Unfortunately, changes in productivity acted in the opposite direction. Had productivity not changed, observed growth would have been 9 percent, but decreases in productivity meant that growth was 1.6 percentage points lower.

Table 2.6: Percent Change in Selected Variables, 2001-05

	% change	Average Annual growth %
Value added	14.47	3.44
Value added per capita	7.14	1.74
Population	6.85	1.67
Population of working age	12.47	2.98
Employment	16.54	3.90
Employment/pop. working age	3.62	0.89
Value added per worker	-1.78	-0.45

*Source: O*wn calculations based on data from BCN and EMNV.

Figure 2.3: Aggregate Employment and Productivity Profile of Growth 2001-2005



Source: Own calculations based on data from BCN and EMNV.

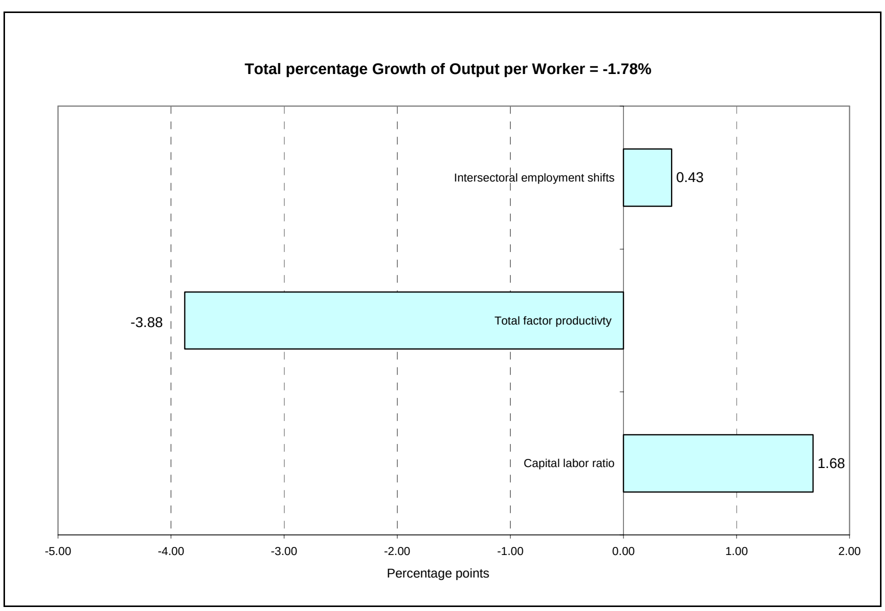
2.19 The key question, then, is why did productivity decrease? There are many reasons why output per worker might have decreased: Workers might have moved to a sector where marginal productivity is lower, TFP might have decreased or, the capital labor ratio was reduced as a result of the large inflow of workers into the economy. To explore these possible alternatives we further decompose changes in aggregate output per worker into change due to: i) intersectoral labor shifts i.e. movements of worker between sectors of different productivity levels- ii) changes in the capital labor ratio and iii) changes in Total Factor Productivity (TFP).

2.20 Figure 2.4 shows the result of the decomposition of changes in output per worker for the aggregate economy. Total output per worker decreased 1.78 percent. Of this decrease intersectoral employment shifts exerted a positive effect on output per worker (half a percentage point) or 6.72% of total productivty growth. The capital labor ratio also increased, contributing with 1.68 percentage points. But TFP suffered an important reduction which explains 3.66 points of the decrease. From this data we can clearly say that TFP changes are responsible for the decrease in output per worker.

2.21 For this decomposition TFP was calculated as a residual (see Appendix A). This means that it is capturing all factors other than capital and intersectoral shifts. For example, the average skill of the labor force which comprises both experience and education. It will also capture changes in the structure of employment by employment categories (rather than by sectors). For example if an important increase of total employment was concentrated among family enterprises or the self employed, which have lower than average productivty, then TFP will decreases. As pointed out in the previous chapter (see Table 1.5) the average years of education of the labor force increased, so the explanation for TFP decreases do not lie on the level of education (at least if quality did not change). In the previous section (Table 1.3 and Table 1.4) we found that employment had increased disproportionately among household enterprise workers and individual self employed, which are the categories with lowest earnings. If they are also those with the categories with the lowest productivty (as is most likely the case) then this increase in the share of employed in low earning categories might account for part of the TFP decrease. New entrants to the labor market also have less experience and as such may have lower productivities.

2.22 In addition, in a segmented labor market, where marginal products differ between sectors, it is possible that as workers move from low marginal product sectors to high marginal product sectors, the average product of labor falls in the sector where employment rises as marginal decreasing returns to labor set in. Unfortunately we have no data to decompose changes in output per worker by sector, to see whether capital labor ratios decreased in the expanding sectors or whether TFP changes explain these decreases. We can however, look at changes in overall productivity and employment by sectors, as well as intersectional shifts, to understand further the aggregate behavior.

Figure 2.4: Decomposition of Changes in Output per Worker. 2001-2005



Decomposing intersectional shifts

2.23 It is possible to understand further how changes in the share of employment in the different sectors help explain the overall contribution of intersectoral shifts to per capita growth. An important literature has found that structural change, which is movements of labor force shares form low productivty sectors to high productivty sectors, is an important factor behind growth. Increases in the share of employment in sectors with above average productivty will increase overall productivty and contribute positively to the intersectoral shift term. On the contrary, movements out of sectors with above average productivty will have the opposite effect. By the same token, increases in the share employment in sectors with bellow average productivty should reduce growth, while reduction in their share should contribute positively to growth.

2.24 Table 2.7 shows the results of decomposing intersectoral shifts using the above intuition (see Annex A for details and formulas). The results show that the increasing shares of employment in manufacturing and government explain most of the positive effect of intersectoral shifts. While movements into agriculture and out of mining and utilities exerted a negative effect on overall per capita growth.

Table 2.7: Decomposition of Intersectoral Shifts

	Direction of Employment Share shift	Contribution to Intersectoral Shifts (%)
Sectoral contributions		
Agriculture	Movements into	-84.72
Mining and utilities	Movements out off	-161.67
Manufacturing	Movements into	279.11
Construction	Movements out off	6.39
Commerce	Movements out off	46.14
Transport	Movements out off	-48.24
Government	Movements into	49.52
Other	Movements out off	13.48
Total Contribution of intersectoral shifts		*100.00*

2.25 In other words, had employment growth been proportionally distributed among all the sectors, per capita Value Added growth would have been 6 percent lower (i.e. the contribution of intersectoral shifts to total per capita growth). But because employment growth was disproportionately concentrated in manufacturing, a sector with high productivty, it spurred growth.

Decreases in productivity were not economy-wide, while increases in employment were concentrated in manufacturing and agriculture

2.26 Table 2.8 shows changes in total Value Added by sector as well as changes in the share of each sector in total Value Added. All sectors experienced positive growth, and overall employment growth was 14.5 percent for the whole period. Manufacturing, commerce, transport and "other" saw a Value Added growth that was above average, thus gaining share in total Value Added. The sector referred to as "other" groups community and enterprise services as well as financial services, but this last has a very small share of the total. Agriculture reduced its share. Overall changes in shares were relatively small: manufacturing gained a 1 percentage point share while agriculture lost a 1 percentage point share.

Table 2.8: Sectoral Growth, 2001-05

	Total Value Added growth 2001-2005	Share of total Value Added		
		2001	2005	% change
Agriculture	9.80	22.1	21.2	-4.08
Manufacturing	18.91	19.0	19.8	3.87
Mining and utilities	12.55	3.6	3.5	-1.69
Construction	4.52	4.9	4.5	-8.69
Commerce	15.45	18.2	18.3	0.85
Transport	20.03	7.1	7.4	4.85
Government	6.86	7.0	6.6	-6.65
Other	18.39	18.1	18.7	3.42
Total	**14.47**	**100.0**	**100.0**	**-**

*Source: O*wn calculations based on data from BCN.

2.27 Table 2.9 shows changes in productivity and employment shares by sectors. All sectors experienced positive employment growth, but growth was disproportionately concentrated in manufacturing and agriculture. Value added per worker decreased in both manufacturing and agriculture, which were the sectors that experienced the highest increases in employment. It is also worth noting that all sectors that saw an increase in employment also saw a decrease in productivity, while sectors that experienced an increase in productivity had a decrease in their share of employment. There may be several explanations for this. One possible explanation is that changes in employment mainly capture new entrants to the labor market and these new entrants have lower productivity than more experienced workers. The sectors that have a stronger increase in employment growth absorb most of this new labor force, and thus have a stronger negative effect on average productivity. Alternatively as explained above, the inflow of workers into these sectors implied a lower capital labor ratio, as decreasing marginal returns to labor set in, and as such a decrease in average productivty.

Decreases in productivity as well as increases in employment were concentrated in agriculture and manufacturing. Increases in the relative size of the manufacturing sector (in terms of employment) account for an important share of growth

2.28 Finally, Table 2.10 illustrates the contribution of each sector to total per capita Value Added growth. Sectoral contributions are decomposed into: i) contribution of changes in output per worker (first column), ii) contribution of the sector to employment rate growth (second column), and iii) contributions of the sector to the intersectoral shift component (see Annex A for details). Overall, manufacturing, commerce, transport and other services contributed positively to growth, while agriculture, mining and utilities, construction and government had a negative contribution.

Table 2.9: Employment Shares and Productivity, by Sectors of Economic Activity, 2001- 2005

	Output per worker (1994 $C)			Employment/pop. of working age		
	2001	2005	% change	2001	2005	Absolute Change
Agriculture	10,973	9,988	(8.97)	19.21	20.60	1.39
Manufacturing	25,032	21,097	(15.72)	7.26	9.11	1.85
Mining and utilities	43,097	55,364	28.47	0.79	0.62	-0.17
Construction	14,701	15,393	4.70	3.19	2.83	-0.36
Commerce	12,505	13,005	4.00	13.86	13.68	-0.18
Transport	28,418	31,084	9.38	2.38	2.32	-0.06
Government	37,223	32,239	(13.39)	1.80	1.98	0.17
Other	14,308	15,643	9.33	12.09	11.64	-0.45
Total	**15,757**	**15,477**	**(1.78)**	**60.59**	**62.78**	**2.19**

Source: Own calculations based on data from BCN and EMNV.

2.29 Despite the enormous employment growth in manufacturing, the decrease in output per worker was so large that it more than offset the employment growth. However, shifts of labor into manufacturing (i.e. the relative size of the manufacturing sector) and away from other sectors of lower productivty, more than compensates this effect , so that in the aggregate manufacturing contributed with 12 percent of total per capita growth. Other services accounted for a non-negligible 14 percent of observed growth of output per capita; and commerce and transport contributed with 9 and 5 percent of the growth, respectively. In all three sectors the effect was mostly due to increases in output per worker.

2.30 Agriculture, on the other hand contributed negatively to per capita growth, via to different effects, first it saw a decrease in output per worker and second it increased its share of total employment. Given that it has productivty bellow average this shift toward agriculture reduced growth.

2.31 These results suggest that had productivity in agriculture and manufacturing not decreased, then Value Added per worker would have been 5 percentage points higher. The next section tries to provide an understanding of what was happening in manufacturing. A closer look at the agricultural sector will be undertaken in a later section..

Despite decreasing productivity in agriculture, agricultural wages increased while manufacturing wages saw a decrease

2.32 Table 2.11 presents the median wages by sector of economic activity, calculated from the household surveys. The table shows that, in real terms, wages in agriculture increased 17 percent while wages in manufacturing decreased 2 percent between 2001 and 2005. As will be seen, lower Value Added per worker in agriculture was compensated by higher producer prices, so that this may have limited the falls in productivity from translating into lower wages. In the case of the manufacturing sector, wages did decrease, but much less than productivity, so that productivity falls were not totally passed on to wages.

Table 2.10: Total Sectoral Contribution to Growth, 2001-05

	Contribution of Changes in Output per Worker (%)	Contribution to Total Employment Rate Changes (%)	Contributions of Intersectoral Shifts (%)	Total (%)
Sectoral contributions				
Agriculture	-29.53	32.78	-5.30	-2.05
Mining and utilities	13.03	-4.11	-10.12	-1.20
Manufacturing	-48.47	43.48	17.48	12.49
Construction	3.14	-8.44	0.40	-4.90
Commerce	10.39	-4.23	2.89	9.05
Transport	9.46	-1.37	-3.02	5.08
Government	-14.19	4.11	3.10	-6.97
Other	23.89	-10.59	0.84	14.14
Subtotals	*-32.26*	*51.64*	*6.26*	*25.64*
Demographic component	-	-		74.36
Total				100.00
Total % change in output per capita 2001-2005				**7.14**

Source: Own calculations based on data from BCN and EMNV.

Table 2.11: Wages by Sector of Economic Activity, 2001 and 2005

	Median wage $C 2001		
	2001	**2005**	Real growth (%)
Agriculture	6,840	8,018	17.2
Mining and Utilities	20,000	23,495	17.5
Manufacturing	12,600	12,364	-1.9
Construction	10,080	10,000	-0.8
Commerce	13,329	13,364	0.3
Transport	18,900	18,327	-3.0
Financial Services	18,175	21,238	16.9
Gvt Services	23,665	25,833	9.2
Community Services	12,179	14,118	15.9

Source: Own calculations based on data from EMNV.

C. A CLOSER LOOK AT THE MANUFACTURING SECTOR

Employment generated in manufacturing was concentrated in low return employment categories and in sectors with no overall wage increases

2.33 Table 2.12 shows employment generation by sub-sector. When analyzing which sectors absorbed most of the employment generation, we find that 66 percent of the employment growth was in the food and beverage sector and the clothing sector. The tobacco sector contributed to an additional 8 percent of employment generation. The last row of the table shows employment generation by maquila, which contributed an amazing 32 percent of employment generation between 2001 and 2005, most of which was clothing (see Box 2.1)

2.34 Table 2.13 shows the median wages for these sectors. The two sectors that generated most of the employment growth in manufacturing (food and clothing) saw differing behavior. In the food sector, median wages decreased, while wages in the clothing sector increased.

Table 2.12: Employment Generation by Sub-sector, 2001 and 2005

	Total employment		Employment growth (number)	Employment growth (%)	Share of total employment generation
	2001	2005	2001-2005	2001-2005	2001-2005
Food and beverage	69,754	100,398	30,644	43.93	38.54
Tobacco	1,118	7,394	6,276	561.35	7.89
Textiles	4,305	6,472	2,167	50.34	2.73
Clothing	62,811	84,989	22,178	35.31	27.89
Wood products	8,766	10,571	1,805	20.59	2.27
Paper and prints	2,455	5,210	2,755	112.25	3.47
Petroleum	469	622	153	32.52	0.19
Chemicals	1,752	2,926	1,174	67.02	1.48
Plastic and rubber	1,441	1,362	(79)	-5.46	-0.10
Other non-metallic mineral products	10,917	13,461	2,544	23.31	3.20
Metal and metal products	14,597	16,460	1,864	12.77	2.34
Machinery and equipment	1,945	3,695	1,750	89.99	2.20
Transport equipment	443	634	190	42.96	0.24
Other	15,271	21,355	6,084	39.84	7.65
Total Manufacturing	**196,043**	**275,549**	**79,506**	**40.56**	**100.00**
Maquila employment	35,565	61,000	25,435	71.52	31.99

Source: Own calculations based on data from EMNV.

2.35 Another way of looking at the types of jobs generated is to see which type of employment showed more growth. As was discussed, in Nicaragua the lowest income is observed in those working in household family enterprises, followed by the individual self-employed, while the highest income corresponds to employers, followed by wage and salaried workers. Table 2.14 shows that 32 percent of the employment generated in manufacturing was concentrated in family enterprise workers, 17 percent was in the individual self-employed, and 55 percent was in the wage and salaried categories. This means that 48 percent of the jobs created in manufacturing were of low income generation.

Table 2.13: Wages in the Manufacturing Sector, 2001 and 2005

	Median Income $C 2001		
	2001	2005	Real growth (%)
Food and beverage	13,800	12,364	-10.4
Tobacco	16,960	9,848	-41.9
Textiles	9,960	8,379	-15.9
Clothing	11,495	13,424	16.8
Wood products	11,700	11,455	-2.1
Paper and prints	19,840	14,773	-25.5
Chemicals	30,805	20,606	-33.1
Plastic and rubber	16,350	18,038	10.3
Other non-metallic mineral products	10,032	11,882	18.4
Metal and metal products	11,970	15,273	27.6
Machinery and equipment	7,036	16,743	138.0
Other	4,944	17,438	252.7

Source: Own calculations based on data from BCN and EMNV.

Table 2.14: Employment Generation in Manufacturing by Type of Employment, 2001 and 2005

	Total employment		Employment growth (number)	Employment growth (%)	Share of total employment generation
	2001	2005	2001-2005	2001-2005	2001-2005
Wage and salaried workers	127,748	171,355	43,607	34.14	54.85
Individual self-employed	33,153	46,837	13,683	41.27	17.21
Employers	12,443	10,850	(1,592)	-12.80	-2.00
Family enterprise workers	22,277	47,526	25,249	113.34	31.76
Other	421	-	(421)	-	-0.53
Total	**196,043**	**276,569**	**80,526**	**41.08**	**101.28**

Source: Own calculations based on data from BCN and EMNV.

The maquila sector may have counteracted the negative forces in income generation

2.36 It is worth noting that the maquila sector may have played an important role in counteracting the negative effect of the growing number of employed in family enterprises and the decreasing wages in the food sector. No data are available on wages for the maquila sector, but most of this is concentrated in the clothing sector, which saw an overall wage increase of 17 percent. If the maquila sector participated in this wage increase, then it may have had important positive effects on income generation, since this sector contributed to 32 percent of total employment (see Box 2.1)

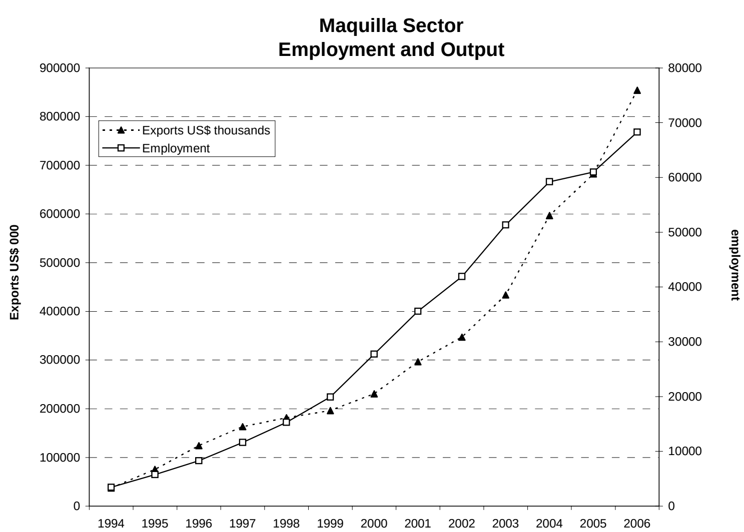
Box 2.1: Evolution of the Maquila Sector and Its Importance in the Employment Growth in Manufacturing

The first maquila factories started in 1990, with the establishment of the first publicly owned Export Processing Zone (EPZ), "Las Mercedes." In 1994 the EPZ law was reformed to allow private ownership by both foreign and domestic investors and an expansion of EPZ to other regions in the country, with the particular aim of providing employment opportunities for poorer areas. Currently there is the zone of Las Mercedes. The rest are distributed in 30 *parques industriales* (industrial parks), which are private EPZs. The main investors are from Taiwan, the United States, Korea, Nicaragua, Italy, Honduras, Belize and Mexico.

Initially, EPZ firms were not allowed to use domestic raw materials, which limited their spillover effects to those of employment generation, but with the signing of the CAFTA agreement these restrictions were removed. EPZs have a 100 percent exemption on corporate income tax for the first 15 years of operation. They are exempt from capital gains on real estate, all corporate taxes, excise, sales and municipal taxes as well as import duties on machinery, inputs and equipment. Currently there are 84 firms, of which the large majority are in the clothing sector.

In 2006 there were 68,300 employees in the EPZ, which corresponds to just over 3 percent of total employment,18 percent of formal employment and 64 percent of formal employment in manufacturing. This employment is mostly female (90 percent). EPZ firms have to comply with all of the labor regulations. There is a special minimum wage for the EPZs, which is above the manufacturing EPZ wage. The rationale for this is that labor force quality in the EPZ is higher than that in the average manufacturing labor force. Apparently, to be a worker in the maquila sector employees have to have completed secondary education, which substantially reduces access to this employment for the very poor. The fact that the minimum wage is higher for the maquila sector may contribute to this selection.

For 2005 Maquila exports represented 50 percent of total exports, and the value of transformations services (which corresponds to the sum of wages, utilities and services paid) was equivalent to 24 percent of Value Added in manufacturing. The graph below illustrates the evolution of employment and output in the maquila sector.



2.37 The main picture that emerges from this chapter is as follows: growth was mainly concentrated in the manufacturing sector. Employment growth was concentrated in both manufacturing and agriculture. Unfortunately, this growth had a limited impact on the income opportunities of the poor. On the one hand, despite the fact that wages in agriculture increased, returns in this sector still offer the lowest income generation, so that growing employment in this sector is not likely to reduce poverty. On the other hand, employment generated in manufacturing was divided evenly between family enterprise employment and wage employment. Family enterprise employment has a very low income generation potential. Wage employment has a better potential, but its benefits to the poor seem to have been limited by two main factors: (i) wages decreased in the food sector, which saw most of the employment growth in manufacturing; and (ii) clothing, which was the other important sector in terms of job creation, offered limited employment access for the poor because of its skill requirements (secondary or above).

CHAPTER 3.
EMPLOYMENT AND LABOR INCOME PROFILE OF THE POPULATION

3.1 Some background knowledge of how labor income and its components affect household poverty is useful to an understanding of what the priority policies should be. A labor profile of the population should inform policymakers as to how households are distributed among sectors, what their status in employment is and what the determinants of per capita household labor income are. This can be done by dividing the population into the poor and the non-poor – defined according to national and international poverty lines – or by using income quintiles. Another method for an understanding of how labor markets have affected household welfare is to disentangle the sources of labor income growth that are responsible for the observed changes in total labor income.

3.2 This chapter is structured as follows: the first section sketches a labor profile of the population, while the second focuses on the decomposition of household labor income growth through the use of the panel component of the 2001 and 2005 surveys. A final section is concerned with the agriculture sector.

A. INCOME AND EMPLOYMENT PROFILE

Inactivity among the poor is more significant than unemployment

3.3 Table 3.1 and Table 3.2 show the employment status of the working age population by quintile and poverty level. There has been an increase among the poor in total working age population, which means that there are fewer dependent people within a household and there are potentially better employment and income opportunities for the household as a whole. Among poor households, not all the members of working age looked for a job (the inactive members increased from 39 percent in 2001 to 40 percent in 2005), but most of those who sought a job actually found one: the proportion of unemployed remained almost constant, while the number of employed increased by almost 1 percentage point.

Table 3.1: Employment Status of the Working Age Population by Quintile, 2001 and 2005

	Q1		Q2		Q3		Q4		Q5		Total	
	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
Employed	9.3	10.4	10.4	11.6	12.4	12.2	13.6	13.4	16.4	15.2	*62.2*	*62.8*
Unemployed	0.2	0.2	0.2	0.3	0.5	0.4	0.5	0.7	0.8	0.6	*2.2*	*2.2*
Inactive	6.1	6.7	6.5	6.9	6.6	7.4	8.2	6.6	8.2	7.4	*35.6*	*35.0*
Total	15.6	17.3	17.1	18.7	19.6	20.1	22.3	20.7	25.5	23.2	*100*	*100*

Source: Own calculations based on data from EMNV.

Table 3.2: Employment Status of the Working Age Population by Poverty Level, 2001 and 2005

	Poor		Non Poor		Total	
	2001	2005	2001	2005	2001	2005
Employed	59.7	60.6	61.2	64.4	60.6	62.8
Unemployed	1.3	1.5	3.0	2.7	2.3	2.2
Inactive	38.9	37.9	35.8	32.9	37.1	35.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations based on data from EMNV.

3.4 The 2001 Household Survey asks the reasons for inactivity. Discouraged workers represent 11 percent among the poor and 8 percent among the non-poor. Those who are temporarily inactive (who have occasional jobs, are waiting for the harvest season, or are waiting to start a new job) correspond to 3 percent of the inactive among the poor and 2 percent among the non-poor. The largest shares of the inactive are homemakers and students: 52 percent and 34 percent are homemakers among the poor and the non-poor, respectively; 14 percent and 32 percent are studying (among the poor and non-poor, respectively).

The poor do not benefit from formal employment

3.5 Table 3.3 and Table 3.4 describe the structure of employment by quintile and poverty level. The fraction employed in each category is shown as a proportion of employed individuals. As discussed above, employment in the formal sector is very small; only 17 percent of the employed have formal jobs, most of which are held by the non-poor (14 percent). This close relationship between poverty and formal employment does not have an immediate interpretation. Either poverty is a consequence of lack of formal employment or being poor hampers access to formal employment. Alternatively both informal employment and poverty may be a consequence of lack of education and skills. It would be important to look further into this relationship, to assess the importance of generating formal employment vis-à-vis removing barriers to employment mobility among the poor, including access to education.

3.6 The number of waged workers employed in the informal sector decreased by 7.8 percent. What is more important is that the decrease was even greater among the poor than among the non-poor (-13 percent compared to -3.78 percent). The individual self-employed with no paid employees and also employers with paid employees decreased their share among the poor, while the number of family enterprises – often associated with low income generation – rose by around 1 percentage point for both the poor and the non-poor. The number of poor employed in the public sector remained almost constant.

Table 3.3: Employment Categories by Quintile, 2001 and 2005

	Q1		Q2		Q3		Q4		Q5		Total	
	2001	**2005**	**2001**	**2005**	**2001**	**2005**	**2001**	**2005**	**2001**	**2005**	**2001**	**2005**
Waged employed private formal sector	0.5	0.6	1.4	1.5	2.8	2.7	4.6	5.0	7.6	7.7	*16.9*	*17.4*
Waged employed private informal sector	6.4	5.4	6.6	6.2	8.2	7.2	6.7	6.9	6.5	6.3	*34.5*	*32.0*
Waged employed public sector	0.1	0.2	0.3	0.2	0.4	0.3	0.9	0.9	1.5	1.7	*3.1*	*3.4*
Self-employed with no paid employees	2.5	2.2	3.2	3.3	3.8	3.6	4.2	4.4	5.1	5.0	*18.7*	*18.5*
Employers with paid employees	0.3	0.1	0.8	0.4	0.8	0.6	1.3	1.3	2.4	2.6	*5.7*	*5.1*
Family enterprise workers	5.1	6.0	4.5	4.7	4.0	4.9	4.4	3.8	3.2	4.3	*21.2*	*23.6*
Total	14.9	14.5	16.7	16.2	20.0	19.4	22.0	22.3	26.3	27.7	*100.0*	*100.0*

Source: Own calculations based on data from EMNV.

Table 3.4: Employment Categories by Poverty Level, 2001 and 2005

	Poor		Non-poor		Extremely Poor		Total	
	2001	**2005**	**2001**	**2005**	**2001**	**2005**	**2001**	**2005**
Waged employed private formal sector	2.5	2.7	14.4	14.7	0.2	0.4	*16.9*	*17.4*
Waged employed private informal sector	15.3	13.5	19.2	18.5	4.8	4.1	*34.5*	*32.0*
Waged employed public sector	0.4	0.5	2.6	2.9	0.1	0.2	*3.1*	*3.4*
Self-employed with no paid employees	6.9	6.4	11.8	12.1	1.9	1.4	*18.7*	*18.5*
Employers with paid employees	1.4	0.6	4.2	4.4	0.2	0.0	*5.7*	*5.1*
Family enterprise workers	10.7	12.1	10.5	11.5	3.9	4.3	*21.2*	*23.6*
Total	37.3	35.9	62.7	64.1	11.1	10.4	*100.0*	*100.0*

Source: Own calculations based on data from EMNV.

Table 3.5: Structure of Income by Quintile, 2001 and 2005

	Q1		Q2		Q3		Q4		Q5	
	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
% income from waged employment agr.	29.2	26.0	15.1	14.5	12.7	9.1	5.9	5.5	3.0	3.3
% income from waged employment non-agr.	18.1	15.0	29.1	26.7	35.4	32.3	37.0	36.7	40.0	34.1
% income from self-employment agri.	22.3	27.6	17.3	21.4	13.7	14.3	8.5	8.6	3.6	5.6
% income from self-employment non-agri.	8.8	7.2	16.4	12.5	17.0	16.7	21.9	21.4	25.2	22.1
% income from public transfers	1.9	6.8	0.8	5.4	1.6	4.4	2.6	3.1	2.3	3.0
% income from family remittances (internal)	3.6	3.3	4.0	3.3	2.1	3.5	4.3	3.9	2.6	3.4
% income from family remittances (external)	0.9	1.4	1.3	2.6	2.6	4.2	2.6	4.9	4.4	8.8
% income from other non-labor sources	15.3	12.7	15.9	13.7	15.0	15.6	17.1	15.9	18.9	19.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations based on data from EMNV.

Table 3.6: Structure of Income by Poverty Level, 2001 and 2005

	Poor		Non-poor		Ext Poor	
	2001	**2005**	**2001**	**2005**	**2001**	**2005**
% income from waged employment agr.	20.7	18.6	5.9	5.0	30.8	28.2
% income from waged employment non-agr.	24.6	22.2	38.6	35.1	16.4	14.0
% income from self-employment agri.	19.0	23.2	7.3	8.2	22.2	27.4
% income from self-employment non-agri.	13.8	10.5	22.1	21.1	8.7	6.4
% income from public transfers	1.4	6.0	2.3	3.2	1.8	6.6
% income from family remittances (internal)	3.6	3.3	3.1	3.6	4.0	3.4
% income from family remittances (external)	1.4	2.4	3.4	6.4	0.9	1.2
% income from other non-labor sources	15.6	13.7	17.4	17.5	15.2	12.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations based on data from EMNV.

Public transfers increased for the poor while remittances increased for the entire population but less so for the poor

3.7 Table 3.5 and Table 3.6 show the earnings profile of the population by quintile and by poverty level. There are no significant differences in the income structure of the population. For all levels of income, wage employment is the main source of income, accounting for a little over 45 percent of total income. The main difference is that poor wage earners receive their earnings from agriculture. This share decreased slightly for all income levels as remittances and public transfers increased. Remittances for the non-poor showed the largest increase, while public transfers showed the greatest increase for the poor, and among them for the extremely poor. It is worth noting that in 2001 public transfers were regressive in the sense that the poor received fewer transfers as a proportion of their total income. In 2005 this situation changed and public transfers became progressive.

B. DECOMPOSING CHANGES IN LABOR INCOME

3.8 A traditional way to understand how labor markets have affected welfare is to disentangle the sources of household per capita labor income that are responsible for observed growth or decreases in average household income.[12] Per capita household labor income – that is, the total income that the household earns from labor divided by the number of members in the household – can change for several reasons: (i) because income per employed member increases, (ii) because unemployment decreases, (iii) because the number of members that actively participate in the labor market rises, or (iv) because the dependency rate decreases.

3.9 In this section we attempt to understand what the main source of per capita labor income growth was between 2001 and 2005.[13] For this purpose we use the panel component of the survey. For each household we decompose how much of the change in labor income was attributed to changes in each of the components mentioned above. In addition, we differentiate between four types of employment: (i) waged work in agriculture, (ii) waged work in non-agriculture, (iii) self-employment in agriculture, and (iv) self-employment in non-agriculture. This means that, in addition to studying the share of income growth that was due to increases in employment, we can further discuss whether this employment growth took place in any of the employment categories mentioned above. In the same way we can determine whether increases in earnings (income per employed member) were due to increases in earnings in agriculture/non-agriculture or to waged/self employment.

3.10 We take a sample of 1,250 households whose members are classified according to their occupation (waged and salaried workers versus the self-employed) and their sector of employment (agriculture and non-agriculture).[14] We decompose labor income growth into

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[12] See Kakwani, Neri and Son (2006) for an application of this decomposition to the analysis of pro-poor rates of growth.

[13] See Annex B for the methodology.

[14] Some methodological clarifications are important. First, we select people of working age by dropping child laborers and the working elderly. This might imply overestimating productivity and underestimating employment shares and thus their contribution to total labor income growth. This is not a serious issue as they represent less than 2 percent and 7 percent, respectively, of the total working population (average over the two years of the survey). Second, we are forced to drop a little over one-third of the sample in both 2001 and 2005 since there is no correspondence between

four main terms: (i) income in "sector" j to total employment, (ii) the employment rate (which is equal to one minus the unemployment rate), (iii) the activity rate, and (iv) the share of working age people within a household. Furthermore, we disaggregate the first component into four sub-terms which represent productivity gains and employment shares in each "sector" of employment.

3.11 Table 3.7 presents the labor profile of the population by poverty level. The table shows the average labor income per employed person by employment category, the share of employed that work in each category, the employment rates (number of employed as a fraction of the active population), the participation rates (the active among the working age population), and the ratio between working age members and total members. All values are in 2001 córdobas.

Table 3.7: Labor Profile by Poverty Level, 2001 and 2005

	Poor		Non-poor	
	2001	2005	2001	2005
Average labor income per worker employed in waged work agriculture (annual 2001 C$)	2,104	2,220	1,079	1,264
Average labor income per worker employed in waged work non-agriculture (annual 2001 C$)	6,235	6,227	21,476	18,219
Average labor income per worker self employed in agriculture (annual 2001 C$)	5,898	6,032	2,942	3,279
Average labor income per worker self employed in non agriculture (annual 2001 C$)	3,133	3,840	12,552	12,152
Share of waged employed in agriculture	11.2	12.4	2.5	2.9
Share of waged employed in non-agriculture	31.9	31.7	57.8	54.8
Share of self employed in agriculture	41.0	39.8	9.2	9.9
Share of self employed in non agriculture	15.9	16.0	30.1	31.7
Employment rate	98.4	98.0	96.5	96.1
Activity rate	63.1	65.0	66.5	68.9
Share of working age members within a HH	52.9	59.0	64.2	67.1
Average per capita labor income	3,588	4,522	9,989	10,085

Source: Own calculations based on data from EMNV.

3.12 Several features are worth noting. First, wage employment in non-agriculture is the highest earnings option in agriculture for both the poor and the non-poor. It should also be noted that the non-poor have a lower earnings rate than the poor in agriculture. This is most likely due to the fact that the non-poor work fewer hours in agricultural activities, and not because they earn less per hour. As discussed earlier, the poor are mostly found in agricultural self-employment: around 40 percent of the members of a poor household are employed in this category. Employment rates are very high among both the poor and the

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workers and reported income within households: there are some households reporting income in a sector where there is no one employed, and vice versa. It might be an issue of misreported income for some of the households. Additionally, in many cases it seems that many people reporting earnings from agricultural self-employment are actually receiving rents from farms and are not directly employed in agriculture. As we believe this is not labor income but rents, we drop these households from the sample. Finally, we need to drop a small number of households that report a jump in the employment rate from 0 to 1 as they have an analogous increase in income and therefore they have a growth rate of income that goes to infinity. The selection is completely neutral across quintiles since we drop proportionally more poor than rich households as they are more likely to suffer from misreported income in agricultural business.

non-poor, being slightly higher for the poor, which merely reflects the fact that they cannot afford to be unemployed. Conversely, participation rates are slightly higher for the non-poor, and, as expected dependency rates are substantially higher for the poor: while for 2005 the poor showed 59 percent of their members of working age, among the non-poor this ratio was 67 percent.

3.13 There have been some important changes in the labor profile for the years analyzed. First, dependency rates among the poor decreased substantially, even more than for the non-poor. Second, there was an important increase in income per worker in self-employment for both agriculture and non-agriculture. On the other hand, the share of the employed in each employment category remained almost constant, with a slight increase in waged agricultural employment.

3.14 Table 3.8 shows the same labor profile as that in Table 3.7 by quintile, which permits a clearer understanding of labor profiles and their changes among the poor and non-poor households. Two important phenomena stand out. First, for the poorest 20 percent, income from non-agricultural waged employment is not the highest earnings option, while for all other quintiles it is. For the poorest 20 percent, income from self-employment is the best earnings option. Two different effects might be responsible for this: (i) the poor might work fewer hours as waged employees in non-agriculture, and (ii) the poor might earn less per hour worked. For the poorest 20 percent the highest earnings option is self-employment in agriculture. The second phenomenon is the increase in income for the very poor households.

3.15 Table 3.9 shows the average change in per capita household income by quintile. Between 2001 and 2005 the poor benefited more from economic growth as their labor income grew substantially more than that for the other groups. For the poorest quintile the annual per capita labor income growth rate was 14 percent. It was around 5 percent in the second quintile and it became negative in the last quintile (-1 percent). It is interesting to note that agriculture was the sector in which the poor, both the waged and the salaried workers and the self-employed, saw their income decreasing, while the income of the poor working in other sectors showed a substantial increase. Despite the important growth in the per capita income of the lowest quintile, it was not sufficient to bring them above the poverty line. In 2001 the poorest 20 percent had an average per capita income of C$ 2,609; the 14 percent increase still left it well below the C$ 5,241 of the poverty line. Figure 3.1 illustrates this growth.

Table 3.8: Labor Profile of the Population by Quintile, 2001 and 2005

	Q1		Q2		Q3		Q4		Q5	
	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
Average labor income per worker in waged agricultural employment (annual 2001 C$)	3,057	2,742	1,716	1,773	1,243	1,904	458	970	1,474	1,242
Average labor income per worker in waged non-agricultural employment (annual 2001 C$)	3,841	3,633	7,864	7,328	9,303	10,551	15,495	14,482	33,683	24,955
Average labor income per worker in agricultural self-employment (annual 2001 C$)	5,175	6,878	6,623	6,107	4,321	4,621	2,792	3,859	2,579	1,955
Average labor income per worker in non-agricultural self-employment (annual 2001 C$)	1,511	1,536	3,564	3,929	5,789	7,043	10,221	11,459	18,723	15,809
Employment share in waged agricultural employment	15.6	18.1	9.8	9.1	4.8	6.7	1.4	2.8	2.2	1.4
Employment share in waged non-agricultural employment	20.6	22.5	39.0	33.6	49.4	47.6	56.8	53.6	60.6	59.2
Employment share in agricultural self-employment	53.3	49.4	36.7	38.6	20.9	22.2	8.6	9.1	3.5	4.2
Employment share in non-agricultural self-employment	10.6	9.8	14.5	18.7	24.4	23.5	33.0	34.4	33.2	33.5
Employment rate	98.4	97.8	98.2	98.1	97.2	96.8	96.5	97.3	96.5	95.0
Activity rate	63.9	64.6	61.2	65.5	65.6	65.8	65.9	69.6	67.7	69.7
Share of working age members within a household	49.0	55.9	55.2	59.5	55.9	62.8	62.4	65.7	70.7	70.8
Average per capita labor income	2,598	3,459	4,022	5,041	4,705	5,977	6,978	8,201	15,906	13,696

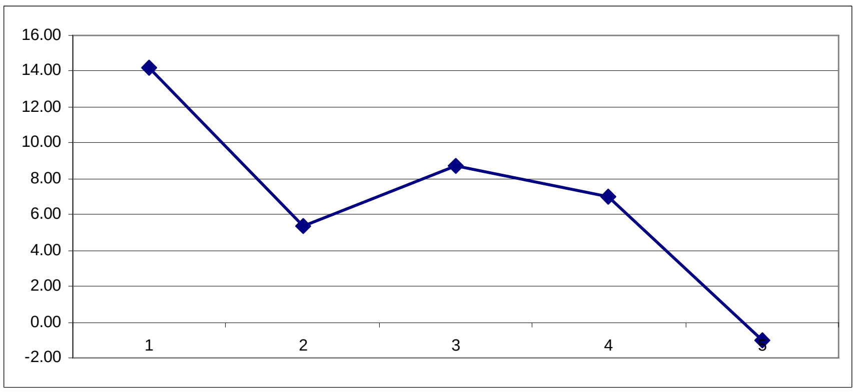
Source: Own calculations based on data from EMNV.

Table 3.9: Per Capita Household Income Changes, by Quintile, 2001-05

Quintile	Annual growth rate of per capita household income Y/N	Level of per capita household income $C 2001 Y/N
1	14.22	2,608.9
2	5.36	3,844.4
3	8.71	4,862.36
4	6.98	7,015.593
5	-1.00	14,897.57
2005 Poverty line in $C 2001:	5,241	

Source: Own calculations based on data from EMNV.

Figure 3.1: Growth in Average per Capita Income by Quintile in 2001 (panel)



Source: Own calculations based on data from EMNV.

3.16 Finally, the decomposition results are shown in Table 3.10. The table shows the contribution of each component to the observed change in per capita labor income by quintile. The two most important factors in raising the income of the poorest 20 percent of the population were (i) the observed increase in income per employed worker in agricultural self-employment (44 percent of the total increase in per capita household income) and (ii) the important increase in the share of working age people within a household (38 percent of the observed change in per capita household income). Participation rates also made an important contribution (11 percent).

3.17 For the second quintile the main source of income growth came from lower dependency rates and higher participation rates. The larger fraction of employed household members in non-agricultural waged jobs also contributed to the higher labor income.

3.18 Decreases in the number of dependents per working age person were seen in all but the richest 20 percent, and they were an important opportunity for poverty reduction. In all but the richest 20 percent, participation rates also increased, and in all but the middle quintile employment rates increased, contributing positively to poverty reduction.[15]

[15] We should be careful in making an interpretation given the small number of households in each quintile. For these estimations we excluded the 2.5 percent in the tails of changes in total labor income, and results change when these outliers are included. Additionally, the sample selected shows no increase in wages except for the third and fourth quintiles, and agricultural wage increases are lower than for the whole sample.

3.19 It should be noted that increases in agricultural wages for the panel sample seem to be relatively small compared to the wage increases seen for the whole sample. It is unclear from this exercise whether agricultural wages may have played a more important role in reducing the incidence of poverty.

Table 3.10: Shapley Decomposition of per Capita Labor Income, by Quintile

	Q1	Q2	Q3	Q4	Q1
Income per waged worker in agriculture	-0.9	-17.1	-1.55	1.29	-3.3
Share of employed in waged agriculture	5.15	-2.44	-1.17	2.76	-9.8
Income per waged worker in non-agriculture	3.45	19.13	33.21	-3.69	289.27
Share employed in waged non- agriculture	2.7	-32.69	3.02	-8.71	77.7
Income per self-employed worker in agriculture	44.64	-5.14	-14.72	-3.39	55.61
Share of self-employed agriculture	-14	3.38	-7.47	-4.9	-20.84
Income per worker self-employed in non-agriculture	10.29	-20.86	3.28	30.82	136.31
Share of self-employed in non-agriculture	-0.96	14.07	6.76	1.05	-31.38
Employment rate	0.53	4.5	-3.74	5.46	4.0
Participation rate	11.14	63.99	16.4	42.49	-342.18
Inverse of dependency	37.94	73.17	65.96	36.83	-55.39
Total	100	100	100	100	100

Source: Own calculations based on data from EMNV.

C. AGRICULTURE: WHAT HAPPENED?

3.20 Household survey data show a sizable increase in real per capita labor income for the self-employed in agriculture, which points to a need to understand where this gain came from: was it driven by relative prices, quantities or productivity?

3.21 By using data from the FAO and the Central Bank of Nicaragua, we can disentangle the effect of each component of the increase in agricultural production which represents 26 percent of total Nicaraguan production. We are interested in goods produced by the poor (precisely, by the self-employed among the poor), even if none of them could be considered as contributing to a sufficient proportion of the GDP or generating a large number of jobs. In addition, we analyze the behavior of export products which might have affected agricultural wages. The products considered are beans, coffee, meat, milk, rice and corn. The first two items are export goods: they represent 8.5 percent and 35.5 percent, respectively, of agricultural GDP (in 2001). The rest are considered "sensitive" goods, according to the definition used by the Nicaraguan Agriculture and CAFTA Report (2004): they "…are those with high tariff protection, are economically vulnerable and possess significant socio-economic importance." This means that they are produced by small and medium scale farmers (see Table 3.11). Beef production represents the largest share of

GDP (4 percent in 2001), and the production of white corn generates the largest number of jobs (175,000), or 9 percent of total employment. Figure 3.2 to Figure 3.5 look at productivity (yields), area harvested and relative producer prices.

Table 3.11: Number of Farms, by "Sensitive" Product, according to Farm Size, 2001

Product	Small	Medium	Large	Total
Rice	6,714	4,873	5,742	17,329
Corn	58,378	53,087	29,919	141,384
Milk	64,855	26,391	5,718	96,964
Beef	64,855.00	26,391.00	5718	96,964.00

Source: Nicaraguan Agriculture, and CAFTA, 2004.

Absolute productivity remained constant for most products while productivity decreased relative to trading partners

3.22 Figure 3.2 shows the evolution of absolute productivity measured as yield per hectare. Productivity remained constant for the period under analysis for beans, coffee and milk, while rice and maize saw increases in productivity of around 13 percent.

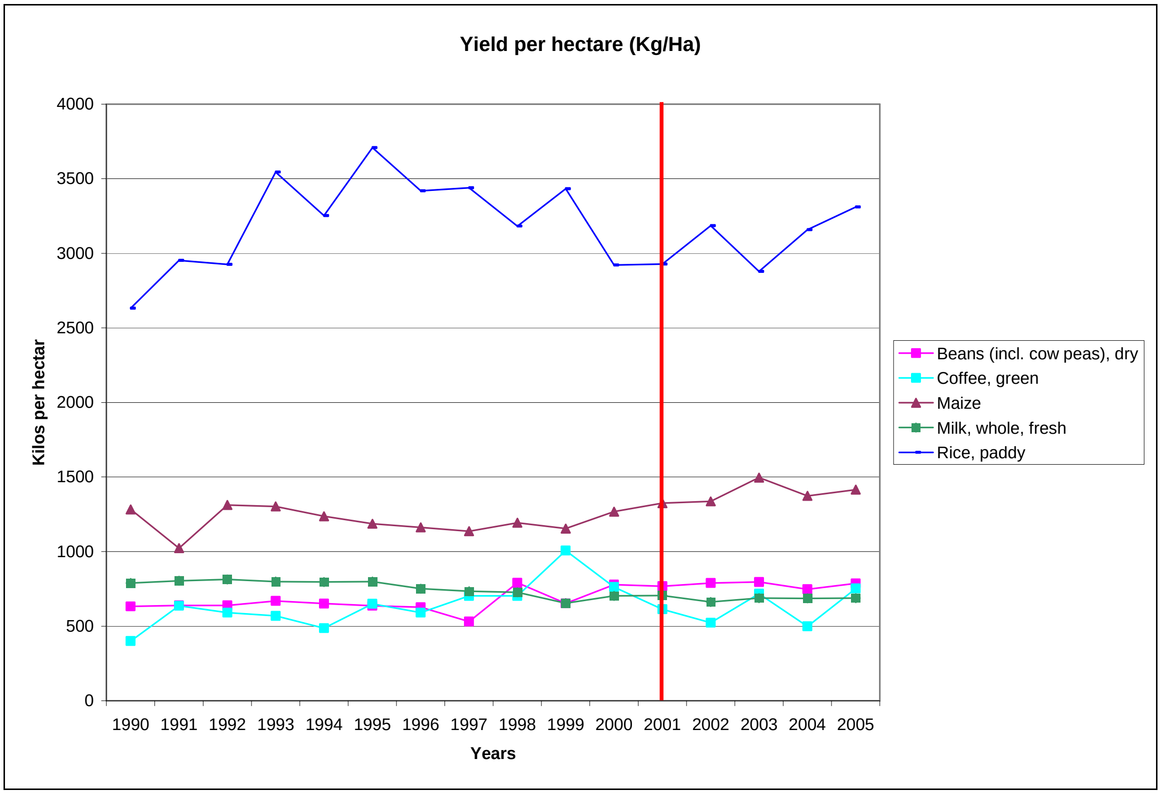
3.23 Since the United States and some Central American countries (Costa Rica, El Salvador and Honduras) are the main trade partners of Nicaragua, we compare relative productivity (as a ratio to U.S. productivity) across these countries. For all products analyzed (except for dry beans) Nicaragua seems to be the least efficient country among the four countries in Figure 3.3. In some cases, relative productivity, measured as yield per hectare of cultivated land with respect to U.S. productivity, decreased over the 15 year period analyzed as well as over the years of the surveys (2001-05). Relative productivity actually decreased for three products out of a total of four (Figure 3.3), the exception being coffee. Then again, the relative gains in productivity were modest.

3.24 Despite these low levels of productivity and the decreases in relative productivity, the observed gains in absolute productivity for maize and rice may have helped the small farmers of these products.

The cultivated area increased, which pulled production up

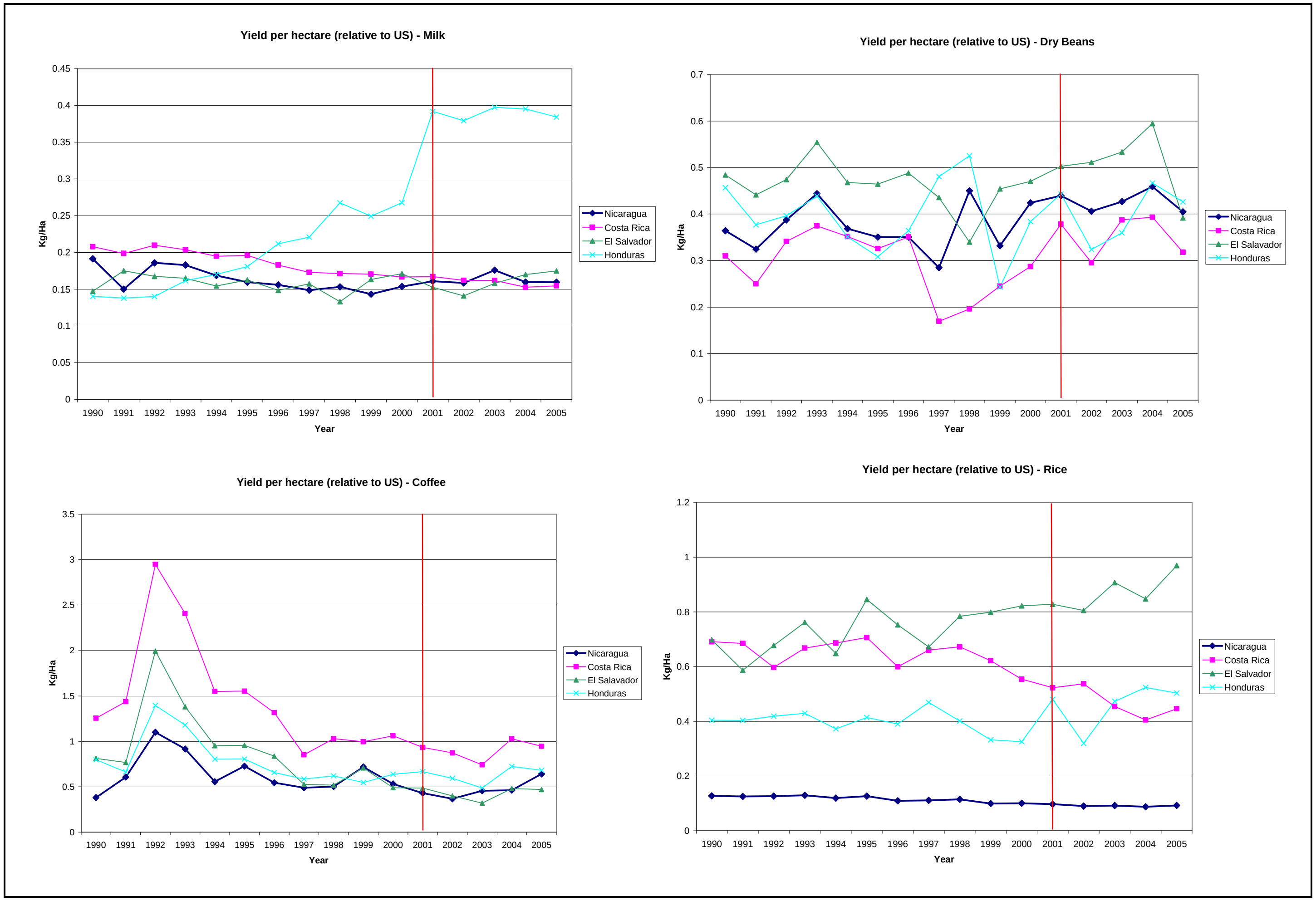
3.25 Between 2001 and 2005, the area harvested increased for three of the products analyzed (milk, maize and beans), while for the others it remained relatively constant (Figure 3.4). Given that productivity remained almost constant, this was the main source of the production increases seen for all of the goods considered (Figure 3.5). In the case of maize, the increase in output was close to 30 percent, while for the other products it was less than 15 percent. In any case, and despite the important increases in output, it is unlikely that aggregate output growth was above the observed employment growth of 21 percent for the whole period, which would explain the decrease in Value Added per worker reported in the second chapter of this report.

Figure 3.2: Productivity of "Sensitive" Products, by Yield per Hectare, 1990-2005



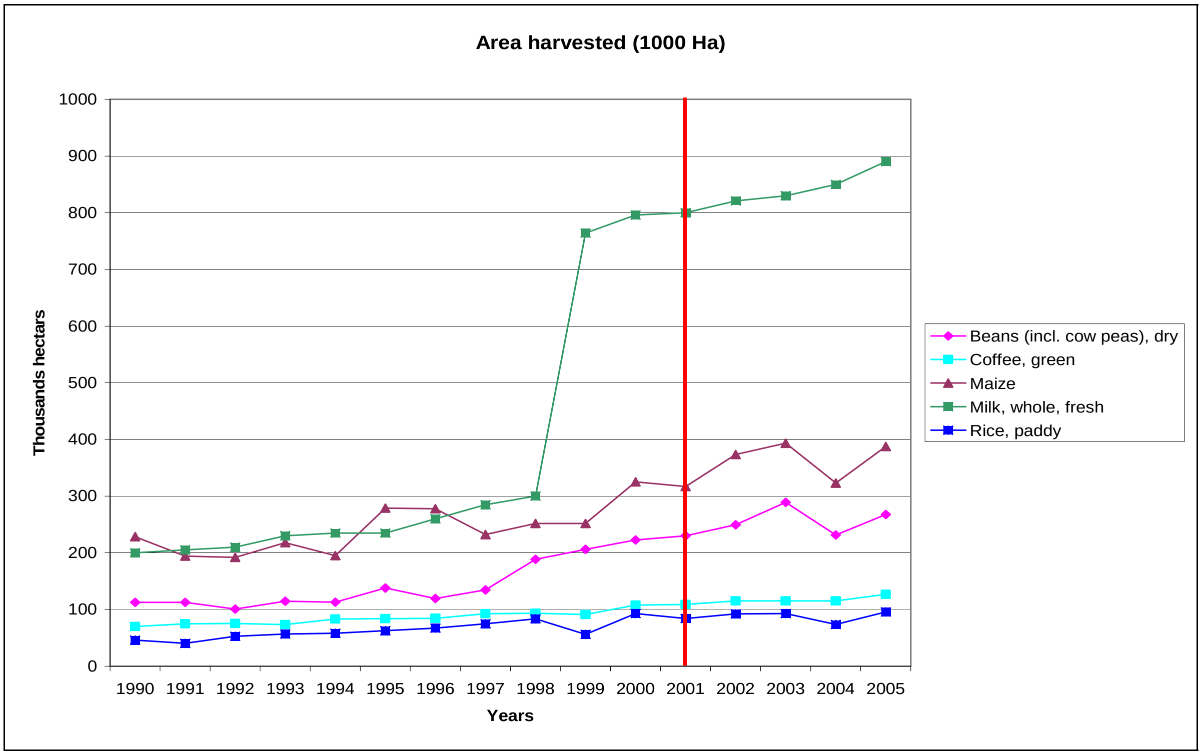
Source: Own calculations with FAO data.

Figure 3.3: Nicaragua Relative Productivty by Product, 1990-2005



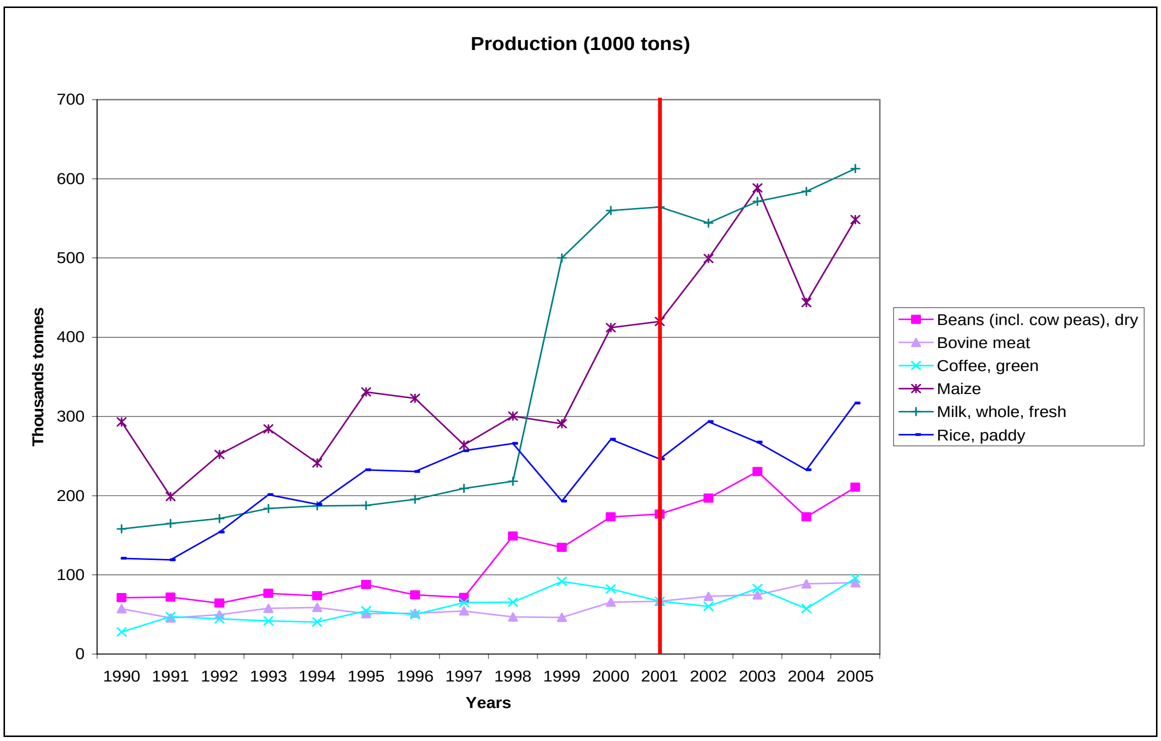
Source: Own calculations with data from FA.

Figure 3.4: Area Harvested for "Sensitive" Products, 1990-2005



Source: Own calculations with FAO data.

Figure 3.5: Production Volume for "Sensitive" Products, 1990-2005



Source: Own calculations with FAO data.

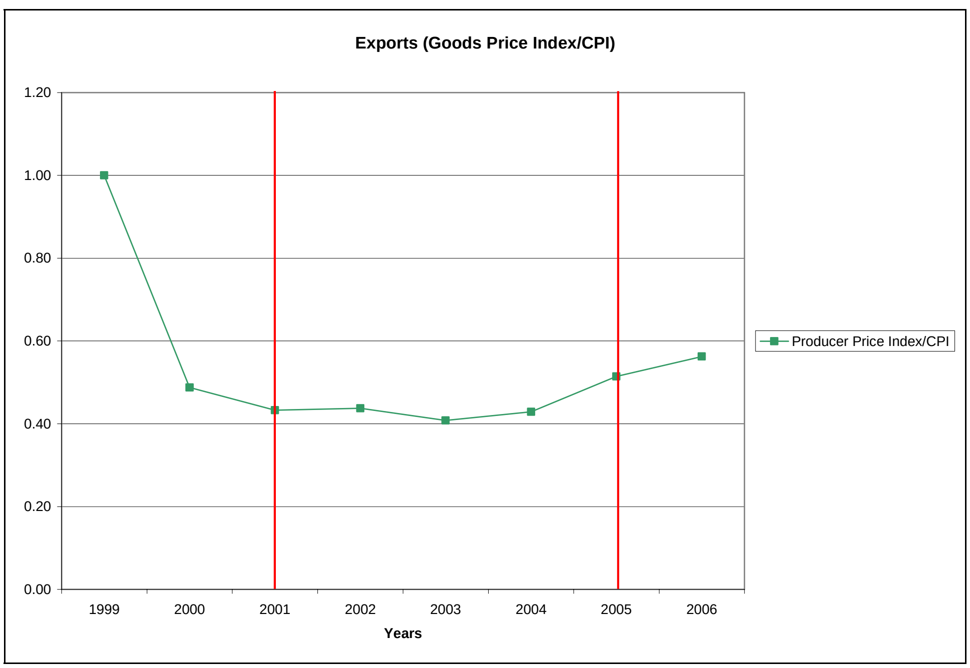
3.26 As regards prices, we first present the pattern of producer price indexes for three baskets of goods as they are computed by the Central Bank: the three aggregates are cereals, export goods and meat. We observe a significant price increase for all the products over the survey years (Figure 3.6 to Figure 3.9). If we look at the producer prices of each single good, we observe an increase for all the goods considered except for milk (according to the data from the Central Bank of Nicaragua).

3.27 This suggests that the terms of trade improved for agricultural producers, as the producer prices increased more than the overall consumer price index (CPI). The case of export goods (Figure 3.6) deserves special attention: after 1999, the basis year, the producer price index dropped dramatically. This may be attributed to the 2000 crisis in coffee prices in the world market that affected the price of green coffee, which is the producer price of coffee but not the price of coffee in grains.

3.28 Thus, it seems that the gains made by the self-employed in agriculture between 2001 and 2005 are due to the evolution of the terms of trade (i.e. relative prices). Increases in the area harvested were important but were probably not sufficient to keep Value Added per worker from falling in response to the apparent inflow of workers to agriculture. Rises in agricultural production may also explain the increases in agricultural wages seen for the overall sample.

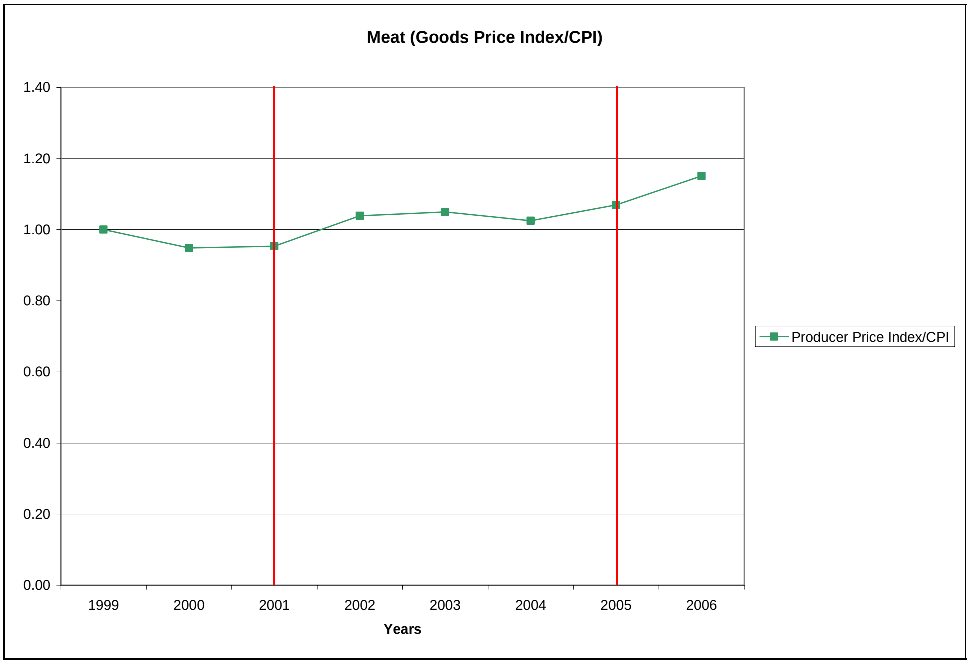
3.29 The decrease observed in productivity (for two out of a total of four goods) relative to the United States poses a considerable challenge for Nicaragua with respect to other Central American trade partners: Nicaragua needs investments in order to recover productivity and to fill the gap with the main trade partners. This is particularly important, because income for rural households appears to be tied to price variations, which increases the vulnerability of this population to price shocks.

Figure 3.6: Relative Prices for Export Goods, 1999-2006



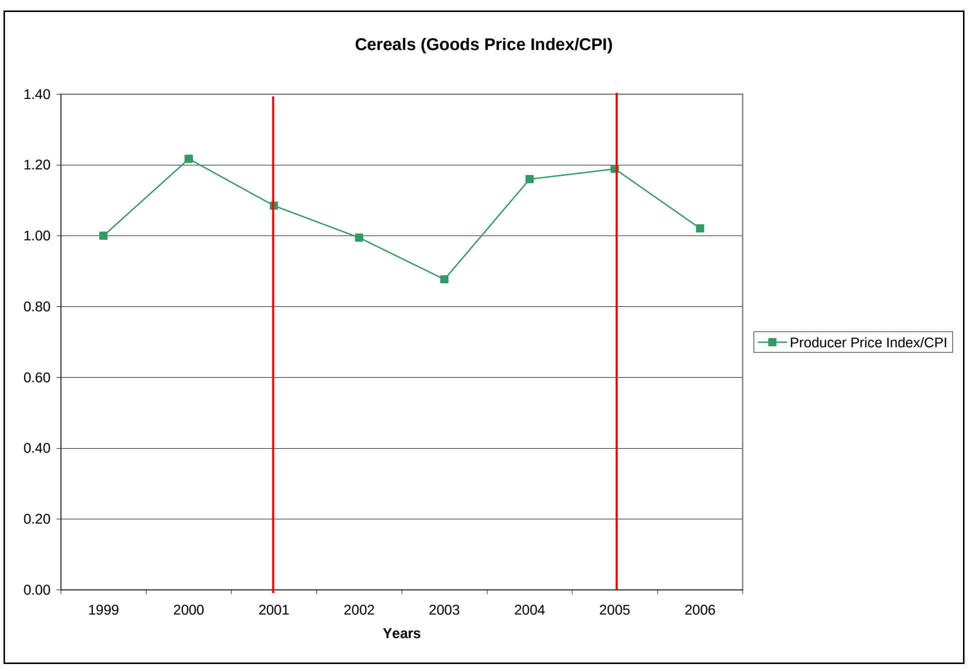
Source: Own calculations with data from BCN.

Figure 3.7: Relative Prices of Trade for Meat, 1999-2006



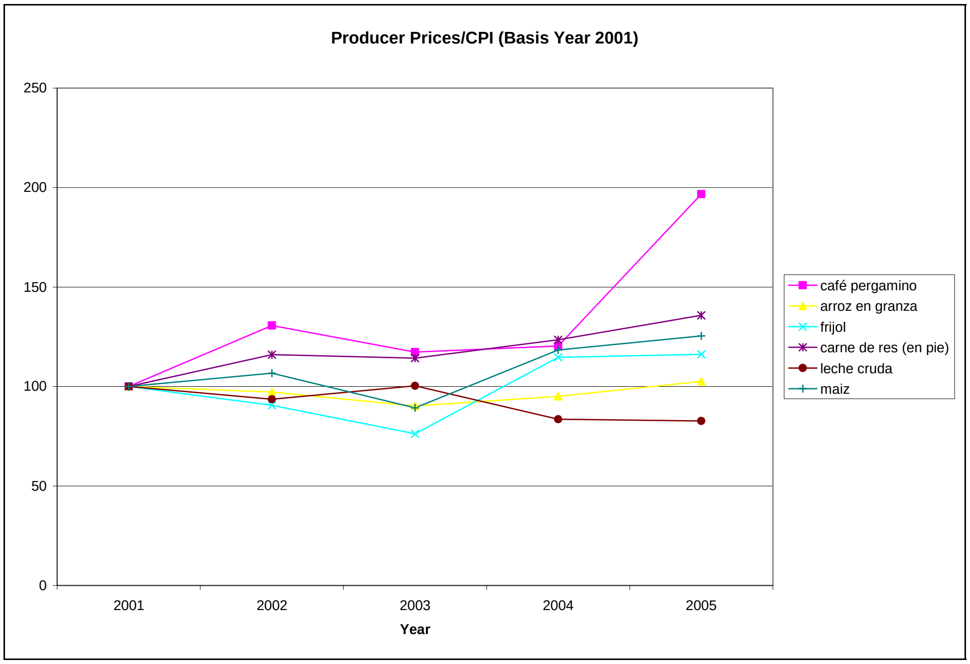
Source: Own calculations with data from BCN.

Figure 3.8: Relative Prices for Cereals, 1999-2006



Source: Own calculations with data from BCN.

Figure 3.9: Relative Prices for Sensitive Products, 2001-06



Source: Own calculations with data from BCN.

CHAPTER 4.
SEGMENTATION AND SKILL MISMATCH

4.1 There is a growing consensus that labor markets in developing countries are segmented, and that this segmentation has important implications for the extent to which the poor benefit from growth and from earnings opportunities.[16] At the core of this model is the idea that

i) The LM consists of various segments that offer qualitative distinct types of employment for individuals with identical productivity endowments—i.e., 'good job' and 'bad job' sector(s);[17]

ii) There is limited mobility between sectors and barriers of access to 'good jobs' so that not all those seeking work in this sector can find it;

iii) Wage and employment levels are not competitively determined in at least one of the sectors;

iv) There are differences in marginal productivity between sectors

4.2 The bad jobs sector is a free entry sector, that is, no skills or capital or special connections/qualities are needed to enter. Returns to labor in this sector are low and households that earn a living in the sector are more likely to be poorer than other households.

4.3 However, there is no consensus as to which are the segments of the labor market and, among them, which segments should be of concern regarding pro-poor employment and labor market policies. Is the market segmented across the formal/informal divide? Or is it segmented across the self-employment/wage-employment divide? Are labor markets segmented between urban and rural areas and/or between agriculture and non-agriculture? And which of these segments are most relevant for the poor?

4.4 Moreover, it is not easy to prove segmentation empirically because it is hard to distinguish whether workers are in a particular sector because of choice or through lack of other

[16] Labor market segmentation is now part of the standard labor economic textbooks (see, for example, Borjas [1996], Bosworth et al. [1996], and Layard, Nickel, and Jackson [1991]). The main reason is that it offers a better explanation for some empirical observations than the competitive model. An often-quoted example is the persistent existence of intra-industry wage differentials for observationally equivalent workers (Katz and Summers [1988]). For other contributions, see Dickens and Lang (1988), and Esfahani and Salehi-Isfahani (1989).

[17] The bad jobs sector is usually associated with agricultural sector or the informal sector and the 'good jobs sector' is generally associated with the industrial or modern sector or the formal sector, we believe that this distinctions may be too simplifying and that the division of the labor market between good and bad jobs, goes beyond the formal/informal or agricultural/industrial divide and depends on the specificities of each country.

employment options. For example, Maloney (2004) finds evidence that in Mexico, Argentina and Brazil many workers are in the informal sector because they value the implied flexibility and the ability to report a higher job status; these workers place a low value on social security benefits, because they do not believe that the governments will reliably deliver these benefits. Moreover, if we control for skills, earnings in the informal sector do not differ substantially from those in the formal sector. This has led to the conclusion that workers opt for the informal sector because, given their level of skills, it offers them the highest returns.

4.5 In addition to the difficulty of identifying whether markets are segmented and, if so, across which dimensions, it can be difficult to disentangle the causes of segmentation. In many cases segmentation that is due to non-competitive wage-setting mechanisms may be intertwined with extensive barriers to moving between good and bad jobs. For example, job location, skills requirements, or ethnic or gender discrimination may play a role.

4.6 In addition to segmentation, the size of the bad jobs sector (whether it is informal or formal) might be affected by the presence of skill mismatch: that is, by the fact that the available skills of the workforce do not match the skills demanded by the good jobs sector. For example, it has been widely noted that technological change increases the relative demand for skills. This usually increases skill premiums, which may widen the income gap between the good jobs sector and the bad jobs sector (as has happened in other Latin American countries). In this case, the gap is not due to segmentation but to differences in the individual characteristics of those employed in each sector, with the good jobs sector reducing its share of unskilled workers and the redundant labor force being shed to the bad jobs sector. In extreme cases, the lack of skills can become a binding constraint to growth.

4.7 In general, the relationships between education/skills, employment and poverty under segmented labor markets are complex, and are not reduced to the role of skill mismatch. In segmented labor markets if jobs are rationed, it is tempting to conclude that increasing the level of education of the labor force may not help those employed in the bad jobs get a job, as 'there are no jobs', jobs are by definition rationed. However, jobs may be rationed for the low skilled but not for the skilled. For example, non market clearing wages like minimum wages, may affect the unskilled but not the skilled labor force; and barriers to mobility due lack of information may be stronger for the unskilled. If this is the case, increasing the level of education of the labor force may reduce the size of the bad jobs sector by pulling people out of the rationed market and into the un-rationed market. Education might also be important if marginal returns to labor are higher for the more educated. For example, there is evidence that literacy is correlated with increasing yields per hectare in agriculture. Better educated laborers are better positioned to apply successfully available technologies, and to produce for the market, rather than for self consumption. Moreover, there might be externalities to education, so that an increase in the share of workers with adequate skills increases overall productivty of the economy, as well as its competitiveness, both may translate in higher wages for everybody, as the size of product markets expands. But increasing the level of education of the labor force also entails risks. Large inflows of skilled labor (abundant supply) may depress wages and thus dampen the earning potential of educational expansions.

4.8 The objective of this chapter is twofold. The first objective is to identify the relevant dimensions across which the labor market is segmented (in other words, which are the good jobs sectors and which are the bad jobs sectors). The second objective is to analyze the role of skills in employment and earnings and to see whether skills are posing a constraint to employment growth in the good jobs sector.

4.9 The chapter is organized as follows: the first section tries to identify whether there is any evidence of segmentation and, if so, across which dimensions. It also points towards the possible causes of segmentation. The second section discusses the barriers to mobility, while the last section deals with skills mismatch and the role of skills in earnings and employment.

A. IS THERE EVIDENCE OF SEGMENTATION? IF SO, ACROSS WHICH DIMENSIONS?

4.10 As has been mentioned, segmentation is hard to prove empirically. The most immediate implication of segmented labor markets is that two apparently identical individuals (with respect to education, age, experience, location, gender and family structure) earn different wages depending on the sector in which they are working. However, this is not sufficient to establish segmentation. As mentioned previously, individuals may be in a given sector by choice. In other words, despite the earnings differential, being in a lower paying sector might give them other benefits (that is, they have different preferences). To establish segmentation we would need to establish that workers in the low paying sectors would rather not be there. We will thus try to address both issues.

4.11 We will explore whether markets are segmented between the formal and informal status of the worker (as measured by affiliation to social security), by sector of economic activity (primary, secondary and tertiary), and by employment category (i.e., self-employed versus waged employed, family enterprise or employer). To do so we will explore whether there are significant differences in returns to individual characteristics (such as education, gender or age) depending on the segment of the labor market.

4.12 The traditional way of establishing whether there are significant differences in returns to individual characteristics is to estimate the determinants of earnings for each sector of economic activity as a function of individual characteristics, and then to decompose the earnings differential between the different segments, into a part due to differences in average characteristics and a part due to differences in returns to individual characteristics using Oaxaca-Blinder decompositions. The following equation illustrates the methodology:

$$\ln \varpi_j - \ln \varpi_s = \beta_s (X_j - X_s) + (\beta_j - \beta_s) X_s + (X_j - X_s)(\beta_j - \beta_s)$$

Equation 1

4.13 Where ω_j denotes average earnings in sector j, β_j corresponds to the vector of coefficients from the earnings equation estimated for sector j, and X_j is the vector of average individual characteristics (education, age, experience, etc.). The first term on the right-hand side of Equation 1 reflects the part of the earnings differential that is due to differences in (average) observed characteristics and the second term reflects that part due to differences in returns to individual characteristics and the final term is an interaction term. Important wage differences due to differences in returns to individual characteristics may be an indication of segmentation.

4.14 Given that people may select themselves (or be selected by employers) into different segments of the labor markets according to observable characteristics, it is important in a first step to correct for possible selection bias by estimating a sectoral choice model. That is, we determine the probability of being employed in particular sector as a function of individual characteristics. It gives information as to which individual characteristics may be potentially acting as barriers to mobility. In a second step, wages are estimated correcting for possible selection bias. From this step we will highlight the effect of education on earnings. Finally, to determine the share of wage differentials that can be attributed to differences in the rewards to individual characteristics, we perform Oaxaca-Blinder decompositions as in Equation 1, but where the term $\ln \varpi_j - \ln \varpi_s$ reflects the earnings gap net *of selection effects*[18]. This step will allow us to identify the possible segments of the labor markets. The results presented correspond to the 2001 Household Survey.

4.15 Before we discuss the results, it is worth describing some stylized facts on earnings and the composition of the labor force by segments. Figure 4.1 shows the pattern of median hourly earnings from the main activity for six employment categories by level of education. We have used the classification of workers as explained in the Introduction, but differentiating them between agricultural and non-agricultural employment. Agricultural employment categories are illustrated by a solid line, while non agricultural categories appear as a solid line. The graph shows a very clear divide between agricultural earnings and non agricultural earnings, with the last being larger for every employment category. In addition, within both sectors being an employer offers the highest return regardless of educational level. Within agriculture, for those with less than secondary education there appears to be no mayor differences between being a wage worker, a self employed worker or a family enterprise worker. For higher levels of education, however, being a family enterprise worker offers the lowest returns. For employment categories outside of agriculture, among those with less than secondary, again family enterprises offers the lowest returns followed by wage work and self employment. For those with complete secondary, the picture changes, with wage work having the highest returns, followed by self employment[19].

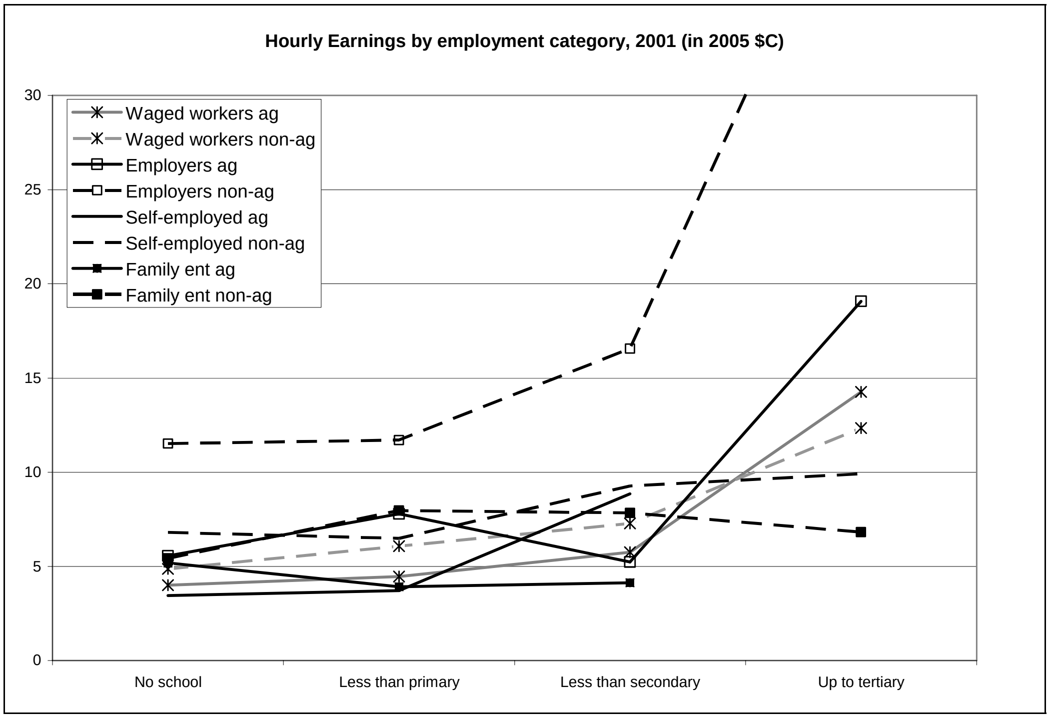
4.16 These results suggest that: i) there is a clear divide between agricultural and non-agricultural employment, ii) being an employer (that is hiring paid labor) makes a positive difference in terms of earnings, regardless of sector or level of education iii) the behavior of earnings among employment categories differs for those with less than secondary education and for those with complete secondary or above. In the former, there seems to be no important premium to being a wage worker, while in the later case there is, and iv) overall there appears to be positive returns to education.

4.17 Figure 4.2 illustrates the evolution of median hourly earnings by sector of economic activity and education. As expected, workers in agriculture earn less than others, except for those with a higher level of education, who earn more than workers in the informal secondary sector and in the tertiary sectors. Within primary and secondary sectors, informal workers earn less than their formal counterparts, and the wage gap widens with the level of education. An exception is represented by formal workers with no schooling in the tertiary sector: which earn almost the same as informal workers in the secondary and tertiary sector.

[18] See Newman and Oaxaca (2004), for a discussion of earning gap decomposition in the presence of selection.

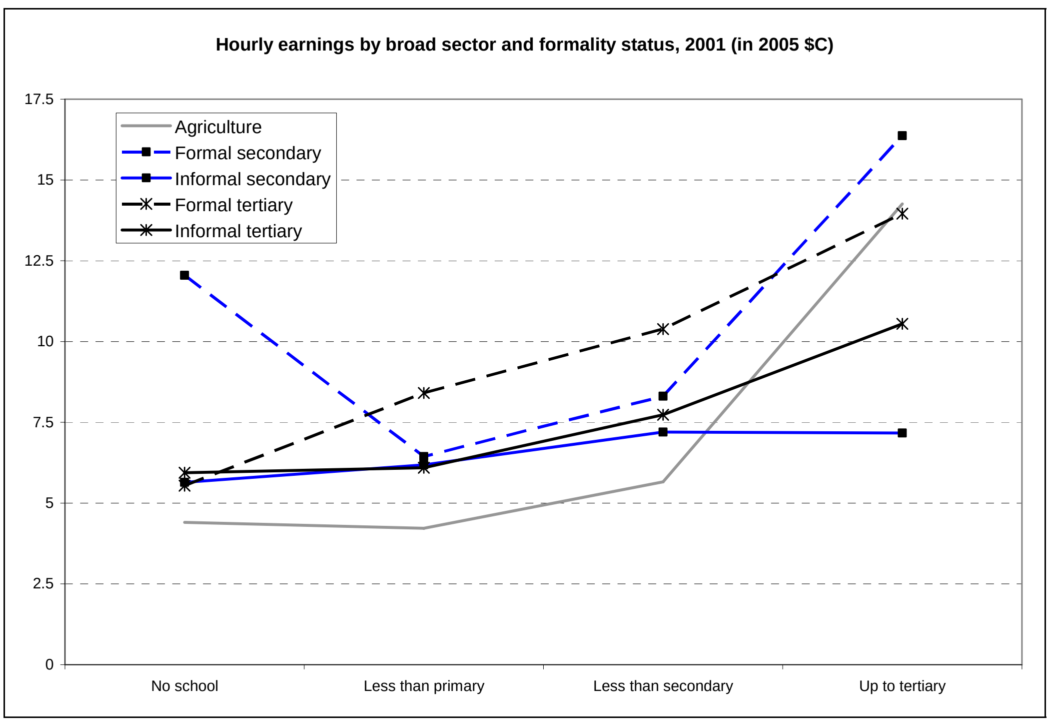
[19] The graph does not show earnings for family enterprises and self employed in agriculture for workers with complete secondary or more because there were very few observations in each cell.

Figure 4.1: Hourly Earnings by Employment Category, 2001



Source: Own calculations based on EMNV.

Figure 4.2: Hourly Earnings by Broad Sector and Informality



Source: Own calculations based on EMNV.

4.18 These results i) confirm the agricultural non-agricultural divide, ii) also support positive returns to education and iii) show a premium for working in the formal sector for workers some level of education, and the premium is increasing with the level of education.

4.19 Summarizing from a simple inspection of wages across different segments of the labor market, we can conclude that there are significant wage premiums attached to being an employer, and being outside of agriculture. Being in the formal sector carries a smaller premium that increases with education. The results indicate that there is scope for the informal sector, the sector of those employed in family enterprises and those in agriculture, to constitute the 'bad jobs sector'. As mentioned before these gaps need not necessarily imply segmentation.

4.20 For a more formal analysis of whether there is segmentation, we will analyze whether differences in average returns across segments of the labor market can be attributed to differences in returns to individual characteristics or differences in the average characteristics of those employed in the different segments. As described above, the first step is to estimate an earnings equation for the different segments, correcting for possible selection bias (because people might be selected or might select themselves into different segments according to individual characteristics).

What determines the probability of ending up in a given segment of the labor market?

4.21 The first step in the estimation procedure is to understand whether there is selection into different segments based on observable characteristics. Given the fact that in low income countries most people participate in the labor market, we analyze the probability of being employed in a particular sector while abstracting from participation decisions.

4.22 The probability of being employed in a particular sector should be interpreted loosely. It might reflect both demand side and supply side choices. For example, in the case of waged workers, demand side constraints might select the people who end up working in that sector. For example in the case of maquila factories, only those who have a completed secondary education and are less than 30 years of age can be employed. In the case of the self-employed, employers and family enterprises, the selection bias is mainly due to the supply side, as they are all independent workers and they have decided to be employed in that specific sector, but demand side forces may still play a role if they are induced to set up and run their own businesses when they do not find jobs as waged workers. In an analysis of the probability of being employed in a particular sector (formal/informal, primary/secondary/tertiary), rather than in a particular employment category, the included explanatory variables might be interpreted as reflecting both demand side and supply side constraints in the selection process.

4.23 To estimate how individual and household characteristics affect the probability of getting a certain job, we estimate a multinomial logit model on 2001 HHS data. In the first case, the employment categories are waged workers, employers, and self-employed/family enterprises, divided into two subcategories: agriculture and non-agriculture. There are six possible alternatives. We have left out the category of unemployed and inactive people since the alternative of not working is not feasible for most of them except for the youth and for women. In the second case, we have five categories: primary sector and secondary and tertiary sectors divided into formal and informal sub-sectors. We use age, gender, educational attainment, non-labor income, regional dummies, and dummies for the presence of the elderly, adults and children in the household as determinates of earnings.

4.24 Annex C contains descriptive statistics of the variables used in the selection and wage equations: on average, employers, the self-employed and household heads of family enterprises are older than waged workers and have more experience. The majority of agricultural workers are males, as are the majority of employers (both in and outside of agriculture). More than one-third of those working in agriculture are illiterate, and that share increases up to almost 50 percent for the agricultural self-employed and those working in family enterprises. There is a very low rate of illiteracy among non-agricultural workers (less than 1 percent), and 40 percent have at least some primary education. Outside of agriculture, among wage workers and employers, 50 percent have a completed secondary education or above, while only 30 percent of the self-employed or those working in family enterprises have a completed secondary education or higher. Agricultural workers are concentrated in the Central and Pacific regions, while others work mainly in the Managua region. Workers in the primary sector are, on average, older and consequently have more experience.[20] Males are mostly employed in the primary sector, in the secondary informal sector and in the tertiary formal. Illiterate workers are employed mainly in the primary sector and in the informal sub sector of both the secondary and the tertiary sector. The tertiary formal sector is comprised mostly of workers with a completed secondary education or above, while the secondary formal sector is evenly divided between workers with incomplete secondary and complete secondary or above. The good jobs, and the upper tier of the secondary and tertiary sectors, are concentrated in the Managua region, and people working there have high non-labor incomes.

4.25 Table 4.1 illustrates the outcomes of the occupational selection obtained by estimating a multinomial logit model.[21] The reference category is waged workers in agriculture.[22] The table presents the relative risk ratio (RRR), which indicates how much more likely (if the coefficient is larger than 1) or how much less likely (if the coefficient is smaller than 1) a worker will be of ending up employed in the given category, compared to being a waged worker in agriculture, if there is a one unit increase in the explanatory variable.[23]

4.26 Overall, age, education, region and non-labor income significantly affect the likelihood of ending up in any given category as compared to being a wage worker in agriculture. Higher non-labor income increases by 9 percent the likelihood of ending up as an employer, either outside of agriculture or in agriculture. It also increases the probability of ending up working outside of agriculture as a family enterprise or as self-employed by 9 percent. Within agriculture it has no effect on the likelihood of being employed as self or family enterprise. Thus non-labor income or assets may be acting as a barrier to moving outside of agriculture. Region determines strongly whether a person ends up in an agricultural employment category or not, with being outside of Managua reducing the chances of ending up in agriculture, again this may suggest urban-rural barriers to mobility. Education is an important determinant of being outside of agriculture for all categories. Within

[20] We construct experience as age minus years of education minus six.

[21] It is a generalization of the two-step selection bias correction method introduced by Heckman that allows for any parameterized error distribution. It only requires the estimation of one parameter in the correction term that is achieved at the cost of some restrictive assumptions, namely, linearity in the outcome variable and joint normality in the error terms (see Bourguignon et al, 2007).

[22] We have left out the no education dummy and the Managua dummy to avoid perfect collinearity.

[23] Relative Risk Ratios (RRRs) are presented as an exponential, and thus a coefficient lower than 1 indicates a negative effect and a coefficient larger than 1 indicates a positive effect. For example, the first column in the table indicates that an increase of one year in age, makes a worker 1.02 times more likely to end up employed as a wage worker outside of agriculture to end up employed as a wage worker in agriculture.

agriculture, more education renders a worker 10 percent less likely of working as a family enterprise worker –the lowest earning category. Outside of agriculture, more education increases by 34 percent the likelihood of being an employer, by 34 percent the likelihood of being a wage worker and by 17 percent the likelihood of being a self employed. Again this suggests that education might be acting as a barrier to moving to better earning opportunities. Demographic characteristics are in general not significant, except in the case of self-employed/family enterprise workers outside of agriculture, in which case having more children aged six or younger makes a worker less likely to be in this category.[24]

4.27 Table 4.2 shows the results of selection across the five categories defined by sector of economic activity and informality (primary sector, secondary formal, secondary informal, tertiary formal and tertiary informal). The reference category is the primary sector. The results indicate that being male decreases the likelihood of working outside of the primary sector. Age increases the likelihood of working in the tertiary sector, but not in the secondary. Education is always significant and increases the likelihood of being employed outside of agriculture. The effect of education is slightly higher for the formal sector, with one more year of education increasing the likelihood of being employed in the formal secondary sector by 36 percent and in the formal tertiary sector by almost 60 percent. Non-labor income also increases the likelihood of being outside of agriculture in the formal sector and informal tertiary sector.[25]

4.28 Overall, individual characteristics are associated with the employment category and the sector of employment. Whether this reflects supply and/or demand conditions is not possible to infer from the analysis presented here. Education, non labor income and region seem to play a key role in this selection process, increasing the chances of ending-up in better earning jobs. As such, if one is going to further explore barriers to mobility, these present themselves as good candidates for analysis.

Returns to education within segments of the labor market

4.29 After controlling for selection bias, we move to the analysis of the determinants of earnings differentials across segments of the labor markets. Annex C presents the results of estimated earning equations.[26] Age increases earnings for wage workers and for household enterprise workers in agriculture, and being outside of Managua reduces these earnings. Education increases returns outside of agriculture for wage worker, employers and self employed, but has no effect on household enterprise worker. Within agriculture it increases the income of wage workers and self employed workers. It is important to note that income for family enterprises is calculated as the profits from the enterprise divided by the number

[24] Some of the results suggest that a sequential decision might be taking place, However we tested this possibility by testing IIA assumptions. In all but one case IIA assumptions hold so that we did explore further nested models.

[25] Caution should be exercised in inferring causality; it might be that because a worker is outside of agriculture the worker's non-labor income is higher, rather than the other way around.

[26] Earnings functions are separately estimated for the two classifications described above. The dependent variable is the logarithm of hourly earnings: the impact of estimated coefficients is measured in terms of percentage change in hourly earnings for a unit increase in the explanatory variable. Since we control for selection bias by using a number of variables that can be interpreted as demand and supply side constraints, we only include standard controls other than the selection term λ in the wage equations.

of workers in the household; as such it captures the returns to all factors of production, rather than to individual factors of production. So caution is need when interpreting the results of earnings equations for this group. In particular, the lack of effect of education on household enterprise workers might just reflect this fact, rather than no effect at all[27]. The premium for education is higher outside of agriculture and in the formal sector of the economy[28].

4.30 The above results are important for educational policy: i) education may be acting as a barrier to mobility and ii) education may increase earnings in some low earning sectors and categories.

The determinants of earnings differentials across segments of the labor market

4.31 In order to determine whether there are wage differentials across labor market segments we perform the Oaxaca-Blinder decomposition explained in Equation 1, where the term $\ln \varpi_j - \ln \varpi_s$ corresponds to earnings gap net of selectivity effects. The results allow us to identify (i) whether the observed net wage differentials are statistically significant, and (ii) which part of the wage differentials (total in Table 4.3 and Table 4.4) between labor market segments can be attributed to differences in average individual characteristics (endowments in Table 4.3 and Table 4.4) and which can be attributed to returns to observed characteristics (β coefficients in Table 4.3 and Table 4.4).

4.32 The results indicate that there are significant (net) wage differentials between the primary and secondary/tertiary sectors, with most of the difference explained by differences in returns to individual characteristics (Table 4.3). There are important wage differentials between the primary and secondary sectors. In all cases, differences in returns to individual characteristics explain most of the differential[29]. When we look at which characteristics are responsible for this differences in returns, we find that age, education and region account for an important part of the of the difference, meaning that there is a higher premium for education and experience outside of agriculture, with the premium lower in the Central and Atlantic regions. Wage differentials however, are not significant between formal and informal. Formal and informal sectors have significantly different compositions of the labor force, but returns to individual characteristics are not significantly different.

[27] There are other approaches to calculating returns to labor for household enterprise workers, one is to estimate a profit function, with different types of labor force female adult, female young, male adult male young in efficiency units (i.e. adjusted by years of education of each), and then impute returns to labor to each type of worker. Alternatively, instead of using as regressors the head of enterprise's individual characteristics, one might use the average characteristics of the household.

[28] Again the lack of returns to education in agriculture overall, may reflect the fact that household enterprise workers are almost 50 percent of al workers in this sector.

[29] For a more detailed analysis, the tables in the Annex C report Oaxaca-Blinder decompositions for each variable.

Table 4.1: Selection among Employment Categories, 2001

	Waged workers		Employers				Self-Employed				Family Enterprises			
	Non Agriculture		Agriculture		Non-Agriculture		Agriculture		Non-Agriculture		Agriculture		Non-Agriculture	
Variables	**RRR**	**t**	**RRR**	**t**	**RRR**	**t**	**RRR**	**t**	**RRR**	**T**	**RRR**	**t**	**RRR**	**t**
Age	1.018	2.600	1.079	6.880	1.098	8.370	1.040	3.730	1.063	7.950	1.095	8.290	1.106	10.680
Years of Education	1.345	10.570	1.066	1.580	1.341	8.130	0.976	-0.710	1.171	5.570	0.907	-2.790	1.126	3.880
Gender	0.114	-8.780	1.952	1.550	0.368	-3.240	0.753	-0.870	0.063	-10.770	1.484	1.080	0.233	-5.240
Dummy child 6	0.867	-1.750	0.846	-1.310	0.889	-0.870	1.074	0.660	0.934	-0.770	0.986	-0.150	0.927	-0.740
Dummy child 7-15	1.038	0.420	1.038	0.360	0.957	-0.440	0.879	-1.390	0.993	-0.080	1.385	3.970	1.115	1.140
Dummy adult	1.037	0.630	1.019	0.240	0.924	-1.060	0.836	-1.930	0.884	-2.070	0.996	-0.060	0.916	-1.340
Dummy elderly	1.222	1.040	1.078	0.260	1.221	0.690	1.379	1.160	0.856	-0.690	0.827	-0.420	0.793	-0.780
Non-Labor Income	1.084	1.980	1.096	2.240	1.093	2.180	1.040	0.890	1.088	2.060	1.081	1.920	1.090	2.120
Pacific	0.296	-2.430	1.24E+08	22.990	0.545	-1.080	1.128	0.220	0.315	-2.190	7.627	1.890	0.499	-1.360
Central	0.146	-5.270	2.20E+08	26.900	0.323	-2.590	2.027	1.880	0.144	-4.660	13.833	2.600	0.329	-2.790
Atlantic	0.207	-4.110	2.24E+08	24.290	0.404	-1.800	3.464	2.980	0.150	-4.300	24.493	3.050	0.501	-1.730

Source: Own calculations based on EMNV.

Table 4.2: Selection among Sectors, 2001

	Secondary			
	Formal		**Informal**	
Variables	RRR	t	RRR	t
Age	0.989	-1.060	0.996	-0.600
Years of Education	1.364	8.550	1.220	8.500
Gender	0.128	-7.930	0.212	-8.690
Dummy child 6	0.871	-1.680	0.903	-1.280
Dummy child 7-15	0.850	-2.040	0.984	-0.250
Dummy adult	0.998	-0.030	1.043	0.840
Dummy elderly	0.766	-1.020	1.144	0.790
Non-Labor Income	1.032	2.180	1.019	1.320
Pacific	0.118	-4.700	0.316	-2.600
Central	0.039	-7.640	0.113	-5.470
Atlantic	0.020	-5.290	0.106	-4.850

	Tertiary			
	Formal		**Informal**	
	RRR	t	RRR	t
Age	1.021	3.000	1.016	2.960
Years of Education	1.588	17.130	1.264	11.020
Gender	0.093	-14.560	0.073	-18.300
Dummy child 6	0.905	-1.270	0.886	-2.130
Dummy child 7-15	1.026	0.360	0.973	-0.500
Dummy adult	1.006	0.110	0.987	-0.330
Dummy elderly	1.125	0.650	1.005	0.030
Non-Labor Income	1.031	2.230	1.034	2.480
Pacific	0.152	-4.550	0.200	-4.100
Central	0.053	-7.320	0.076	-7.270
Atlantic	0.069	-6.570	0.072	-7.220

Source: Own calculations based on EMNV.

Table 4.3: Oaxaca-Blinder Decomposition by Employment Category

WNAG/WAG	**Coef.**	**P>|z|**
Net difference	0.342	0.445
Endowments	0.517	0.093
β coefficients	-0.336	0.480
Interaction	0.160	0.617
WNAG/EAG		
Net difference	4.083	0.259
Endowments	-0.364	0.006
β coefficients	5.715	0.348
Interaction	-1.268	0.717
WNAG/ENAG		
Net difference	4.409	0.001
Endowments	0.248	0.000
β coefficients	4.813	0.002
Interaction	-0.652	0.004
WNAG/SAG		
Net difference	0.914	0.289
Endowments	0.713	0.297
β coefficients	0.312	0.724
Interaction	-0.111	0.873
WNAG/SNAG		
Net difference	1.122	0.001
Endowments	-0.255	0.000
β coefficients	1.425	0.000
Interaction	-0.048	0.580
WNAG/FAG		
Net difference	0.703	0.130
Endowments	-0.494	0.002
β coefficients	1.718	0.116
Interaction	-0.521	0.461
WNAG/FNAG		
Net difference	0.127	0.909
Endowments	0.045	0.853
β coefficients	-0.102	0.928
Interaction	0.184	0.497

Source: Own calculations based on EMNV.
WNAG=wage worker non , WAG=wage worker agriculture
ENAG=employers non agriculture, SAG=self employed agriculture
SNAG=self-employed non agriculture, FAG= Family enterprise worker in agriculture, FNAG=family enterprise worker non-agriculture

4.33 Table 4.4 shows the results among employment categories. The reference category is wage employment outside of agriculture. Earnings differentials –net of selection effects- are only significant between wage workers and self employed outside of agriculture and wage workers and employer outside of agriculture. Note that in both cases both net earnings differentials are positive, while observed earnings differentials are negative. This means that selection is playing an important role in observed difference in average earnings among these categories. In both cases the net earnings premium is positive for wage workers due to higher returns to individual endowments, with age and education having the most important effect (see appendix). Net earnings differentials are not significant between other employment categories and wage workers outside of agriculture, which means that differences in *observed* earnings arise solely because of selection effects.

Table 4.4: Oaxaca-Blinder Decomposition by Employment Sector

Secondary informal/Primary	**Coef.**	**P>|z|**
Net difference	1.326	0.083
Endowments	-0.648	0.150
β coefficients	1.205	0.110
Interaction	0.769	0.090
Tertiary informal/Primary		
Net difference	1.234	0.018
Endowments	-0.922	0.170
β coefficients	1.065	0.058
Interaction	1.092	0.108
Secondary formal/Secondary informal		
Net difference	1.598	0.171
Endowments	-0.341	0.002
β coefficients	1.773	0.135
Interaction	0.167	0.174
Tertiary formal/Tertiary informal		
Net difference	0.110	0.856
Endowments	-0.778	0.002
β coefficients	0.398	0.512
Interaction	0.490	0.049

Source: Own calculations based on EMNV.

4.34 Thus, there appears to be segmentation between the primary and secondary/tertiary sectors, or in other words between employment in agriculture and non-agriculture. Potential segmentation between the formal and the informal is not supported by the results. Potential segmentation between wage workers and self employed workers and wage workers and employers categories outside of agriculture is also supported by the results. Differences in earnings between other employment categories arise mostly as a result of selection, whereby more educated and older workers select themselves or are selected into higher earning employment options.

4.35 Evidence from the above chapter suggests that, selection into employment outside of agriculture plays an important role in explaining observed earnings, with education playing the most prominent role in this selection process. Even after neting-out the effects of selection from the non-agricultural earnings premium, there is an important premium to working outside of agriculture, with most of the difference being explained by differences in returns to endowments, mainly age, education and location. Therefore, some potential segmentation between agricultural and non agricultural employment is supported by the data. Potential segmentation between formal and informal work is not supported by the data. Instead selection effects appear to explain the observed earnings differentials. Selection into formal employment is determined mostly by education and gender, with more education and being a male increasing the chances of selecting/being selected into formal employment.

4.36 In terms of employment categories the results suggest that most of the observed earnings differentials can be attributed to selection effects. Once these affects are controlled for, there are no significant differences among most of the employment categories, except for earnings premium in wage work and self employment outside of agriculture. Selection into better earning employment categories is determined by education, age and non labor income. Non-labor income appears to be an important determinant for being an employer, which may be an indication of credit constraints, as those with other sources of income may also be able to offer more as collateral.

4.37 In terms of policy it is thus important to understand the barriers to selection into formal employment and wage work, and to moving people outside of agriculture. In addition credit constraints to becoming an employer merit further research.

4.38 As has been mentioned, however, differences in returns to individual characteristics among segments of the labor market are only a first step in identifying segmentation. These differences may be capturing other non-pecuniary characteristics of jobs (such as flexibility or regional price differences) which are not explored here. In addition, they are inconclusive about whether workers end up in a given segment because of choice or through lack of an alternative. We will explore this issues further in the next section.

B. SEGMENTATION AND BARRIERS TO MOBILITY: A QUALITATIVE APPROACH

4.39 In the previous section we found that when we control for observable characteristics, markets may be segmented between agriculture and non-agriculture, among formal and informal secondary sector and among employers and non-employers.

4.40 However, as has been mentioned, this is not sufficient for an understanding of whether there is segmentation among good and bad job sectors. For segmentation to be present, it is necessary that workers are not in the low paying alternatives through choice. Unfortunately, this is a question rarely addressed in household surveys. However, the Nicaragua Household Survey contains a question that addresses this issue for the non-agricultural self-employed. In particular, the 2001 Survey includes a question that may help to identify whether the *non-agricultural* self-employed are self-employed because they cannot find a waged job. Those who respond as being self-employed in the non-agricultural sector are asked detailed questions about the type of business they have. Among these questions they are asked the reason for opening a business. One possible answer is "because [they] could not find wage employment." In other words, they would rather be waged workers.

Table 4.5: Reason for Starting a Business, by Level of Education, 2001

(Percent stating main reason)

	No schooling	Incomplete Primary	Complete primary	Incomplete Secondary	Complete Secondary	Tertiary	All
Implied flexibility[1]	23	32	39	36	35	35	33
Get higher income than as waged employment	4	5	6	11	10	12	7
Complement other income	35	37	25	26	32	21	31
Could not find waged employment	23	17	20	17	18	12	18
Wanted to use skills	2	1	1	4	1	10	2
Other	13	9	9	5	5	11	9
Total	100	100	100	100	100	100	100

[1] Implied flexibility aggregates the following answers "wanted to be independent," "flexible time" and "combine work and households activities."

Source: Own calculations based on EMNV.

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4.41 Table 4.5 summarizes the results, disaggregating them by level of education and Table 4.6 summarizes the results by poverty level. For the population as a whole, the main reason for starting a business is because it gives workers more flexibility, and this is followed by wanting to complement other sources of income

4.42 However, when the answer is disaggregated by level of education, we find that for those with no schooling or with incomplete primary education the most important reason for starting a business is to complement other sources of income followed by the inability to find waged employment. It should also be noted that a very low proportion of low skilled workers answers that they started a business because they could have a higher income than as a waged worker (4 percent to 6 percent). Thus, self-employment does seem to be a last resort option for 23 percent of those with low skills.

4.43 When the results are disaggregated by poverty level a similar picture emerges. Twenty-six percent of the poor started a business because they were unable to find waged employment. However, 28 percent did so because of the flexibility it allowed them. Only 3 percent started a business because they believed that they could have higher earnings than as waged workers.

4.44 This suggests that some sort of segmentation may be occurring for those with very low skills, which is consistent with the results of the previous section. The result may be intuitive: if minimum wages are binding, those with productivity below the minimum wage would be the ones rationed out of waged employment (most likely workers with very low skills)[30].

Table 4.6: Reason for Starting a Business , by Poverty Level, 2001

(percent stating reason)

	Poor	Not Poor	Total
Implied flexibility	28	34	33
Get higher income than as waged employment	3	9	7
Complement other income	33	30	31
Could not find waged employment	26	15	18
Wanted to use skills	1	3	2
Other	9	9	9
Total	100	100	100

Source: Own calculations based on EMNV.

4.45 The agricultural business module does not have a comparable question, so it is unclear to what extent agricultural self-employment may be serving as a last resort employment option. But the Nicaragua Poverty Assessment conducted a qualitative study (Del Carpio 2006) from which some insight may be gained as to possible segmentation and barriers to mobility. The study focuses on urban and rural communities that, on average, hovered around the poverty line, but both poor and better off households were interviewed.

4.46 The study finds some evidence that there are barriers and queuing in accessing formal jobs and that agricultural employment is a non-preferred employment option, particularly among the youth:

> **Access to formal employment seems to be limited by geography, skills and social connections.** From the communities evaluated in the qualitative analysis there seems to be a pattern emerging in terms of formal employment; people in the urban area tend to have wider access to formal low skilled jobs located in nearby communities or urban centers. People in an urban community in a municipality in Managua were able to count and report the status on 10 people in the community who are formally employed in a local cement factory. Those people have social security benefits and have a fixed income whereas the rest of the people in the community work informally as drivers, carpenters, builders, welders (all men) and making tortillas, bread, washing, cleaning and domestic duties (for women) People who gained employment in the cement factory or maquilas usually have someone already working who helped them gain employment; the majority of the people however cannot access these jobs because they either lack the skills necessary, a connection or both. In RAAS [the Autonomous Region of the Atlantic South], the ability to speak English is a necessary skill to work as an *embarcado* (in

[30] We are working under the assumption that more skilled workers are more productive, and that in the medium and long run diminishing marginal returns to labor due to fixed capital need not set in. If in fact capital is fixed, then the marginal product of labor will also depend on the employment decisions of the firm (i.e. how many workers to hire)

cruise ship); people with low levels of education, ability to speak English and an initial fee for paperwork (passport, medical exams, etc.) can access these jobs. In Managua, a high school degree is required to work in the maquila factories; age (under 30) is also a factor that some of the youth mention is a requirement. People in some rural communities exhibited frustration toward the lack of employment outside of agriculture; many are hopeful about the prospect of finding a job, particularly the youth who often aspire to work in an activity different than that of their father (agriculture). There is wide heterogeneity in economic functions and opportunities related to agriculture; disparities within communities and between them as well as gender divisions. Livestock and commerce of livestock products (milk, *cuajada*, meat) are generally reserved for the more affluent members of the community.[31]

4.47 In addition, the sector of employment was perceived by the interviewed communities, together with the available services and educational attainment, as important factors in determining the socioeconomic change. The youth in particular expressed their concern for the lack of adequate employment opportunities and for the little access they have to vocational training; they see agricultural work as the only available occupation. A youth group interviewed expressed that "…*there are no alternatives for them in the community in terms of vocational education, professional, entertainment or social; only agricultural work is available. They want to have a better life than their parents and would like to have a profession but see no alternatives, no one has come to help them or worry about them.*"[32]

4.48 Throughout the qualitative analysis, a rural/urban divide was present. Rural communities have a more limited access to non-farm employment and to education. Both factors reinforce each other and act as barriers for the poor in moving out of poverty through better employment opportunities. Although communities perceive education to be important for accessing better earning opportunities, the qualitative evidence is that the supply of educational services is vastly reduced in rural areas, and particularly in remote ones. The transport costs for accessing secondary education are high, and in the winter months the lack of infrastructure makes it impossible for children and teachers to access schools. In one of the rural communities interviewed, parents do not send their daughters to school because they perceive their daughters to be at risk, given the long distances that they must travel.

4.49 All of the above factors suggest that rural farm employment may be a non-preferred sector of employment, and that skill and geographic barriers reduce outward mobility for this sector. Formal wage employment, on the other hand, seems to be an option mostly for urban workers. Although many opt for self-employment as a choice rather than as a last resort option, an important fraction sees self-employment as an alternative second to waged employment, particularly those with low skills. Queuing is evidenced by the need for "connections" in accessing formal wage employment. Finally, lack of skills seems to be a major obstacle to good employment opportunities. The next section explores the skills mismatch in more detail.

[31] Taken from Del Carpio, 2006.

[32] Del Carpio, op. cit.

C. Skill Mismatch

4.44 As has been mentioned, in non-competitive settings supply and demand may not equate to "clear the market." Instead, market imperfections and friction may imply that a share of those needing employment ends up unemployed or if unemployment is not an option, in the bad jobs sector. This means that markets would be segmented in the sense defined in the previous section: that is, two agents with similar characteristics would end up with different earnings depending on their segment of the labor market (in the good jobs sector versus unemployed or in the bad jobs sector).

4.45 However, although segmentation implies that there may be two identical individuals with different earnings because they are in different segments, it is also well known that the compositions of labor market segments differ, with the good jobs sector having a lower share of unskilled workers than the unemployed sector and the bad jobs sector. A possible explanation is that the rigidities that generate the segmentation are more binding for the unskilled. For example, minimum wages or union set wages affect the unskilled more than the skilled. If workers in the bad jobs sector could become skilled they would have a higher probability of being hired in the good jobs sector. In terms of demand and supply, this means that excess supply is higher for the unskilled population. This is what is referred to as mismatch of skills.

4.46 But skill mismatch matters not only in a static sense, but also and probably most importantly, in a dynamic sense. In the presence of skill-biased technical change, skill mismatch is likely to increase. The larger the share of agents that lack or cannot acquire the skills demanded by firms, the larger is the share that will end up in the bad jobs sector. Rising informality or increasing shares of employment in agriculture may be consequences of rising skill mismatch.

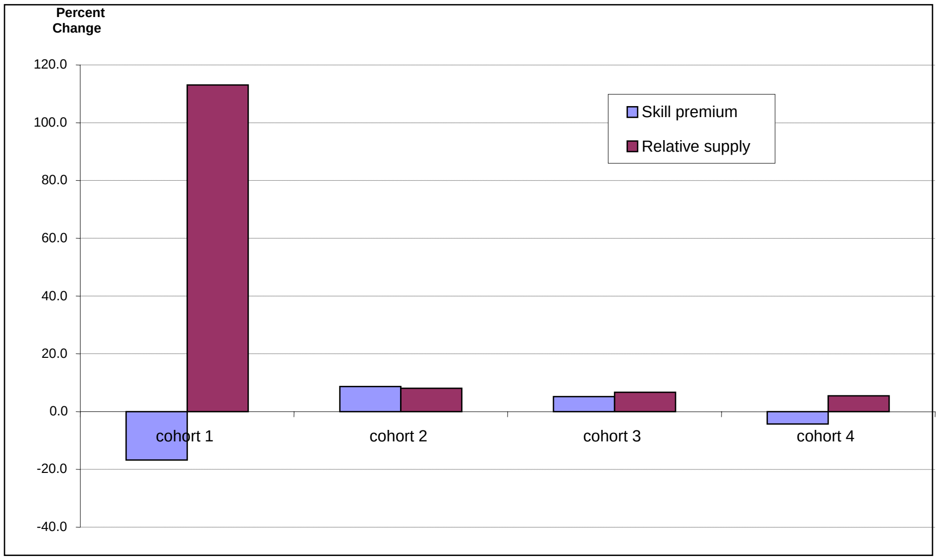
4.47 There are several ways of exploring the degree and evolution of skill mismatch. We will review two of these methods. The first is an adaptation based on the work of Katz and Murphy (1991). The general idea is that if the relative demand of two educational categories was stable, then an increase in the relative supply of a group must lead to a reduction in the relative wage of that group. For example, if the amount of skilled labor is increasing with respect to unskilled labor, and if there is no change in the demand for either, then the wages of the skill must fall in response to the greater relative supply. Thus, a very simple test of this hypothesis is to check whether the product of the change in the skill premium and the change in the relative supplies is negative. Rising wage gaps due to relative demand shifts may be interpreted as increasing skill mismatch (i.e., the demand for skills is rising more rapidly than the supply of skills).

4.48 Aside from supply and demand, average wages may be affected by the average level of education. If the quality of education is changing unevenly (for example, if it is improving for the unskilled), then the wage premium may go down for the youngest cohorts, and this will be reflected in an overall decrease in the skill premium. However, this shrinking of the skill premium would not be due to the relative supplies, but to the changing quality of education. To control for this effect it is useful to perform the analysis by cohorts, as the quality of education is likely to stay constant within cohorts.

4.49 Figure 4.3 and Figure 4.4 show the changes in the relative supply of skills and the skill premium by cohort of workers for the total population and for the population in urban areas. The skilled are defined as those having a complete secondary education and above. Cohort 1 corresponds to the population aged 15 to 25 in 2001; cohort 2 corresponds to the population aged 26 to 35; cohort 3 corresponds to the population aged 36 to 45; and cohort

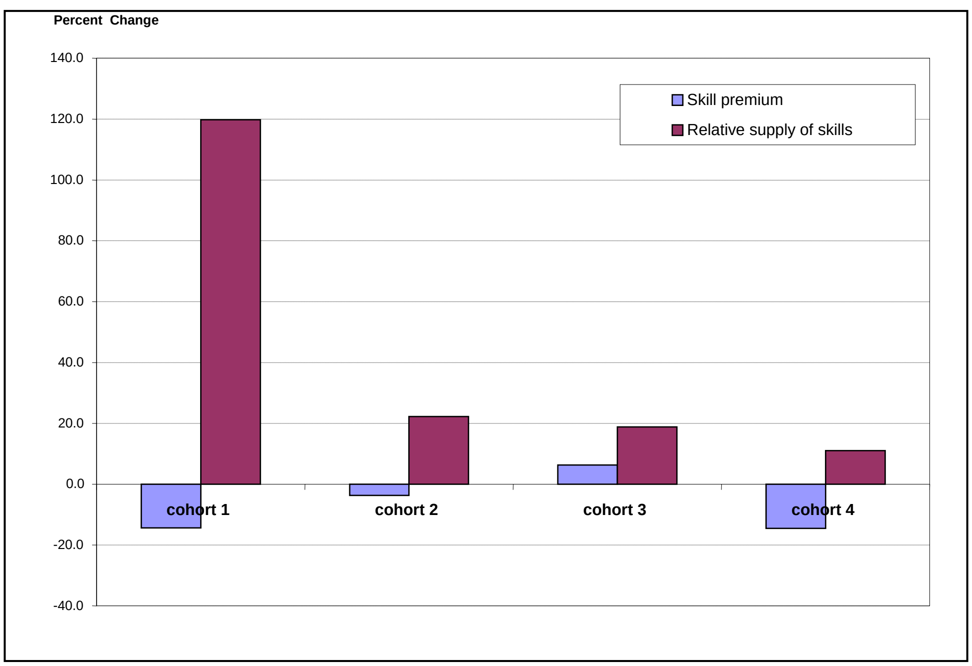
4 corresponds to those between 46 and 55. The last cohort, those between 56 and 65, is not included in the analysis given that an important fraction was above working age (65 years) in 2005.

Figure 4.3: Changes in the Skill Premium and the Relative Supply of Skills, Total Wage Workers (2005-2001)



Source: Own calculations based on EMNV.

Figure 4.4: Changes in the Skill Premium and the Relative Supply of Skills, Urban Wage Workers (2001-2005)



Source: Own calculations based on EMNV.

4.50 The results show that, for the total labor force (urban and rural), the skill premium between 2001 and 2005 shrank for the youngest cohorts while it remained relatively constant for the other cohorts. For cohorts 2 and 3, the skill premium increased while for the oldest workers it decreased. When the results are analyzed for the urban labor force only, the results are similar.

4.51 General features are worth highlighting. First, the educational expansion is significant. This is manifested in the fact that, in the case of urban areas, for example, for 2005, 79 percent of the urban population aged 19 to 29 (cohort 1) had complete secondary education or above while only 27 percent among those aged 50 to 59 (cohort 4), had a secondary or above. A similar trend is observed for the total population. The second feature of these results is that, proportionally, in most cases where there was a drop in the skill premium, the reduction of the skill premium was substantially smaller than the increase in the relative supply of skills. In other words, either the elasticity of the wage with respect to the supply of skills was substantially smaller than 1, or relative wages responded less than proportionately to relative labor supply, or the demand for skills was increasing for the period analyzed. Third, it is worth highlighting that the skill premium is lower in the younger cohorts, where the relative supply of skills is highest, which reinforces the idea that the higher supply of skills is reducing its relative return.

4.52 The above analysis suggests that the demand for skills in the waged sector is increasing. In the case of cohorts 2 and 3 the evidence suggests that the supply of skills, although increasing slightly, is increasing at a slower pace than the relative demand. For the oldest cohort (4) the result is the opposite. In the younger cohorts however, the increase in the supply of labor was large enough to have had a downward impact on the relative wage. This may imply that as the educational expansion continues the wage differential could possibly be further reduced. The implications for poverty reduction will depend on whether this contraction of the skill premium is obtained through higher wages for the unskilled or lower wages for the skilled, and on whether the educational expansion is reaching the poor. If the educational expansion is leaving the poor behind and the skill premium is shrinking because of lower wages among the skilled, then poverty is not likely to be reduced. If, however, part of this educational expansion is reaching the poor and the skill premium shrinks because of higher unskilled wages, then poverty should be reduced. For the period analyzed, wages for the unskilled increased in constant terms, thus having a potential poverty reducing effect.

4.53 Despite some small increases in the skill premium of those aged 36 to 46, it is unclear whether the economy has a substantial skill mismatch, as the observed increases in the skill premium are small, and among the younger cohorts the skill premium has shrunk. On the other hand, the supply of skills seems to be growing, particularly among the youngest cohorts.

4.54 In addition to exploring the evolution of the skill premium and the supply of skills, a more direct approach to discovering whether the supply of skills meets the demand is by asking employers whether they find it difficult to fill vacancies because of lack of skills. Although there is no such information for Nicaragua, the 2003 Investment Climate Assessment asks a related question: namely, whether the skills and the education of available workers present a problem for the operation and growth of business. The survey asks the respondents to judge the severity of the problem on a five point scale, rated “no obstacle,” “minor obstacle,” “moderate obstacle’,” “major obstacle,” and “very severe obstacle.”

Table 4.7: Skills and Education of Available Workers as an Obstacle to Firm Operation and Growth, 2003

Firm size by number of workers					
	small	**medium**	**large**		**Total**
Not a problem	57.45	38.69	40		50.22
Minor problem	15.64	18.25	17.5		16.59
Moderate problem	13.82	18.98	22.5		16.15
Major Problem	9.09	14.6	17.5		11.5
Very severe problem	4	9.49	2.5		5.53
By export type					
	Exporters	**Non-exporters**			**Total**
Not a problem	38.03	52.49			50.22
Minor problem	23.94	15.22			16.59
Moderate problem	21.13	15.22			16.15
Major Problem	12.68	11.29			11.5
Very severe problem	4.23	5.77			5.53
By ownership					
	Domestic Private	**Foreign**	**Government**	**50 - 50**	**Total**
Not a problem	51.12	47.22	42.86	28.57	50.22
Minor problem	16.96	13.89	14.29	14.29	16.59
Moderate problem	15.71	16.67	14.29	28.57	16.15
Major Problem	10.97	16.67	14.29	14.29	11.5
Very severe problem	5.24	5.56	14.29	14.29	5.53
Total	100	100	100	100	100

Source: Own calculations based on World Bank Enterprise Survey.

4.55 Table 4.7 presents the results of this question, disaggregating firms by firm size, export type and ownership. For the aggregate, only 5.5 percent of firms judged it to be a very severe problem and 11.5 percent judged it to be a major problem. The majority of firms (66 percent) considered it “not a problem” or only a “minor problem.” When the results are disaggregated by firm type, they indicate that large firms, exporters and government firms tend to find it slightly more of a problem although the majority consider it a “minor” or a :moderate” problem.

4.56 The results seem to confirm what the analysis of skill premiums and supplies indicated: overall, there do not appear to be major skill mismatches in the Nicaraguan labor market.

CHAPTER 5.
POLICY IMPLICATIONS AND FURTHER RESEARCH

5.1 Despite modest growth and important employment growth, Nicaragua saw no major decrease in poverty. Two main factors explain this outcome: (i) an important fraction of new jobs were generated in agriculture, which offers the lowest returns among economic activities; (ii) jobs generated outside of agriculture with good earnings were either accessible only to the most educated sector (the maquila sector) or experienced a decrease in wages (industrial food and beverage sector).

5.2 The depth of poverty, as measured by the poverty gap, saw significant reductions. This was due to the following: (i) increases in the relative prices of products produced by the agricultural poor; and (ii) an increase in the amount of remittances. However, the increase in income was not sufficient to bring the poorest out of poverty.

5.3 The analysis presented here has implications for action on five policy fronts: (i) skills, (ii) productivity, (iii) employment generation, (iv) geographical mobility, and (v) minimum wage regulation.

5.4 *Skill levels* in Nicaragua are substantially lower than in neighboring countries. Despite the important progress on this front, substantial efforts are still needed. Increasing skills in Nicaragua would involve both benefits and risks, and any educational policy must try to magnify the former while minimizing the later. Currently, the supply of skills seems to be growing at a higher rate than the demand, and, as a consequence, wages for the skilled population might drop. Such a drop in the returns to schooling could serve as a disincentive to acquiring education and might reduce employment growth in the waged sectors of the economy, mainly manufacturing and services. It is thus imperative that policies to increase growth in these sectors (and with this to increase the demand for labor) are undertaken. Currently, constraints to growth appear to lie outside of the labor market, and involve macroeconomic uncertainty and lack of affordable credit. An increase in the demand for waged work and in particular of higher skills is unlikely to be seen unless these constraints are addressed. However, higher skills are important determinants of earnings among the urban self-employed and family enterprises as well as urban informal wage workers. It is also important in increasing earnings in wage agricultural work and among agricultural employers. Targeting the expansion of education to the rural sector appears to have important potential as a poverty reducing strategy. Education is a key determinant in accessing better earning opportunities and in moving out of agriculture.

5.5 *Productivity* in Nicaragua declined during the period studied, with important decreases within agriculture. Nicaragua has the lowest levels of agricultural productivty among its neighbors and trading partners. This factor, together with some indirect evidence of low mobility between urban and rural areas, suggests that raising productivity in agriculture should also be in the forefront of policy initiatives. Without targeted investments in agricultural productivity and agricultural exports, decreasing rural poverty in the short and medium runs seems implausible.

5.6 *Employment generation* should be targeted towards the formal secondary and tertiary unskilled intensive sectors. Exploring targeted interventions to foster growth in such sectors as tourism, with training programs for the unskilled specifically designed for the industry, seems a policy worth exploring. Nicaragua recently conducted a tourism investment climate survey which may provide initial input for the design of this policy. Regulation does not seem to pose a constraint for job creation and growth. The most urgent policies in this area would seem to be to address macroeconomic uncertainty and credit constraints.

5.7 The study pointed towards possible geographical *barriers to mobility* between the urban and the rural sectors. It is as yet unclear as to how important these barriers are, and what its main determinants are. Further study on this issue may yield promising policy implications. Becoming an employer is also linked with availability of non-labor income, which lead to the natural question of whether alleviating credit constraints might help more family enterprise workers or self employed become employers.

5.8 It is unclear to what extent the current *minimum wage structure* in Nicaragua provides any benefits or manages to take into account the skills of the labor force. More productive sectors have higher minimum wages and thus may be constraining the poorest from accessing jobs in precisely the sectors that offer the highest earnings potential. Workers with productivity below the minimum wage will be rationed out of formal employment. The higher the minimum wage is, the less is the access the unskilled have to these sectors. Results of this study suggest that minimum wages may be binding for the maquila manufacturing sector and probably for commerce. Further study in this area may clarify the extent to which the current sectoral structure of minimum wages is beneficial to the poor or is actually constraining them from accessing jobs in the most productive sectors of the economy.

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ANNEX A: DECOMPOSITION OF PER CAPITA VALUE ADDED GROWTH

Step1: decompose aggregate growth:

A simple way of understanding how growth has translated into increases in productivity and employment at the aggregate level and by sectors (or regions), is to perform a simple decomposition of growth in per capita GDP. To do so, note that per capita GDP, *Y/N=y* can be expressed as:

$$\frac{Y}{N}=\frac{Y}{E}\frac{E}{A}\frac{A}{N}$$

Equation 2

Or:

$$y=\omega * e * a$$

where Y_i is total Value Added E is total employment, A is the total population of working age and N is total population. In this way Y/E=ω it total output per worker, E/A is the share of working age population (i.e. the labor force) employed and A/N is the labor force as a fraction of total population.

Thus change sin per capita Value Added can be decomposed into changes in output per worker, changes in employment rates and changes in the size of the labor force. Using shapely decompositions this will be equal to:

$$\Delta y=\Delta\omega\left[\frac{e_{t=1}a_{t=1}+e_{t=0}a_{t=0}}{3}+\frac{e_{t=1}a_{t=0}+e_{t=0}a_{t=1}}{6}\right]+\Delta e\left[\frac{\omega_{t=1}a_{t=1}+\omega_{t=0}a_{t=0}}{3}+\frac{\omega_{t=1}a_{t=0}+\omega_{t=0}a_{t=1}}{6}\right]+$$
$$\Delta a\left[\frac{\omega_{t=1}e_{t=1}+\omega_{t=0}e_{t=0}}{3}+\frac{\omega_{t=1}e_{t=0}+\omega_{t=0}e_{t=1}}{6}\right]$$

The first term in the summation will be the contribution of changes in output per worker, the second term the contribution of changes in the employment rate and the third term the contribution to changes in the demographic component.

With this information we can present aggregate growth in terms of each of these components: $\overline{\omega}\equiv\Delta\omega\left[\frac{e_{t=1}a_{t=1}+e_{t=0}a_{t=0}}{3}+\frac{e_{t=1}a_{t=0}+e_{t=0}a_{t=1}}{6}\right]/\Delta y$ will be the fraction of growth that can be linked to changes in output per worker,
$\overline{e}\equiv\Delta e\left[\frac{\omega_{t=1}a_{t=1}+\omega_{t=0}a_{t=0}}{3}+\frac{\omega_{t=1}a_{t=0}+\omega_{t=0}a_{t=1}}{6}\right]/\Delta y$ will be the fraction of growth that can be linked to changes in the employment rate, and

$\overline{a} \equiv \Delta a\left[\frac{\omega_{t=1}e_{t=1}+\omega_{t=0}e_{t=0}}{3}+\frac{\omega_{t=1}e_{t=0}+\omega_{t=0}e_{t=1}}{6}\right]/\Delta y$ will be the fraction of growth that can be linked to changes in the share of total population that is of working age; where the bar denotes the fraction of growth explained by the component. In this way percentage growth between two periods can be expressed as:

$$\frac{\Delta y}{y}=\overline{\omega}\frac{\Delta y}{y}+\overline{e}\frac{\Delta y}{y}+\overline{a}\frac{\Delta y}{y}$$

Once we have decomposed aggregate employment growth we can go further and understand i) the role played by different sectors in changes in employment and ii) the role of capital, Total Factor Productivty and intersectoral shifts in explaining changes in output per worker, both at the aggregate level and by sectors. This amounts to doing a step wise decomposition: first decomposing aggregate growth into employment and productivity changes and the decomposing employment and productivty changes by sectors.

Step 2: Understanding which sectors contributed most to employment generation.
To understand which sectors contributed to most of the employment generation we can further decompose employment growth (Δe) by sectors. The easiest is of course to express the total growth in employment as the sum of employment generation in each sector.

$$\Delta e=\sum_{i=1}^{s}\Delta e_i$$

Where $\Delta e_i=\Delta\frac{E_i}{A}$ is just the change in employment in sector *i* as a share of total working age population. Let $\overline{e}_i^e \equiv \Delta e_i/\Delta e$, denote the fraction of the aggregate employment rate change that can be linked to changes in employment in sector *i*. The supra-index *e* will make explicit that it is the contribution to employment growth (as opposed to total per capita growth).

Step 3: Decompose changes in output per worker by sectors and in between and within components

We can further decompose output per worker into sectoral employment shifts and changes in output per worker by sectors by noting that:

$$\frac{Y}{E}=\sum_{S}\frac{Y_i}{E_i}\frac{E_i}{E}$$

Or equivalently:

$$\omega=\sum_{i=1}^{S}\omega_i s_i$$

where Y_i is Value Added of sector $i=1...S$, E_i is employment in sector i, and E is total employment. This means that $\omega_i = \frac{Y_i}{E_i}$ will correspond output per worker in sector i, $s_i = \frac{E_i}{E}$ is the share of sector i in total employment. This equation juts states that changes in output per worker are the weighted sum of changes in output per worker in all sectors, where the weights are simply the employment share of each sector.

Using the shapely approach, changes in aggregate output per worker can be decomposed as:

$$\Delta\omega = \underbrace{\Delta\omega_1 * \left(\frac{s_{1,t=0} + s_{1,t=1}}{2}\right) + \Delta\omega_2 * \left(\frac{s_{2,t=0} + s_{2,t=1}}{2}\right) + ... + \Delta\omega_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2}\right)}_{\Delta\omega_W} + \underbrace{\sum_{i=1}^{S} \Delta s_i * \left(\frac{\omega_{i,t=0} + \omega_{i,t=1}}{2}\right)}_{\Delta\omega_B}$$

Each terms $\Delta\omega_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2}\right)$ are the change in output per worker due to changes in output per worker in sector s. The last term in the equation $\Delta\omega_B$ is the change in output per worker due to due to intersectoral employment changes (i.e. between sectors). That is employment movements from low productivty sectors to high productivity sectors should increase total output per worker, and the flows from high productivty sectors to low productivity sectors should reduce aggregate output per worker. If this last term is negative the reallocation of employment by sectors was detrimental to overall productivty growth. Finally, the term $\Delta\omega_w$ corresponds to total changes in output per worker net of relocation effects (or within component).

We can then denote the fraction of aggregate output per worker growth that can be linked to growth in output per worker in sector i as $\overline{\omega}_i^{\omega} \equiv \Delta\omega_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2}\right) / \Delta\omega$, where again the bar denotes the fact that we are referring to contributions, and the supra-index denotes the fact that it is a contribution to aggregate output *per worker* growth ω, rather than a contribution to output *per capita* growth *y*.

Similarly we can define the contribution of within sector productivity growth as $\overline{\omega}_w^{\omega} \equiv \Delta\omega_w / \Delta\omega$ and the contribution of intersectoral shifts as $\overline{\omega}_B^{\omega} \equiv \Delta\omega_B / \Delta\omega$

Step 4: understanding the sources of changes in output per worker (net of intersectoral shifts) at the aggregate level and by sectors.

The terms ω and ω_i, will capture changes in output per worker, but its interpretation is not so straight forward. Increases in output per worker can come from three different sources: i) increases in capital labor ratio ii) increases in Total Factor Productivty (TFP) and iii) relocation of jobs from bad jobs sectors (low productivty) to good jobs sector (high productivity). To see the first two points, note that under constant returns to scale, if $Y_t = \Phi_t f(E_t, K_t)$ where K_t is the capital stock and Φ_t a technological, then output per worker $Y_t/E_t = \Phi_t f(1, K_t/E_t)$. Therefore it will capture changes in capital labor ratio and in TFP growth. Note that it may also capture cyclical behavior of output: firms operating in economic downturns may have underutilized capital, when the demand rises again; it will be reflected as rise in output per worker. The third point is simply the result of worker moving from a low productivty sector (or firm) to a high productivty sector (or firm), so that in the aggregate average output per worker will rise. From step 3 we found that it is possible to isolate the effect of intersectoral shifts: $\Delta\omega_w$ is just changes in output per worker net of intersectoral shifts.

If data on capital stock is available then we can assume a particular functional form for the production function and separate the contribution of higher capital labor rations and the rest. For example if we are willing to assume that the production function is Cobb-Douglas then:

$$\frac{Y}{E} = \Phi \left(\frac{K}{E} \right)^{1-\alpha}$$

In competitive markets 1-α is the share of payments to capital in total Value Added. It is usually available from national accounts data or if there are enough time series then it can be estimated by taking logs and estimating:

$$\ln \frac{Y}{E} = \ln \Phi + (1-\alpha) \ln \left(\frac{K}{E} \right) + t + \mu$$

Where t is an (optional) time trend capturing technological change and μ is a residual. Once we have a value of α we can proceed to decompose changes in output per worker net of intersectoral shifts, into changes in Total factor Productivity and changes in the capital labor ration.

Once we have an estimate of α, we can calculate total factor productivty as a residual: In the first period it will be:

$$\left(\frac{Y}{E} \right)_{t=0} / \left(\frac{K}{E} \right)_{t=0}^{(1-\alpha)} = TFP_{t=0}\,.$$

In the second period we need however to take into account that part of the change in output per worker was due to relocation shifts so that:

$$\left[\left(\frac{Y}{E}\right)_{t=1} - \Delta\omega_B\right] / \left(\frac{K}{E}\right)_{t=1}^{(1-\alpha)} = TFP_{t=1}$$

The term in square brackets I just output per worker in period two net of relocation effects. In this way we are able to see whether changes in output per worker net of relocation effects, where due to increases in capital per worker or in total factor productivity:

$$\Delta\omega_w = \Delta k^{1-\alpha}\,\frac{(TFP_{t=0}+TFP_{t=1})}{2} + \Delta TFP\,\frac{(k^{1-\alpha}{}_{t=0}+k^{1-\alpha}{}_{t=1})}{2}$$

Where k is simply the capital-labor ratio. The first tem in the right hand side is the contribution of changes in the capital labor ratio to growth in output per worker net of relocation effects, and the second term is the contribution of changes in TFP.

This means that changes in total output per worker can be expressed as the sum of changes in TFP, changes in the capita labor ratio and intersectoral shifts:

$$\Delta\omega = \underbrace{\Delta k^{1-\alpha}\,\frac{(TFP_{t=0}+TFP_{t=1})}{2} + \Delta TFP\,\frac{(k^{1-\alpha}{}_{t=0}+k^{1-\alpha}{}_{t=1})}{2}}_{\Delta\omega^{w}} + \Delta\omega_B$$

As before let $\bar{k}^{\omega} \equiv \Delta k^{1-\alpha}\,\frac{(TFP_{t=0}+TFP_{t=1})}{2} / \Delta\omega$ denote the share of output per worker that can be linked to changes in the capital labor ratio, $\overline{TFP}^{\omega} \equiv \Delta TFP\,\frac{(k^{1-\alpha}{}_{t=0}+k^{1-\alpha}{}_{t=1})}{2} / \Delta\omega$ denote the share of growth in output per worker that can be linked to TFP changes $\bar{\omega}_B{}^{\omega} \equiv \Delta\omega_B / \Delta\omega$ denote the share of changes in output per worker that can be attributed to intersectoral employment shifts.

Step 5: Understanding the role of each sector on intersectoral shifts.

It is possible to understand further how changes in the share of employment in the different sectors help explain the overall contribution of intersectoral shifts to per capita growth. An important literature has found that structural change, which is movements of labor force shares form low productivty sectors to high productivty sectors, is an important factor behind growth. Increases in the share of employment in sectors with above average productivty will increase overall productivty and contribute positively to the intersectoral shift term. On the contrary, movements out of sectors with above average productivty will have the opposite effect. By the same token, increases in the share employment in sectors with bellow average productivty should reduce growth, while reduction in their share should contribute positively to growth.

Using the above intuition we can rewrite the intersectional shift as:

$$\Delta\omega_B = \sum_{i=1}^{S} \Delta s_i \left(\frac{\omega_{i,t=0}+\omega_{i,t=1}}{2} - \frac{\omega_{t=0}+\omega_{t=1}}{2}\right)$$

The term in parenthesis is the difference between a sector i's productivty (averaged between the two periods) $\frac{\omega_{i,t=0}+\omega_{i,t=1}}{2}$ and the average (over the two periods) productivity of all the economy (note there is no sectoral sub-index) $\frac{\omega_{t=0}+\omega_{t=1}}{2}$.

Therefore, the contribution of sector i to the intersectoral shifts term will be:

$$\Delta s_i \left(\frac{\omega_{i,t=0}+\omega_{i,t=1}}{2} - \frac{\omega_{t=0}+\omega_{t=1}}{2} \right)$$

Thus if sector i has productivty bellow the average productivty, and increases its share s_i, its contribution will be positive, that is outflows from this low productivty sector have contributed to increase output per worker. If on the other hand, if the sector sees an increase in its share, these inflows into this low productivity sector will decrease output per worker and thus have a negative effect on the intersectoral shift term. The magnitude of the effect will be proportional to: i) the difference I the sector's productivity with respect to the average and ii) the magnitude of the employment shift.

As before we can denote the share of intersectoral shift that is explained by sector i as:

$$\overline{s}_i^{\omega_B} = \Delta s_i \left(\frac{\omega_{i,t=0}+\omega_{i,t=1}}{2} - \frac{\omega_{t=0}+\omega_{t=1}}{2} \right) / \Delta\omega_B$$

Step 6: putting everything together

Once the above steps are completed the percent contribution of each factor to total changes in GDP <u>per capita</u> can be obtained as follows:

Contribution of	**Formula**	Comments
1. Demographic shifts	$\overline{a} \equiv \Delta a \left[\frac{\omega_{t=1}e_{t=1}+\omega_{t=0}e_{t=0}}{3} + \frac{\omega_{t=1}e_{t=0}+\omega_{t=0}e_{t=1}}{6} \right] / \Delta y$	As in step 1
2. Contribution of aggregate changes in output per worker	$\overline{\omega} \equiv \Delta\omega \left[\frac{e_{t=1}a_{t=1}+e_{t=0}a_{t=0}}{3} + \frac{e_{t=1}a_{t=0}+e_{t=0}a_{t=1}}{6} \right] / \Delta y$	As in step 1
3. Contribution of changes in the employment rate	$\overline{e} \equiv \Delta e \left[\frac{\omega_{t=1}a_{t=1}+\omega_{t=0}a_{t=0}}{3} + \frac{\omega_{t=1}a_{t=0}+\omega_{t=0}a_{t=1}}{6} \right] / \Delta y$	As in step 1
4. Contribution of increases in sectoral employment	$\overline{e}_i = \overline{e}_i^{e} * \overline{e} = \left[\Delta e_i / \Delta e\right] * \overline{e}$	Is calculated as the contribution of changes in employment in sector i to total employment rate changes (step 2), times the contribution of employment rate changes to changes in total GDP per capita (step 1)

5. Contribution of changes sin output per worker within sectors	$\overline{\omega}_w = \overline{\omega}_w^{\omega} * \overline{\omega}$ $= \left[\left(\sum_{i=1}^{S} \Delta\omega_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right) \right) / \Delta\omega \right] * \overline{\omega}$	It's the contribution of *within* changes in output per worker to total changes in output per worker (step 3) times the contribution of aggregate output per worker to GDP per capita (step 1)
6. Contribution of intersectoral employment shifts	$\overline{\omega}_B = \overline{\omega}_B^{\omega} * \overline{\omega}$ $= \left[\sum_{i=1}^{S} \Delta s_i * \left(\frac{\omega_{i,t=0} + \omega_{i,t=1}}{2} \right) / \Delta\omega \right] * \overline{\omega}$	It's the contribution of between changes in output per worker to total changes in output per worker (step 3) times the contribution of aggregate output per worker to GDP per capita (step 1)
7. Within changes in output per worker in sector i	$\overline{\omega}_i \quad = \quad \overline{\omega}_i^{\omega} * \overline{\omega}$ $= \left(\Delta\omega_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right) / \Delta\omega \right) * \overline{\omega}$	It is the contribution of sector *i*, to within changes to total changes in output per worker (step 3) times the contribution of output per worker to changes in per capita GDP (step1)
8. Contribution of shifts in the share of employment witnessed by sector *i*	$\overline{s}_i \quad = \quad \overline{s}_i^{\omega_B} * \overline{\omega}_B$ $= \left[\Delta s_i \left(\frac{\omega_{i,t=0} + \omega_{i,t=1}}{2} - \frac{\omega_{t=0} + \omega_{t=1}}{2} \right) / \Delta\omega_B \right] * \overline{\omega}_B$	It is the contribution of sector *i* , to the between component of changes in output per worker (step5) times the contribution of the between employment shifts component to total GDP per capita (calculated as above in Numeral 6)
9. Contribution of TFP (net of intersectoral shifts)	$\overline{TFP} \quad = \quad \overline{TFP}^{\omega} * \overline{\omega}_w$ $= \left[\Delta TFP \frac{(k^{1-\alpha}{}_{t=0} + k^{1-\alpha}{}_{t=1})}{2} / \Delta\omega \right] * \overline{\omega}_w$	It is the contribution of TFP growth to changes in output per worker net of intersectoral shifts (step 4) times the contribution of within changes in output per worker to total GDP

		(calculate above Numeral 5)
10. Contribution of capital labor ratio	$\bar{k} = \bar{k}^{\omega} * \bar{\varpi}^{w}$ $= \left[\Delta k^{1-\alpha} \dfrac{(TFP_{t=0} + TFP_{t=1})}{2} / \Delta\omega \right] * \bar{\varpi}^{w}$	It is the contribution of changes in the capital labor ratio to changes in output per worker net of intersectoral shifts (step 4) times the contribution of within changes in output per worker to total GDP (calculate above Numeral 5)

ANNEX B: DECOMPOSITION OF LABOR INCOME GROWTH

The labor income profile is best described at the household level. A simple and useful characterization of households in terms of labor indicators can be obtained by noting that the average labor income of household *j* can be written as (borrowing from Kakwani, Neri and Son, 2006):

$$\frac{I_j^L}{N_j} = \frac{I_j^L}{H_j}\frac{H_j}{E_j}\frac{E_j}{L_j}\frac{L_j}{A_j}\frac{A_j}{N_j}$$

Equation 3

where I_j^L is the total labor income of household *j*, H_j is the total hours worked by working age members of the household, *j,* E_j is the total number of employed in the household, L_j the number of participants in the labor market, and A_j the number of working age members. In this way $\varpi = I^L/H$ corresponds to average earnings per hour worked, $h=H/E$ corresponds to average hours worked, E/L is the employment rate, $l=L/A$ is the participation rate, and $a=A/N$ is the ratio of working age members to total household members, or the dependency rate. For simplicity let the above equation be rewritten as:

$$\iota_j^L = \varpi_j h_j (1-u_j) l_j a_j$$

Equation 4

where $(1\text{-}u_j)$ corresponds to the employment rate of household j, which can be rewritten as 1 minus the household's unemployment rate u_j. Note that ϖ (omega bar) is different to ω (simple omega), which refers to output per worker in the previous sections.

In many contexts there is an important fraction of child laborers and elderly workers, and calculating earnings per hour worked by the employed of working age is overestimating real household "productivity." In these cases, it might be better to abstract from the structure of the household according to working age (A_j in Equation 3) and calculate dependency rates as the number of participating individuals over the working total household members (A_j/L_j), and define E_j as the number of working individuals irrespective of whether they are of working age or not; and hours worked H_j, as total hours worked for all employed individuals irrespective of age.

By averaging each of the components of the household's per capita labor income over sub-groups of population we can obtain a full profile of labor market characteristics. For example, if we divide households by quintile of income, it will describe the average labor market characteristics of each quintile. Let Ω denote the subset of households belonging to a particular quintile. It is possible to compare deciles by average dependency rates $\frac{1}{N_\Omega}\sum_{j\in\Omega} a_j$, average participation rates $\frac{1}{N_\Omega}\sum_{j\in\Omega} l_j$, average hours worked $\frac{1}{N_\Omega}\sum_{j\in\Omega} h_j$, incidence of unemployment $\frac{1}{N_\Omega}\sum_{j\in\Omega} u_j$ and earnings per hour worked $\frac{1}{N_\Omega}\sum_{j\in\Omega} \varpi_j$.

Analyzing the sources of changes in labor incomes

A traditional way to understand how labor markets have affected welfare is to disentangle the sources of labor income growth that are responsible for observed changes in total labor income.[33]

From Equation 4 the average per capita labor income of the subset Ω of households (whether poor or non-poor households, or households falling within an income range or with particular demographic characteristics), will then be:

$$\frac{1}{N_\Omega}\sum_{j\in\Omega}\ln \iota_j^L = \frac{1}{N_\Omega}\left(\sum_{j\in\Omega}\ln\varpi_j + \sum_{j\in\Omega}\ln h_j + \sum_{j\in\Omega}\ln(1-u_j) + \sum_{j\in\Omega}\ln l_j + \sum_{j\in\Omega}\ln a_j\right)$$

Equation 5

It is thus possible to decompose the change in the average per capita household labor income of group Ω into changes in its different components: changes in average log earnings/per hour worked, changes in average of log hours-worked, changes in average log unemployment rates, etc. In particular:

[33] See Kakwani, Neri and Son (2006) for an application of this decomposition to the analysis if pro-poor rates of growth.

$$\Delta \frac{1}{N_\Omega} \sum_{j \in \Omega} \ln \iota_j^L = \Delta \frac{1}{N_\Omega} \sum_{j \in \Omega} \ln \varpi_j + \Delta \frac{1}{N_\Omega} \sum_{j \in \Omega} \ln h_j + \Delta \frac{1}{N_\Omega} \sum_{j \in \Omega} \ln(1-u_j) + \Delta \frac{1}{N_\Omega} \sum_{j \in \Omega} \ln l_j + \Delta \frac{1}{N_\Omega} \sum_{j \in \Omega} \ln a_j$$

Equation 6

In this way we can easily see whether growth in the average labor income of the poor (or any group Ω) was due to changes in employment rates, participation rates, hours of work or earnings per hour worked.

We can go a step further and decompose average earnings per hour into earnings per hour from self employment (π_j) and earnings per hour from waged employment (w_j): $\varpi_j^{\ L} = h_j^w w_j + h_j^\pi \pi_j$, with h_j^w corresponding to the share of waged employment in total hours worked and h_j^π the share of self employment. In this case, however, log-linearization of Equation 4 is no longer possible and we would have to perform Shapley decompositions to analyze income changes.

Comparing in this way changes in average incomes of the poor and their components with changes in average incomes of the non-poor can shed some light on what the channels are through which a growth process is affecting the income of the poor. In many cases, however, there might be considerable heterogeneity among employment sectors. In many cases it is useful to perform these decomposition dissagregating households according to other characteristics: for example, dividing households depending on their main occupation (e.g., differentiating between rural farmers, rural non-farm workers, sector of occupation of household head, etc.).

ANNEX C: ESTIMATION RESULTS (CHAPTER 3)

Table AC 1: Mean and Standard Deviation by Employment Category

Variable	Waged workers		Employers		Self-employed		HH enterprises	
	Agriculture	Non-agriculture	Agriculture	Non-agriculture	Agriculture	Non-agriculture	Agriculture	Non-agriculture
Earnings	6.073	13.240	29.293	48.983	16.367	15.787	8.071	15.039
Age	31.244	32.716	42.320	42.627	36.367	39.438	44.708	44.896
Years of Education	3.121	8.407	3.339	8.027	2.654	5.375	1.729	4.039
Gender	0.916	0.537	0.949	0.781	0.885	0.393	0.930	0.696
No. of children < 6 years	1.370	0.878	0.976	0.740	1.323	0.904	1.319	0.927
No. of children ages 7-15	1.502	1.296	1.506	1.118	1.281	1.346	2.276	1.556
Number of adults	3.326	3.549	3.509	3.299	2.879	3.146	3.589	3.326
Number of elderly	0.116	0.200	0.127	0.183	0.169	0.133	0.072	0.109
Non-Labor Income	3.210	10.529	5.857	15.076	3.653	8.364	4.481	7.597
Managua	0.082	0.431	0.000	0.312	0.046	0.383	0.007	0.234
Pacific	0.329	0.303	0.270	0.361	0.208	0.348	0.227	0.360
Central	0.468	0.197	0.580	0.247	0.520	0.211	0.509	0.288
Atlantic	0.121	0.070	0.150	0.080	0.226	0.058	0.257	0.117

Source: Own calculations based on EMNV.

Table AC 2: Mean and Standard Deviation, by Sector of Economic Activity and Formality Level

Variable	Primary	Secondary		Tertiary	
		Formal	Informal	Formal	Informal
Earnings	11.492	15.899	10.776	21.421	15.697
Age	37.235	32.350	34.513	35.486	37.011
Years of education	2.672	8.249	5.631	10.649	6.268
Gender	0.916	0.609	0.710	0.517	0.456
No. of children < 6 years	1.299	0.833	1.025	0.760	0.893
No. of children ages 7-15	1.660	1.036	1.452	1.174	1.376
Number of adults	3.318	3.419	3.516	3.470	3.358
Number of elderly	0.118	0.128	0.176	0.211	0.168
Non-labor Income	3.969	10.870	6.461	14.664	9.107
Managua	0.045	0.571	0.274	0.485	0.374
Pacific	0.268	0.254	0.396	0.275	0.329
Central	0.504	0.150	0.248	0.170	0.224
Atlantic	0.184	0.025	0.082	0.070	0.074

Source: Own calculations based on EMNV.

Table AC 3: Earnings Equations by Employment Category, 2001

Employment category								
Variable	Waged workers		Employers		Self-employed		HH enterprises	
	Agriculture	Non-agriculture	Agriculture	Non-agriculture	Agriculture	Non-agriculture	Agriculture	Non-agriculture
Age	.0234***	.0261***	-0.0034	-0.0126	0.0043	-0.0015	-.0344***	0.0065
Years of Education	.0667**	.1279***	.1374*	0.0324	.1144*	.0731***	0.0692	0.0221
Gender	0.053	.2296***	-1.319	-.8265**	-0.3815	.4915***	-.8999***	.4435***
Pacific	-.5601*	-.1525*	-1.383	-0.5319	-1.36*	0.0715	0.3933	-.6348**
Central	-0.4818	-.1692*	-1.057	-.6464**	-0.4303	0.1019	0.3589	-.477*
Atlantic	-0.0964	-0.0079	0	-0.0989	0.4632	.4823**	0.7036	-0.3808
λ_1	-0.0317							
λ_2		0.2883						
λ_3			-1.996					
λ_4				-1.72**				
λ_5					0.3646			
λ_6						-.6512**		
λ_7							-.8981***	
λ_8								0.2035
Constant	0.8791	-0.1851	7.793	7.476***	1.151	2.306***	4.293**	1.381
No Observations	409	1939	159	234	283	873	356	245
R-squared	0.1471	0.2465	0.1379	0.3532	0.1685	0.0539	0.0965	0.0908

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; lambdas standard errors are bootstrapped standard errors.
Source: Own calculations based on EMNV.

Table AC 4: Earnings Equations by Sector of Employment, 2001

Sector of economic activity					
Variable	**Primary**	**Secondary**		**Tertiary**	
		Formal	**Informal**	**Formal**	**Informal**
Age	0.0045	0.014	.0354***	.027***	.0253***
Years of Education	-0.0356	.1181***	.0649***	.177***	.0715***
Gender	.8978*	0.2768	0.1972	.2212**	0.1668
Pacific	0.0546	-.3224*	-.3854***	-.2501**	-0.0094
Central	0.8212	-0.1309	-.405***	-.3088*	-0.063
Atlantic	1.399**	-0.5493	-0.1137	-0.0783	0.2034
λ_1	1.109*				
λ_2		1.066*			
λ_3			-0.0587		
λ_4				0.7258	
λ_5					0.1745
Constant	-1.017	-1.189	0.4249	-1.142	0.3396
No Observations	1210	219	569	693	1812
R-squared	0.0814	0.2304	0.159	0.2732	0.1097

* significant at 10%; ** significant at 5%; *** significant at 1%; lambdas standard errors are bootstrapped se.

Note: *significant at 10%; ** significant at 5%; *** significant at 1%; lambdas standard errors are bootstrapped standard errors.
Source: Own calculations based on EMNV.

Table AC 5: Oaxaca-Blinder Decomposition: Detailed Outcomes for Sector and Informality

	Secondary informal/Primary		Tertiary informal/Primary		Secondary formal/Secondary informal		Tertiary formal/Tertiary informal	
	Coefficients	P-value	Coefficients	P-value	Coefficients	P-value	Coefficients	P-value
Net difference	1.326	0.083	1.234	0.018	1.598	0.171	0.110	0.856
endowments								
Age	-0.012	0.245	-0.001	0.257	0.030	0.158	0.041	0.000
Years of education	-0.105	0.549	-0.128	0.549	-0.309	0.000	-0.775	0.001
Gender	-0.184	0.097	-0.413	0.097	0.028	0.098	-0.013	0.010
Pacific	0.007	0.902	0.003	0.902	-0.046	0.074	-0.014	0.045
Central	-0.210	0.212	-0.230	0.212	-0.013	0.660	-0.016	0.050
Atlantic	-0.143	0.038	-0.154	0.038	-0.031	0.164	0.000	0.545
Total	-0.648	0.150	-0.922	0.170	-0.341	0.002	-0.778	0.002
coefficients								
Age	1.150	0.000	0.774	0.000	0.692	0.060	-0.060	0.802
Years of education	0.268	0.102	0.286	0.075	-0.439	0.064	-1.123	0.060
Gender	-0.642	0.210	-0.670	0.190	-0.048	0.716	-0.028	0.731
Pacific	-0.118	0.343	-0.017	0.888	-0.016	0.783	0.066	0.131
Central	-0.618	0.069	-0.446	0.185	-0.041	0.407	0.042	0.207
Atlantic	-0.278	0.031	-0.220	0.081	0.011	0.326	0.020	0.122
Constant	1.442	0.302	1.356	0.301	1.614	0.116	1.481	0.240
Total	1.205	0.110	1.065	0.058	1.773	0.135	0.398	0.512
interaction								
Age	-0.084	0.000	-0.005	0.001	0.046	0.061	-0.003	0.802
Years of education	0.297	0.102	0.385	0.075	0.139	0.064	0.462	0.060
Gender	0.144	0.210	0.336	0.190	-0.008	0.716	0.003	0.731
Pacific	-0.057	0.343	-0.004	0.888	-0.009	0.783	0.013	0.131
Central	0.314	0.069	0.248	0.185	-0.027	0.408	0.013	0.208
Atlantic	0.154	0.032	0.132	0.081	0.025	0.326	0.001	0.143
Total	0.769	0.090	1.092	0.108	0.167	0.174	0.490	0.049

Source: Own calculations based on EMNV.

Table AC 6: Oaxaca-Blinder Decomposition: Detailed Outcomes for Employment Categories

	WNAG/ WAG		WNAG/ EAG		WNAG/ ENAG		WNAG/ SAG		WNAG/SNAG		WNAG/ FAG		WNAG/ FNAG	
	Coef.	**P>|z|**	**Coef.**	**P>|z|**	**Coef.**	**P>|z|**	**Coef.**	**P>|z|**	**Coef.**	**P>|z|**	**Coef.**	**P>|z|**	**Coef.**	**P>|z|**
difference	0.342	0.445	4.083	0.259	4.409	0.001	0.914	0.289	1.122	0.001	0.703	0.130	0.127	0.909
endowments														
Age	0.034	0.008	0.250	0.000	0.258	0.000	-0.016	0.644	0.175	0.000	0.312	0.000	-0.079	0.641
Years of Education	0.353	0.013	-0.648	0.000	-0.049	0.000	0.658	0.049	-0.388	0.000	-0.854	0.000	0.097	0.364
Gender	-0.020	0.851	0.095	0.000	0.056	0.000	0.133	0.399	-0.033	0.000	0.090	0.000	-0.071	0.008
Pacific	0.015	0.084	0.005	0.062	-0.009	0.059	-0.129	0.090	-0.007	0.058	0.012	0.058	0.037	0.025
Central	0.131	0.155	-0.065	0.091	-0.009	0.092	0.139	0.628	-0.002	0.094	-0.053	0.091	0.044	0.093
Atlantic	0.005	0.771	-0.001	0.938	0.000	0.939	-0.072	0.613	0.000	0.938	-0.001	0.938	0.018	0.234
Total	0.517	0.093	-0.364	0.006	0.248	0.000	0.713	0.297	-0.255	0.000	-0.494	0.002	0.045	0.853
coefficients														
Age	0.084	0.787	-0.964	0.277	-1.264	0.024	0.791	0.039	-0.900	0.000	-1.979	0.000	0.880	0.182
Years of Education	0.191	0.040	0.080	0.895	-0.802	0.031	0.036	0.820	-0.461	0.003	-0.494	0.242	0.427	0.000
Gender	0.162	0.539	-0.831	0.299	-0.567	0.002	0.541	0.181	0.141	0.145	-0.606	0.001	-0.149	0.227
Pacific	0.134	0.219	-0.373	0.864	-0.115	0.267	0.251	0.134	0.068	0.132	0.165	0.531	0.174	0.101
Central	0.146	0.377	-0.175	0.903	-0.094	0.159	0.136	0.770	0.053	0.116	0.104	0.547	0.089	0.307
Atlantic	0.011	0.799	0.001	0.999	-0.006	0.799	-0.106	0.609	0.034	0.042	0.050	0.441	0.044	0.267
Constant	-1.064	0.079	7.978	0.429	7.661	0.001	-1.336	0.406	2.491	0.000	4.478	0.008	-1.566	0.345
Total	-0.336	0.480	5.715	0.348	4.813	0.002	0.312	0.724	1.425	0.000	1.718	0.116	-0.102	0.928
interaction														
Age	0.004	0.787	-0.283	0.277	-0.383	0.024	-0.079	0.039	-0.185	0.000	-0.725	0.000	-0.239	0.182
Years of Education	0.323	0.040	-0.048	0.895	0.036	0.033	0.078	0.820	0.166	0.003	0.392	0.242	0.462	0.000
Gender	-0.067	0.539	-0.638	0.299	-0.258	0.002	-0.213	0.181	-0.038	0.145	-0.444	0.001	0.034	0.227
Pacific	-0.011	0.221	0.040	0.865	-0.022	0.267	0.115	0.134	0.010	0.132	-0.042	0.532	-0.028	0.102
Central	-0.085	0.377	-0.340	0.903	-0.024	0.160	-0.084	0.770	0.004	0.119	0.165	0.547	-0.028	0.307
Atlantic	-0.005	0.799	0.001	0.999	-0.001	0.800	0.074	0.609	-0.006	0.044	0.133	0.441	-0.018	0.267
Total	0.160	0.617	-1.268	0.717	-0.652	0.004	-0.11085	0.873	-0.048	0.580	-0.521	0.461	0.184	0.497

Note: WAG=wage agriculture, WNAG=wage non-agriculture, ENAG=employers non-agriculture, EAG=employers agriculture, SAG=self-employed agriculture, SNAG=self-employed non agriculture, FAG=family enterprises agriculture, FNAG=family enterprises non-agriculture

Source: Own calculations based on EMNV.