A Multidimensional Well-being Approach to a Rural Business Development Program in Nicaragua

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This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

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List of Acronyms

AECID	Spanish Agency for international development cooperation and for humanitarian assistance
ALBA	Bolivarian Alliance of the Peoples of Our America
ASOMIF	Nicaraguan Association of Microfinance Institutions
CA	Capability Approach
CATIE	Canadian Aids Treatment Information Exchange
CBN	Central Bank of Nicaragua
CENAGRO	National Agricultural and Livestock Census
CETREX	Nicaraguan Center for Export Procedures
CIASES	Working Group of the Centre for Research and Education and Social Action
COSEP	Superior Council of the Private Enterprise
COSUDE	Swiss Agency for Development and Cooperation
CSPro	Census Survey Processing System software
DAI	Development Alternatives Incorporated
DESD	Decade of Education for Sustainable Development
DFATD	Canadian Department of Foreign Affairs, Trade and Development
DR-CAFTA	Dominican Republic and Central America Free Trade Agreement
EFA	Education for all
EMNV	National Household Survey on Living Standards Measurement
EU	European Union
FAO	Food and Agriculture Organization
FGT	Foster-Greer-Thorbecke
FIDEG	International Foundation for the Global Economic Challenge
FUNIDES	Nicaraguan Foundation for Social and Economic Development
GDI	Gender Development Index
GDP	Gross Domestic Product
GEM	Gender Empowerment Measure
GNP	Gross National Product
HD	Human Development

HDCA	International Conference of Human Development and the Capability Approach
HDI	Human Development Index
HDR	Human Development Report
HPI	Human Poverty Index
IDB	Inter-American Development Bank
IEEPP	Institute of Strategic Studies and Public Policy
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
INIDE	National Institute of Development Information
INSS	Nicaraguan Institute of Social Security
ISS	Institute of Social Studies
JICA	Japan International Cooperation Agency
LDC	Least Developed Country
MAGFOR	Ministry of Agriculture and Forestry
MCA-N	Millennium Challenge Account Nicaragua
MCC	Millennium Challenge Corporation
MDG	Millennium Development Goal
MECOVI	Program for Improvement of Surveys and Measurement of Living Conditions in Latin America and the Caribbean
MINSA	Ministry of Health of Nicaragua
NDP	National Development Plan
NGO	Non-Governmental Organization
OPHI	Oxford Poverty & Human Development Initiative
PNDH	National Human Development Plan
PRORURAL - I	Productive Rural Development Sector Program - Inclusive
RBD	Rural Business Development
SIBOIF	Superintendency of Banks and Other Financial Institutions
SME	Small and Medium Enterprise
SNV	Netherlands Development Organization
TNS	TechnoServe
UN	United Nations
UNAN	National Autonomous University of Nicaragua
UNDP	United Nations Development Program
USDA	United States Department of Agriculture
WB	World Bank
WEAI	Women's Empowerment in Agriculture Index

WEF	World Economic Forum
WHO	World Health Organization

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Abstract

Despite the progress made on multidimensional approaches to well-being, income-based methods continue to set the framework for economic policy. This research analyzes how increased income and other dimensions of poverty and well-being are understood and measured in program evaluation. It uses a study case of Rural Business Development in Nicaragua in order to illustrate the relationship between income and other dimensions such as level of education, health and access to credit from the perspective of the Capability Approach. The paper draws on secondary data collected from 1,600 rural farmers and utilizes econometric techniques to describe the extent of the program impact as well as whether causal effect is established between the program treatment and the studied variables. The findings indicate that despite a boost of up to 30% in farmer income, changes in the dimensions used are not directly associated with program treatment. Although the findings do not put into argument the efficiency of the program, the evidence supports the argument that the real impacts on the multidimensional well-being might be occurring directly through increased income.

Keywords

Rural Business Development, Poverty Alleviation, Dimensions of well-being, Capability Approach, NGOs, Program Design, Impact Evaluation.

Chapter 1 Introduction

Most of the world's extreme poor live in rural areas with agriculture and livestock activities as their main source of income and employment. They not only survive on exceptionally low incomes, but they also suffer from severe deprivations including unemployment, ill-health, malnutrition, inadequate shelter, lack of education, vulnerability, powerlessness, social exclusion and so on. Initiatives to promote development in the rural areas have arisen as mechanisms to address these issues. Among them, RBD Programs which aim to enhance the living standards of the rural poor by providing leadership in building competitive businesses that can prosper in the global marketplace, building on the premise that rural poor have underutilized potential and that thriving businesses can be a solution to poverty. The approach has been adopted by several development organizations around the world. Most of them however, continue to understand poverty strictly as a shortfall in economic resources and as so, have focused their development strategies in increasing income for the poor. Leveraging on evidence that shows that economic growth is not necessarily linked to well-being, multidimensional approaches to development have arisen as an alternative for the understanding of development. The main one, introduced by Amartya Sen is known as the CA, which has contributed to the field by refocusing the issue of poverty on people, their deprivation and their capability to take control of their lives. However, the main issue remains the operationalization of the capability approach to efficient and competent methods of analysis.

This paper uses a case of RBD in Nicaragua which aimed to increase incomes through improved productivity, to critically analyze the relationship of income with other dimensions of well-being including Education, Health and Access to credit. It relies on secondary data collected in the departments of Leon and Chinandega between 2007 and 2011 for 1,600 farmers in order to offer an alternative view to impact measurement.

1.0 Research Paper

1.0.1 Statement of the Problem

Agriculture has traditionally played a central role in the economy of Nicaragua and the livelihoods of millions of rural poor. Despite this, farmers still struggle with low income and living standards as a result of a multitude of constraints for profitable market opportunities. Rural business development (RBD) programs have arisen as public and private initiatives to target these constraints. However, there is an on-going debate on whether these programs effectively result in the improvement of farmers' well-being. Most studies focus on assessing program impact using income and consumption-based approaches as the sole measure to determine poverty reduction. There is, however, little evidence on whether this mechanism translates into improved multidimensional well-being. Most program evaluations measure outcomes at the enterprise or industry level, assuming improvement of well-being, rather than quantifying

the real impacts on poverty, which would imply measuring change at the individual or household level. It is critical for policy and program design to understand the link between income and improvement of well-being taking into account the multiple dimensions of poverty and the particularities of local context.

1.0.2 Research Objective(s)

Based on the stated problem, the objective of this research is to analyze how the link between income and improvement of well-being is understood by policy makers and program designers as well as the ways farmers' well-being is currently measured and observed. The research will use a Rural Business Development intervention in Nicaragua as a study case to understand the extent to which small farmers' well-being is affected with the purpose to add insights to the general debate as well as to contribute to policy and decision-making regarding poverty alleviation.

1.0.3 Research Question

To what extent does Rural Business Development affect the multidimensional well-being of small farmers?

1.0.4 Sub-questions

1. Do the households' spending/consumption over time display a developmental characteristic?
2. To what extent does Rural Business Development affect the education and health of the household members?
3. To what extent does Rural Business Development affect households' access to credit?

1.0.5 Research Methodology

This paper makes use of a study case of RBD in Nicaragua, implemented by the MCA from 2007 to 2011. It therefore draws on secondary data analyzed by the Research Center of the University of California, Davis, in its "Impact Evaluation in the Economic Well-being of Small Farmers in Nicaragua" (Carter and Toledo, 2012) for the MCC. This section will briefly introduce the methodology used for the analysis. For more details refer to Chapter 4.

1.0.5.1 Introduction to RBD Program in Leon and Chinandega

The RBD program aimed to increase income for small and medium farmers through improved productivity and targeted the sectors of livestock, agriculture, non-agricultural businesses and forestry. The program designed a randomized rollout strategy in order to select the farmers suited for treatment that

requested to participate in the program based on established criteria defined by the program. In October 2012, Carter et.al. (2012) released an Impact Evaluation of the RBD with the objective of learning the effects of the Program on the economic well-being of small farmers in Nicaragua. They discovered a substantial boost in income from the targeted activities of up to 30%. More details are presented in Chapter 3.

1.0.5.2 Research Paper rationale and choice of variables

This paper engages on the literature on multidimensional poverty and well-being, and the complex relationship between economic growth and improvement of multidimensional living standards. It aims to analyze whether the effects of an RBD program also affect other dimensions of poverty and well-being at the household level. It attempts to identify changes in education measured by school attendance; health, measured by expenses in health and access to credit. The choice of variables considers the following factors:

1. Literature available about constraints faced by small and medium farmers in Nicaragua to develop rural businesses, including the World Banks' Doing Business 2014 (2013), which ranks Nicaragua at 123 from a list of 189 countries and the Global Competitiveness Report (2010), which surveys Nicaraguan citizens on the most problematic factors for doing business. In addition, the National Development Plan executed by the Government in 2005 suggests that lack of access to education, health and credit are among the main constraints to productivity faced by Nicaraguan farmers.
2. MCC identified the main threats and challenges faced by producers to design the intervention strategy. Lack of access to credit and lack of technical education ranked high on the list, along with inadequate on-farm and out-farm infrastructure.
3. Availability of data.
4. Selectivity of analysis based on the approach utilized, relying heavily on literature on HD and Sen's Capability Approach.
5. Ability of the analysis of variables used to affect other aspects of poverty and well-being, as well as to generate relevant policy implications.

1.0.5.3 Sampling and Identification of Counterfactual

Data from 1,600 households was used for the analysis, collected in three rounds of surveys (2007, 2009 and 2011). The assessment exploits the fact that during implementation not all farmers could be treated simultaneously, facilitating the identification of a counterfactual, given that the randomization of clusters of farmers into early or late treatment ensures validity of results. The group of farmers that were not offered treatment at the beginning of the program but were equally eligible served as a temporary control group. The strategy not only facilitated gathering information of eligible households, but also of complier households which actually participated in the RBD program.

1.0.5.4 Approach to answering Research Questions and Specification of Model

A Difference-in-Difference Model is used for the variables of the indicators of Education, Health and access to Credit, specified by:

$$D^T = [(y_2^T - y_1^T) - (y_2^C - y_1^C)]$$

And its adaptation to include the three periods of time,

$$E[Y_{it}] = \alpha_0 + \lambda_2 t_2 + \lambda_3 t_3 + \delta_2(t_2 T_i) + \delta_3(t_3 T_i) + [\gamma T_i + \beta' X_i]$$

Q1: To what extent does Rural Business Development affect the education and health of the household members?

The variable for Education, ***"school attendance***", describing the rates of enrollment in previous year, is used as the main indicator of education attainment at the household level.

Expenditures in health during the previous month (diarrhea, illness/accidents and other illnesses) as well as ***expenditures in private health insurance*** are the variables analyzed for Health at the household level.

Q2: How does Rural Business Development affect households' access to credit?

The key variables for Access to Credit are whether the ***farmer received credit*** the previous year, and if they did whether the ***amount received was equal or lower than requested***.

Q3: Do the households' spending/consumption display a developmental characteristic?

The research will compare descriptive statistics of spending/expenses before and after the project implementation.

The categories analyzed are expenses in:

- Education
- Health
- Services
- Food, drinks and tobacco
- Transportation
- Newspapers
- Fuels for vehicles
- Short term non-food
- Medium term non-food
- Long term non-food

More details about sampling, counterfactuals identification and approach to answer the research questions are explained in Chapter 4.

1.1 Scope and Limitations

Measurement of multidimensional poverty and well-being is a vastly experimental and debated topic. Therefore it is important to situate this paper in that context. This research does not intend to provide absolute answers to the

discussion about measurement of results in program design and the highly complex analysis of the relationship between changes in income and other dimensions of well-being. It is acknowledged herein that the paper does not comprehend all aspects for a clear definition on the debated topic, given the constraints in space and time of the research. It is also aware of the limitations of impact evaluation and quantitative research techniques to understand social sciences and its implications particularly on external validity, as well as the challenges inherent to analyzing information based on secondary data. This paper aims to simply be an exercise in development economics to gather more understanding on how the link between income and improvement of well-being is regularly understood in program design and the ways farmers' well-being is currently measured and observed. The result could offer if even, a tiny piece of the puzzle to the entire picture.

1.2 Organization of the Paper

Chapter one provides a brief background into the context, problem statement, questions, objectives and analysis methodology. Chapter two offers insights on RBD approach, as well as the debate shaping the definition of poverty as a multidimensional concept seen through Sen's Capability Approach, and identifies the existing measurement of well-being. Chapter three introduces the reader to the contextual background of the Nicaraguan economy and rural landscape and illustrates the role of the Government and NGOs on RBD and initiatives in multidimensional measures of poverty; finally, it describes the selected study-case. Chapter four assesses the data corresponding to the study-case and draws on the relevant issues and debates presented in chapter 2 and 3. Chapter five provides concluding remarks that attempt to answer the main research question and sub-questions.

Chapter 2 Rural Business Development: Framing the discussions on farmer well-being

This chapter attempts to serve as an Analytical Framework to introduce the study of RBD approach as a development strategy and present the debate about the conceptual basis and measurement of multidimensional well-being, in particular the Capability Approach.

2.0 The Rural Business Development approach to Development

Despite different definitions for what is considered "rural", a general understanding is the "areas outside cities or towns", "all population, housing and territory not included within an urban area" (HRSA, Defining the Rural Population) or "whatever is not urban" (ibid). Countries worldwide have set different criteria to define what is considered rural including number of residents, population density and population dedicated to primary activities. According to World Bank (WB) data, 47% of the worlds' population lives in rural areas with agro-livestock as their main source of income and employment. An estimated 75% of the 1.2 billion people in extreme poverty live in rural areas in the developing world (ECOSOC, 2003:10).

Rural poor are not only characterized for having significantly lower income than urban areas, but they also systematically lag behind in every MDG area: education, status of women, child mortality, maternal health, incidence of endemic diseases and environmental stress (ibid). Furthermore, a relevant portion of the explanation of the modest decline in the share of rural poverty in recent years is attributed to migration to urban areas instead of actual improvement in rural income and other poverty indicators. Ill-prepared rural migrants have been displacing poverty to the urban sector (ibid).

Considering these factors, MDG 1, halving world extreme poverty and hunger before 2015 cannot be achieved without a special focus on rural poverty reduction. However, currently, only 25% of major donor portfolios is dedicated to rural areas (ibid).

It is worth mentioning that agricultural society has long been regarded as a stepping stone toward modern and industrial development within capitalism. Rostow's five stages of economic growth (1960) is merely one example of this perspective. In this point of view, smallholder peasant life is a transitional mode on the way to waged labor. The UN has been among the many recognizing that this does not necessarily reflect reality in much of the developing world. If well it is true that the overall trend is toward urbanization, the movement is slow and the majority of extreme poor will continue living in rural areas for many years to come (ECOSOC, 2003).

It is clear that rural development must therefore be a cornerstone of any integrated development effort. The UN defines Rural Development as "a process of change, by which the efforts of the people themselves are united, those

of government authorities to improve their economic, social and cultural conditions of communities into the life of the nation and to enable them to contribute fully to national programme". "Rural Development is a process of bringing change among rural community from the traditional way of living to progressive way of living. It is also expressed as a movement for progress".

RBD has arisen in the form of private/public interventions as an approach aimed to tackle issues of development. Development institutions have introduced the approach including national governments, USDA, UN, IFAD, IDB, WB, Chemonics, TechnoServe, DAI as well as multiple cooperation agencies. Although there is no specific definition of the approach, the USDA (USDA, 11/08/2013) states that the mission of RBD is "to enhance the quality of life for rural people by providing leadership in building competitive businesses including sustainable cooperatives that can prosper in the global marketplace."

The approach is based on the premise that rural poor have great underutilized potential and that thriving businesses can be a solution to poverty. Businesses are sources of jobs and income and could potentially increase rural families well-being. Businesses can also be seen as sources of economic opportunity that can empower individuals to choose the kind of life that they most prefer.

The approach is fairly simple. It mostly involves:

- Investing financial resources and providing technical assistance to businesses and cooperatives located in rural communities.
- Establishing strategic alliances and partnerships that leverage public, private, and cooperative resources to create jobs and stimulate rural economic activity.

2.0.1 Development, Poverty and well-being

Conventional approaches to economics interpret development as raising basic living standards of the majority of the population. This increases the ability of a society to satisfy wants[1]. Therefore development is equated with economic growth. The term poverty is regularly used under this approach to define income deficit. There are discussions whether income is a good enough poverty and well-being measure. There are plenty of examples in which economic growth does not lead necessarily to improved living conditions or where high living standards are not necessarily a result of economic growth[2]. Nowadays, the multidimensional nature of poverty and human well-being is mostly commonly accepted. The UN (ECOSOC 2003:11) has expressed that improving overall well-being implies balance in improving all different components of a person's life. Moreover, a complex web of factors determines a person's well-

[1] Lectures of the Global Economy class – 3/1 – "The developing countries in the world economy"

[2] Cuba ranks highly in health and education provision, despite of not having high economic development. This observation is central to the analysis of poverty, however it is not discussed deeply since it is beyond of the scope of this paper.

being, including assets, capabilities, environment, family situations and education among others.

New Keynesian approaches, based on this acknowledgement, interpret development as growth combined with increased welfare[3]. Welfare is understood in terms of freedoms and capabilities as exposed by Amartya Sen (Sen, 1999). In this context development is seen as "widening of choices, an expansion of freedoms and a fulfilment of human rights" (Fakuda-Parr, 2003). It brings about issues of deprivation and inequality not considered in the conventional approach.

Poverty is therefore viewed as multifaceted, reflecting deprivation, suffered by people in many aspects of life, including unemployment, ill-health, malnutrition, inadequate shelter, lack of education, vulnerability, powerlessness, social exclusion and so on. The capability approach understands poverty as deprivation in the space of capabilities, or failure to achieve certain minimal or basic capabilities, where "basic capabilities" are "the ability to satisfy certain crucially important functionings up to certain minimally adequate levels" (McGillivray, Clarke, 2006: 30).

Human well-being, is often associated with quality of life, welfare, well-living, living standards, utility, life, satisfaction, prosperity, needs fulfilment, development, empowerment, capability expansion, human development and happiness (McGillivray, Clarke, 2006). Sen evaluates well-being in terms of an individual's achievements and abilities to function (Foster, Handy, 2008). It is seen as the freedom of individuals to live lives they value. (McGillivray, Clarke, 2006:30)

UNDPs' HDR has described poverty from three different perspectives:

- Income perspective: if their income is below a defined poverty line.
- Basic needs perspective: if they are deprived of material requirements for minimally acceptable fulfilment of human needs.
- Capability perspective: if they lack the opportunity to achieve some minimally acceptable level of functioning. In other words they are poor in absence of some basic capabilities to function.

2.1 The Debate on multidimensional well-being

2.1.1 Development Economics and the incorporation of Human Well-being into Economic Thought

In the last decades we have seen an important transition in paradigms that shape our understanding of development. By far the most important development in recent years is placing the issue of poverty at the center of the development discourse. Poverty and well-being, as seen above, have become cornerstones of development studies and development policy. There is a relative

[3] Lectures of the Global Economy class – 3/1 – "The developing countries in the world economy"

consensus today about the necessity to assess the concepts of poverty and well-being from a multidimensional perspective.

The concern about human well-being can be found in social science literature centuries ago, from early political economy to classical economics put forward by Adam Smith, Robert Malthus and John Stuart Mills among others (Fakuda-Parr et al., 2003). However, it was not until later that development economics became a field of its own with the study of poverty at its core center.

After World War II, neo-classical economics took over economic thought with market-based theories of determination of prices mediated by individual maximization of utility, rational choice and economic models to measure economic indicators. Conventional economics assumes that economic growth in one sector eventually trickles down and translates into economic expansion for all. The rise of development economics came as a response to general discontent experienced around the 1980s, when it became obvious that the trickle-down theory was not operating in reality and human lives were shrivelling despite economic expansion. (Fakuda-Parr et al.., 2003). Moreover, a series of structural adjustment programs put forward in developing countries by the Bretton Woods Institutions as conditions for loans, proved too harsh a medicine, especially for the poor, exposing huge inequalities.

Different theories and paradigms as the Capability Approach (CA) and the Human Development (HD) Paradigm were proposed as alternatives to the mainstream approach. The HD paradigm, born within the United Nations by initiative of a team lead by Mahbub Ul Haq including Paul Streeten, Frances Stewart, Richard Jolly and Amartya Sen, questioned the link between expanding income and expanding human choices and sought to draw attention to the focus on well-being.

UNDP identified 5 kinds of growth that are not linked to well-being:

- Jobless growth: economic expansion without employment opportunities
- Ruthless growth: economic expansion only benefits the rich
- Voiceless growth: growth not accompanied by an extension in democracy or empowerment
- Rootless growth: growth that also withers people's cultural identity
- Futureless growth: present growth consumes resources needed by future generations

Based on this analysis, they sought to expand the poverty and well-being concepts to more than the one-dimensional income-based definition proposed by conventional economics. They drew attention to neglected aspects of economic and social development; access to education, health, adequate shelter, safety, employment, political freedom and ability to participate in the social, economic and political life, among others. It questioned the existing power structure, elaborating that to link economic growth with HD it was necessary to put in place parallel policies that promote far-reaching land reforms, progressive tax systems, credit systems for the poorest, expansion of social services, removal of barriers of entry in political and economic spheres and equalization of access to opportunities among others (Fakuda-Parr et al, 2003).

2.2 The Capability Approach

The CA, pioneered by Amartya Sen in the 1980s, understands development as expansion of human capabilities, instead of the maximization of utility, money or income. Instead of focusing on the latter, the CA concentrates on well-being indicators as freedom to live a valued life (MacGillivray, Clarke, 2006).

Sen highlights three key concepts in CA, functionings, capabilities and agency. CA recognizes different roles of people. They are themselves means of production, beneficiaries and agents of progress. Life is perceived as a set of "doings" and "beings" called functionings. In particular, evaluation of quality of life is related to the assessment of the capability to function. A functioning is an achievement of a person to be or do. A capability, on the other hand, represents a person's freedom to achieve various functioning combinations. Agency plays a key role in the capacity of individuals to take control of their lives and surroundings. The true meaning of development consists on the ability to transform capabilities; access to education, health, adequate living conditions and nutrition among others, into functionings; being healthy, being educated, being well-nourished, being happy and satisfied, being able to participate in social, economic and political decisions that affect them, etc. Access to economic resources becomes just an additional capability that human beings desire to achieve functionings. The capacity of agency is associated with the empowerment of human beings. When people acquire capabilities and eliminate deprivations, they obtain freedoms to choose what they want to be or do with their lives (HDR Nicaragua, 2011). It is relevant to discuss that CA is not about allocating the poor the responsibility of overcoming their own poverty or autonomy to generate processes so that they will not depend on other people's decisions, but that they act as subjects capable of managing the processes that involve them and making governments and institutions accountable for their responsibilities (HDR Nicaragua, 2011: 47).

The change in focus from strictly monetary value to outcomes implies a basic shift in the epistemology of well-being in which monetary value becomes an instrumental tool to achieving freedom. Capabilities in the CA are perceived both as a means and end of enhancing well-being and achieving development. Sen describes this dual function as the constitutive and the instrumental role, respectively. He advocates for five instrumental freedoms: political freedoms (civil rights and other aspects of democratic processes); economic facilities (access to credit and other distributional considerations); social opportunities (access to education and health care); transparency guarantees (societal prevention of corruption and financial irresponsibility); and protective security (social safety nets providing income supplements and unemployment benefits) (Pyles, 2013: 33).

Sen points out that the set of capabilities of an individual and their use are determined by private monetary income, publicly provided goods and services, individual's own characteristics and general environment context (McGillvery, Clarke, 2006).

If well the CA is recognized for expanding the definition of poverty to one that encompasses multiple dimensions, it is criticized for not automatically yielding one operational metric. As mentioned by Fakuda-Parr (2003), the issue

remains that social valuation cannot be taken over by some kind of value-neutral engineering. Application issues are discussed in further sections. Another critique to the CA is that it does not entail a change to include a different unit of analysis other than the individual. In this context, it remains highly similar to the theory of maximization of utility used by more conventional approaches. Both utility deprivation and capability failure are characteristics of individuals.

2.2.1 Social Opportunities

2.2.1.1 The role of education in the CA

Education is generally conceived as a driving force of development. However, while it is conventionally seen as an additional factor of production and thus a means to yielding economic returns, the CA understands it as "the ability of human beings to live lives they have reason to value and to enhance the substantive choices they have" (Deneulin-Sahani, 2009:212). There is a clear connection between the conventional and the CA in that, as Sen describes, they both concern the role of human beings and in particular the abilities they achieve and acquire. The main difference between the two approaches lies in their perception of education as a means to development and as both a means and end in itself respectively. The CA regards education as an expansion of human freedom and therefore has intrinsic value on its own. Education thus, constitutes an essential dimension of well-being, given that it widens the range of options and opportunities people have to choose the type of lives they value and desire to live. This expansion of opportunities goes beyond the ability to aspire for better jobs and obtain higher income. It also entails being healthier, being able to actively make decisions about their lives and protect themselves from violence and social injustice, participate in their communities and society, being able to have a say in the political and economic processes that affects them and even enjoying their free time (HDR Nicaragua, 2011). This is viewed as a process of "human flourishing" (Deneulin-Shahani, 2012). Education not only empowers human beings to take control of their own lives, but also gives them a voice that allows them to influence their surroundings and change the fate of those who need it most. Unterhalter characterizes this multiplicity of roles of education in development of in three ways: it is instrumental, empowering and redistributive (Deneulin- Shahani, 2009: 207).

Fakuda-Parr (2003) also makes reference to this multiplicity of roles. He argues that education matters in 4 different levels. A higher level of education can potentially contribute to increased productivity. Wide sharing of education can improve the distribution of income. Education can also improve the ability to convert income into functionings. Last but not least, a higher education may provide the intelligence to choose a particular type of life.

In addition, education has a multiplier effect which increases the enjoyment of other dimensions of well-being, rights and freedoms (HDR Nicaragua, 2011).

Although the application of CA poses multiple methodological issues, several attempts have been made to go beyond the conventional approach. In particular, international declarations such as the MDGs, Education for all

(EFA), the Decade of Education for Sustainable Development (DESD) and the Beijing Declaration on Women

2.3.1.1 The role of health in the capability approach

According to WHO, health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". In addition, "enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being" *(*Deneulin-Shahani 2009: 229). In fact, few would argue about the intrinsic importance of health to all factors of life and most agree on it being a key dimension of well-being. However, the value of health is perceived in different ways. The conventional approach views access to health mainly as an utilitarian instrument or a mean to ensure productive inputs for economic growth, while the capability approach perceives health to have a multi-purpose effect. It is instrumental that human beings are healthy to obtain other capacities and freedoms, but it is also intrinsic in the sense that being healthy is an end itself. Access to Health, as a critically significant constituent of human capabilities leads to being healthy and being healthy is a freedom we have reason to value. It is not only indispensable for economic growth, educational achievements and economic, social and political opportunity among others, but it is also intrinsically associated with human dignity, safety and empowerment (Deneulin-Shahani 2009: 229).

Health, even more than education, is instrumental to acquiring other valuable capabilities and freedoms. It is also similar to education in that it facilitates conversion of resources to capabilities and capabilities to functionings.

Although main exponents have acknowledged the limitations of the applicability of the approach on health, detailing that there is no single indicator that readily measures health, the mostly used variables include infant and maternal mortality, malnutrition indexes, life expectancy and anthropometric measures[4].

2.2.2 Economic Facilities

2.3.2.1 The role of access to credit in the capability approach

The Role of Access to Credit is not addressed as a specific topic in the CA, although it is broadly understood to have an instrumental role as an economic freedom (Pyles, 2013:31). It is reflected as an "individual capability" and as a feature than can enable a synergistic expansion of other individual capabilities (Foster and Handy, 2008:10). Access to credit is a facilitator of the ends of development. This particularity makes it somewhat different to other more common dimensions of development, such as education and health.

It is expressed in most literature that the poor are often denied access to credit, since they regularly are considered to not meet the traditional criteria for borrowing and financial institutions perceive them as bad credit risks. However, development practitioners provide evidence (Yunus, 2003) that the poor

[4] Hight-for-age, weight-for-height or body-mass-index (BMI)

can indeed make effective use of credit as leverage to obtain other capabilities and freedoms.

Access to credit can also be understood within the framework of the CA in the literature about institutions and markets. Access to credit can provide opportunities for people to live the lives they have reason to value and expand their freedoms. Access to credit can be seen as an empowering tool and an essential first step to eradicating poverty; this is the way it contributes to the CA framework. It respects the willingness and capability that each individual has to take charge of its own life and to seek out opportunities to make it better (Rural Poverty Portal).

Sen emphasizes that "we have good reasons to buy and sell, to exchange, and to seek lives that can flourish on the basis of transactions. To deny that freedom would in itself be a major failing in society" (Deneulin-Shahani, 2012:179). However, Sen highlights that this has to be seen merely in terms of the agency and well-being.

2.3 Poverty and Well-Being Measurements

Poverty and well-being measurement has evolved through time as development economics has incorporated the concept of well-being in its framework. The two main approaches to poverty and well-being measurements are the ones known as one-dimensional measurements and the multidimensional measurements.

2.3.1 One-dimensional measures of well-being

One-dimensional measures of well-being are regularly associated with those proposed by conventional economics. These measures use a reasoning based on key assumptions about the relationship between money and individual social welfare that have been exposed by Foley. The author explains that conventional economics assume money is an appropriate measure of welfare. In addition, the welfare of society is just a reflection of the welfare of individuals. This type of analysis uses comparative static to measure virtual changes in welfare, to compare welfare with what it "might have been if the world was different". It relies on surpluses gains and losses of income and consumption as adequate measures of development, identifying poverty by a shortfall in consumption (or income) from some poverty line (McGillivray and Clarke, 2006). These assumptions could be relevant when analyzing policy interventions, such as price controls, tariffs, other limitations on trade, taxes, regulation, legalization or outlawing of trade in particular goods, and so forth, given that they are in fact dominated by struggles over rents or economic surplus (Foley: 23). Conventional economics assumes that the individual spends all of his income on consumption and that consumption and the maximisation of benefits through consumption is the only goal of individuals and thus income (more accurately expenditure on consumption) becomes the "best" measure of welfare. Income, nonetheless, has demonstrated to be a key dimension of well-

being. Insufficient income usually –however not always - implies deprivation and poverty (ECOSOC, 2003)

Commodity-based systems of evaluation and utility-based approach sees value only in individual benefit. But it may fail to reflect a person's real deprivation (Fakuda-Parr, 2003).

Conventional economics uses Paretto Efficiency to illustrate the concept of allocation. The optimal allocation is the point where it is impossible to achieve an improvement without making someone worse off. It assumes that market equilibrium is Paretto-efficient. Asymmetric information and competitive equilibrium show that this is not necessarily the case. Another issue is that it does not take into account valuation of human life, the environment and others. A normative dimension which is inherent to humanity is missing in the approach. Human beings do not always make rational decisions. Foley analyses this feature as being "amoral" given that a money price is set on everything and everything becomes a commodity without taking into account normative sensibilities. There are no special considerations for the market in labor wages or human slavery, the market of food or the market for narcotics, intellectual property or sexual services. All of them are as seen as equal (Foley, 24).

Economic analysis under the conventional approach often also rely on the value of goods and services as a reflection of their scarcity, ignoring the contextual role of institutions.

In this framework, monetary poverty measures were developed as well as the GINI coefficient which measures inequality. In addition, Foster, Greer and Thorbecke (FGT) (2010) presented a class of decomposed poverty measures that combines outfall from the poverty line and measures of inequality[5].

2.3.2 Multidimensional measures of well-being

Multidimensional measures have arisen as a response to the limitations of one dimensional measures. The main exponents have based their methods on the CA and HD Paradigm. As seen in the sections before, the CA argues that poverty is too complex to be reduced to a single dimension of human life. It argues that multidimensional poverty and well-being measurement must allow achieving more knowledge about the state of deprivation that constrain human beings from reaching their development potential and improved well-being. Furthermore it defends the idea that the development of a country must be measured by the development of the people that conform it (HDR Nicaragua, 2011:46).

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[5] $FGT_\alpha = \frac{1}{N}\sum_{i=1}^{H}(\frac{z-y_i}{z})^\alpha$, where z is the poverty line, yi is the ith lowest income (or other standard of living indicator), n is the total population, q is the number of persons who are poor, and $\alpha \geq 0$ is a"poverty aversion" parameter (Foster et al., 2010)

UNDP proposed a set of measurements including the Human Development Index (HDI)[6], which remains one of the main references to measure poverty. It tracks three indicators: GNP, longevity and educational attainment to compose an aggregate index that goes from 0 to 1. UNDP also released the Human Poverty Index (HPI), which was separated into two indexes (HPI1 and HPI2) in order to consider the contextual differences between developing and industrial countries. The HP1 measures a composite of longevity, knowledge and decent living standard, the latter referring to economic provisioning, for the case of LDCs; the HP2 on the other hand, measures a composite of the above mentioned plus social exclusion for industrial countries.

Two additional indexes were included in the 1995 and 1998 in order to capture gender-sensitive poverty information, the Gender Development Index (GDI) and Gender Empowerment Measure (GEM) – (Fakuda, Parr, 2003). These were included as an effort to obtain a better understanding of how men and women experience poverty.

Alkire has been regarded as one of the main exponents of multidimensional poverty measures, being at the front of one of the pioneering institutions in development and human studies, the Oxford Poverty & Human Development Initiative (OPHI). She suggests that poverty and well-being measures can draw on quantitative, qualitative, participatory or subjective data.

Building on the CA, she engineered a methodology of "counting" (Alkire and Foster, 2008) for multidimensional poverty that proposes extending the traditional intersection and union approaches, and a class of poverty measures. The identification step employs two forms of cut off: one within each dimension to determine whether a person is, and a second across dimensions that identifies the poor by 'counting' the dimensions in which a person is deprived, building a matrix of deprivations. The aggregation step employs the Foster – Greer - Thorbecke measures, appropriately adjusted to account for multidimensionality. The axioms are presented as joint restrictions on identification and the measures, and the methodology satisfies a range of desirable properties including decomposability. (Alkire, Foster, 2010:476).

The proposed indices are sensitive both to:

- share of dimensions in which people are deprived and;
- duration of their multidimensional poverty experience

Alkire has promoted the methodology in the past couple of years, which has been considered one of the biggest contributions to human development (La Prensa, Sept. 11, 2013). In September 2013 she was part of the International Conference of Human Development and the Capability Approach (HDCA) in Managua, Nicaragua, alongside with other pioneers of multidimensional measurement. The Conference included poverty and well-being meas-

[6] There is a debate on the advantages and disadvantages of using aggregate VS. disaggregate measurements that is relevant to this paper but is not addressed due to time and space constraints.

urement proposals from Academic institutions in Venezuela, Nicaragua, Uruguay, Peru, China, India, Zimbabwe, Cameroon and Vietnam.[7]

In a recent interview[8], Alkire stresses the importance of listening to poor people's views about the dimensions that constitute their experience of poverty to build people-centered evaluations. She asked: "Who are the real experts of poverty? "Is it the World Bank or is it the poor people".

Effective people's participation and inclusion in decision-making are needed for interventions to be sustainable.

2.3.2.1 Choosing dimensions

Choosing dimensions is often considered one of the biggest challenges of the operationalization of the CA. Sen, in his work, does not provide a specific list of minimally essential capabilities to allow for choice across societies and ensure that capabilities chosen are relevant to the. Nussbaum, on the other hand (Grusky and Kanbur, 2006), takes on a critical perspective of the CA, endorsing a fixed list of ten capabilities that she defines as central requirements of a life with dignity that should be thought of in an arena of social justice:

1. Life
2. Bodily Health
3. Bodily integrity
4. Senses, imagination and thought
5. Emotions
6. Practical reasons
7. Affiliation
8. Other species
9. Play
10. Control over one's environment

Alkire on the other hand, argues that most times the problem is not the choice of dimensions, but that researchers do not make explicit the reasoning behind their choices. She also suggests that normally dimensions are chosen by 5 processes (Kakwani and Silber, 2007:97)

- Using existing data
- Making assumptions based on theories of what people value or should value
- Draw on existing lists generated by consensus
- Use on-going deliberative participatory processes
- Propose dimensions based on empirical studies of people's values and/or behaviours

Raworth and Stewart (Fakuda-Parr, 2003:141) address the issue of choice of dimensions through the feasibility of inclusion of variables in the HDI. They state that the data needs to be:

- Internationally comparable
- Available for a large proportion of the world's countries
- Of reasonable quality

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[7] From abstracts of the Conference of Human Development and the Capability Approach (HDCA) in Managua, Nicaragua, September 2013

[8] La Prensa, 11 Sept., 2013

- Valid-based on identifiable criteria: that measure what they intend to measure
- Policy relevant: based on criteria that can be influenced by policy action.

2.3.2.2 Why do income-based approaches continue to set the framework for international policy?

It would appear that although it has been exposed above that income-based approaches offer a quite simplistic vision of reality, it continues to be the most commonly used approach in international policy. But why is this?

The CA claims that contrary to the rigid measurement systems promoted by conventional economics, evaluation from the CA perspective is not imprisoned in any given formula and is open to pragmatic reasoning that invokes different kinds of arguments within a broad, permissive framework. This feature might conceptually make it more appropriate for the study of the multifaceted concepts of poverty and well-being. However, measuring evaluative judgements continues to be an extremely complex process. The problem remains on the difficulty of operationalizing a measurement that is able to take into account the different dimensions of poverty and well-being. Sen recognizes the difficulty of measuring freedoms, and considers that the concept is too large and complex and any system of measurement would diminish it (Fukuda-Parr, 2003). Another application challenge of the CA lies in the difficulty of measuring the extent in which people are capable of transforming inputs as education, health or credit, into capabilities and functionings. In practice there has been a tendency to measure functionings rather than capabilities (i.e. life expectancy, mortality, literacy, nutrition levels, etc.) (MacGillivray and Clarke, 2006:33). If well these dynamics give us an idea of human development, they remain insufficient given that they do not capture all necessities of human deprivation so that they can reach well-being levels on their own choices and agency. It is important to highlight that both the CA and the income-based approach share common grounds in that both take on an individualistic approach (McGillivray and Clarke, 2006), which has been highly criticized for not offering insights about other group features.

Compared to multidimensional approaches, income-based methods, despite of their limitations, are considered able provide a small part of the big picture. Research based on these methods is often considered more reliable, cost-efficient and objective, given that data is more easily obtainable, while the alternatives are still considered subjective and unreliable.

Bourignon states that "analysts and policy makers are more prepared to accept the inconclusiveness of partial orderings of multidimensional distribution" (Grusky and Kanbur, 2006:101) inferring that although the income poverty paradigm continues to set the framework for economic policy, there seems to be increasingly more acceptance for alternative multidimensional views, despite of its operational challenge.

Torbecke states that although it is clear that the economic literature on multidimensional poverty measures has made considerable progress in clarifying the concept of functioning and in identifying many of the related theoretical issues. Yet, … there are too many unresolved questions left over to consid-

er seriously suing multidimensional measures in any truly operational sense" (Kakwani and Silber, 2007:18).

Chapter 3 Rural Business Development in Nicaragua

This Chapter intends to provide a contextual framework to the analysis of multidimensional well-being applied to the Nicaraguan background as well as to situate the study of RBD to the local setting.

3.0 Nicaraguan Economy

Nicaragua is the largest Central American country with an area of 129,494 km^2. and a population close to 6 million (UNDP, 2012). This makes it the least densely populated country in the region with only 44 people per square kilometer.

It has not been long since the country went through the debt crisis and the stagnation that characterized the Latin American region during the 1980's remembered by many as "the lost decade". Today, despite being considered the second poorest Central American country, Nicaragua has experienced a significant economic turn-over, maintaining positive GDP growth rates during the last decade. In 2012, the economy expanded by 5.2% and it is estimated that in 2013 the trend will continue with the economy growing by 4.1% (FUNIDES, 2013). The country has also been able to maintain relatively low and stable inflation rates and improved social outcomes as a result of prudent macroeconomic management which has largely enabled the country to offset the impact of negative external shocks. Exports grew close to 18% from 2011 to 2012 being the main products coffee, gold, beef, sugar cane, dairy products, peanuts and shrimp amongst others. It is often argued that Nicaragua, more than being a poor country is an "impoverished" country. This phrase refers to the aftermath of years of civil war, constant political and social conflict and the memory of severe economic instability that affected structural aspects of education, culture, trust in institutions, patriotism, citizenship, and many others. Today, regardless of the economic achievements which have contributed to reduce income poverty, the distribution of income continues to be highly unequal with a GINI coefficient of over 40% in 2010 (Lopez & Lustig, 2012). Targeting of public spending is mostly ineffective, access to health, education and services is unequal and most importantly, the earnings of educated people are disproportionately high as compared to those who lack the skills. Political instability and corruption, which have demoralized and discouraged political participation, remain key constraints to growth and prosperity.

3.1 Agriculture and Livestock in Nicaragua

Agriculture and livestock have traditionally been among the most important sectors of the Nicaraguan economy. Both are regularly put under the same category given that agriculture has traditionally been carried out alongside livestock activities. CENAGRO estimates that close to 80% of livestock producers combine agriculture with livestock (Smith, 2004).

According to MAGFOR (2009), agro-livestock activities contribute to 20% of the country's GDP, where agriculture makes up 10%, livestock 8% and other activities 2%. In addition, the sector absorbs 43% of the total productive workforce. IFAD estimates that over 2.5 million people, or almost 43% of the total population, live in rural areas, and two out of three (68%) struggle to survive under the poverty line (Rural Poverty Portal, 2010). The incidence of poverty in rural areas more than doubles poverty in urban areas. Around 80% of the rural population in Nicaragua depends directly on agro-livestock activities (ibid) with annual incomes that do not surpass US$472 (MAGFOR, 2009). Small-scale farmers constitute a big part of the rural poor population in Nicaragua.

3.1.1 Demographic landscape of the Agriculture and Livestock Farmers

The 2011 HDR Nicaragua reveals that the average family is composed by six members, of which two were teens and youth (between 13 and 29 years old). The Report identifies five different types of families including:

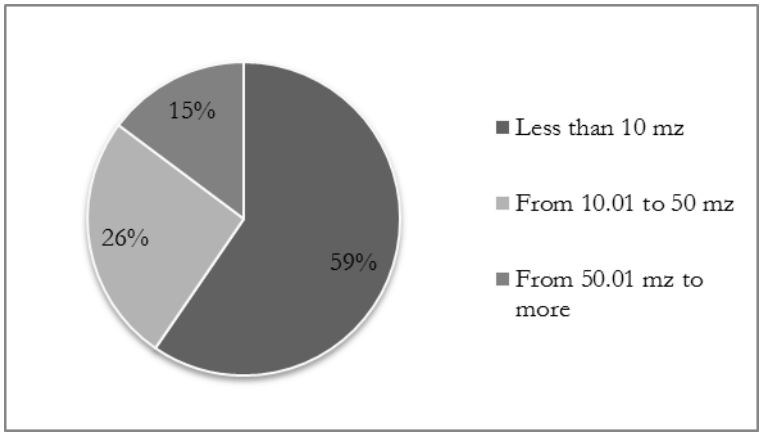
1. Complex, composed by family and not related;
2. Extensive, integrated by family members of more than one degree of consanguinity;
3. Mono-parental, in which the family's head has no couple;
4. Nuclear, composed by a couple and their children, and;
5. Unipersonal.

The Report shows that for most families, around 36% of the members are older than 30 years old, with the exception of the unipersonal families, in which the proportion ascends to 92%. Nuclear families are characterized for having the largest amount of children below the age of 13, whilst the complex family offers the largest amount of teenagers between the ages of 13 and 17, followed by the mono-parental family. Furthermore, the report states that poverty is more visible in extensive and nuclear families. This is explained given that these two categories have the highest number of dependents (HDR Nicaragua, 2011). It is relevant to mention that rural families show the largest proportions of younger families with children under the age of 13.

The IV National Agricultural Census CENAGRO, put forward by the National Institute of Information Development of Nicaragua (INIDE) and the Ministry of Agriculture and Forestry (MAGFOR), shows that in 2011 59% of the farmers held farms of less than 10 mz[9];25% between 10.01 and 50 mz. and 15% of 50.01 mz and more. The census shows that 76% of farms are held by male farmers, whilst only 23% by female farmers. Most importantly, female participation is higher in smaller farms and decreases in medium and larger sized farms. (CENAGRO, 2011).

[9] 1 manzana = 0.7056 hectares

Figure 1. Number of producers by size of farms (2011)

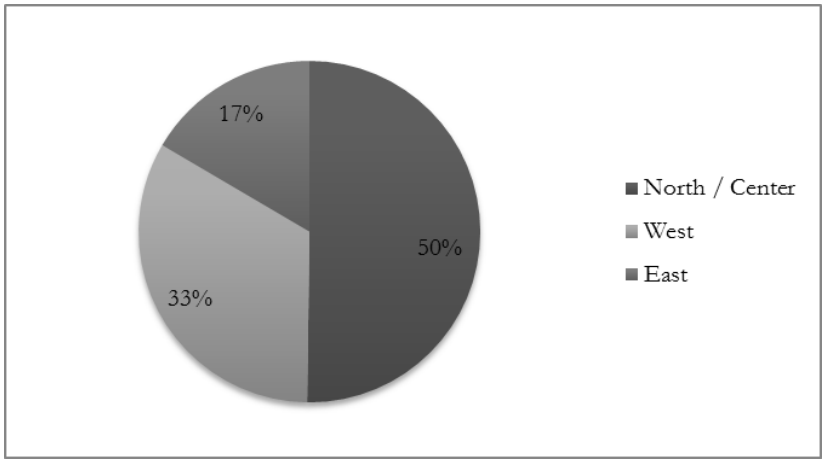


Source: Author elaborated with data from CENAGRO (2011)

MAGFOR (2009) estimates that small and medium farmers[10] produce up to 65% of the total and 80% of the gross value of production of basic grains, as well as 65% of the bovine cattle, 89% of porcine cattle and 84% of birds.

Roughly 50% of the agro-livestock activities are located in the north and center of the country in the departments of Nueva Segovia, Jinotega, Madriz, Esteli, Matagalpa, Boaco, Chontales and Rio San Juan; whilst 33% are located in the west in Leon, Chinandega, Managua, Masaya, Carazo and Rivas; 17% are in the east in RAAN and RAAS.

Figure 2. Agro-livestock Activity by Geographical Location (2011)



Source: Author elaborated with data from CENAGRO (2011)

[10] According to the NDP, small or medium size farmer corresponds to farmers that face constraints, such as informal land tenure, lack of access to financial services, low or varying product quality, entrepreneurial and technological weaknesses, and lack of access to markets. Small farmers are poor producers with basic productive capacities that live in isolated areas and own net capital between US$20,000 and US$50,000 for a household of 6 members. Medium-scale farmers own net capital between US$50,000 and US$100,000 for a household of 5 members. (MAGFOR, 2006)

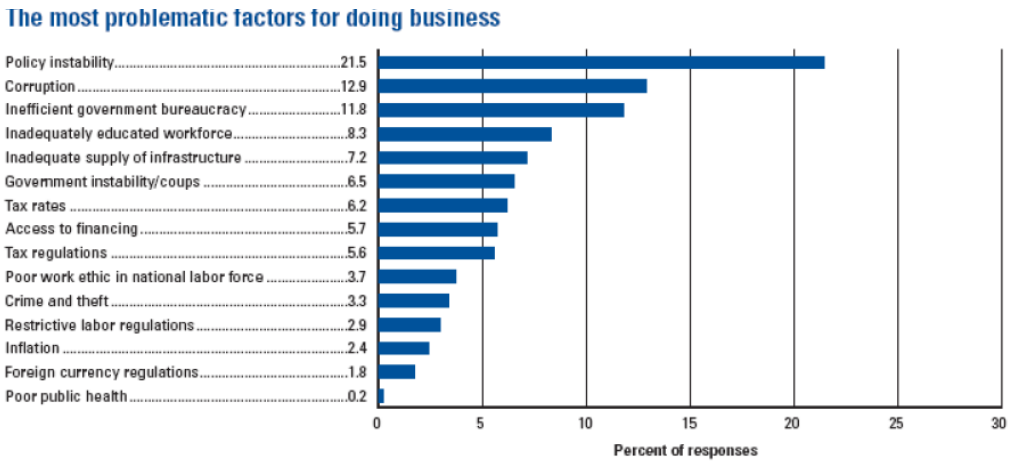
Agro-livestock production is predominantly extensive, growing by the expansion of cultivated areas instead of increase in productivity. This situation is explained by the low levels of technology, use of marginal lands, high vulnerability to weather, plagues and access to services. Agro-industrial development is limited to few economic activities, and in many of the cases transformation of products only reaches a primary stage, which limits the addition of value and reduces the potential of primary production. The sector has traditionally relied on the low costs of labor.

3.1.3 Main constraints to Agricultural and Livestock business development in Nicaragua

Among these are poor on-farm and out-farm infrastructure including roads, ports and services such as water and electricity; low levels of health, education and little to none technical training as well as inadequate use of technology that often result in low productivity and competitiveness; limited access to credit; lack of secured markets; and an ineffective institutional setting characterized by corruption and lack of political stability.

The World Banks' Doing Business 2014 (2013) ranked Nicaragua in the position 123 from a list of countries of 189 in 2013. The Global Competitiveness Report (2010) shows the most problematic factors for doing business in the country, according to Nicaraguans. Although the ranking did not aim to reveal the challenges faced by rural poor, the results can be taken as an example of constraints nicaraguans struggle with to do business. The survey indicates that although in different positions, inadequate education and health, as well as access to financing, rank high in the list of what they considered "problematic" for developing businesses:

Figure 3. The most problematic factors for doing Business



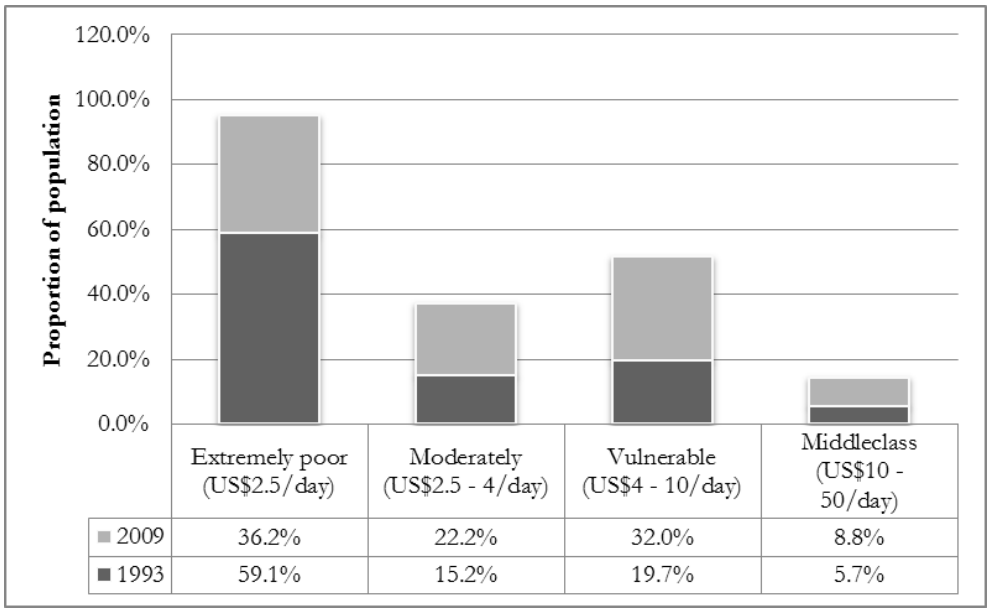
Source: Global Competitiveness Report (2010)

3.2 Human Development in Nicaragua

According to the latest HDR (2011), Nicaragua has made progress in terms of HD in the last couple of decades. In fact, over the past 12 years, Nicaragua has outpaced the Latin American average ascent in HDI averaging 1.1%

growth per year and moved from the lowest human development to the bottom half of the medium development countries. This is confirmed by the drop in the percentage of the population that earns less than US$2.5 a day, which went from 59.1% in 1993 to 36.2% in 2009 as well as the increase from 15.2% to 22.2% of people gone from extreme poverty to "moderate poverty" earning US$2.5 to US$4 a day in the same period. Furthermore, the number of people reaching the middle class threshold of US$4-10 a day has significantly increased. The percentage of people in this category, also labeled "vulnerable" by the UN has increased from 20% to 32% over the last 16 years. Nicaraguan middleclass, earning US$10 to US$50 a day has grown from 5.7% in 1993 to 8.8%. (Nicaraguan Dispatch, May 2013).

Figure 4. Change in Poverty Nicaragua (1993-2009)



Source: Elaborated with data from the HDR (Nicaraguan Dispatch, May, 2013)

Despite accomplishments in economic poverty, Nicaragua remains relatively poorly ranked in position 129 out of 187 countries in the HDI (HDR, 2013). It is also crucial to point out that Nicaragua has remained in the same position for the past six years. Therefore, it is evident that it faces important HD challenges.

A study included in the HDR Nicaragua (2011), which analyzed the perceptions of Nicaraguan youth about poverty showed that although most considered to be healthy and well economically, they considered to be living in contexts of vulnerability that *exposed their physical and emotional well-being* (2011:30). The main causes are related to prevalence of patriarchal and overbearing adult-based social gender norms, families not always providing harmonious spaces of coexistence, communication and learning as well as rules and regulations and institutional settings that do not always protect their physical and emotional integrity. It is also valid to highlight the intra-household power relations that shape Nicaraguan communities, intensified in rural areas, in which women are normally perceived as sources of collaboration and support but men are usually the decision-makers. Nonetheless, the recent publication

of the Global Gender Gap (2013) by the WEF places Nicaragua as the 10th country in the world with the narrowest gender gap.

In terms of security, it is relevant to acknowledge the remarkable effort made by the Nicaraguan police force to deal with drug trafficking and the issues of the Central American "maras" or gangs. Nicaragua stands out from the list of Central American countries as one of the safest nations with the lowest number of murders (13 per 100,000 people) compared to El Salvador (52), Guatemala (48) and Honduras (58).

The 2011 HDR Nicaragua highlights that Nicaragua is experiencing a demographic bonus, which implies a change in population structure where the portion of population in the working-age group increases. The HDR states that by 2030, Nicaragua could cut the spending on dependents by half the rate of 1980. This phenomenon could potentially represent an unprecedented opportunity for growth for Nicaragua. It also represents extraordinary challenges. If taken advantage of, it could empower Nicaraguans to break the cycle of poverty, exclusion and inequality.

3.2.1. Access to Education as a social freedom in Nicaragua

The HDR Nicaragua (2011) reports that education has improved over the generations and today youth is better equipped to face the challenges of the professional world.[11] However, education levels of the great majority of the population and the quality of education remain insufficient to break the cycle of poverty and channel HD for society in general. 4 out of 10 children in schooling age are out of the schooling system. In particular, there are great disparities between the education levels in the urban and rural areas, where the population in schooling age amounts to a significant 48% of the total. Illiteracy in rural areas reaches 37% and an average schooling level of 3.4 years, whilst in urban areas illiteracy reaches 14.5% and average schooling increases to 7 years (CIASES, 2008: 4). This gap intensifies when taking into account gender. This is partially explained by cultural reasons; girls are expected to contribute more with household chores. Nevertheless, the amount of girls in the educational system is higher than the number of boys. An analysis made by CIASES (2008) based on the National Household Survey on Living Standards Measurement (EMNV, 2001), indicates that there is a high negative correlation between child labor and school attendance. In fact, labor was the most common justification for not attending school, followed by lack of resources and lack of interest. The percentage was found significantly higher in rural areas (2008:23).

Qualitatively, there is also a lack of educational equity between urban and rural areas expressed in the limited relevance of the curriculum, inadequate teaching practices and school organization, which generate low levels of learning, high repetition and dropout rates (CIASES, 2008:4).

Public expenditure in education has increased in recent years, going from 3.8% of GDP in 2010 to 5.4%. A situation worth bringing up is that education

[11]Education for many Nicaraguans was interrupted due to the war in 1979 and the following years. Many also migrated resulting in a brain drain.

levels decrease with age, with significant differences between children between 6 and 12 years old and youth between 13 and 17 years old, which indicates that investments in education in the early years are not being taken advantage of during adolescence (CIASES, 2008). The reason behind this is that primary school is prioritized in terms of public funding. In addition, a 6% of the public budget is secured by law for superior level schooling (university and technical education), raising a debate whether a higher allocation of public budget should be assigned to secondary education, given that a gap prevails between primary and superior (university and technical schooling) education.

The analysis put forward by CIASES (2008), highlights that the main challenges faced by rural education is the low coverage and low quality derived from public underinvestment, lack of priority and lack of differentiated policies regarding urban (2008:5). A different study by the IEEPP, states that "a low quality education, such as the being offered in rural areas is, in practice, an indirect way of reproduction of poverty between a generation and another that preserves the vicious cycle between economic and social backwardness and the lack of education equity" (2012:7)

The demographic dividend brings about a crucial consideration on improvement of the education system, given that childhood and youth are the most important stages in life to build knowledge, skills and abilities for personal and social development. They need to be equipped with the ability to influence their environment and exercise their agency to choose the way of life they most value. It is also during this stage where respect and value for the diversities between urban and rural areas, ethnicity, gender and age are built intrinsically. The lack proper education and values often transforms into inequality, exclusion and poverty (HDR, 2011).

3.2.2 Access to Health as a Social Freedom in Nicaragua

According to USAID, in the last 51 years Nicaragua has made important progress in securing access to health. Child mortality rates have decreased by 40%, maternal mortality by 31% and child malnutrition by 20% (El Nuevo Diario, 30/08/2013). However, a notable gap remains between urban and rural areas. CENAGRO (2011) indicates that only around 50% of the rural population has access to health services and many communities have to travel hours through bad roads to reach Health Centers. Only 6.3% of the population enjoys Social Insurance. The Rural poor are often forced to spend money from their own pockets which is a severe limitation added to the lack of access in rural areas.

The health sector remains greatly challenged, mainly by the limitation of public funding. The expense in health represented 3.2% of the GDP in 2012 and presumably it would increase to 3.3% in 2013 (El Nuevo Diario, 16/10/2013). This amount also represented 14.2% of the total National Budget in 2012 (Avendano, 18/10/2011).

According to the WHO (2011), the Ministry of Health (MINSA), the ministries of Governance and Defense and the Nicaraguan Institute of Social Security (INSS) are the public providers contributing to 67% of the consultations

from which 60% are offered without cost; 31% of the consultations are done by the private sector.

In the more deprived departments of the country, diarrhea, respiratory diseases, malnutrition and meningitis continue to be common causes of death for young children.

3.2.3 Access to Credit as an Economic Facility in Nicaragua

Lack of access to credit has traditionally been one of the main elements limiting the competitive potential of Nicaragua. In particular, access to medium and long term credit is highly restrictive especially for SMEs in the agro-livestock sector, and is characterized for high interest rates that small farmers are not able to afford, hindering investment and development of the sector. In addition, there is a generalized culture of distrust in the national banking system that has remained from the hyperinflation and exaggerated devaluations that took place during the 1980s, which lead to thousands of producers ignoring their financial obligations and to the collapse of the financial system. Also as a result of the 1980s and despite Governments initiatives to correct the situation, many of the lands used for livestock activities lack property titles, obstructing the granting of credit. The financial system collapsed once more during the 1998-2000 period, with close to 50% of it crashing causing a very high cost on society of about 20% of the GDP (PND, 2005:77). However, the most severe impact was the even further restriction of credit. As explained in Chapter 2, access to credit is a key condition for the generation of economic opportunity and development. The lack of economic opportunities has translated into significant migration of human capital to other countries throughout time.

A recent Forum for medium and long term financing in Nicaragua organized by FUNIDES, COSEP, SIBOIF and ASOMIF, reported that 91% of the financing comes from private banks, 5% from microfinance institutions, and 3.6% from offices of representation. The commercial sector concentrates 36% of the financing, while industry does for 15%, agro for 13% and mortgage credit for 12%. It is estimated that only 20% of families and 6% of small agro-livestock producers have access to credit, provided mainly by non-banking financial institutions as NGOs, cooperatives, local Banks and public credit and assistance programs (PND, 2005:77).

3.3 Role of the Government, Cooperation Agencies and NGOs in RBD

The instruments of agriculture development policy are classified in three types of support according to the OECD (IDB, 2012):

- Support via prices: generate differences between local prices and border prices. These interventions are characterized for highly distorting markets, being of low coverage and having a low economic impact.

- Direct Support: including transfers or subsidies based on production units, inputs, capital accumulation, farm services, productive areas, etc. These interventions are characterized for having low coverage and medium/high economic impact.
- General Services: including Public Goods such as sanitation, agriculture innovation, information systems and land tenure regularization, as well as rural infrastructure programs. These interventions are characterized for having no distorting effects and high coverage and economic impact.

According to the IDB (2012), in 2010 rural development interventions with most funding in Nicaragua correspond to support via prices (61%), followed by General Services (32%) and Direct Support (7%).

The study by the Division of Rural Development of IDB (2012) highlights that policies should be based on social inclusion, covering broad bases of producers with an emphasis on SMEs, and last but not least, it should guarantee high economic yields to translate into increase in rural households' well-being (ibid).

Nicaragua 2005 NDP highlights competitiveness as a poverty reduction strategy. The Plan encourages active intervention of the Government through public policies to improve the competitiveness of SMEs. The Plan states that "in a country like Nicaragua that is characterized by a large lag in basic infrastructure, technological, managerial and human capital, the market alone could not achieve an accelerated growth that the country needs, and much less the balance in regional development it needs to ensure that the benefits of growth reach all Nicaraguans in all territories, at least not in the time frame that current conditions require" (2005:68).

One of the main topics is the support to SMEs as well as the cluster focus as a tool to facilitate improvement of competitiveness and the organization of territorial plans and actions (2005:58). Production and operation, as well as marketing and development of businesses, human capital and financing for development are areas to develop. The main focus is to support SMEs in the improvement of entrepreneurial capacities, innovation, insertion into regional and international markets and development of businesses among others. Country regions were categorized in territories based on their level of productivity, marginality or access to basic infrastructure. The territorial approach intends to allow changes not only in the internal competitive aspects of businesses, but also on the external aspects referring to the interconnected systems of primary health, education, infrastructure and communications. Social inclusion and cohesion are also considered as a support mechanism including schools, technical education, health and recreation centers. The Plan aims to directly support 10,000 SMEs per year (2005:67). It encourages the implementation of programs targeting sectors with more potential to accelerate growth as a mechanism for poverty reduction. One of the main strategies is to promote a well-integrated financial system in which regulated and not regulated institutions interact in an efficient way to grant credits, mobilize savings and payment means that productive sectors require.

The PNDH 2012-20016 (2012) prioritizes household, communal and cooperative economy, as well as food sovereignty and security in a context of climate change with the aim to reduce poverty and inequality. The Plan pro-

poses an integral approach to support SMEs, capitalizing and strengthening the productive capacities of poor rural farmers with training and technical assistance, credits, inputs and support in the several association forms including cooperatives (2012:107). The purpose is to increase yields, production and value added as well as diversifying the productive base. With the objective of increasing household income through productivity and promotion of value added in primary production among others, the Government also put forward PRORURAL, a program of Rural Development.

3.3.1 Mapping of RBD interventions in Nicaragua

Table 1 shows the inventory of main interventions in Rural Development in Nicaragua from international development organizations as of August 2013.

Table 1. Inventory of Rural Development Interventions by Cooperation Agencies (by Aug 2013)

Agency	Name of program / project	Type of intervention	Componenents of Intervention	Target group
AECID	Bilatreal Program with MAGFOR in he PRORURAL –I framework	Rural Development	PRORURAL – I	PPA
	Community Microfinance and rural microfinance services specializing in El Salvador, Guatemala, Nicaragua and Dominican Republic, with possible actions in other countries in the region. "	Rural Development	Agricultural microcredit, irrigation technologies and agricultural microinsurance	PPA
BID	Program for promotion of sustainable agricul	Agricultural health and safety system, ecological production, research and sustainable technology transfer, institutional strengthening	Management support and promotion of sustainable production, strengthening agricultural technological innovation, Program Administration, Monitoring and evaluation ad Financial costs and audits.	MAGFOR-DGPSA, INTA
	Support for Agrifood Production Program	Provision of goods and technology services. Training. Constitution of productive enterprises.	Support to production / Support for Business Development Services / Administration, Supervision, Evaluations and Audit	Rural poor farmer households
DFATD Canadá	Improving Agricultural production of young producers of the Segovias (PROGA)	Agro ecological production / Improvement of agricultural production	Promotion of a sustainable rural development model / Systematic training and technical support / Capitalization of production units / Processing and Marketing of products / Financing of productive activities / Institutional Strengthening of INPRHU et INATEC / Synergy of the actors / Research and updating of information	Students / Units of production
	Sectorial Program of Productive Rural Devel	Assistance to small and medium producers, individuals or groups for improvement of productivity, agricultural yields, food security and sovereignty, Capacity (public and private), governance (policies and strategies), access to supplies, equipment, materials and financial services, technological services (technical assistance, extension and research and local technology markets), safety and health services, Information Services agricultural and forestry support services for sustainable forest management, promotion of partnerships (unions, cooperatives and community) , investment in conservation and restoration of forest ecosystems, facilitattion of market linkages and agro-industrial processes	Support to PRORURAL-I prioritized programs: National Food Program (PNA), National Forestry Programme (PNF), the National Rural Agribusiness (PNAIR) and Capacity Building Program, as well as other programs and activities that are prioritized by implementing institutions in their sectoral Annual Operating Plans	Small and medium rural poor farmer hosueholds / Prioritation to indigenous and Afro-descendant communities
	Project of Purchases for Progress	Strengthening of basic grains value chains (beans, corn) in productivity and quality with a domestic, regional and international focus	Improvement of production (techniques, soil conservation measures and water); business strengthening, post-harvest improvement and marketing.	Small producers
	Support to PRORURAL-I	Strengthening of agricultural production chains	Improvement of rural productivity	TBD

CATIE	CATIE Project in Nicaragua	Equity and Gender; Production courtyard Agroforestry Production (cocoa, coffee, livestock silvopastorial) Business strengthening and organizational partner of producer organizations; Zoning and Climate Change by strengthening and operation of local and national platforms	Contribution to sustainable rural development through job training and TA to farm families (2500 families and patios), capitalization of families / yards / farms (U.S. $ 100 / unit production); capitalization and strengthening of producer organizations (U.S. $ 3,500 / Organization)	5,000 families (2,500 direct and 2,500 indirect), 16 producer organizations, 6 value chains (coffee, cocoa, dairy production, production of basic grains (beans and maize) production forest
International Center for Tropical Agriculture (CIAT)	Increased productivity of dual-purpose cattle	Appropriate use of types of races and application of best parenting practices	research and assistance to producers	Small producers
	Rural Business Management Program, Health and Environment	Business management, linkage to markets, environmental sustainability	Technical Assistance / Research	TBD
	Sustainable Intensification of forage areas	Implementation of environmental and management strategies	research and assistance to producers	Small producers
	Eco-efficient livestock production in the areas of sub-humid slopes of Nicaragua	Forage and livestock	Research on small producers adapted varieties of forage and livestock performance improvement	Small producers
	Development of Brachiaria genotypes	Materials adapted to poorly drained soils to increase cattle production and grazing systems adapt to climate change	research and assistance to producers	Producers assisted by the INTA
	AGROSALUD, Phase II	Biofortification of crops, nutrition, food security	Technical Support / Research for Development	TBD
COSUDE	PYMERURAL	Healing agriculture, research and technology transfer and irrigation infrastructure, local economic development in value chains. Capacity development through the facilitation of tools. Institutionalization of public-private partnerships, improved public sector management in DEL. Create MEFC and Universities along with training for those who will provide technical assistance to SMEs and the same to improve productivity and meet standares	Value Chains, Local Economic Development, Institutional Strengthening agribusiness.	SMEs, MEFC and Associations of Municipalities,
	RED-SICTA	Technological innovations in the value chain of maize and beans: growth performance, value addition, marketing, public policy advocacy.	Technological innovations in corn and beans at the regional level for managing networks of knowledge, strengthening SICTA	Organizations linked to the value chain of maize and beans.
	Cocoa Value Chain	Increased production of high quality cocoa, promotion of producer organization, technology products and services for the production, post-harvest and processing, increased transformation and processing of cocoa, public policy advocacy, knowledge management, platform dialogue.		small producers of cocoa

FAO	Project "Support for the implementation of the National Rural Nicaragua Agribusiness (PNAIR)".	Enhanced capacity of public institutions GP, with emphasis on MEFCCA, and the private sector for the effective implementation of PNAIR through training and technical assistance at the national and territorial.	Institutional Strengthening of the MEF Training and Technical Assistance 120 RIAs Strategic Alliances	120 Companies Agroindustrial and 80 technicians MEFCCA
	Strengthening Agrocadenas selected with an entrepreneurial approach in El Salvador, Guatemala, Honduras and Nicaragua	To help improve the food security, food quality and safety, as well as the marketing of smallholder farmers in four Central American countries, adding value defined chains, by developing inclusive value chains, service and support institutions and the promotion of partnerships, while contributing to the integration of regional policies and programs.	adding value through marketing support, logistics, processing, financing, post-harvest. Standards of quality and food safety in chains. Strengthening and integrating the institutional framework at the national and local levels. Policy Dialogue. strategic Alliances	1000 producers / as of the RAAS, institutional strengthening DGPSA New Guinea, New Guinea CDT INTA, Manufacturers / ace of the 13
	Strengthening Food Security, with emphasis on increasing food availability generated in agrifood chains in the food sector of the potato and maize in Nicaragua	i) Strengthened capacities for data collection, storage and marketing of producers organized in cooperatives and Associations Affiliated to CONAPAPA, (ii) Strengthened the technology and availability of financial resources in the production of potato beneficiaries (iii) Strengthening institutional capacities and its affiliates CONAPAPA (iv) Strengthened capacity of technology transfer internally beneficiaries of cooperatives. (v) Increased adoption of technologies with emphasis on proper use of certified seed corn in two unions of cooperatives of UNAG.		small and medium producers (as) potato and corn, maize and 720 500 potato
FIDA	Program development of production systems of agriculture, fisheries and forestry in indigenous territories of RAAN and RAAS	land development plans, community. Productive land and territory ecoómica management (capacity building). Food security, community forestry, fishing, cocoa production, small-scale enterprises (small joinery business, production of bio-inputs). Plant material, infraesctura and equipment, capactiacion, marketing, storage.		10,580 families in seven territories including 5 RAAS RAAN and two. Afrodescientes 100 indigenous communities. Wanki Maya, Wanki Tui, Matumbak, Mayagnas Sauni As, Bituahka,. RAAS: Pearl Lagoon Awaltara, Luhpia, Nani Tasbaya.
	Support for insertion of small producers in value chains and market access	Value chain: Coffee, cocoa, dairy, meat, honey, grains, vegetables. Local Importance: banana. Ex-focus: Capacity building, partnership, road improvement, marketing, infrastructure, equipment.		Producer organizations. 21,000 beneficiary families
	Adaptation to changes in the markets and the effects of climate change (NICADAPTA)	Productivity: the ability of producers to improve production and quality, investments and practices to reduce environmental impact and improve production in plantations with adptación practices to climate change (soil and water management). Institutional strengthening productive technologies, organization, marketing and information agroclimatic and policies and incentives for coffee and cocoa.		Coffee and cocoa organizations and indigenous and afrodescientes. 40,000 families

JICA	Agricultural Development Advisory	Policies and strategies are proposed to support small and medium farmers and ranchers in the area taking advantage Nicaraguan agropecurio results obtained by the JICA completed projects and future projects linking technical and financial cooperation	1. It supports the analysis of trends and movements in the Nicaraguan agricultural sector and encourages the systematization of this information to develop develop policies and strategies. 2. They seek opportunities to develop projects to apply to the government of Japan to travesd and nalysis and sistematizaciónde the results obtained by the completed projects of JICA	Policy Department of MAG-FOR
	Capacity Building Project on Community Alliance for Rural Territorial Development	The ability of the subject areas for rural development will be strengthened by increasing participation, solidarity, and the ability of actors at central, local and community (IBD: Inter Institutional Equipment, ETL Task Local and communities models)	1. The participatory rural development methods will be purchased by actors at central, local and community (EII, ETL and community models) by recognizing their needs 2. The participation of communities in rural development will be promoted and skills related organizations	Residents of 12 communities
	Technology Outreach Project in Sustainable Agriculture for Small Producers	Strengthened extension system in sustainable agriculture and small producers in beneficiary start implementing the technologies learned.	1. Developed technologies for sustainable agriculture. 2. Established methodology for technicians ertification agriculture technologies sositenible. 3. Beneficiary area farmers learn sustainable agriculture technologies.	Agricultures of small and medium scale
	Project to Improve Living Standards through the Strengthening of Agricultural Production of Indigenous and Ethnic Communities of Puerto Cabezas in Nicaragua	It improves the standard of living of the producers of the model groups.	1. The CDR has worked according to its rules and its members distributed responsibilities. Two. The producers have introduced model group taught techniques. Three. The CDR mechanism has been established to run sustainably agricultural extension activities.	Residents of 20 communities
UNDP	Promoting exports to the Chinese market.	Processing of agricultural products for export. From a Chinese business mission visited Nicaragua in August 2013, there will be more precise about the areas of interest.	Technical assistance, training, modernization. Foreign Direct Investment.	Manufacturers and producers involved in. value chains to identify identity client companies.
EU	Program Support for seed production of basic grains - PAPSANN	certified seed produced in grains, institutional support to INTA	Technical assistance, producer organization, marketing and trading, institutional support, financial support through small projects	Producers of basic grain seed (native and improved varieties)

Source: Provided by UNDP Nicaragua

While vastly characterizing the RBD approach is not in the scope of this research, I mention a few as an illustration of the type of interventions used by organizations in Nicaragua. SNV Netherlands combines a value chain approach with an inclusive businesses focus in order to increase income, production and well-being of low-income groups through involvement of low-income groups in the value chain of medium or large companies as producers, distributors or consumers, "SNV helps companies improve their supply chains, strengthen their human resources and access new markets. Low-income participants benefit by gaining reliable buyers and fair prices for their products, from new jobs and from access to affordable, quality goods and services" (SNV Netherlands, 2013). TechnoServe, a US-based implementing agency, intends to build competitive farms, businesses and industries". They "help grow strong markets that create income and jobs in poor communities" (TechnoServe, 2013). They used a shared-value approach[12] to improve market systems that "set in motion a cycle of development that helps people lift themselves and their communities out of poverty". TNS strengthens market linkages among industry players, develop capacities of individuals and businesses and improve their business environment in order to create thriving markets where participant can obtain financing, launch businesses and adopt new technologies and best practices. Chemonics International, similarly to the interventions described above, uses a market-driven approach to agricultural development. "by building the capacity of agricultural entrepreneurs to respond to market demands and drive change, they promote lasting growth". They work with stakeholders to "develop targeted, market-based solutions that reduce risks, upgrade production and marketing practices, and improve livelihoods for direct and indirect beneficiaries" (Chemonics, 2013). CARANA Corporation and DAI are amongst other international development agencies working with similar approaches to RBD in Nicaragua.

Although details about each organization's scopes and approaches have not been thoroughly explained, the relevant implication to this research is that the great majority of development organizations are currently utilizing a one dimension income-based approach to tackle the poverty of rural farmers, households and communities. It could be inferred by their objective statements that the understanding of farmer well-being is limited to that of the generated solely by increased income processes. In other words, it is understood that well-being of rural families and communities is an inevitable or certain result brought about by the dynamics of increased income. However, few to none specifics are provided about the actual mechanism that affect farmers' well-being.

[12] Pioneer Prof. Porter explains that shared value reconnects company success with social progress. The principle of shared value involves creating economic value in a way that also creates value for society by addressing its needs and challenges (Harvard Business Review, Jan 2011)

3.3.2 Initiatives in multidimensional measurements

Although most interventions use one dimension income-based approaches to measure outcomes, initiatives aiming to measure the effects at a multidmensional level are becoming increasingly relevant as the theory and applicability of Sen's CA continues to develop.

A few proposals of quantitative research methods using the CA have been developed by Nicaraguan researchers with most of the efforts coming from the academic sector. In particular, A. Rostran from the UNAN-Leon in collaboration with P. Mariel and J. Modrono from the University of the Basque Country designed a measure to determine household poverty based on data from the National Household Survey on Living Standards Measurement (EMNV 2001) under the program MECOVI (Measurement of Living Conditions). Seven indicators were built defined as: demographic, housing, basic services, employment and income, geographic location, costs and other variables. They applied a Multiple Correspondence Analysis (MCA) to characterize Nicaraguan households. Then they applied a hierarchical classification analysis to determine homogeneous households. According to Rostran, the groups are the indicators that allow to measure the conditions of households. The indicators are: 1) Urban Managua Region adequate housing conditions and basic services. 2) Insert the labor market and education. 3) Pacific Region urban basic services and adequate housing conditions. 4) Precarious housing conditions 5) Atlantic Region rural housing conditions and access to water and 6) Central Region rural housing conditions and services. The empirical technique for validating the quality of the classification was crossing variables that were not used in the MCA[13].

In addition, researcher M. Gamboa and M. Vanderschaeghe from the University of Agriculture in Nicaragua in collaboration with E. Aleman from CATIE and the UNDP, have been working to test a pilot methodology to measure the empowerment of women in agriculture – WEAI (Women's Empowerment in Agriculture Index) developed by the International Food Policy Research Institute (IFPRI), the Oxford Poverty and Human Development Initiative (OPHI), with support from the United States Agency for International Development (USAID). Their index measures agency, empowerment and inclusion of women in the agricultural sector with the aims of increasing the understanding of the connections between women's empowerment, food security and agricultural growth. It measures the roles and women's engagement in agriculture in five domains: agricultural production, productive resources; income; leadership; and time use. It also measures women's empowerment in relation to men within their household. Gamboa et al. (2013) adapted the WEAI survey to the local context and included an additional module on violence in order to apply the measurement to a sample of 300 households from 13 communities of the municipality of Muy Muy, Nicaragua[14].

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[13] From abstracts of the Conference of Human Development and the Capability Approach (HDCA) in Managua, Nicaragua, September 2013

[14] From abstracts of the Conference of Human Development and the Capability Approach (HDCA) in Managua, Nicaragua, September 2013

Despite this section not going into detail on the efforts regarding development and testing of multidimensional measures of poverty in Nicaragua given that it is beyond the focus of this paper, the examples serve as an illustration of the expansion and utilization of alternative methods to one dimension measures of poverty and well-being.

3.4 Background of selected case

3.4.1 MCC's RBD Program in Leon and Chinandega

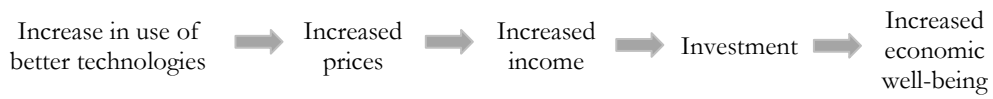
In 2006, the MCC started implementing a five-year, US$32.9 million in a RBD program, executed in the western departments of Leon and Chinandega by MCA Nicaragua (MCA-N), the local implementing entity. The RBD Program worked with over 8,500 producers and targeted key productive sectors such as livestock, agriculture (sesame, beans, cassava, and vegetables), non-agriculture businesses and forestry.[15] This research focuses specifically on the RBD project as a Study-Case, aimed to raise income for small to medium farms and rural businesses through improved productivity and access to markets.

Regions were selected based on their potential[16] and not necessarily because of the poverty status. In fact, a 2005 Poverty Map showed that income poverty in Leon and Chinandega is milder than in other regions (Carter and Toledo, 2012:1). To participate in the program, farmers had to present business plans built around a high potential activity. Once elected, they would receive Business Services for 24 months. Farmers would receive a variety of small-scale infrastructure, technology transfer (drip irrigation, good agricultural practices, improved product varieties, improved livestock management), capacity building for producers' cooperatives, and marketing support (MCC, 2011).

It is important to highlight that only 2% of the RBD participants were below the poverty line prior to initiation of the program whereas 34% of the rural population in Leon and Chinandega were under the poverty line in 2005 (Carter and Toledo, 2012:9).

The causal model is quite straightforward and similar to other Rural Development programs:

Figure 5. Causal flow of RBD Program



Implementation Strategy

A large campaign was launched to encourage program participation and application. While the program was advertised, groups of farmers referred to as

[15] MCC, Success Story, 17/06/2011.

[16] During the designing phase of the project, MCA-N carried out a value chain analysis of the key sectors in order to identify their constraints to increase productivity

"nuclei" were identified based on the productive activity that the program would support. Each nucleus was constructed around a leader farmer and 10 to 15 satellite farmers that had farms close to the leader's. The leader had to be willing to invest more than the satellite farmers and to coordinate technical meetings.

Clusters of farmers were selected based on previously set criteria e.g.: for agricultural and livestock areas, criteria included requirements on asset floor, asset ceiling, prior experience, water requirements (sources of water), legal status, age and environment (whether located outside of protected areas).

Given time and budget constraints, identified clusters were not all able to initiate treatment at the same time, so the program was offered in two different periods of time. The first group (early treatment) was offered treatment in late 2007, with 64% of eligible households choosing to participate (early compliers). The second group (late treatment group) was offered in early 2009, with 57% of eligible household electing to participate (late compliers).

3.4.2. The Impact of RBD on the economic well-being of farmers in Nicaragua

Evaluation and implementation teams worked on a quasi-census of eligible farmers, which verified the characteristics of every farmer until a sample of 30 eligible farmers was reached. The next step was to randomly select a number of farmers per cluster, resulting in 1,600 participating in the evaluation.

Toledo and Carter (2012) report diverse effects on production across different target crops. Bean farmers planted more beans and received higher prices in addition to using more improved seeds. Sesame farmers also increased production on prices. For cassava and livestock farmers, the effects were less clear. Carter et. al. (2012), on this regard, warns about the possibility of the generation of spillover externalities in which groups that were not treated and groups to be treated were able to benefit from the improved processing facilities offered to early treated groups (2012:32). In addition he reports a substantial increase in income related to the activities targeted by the program after two years of as much as 30%. There were significant increases in both mobile and perhaps fixed farm capital, since the program provided equipment or supported the construction of new productive installations. A clear increasing trend is identified for investment in mobile capital which includes tools and equipment. In contrast, in the case of fixed capital, including buildings, installations and fences located in the properties, the trend is not quite evident, which according to Carter et al. could be explained by issues with land tenure. Carter comments that the initial capital boost may have reinforced the capital accumulation and in turn the increase in income in the short term (2012:34). In terms of the effect on Consumption, the measure utilized as the indicator of household living standard and economic well-being, the study reports no clear impact. A possibility is that total income increased but it was mostly allocated towards investment in capital, crowding out the increase in short term consumption. An important feature is the finding of substantial heterogeneity in

the program results, which may explain some of the inconclusive results (e.g. change in consumption). In this context, the top 25% top performers[17] experienced increase in income double those of the average performer producer and also enjoyed statistically significant increases in consumption. The lowest 25% performance experienced modest income gains and no change in consumption (2012:3).

[17] Refers to those that did better than predicted by the household's level of treatment and other control variables.

Chapter 4 Analysis of RBD Study-Case

4.0. Research Methodology

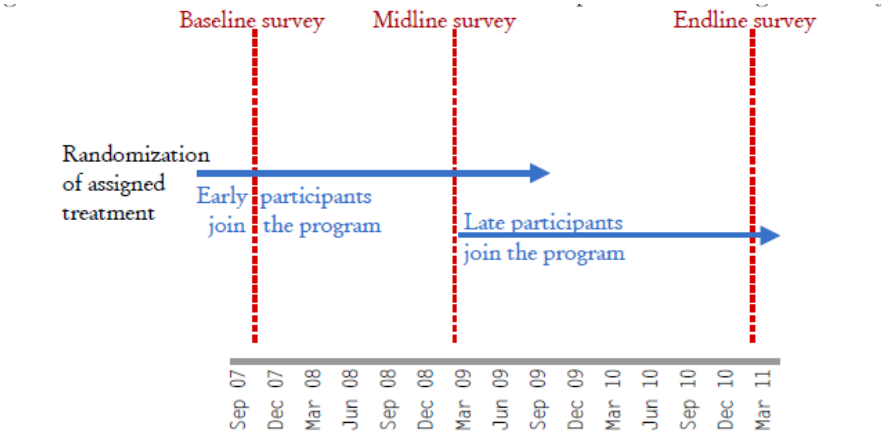
The research paper uses a Study-case as an illustration of the extent to which an RBD program can affect other dimensions of farmer well-being. The researcher utilizes secondary data collected and entered by FIDEG using the Census Survey Processing System software (CSPro 4.0) and analyzed by the Research Center of the University of California, Davis for the MCC.

4.0.1 Sample

Three rounds of survey served to collect the data corresponding to the periods of 2006-2007, 2008-2009 and 2010-2011. The first round collected baseline data in late 2007, the second round collected midline data in early 2009 and the third round collected endline data in early 2011.

As mentioned previously, not all eligible farmers initiated treatment simultaneously; farmer clusters were randomly assigned into an early and a late treatment group. Once the random assignment of these clusters was made, a further randomization of eligible producers within the clusters was made in order to select the evaluation sample which consists of 1,600 households between both groups. Treatment was offered to selected clusters with 64% of the households choosing to participate in the RBD program in the first round and 57% in the second round after February 2009. Timing of the surveying around the identification and allocation of farmers into groups, facilitated the gathering of data on both eligible households as well as complier households, the latter referring to those that actually participated in the RBD program. The following figure (Carter and Toledo, 2012) illustrates the above mentioned:

Figure 6. Timeline of Received Treatment as Compared to Timing of Surveys



Source: Carter and Toledo (2012)

4.0.2 Experimental Design and Model Specification

Impact evaluation techniques have been implemented aiming to identify effects of the program over a given output. According to the WB Impact Evaluation Guide (2007), "the Difference-in Difference model estimates the counterfactual for the change in outcome for the treatment group by calculating the change in outcome for the comparison group. This method allows us to take into account any differences between the treatment and comparison groups that are constant over time". Mathematically:

$$D^T = [(y_2^T - y_1^T) - (y_2^C - y_1^C)]$$

Where, D_T = the impact of the program; **y** = an outcome variable of interest (School attendance, expense in health, amount of credit received, whether amount of credit received was lower or equal than the requested.); subscripts **1** and **2** = time (1 is the time before the treatment; 2 is the time after the treatment); superscript **C** =values for the counterfactual or control group; superscript **T** = values for beneficiaries of the project or treatment group.

Given that the program included three periods of time, the model is adjusted and generalized mathematically as follows:

$$E[Y_{it}] = \alpha_0 + \lambda_2 t_2 + \lambda_3 t_3 + \delta_2(t_2 T_i) + \delta_3(t_3 T_i) + [\gamma T_i + \beta' X_i]$$

Where, **Ti** is the binary complier-treatment group indicator defined above, **Xi** represents the vector of baselines characteristics (farmer age, farmer education, farmer household size, etc), and **t2** and **t3** are binary time period indicators for survey rounds 2 and 3, respectively.

Fixed effects were introduced to the Difference-in Difference model as a means to control for household fixed effects. This allows to reduce the chances of omitted variable bias. Estimations were also clustered using the variable "clust" which represents the geographical units of randomization. This reduces the chance of estimating standard errors wrongly, given that there may be unobservable variables in each cluster that are correlated between one another.

This research uses household data as unit of analysis and therefore observations have been assembled accordingly. Household data allows us to quantify with a relative detail the impacts of interventions.

To analyze the three periods we separate the effects for the early compliers in 2009 (early_treat), early compliers between 2009 and 2011 – when there was no more treatment – (extended_treat) and the combined or long term effect for early compliers (long_treat), as well as the late compliers in 2011 (late_treat), the late compliers in 2009 – when they had not been treated – (not_yet_treat) and the combined effect of the late compliers (short_treat).

4.0.3 Identification of a counterfactual

The greatest challenge when working with Diff-in-Diff models is the identification of a counterfactual or a control group, that is, a group with identical observed and unobserved average characteristics to a group of beneficiaries that have are exposed to an intervention, or said mathematically:

$E(Y_A(0)|T=1) - E(Y_A(0)|T=0) = 0$[18]. This feature allows comparisons to measure isolated impacts of a program. In this case, the fact that not all eligible farmers of the RBD program could be brought into the project immediately is exploited (Carter and Toledo, 2012). This strategy creates a temporary control group in the group that was offered treatment in 2009, which given the random allocation into early and late treatment, should share the same characteristics as the group that initiated treatment in 2007. The random rollout also minimizes the chances of bias and strengthens internal validity.

4.0.4 Descriptive Statistics

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
hh_size	1600	5.410625	2.292171	1	18
leduc_head~h	1600	2.154375	2.185413	0	9
years_ed_h~h	1600	3.93875	4.213353	0	20
sex_head_hh	1600	.884375	.3198747	0	1
age_head_hh	1600	52.715	13.23455	20	92
exp_diarrhea	1600	19.2425	135.5772	0	4000
exp_ill_acc	1600	512.0525	1995.332	0	50000
exp_o_health	1600	81.02312	840.9016	0	27000
exp_pr_ins	1600	4.89875	69.75873	0	2000
received_c~t	1600	.490625	.5000684	0	1
cr_rec_cor~h	1600	11303.87	32157.38	0	500000
cr_rec_dol~h	1600	575.25	4074.962	0	106000
land_area_hh	1600	38.04804	68.08503	.0002126	1172

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Figure 1 shows that the average household size is of 5.4 having up to 18 members and minimums of just 1. The level of education of the heads of the households is predominantly low, with the majority (51%) having attained elementary school at the most. Approximately 11% attained high school and only 10% reached levels beyond high school, including university, basic, intermediate and superior technical schooling, teaching education and others. Most importantly, 30% of the households' heads display no education at all. This is consistent with the average years of education of households' heads which barely reaches 3.9. Regarding sex of households' heads, 88% of them are male and 12% female. Both have similar levels of education attaining in average 3.8 and 3.9 years of schooling respectively. Average household head is around 53 years old, being the youngest 20 years old and the oldest 92.

To examine how the core regression estimates behave when the regression specification is modified by adding or removing regressors (White, Lu, 2010) we run t-tests to check for robustness. Any control variable with statistically

[18] Meaning that the average expected value of an outcome Y for a group of individuals that are not treated *(YA(0))* given that they were selected to participate in the treatment *(T=1)* should be identical to the outcome of those who were not treated and not selected to participate.

significant difference in means was included to control for differences between the treatment and counterfactual groups.

Table 3. T-test Household Size, Sex of Household Head, Age of Household Head, Level of education of Household Head, Years of Education of Household Head

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	233	5.373391	.1546307	2.360336	5.068731	5.678051
1	517	5.466151	.0977046	2.221572	5.274203	5.658099
combined	750	5.437333	.0826848	2.264415	5.275012	5.599655
diff		-.0927603	.1787621		-.4436954	.2581748

diff = mean(0) - mean(1) t = -0.5189
Ho: diff = 0 degrees of freedom = 748

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.3020 Pr(|T| > |t|) = 0.6040 Pr(T > t) = 0.6980

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	233	1.141631	.0228914	.3494218	1.096529	1.186732
1	517	1.104449	.0134639	.306138	1.077998	1.1309
combined	750	1.116	.0117008	.3204386	1.09303	1.13897
diff		.0371822	.0252647		-.012416	.0867804

diff = mean(0) - mean(1) t = 1.4717
Ho: diff = 0 degrees of freedom = 748

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9292 Pr(|T| > |t|) = 0.1415 Pr(T > t) = 0.0708

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	233	53.72532	.8948162	13.65878	51.96232	55.48833
1	517	51.40232	.577598	13.13321	50.26759	52.53705
combined	750	52.124	.4868534	13.33303	51.16824	53.07976
diff		2.323001	1.049321		.2630371	4.382965

diff = mean(0) - mean(1) t = 2.2138
Ho: diff = 0 degrees of freedom = 748

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9864 Pr(|T| > |t|) = 0.0271 Pr(T > t) = 0.0136

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	233	2.030043	.1390249	2.122122	1.75613	2.303956
1	517	2.334623	.0998385	2.270091	2.138483	2.530763
combined	750	2.24	.0813635	2.228232	2.080272	2.399728
diff		-.3045799	.1755845		-.649277	.0401172

diff = mean(0) - mean(1) t = -1.7347
Ho: diff = 0 degrees of freedom = 748

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0416 Pr(|T| > |t|) = 0.0832 Pr(T > t) = 0.9584

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	233	4.004292	.285334	4.355434	3.442115	4.566469
1	517	4.268859	.1916614	4.357927	3.892326	4.645391
combined	750	4.186667	.1590575	4.355968	3.874415	4.498918
diff		-.264567	.3438035		-.9395016	.4103677

diff = mean(0) - mean(1) t = -0.7695
Ho: diff = 0 degrees of freedom = 748

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.2209 Pr(|T| > |t|) = 0.4418 Pr(T > t) = 0.7791

Source: Author's own calculations based on Carter et al. (2012)'s data set

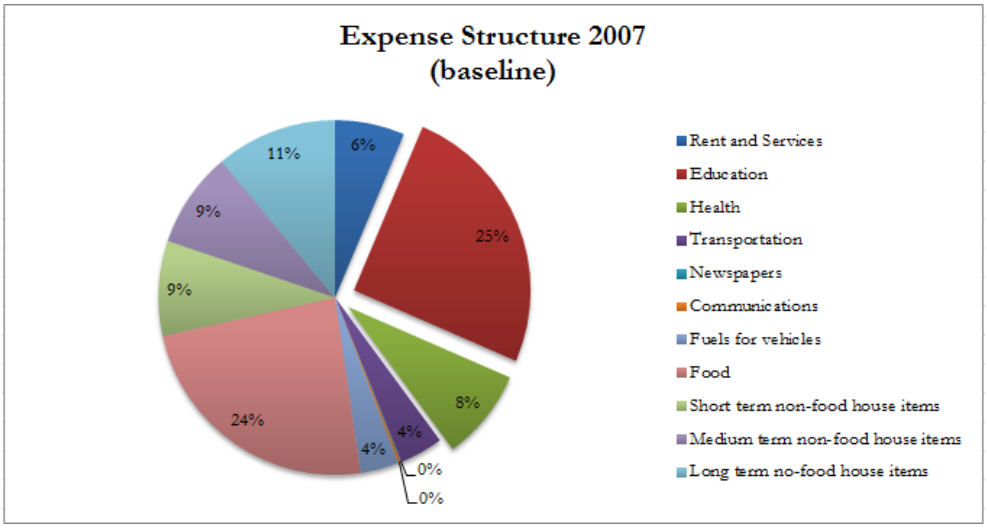
4.1 Expenditure Structure of RBD Program households

According to Carter and Toledo (2012), "income in the activities targeted by the program steadily rose, plateauing at 30% increase over the baseline two years after the program"[19] The evaluation also determined that there were no significant impacts on household living standards measured by consumption. Further analysis aimed to identify changes in the yearly expense structure of households indicates that treated households did not experience a significant change in consumption patterns and that there was not significant increase in a specific category of expense (See Figure 2 and 3). The analysis is consistent with the findings of Carter et al. (2012) in Chapter 3, which explain that households allocated more resources towards investments in mobile and fixed capital, presumably at the cost of increased consumption. The proportion of expenses in education and health increased by 1% each in relation to total expenses, going from 25% to 26% in the case of education (including registry, enrollment, tuition fees, monthly quotas, transportation, photocopies, uniforms, books, school supplies and parents' association quotas); and from 8% to 9% for health (including curative health and private insurance fees). As expected, rural poor farmers spend a large proportion of income (24%) in food[20]. Almost 97% of households owned their property therefore the expense in Rent is low. 67.7% are not paying potable water, with 52% getting water from public or private wells; 12% pays potable water without a meter. For electric energy, the amounts are inversed, 66% pays the service with proper meters, 17% pay without a meter and 13% do not pay at all. 87% use firewood for cooking and around 60% use cellphone services.

[19] Carter and Toledo (2012) highlight that "the increase in income does not imply increase in overall incomes, as productive incomes may have been reallocated from other activities that we (they) do not measure" (ibid:32). They also point out the evidence of substantial heterogeneity found in the conditional quintile regressions (ibid:41).

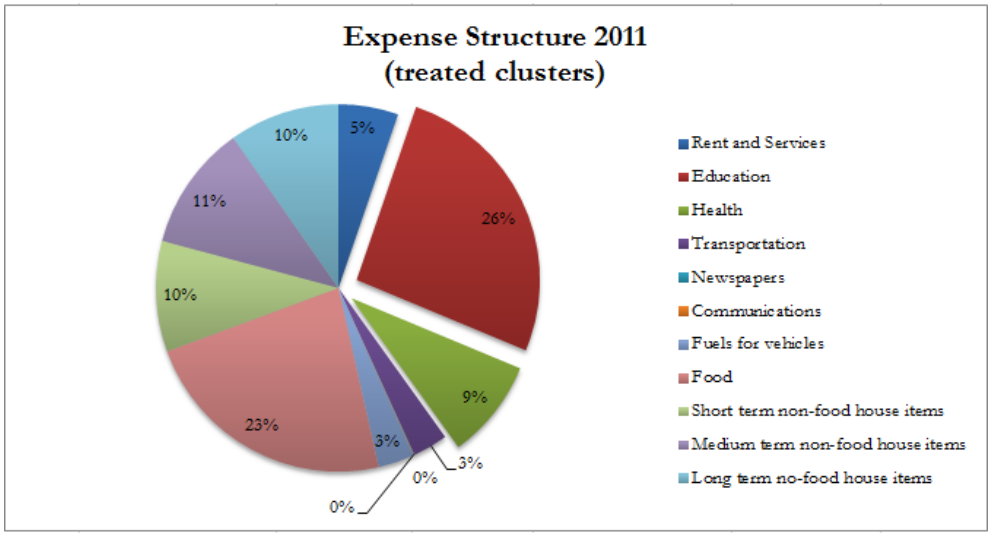
[20] Food expense data was collected considering the 15 days previous to the surveys. The expense was calculated considering the frequency of purchase which was for the majority (around 80%) either weekly or every two weeks.

Figure 7. Expense Structure at baseline



Source: Author's own calculations based on Carter et. al. (2012)'s data set

Figure 8. Expense Structure in 2011 for treated households



Source: Author's own calculations based on Carter et. al. (2012)'s data set

4.2 Access to Education

4.2.1 School Attendance

The indicator utilized as outcome variable (Y) is **School Attendance**. Figure 2 illustrates the results of a single Diff-in-Diff model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator displays a positive relationship between the treatment given to clusters between 2007 and 2009 and school attendance of farmers' children in the same period. However, the relationship is not statistically significant at the 95% level. Household size does have statistically significant effect on school attendance, with every additional household member reducing the

probability of children to attend school by 1%. Years of education of household head also appears to have an effect on the school attendance, increasing the probability of a child in the household to attend school by 1% with every additional year of education. Both household size and years of education of the household head are statistically significant at the 5% level.

Table 4. Fixed effect regression for School Attendance (2007 – 2009)

```
Fixed-effects (within) regression               Number of obs      =      2403
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0318                         Obs per group: min =         7
       between = 0.1473                                        avg =      42.9
       overall = 0.0385                                        max =        86

                                                F(8,55)            =      6.54
corr(u_i, Xb)  = 0.0715                         Prob > F           =    0.0000

                                    (Std. Err. adjusted for 56 clusters in clust)
```

sch_att_hh	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
hh_size	-.0118466	.0036833	-3.22	0.002	-.0192281	-.0044651
sex_head_hh	-.0043459	.0253605	-0.17	0.865	-.0551695	.0464776
age_head_hh	.0011153	.0006731	1.66	0.103	-.0002337	.0024643
years_ed_h~h	.0131939	.0026587	4.96	0.000	.0078657	.0185221
leduc_head~h	-.0048289	.0043197	-1.12	0.268	-.0134858	.0038279
ec11	.0261771	.0199052	1.32	0.194	-.0137138	.0660681
Y2009	-.0198244	.0130428	-1.52	0.134	-.0459628	.006314
early_treat	.0263421	.0203174	1.30	0.200	-.0143748	.067059
_cons	.7765196	.0478206	16.24	0.000	.6806849	.8723543
sigma_u	.07044339					
sigma_e	.31015821					
rho	.0490535	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Analyzing the three periods, we find that school attendance increases for the early complier groups during the first two years of treatment in 2009 and later in 2011 after the next two years without treatment. The estimator is not, however, statistically significant (See Figure 3). The relationship is positive for school attendance of clusters treated during 2009 through 2011 and negative for clusters that were not treated. The estimators of treatment are also not significant at the 5% level.

Table 5. Fixed effect regression for School Attendance (2007 – 2011)

```
Fixed-effects (within) regression               Number of obs      =      3511
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0277                         Obs per group: min =        11
       between = 0.1626                                        avg =      62.7
       overall = 0.0327                                        max =       125

                                                F(10,55)           =      8.75
corr(u_i, Xb)  = 0.0608                         Prob > F           =    0.0000

                                    (Std. Err. adjusted for 56 clusters in clust)
```

sch_att_hh	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex_head_hh	-.0084556	.022118	-0.38	0.704	-.052781	.0358697
age_head_hh	.0008047	.0005774	1.39	0.169	-.0003525	.0019619
years_ed_h~h	.0106934	.0018003	5.94	0.000	.0070856	.0143013
hh_size	-.0114812	.0028854	-3.98	0.000	-.0172636	-.0056988
ec11	.0305103	.0210145	1.45	0.152	-.0116037	.0726244
lc11	.0031552	.0261725	0.12	0.904	-.0492957	.0556061
Y2009	-.0111398	.0184966	-0.60	0.549	-.0482078	.0259281
Y2011	.0184547	.0203357	0.91	0.368	-.022299	.0592085
long_treat	-.002659	.0244426	-0.11	0.914	-.051643	.0463251
short_treat	-.0010275	.0253134	-0.04	0.968	-.0517566	.0497016
_cons	.7904032	.0450389	17.55	0.000	.7001433	.8806631
sigma_u	.06311453					
sigma_e	.31090027					
rho	.03958016	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Further models were run using solely the combined treatment variables for long and short_treat as well as OLS with similar results.

4.3 Access to Health

4.3.1 Household expenditures in health

The three outcome variables analyzed are **Expenditures in Diarrhea, in Health (other than diarrhea) and accidents and in Private Insurance** in current prices. It is relevant to highlight that the nature of the expenses were not for preventive but for curative healthcare.

The first indicator utilized as outcome variable (Y) in this case is Expenditure in Diarrhea. Figure 4 illustrates the results of a single Diff-in-Diff model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator for the outcome variable displays a negative, but statistically insignificant, effect on expense in diarrhea. Expense in diarrhea is also not associated with changes in the rest of the control variables (household size, sex, age and education of household head).

Table 6. Fixed effect regression for Expenditure in Diarrhea (2007 – 2009)

```
Fixed-effects (within) regression               Number of obs      =      3164
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0043                         Obs per group: min =        10
       between = 0.0076                                        avg =      56.5
       overall = 0.0037                                        max =       119

                                                F(8,55)            =      1.62
corr(u_i, Xb)  = -0.0413                        Prob > F           =    0.1400

                                  (Std. Err. adjusted for 56 clusters in clust)
------------------------------------------------------------------------------
exp_diarrhea |      Coef.   Robust Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |   .5894436   2.226344     0.26   0.792    -3.87225    5.051138
 sex_head_hh |   6.725754    10.5875     0.64   0.528   -14.49207    27.94357
 age_head_hh |  -.0162297    .429354    -0.04   0.970   -.8766744     .844215
years_ed_h~h |  -1.201495   1.527089    -0.79   0.435   -4.261849    1.858859
leduc_head~h |   6.014924    3.76498     1.60   0.116   -1.530264    13.56011
         ec11 |  -12.99138   7.900827    -1.64   0.106   -28.82499    2.842232
       Y2009  |   12.34436   12.90509     0.96   0.343   -13.51801    38.20673
 early_treat  |  -4.355522   13.90105    -0.31   0.755   -32.21385    23.50281
        _cons |   7.067619   25.42134     0.28   0.782   -43.87788    58.01312
-------------+----------------------------------------------------------------
      sigma_u |  35.92535
      sigma_e |  228.06576
          rho |  .02421236   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Author's own calculations based on Carter et. al. (2012)'s data set

When analyzing the three periods (See Figure 5), we find no relevant differences with the previous results for expense in diarrhea (See Figure 5). The treatment estimator remains statistically insignificant.

Table 7. Fixed effect regression for Expenditure in Diarrhea (2007 – 2011)

```
Fixed-effects (within) regression               Number of obs      =      4727
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0024                         Obs per group: min =        15
       between = 0.0144                                        avg =      84.4
       overall = 0.0022                                        max =       177

                                                F(12,55)           =      0.86
corr(u_i, Xb)  = -0.0160                        Prob > F           =    0.5930

                                  (Std. Err. adjusted for 56 clusters in clust)
------------------------------------------------------------------------------
exp_diarrhea |      Coef.   Robust Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 sex_head_hh |   .3466164   7.996055     0.04   0.966   -15.67783    16.37107
 age_head_hh |  -.0237339   .3098269    -0.08   0.939   -.6446409     .597173
years_ed_h~h |   .7783343   .6214805     1.25   0.216   -.4671405    2.023809
     hh_size |    .77951   1.692396     0.46   0.647   -2.612128    4.171148
        ec11 |  -11.26851   10.41731    -1.08   0.284   -32.14526    9.608244
        lc11 |  -1.322705   8.562481    -0.15   0.878    -18.4823    15.83689
       Y2009 |   19.31042   21.56987     0.90   0.375   -23.91656    62.53741
       Y2011 |  -9.927489   8.89897    -1.12   0.269   -27.76142    7.906445
 early_treat |  -10.61659   21.94912    -0.48   0.631    -54.6036    33.37043
extended_t~t |   31.91524   13.43469     2.38   0.021    4.99152    58.83896
  late_treat |   10.76905   11.10586     0.97   0.336   -11.48759    33.02569
not_yet_tr~t |  -10.35431    23.1663    -0.45   0.657   -56.78061    36.07198
       _cons |   17.08064   18.35399     0.93   0.356   -19.70158    53.86286
-------------+----------------------------------------------------------------
      sigma_u |  29.389366
      sigma_e |  201.05434
          rho |  .02092047   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Author's own calculations based on Carter et. al. (2012)'s data set

The second outcome variable (Y) in this case is Expenditure in health (other than diarrhea) and accidents. Figure 6 illustrates the results of a single Diff-in-Diff model between the first half of the program - 2007 and 2009,

where early_treat reveals the treatment estimator. The estimator reveals no statistically significant causal relationship between treatment and expenses in health/accidents. With regards to the rest of the control variables, the analysis shows no relationships with the outcome variable.

Table 8. Fixed effect regression for Expenditure in Health/Accidents (2007 – 2009)

```
Fixed-effects (within) regression               Number of obs      =      3164
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0037                         Obs per group: min =        10
       between = 0.0049                                        avg =      56.5
       overall = 0.0036                                        max =       119

                                                F(8,55)            =      2.41
corr(u_i, Xb)  = -0.0148                        Prob > F           =    0.0261

                                  (Std. Err. adjusted for 56 clusters in clust)
------------------------------------------------------------------------------
             |               Robust
exp_ill_acc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |    2.014696   13.69337     0.15   0.884    -25.42743    29.45683
 sex_head_hh |    104.9096   87.75925     1.20   0.237    -70.96391     280.783
 age_head_hh |    4.410106   2.812727     1.57   0.123    -1.226724    10.04694
years_ed_h~h |   -25.44817   13.54745    -1.88   0.066    -52.59786    1.701523
leduc_head~h |    45.49588    19.6663     2.31   0.024     6.083732    84.90803
         ec11 |   -87.04278   94.20101    -0.92   0.360    -275.8258    101.7403
       Y2009  |   -56.92794   82.24292    -0.69   0.492    -221.7464    107.8906
 early_treat  |    84.43436   120.1157     0.70   0.485    -156.2829    325.1516
        _cons |    206.1649   229.4763     0.90   0.373    -253.7159    666.0458
-------------+----------------------------------------------------------------
      sigma_u |  260.24007
      sigma_e |  1889.6911
          rho |   .0186126   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Analyzing the combined effects of the three periods (See Figure 7), we find no relevant difference with the previous analysis. The treatment estimators remain not statistically significant at the 5% level.

Table 9. Fixed effect regression for Expenditure in Health/Accidents (2007 – 2011)

```
Fixed-effects (within) regression               Number of obs      =      4727
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0023                         Obs per group: min =        15
       between = 0.0015                                        avg =      84.4
       overall = 0.0022                                        max =       177

                                                F(10,55)           =      2.70
corr(u_i, Xb)  = -0.0175                        Prob > F           =    0.0092

                                  (Std. Err. adjusted for 56 clusters in clust)
------------------------------------------------------------------------------
             |               Robust
exp_ill_acc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 sex_head_hh |    158.1848   63.74472     2.48   0.016     30.43748    285.932
 age_head_hh |    3.687923    2.31607     1.59   0.117    -.9535856   8.329432
years_ed_h~h |   -9.386372   7.976203    -1.18   0.244    -25.37104   6.598297
     hh_size |    12.57714   13.20966     0.95   0.345    -13.89562   39.04989
         ec11 |   -111.559   130.2947    -0.86   0.396    -372.6755   149.5574
         lc11 |   -7.016516    117.639    -0.06   0.953    -242.7703   228.7373
       Y2009  |   -24.59192   133.4764    -0.18   0.855    -292.0846   242.9007
       Y2011  |   -3.746305   148.3949    -0.03   0.980    -301.1363   293.6437
  long_treat  |    49.7078    170.4066     0.29   0.772    -291.7947   391.2103
 short_treat  |   -44.26493    157.45     -0.28   0.780    -359.8019    271.272
        _cons |    186.6957   224.1213     0.83   0.408    -262.4535    635.845
-------------+----------------------------------------------------------------
      sigma_u |  265.88473
      sigma_e |  1927.8802
          rho |   .01866568   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Author's own calculations based on Carter et. al. (2012)'s data set

The third and last outcome variable (Y) in this case is Expensditure in Private Insurance. Figure 8 illustrates the results of a single Diff-in-Diff model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator reveals no statistically significant causal relationship between treatment and expenses in Private Insurance. With regards to the rest of the control variables, the analysis shows no relationships with the outcome variable.

Table 10. Fixed effect regression for Expenditure in Private Insurance (2007 – 2009)

```
Fixed-effects (within) regression               Number of obs      =      3164
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0077                         Obs per group: min =        10
       between = 0.0334                                        avg =      56.5
       overall = 0.0077                                        max =       119

                                                F(8,55)            =      1.53
corr(u_i, Xb)  = -0.0055                        Prob > F           =    0.1696

                                    (Std. Err. adjusted for 56 clusters in clust)
------------------------------------------------------------------------------
             |               Robust
  exp_pr_ins |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |   .3388698   .2652376     1.28   0.207    -.1926783    .8704179
 sex_head_hh |   2.457944   1.604396     1.53   0.131    -.7573379    5.673226
 age_head_hh |  -.0316417   .0554988    -0.57   0.571    -.1428637    .0795804
years_ed_h~h |   .8418124   .4394265     1.92   0.061     -.038818    1.722443
leduc_head~h |   .1969485   .4940528     0.40   0.692    -.7931554    1.187052
         ec11 |   3.901718   4.165309     0.94   0.353    -4.445749    12.24918
       Y2009  |  -3.248518   1.711375    -1.90   0.063     -6.67819    .1811548
 early_treat  |   -2.18179   4.726817    -0.46   0.646    -11.65454    7.290964
        _cons |  -2.367172    4.37613    -0.54   0.591    -11.13713    6.402789
-------------+----------------------------------------------------------------
     sigma_u |  7.8984273
     sigma_e |  51.484433
         rho |  .02299463   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Analyzing the combined effects of the three periods (See Figure 9), we find no relevant difference with the previous analysis. Treatment estimators remain not statistically significant at the 5% level.

Table 11. Fixed effect regression for Expenditure in Private Insurance (2007 – 2011)

Fixed-effects (within) regression — Number of obs = 3166
Group variable: clust — Number of groups = 56

R-sq: within = 0.0110 — Obs per group: min = 10
between = 0.0528 — avg = 56.5
overall = 0.0112 — max = 119

F(9,55) = .
corr(u_i, Xb) = 0.0019 — Prob > F = .

(Std. Err. adjusted for 56 clusters in clust)

exp_pr_ins	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex_head_hh	2.409884	1.605607	1.50	0.139	-.8078254	5.627593
age_head_hh	-.0313239	.0553093	-0.57	0.573	-.1421662	.0795184
years_ed_h~h	.9151092	.4894769	1.87	0.067	-.0658244	1.896043
hh_size	.3294656	.2638149	1.25	0.217	-.1992312	.8581624
ec11	5.204205	3.781433	1.38	0.174	-2.373957	12.78237
lc11	2.795411	3.364675	0.83	0.410	-3.947549	9.538371
Y2009	-1.94315	1.073488	-1.81	0.076	-4.094469	.2081684
Y2011	123.3286	3.218562	38.32	0.000	116.8784	129.7787
early_treat	-3.458334	4.483818	-0.77	0.444	-12.44411	5.527437
extended_t~t	-13.65947	4.89621	-2.79	0.007	-23.4717	-3.847248
late_treat	(dropped)					
not_yet_tr~t	-2.430588	2.945258	-0.83	0.413	-8.333017	3.471841
_cons	-3.550397	4.493626	-0.79	0.433	-12.55583	5.455031
sigma_u	7.8674937					
sigma_e	51.48792					
rho	.02281595	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Further models were run including using solely the combined treatment variables for long and short_treat as well as OLS with similar results.

4.4 Access to credit

4.4.1 Farmers obtained credit that met their expectations

The four outcome variables analyzed are **Farmers received credit, Amount of credit received in cordobas[21], Amount of Credit received in dollars** and **Amount was equal or lower than requested.**

Around 50% of the households received credit; 16% received credits lower than requested. Figure 10 illustrates the average of credits received by households in cordobas (first line) and in US dollars (second line). According to Carter et. al. (2012), roughly 40% was reported to be credit-constrained in the sense of having unmet demand for loans.

The first outcome variable (Y) used in this case is Farmer received credit. Since the object of study is a binary variable, a logit model is utilized maintaining household fixed effects. Figure 10 illustrates the results of the model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator for the outcome variable dis-

[21] 1 cordoba = US$25.17

plays a positive, but statistically insignificant effect on the odds of farmers receiving credit. Sex, age and years of education of the household head, however, do appear to play a role in determining whether farmers receive credit with statistically significant coefficients at the 5% level. In the case of sex, the odds of receiving credit increases by 39.4% for male farmers with respect to female heads of household. The odds of receiving credit increases by almost 1% with every additional year of age. Finally, the odds of receiving credit increases by 3.7% with more years of education of the household head. Interestingly, the area of land belonging to farmers does not play a role in the odds of receiving credit.

Table 12. Fixed effect regression for Odds of receiving credit (2007 – 2009)

Conditional (fixed-effects) logistic regression — Number of obs = 3179
LR chi2(9) = 129.68
Prob > chi2 = 0.0000
Log likelihood = -1933.7133 — Pseudo R2 = 0.0324

received_c~t	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
hh_size	1.021675	.0162627	1.35	0.178	.9902923	1.054051
sex_head_hh	1.394399	.1676579	2.77	0.006	1.101645	1.764951
age_head_hh	.9820639	.0031658	-5.61	0.000	.9758785	.9882884
years_ed_h~h	1.037654	.0132579	2.89	0.004	1.011991	1.063967
leduc_head~h	1.019118	.021294	0.91	0.365	.9782255	1.06172
land_area_hh	1.000338	.0006758	0.50	0.617	.9990143	1.001663
ec11	1.312544	.1540687	2.32	0.021	1.042794	1.652074
Y2009	.7501614	.0676235	-3.19	0.001	.6286702	.8951309
early_treat	.7666728	.1210451	-1.68	0.092	.5626253	1.044722

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Analyzing the three periods (See Figure 11), we find no statistical significance in the association between early, extended, late and not yet treated groups with the outcome variable which determines odds of farmer receiving credit.

Table 13. Fixed effect regression for Odds of receiving credit (2007 – 2011)

Conditional (fixed-effects) logistic regression — Number of obs = 3810
LR chi2(13) = 684.73
Prob > chi2 = 0.0000
Log likelihood = -2085.86 — Pseudo R2 = 0.1410

received_c~t	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex_head_hh	1.344992	.1561489	2.55	0.011	1.071268	1.688656
age_head_hh	.9812166	.0030879	-6.03	0.000	.9751831	.9872875
years_ed_h~h	1.044387	.0103027	4.40	0.000	1.024388	1.064776
hh_size	1.016915	.0156547	1.09	0.276	.9866903	1.048065
land_area_hh	1.000543	.0006536	0.83	0.406	.9992631	1.001825
ec11	1.442585	.1921204	2.75	0.006	1.111169	1.872848
lc11	1.234309	.1620478	1.60	0.109	.9542737	1.596523
Y2009	.6948805	.0914403	-2.77	0.006	.5369074	.8993338
Y2011	11.03906	2.969512	8.93	0.000	6.51566	18.70276
early_treat	.8321886	.1539456	-0.99	0.321	.5791072	1.195872
extended_t~t	1.579426	.6659489	1.08	0.278	.6911923	3.609107
late_treat	1.053124	.3918113	0.14	0.889	.5079174	2.183566
not_yet_tr~t	1.165812	.2100622	0.85	0.395	.818945	1.659597

Source: Author's own calculations based on Carter et. al. (2012)'s data set

The second outcome variable (Y) utilized for access to credit is Amount of credit received in cordobas. The credit received by household members was aggregated to create a household level variable. Figure 12 illustrates the results of the model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator for the outcome variable displays a positive, but statistically insignificant effect on the odds of farmers receiving credit.

Table 14. Fixed effect regression for Amount of Credit Received in cordobas (2007 – 2009)

```
Fixed-effects (within) regression               Number of obs      =      3179
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0142                         Obs per group: min =        10
       between = 0.2304                                        avg =      56.8
       overall = 0.0218                                        max =       119

                                                F(9,55)            =      7.32
corr(u_i, Xb)  = 0.1032                         Prob > F           =    0.0000

                                              (Std. Err. adjusted for 56 clusters in clust)
```

cr_rec_cor~h	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
hh_size	-13.40866	212.7909	-0.06	0.950	-439.8512	413.0339
sex_head_hh	4768.045	1312.244	3.63	0.001	2138.249	7397.84
age_head_hh	-44.06106	46.01677	-0.96	0.343	-136.2807	48.1586
years_ed_h~h	244.2595	220.5686	1.11	0.273	-197.7699	686.2889
leduc_head~h	190.9517	207.8304	0.92	0.362	-225.5498	607.4532
land_area_hh	32.52202	23.21026	1.40	0.167	-13.99239	79.03642
ec11	1272.189	1917.838	0.66	0.510	-2571.244	5115.621
Y2009	-2619.243	799.3633	-3.28	0.002	-4221.202	-1017.283
early_treat	-698.3563	2001.9	-0.35	0.729	-4710.253	3313.54
_cons	6464.952	3035.446	2.13	0.038	381.7809	12548.12
sigma_u	9737.8293					
sigma_e	28256.286					
rho	.10615848	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

When analyzing the three periods together (See Figure 14), we see no relevant difference with the previous analysis. The treatment estimators remain insignificant at the 5% level.

Table 15. Fixed effect regression for Amount of Credit Received in cordobas (2007 – 2011)

```
Fixed-effects (within) regression               Number of obs      =      4754
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0130                         Obs per group: min =        15
       between = 0.2319                                        avg =      84.9
       overall = 0.0176                                        max =       178

                                                F(13,55)           =      5.57
corr(u_i, Xb)  = 0.0630                         Prob > F           =    0.0000

                                    (Std. Err. adjusted for 56 clusters in clust)
```

cr_rec_cor~h	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex_head_hh	3591.791	1237.94	2.90	0.005	1110.904	6072.678
age_head_hh	-11.75559	33.49823	-0.35	0.727	-78.88753	55.37636
years_ed_h~h	346.0296	184.6682	1.87	0.066	-24.05374	716.113
hh_size	18.94054	191.3018	0.10	0.921	-364.4369	402.318
land_area_hh	35.04724	16.48193	2.13	0.038	2.016719	68.07776
ec11	1919.352	2141.329	0.90	0.374	-2371.968	6210.672
lc11	1844.947	1771.341	1.04	0.302	-1704.899	5394.794
Y2009	-3034.092	1257.19	-2.41	0.019	-5553.557	-514.6282
Y2011	-2842.382	2348.764	-1.21	0.231	-7549.41	1864.646
early_treat	-284.1058	2240.45	-0.13	0.900	-4774.067	4205.856
extended_t~t	-1889.309	2806.072	-0.67	0.504	-7512.803	3734.185
late_treat	-529.2016	2647.427	-0.20	0.842	-5834.764	4776.361
not_yet_tr~t	794.9548	1693.421	0.47	0.641	-2598.736	4188.646
_cons	4688.869	3078.898	1.52	0.134	-1481.381	10859.12
sigma_u	7383.5262					
sigma_e	29629.426					
rho	.05846775	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

The third outcome variable (Y) to analyze for Access to Credit is Amount of Credit received in US dollars. The credit received by household members was aggregated to create a household level variable. Figure 15 illustrates the results of the model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator for the outcome variable displays a negative, but statistically insignificant effect on the amount of credit received in US dollars. The only significant estimator belongs to the years of education of the household level. The positive coefficient infers that the mount of credit in US dollars increases with more years of education of the household head.

Table 16. Fixed effect regression for Amount of Credit Received in dollars (2007 – 2009)

```
Fixed-effects (within) regression               Number of obs      =      3179
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0327                         Obs per group: min =        10
       between = 0.6159                                        avg =      56.8
       overall = 0.0649                                        max =       119

                                                F(9,55)            =      2.40
corr(u_i, Xb)  = 0.2408                         Prob > F           =    0.0224

                                    (Std. Err. adjusted for 56 clusters in clust)
```

cr_rec_dol~h	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
hh_size	-34.10347	36.01817	-0.95	0.348	-106.2855	38.07855
sex_head_hh	306.5055	169.1098	1.81	0.075	-32.39814	645.4092
age_head_hh	5.888396	5.145971	1.14	0.257	-4.42436	16.20115
years_ed_h~h	103.216	30.85463	3.35	0.001	41.38195	165.0501
leduc_head~h	34.04735	30.47846	1.12	0.269	-27.03284	95.12755
land_area_hh	7.726818	3.36548	2.30	0.026	.9822452	14.47139
ec11	108.7931	216.9725	0.50	0.618	-326.0294	543.6156
Y2009	-79.58126	178.2932	-0.45	0.657	-436.8889	277.7264
early_treat	-168.3055	233.4026	-0.72	0.474	-636.0547	299.4437
_cons	-630.2147	442.3692	-1.42	0.160	-1516.742	256.3129
sigma_u	1646.4795					
sigma_e	3765.9758					
rho	.16046999	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Analyzing the three periods (See Figure 16), we find no relevant differences with the previous analysis. Only years of education of household head remains statistically significant at the 5% level. The treatment estimators are insignificant.

Table 17. Fixed effect regression for Amount of Credit Received in dollars (2007 – 2011)

```
Fixed-effects (within) regression               Number of obs      =      4754
Group variable: clust                           Number of groups   =        56

R-sq:  within  = 0.0261                         Obs per group: min =        15
       between = 0.6030                                        avg =      84.9
       overall = 0.0517                                        max =       178

                                                F(13,55)           =      4.04
corr(u_i, Xb)  = 0.2305                         Prob > F           =    0.0001

                                    (Std. Err. adjusted for 56 clusters in clust)
```

cr_rec_dol~h	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex_head_hh	187.3845	182.5393	1.03	0.309	-178.4323	553.2014
age_head_hh	5.278432	4.769995	1.11	0.273	-4.280852	14.83772
years_ed_h~h	81.98202	26.24079	3.12	0.003	29.39431	134.5697
hh_size	-24.18449	23.07782	-1.05	0.299	-70.43347	22.0645
land_area_hh	8.387442	3.794031	2.21	0.031	.7840342	15.99085
ec11	80.71352	291.9075	0.28	0.783	-504.2822	665.7093
lc11	-103.6318	254.5418	-0.41	0.685	-613.745	406.4814
Y2009	-144.3069	300.985	-0.48	0.634	-747.4944	458.8806
Y2011	-88.80972	268.5126	-0.33	0.742	-626.9209	449.3015
early_treat	-91.95711	336.1391	-0.27	0.785	-765.5949	581.6807
extended_t~t	-109.3326	360.905	-0.30	0.763	-832.6024	613.9372
late_treat	29.7566	289.9362	0.10	0.919	-551.2886	610.8018
not_yet_tr~t	144.6681	336.18	0.43	0.669	-529.0518	818.3879
_cons	-369.6685	326.2642	-1.13	0.262	-1023.517	284.1796
sigma_u	1326.2299					
sigma_e	3788.8258					
rho	.10915206	(fraction of variance due to u_i)				

Source: Author's own calculations based on Carter et. al. (2012)'s data set

The fourth and last outcome variable (Y) in the analysis of Access to Credit is whether Farmers received credits equal or lower than the ones they requested. Given that the object of study is a binary variable, a logit model is utilized maintaining household fixed effects. It is important to mention that households with more than one credit received in which there was at least one credit lower than the one requested were taken as a lower value for the entire household. Figure 17 illustrates the results of the model between the first half of the program period - 2007 and 2009, where early_treat reveals the treatment estimator. The estimator for the outcome variable displays a negative, but statistically insignificant effect on the odds of farmers receiving equal credits to the ones they requested. Other control variables' coefficients are also insignificant at the 5% level.

Table 18. Fixed effect regression for Odds of receiving credit equal or lower than requested (2007 – 2009)

Conditional (fixed-effects) logistic regression — Number of obs = 1328; LR chi2(9) = 14.58; Prob > chi2 = 0.1030; Log likelihood = -447.69323; Pseudo R2 = 0.0160

am_rec_ir_~h	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
hh_size	.9431917	.0333918	-1.65	0.099	.879964	1.010962
sex_head_hh	.9634411	.2720921	-0.13	0.895	.5539001	1.675788
age_head_hh	1.008075	.0076858	1.05	0.291	.993123	1.023252
years_ed_h~h	.9788675	.0259596	-0.81	0.421	.9292873	1.031093
leduc_head~h	.9898571	.0453423	-0.22	0.824	.9048605	1.082838
land_area_hh	1.001306	.0015228	0.86	0.391	.9983263	1.004296
ec11	1.021745	.231176	0.10	0.924	.6557721	1.59196
Y2009	1.725752	.3585216	2.63	0.009	1.148531	2.593068
early_treat	.7547113	.2546947	-0.83	0.404	.3895142	1.462306

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Analyzing the three periods (See Figure 18) we find no relevant difference with the previous analysis. The treatment estimators remain statistically insignificant as well as the coefficients for the control variables.

Table 19. Fixed effect regression for Odds of receiving credit equal or lower than requested (2007 – 2011)

Conditional (fixed-effects) logistic regression — Number of obs = 1328; LR chi2(10) = 16.29; Prob > chi2 = 0.0917; Log likelihood = -446.84197; Pseudo R2 = 0.0179

am_rec_ir_~h	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex_head_hh	.9659497	.2732012	-0.12	0.903	.554891	1.681517
age_head_hh	1.007979	.0076637	1.05	0.296	.9930702	1.023113
years_ed_h~h	.9763359	.0200513	-1.17	0.244	.9378165	1.016437
hh_size	.9413123	.033283	-1.71	0.087	.8782879	1.008859
land_area_hh	1.001329	.0014984	0.89	0.375	.9983965	1.00427
ec11	1.081544	.2752634	0.31	0.758	.656758	1.781079
lc11	1.197502	.3369647	0.64	0.522	.6898533	2.078718
Y2009	1.498829	.4364322	1.39	0.165	.8470271	2.652203
early_treat	.8666581	.3422221	-0.36	0.717	.3996954	1.879172
not_yet_tr~t	1.295132	.5363132	0.62	0.532	.5752171	2.916057

Source: Author's own calculations based on Carter et. al. (2012)'s data set

Further models were run including using solely the combined treatment variables for long and short_treat as well as OLS with similar results.

4.5 Analysis of Econometric Results

The analysis of the data indicates that there is no relevant change in the structure of expenses of the RBD program beneficiaries between 2007 and 2011. Furthermore the increase in income in targeted activities identified by Carter et. al. (2012) does not seem to increase any category of consumption in particular. Expenditures in education and health, which are conceived as developmental, do not experience significant impact. This may imply that changes in structural expenditure require longer periods to manifest. This result is consistent with the findings of Carter et al. (2012). In addition, changes in school attendance and expenses in health do not appear in any way to be **directly** associated with the treatment by the Rural Business Development Program. In fact, the probability of a child from a farmer household attending school seems to be more determined by the household size, which reduces the probability of attending school; and years of education of the household head, which increases the probability of attending school with every additional year of education. Furthermore, there is no evidence of **direct** causal relationship between RBD and greater access to credit for farmers, as well as higher amounts of credit. There is also no evidence of farmers getting more credits that are equal to what they requested that can be explained by the **direct** incidence of the RBD program. Access to credit seems to be mostly associated with age and years of education of the household head. With every additional year of life and year of education, the probability of accessing credit increases. Most importantly, male household heads hold a significant advantage over female household heads with regards to access to credit. Male farmers have almost 40% more chances of accessing credit than female farmers. This evidence places an argument against the recent announcement of the placement of Nicaragua among the ten countries with the highest rankings in gender equality (Global Gender Gap, 2013).

It is relevant to mention the limitations of the econometric analysis. It does not take into account the individual duration of treatment and assumes all farmers completed two years, hence no continuous treatment estimates are calculated. In addition, it does not take into account heterogeneity, assuming that treatment effect is equal for all participants. Furthermore, the household as unit of analysis does not provide information about intra-household details. Last but not least, more analysis is needed in order to confirm external validity and determine the implications of the results over other RBD programs.

Chapter 5 Concluding Remarks

Agriculture and livestock are predominantly the activities performed by the poor in rural areas. It is estimated that 47% of the world's population lives in rural areas with agro-livestock as their main source of income and employment. Although, the sector has traditionally been considered as "backwards" for development, or a stage which individuals need to overcome on their way towards development a great portion of extreme poor continue to survive through this activities. Hence, rural development must be a cornerstone of any integrated development effort.

The objective of this paper has been to answer the question of the extent in which Rural Business Development has an impact on multidimensional well-being. In order to do so, the conceptual basis of poverty and well-being was analyzed and discussed as well as the shift in the paradigms that have shaped the understandings of development in the last few years. In this context, while conventional approaches to economics have interpreted poverty and well-being as analogue to income, the Capability Approach understands poverty as a denial of opportunities and choices, and well-being as expansion of freedoms. The latter approach challenges conventional approaches in that it does not assume an automatic translation of income into well-being, although it recognizes income as a significant part of development. It also advocates for a change in the very epistemology of conceiving income as a means to obtain capabilities and functionings instead of a final purpose. Education and health and access to credit are thus seen as social opportunities with instrumental and empowering tools that are able to widen the range of options and opportunities people have to choose the type of lives they value and desire to live.

It is argued herein, that despite the significant progress in the theorization and applicability of multidimensional measures of poverty and well-being and the acceptance of these by many development organizations as alternative methods of measurements, income-based approaches continue to set the framework for economic policy. Such is the case of many development organizations implementing Rural Development Programs in Nicaragua, which rely on income and consumption-based analysis as their sole method of evaluating programs.

Building on the theory of Rural Business Development and Multidimensional measures of well-being and with the aims of contributing to the general debate, a case of Rural Business Development was analyzed and discussed. The program, which was implemented in the departments of Leon and Chinandega by the Millennium Challenge Account between 2007 and 2011, worked with 8,500 small farmers with the objective of increasing their incomes and economic well-being, by boosting productivity through the use of better technologies. An impact evaluation prepared by the Research Center of the University of California, Davis, indicated heterogeneous increases in income of up to 30% in target activities as well as increase in mobile to some extent fixed capital. With the aims of expanding the understanding of the program impact, econometric techniques were applied to the 1,600 farmer sample to identify significant differences between treated and non-treated groups for variables of Edu-

cation (school attendance), Health (expenditures) and Credit (Whether they received, amount, whether it was higher or lower than the requested).

The results of the analysis indicate that changes in the education, health and credit variables cannot be attributed to the RBD program directly and these are more impacted by other factors such as characteristics of the household head. Therefore we cannot conclude that RBD affect the multidimensional well-being of small farmers. Furthermore, there does not seem to be significant changes in the expense structure of farmer households towards health and education, for which we conclude they did not display a developmental characteristic over the period of treatment.

Despite the lack of evidence found about the impact of RBD program on measures of multidimensional well-being, based on the analysis made in Chapter 2 and 3, I argue that income is still a not good enough proxy to understand development and other indicators should be included in program evaluation.

The econometric procedures do not necessarily put into argument the efficiency of RBD programs in changing family's multidimensional well-being status in a multidimensional way. It merely suggests that the programs may not be **directly** affecting other dimensions of well-being. There might also be the case that the period of time analyzed is not long enough to show conclusive causal inference between the RBD program and the outcome variables.

The evidence supports the argument that the real impacts on the multidimensional well-being of farmers indeed occur through the vehicle of increased income, although further analysis is needed to establish a causal relationship. This does not necessarily entail that impact evaluation should be limited to strictly monetary measurements of outcomes. Analysis gathered by Fakuda-Parr (2003), Deneulin-Shahani (2009) and McGillivray and Clarke (2006) among others as well as the increasing incorporation of multidimensional measures and analysis in the agenda of international policy-setters, indicates that income-based approaches are not capturing the multifaceted nature of human poverty and well-being.

Although multidimensional poverty and well-being is still a recent and experimental field and the methods of measure still many challenges to application, there are plenty of examples found in literature of appropriate measurements utilized as an effort to grasp more and more aspects of poverty and well-being, including the HD indexes and reports, Alkire's counting method (Alkire and Foster, 2008) and the methods designed by academic institutions presented in the HDCA (2013). Hence, despite the fact that income-based approach continues to set the framework for economic policy, it does not mean that multidimensional approaches should be dropped. On the contrary, these alternative measures that attempt to provide a bigger portion of the well-being picture, should be encouraged for further development.

References

Alkire, S. 2007, "Choosing dimensions: The capability approach and multidimensional poverty", *Chronic Poverty Research Centre Working Paper,* , no. 88.

Alkire, S. & Foster, J. 2011, "Counting and multidimensional poverty measurement", *Journal of Public Economics,* vol. 95, no. 7, pp. 476-487.

Altenburg, T. 2007, *Donor approaches to supporting pro-poor value chains,* Donor committee for enterprise development.

*ASSESSING THE EFFECTIVENESS OF ECONOMIC GROWTH PROGRAMS*may 2010-last update [Homepage of United States Agency for International Development], [Online]. Available: http://www.microlinks.org/sites/microlinks/files/resource/files/Effectiveness_of_EG_Programs.pdf [2013]

Avendano, N. 18 october 2011-last update*, Presupuesto 2012, más de lo mismo*. Available: http://nestoravendano.wordpress.com/2011/10/18/presupuesto-2012-mas-de-lo-mismo/ [2013, 10/28].

Bernal, R. & Peña, X. 2011, *Guía práctica para la evaluación de impacto,* Universidad de los Andes, Facultad de Economía, Centro de Estudios sobre Desarrollo Económico.

Bourguignon, F. 2002, "The growth elasticity of poverty reduction: explaining heterogeneity across countries and time periods", *Inequality and Growth: Theory and Policy Implications.TS Eicher and SJ Turnovsky, eds,* , pp. 1-26.

Bourguignon, F. 2002, "The growth elasticity of poverty reduction: explaining heterogeneity across countries and time periods", *Inequality and Growth: Theory and Policy Implications.TS Eicher and SJ Turnovsky, eds,* , pp. 1-26.

Campbell, R. 10 july 2013-last update*, Feed the Future Learning Agenda Literature Review: Expanded Markets, Value Chains and Increased Investment* [Homepage of USAID/BFS], [Online]. Available: http://agrilinks.org/sites/default/files/resource/files/FTF%20FEEDBACK%20Value%20Chains%20Theme%20Lit%20Review_Jul1_2013%20(1).pdf [2013, 10/19].

Carter, M.R., Toledo, P. & Tjernström, E. 2012, "The Impact of Rural Business Services on the Economic Well-being of Small Farmers in Nicaragua", .

Carter, M.R., Toledo, P. & Tjernström, E. 2012, "Investing in Small-Farm Productivity: Impact Dynamics and Heterogeneity in Nicaragua", .

Chen, S. & Ravallion, M. 2008, "The developing world is poorer than we thought, but no less successful in the fight against poverty", *World Bank Policy Research Working Paper Series, Vol,* .

Comim, F., Qizilbash, M. & Alkire, S. 2008, *The capability approach: concepts, measures and applications,* Cambridge University Press.

*Cooperation strategy*April 2006-last update [Homepage of Organization mundial de la salud], [Online]. Available:

http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_nic_es.pdf [2013, 10/08].

Copestake, J.G. & Copestake, J.G. 2008, *Wellbeing and development in Peru: local and universal views confronted,* Palgrave Macmillan New York.

Cornia, G.A. 2010, "Income distribution under Latin America's new left regimes", *Journal of Human Development and Capabilities,* vol. 11, no. 1, pp. 85-114.

Datt, G. & Ravallion, M. 1992, "Growth and redistribution components of changes in poverty measures: A decomposition with applications to Brazil and India in the 1980s", *Journal of Development Economics,* vol. 38, no. 2, pp. 275-295.

Defining the Rural Population [Homepage of Health Resources and Services Administration], [Online]. Available: http://www.hrsa.gov/ruralhealth/policy/definition_of_rural.html [2013, 10/12].

Deneulin, S. & Shahani, L. 2009, *An introduction to the human development and capability approach: Freedom and agency,* Earthscan.

Diagne, A. 2001, *Access to credit and its impact on welfare in Malawi,* Free downloads from IFPRI.

Donovan, J. & Poole, N. 2013, "Asset building in response to value chain development: lessons from taro producers in Nicaragua", *International Journal of Agricultural Sustainability,* vol. 11, no. 1, pp. 23-37.

*EE.UU. destaca avances de Nicaragua en salud*30 august 2013-last update [Homepage of elnuevodiario], [Online]. Available: http://www.elnuevodiario.com.ni/nacionales/295578-eeuu-destaca-avances-de-nicaragua-salud [2013, 10/17].

*EXPORTACIONES AUTORIZADAS DE LOS 20 PRINCIPALES PRODUCTOS*December 2011 - 2012-last update [Homepage of CENTRO DE TRAMITES DE LAS EXPORTACIONES], [Online]. Available: http://cetrex.gob.ni/website/servicios/princprodu12.html [2013, 10/27].

Foley, D. "Chapter 2: Welfare, money, and market failure "

Foster, J., Greer, J. & Thorbecke, E. 2010, "The Foster–Greer–Thorbecke (FGT) poverty measures: 25 years later", *The Journal of Economic Inequality,* vol. 8, no. 4, pp. 491-524.

Foster, J. & Handy, C. 2008, "External capabilities", *OPHI Working Papers,* .

Frey, B.S. & Stutzer, A. 2010, *Happiness and economics: How the economy and institutions affect human well-being,* Princeton University Press.

Fukuda-Parr, S. & Kumar, A.S. 2003, *Readings in Human Development: Concepts, measures and policies for a development paradigm,* Oxford University Press, USA.

Gereffi, G. 2013, "Global value chains in a post-Washington Consensus world", *Review of International Political Economy,* , no. ahead-of-print, pp. 1-29.

Gereffi, G. & Fernandez-Stark, K. 2011, "Global value chain analysis: a primer", *Center on Globalization, Governance & Competitiveness, Durham, NC,* .

Gibbon, P., Bair, J. & Ponte, S. 2008, "Governing global value chains: an introduction", *Economy and Society,* vol. 37, no. 3, pp. 315-338.

Grigsby, C. 2012, *la educacion rural en nicaragua*, IEEPP.

Grusky, D.B., Kanbur, S.R. & Sen, A.K. 2006, *Poverty and inequality,* Stanford University Press.

Helmsing, A. & Vellema, S. 2011, *Value Chains, Social Inclusion and Economic Development: Contrasting Theories and Realities,* Routledge.

Humphrey, J. & Navas-Alemán, L. 2010, "Value chains, donor interventions and poverty reduction: A review of donor practice", *IDS Research Reports,* vol. 2010, no. 63, pp. 1-106.

*Impact Evaluation in Practice*2011, [Homepage of World bank], [Online]. Available: http://siteresources.worldbank.org/EXTHDOFFICE/Resources/5485726-1295455628620/Impact_Evaluation_in_Practice.pdf [2013, 11/02].

*Informe de comercio Exterior enero*2012, , Direccion general de comercio exterior, ministerio de fomento, industria y comercio.

*Informe Nacional de Desarrollo Humano 2011: las juventudes construyendo Nicaragua*7 december 2011-last update [Homepage of Programa de las Naciones Unidas para el Desarrollo], [Online]. Available: http://www.undp.org/content/undp/es/home/presscenter/articles/2011/12/07/-informe-nacional-de-desarrollo-humano-2011-las-juventudes-construyendo-nicaragua-/ [2013, 10,24].

INIDE, M. 2012, *IV Censo Nacional agropecuario (CENAGRO)*

*INVERSION DE DESARROLLO INTEGRAL PARA LA PRODUCCION DE LECHE EN POLVO DE ALCANCE REGIONAL*october 2008-last update [Homepage of MINISTERIO AGROPECUARIO Y FORESTAL DE NICARAGUA], [Online]. Available: http://www.magfor.gob.ni/prorural/programasnacionales/perfilessub/plantalactea.pdf [2013, 11/02].

Jayne, T.S. & Boughton, D. 2011, *What Kind of Agricultural Strategies Lead to Broad-Based Growth: Implications For Country-Led Agricultural Investment Programs,* .

Kakwani, N. & Silber, J. 2007, *The many dimensions of poverty,* Palgrave Macmillan.

Kanbur, R. 2001, "Economic policy, distribution and poverty: the nature of disagreements", *World Development,* vol. 29, no. 6, pp. 1083-1094.

Kula, O., Downing, J. & Field, M. 2006, "Value chain programmes to integrate competitiveness, economic growth and poverty reduction", *Small Enterprise Development,* vol. 17, no. 2, pp. 23-35.

*LA EDUCACIÓN RURAL NICARAGÜENSE*August 2008-last update [Homepage of Grupo de Trabajo del Centro de Investigación y Acción Educativa y Social (CIASES)], [Online]. Available: http://biblioteca.clacso.edu.ar/Nicaragua/ciases/20120729082127/016.pdf [2013, 10/24].

Lustig, N. 2010, *Declining inequality in Latin America: a decade of progress?* Brookings Institution Press.

Malarin, H. 2012, *NICARAGUA: HACIA UNA AGRICULTURA MÁS INCLUSIVA Y COMPETITIVA*, Banco Interamericano de Desarrollo.

*MCC Successfully Completes Projects to Reduce Poverty and Promote Economic Growth in Nicaragua*26 may 2011-last update [Homepage of Millenium challenge corporation], [Online]. Available: http://www.mcc.gov/pages/press/release/mcc-successfully-completes-projects-to-reduce-poverty-and-promote-economic- [2013, 09/28].

McGillivray, M. & Clarke, M. 2006, *Understanding human well-being,* United Nations University Press Tokyo.

Mitchell, J., Coles, C. & Keane, J. 2009, *Upgrading along value chains: strategies for poverty reduction in Latin America,* Overseas development institute (ODI).

*Nicaragua country indicators*2011-2012, [Homepage of WORLD ECONOMIC FORUM], [Online]. Available: http://www3.weforum.org/docs/GCR2011-12/CountryProfiles/Nicaragua.pdf [2013, 11/03].

*Nicaragua's human development improving but got a ways to go*8 may 2013-last update [Homepage of The Nicaragua Dispatch], [Online]. Available: http://www.nicaraguadispatch.com/news/2013/05/nicaraguas-human-development-improving-but-got-a-ways-to-go/7535 [2013, 11/06].

*Plan Nacional de Desarrollo humano*2012-2016, [Homepage of gobierno de reconciliacion y unidad national], [Online]. Available: http://www.pndh.gob.ni/documentos/pndhActualizado/pndh.pdf [2013, 09/25].

*PLAN SECTORIAL PRORURAL Incluyente 2010-2014*2009, MAGFOR.

Policy – A Multidimensional Approach [Homepage of Oxford Poverty & Human Development Initiative], [Online]. Available: http://www.ophi.org.uk/policy/multidimensional-poverty-index/ [2013, 10/05].

*Presupuesto 2013 prioriza gasto social*16 october 2012-last update [Homepage of elnuevodiario], [Online]. Available: http://www.elnuevodiario.com.ni/nacionales/266655-presupuesto-2013-prioriza-gasto-social [2013, 11/01].

PROPUESTA DE PLAN NACIONAL DE DESARROLLO, Gobierno bolaños (2005).

Pritchett, L. & Sandefur, J. 2013, *Context Matters for Size: Why External Validity Claims and Development Practice Don,* .

Pritchett, L., Samji, S. & Hammer, J. 2013, "It's All About Mee: Using Structured Experiential Learning ("E") to Crawl the Design Space", *Center for Global Development Working Paper,* , no. 322.

Przeworski, A. 2000, *Democracy and development: political institutions and well-being in the world, 1950-1990,* Cambridge University Press.

Ravallion, M. & Chen, S. 2003, "Measuring pro-poor growth", *Economics letters,* vol. 78, no. 1, pp. 93-99.

Rostow, W.W. 1990, *The stages of economic growth: A non-communist manifesto,* Cambridge University Press.

Rural poverty in Nicaragua [Homepage of International Fund for Agricultural Development], [Online]. Available: http://www.ruralpovertyportal.org/country/home/tags/nicaragua [2013, 11/02].

Sen, A. 1999, *Development as freedom,* Oxford University Press.

Smith, J.F., Gutiérrez, V., Flores, S. & Artola, N. 2004, "LAS CADENAS DE VALOR EN NICARAGUA: QUEQUISQUE, FORESTAL Y LÁCTEOS TRES ESTUDIOS DE CASO", .

Social Affairs. Office of ECOSOC Support & Social Council 2004, *An Integrated Approach to Rural Development: Dialogues at the Economic and Social Council,* United Nations Publications.

*Statistics of Nicaragua*12 december 2012-last update [Homepage of Central American Bank for Economic Integration], [Online]. Available: http://www.bcie.org/uploaded/content/article/1249943988.pdf [2013, 10/08].

The Capabilities Approach and Violence Against Women [Homepage of Sage], [Online]. Available: http://www.sagepub.com/upm-data/40604_2.pdf [2013, 10/23].

Thorbecke, E. 2005, "Multidimensional poverty: Conceptual and measurement issues", *international conference on "The Many Dimensions of Poverty," Brasilia, August*, pp. 29.

*USDA Rural Development*11 august 2013-last update [Homepage of United states department of agriculture], [Online]. Available: http://www.rurdev.usda.gov/Business.html [2013, 10/30].

Van Dijk, M.P. & Trienekens, J.H. 2012, *Global value chains: linking local producers from developing countries to international markets,* Amsterdam University Press.

White, H. & Lu, X. 2010, "Robustness checks and robustness tests in applied economics", *V UCSD Department of Economics Discussion Paper,* .

World bank 2013, *Economy profil: Nicaragua* [Homepage of Doingbusiness], [Online]. Available: http://www.doingbusiness.org/~/media/giawb/doing%20business/documents/profiles/country/NIC.pdf [2013, 11/05].