

**Comparing welfare levels in the Fairtrade banana sector:
Smallholders versus workers of smallholders and large growers**



Thesis
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This thesis looks at the material welfare levels of smallholders, their employees and the employees of large plantations in the Fairtrade export banana sector in Ecuador. A questionnaire has been developed and used in El Oro province in Ecuador to gather data of 148 workers and smallholders. The data have been analysed and some interesting conclusion were found.

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Chapter 1 Introduction

For a long time, smallholder agriculture has been seen as the way forward for poverty reduction and agricultural growth in developing countries. Much of these ideas stem from research by T.W. Schultz in the 1960s with the conclusion that smallholders are "poor but efficient" (Schultz & others, 1964). As a consequence, NGOs developed numerous programs around small farmers to stimulate their activities and promote their work and products in the developed world. A well-known initiative in this field is the development and establishment of the Fairtrade label and movement. Its focus is on creating a sustainable position for smallholders in the value chain of many agricultural products originating in the developing world. Certification institutes like Max Havelaar and Rainforest Alliance have originated and have since focused on the existence and protection of smallholders. This with the end goal in mind: a better world for those in developing countries. However, a recent body of empirical research suggests that smallholders are, in comparison with large farmers, not that efficient at all (Collier & Dercon, 2014) and that the continued focus on smallholders might have the opposite effect. Instead of elevating people out of poverty, focus on and the support of smallholders might slow the growth of developing countries and keep small farmers and people working on these small farms poor.

Since the amount of research comparing smallholders in the agricultural sector with larger production systems is still quite limited, the purpose of this study is to contribute to this area of interest. The study will examine and compare the welfare levels of smallholders, their workers and the workers of larger growers. This will be done by setting up and carrying out a survey among producers in the banana sector in Ecuador. The country of Ecuador is the biggest banana exporter in the world and a substantial part of the production is Fairtrade certified. The research will take place among Fairtrade certified smallholders and Fairtrade certified larger growers.

The research question of this thesis is:

To what extent does being a smallholder improve welfare levels as compared to their workers and employees of larger growers, in the Fairtrade banana sector in Ecuador?

The next section of this thesis will zoom in on the concepts of smallholders and larger growers. When do we talk about smallholders and when do we talk about larger growers? What are the typicality's and when does a smallholder become a larger grower? Also, we will look at the concept of Fairtrade and what the influence of the Fairtrade certification is on the smallholder and larger growers.

In chapter 3, we will define the welfare concept and the research methodology. What do we exactly mean by welfare levels and how can we measure these? A detailed questionnaire will be an important element of how we are going to measure welfare.

Having defined welfare, we will then present the research methodology. The hypothesis to be tested (H_0 hypothesis) is that there will be no difference in welfare levels of smallholders, workers of plantations and workers of smallholders. And subsequently the alternative hypothesis is that the H_0 is not true and that there are significant differences. The results of the questionnaires will be quantified according to the welfare concepts having been defined in chapter 3. These results will be analysed using STATA in order to be able to test the H_0 hypothesis.

Chapter 4 will present the results of the research and the thesis will end with concluding remarks in the last chapter.

Chapter 2 Concept of smallholders, larger growers and Fairtrade

2.1 Introduction

This chapter will try to establish a description of a typical smallholder. When is a farmer a smallholder and when is a farmer a larger grower. Can we define the characteristics for these groups and establish objective boundaries for where the smallholder ends and where the farmer becomes a larger grower? In literature, it is very hard to find definitions of these two groups, also because there seems to be a big area of overlap. One study about smallholders and contract farming (Key and Runsten, 1999), concludes with listing advantages of both groups: “smallholders have access to “cheap” family labour, and to the extent that the smallholders cultivate the crops themselves, their labour is self-supervising. On the other hand, larger and wealthier growers have better access to often-subsidized formal sector credit and insurance, they are better able to self-insure, and they can take advantage of economies of scale in production.” In this chapter, we will see more of these variables typical for smallholders on the one hand and larger growers on the other hand. These variables can be used for trying to set up a distinction between the two groups but in practice this will be difficult, also because the “distinction line” between the two groups is not the same looking at different product categories (e.g. bananas versus coffee versus palm oil), but also differs between the regions (e.g. Sub Saharan Africa versus Latin America). The chapter also zooms in on the concept of Fairtrade. This concept is found to be relevant for this study in two ways. First of all, we will see that the concept of Fairtrade is a direct result of the lingering welfare levels of smallholders in the Mexican coffee sector. Smallholders asked for fair prices for their products and the Fairtrade movement was set up to help smallholders raise their standard of living and, among many other measures, give the smallholder better access to commercial markets. The second reason for this chapter to elaborate on the topic of Fairtrade is the fact that this research is focused on the difference in welfare levels between Fairtrade certified smallholders and Fairtrade certified larger growers in the Ecuadorian banana production sector. The last reason to look into the concept of Fairtrade is the fact that the research presented in this thesis has been done among Fairtrade certified smallholders and plantations.

2.2 Smallholders and larger growers

In 1993 Robert M. C. Netting published his book about smallholders, householders and farm families (Netting; 1993). He characterizes smallholders as “rural cultivators practicing intensive, permanent, diversified agriculture on relatively small farms in areas of dense

population.” The family household is an important element of the smallholder’s concept. The family household is crucial in mobilizing agricultural labour, managing productive resources and organizing consumption. Another important element is the fact that the smallholder has ownership or well-defined tenure rights in land that are often long-term and heritable. Fertilization, irrigation, drainage, terracing, animal husbandry, crop diversification and rotation, everything is being supplied by the family household. According to Netting smallholders practice intensive agriculture with relatively high yields from permanent fields that are seldom rested. His opinion is a reminder of the famous quote of T.W. Schultz: “there are comparatively few inefficiencies in the allocation of factors of production in traditional agriculture” (Schultz, 1964, p 37).

In 1992 the Food and Agriculture Organization (FAO) published a study about the impact of structural adjustment programs on smallholders (Boussard, 1992). The paper starts by stating the difficulties in making a statistical definition of smallholders. Cultural differences lead to different definitions of small farmers in terms of size of their land holdings. Boussard makes a broad distinction between developed countries and developing countries. For the purpose of this thesis, literature research will be focused on smallholders in developing countries. The size of the cultivated land is an important factor but this size should be related to the type of produce. Growing vegetables is quite different from growing cereals and one can imagine that a 5-acre vegetable farmer is bigger than a 10-acre cereal farmer from an economic point of view. Boussard suggests it might be better to focus on certain common features smallholders might have instead of a statistical definition. Most smallholders have no or very little capital and the way they produce is mainly a mere combination of land and labour, in some studies described as “traditional agriculture”. Labour productivity of the smallholder in general is low and since most of their incomes are derived from the rewards of labour, incomes are low. This consequential relation between labour productivity and income is both the cause and the consequence of poverty. Land productivity is also low, as shown by low yields, and for the same reason: the low yields of smallholders are a consequence of their lack of capital. Interesting enough though, the little capital the smallholder does have is very productive. Boussard states that budget calculations show the high profitability of simple tools such as spades, or bicycle wheels, or even donkeys or buffaloes.

Another important common element for smallholders is their ample access to markets (Barrett et al., 2012). As Barrett explains this is typical for smallholders in low-income rural areas. Market access in general, but more important low-cost access to competitive well-functioning markets requires a basic institutional and physical infrastructure. And if this infrastructure is not there, the local government often lacks incentives to improve the situation because the smallholders in those areas do not contribute to tax revenues. So why invest in them? And since there is no investment in establishing market access for the

smallholder they will stay poor and will not pay taxes, hence, as Barrett calls it, the semi-subsistence poverty trap. The conditions of poor roads and telecommunications is one of the base elements in the ample functioning markets. The markets for outputs, but also agricultural inputs and finance are relatively “thin”. Although sometimes large number of people trade on these markets, the volumes are very small and prone to large seasonal variability in demand and supply (Poulton, Kydd & Dorward 2006).

For long there has been a discussion about the productivity and efficiency of the smallholder. The “inverse relationship” launched in 1926 by Chayanov, has since long been a dominant factor in the debate. Chayanov noted this inverse relationship during the reign of Lenin when he saw low productivity on very large Russian state farms compared to the smaller *kaluks*, privately owned smaller, but not very small, farms. Since this observation the inverse size-productivity relationship has been established in India by Sen (1962) where the small Indian household farms were more productive than the bigger farms. And since those early days also in Africa, Asia, Europe and Latin America the inverse relationship has been noted. This inverse relationship is in contradictory to general economic theories, which hold that productivity should be equal across producers, because otherwise producers with low productivity will sell or lease their land to producers with high productivity (Barret, Bellemere & Hou, 2009). In Zambia research showed monotonic positive relationship between the yield of maize and the plot size, indicating clear economies of scale effects. However, when corrected for the endogeneity of the plot size, the inverse relationship seems to dominate the economies of scale in all plot sizes up to 3 ha (Kimhi, 2005).

Recent research has shown though that the supposed higher productivity of smallholders compared to large scale production might have been the result of incorrect research methods (Collier & Dercon, 2014). Smallholders are probably not more efficient than larger producers, but are reasonably efficient in what they do, looking at the constraints they face. Collier and Dercon (2014) conclude that smallholders in general share three distinctive types of constraints. The first one is difficulties in adoption and efficient use of new technologies. Having access to technology is not always the problem, but skills to use this new technology in the right way, are lacking with most smallholders. Secondly, smallholders have, compared to larger farmers, a less favourable position in terms of finance. Their access to the capital market, for securing credit, is not very good. In poor agrarian societies, the right (amount) collateral is an important factor in acting in the capital market. Obviously, this is a setback for smallholders but also the fact that smallholders are being less well-organized is an important factor. Larger, commercial farms have a well-organized financial department which makes it possible to present the right documents in the process of securing working capital. Equity, bonds and bank loans can only be raised when presenting audited profits and asset valuations (Eswaran & Kotwal, 1986). Another

important element is poor money transmissions making both investments more difficult as market transactions (Poulton, Kydd & Dorward, 2006). Collier and Dercon continue their listing of shared smallholder characteristics by elaborating further on the element of organization. Larger growers in general enjoy scale of economies in production, but, at least as important, also in trading, marketing and storage. Markets with mainly smallholders in general have much higher transaction costs and one of the result is that in many countries in the developing world a variety of donor-supported interventions take place to offset these inefficiencies.

A research team from the Central American Institute for Studies on Toxic Substances (Universidad Nacional, Heredia, Costa Rica) and the Technology and Agrarian Development Group of the Wageningen University came up with specific example of difference in knowledge between larger growers and smallholders. Extra relevant for this study since the research took place in the banana (and plantain) producing sector in Costa Rica. The focus of the research was the use of pesticides in this sector and the amount of knowledge being present about this. They researched large plantations and smallholders, this last group many times being indigenous people. “Compared to formalized practices on transnational company plantations, where workers reported to feel protected, pesticide handling by plantain smallholders was not perceived as hazardous and therefore no safety precautions were applied” (Barraza, Jansen, Van Wendel de Joode, Wesseling, 2011). Smallholder status is connected here to knowledge about production technologies and in this case possible health issues.

Working together in farmer groups can be an important strategy for smallholders to respond to the rapidly changing environments. (Fisher, Qaim, 2014). Especially where it concerns market access and knowledge sharing. The research of Fisher & Qaim was focused on smallholder banana farmer groups in Kenya. The groups were established with support from international NGOs and one of their conclusions was that medium-sized growers expect larger benefits from intensive participation. Also, they concluded that farmers who are more specialized in banana production participate more intensively in collective marketing than farmers who are highly diversified. Smallholder farmers in Africa are often highly diversified (Chavas and Di Falco, 2012) and in those cases, it is less likely that smallholder groups lead to clear advantages in terms of market participation. This is different for bananas and other food crops that are widely traded in local markets. Contract farming can offer benefits for smallholders as long as they are not excluded from contracting. Benefits include access to new markets, technical assistance, specialized inputs and financial resources (Key & Runsten, 1999). Some researchers even suggest to reorganize the large growers or plantations into a more decentralized system such as the above-mentioned contract farming. This can mean that the land is being distributed among smaller growers and a centralized agribusiness enterprise manages the processing/marketing process (Hayami, 2010)

2.3 Producers in the Ecuadorian banana sector

Since this paper is focused on smallholders and large producers in the Ecuadorian banana sector it's good to zoom in this specific sector. In 2002 Hellin en Higman researched both the export coffee and the export banana sector in Ecuador (Hellin and Higman, 2002). Ecuador is discussed extensively as being the world's largest exporter of bananas. In 2002 more than four million metric tons were exported from 150,000 hectares of plantations. This production was the result of the activities of 5,200 independent producers. Around 240 of them were larger producers and about 60% were smallholders with fewer than 30 ha of bananas. They could only export their products through a handful of export companies which controlled the trade. These companies were having considerable influence on the prices being paid to the smallholders and as a result a majority of small producers were hardly able to cover their production cost. The advice of the researchers was that smallholders needed to learn new skills and acquire sufficient business acumen in order to benefit from global markets. Examples being mentioned are access to credit, better infrastructure such as packing lines and access to Fairtrade and organic certification schemes.

In 2006 La Cruz writes in the book "Agro-food chains and the Networks for Development" (Ruben et al 2006) about specific challenges for smallholders in the export banana sector in Peru and Ecuador. The smallholder banana producers meet four major constraints to enter the international banana market: quality, logistic, finances and trade regulations. The quality standards are set by large retailers and are difficult to meet by smallholders. Logistics depend on the right vessels on the right place on the right time, something smallholders have no control on. Funding is needed for pre-export operations but smallholders have little access to appropriate credit facilities.

Looking at a 2016 study of the Food and Agriculture Organization of the United Nations we can find more recent figures about the Ecuadorian banana sector (FAO, 2016). The sector is quite important for the economy, with about a tenth of the population economically tied to the production of bananas and affiliated business. Even the smallest farm will hire permanent workers (Roquigny et al., 2008) and the estimated average national number of workers on a banana plantation is 1.1 person per hectare and 1.5 for direct and indirect labour combined. With about 165,000 hectares under banana cultivation in 2012, the direct and indirect labour force working on banana plantations is approximately 250,000 workers. Total export in 2012 was about 6,6 million metric tons, of which about 79% was produced by smallholders on farms smaller than 30 hectares, about 16% on medium sized farms (30-100 ha) and 5% on large farms (bigger than 100 ha). Interesting for our study is that 60 percent of banana farmers operate plantations of less than 10 hectares (average size is 6.8 ha) and 10 percent of all farms cover less than 2 hectares. Even more interesting is to analyse the production per hectare in relation to the

size of the farm. The smallholder's farms (less than 30 ha) produce an average of 28.9 MT/ha, the medium size farms produce on average 38.5 MT per hectare and the larger plantations (over 100 ha) even produce 57.7 MT per hectare. These differences in yield per hectare most likely will have an effect on the income level of the farmer.

Analysing the low average yields of small-scale plantations (smallholder farms) in Ecuador show us these are the result of a lack of investment in improved technologies. One of the reasons for this is the insecure and variable income of many smallholders, due to the fact they sell their products on the spot market and thus are liable to price fluctuations. The smallholders have, in general, a weak position in terms of price bargaining and cannot compete with the bigger and stronger banana export companies.

2.4 Fairtrade

“Fairtrade is a strategy that aims to promote sustainable development and to reduce poverty through fairer trade”. (www.fairtrade.net/standards.html)

In the 1980's Fairtrade movement emerged and developed in rural Mexico. The Dutch worker-priest Frans van der Hoff played a crucial part in the origination of modern day Fairtrade. In 1980 Van der Hoff moved from Mexico City to the Southern State of Oaxaca in Mexico, where he started working as a day labourer on coffee plantations of smallholders for two years. In 1983 he started a farmer's cooperative to tackle two major problems: debt to the banks and the low sales price of the coffee beans. With the help of Dutch interfaith humanitarian development organization Solidaridad, coffee was then directly sold to western customers under the Fairtrade label Max Havelaar. Over the next 20 years Fairtrade gradually evolved and became an interesting option for smallholders in all kinds of cash crops. Coffee and bananas being the most important ones, but also smallholders in cocoa, cotton, nuts and other tropical fruits benefitted (Roozen, 2003).

Several non -profit interest organizations developed to ensure the growth and standards of Fairtrade and in 2001 on a global Fairtrade conference in Arusha this definition was launched:

“Fair Trade is a trading partnership, based on dialogue, transparency and respect, that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers, especially in the South. Fair Trade Organizations (backed by consumers) are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade.” (www.WFTO.com; history of the World Fair Trade Organization).

In the last 20 years the Fairtrade character has been changing by a development, Raynolds calls “mainstreaming Fair Trade”. The historical mission of Fairtrade, the linking of marginalized producers in the global South with progressive consumers in the global North is changing by commercial success of the Fairtrade model (Raynolds, 2008). In 2007 worldwide Fair Trade certified products sales had a volume of over US\$2 billion and represented a minor share of the world market (FLO, 2007). In 2010 shoppers already spend about € 4,36 billion on Fairtrade Products which translates in about € 550 million in revenues for the producers. In that year there were 1.2 million Fairtrade producers in 63 countries worldwide (Report: “Monitoring the scope and benefits of Fairtrade report” third edition, 2011). A few years later, in 2016, worldwide Fairtrade sales already reached almost US\$ 8 billion and are rapidly growing (<https://annualreport16-17.fairtrade.net/en>). An important factor for this is the widely discussed and criticized incorporation of plantation and workers in the Fairtrade labour certification system (Raynolds, 2017). Cooperatives successfully barred plantations from six commodities where large numbers of small producers can meet the Fairtrade demand. This concerned the four original Fairtrade commodities coffee, cacao, sugar and honey as well as rice and cotton, two products introduced in the early 2000s. Although workers lacked the political power to have a lot of influence on the detailed Fairtrade policies, labelling organizations were able to include large growers in other new commodities. This was especially easily accepted in the production of tea and bananas. Here it was most obvious that plantations were needed in satisfying consumer demand and that agricultural workers on these plantations were among the most disadvantaged populations around. As a result, the number of certified banana plantations in Latin America rose significantly over the last decade and has fuelled the question about Fairtrade’s ability to have influence on the power of transnational corporations, the role of trade unions and the implications for labour. One of the most comprehensive studies done on Fairtrade bananas has been done by Henry Frundt. In his book “Fair Bananas” he claims that more and more people now agree that those who grow and pack bananas ought to receive a living wage in a healthy working environment. One may not agree on a precise definition of Fairtrade, let alone the path to get there, but there is a broad consensus among the actors in the banana sector both in the North and in the South that we need a “better banana” (Frundt, 2009). Not everybody agrees on how to get to this better banana though. In the US the debate is still very lively with on one side opponents of expanding the Fairtrade labelling system to larger growers and on the other side advocates stating that growth of the Fairtrade market should be established by an expansion strategy described as “more inclusive for more impact” (Besky, 2015). Opponents emphasize the ethical side of the plantation system which starts with the difference in ownership of the land and the farm. The plantation is owned by one owner representing the 1% wealthy people in the world, while the small farmer co-op is owned by equal owners, representing the 99%. In general, decisions on the plantation are being made autocratic while the co-op is run in a democratic way.

Dilution of the Fairtrade principles is the main topic of an article called “Where now for fair trade” (Doherty et al, 2013). The authors also focus on the difference of the so-called democratic level between a smallholder co-op and a large plantation.

Contrary to cash crops like coffee and cocoa, which are traditional cash crops for small farmers, relatively little work has been done on studying the impact of Fairtrade on (export) banana producers and workers. Notable exceptions are the production function study conducted by (Ruben, Clercx, Cepeda, & de Hoop, 2008) and the study done by the LEI (Van Rijn et al, 2016). These researches find that Fairtrade seems to have a high contribution in terms of economic benefits as a result of the Fairtrade premium. In kind benefits on top of the primary wage and schooling and housing are mentioned. Export bananas are predominantly produced on plantations, but Fairtrade bananas are also produced by a significant number of small producers (van der Waal, 2010). As such, comparing the efficiencies and household income differentials between smallholder and plantation production models for export bananas will be important to judge if a policy focus on smallholders is a sensible strategy and hopefully this study can contribute to this.

Also quite relevant for this study is taking a look at the Fairtrade standards as defined by Fairtrade International. Fairtrade Standards are designed to support the sustainable development of small producer organizations and agricultural workers in the poorest countries in the world and consequently are likely to have influence on the welfare levels of the smallholders and workers in the research.

The following common principles are considered in Fairtrade standards applicable to both small-scale producers and workers and their organizations.

In the area of social development Fairtrade standards require a democratic organizational structure that allows the for small-scale producers to actually bring a product to the market. In hired labour situations the Fairtrade standards require the company to bring social rights and security to its workers. Core elements are: training opportunities, non-discriminatory employment practices, no child labour, no forced labour and sufficient facilities for the workforce to manage the Fairtrade Premium.

In the area of economic development Fairtrade standards require the buyers to pay a Fairtrade Minimum Price and/or a Fairtrade Premium to the producers. The Fairtrade Minimum Price aims to help producers cover the costs of sustainable production. The Fairtrade Premium is money for the producers or for the workers on a plantation to invest in improving the quality of their lives.

On the area of environmental development Fairtrade standards include requirements for environmentally sound agricultural practices. The focus areas are: minimized and safe use of agrochemicals, proper and safe management of waste, maintenance of soil fertility and water resources and no use of genetically modified organisms.

The common principles already touch the topic of the economic situation and thus welfare of both the smallholder as the worker, but mainly through the disposition of the Fairtrade premium. Let's zoom in on the specific standards for both groups. We will start by taking a closer look at the standards for small producer organizations or, in other words, the cooperatives of smallholders (the members).

The purpose of the Fairtrade Standard for Small Producer Organizations is to set the requirements that determine participation in the Fairtrade system.”

<https://www.fairtrade.net/standards/our-standards/small-producer-standards.html>).

The introduction to the standards continues with “*Members must be small-scale producers. The majority of the members of the organization must be smallholders who don't depend on hired workers all the time, but run their farm mainly by using their own and their family's labour. Profits should be equally distributed among the producers. All members have a voice and vote in the decision-making process of the organization*”. Implicitly this means that small producers have to be organized in cooperatives in order to be Fairtrade certified. The specific small producer's standards elaborate a lot on how to organize these cooperatives and how Fairtrade certification takes place, not very relevant for this paper. Interesting though is that the standards also come up with definitions for small producers. These differ depending of the type of crop and for banana producers, these are the guidelines.

- They hire less than a maximum number of permanent workers, as defined and published by Fairtrade International.
- The size of the land they cultivate is equal to or below the average of the region, as defined and published by Fairtrade International. Further research on this shows that for a banana farmer in Ecuador the farm size must be below 10 hectares (https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2017-08-01_SPO_indicator_table_EN.pdf)
- They spend most of their working time doing agricultural work on their farm.
- Most of their income comes from their farm.

Also relevant is that the standards contain a chapter about the working conditions of workers of smallholders being a member of the Fairtrade cooperative. This section intends to ensure good working conditions for workers. Fairtrade International regards the core ILO conventions as the main reference for good working condition.

Next, the standards for hired labour will be discussed. As seen above this concerns workers not working for smallholders but workers working for large producers. According to Fairtrade International the purpose of the standard for hired labour is to set the requirements that determine participation in the Fairtrade system that applies to workers, empowering them to combat poverty, strengthen their position and to take more control of their lives. The requirements ensure that employers pay decent wages, guarantee the right to join trade

unions, and make certain that health, safety and environmental principles are adhered to. Most products have a Fairtrade Minimum Price, which is the minimum that must be paid to the producers. In addition, producers get an additional sum, the Fairtrade Premium, to benefit workers and invest in their communities. Fairtrade standards for hired labour as published on 15.01.2014_v1.4 by Fairtrade International (<https://www.fairtrade.net/standards/our-standards/hired-labour-standards.html>) give instructions on the following topics:

1. Social development

Intent and scope of this topic is that Fairtrade leads to the empowerment of workers and the sustainable social and economic development of workers and their communities. This includes permanent, migrant, seasonal and temporary workers.

2. Labour conditions

This section intends to ensure decent working conditions. Fairtrade International regards the “1998 ILO Declaration on Fundamental Principles and Rights at Work”, as well as all other applicable ILO Conventions as references for decent working conditions. The core of this is to pay wages that do not fall below the global extreme poverty line set by the World Bank (in 2018 \$ 1.90 day)

3. Environmental development

The intent of this section is to ensure that a company has agricultural and environmental practices that contribute to a more sustainable production system where risks to health and the environment are minimized. Protecting and enhancing biodiversity in the farm and in adjacent areas supports the objective of a more sustainable production system. For the banana sector in particular there are specified rules about the use of herbicides, pesticides and fungicides.

4. Trade

This section of the Fairtrade standards is focused on the trading part of the business and gives rules on packaging etc. and therefore not relevant for our research since we focus on the product side of the industry.

As one can see from the above standards both workers of plantations (hired labour) as workers of small producers are protected by the rules of Fairtrade and thus ILO standards. It seems that for the smallholder these income and working condition guarantees cannot be given as of course this is also the case for the plantation owner. One of the first large scale studies of the effect of Fairtrade certification on the labour conditions of plantation workers was published only this year (Krumbiegel et al 2018). The study examined worker welfare and employment conditions on eight large scale export oriented pineapple plantations in Ghana. Primary survey data were collected on 325 randomly sampled workers from four Fairtrade certified and four not certified plantations. The study found that Fairtrade has a

positive effect on two measures that were evaluated: hourly wages are higher for Fairtrade workers and they are more satisfied with their job.

2.5 Welfare definition

Before we can dive into the theme of this thesis, who is better off in terms of welfare level, the small independent farmer of bananas or the smallholder's employees or the banana plantations workers, we first have to define what we mean with the term welfare.

Many academic papers, articles and books use the term welfare and the meaning is not always the same. Looking at the most widely used and generally accepted dictionaries we find a number of helpful definitions. The Merriam-Webster dictionary defines welfare as "the state of doing well especially in respect to good fortune, happiness, well-being, or prosperity" (2018 <https://www.merriam-webster.com/dictionary/welfare>); the Oxford dictionary defines welfare as "the health, happiness and fortunes of a person or group" (2018 <https://en.oxforddictionaries.com/definition/welfare>); and Cambridge dictionary states welfare as "physical and mental health and happiness, especially of a person (2018 <https://dictionary.cambridge.org/dictionary/english/welfare>).

As we can see from these definitions welfare has several components. In general, one can say that fortune, physical health and mental health are the main components of welfare. But as we have seen in this chapter, Fairtrade has a focus on the "fortune" side of welfare which we will call "material welfare". So, for the purpose of this paper we will focus our research on this material welfare side. In paragraph 3.3 we will introduce a number of constructs to measure welfare.

Chapter 3 Research Methods

3.1 Introduction

As discussed in the previous chapters we want to research the material welfare levels of smallholders and the material welfare levels of plantation workers and workers of smallholders in the Fairtrade banana sector in Ecuador. In order to do so a questionnaire was developed and used to interview a selection of smallholders and a selection of plantation laborers and workers of smallholders. A linear regression model was used to compare the welfare levels between the different groups, taking into account various control variables.

3.2 Research objective and research questions

So our research question is:

“To what extent is there a difference in the welfare levels of smallholders, their workers, and workers of large plantations in the Fairtrade banana sector in Ecuador?”

The hypothesis to be tested (H_0) is:

“The welfare levels of smallholders in the Fairtrade banana sector are the same as welfare levels of their workers and the welfare levels of plantation workers”

Since the research was conducted in Ecuador, the questionnaire was set up in Spanish. You will find the original questionnaire in the appendix and herewith a short description in English. The questionnaire consists of 10 sections:

- Section 0: description of the farm where the questionnaire was conducted. Name, size, location, owner etc.
- Section 1: description of the activity involved with conducting the questionnaire. Date, time of day, time involved etc.
- Section 2: personal information of respondent. Name, sex, age, address, family composition etc.
- Section 3: section for labourers with questions about the relationship with the employer about length of the cooperation, type of contract etc.
- Section 4: questions about the salary or income of the respondent for the work on the farm
- Section 5: questions about income from activities outside the farm, savings, pension etc.

- Section 6: questions concerning the quality, facilities and value of the house of the respondent, but also about other household possessions like appliances and transportation means.
- Section 7: asking more detailed information about the other members of the household. Age of the household members and occupation.
- Section 8: questions about household expenditures
- Section 9: questions about the health situation of the respondent and his or her family
- Section 10: questions about ones “happiness”, based upon the Oxford Happiness Questionnaire (Hadinezhad & Zareei, 2009).

The questionnaire was conducted by an experienced interviewer who stayed in El Oro province, Ecuador for four months and personally visited all the respondents. The interviewer helped in fine-tuning the questionnaire by test interviewing three potential respondents on location before proceeding to interviewing the whole sample.

3.3 Welfare definition and measurement

Considering research concerning the material side of welfare levels in developing countries we find it hard to get good examples of “fortune” or “prosperity” measurement. Instead we find that much more research has been done in the area of “poverty” measurement. Clearly a negative way of measuring the material side of welfare obviously the result of the fact that these researches are being done predominantly in developing countries. One of the most well-known tools to measure poverty and (in) equality is the household survey. Data of these surveys have been used to document how people live, how much they spend and on what. Today’s household surveys typically collect information on household incomes, (detailed) expenditures as well as demographic, geographical and other characteristics of household members. Households surveys are the basis for estimates of poverty rates and of income inequality. The quality of the data of household surveys can be a problem though. Per capita consumption estimated from household surveys has long been less than per capita consumption estimated in the national accounts of a country. Education and health are also two important categories that are treated inconsistently in different countries (Deaton, 2016). For our research these measurement errors are acceptable though. Since we compare data from people living in the same country, even in the same province and working in the same line of business we can assume that data collected with our household survey are valid enough be used for comparison of the groups to be researched. Interesting in this respect is a paper about the measurement of household poverty in Ecuador and the influence of basis services provided by the government. How significant are the different government policies for the basic services market for making household welfare comparisons in Ecuador? Water, gas and electricity can be treated differently depending on living in an urban environment or rural environment (Hentschel & Lanjouw, 2000). We will

assume though that the government policy in this respect has no significant influence on our collected data.

One of the constructs we use in measuring welfare is an index using the household data gathered with the questionnaire and is known as the International Wealth Index (Smits & Steendijk, 2015). Au contraire to what has been said above, this measurement construct talks about wealth and not about poverty. This so-called IWI is based upon data from 2.1 million households in 97 developing countries and looks like a good way to measure the wealth (better than poverty) of our research group.

To compute the IWI value of a household, information is needed on twelve assets. These assets include seven consumer durables (TV, fridge, phone, bike, car/motorcycle, a low-cost utensil (microwave and stereo) and an expensive utensil (washing machine and personal computer), access to two public services (water and electricity) and three housing characteristics (number of sleeping rooms, quality of floor material and of toilet facility). For each of the seven consumer durables, an indicator must be created with two possible values: the value 'one' if the household (or one of its members) owns the specific durable and the value 'zero' if they do not own the durable. A similar two-category indicator has to be created to denote whether (1) or not (0) the household has access to electricity. Quality of water supply, flooring material, and toilet facility is measured with three categories: low quality, intermediate quality, high quality. The number of sleeping rooms is also measured with three categories: zero or one sleeping room, two sleeping rooms, three or more sleeping rooms. For each of the categories of these variables an indicator is created that shows whether (1) or not (0) a household is in that category. The total number of indicators needed for computing IWI is thus 20. Eight indicators to denote the possession of the consumer durables and access to electricity, three times three indicators to denote the quality of water supply, flooring material, and toilet facility, and three indicators to denote the number of sleeping rooms. To rank a household on the IWI scale, its values on the 20 indicators must be included in the following equation: $IWI = \text{constant} + \sum (W_n * X_n)$ where X_n are the indicator variables and W_n their IWI weights. We will indicate this measurement of wealth by "IWI".

As a second method to measure wealth we use a construct where we add one's possessions and deduct the one's debts. In this way we come to a real dollar amount which also gives an interesting indication about wealth in absolute numbers.

We calculate this dollar amount by adding the value of the house, value of savings, expensive utensils (1 or 0) * 250, value of a motorcycle (0 or 1) * 500, value of a car (0 or 1) * 5,000 and deducting the debts. This definition was constructed using the input of the questionnaires and discussions with several practitioners knowledgeable about the social situation in the area under study. A discussion took place about the inclusion of pension, but since many respondents could not answer this question and the local pension

arrangements don't seem very solid it was decided to leave this out of this construct. The amounts are based upon the experience in the field and indicate the average value of the mentioned goods. We will indicate this measurement of wealth by "WL".

A third way is taking a closer look at the income of the research group as an indicator of the welfare level. Respondents either get salary per day, per week, biweekly or monthly so we converted all income amount to dollar earnings per day. Income was labelled as "inc".

3.4 Sample

To test our hypothesis a survey was fielded for the two different production systems. On the one hand, banana production on Fairtrade certified banana plantations; and on the other, hand banana production in Fairtrade certified small producer cooperatives. The two different production systems are both in the same country to control for externalities caused by different social and legal environments. Ecuador was the country of choice because of the presence of both producing systems with Fairtrade certification. Another important reason is that the contacts in Ecuador and especially in the province of El Oro are excellent because of the close cooperation with Agrofair, a Fairtrade banana trading company. This is not unimportant because in the questionnaire there are many personal questions, like "how high is your monthly salary" and people would not easily answer these kinds of questions to strangers. But some incentive from the side of Agrofair, being one of the biggest customers of the interviewed farmers, made things much easier.

The researcher was based in Machala, the capital of El Oro, and the centre of the regional banana production. The original plan was to interview three group of people of about 75 each. So, 75 smallholders, 75 workers of smallholders and 75 workers on plantations. Due to the fact that a lot of time was needed by the interviewer to travel to the smallholders, these numbers were not met. In total the interviewer collected 148 valid questionnaires: 73 questionnaires were filled out by workers of plantations, 29 by smallholders and 46 by workers of smallholders.

The 73 plantation workers were working on six different Fairtrade certified plantations: San Vicente, owned by the cooperative El Guabo and five plantations owned by the Prieto family of which Media Montaña and Los Angeles are the two biggest. All six of these plantations are supplying most of their harvest to Agrofair.

The other group are smallholders, and in some cases the workers of smallholders, all of which are members of Aso Guabo, one of the bigger smallholder cooperatives and selling most of their harvest to Agrofair.

The respondents were selected based on a random drawing (using MS Excel) from a number of lists containing per group several hundred potential respondents. The drawing of the smallholders amounted to a sample of about 100, because it was expected that on average one in four smallholders would not be willing to cooperate.

3.5 Variables

The questionnaire results have been entered in STATA in this statistical package has been used to analyse the data. To do this several constructs have been made. For example, household size (hh-size) has been a construct of the number of sons and daughters plus two parents, as this was not asked directly in the questionnaire. In addition, we created the three constructs to measure welfare as discussed in the previous chapter: IWI, WL and income per day (inc). These three variables were used as the dependent variables.

The main independent variable, and focal point of this study, is the economic status of the interviewee as being a plantation worker (PW, coded 1), smallholder (SH, coded 2) or a worker of a smallholder (SHW, coded 3).

Next to these dependent and independent variables we can distinguish a number of (independent) control variables:

- **Age**
One of the most likely control variables is the age of the interviewee. One can imagine that the age of an employee is correlated with the salary of the employee. Older people usually have a higher salary than younger people, although with heavy physical labour one can also imagine older people producing less labour and thus earn less. Also, we should consider that an older person had more years to accumulate wealth.
- **Education**
Another important control variable is education. It is likely to assume an association between education and both income and wealth, because higher education increases the probability of getting a better-paid job and the level of farming professionalism.
- **Household size**
Another control variable is household size. One can reason that a smallholder or worker with many children has a lower wealth than those with a small family. Children are costly, so less money is available for material assets. The other way around one could reason there is a positive relationship between income and family size since the height of the income has influence on the family planning.

- **Gender**
Also gender of the interviewee should be considered as a control variable, since one can imagine that the salary for men and women is not the same and this can also influence wealth.
- **Marital status**
Marital status is another control variable. It can be suspected that there is an influence of being married on income and/or wealth.
- **Health status**
Also, the health status is a variable to be considered. Structural health issues within a household could lead to higher costs, lower income and lower wealth.
- **Farm size**
Obviously farm size is also a control variable but most likely more for smallholders than for workers so we will leave this variable out of the between-group regressions.

3.6 Econometric analysis

My research is set up to test the hypothesis in which a relationship between welfare and the status of the interviewee (smallholder/plantation worker/ worker of smallholder) is assumed and is corrected for gender, age, marital status, education household size and health:

$$\text{Welfare (inc, IWI, WL)} = f(\text{SH/PW/SHW, sex, age, marital stat, education, hh-size, health})$$

This relationship or function will be tested by a general linear regression model:

$$Y = \alpha + \beta ST + \gamma X + \varepsilon$$

There will be three dependent variables y: measured income (inc), IWI and WL. The status of the interviewee is captured by the set of dummy variables ST, which include smallholder (SH), plantation worker (PW) or smallholder's worker (SHW). The vector β therefore includes the main coefficients of interest. Finally, the control variables X include age, gender, marital status, education, household size and health.

ε represents the error term, which we assume to be independent and randomly distributed.

Possible weaknesses of the model and analysis are the omission of variables which might influence the outcome variables and are also correlated with the explanatory variables. For example, smallholders could be relatively more talented, which can improve success as smallholder but would also increase welfare irrespective of worker/smallholder status.

Chapter 4 Results and discussion

4.1 Descriptive statistics

Before proceeding to the regressions, it is important to illustrate the three groups of interviewees. We will do so by laying out a summary of the characteristics of the plantation worker (PW, labelled in Stata as “tp1”), smallholder (SH, labelled in Stata as “tp2”), a smallholder worker (SHW, labelled in Stata as “tp3”), respectively.

Firstly, plantation workers too are either full-time or part-time employees, both groups having distinguishable characteristics. Only on well-coordinated plantations, for example, did we document full-time workers having been with the same producer for over twenty years. Activities of full-time plantation workers include, amongst others, work in the field, maintenance on and around the plantation’s structures, and administration. On specific harvesting days the roles are slightly shifted as a team of part-time employees takes up the task of processing the fruit entirely. Only on plantations have we encountered full-time workers under monthly contracts, even though the bi-weekly contracts are the standard throughout the industry. The part-time employees on plantations, unlike their colleagues working for smallholders, rarely have other employers. This is due to the fact that larger plantations naturally produce much greater quantities of fruit than smallholders’ farms, and can offer up to four days of workload for harvesting and processing, depending on yield subject to seasonal fluctuations. Also, part-time employees are called upon for irregular, extra activities.

Secondly, the smallholders, as interviewed, can be defined as either farm owners, presently leading and working on a farm, as well as managers put in charge of overseeing operations at a farm. Not rarely, a family member, close relative, friend or acquaintance is appointed as manager. He or she then, in effect, takes up the role of producer even though the farm is not owned by them. During the researching and interviewing, many cases of this organizational structure have been witnessed. Underlying reasons reported for farm owners not managing their own farms vary widely; from old age, illness and physical limitation to having one of more other jobs, farms or businesses to attend to. Smallholders tend to have only a small number of full-time employees, or none at all, depending on the workload. Commonly though, farm owners work and live on a property that includes both a public area for producing and a private area for living. The smallholders’ fixed workforce is usually made up of family members, close relatives, friends and/or acquaintances, all performing interchangeable tasks. In addition, on days of harvesting, once weekly, part-time employees help with the increased workload. Some fulltime employees have biweekly contracts, but the vast majority works under an unaccredited verbal contract. That is to say,

smallholders pay their employees in cash at the end of the day. Smallholders themselves, report periodically having little to no net monthly income, as high expenses stay constant in months of subpar yield.

Thirdly, smallholder workers that participated in interviews are part of either one of two groups. The first group are full-time employees and the second are part-time employees. Family members, close relatives, friends and/or acquaintances take up the larger part of both categories. They are involved in the business in varying degrees. Some fulfil actual full-time responsibilities related to production, others help by running errands as a means of doing the smallholder a favour. However, on busy days of harvesting and processing the fruit, the group of part-time employees rises dramatically, part-time employees whom are only linked to the smallholder professionally. These smallholder workers are part of a network of people dedicated solely to processing the fruit. As described above, these workers get paid daily at the end of the day. As one employer can offer only one single day of labour weekly due to the size and frequency of the harvest, these part-time employees seek work elsewhere and rotate between a number of farms. In reality, to earn sufficiently, they could work on up to seven different farms on seven different days, earning possibly seven different types of daily salaries.

Table 1 below presents the averages of the different variables of the three groups of interviewee's.

Table 1 Descriptive statistics (averages) of the three groups interviewed

Stata code		TP1	TP2	TP3	
	description	plantation worker (PW)	smallholder (SH)	smallholder worker (SHW)	Total
	Number in sample	73	29	46	148
INC	income	\$ 21.37	\$ 47.11	\$ 28.87	\$ 28.74
IWI	wealth measured by IWI	80.1	83.69	82.75	81.63
WL	wealth measured by WL	\$ 10,108	\$ 206,517	\$ 15,930	\$ 50,403
z17	% female	18%	24%	4%	15%
z18	age	39	52	41	42
z19	% married	76%	86%	76%	78%
z20	education	3.52	3.76	3.96	3.7
hh	household size	4.35	5.03	5.54	4.55
q95	% chronic ill in household	38%	34%	30%	35%
FS	farm size	6.91 ha			

The conclusion of a first quick look is that smallholders are older, earn substantially more per day and are substantially wealthier measured by the WL construct.

In the following three graphs we see respectively how income, wealth measured by IWI and wealth measured by WL are spread out among the three groups

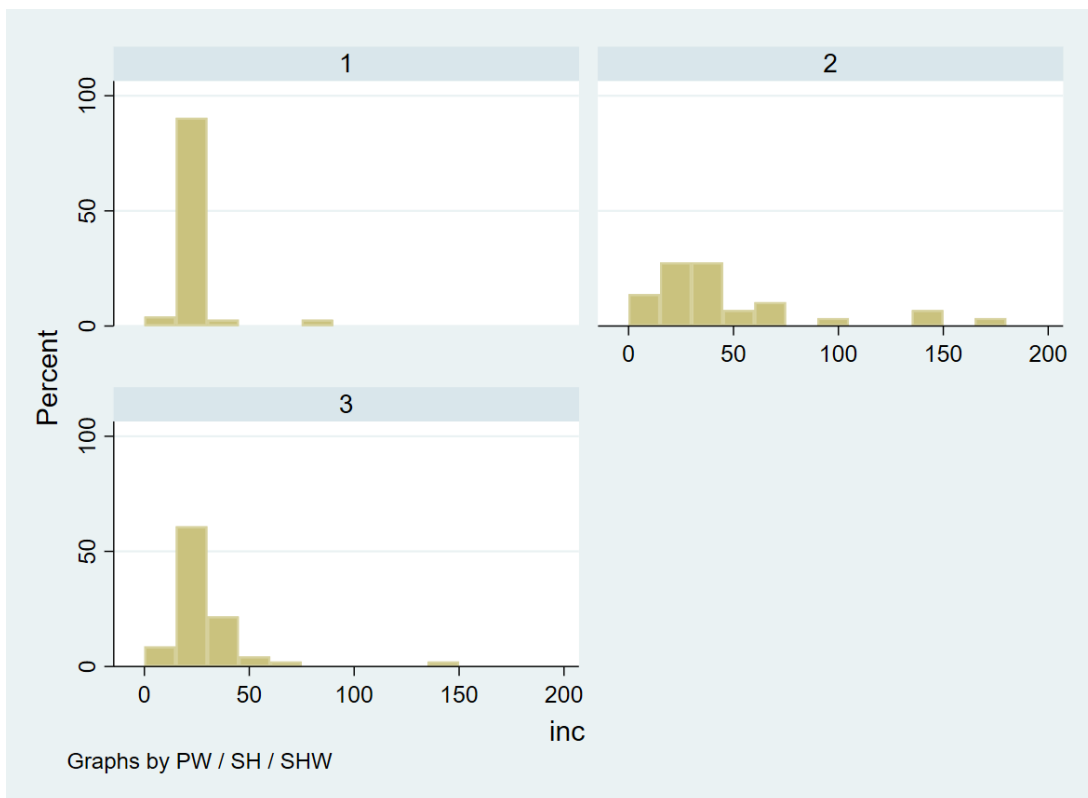


Figure 1 Income histogram per group

In figure 1 we see the histograms of the income in the three groups. The vertical axe gives the percentage of respondents per group and the horizontal axe the height of the income. We see that the income of the plantation workers is quite homogeneous, where the income of the smallholders is quite spread out.

In figure 2 we see on the distribution of the wealth measured by IWI in the three groups and in figure 3 we see on the distribution of the wealth measured by WL in the three groups. What is striking is that the wealth of plantation workers shows a sharp peak (left skewed), whereas that of the small holder workers is more distributed. The same holds for the small holders, but this is less salient, as it is known they have different farm sizes and hence different amounts of wealth. The same observation cannot be made for the IWI wealth index of Figure 2, which is due to the different composition of the IWI and WL variables giving different weights to different wealth and property components.

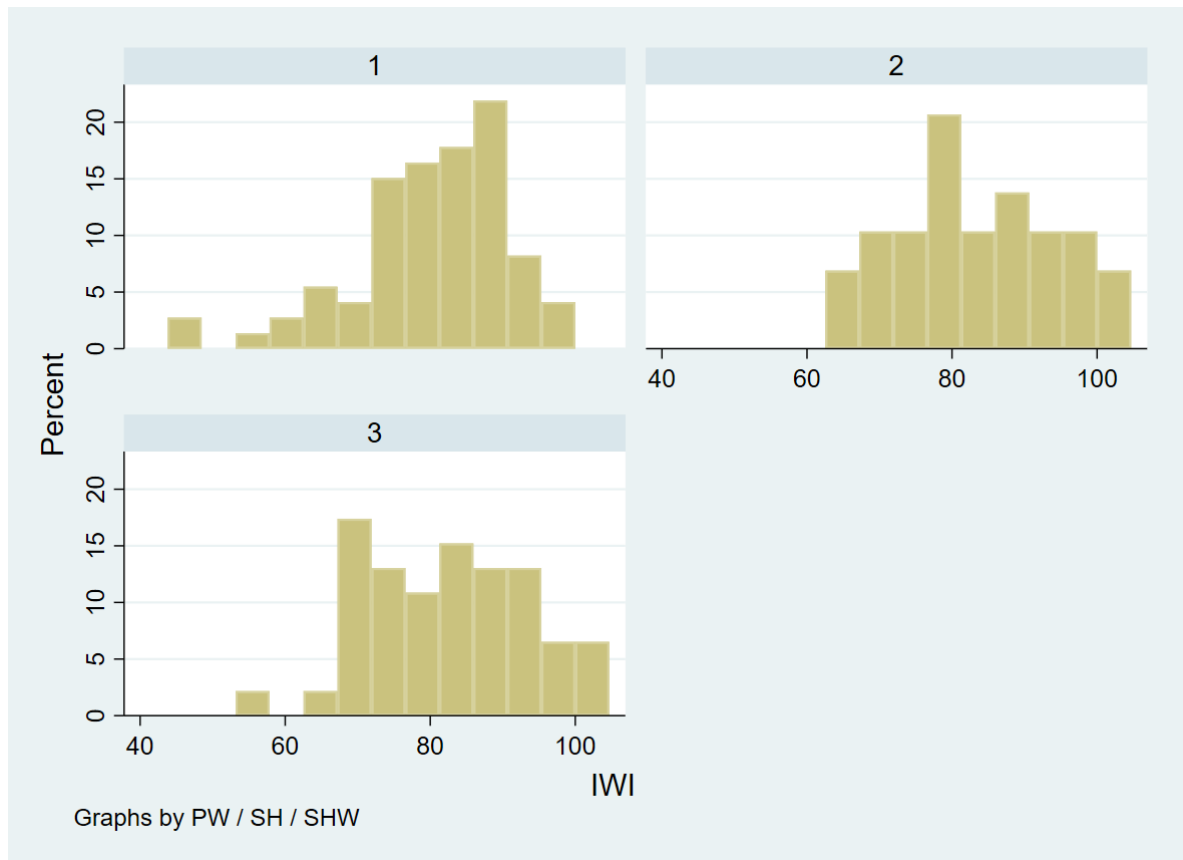


Figure 2 IWI histogram per group

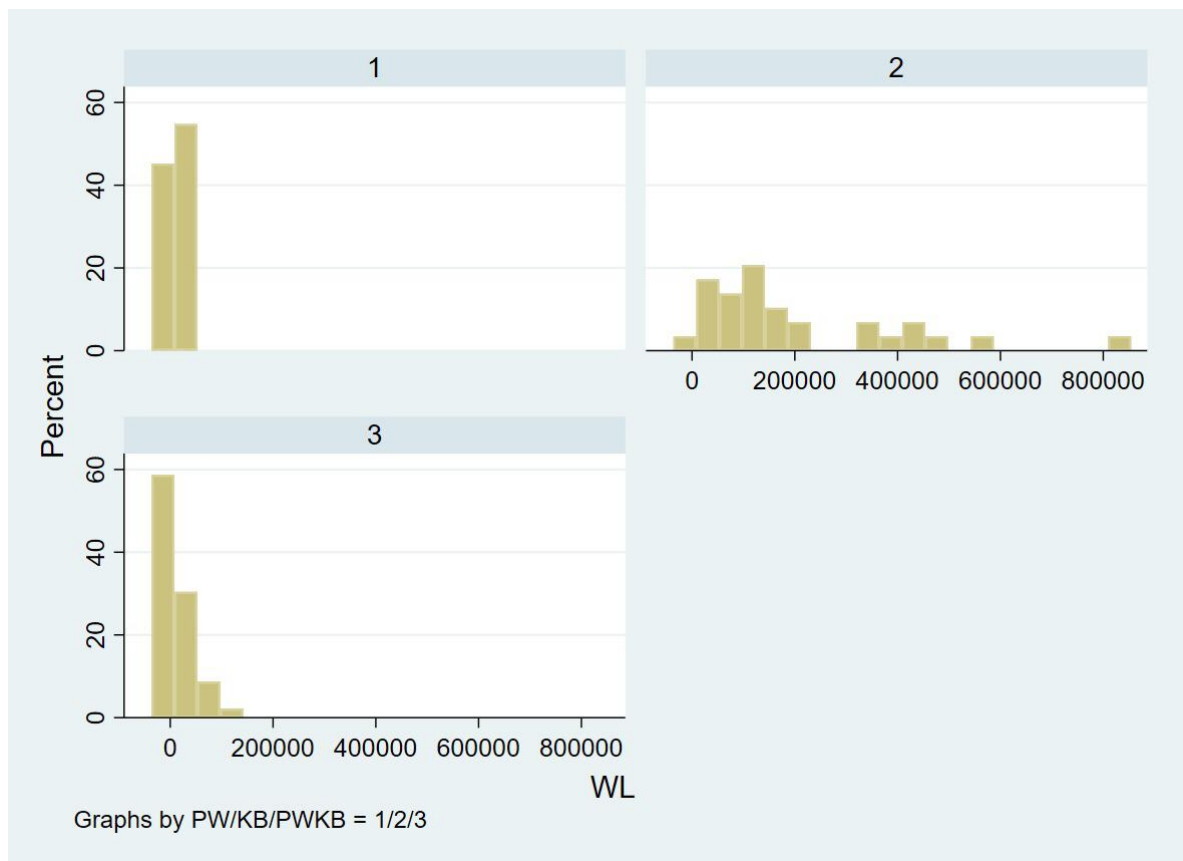


Figure 3 WL histogram per group

The next step of our research is to make regressions to deduct whether these differences are significant or not and to find out the influence of possible other (control) variables.

4.2 Analytical statistics

We start by exploring the correlation between the status of the interviewee and the income level of the interviewee. We do this by using an ordinary least squares regression in which income is the dependent variable and the status of the interviewee is the independent variable and a number of demographic and household characteristics are independent control variables. Table 2 shows the variables, coefficients, standard errors and significance levels.

Table 2 income model results (n = 148)

Income	Coef.	(Std. Err.)
<i>Dependent variable: income</i>		
Status of interviewee		
Plantation worker		
Smallholder	27.465***	5.505
Smallholder worker	7.237*	4.371
Interviewee's characteristics		
Gender	5.436	5.573
Age	-.026	.185
Marital status	5.920	4.976
Education	3.216**	1.652
Household size (hh)	-.022	1.401
Health status	-1.872	3.991
Intercept	3.983	15.671
R ²	0.22	
* indicates statistical significance at the 10 % level		
** indicates statistical significance at the 5 % level		
*** indicates statistical significance at the 1 % level		

We see a statistically significant difference in income between the plantation workers and smallholders and smallholder's workers and smallholders.

We can thus reject the null hypothesis if we take income as the construct to measure welfare.

The coefficient on the status of the interviewee (smallholder, smallholder's worker or plantation worker) is a good indication of the difference in daily income in \$ (dependent variable y) between the three groups. So, the smallholder effect is an extra income of \$ 27 a day after controlling for differences in education, health and household demographics, compared to the plantation worker (base level). This is in line with the descriptive statistics and we can see that a plantation worker becoming a smallholder would more than double the income. Also, the smallholder's worker makes \$7 a day more than the plantation worker after controlling for differences in the other variables.

Of the control variables only education has a statistical significant effect on the income levels of the three groups. The coefficient of education indicates that with an increase of the education level of one (e.g. level 3 indicates a completed primary school, level 4 is a not

completed secondary education and level 5 a completed secondary education), the mean daily income will increase with \$ 3.22 while the other variables stay the same.

Next, we regress wealth using the IWI construct with status of the interviewee and the same control variables as above. In table 3 below we see the results of this regression with the relevant variables, coefficients, standard errors and significance levels.

Table 3 Wealth IWI model results (n = 148)

Wealth (IWI)	Coef.	(Std. Err.)
<i>Dependent variable: wealth (IWI)</i>		
Status of interviewee		
Plantation worker		
Smallholder	1.007	2.650
Smallholder worker	1.798	2.104
Interviewee's characteristics		
Gender	- .032	2.682
Age	.224**	.089
Marital status	- .360	2.395
Education	1.668**	.795
Household size (hh)	-1.066	.674
Health status	1.450	1.921
Intercept	70.268	7.543
R ²	0.091	
* indicates statistical significance at the 10 % level		
** indicates statistical significance at the 5 % level		
*** indicates statistical significance at the 1 % level		

The coefficients indicating the status of the interviewee do not have a statistically significant influence on the IWI level, so we cannot reject the null hypothesis.

Age and education are significant on 5% level. For age this means that being one year older the mean IWI index score increases with 0.22 and for education it means that every additional level of education increases the mean IWI index score with 1.67 in both cases while the other variables stay the same.

The IWI construct indicates the level of an index and not a real value so further interpretation is difficult. In the descriptive statistics we can see that the IWI index score for the three groups of interviewees is not too far apart, which is in line with statistical result above.

Let's therefore continue with correlating WL, the other construct for wealth, with the status of the interviewee and the above mentioned independent (control) variables. In table 4 we see the relevant coefficients, standard errors and significance levels.

Table 4 Wealth (WL) model results (n = 148)

Wealth (WL)	Coef.	(Std. Err.)
<i>Dependent variable: wealth (WL)</i>		
Status of interviewee		
Plantation worker		
Smallholder	175,012.4***	21,590.23
Smallholder worker	-3,946.875	16,980.95
Interviewee's characteristics		
Gender	-25,405.33	21,125.03
Age	1,253.21*	668.713
Marital status	26,327.55	16,906.65
Education	17,082.61***	6,432.878
Household size (hh)	-9,307.509	6,716.735
Health status	17,699.34	15,322.889
Intercept	-1,962,138	1,491,197
R ²	0.1670	
* indicates statistical significance at the 10 % level		
** indicates statistical significance at the 5 % level		
*** indicates statistical significance at the 1 % level		

We see a statistically significant difference in wealth (WL) between the plantation workers and smallholders. There is no significant difference between smallholder's workers and plantation workers. We can reject the null hypothesis that there is no difference in welfare (wealth) between the three groups. The mean difference between the wealth welfare level of a smallholder and the wealth welfare level of a plantation worker is \$ 175,012 controlling for the other variables (welfare smallholder is higher than welfare plantation worker). This is quite large difference, both relative (looking at the descriptive statistics) as absolute. A logical explanation for this might be that in calculating the WL construct, the property is part of the possessions and in the case of the smallholder this property also contains the land holdings. With an average holding of 6.9 hectares and a market price of around \$ 25,000 per hectare (according to the interviewed farmers) almost the whole difference has been explained.

Looking at the control variables we can see a statistical significant influence of age and education. Being one year older adds \$ 1,253 (mean difference) to one's wealth assuming that the other variables stay the same. One extra level of education adds more than \$ 17,000 to a person's wealth.

4.3 Research conclusions

An important finding is the large positive effect for smallholders both on income and wealth (measured by WL).

On average a smallholder earns more than \$ 27 a day more than a plantation worker and \$ 20 a day more than their workers.

The mean wealth of a smallholder (using the WL construct; possessions minus debts) is more than \$ 175,000 higher than the mean wealth of a plantation worker.

Our overall conclusion is that welfare based upon income and wealth measured by the WL construct does show significant differences between the three groups.

So, we can reject our H_0 hypothesis and the alternative hypothesis H_A has been accepted.

Looking at wealth measured by IWI we cannot draw any conclusions and thus not reject the null hypothesis. The question is, whether IWI is a good wealth measure in the context of our research problem. It was developed for developing countries, but in the context of the banana industry in Ecuador, a lower middle-income country, it does not seem to be capable of capturing important differences between the groups studied.

An interesting result is that the study shows that the socio-economic status of the banana smallholder farmer in the Fairtrade system seems to be much stronger than that of the Fairtrade plantation worker. While this may not be counter-intuitive, as the smallholder has the benefit of owning land, and apparently, perhaps thanks to the Fairtrade commercial system also can turn this land asset into a stable rent providing income, it is interesting because small farmers are in the Fairtrade discourse often considered as disadvantaged. This may certainly be the case compared to large plantation owners, but according to this study certainly not according to plantation workers, even if these are also part of the Fairtrade system.

Another surprising result is the fact that the income of the worker of a smallholder is higher than the income of a worker of a plantation. The expectation based on several visits and interviews with industry experts¹ was that the workers of a smallholder would be underpaid compared to plantation workers, but this study shows that the opposite is true. An observed explanation for this is the fact that workers for smallholders often work part time at one smallholder. Day pay seems to be higher than (bi) weekly or monthly pay because of the uncertainty the workers face. In practice though the workers of smallholders seem to have a well filled agenda with several “customers”. In the paragraph about descriptive statistics we could read that some workers work seven days on seven different smallholder farms. This

¹ Hans-Willem van der Waal, CEO of AgroFair; Jeroen Douglas, project manager of Solidaridad and initiator of the Fairtrade banana.

finding also mitigates criticism on the Fairtrade system advanced by practitioners that the Fairtrade system is too much focused at small producers or plantation workers in large, certified farms, and that it neglects the interests of the workers of Fairtrade certified small farmers. Currently, Fairtrade small farmers organizations are not obliged by the Fairtrade system to include small farmer's workers in the benefits of the Fairtrade system, such as the social protection, the social premium and the decision taking. Hence, workers of small farmers, even Fairtrade small farmers, are often seen as the weakest part of the chain. Their position, looking at income and wealth may not be that bad after all. However, it is not at all sure that this conclusion can be generalised towards workers of small farmers that are not in a Fairtrade organization. Such non-Fairtrade small farmers may have significantly less predictable income as they do not benefit from guaranteed prices and contractual volumes.

We also concluded that education is an important explanatory variable for the height of the income and that older people on average have a higher wealth (measured by WL).

The validity of the model seems fine since the model is quite a correct representation of the real situation. The Income (Inc) and Wealth (WL) variables are not complicated constructs for which the validity raises questions. Only the IWI construct seems not to measure any significant correlations, and its composition is rather difficult to grasp, we are not sure whether this construct is the right one for this research. The three groups of interviewees are the actual groups in the Fairtrade export banana producing Ecuadorian society.

The precision of the model is not too high because of the size of the sample especially the sample of the smallholders. Next to that the results used for the analysis are based upon interviews so the answers have been given by the interviewees and have not been checked upon reliability. People can easily not tell the truth about income etc. out of shame or ignorance. However, the main results have also been triangulated to some extent by checking the reality value with a number of well-informed key informants in the sector, notably the management and staff of the El Guabo cooperative. The model can also contain some bias by omitting some relevant variables like talent and sense for entrepreneurship.

4.4 Concluding remarks

The fact that the income of the smallholder is so much higher than the other two groups came as a surprise to the researchers. Based upon the desk research in chapter two we didn't expect that much of a favourable position for the smallholder on income. Part of the explanation could be the fact that we are looking at Fairtrade certified shareholders who have, through their cooperative structure, a good access to finance and export markets. Another reason might be that these smallholders, in contradiction to many other smallholders, are focussed on one export product. Looking at examples from Africa we see that most smallholders are highly diversified and therefore benefit less from smallholder structures like cooperatives. (Chavas & Di Falco, 2012). On the other hand though we also found that in Ecuador the production of export bananas per hectare is up to two times higher at a large farm than at a small farm. In theory this could lead to salaries of plantation workers being higher than the smallholder's salaries. This is not the case though so presumably these larger farms make good profits.

The much higher wealth (WL) for the smallholders in comparison to workers is easier to understand. As we have noticed before this is likely to be the result of the land holdings of the smallholder. In the WL construct we include the value of the house or in case of the smallholder the farm including land. On average the smallholders of this sample own 6.9 hectares of land which adds a substantial amount to their wealth.

Talking in December 2017 to several plantation workers they showed ambition to become a smallholder and not without reason it shows now. This ambition is not so easy to realize though since not many farms are for sale.

As policy recommendations for both Fairtrade International as smallholder cooperatives like AsoGuabo we would make a strong case to research the possibilities of more intensive cooperation of the smallholders. This in order to raise their production per hectare towards the level of larger farms and thus further raise their income. Also, further stimulation of education will be beneficial.

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Appendix 1 Sociodemographic questionnaire

Encuesta sociodemográfica El Oro Enero - Mayo 2018 Última versión

Parte 0. Pre cuestionario

1. Nombre de la finca:

2. Ubicación de la finca:

Provincia: _____ Cantón:

Parroquia: _____ Sector:

3. GPS: Latitude(Y)= _____

4. GPS: Longitud(X)= _____

5. Altitud: _____ msnm

6. La finca es propiedad de:

7. Tamaño de la finca: _____ hectarías

--	--	--

7. Valor de la finca aproximado: _____ USD

--	--	--	--	--	--

9. Número de empleados fijos: _____

--	--	--

10. Número de empleados temporales: _____

--	--	--

Trabajador fijo: Recibe salario semanal, quincenal o mensual, trabaja toda la semana con el mismo productor.

Trabajador temporal: Trabaja por día, es jornalero, trabaja por contrato, trabaja solo días de embarque, o por temporadas cortas; puede tener más de un patrón. ¡OJO! Es temporal, a pesar de que puede tener años de trabajar con el mismo productor o con los mismos productores.

11. La finca tiene certificación fair trade 1=Sí 2= No ☐

encuesta: 1. Número de

Encuesta sociodemográfica El Guabo Enero - Mayo 2018 Última versión

Parte 1. Administración

1. Fecha: 0 2 0 1 8
2. Hora de inicio de la entrevista:
3. Hora de terminar la entrevista:
4. Total duración: minutos
5. Fecha de digitalización: 0 2 0 1 8

Buenos días. Pertenezco a...
 Estamos realizando una encuesta a fin de conocer.....
 Todos los datos que nos proporcione serán confidenciales.
 Siéntase libre de responder la encuesta.

Parte 2. Datos personales

1. Nombre de la persona entrevistado(a): _____
2. Sexo: 1= Hombre 2= Mujer
3. Edad: _____ Años

4. Estado civil: 1= Soltero(a) 2= Casado(a) o unido(a) 3= Viudo(a), separado(a) o divorciado(a)

5. Cuál es su nivel de educación? 1= Ninguno 2= Primaria incompleta 3= Primaria completa 4= Secundaria incompleta 5= Secundaria completa 6= Educación superior ☐

6. Cuántos hijos tiene **en total**: hijos ☐ hijas ☐
(**Todos**, incluyendo los que ya salieron del hogar)

7. ¿Dónde vive? _____

Provincia: _____ Cantón: _____

Parroquia: _____ Sector: _____

Parte 3. Relación con el productor (si es trabajador)

1. ¿Cuál es el nombre del productor con quien trabaja en **este momento**? _____

2. ¿Desde cuando trabajas con este productor? _____

3. ¿Usted es trabajador **fijo** de este productor, o es trabajador **temporal**? ☐
1= Fijo 2= Temporal

Trabajador fijo: Recibe salario semanal, quincenal o mensual, trabaja toda la semana con el mismo productor.

Trabajador temporal: Trabaja por día, es jornalero, trabaja por contrato, trabaja solo días de embarque, o por temporadas cortas; puede tener más de un patrón. **¡OJO!** Es temporal, a pesar de que puede tener años de trabajar con el mismo productor o con los mismos productores.

4. En caso que es **trabajador TEMPORAL** ...:

1. ... ¿Para cuántos **otros patrones** / fincas trabaja? _____ Otros patrones

2. ... En promedio, ¿cuántos **días por semana** tiene trabajo con **otros patrones**? _____ Días / semana

Parte 4. Ingresos del trabajo

1. En promedio: ¿Cuántos **días por semana** trabaja en esta finca? Días / semana
2. En promedio: **Cada día** laboral ¿**cuántas horas** trabaja en esta finca?
Horas / Día
3. Si le paguen **por día**, en **promedio**: ¿Cuánto es su salario diario?
USD / Día
4. Si le paguen **por semana**, en **promedio**: ¿Cuánto es su salario semanal?
USD / Semana
5. Si le paguen **por dos semanas**, en **promedio**: ¿Cuánto es su salario quincenal?
USD / 2Semanas
6. Si le paguen **por mes**, en **promedio**: ¿Cuánto es su salario mensual?
USD / Mes
7. **TRABAJADORES** Aparte del salario en dinero: ¿El patrón le da comida? 1= Sí, el almuerzo 2= Más 0= No
8. En su hogar, ¿cuántas personas contribuyen al hogar con ingresos?

PARTE 5. Otras fuentes de ingresos

1. **Fuera** del trabajo en la finca o las fincas, ¿su hogar recibió ingresos de **otras fuentes** en el último año? (**Cualquiera** de los miembros del hogar que viven y comen **bajo el mismo techo**) Sí= 1 No= 0
2. En caso afirmativo ¿de qué tipo de actividades?
 1= Finca o tierra propia 2= Otra profesión 3= Pensión/jubilación
 4=Algún negocio 5=Préstamo 6= Remesas del exterior
 7=Alquila a otros A
 8=Otro _____ B
 C
3. ¿Cuántos días **por mes** se dedica(n) a esta actividad, en promedio?
4. Ingreso promedio total del hogar **por mes** de esta actividad A
 B
 C

5. ¿Usted tiene ahorros? 1=Sí 0= No ☐
6. En caso afirmativo ¿nos puede decir cuánto es el saldo de sus ahorros?
 USD
7. ¿Usted tiene un seguro de vida? 1= Sí 0= No ☐
8. ¿Está afiliado a algún sistema de pensiones o de jubilación? 1= Sí 0= No ☐
9. En caso afirmativo ¿nos puede decir cuánto es el saldo de la pensión?
 USD
10. ¿Usted tiene alguna deuda? 1= Sí 0= No ☐
11. En caso afirmativo ¿cuál es el monto pendiente de pagar?
 USD

PARTE 6. El hogar

1. ¿La vivienda que ocupa su hogar es ...? ☐
 1= Propia con escritura 2= Propia sin escritura 3= Arrendada
 4= En anticresis 5= Gratuita 6= A cambio de servicios
 7= Otro
2. ¿Cuántos cuartos o piezas tiene su vivienda (***sin contar la cocina ni el baño***)?
3. ¿Cuál es el material predominante del techo de su vivienda? ☐
 1= Losa 2= Asbesto 3= Zinc 4= Teja 5= Paja
 5= Duratecho 6= Otro
4. ¿Cuál es el material principal de las paredes exteriores de su vivienda? ☐
 1= Cemento 2= Adobe 3= Madera 4= Caña revestida
 5= Caña no revestida 6= Otro
5. ¿Cuál es el material predominante del piso de su vivienda? ☐
 1= Parquet o duela 2= Baldosa o vinyl
 3= Cemento o Ladrillo 4= Caña
 4= Tierra 5= Otro
6. ¿Con qué tipo de alumbrado cuenta principalmente su vivienda? ☐
 1= Energía eléctrica 2= Planta / generador eléctrico
 3= Gas o kerosene 4= Otro
 5= Ninguno
7. ¿Cuál es la principal fuente de combustible para cocinar? ☐
 1= Gas natural 2= Butano o propano 3= Electricidad

4= Kerex 5= Leña o Carbón 6= Otro

8. ¿De dónde obtiene principalmente agua para su hogar? ☐
- 1= Red pública 2= Pozo 3= Río u acequia
 4= Carro repartidor 5= Otro

9. ¿Con qué tipo de servicios higiénicos cuenta su hogar?
- 1= Red pública 2= Pozo ciego 3= Pozo séptico 4= Otro 5= No tiene ☐

10. ¿En la casa de su hogar tienen servicio telefónico?
- 1= Si, teléfono fijo 2= Si, teléfono celular 3= Ambos 4= No tiene ☐

11. En caso que su casa es propia ... ¿cuál es el valor aproximado, incluyendo el lote?
 USD

12. ¿Qué bienes duraderos hay en el hogar? (propiedad de cualquier miembro del hogar, todo)

	Tipo de artículo	¿Cuántos tiene? 0= No tiene
1	Refrigerador	
2	Micro-ondas	
3	Lavadora	
4	Lavavajillas(lavaplatos)	
5	Televisor a colores	
6	Equipo de sonido	
7	Computadora	
8	Bicicleta	
9	Motocicleta	
10	Carro	

PARTE 7. Composición del hogar, características

1. ¿Quiénes forman parte del hogar, y qué características y actividades tienen estas personas?

	1. Otros miembros del hogar 1= Jefe del hogar 2= Esposa(o) / cónyuge 3= Hijo / hija 4= Hermano / hermana 5= Padres o abuelos 6= Otro tipo de personas (Trabajar por filas) → →	2. Sexo 1= Hombre 2= Mujer	3. Edad Años	4.Cuál es su nivel de educación? 1= Ninguno 2= Primaria incompleta 3= Primaria completa 4= Secundaria incompleta 5= Secundaria completa 6= Educación superior	5. Actividad principal 1= Ninguna 2= Estudia 3= Trabajo doméstico 4= Asalariado agrícola 5= Peón / jornalero 6= Auto-empleo 7= Comercio / venta 8= Finca propia 9= Trabajador familiar no remunerado
1	(Entrevistado(a))=	X	X	X	X
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

Parte 8. Gastos del hogar

1. **En promedio**, ¿cuántos son tus gastos mensualmente?
2. **En promedio**, ¿cuántos son tus gastos de alimentos mensualmente?
 (Mercado, supermercado)
3. **En promedio**, ¿cuántos son tus costos de vivienda mensualmente?
 (Gas, electricidad, agua)
4. **En promedio**, ¿cuántos son tus gastos no alimentarios ni de la vivienda mensualmente?
 (Higiene, salud, transporte, educación, inscripciones, ropa)
5. **En promedio**, ¿qué otros tipos de gastos tiene su hogar mensualmente?
6. **En promedio**, ¿cuántos son tus gastos mensualmente?

Parte 9. Salud

1. ¿Usted está afiliado al Seguro Social IESS? 1= Sí 0= No ☐
2. **En caso de enfermedad o problemas de salud**, ¿adónde acude Usted o cualquier miembro de su familia?
 1= Dispensario anexo al IESS 2= Otro centro de salud 3= Hospital público ☐
 4= Clínica o centro privado de salud 5= Médico particular 6= Curandero(a)
 7= Se cura solo o con ayuda familiar 10= Otro
3. ¿A qué distancia aproximada le queda el Centro o Puesto de Salud más cercano?
 Distancia: 1. _____ Kilómetros 2. _____ Metros
4. ¿Cuánto tiempo tarda en llegar a ese Centro de Salud con el medio transporte que Usted normalmente utiliza?
 Tiempo: 1. _____ Horas 2. _____ Minutos
5. ¿Usted realiza un chequeo médico regular? 1= Sí 0= No ☐
6. ¿Alguna persona de su hogar tiene una discapacidad permanente o enfermedad crónica? 1= Sí 0= No ☐
7. ¿Cuántos miembros de su hogar están asegurados con el IESS? _____ Personas

Parte 10. Cuestionario de felicidad OHQ

Totalmente en desacuerdo	Bastante en desacuerdo	Ligeramente en desacuerdo	Ligeramente de acuerdo	Bastante de acuerdo	Totalmente de acuerdo
--------------------------	------------------------	---------------------------	------------------------	---------------------	-----------------------

1	2	3	4	5	6
---	---	---	---	---	---

1. Me siento particularmente contento/a con mi manera de ser
2. Estoy intensamente interesado/a en los demás
3. Pienso que la vida ofrece grandes recompensas
4. Tengo sentimientos de cariño hacia casi todo el mundo
5. Casi siempre me levanto con sensación de haber descansado
6. Soy particularmente optimista con relación al futuro
7. La mayoría de las cosas me parecen divertidas
8. Siempre estoy comprometido/a e involucrado/a
9. La vida es bella
10. Pienso que el mundo sea un buen lugar
11. Acostumbro a reír
12. Me siento satisfecho/a con todo en mi vida
13. Me considero atractivo/a
14. No hay diferencia entre lo que me gustaría hacer y lo que he hecho
15. Soy muy feliz
16. Encuentro la belleza en muchas cosas
17. Tengo efecto alegre sobre los demás
18. Puedo encontrar tiempo para todo lo que tengo que hacer
19. Me siento en control de mi vida
20. Me siento capaz de cualquier cosa
21. Siento que mi mente está totalmente alerta
22. Suelo experimentar alegría y euforia
23. Me resulta fácil tomar decisiones
24. Encuentro significado y propósito en mi vida
25. Siento que tengo mucha energía
26. Suelo ejercer una influencia positiva en los demás
27. Me divierto con los demás
28. Me siento muy sano/a
29. Tengo buenos recuerdos del pasado

Gracias, check, gracias, despedida.

Appendix 2 Stata do-files

```
generate WL=ValueHouse+ValueFarm+Savings-  
Debt+(Pos_Ref+Pos_Lau+Pos_DW+Pos_TV+Pos_HiFi)*250+Pos_MCycle*500+Pos_Car*5000  
* dit specificceert de WL variabele ($250 voor elec app, $500 voor bromfiets, $ 5000 voor  
auto).  
tabstat inc IWI WL z17 z18 z19 z20 hh q95 FS, by(tp1)  
* deze tabstat maakt een tabel met beschrijvende statistiek (gemiddelden) van de  
afhankelijke en onafhankelijke variabelen, per groep (arbeiders, kleine boeren, arbeiders  
van kleine boeren)  
reg inc i.tp1 z17 z18 z19 z20 hh q95  
reg IWI i.tp1 z17 z18 z19 z20 hh q95  
reg WL i.tp1 z17 z18 z19 z20 hh q95  
histogram WL, bin(20) by(tp1)
```

Appendix 3 Stata logfiles

```
. log using "C:\Users\Hans-Willem vd Waal\Dropbox\Divers\PA\Final LOG.smcl"
-----
-
      name: <unnamed>
      log:  C:\Users\Hans-Willem vd Waal\Dropbox\Divers\PA\Final LOG.smcl
  log type: smcl
opened on: 11 Jul 2018, 11:28:54

. drop WL

. do "C:\Users\Hans-Willem vd Waal\Dropbox\Divers\PA\Final DO-file.do"

. generate WL=t534+(t588+t696+t750+t804+t858+t912)*250+t1020*500+t1074*5000-t60+v56

. * dit specificceert de WL variabele ($250 voor electrisch apparaat, 500 voor bromfiets,
5000 voor auto).
. tabstat inc IWI WL z17 z18 z19 z20 hh q95 FS, by(tp1)

Summary statistics: mean
by categories of: tp1 (PW/KB/PWKB = 1/2/3)
```

tp1	inc	IWI	WL	z17	z18	z19	z20	hh
1	21.36836	80.09726	10224.42	1.178082	38.89041	1.767123	3.520548	4.356164
2	47.10673	83.69345	50189.66	1.241379	52.34483	1.862069	3.758621	5.034483
3	28.87459	82.75283	16071	1.043478	40.86957	1.76087	3.956522	4.543478
Total	28.74471	81.6273	19872.63	1.148649	42.14189	1.783784	3.702703	4.547297

```
-----
      tp1 |      q95      FS
-----+-----
      1 | .3835616      .
      2 | .3448276  6.907931
      3 | .3043478      .
-----+-----
    Total | .3513514  6.907931
-----
```

```
. * deze tabstat maakt een tabel met beschrijvende statistiek (gemiddelden) van de
afhankelijk
> ke en onafhankelijke variabelen, per groep (arbeiders, kleine boeren, arbeiders van kleine
> boeren)
. reg inc i.tp1 z17 z18 z19 z20 hh q95
```

Source	SS	df	MS	Number of obs	=	148
Model	19514.7621	8	2439.34526	F(8, 139)	=	4.87
Residual	69601.1296	139	500.727551	Prob > F	=	0.0000
Total	89115.8917	147	606.230556	R-squared	=	0.2190
				Adj R-squared	=	0.1740
				Root MSE	=	22.377

```
-----
      inc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----+-----
      tp1 |
        2 |  27.46509   5.505358     4.99  0.000   16.58002   38.35016
        3 |  7.236841   4.370918     1.66  0.100   -1.405241  15.87892
      z17 |  5.435624   5.57252     0.98  0.331   -5.582239  16.45349
      z18 | -1.2569035  .1852012    -1.39  0.168   -1.6230792  .1092722
      z19 |  5.919966   4.976312     1.19  0.236   -3.919087  15.75902
      z20 |  3.216344   1.652092     1.95  0.054   -1.0501359  6.482824
       hh | -1.0215315  1.400789    -0.73  0.466   -3.841141  1.800000
      q95 | -1.872188   3.99096    -0.47  0.640   -9.763024  6.018649
-----
```

```

      _cons |    3.983125    15.6711    0.25    0.800   -27.00143    34.96768
-----+-----

```

```
. reg IWI i.tp1 z17 z18 z19 z20 hh q95
```

```

      Source |         SS          df           MS      Number of obs   =        148
-----+-----+-----+-----+-----+-----
      Model |   1622.37373            8   202.796716      F(8, 139)         =        1.75
      Residual |  16124.3956          139   116.002846      Prob > F           =       0.0925
      Total |  17746.7694          147   120.726322      R-squared           =       0.0914
                                         Adj R-squared        =       0.0391
                                         Root MSE            =       10.77

```

```

-----+-----
      IWI |         Coef.      Std. Err.      t    P>|t|     [95% Conf. Interval]
-----+-----+-----+-----+-----+-----
      tp1 |
      2   |    1.007204      2.649837      0.38   0.704    -4.231995    6.246402
      3   |    1.797612      2.103809      0.85   0.394    -2.361992    5.957217
      |
      z17 |   -.0317107      2.682163     -0.01   0.991    -5.334824    5.271403
      z18 |    .2236419      .089141      2.51   0.013     .0473943    .3998895
      z19 |   -.3596013      2.395197     -0.15   0.881    -5.095331    4.376128
      z20 |    1.667839      .7951845      2.10   0.038     .0956182    3.24006
      hh  |   -1.065663      .6742274     -1.58   0.116    -2.398731    .267404
      q95 |    1.498548      1.920927      0.78   0.437    -2.299466    5.296563
      _cons |    70.26826      7.542809      9.32   0.000     55.35479    85.18174
-----+-----

```

```
. reg WL i.tp1 z17 z18 z19 z20 hh q95
```

```

      Source |         SS          df           MS      Number of obs   =        148
-----+-----+-----+-----+-----
      Model |  9.8447e+11            8   1.2306e+11      F(8, 139)         =       16.45
      Residual |  1.0396e+12          139   7.4792e+09      Prob > F           =       0.0000
      Total |  2.0241e+12          147   1.3769e+10      R-squared           =       0.4864
                                         Adj R-squared        =       0.4568
                                         Root MSE            =       86482

```

```

-----+-----
      WL |         Coef.      Std. Err.      t    P>|t|     [95% Conf. Interval]
-----+-----+-----+-----+-----+-----
      tp1 |
      2   |   175012.4      21590.23      8.11   0.000     132324.7    217700.1
      3   |   -3946.875     16980.95     -0.23   0.817    -37521.23    29627.47
      |
      z17 |  -25405.33     21125.03     -1.20   0.231    -67173.27    16362.6
      z18 |   1253.215      668.7133      1.87   0.063    -68.95048    2575.38
      z19 |   26327.55     16906.65      1.56   0.122     -7099.9     59755
      z20 |   17082.61     6432.878      2.66   0.009     4363.67    29801.56
      hh_size | -9307.509      6716.735     -1.39   0.168    -22587.69    3972.669
      q95 |   17699.34     15322.89      1.16   0.250    -12596.73    47995.41
      _cons |   1962138      1491197      1.32   0.190    -986223.9    4910501
-----+-----

```

```
end of do-file
```

```

. log close
  name: <unnamed>
  log: C:\Users\Hans-Willem vd Waal\Dropbox\Divers\PA\Final LOG.smcl
  log type: smcl
  closed on: 11 Jul 2018, 11:29:37
-----+-----

```

IWI FORMULE

```
. generate HC_fm = 0

. replace HC_fm = 1 if t210==4
(1 real change made)

. replace HC_fm = 1 if t210==5
(4 real changes made)

. replace HC_fm = 2 if t210==3
(100 real changes made)

. replace HC_fm = 3 if t210==1
(15 real changes made)

. replace HC_fm = 3 if t210==2
(28 real changes made)

. generate HC_wc = 0

. replace HC_wc = 1 if t426==4
(14 real changes made)

. replace HC_wc = 1 if t426==2
(13 real changes made)

. replace HC_wc = 2 if t426==3
(46 real changes made)

. replace HC_wc = 3 if t426==1
(75 real changes made)

. generate HC_nr = 0

. replace HC_nr = 1 if t48==0
(0 real changes made)

. replace HC_nr = 1 if t48==1
(13 real changes made)

. replace HC_nr = 2 if t48==2
(27 real changes made)

. replace HC_nr = 3 if t48>=3
(108 real changes made)

. generate PU_el = 0

. replace PU_el if t264==1
=exp required
r(100);

. replace PU_el = 1 if t264==1
(147 real changes made)

. generate PU_ws = 0

. replace PU_el = 1 if t372==3
(0 real changes made)

. replace PU_el = 1 if t372==5
(0 real changes made)

. replace PU_el = 2 if t372==4
(0 real changes made)

. replace PU_el = 2 if t372==2
(18 real changes made)
```

```

. replace PU_el = 3 if t372==1
(128 real changes made)

. generate CD = CD_tel*8.61 + CD_ref*8.43 + CD_ph*7.13 + CD_car*4.65 + CD_cyc*1.85 +
CD_cu*4.12 + CD_eu*6.51

. replace HC_fm = -7.56 if HC_fm==1
(5 real changes made)

. replace HC_fm = 1.23 if HC_fm==2
(100 real changes made)

. replace HC_fm = 6.11 if HC_fm==3
(43 real changes made)

. replace HC_wc = -7.44 if HC_fm==1
(0 real changes made)

. replace HC_wc = -1.09 if HC_fm==2
(0 real changes made)

. replace HC_wc = 8.14 if HC_fm==3
(0 real changes made)

. tabulate HC_wc

```

HC_wc	Freq.	Percent	Cum.
1	27	18.24	18.24
2	46	31.08	49.32
3	75	50.68	100.00
Total	148	100.00	

```

. replace HC_wc = -7.44 if HC_wc==1
(27 real changes made)

. replace HC_wc = -1.09 if HC_wc==2
(46 real changes made)

. replace HC_wc = 8.14 if HC_wc==3
(75 real changes made)

. replace HC_nr = -3.7 if HC_nr==1
(13 real changes made)

. replace HC_nr = 0.38 if HC_nr==2
(27 real changes made)

. replace HC_nr = 3.45 if HC_nr==3
(108 real changes made)

. replace PU_el = 8.06 if PU_el==1
(2 real changes made)

. tabulate PU_el

```

PU_el	Freq.	Percent	Cum.
2	18	12.16	12.16
3	128	86.49	98.65
8.06	2	1.35	100.00
Total	148	100.00	

```

. replace PU_el = 8.06 if PU_el>=2
(146 real changes made)

. replace PU_ws = -6.31 if PU_ws==1

```

```
(0 real changes made)

. replace PU_ws = -2.3 if PU_ws==2
(0 real changes made)

. replace PU_ws = 7.95 if PU_ws==3
(0 real changes made)

. tabulate PU_ws
```

PU_ws	Freq.	Percent	Cum.
0	148	100.00	100.00
Total	148	100.00	

```

. replace PU_ws = -6.31 if t372==
invalid syntax
r(198);

. replace PU_ws = -6.31 if t372==3
(1 real change made)

. replace PU_ws = -6.31 if t372==5
(1 real change made)

. replace PU_ws = -2.3 if t372==4
(0 real changes made)

. replace PU_ws = -2.3 if t372==2
(18 real changes made)

. replace PU_ws = 7.95 if t372==1
(128 real changes made)

. generate IWI=CD+HC_fm+HC_wc+HC_nr+PU_el+PU_ws+25
```

WL TABSTAT

```
by tp1, sort: tabstat WL, statistics(mean sd semean)
```

```
-> tp1 = 1
```

variable	mean	sd	se(mean)
WL	10107.99	11310.29	1323.769

```
-> tp1 = 2
```

variable	mean	sd	se(mean)
WL	206517.2	197721.8	36716.01

```
-> tp1 = 3
```

variable	mean	sd	se(mean)
WL	166239.5	142519.5	21013.35

```
.  
tabstat WL (total)
```

variable	mean
WL	97120.94