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► **Wages and working conditions in the banana sector: the case of Costa Rica, Ethiopia, India, Indonesia, and Viet Nam**

Background note

by Luis Pinedo Caro

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Wages and working conditions in the banana sector: the case of Costa Rica, Ethiopia, India, Indonesia, and Viet Nam
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Acknowledgements

This background note is one of three in a research series on wages and working conditions in different sectors, including tea, coffee and banana. The reports seek to contribute to a better understanding of the prevailing wages and working conditions in these selected sectors to feed into the knowledge base for setting of adequate minimum wages, statutory or negotiated. These background notes are undertaken as part of an ILO project on Indicators and methodologies for wage setting supported by the Ministry of Foreign Affairs of the Netherlands. The project seeks to develop indicators and methodologies that will strengthen the capacity of governments and social partners to negotiate and set adequate wage levels, which take into account the needs of workers and their families along with economic factors. The project covers five pilot countries namely, Costa Rica, Ethiopia, India, Indonesia and Vietnam. This report has been prepared by Luis Pinedo Caro under the supervision of Nicolas Maitre.

Executive Summary

This study provides estimates on wages, employment levels and hours worked in the banana sector in five countries - all major banana producers except Ethiopia - namely, India (1st largest producer), Indonesia (3rd), Costa Rica (11th), Viet Nam (13th) and Ethiopia (29th). This study is based on the analysis of 22 household and labour force surveys from the 5 countries under review. Altogether, this report uses the responses of 16,052 banana workers -mostly Costa Rican- over the last two decades representing 1.58 million workers.

Some of the main estimates are the following:

- ▶ In the five countries, it is estimated that there are more than 1 million workers employed in the banana sector. Contrary to other products such as coffee or tea, banana is produced all year long and does not experience a strong seasonality component.
- ▶ The share of women among banana workers varies from an estimated 15.4 per cent in Costa Rica, 25.3 per cent in India, and 32.5 per cent in Indonesia, up to more than 40 per cent in Ethiopia.
- ▶ The age and education profile of workers in the banana sector vary widely across countries, with workers being on average younger and with lower educational attainments in Ethiopia and India, and considerably older with relatively higher educational attainments in Costa Rica and Indonesia.
- ▶ While in Costa Rica and India a majority of workers are paid employees, the banana sectors of Indonesia and Ethiopia obtain most of their production from smallholder farmers. In those latter countries, employees are seldom hired and the use of unpaid family workers is commonplace.
- ▶ Regarding the degree of vertical integration in the banana sector, in Costa Rica it is easier to find factory workers and high skilled professionals working alongside field workers. In contrast, the banana sector in India only includes field workers.
- ▶ Looking only at employees, estimated median monthly earnings amount to approximately USD 18 in Ethiopia, USD 94 in India, USD 110 in Indonesia, up to USD 567 in Costa Rica.
- ▶ Own-account workers earn approximately USD 6 in Ethiopia, USD 73 in Indonesia, USD 95 in Costa Rica and USD 163 in India.
- ▶ On average, women earn less than men in all countries analysed. The monthly gender pay gap among employees in the banana sector is equal to 10.6 per cent in Costa Rica (field workers), 37.1 per cent in India, and 9.2 in Indonesia.
- ▶ Time series data from 2011 to 2018 in Costa Rica shows that banana employees have actually increased their purchasing power (measured in constant \$USD of 2020) by 14.0 per cent since 2011 (2011 average vs. 2018 average). At the same time, the earnings of smallholder farms has decreased by 39.1 per cent in real terms.
- ▶ Estimated hours worked by employees in the banana sector range from 39.8 hours in Indonesia, 46.2 hours in India, to 57.6 hours in Costa Rica.
- ▶ In Costa Rica the average hourly wage in the banana sector (3.14) is higher than the minimum wage and higher than the average hourly wage paid in the agricultural sector. In India, we observe that the hourly wage paid in the banana sector (0.45) fall into the range of minimum wages and is also higher than the average hourly wage paid in the agricultural sector. The same cannot be said for Indonesia where the average hourly wage is slightly lower than the lowest of the applicable minimum wages (the one found in Java) and slightly lower than the average hourly wage paid in the agricultural sector.
- ▶ Regarding compliance with the minimum wage, in Indonesia, 81.7 per cent of the employees receive a wage lower than the minimum wage. In India and Costa Rica, the share of employees receiving wages that are lower than the minimum wage reaches respectively, 33 (India) and 40.3 per cent (Costa Rica).
- ▶ Data for Costa Rica shows that larger employers pay higher wages, provide work on a more regular basis and create high skilled jobs more often than smaller plantations.



1. Introduction

Historically bananas have been mostly consumed locally¹ yet the quantities produced and exported have been growing year by year as did the number of families that depend on this product to sustain their livelihoods. Due to the increasing importance of banana trade, information on exported quantities, consumption and price levels is commonplace and detailed studies can be found for several countries. Yet, not as much is known about wages and working conditions in producing countries.

The International Labour Organization (ILO) has therefore embarked on a project aimed at improving the information on wages, employment levels and hours worked in the banana sector to fill the existing knowledge gap, and to strengthen the ability of governments, social partners, and others to negotiate and set adequate wage levels in the sector. This study covers the five pilot countries of the project -all major banana producers except Ethiopia- namely, India (1st largest producer), Indonesia (3rd) Costa Rica (11th),² Viet Nam (13th) and Ethiopia (29th).

TABLE 1. RANKING, TOP BANANA PRODUCING COUNTRIES, 2017

Position, country	Output (000' Tons)	Position, country	Output (000' Tons)
1.India	30,477	6.Philippines	6,041
2.China	11,170	7.Angola	4,302
3.Indonesia	7,163	11.Costa Rica	2,553
4.Brazil	6,675	13.Viet Nam	2,045
5.Ecuador	6,282	29.Ethiopia	563.3

This study is based on the analysis of 22 household and labour force surveys from the 5 countries under review. These databases has provided useful time-series to explore and construct trends for Costa Rica and to compare the current conditions in the banana sector across countries. Altogether, this report uses the responses of 16,052 banana workers -mostly Costa Rican- over the last two decades representing³ 1.58 million workers.

In addition to basic information on working conditions, the analysis of the post-harvest modules of the Ethiopian household survey allows us to obtain output figures as well as quantifying labour demand. More importantly, it provides a rather unique snapshot of the Ethiopian banana sector, including its structure. Thanks to this we are able to estimate the share of banana producers represented in the data and find that Ethiopia's banana production may be larger than expected due to a large number of farms cultivating banana for their own consumption or for small scale trade.

The report is divided into three sections. Section 2 describes the dataset and offers details on how banana workers are identified within each country. Section 3 contains the core of the analysis and is divided into five subsections. These describe the employment structure, some characteristics of the workers such as their age and education profile, their monthly and hourly wages and their hours worked. In addition, section 3.5 looks at company size and assesses whether scaling up businesses pays off for Costa Rican workers. At last, Section 4 concludes.

¹ <https://www.encyclopedia.com/social-sciences/applied-and-social-sciences-magazines/banana-industry>

² See deagostinigeografia.com.

³ After using the survey weights provided by the national statistical offices.



2. Database description

This study uses 22 household and labour force surveys from five countries, Costa Rica, Ethiopia, India, Indonesia, and Viet Nam. For more information regarding the data sources, Table A.1 in Appendix A provide a visual description of the type of survey used, the exact years for which data have been collected and the periodicity (monthly, quarterly) of the data.

Given the numerous sources of data an effort has been made to harmonize a number of variables in a way they can be used in a cross-country report. This harmonization has followed a similar process to the one found in the Labour Force Micro-dataset of the Global Employment Trends for Youth 2017 and 2020, both published by the ILO.

The complete list of harmonized variables can be retrieved from the database documentation, which is available in the form of a separate Excel file. As a summary, variables concerning age, educational attainment, region, labour market status, status in employment, economic activity, occupation, hours worked, and earnings are included in the dataset. Even though the documentation provides an explanation for all the variables present in the dataset we offer some additional details on how certain -critical- variables have been harmonized and the limitations/ comparability issues that may exist across countries/datasets.

Seasonality. Banana is produced all year long and generally speaking lacks the strong seasonality component that other products (e.g. coffee) may show. In this sense, even surveys that do not cover the whole year may still represent labour market indicators accurately. In this report the Costa Rican household survey (2001-2009), and the Indonesian labour force survey (2018) only cover the third quarter while the Ethiopian household survey (2016) covers the first quarter. It might still be the case that some variability exists across quarters; in this sense, the quarterly databases of Costa Rica (2010-2018) provide, throughout the report, a helping perspective to better understand the relevance of the phenomenon and its consequences.

Identifying banana workers in Indonesia and Viet Nam. Neither in Indonesia nor in Viet Nam the banana sector is assigned an exclusive activity code (it is shared with a number of other fruits). This poses a challenge for the production of figures on the banana sector of these two countries.

In Indonesia activities are classified following the KBLI⁴ 2005 (2007 and 2010 LFS) and the KBLI 2015 (2018 LFS). These two classifications are adapted from, respectively, the International Standard Industrial Classification of All Economic Activities (ISIC) rev.3 and rev.4. In the case of the KBLI 2005 banana activities are placed together with all year long fruits. In turn, the KBLI 2015 places banana picking activities in the more restricted group of growing of tropical fruits activities. Since the KBLI 2015 code follows a narrower definition than the one followed by the 2005 KBLI classification we discard the 2007 and 2010 LFS's from being used in the report. In our assessment, the percentage of identified workers expected to be actual banana workers is 53.5 per cent (see Appendix B). Since it is more than half, we provide all statistics -except total employment figures- assuming that all workers classified under the code 1220 are all banana workers. Yet, the reader is warned, the figures are shown for informative purposes and cannot be totally trusted.

In Viet Nam, the problem is exacerbated. First of all, banana is always (2011-2018) classified together with all the other groups of fruits. Secondly, in 2018 the estimated share of banana workers among all fruits' workers is an extremely low 7.4 per cent. In light of the difficulties encountered in identifying banana workers we decided to only report figures on total employment in the banana sector of Viet Nam (see Appendix B for calculations).

Identifying banana workers in India. India's 2012 labour force survey uses the National Industrial Classification (NIC) of 2008 where banana workers are assigned a unique code. The same cannot be said of either the 2000 or the 2005 India's databases. The NIC 1998 puts banana workers together within the "growing of fruits" activities. Even though a region by region⁵ identification was

4 Klasifikasi Baku Lapangan Usaha Indonesia, Indonesian Standard Industrial Classification.

5 Indian states are divided into regions.

performed to find banana producers, the resulting figures do not seem to be comparable across years. As a result, only figures from the 2012 LFS are used in this report.

Identifying banana workers in Ethiopia. The harmonization of employment figures in the Ethiopian household survey goes beyond finding an activity code and needs to be described in detail. The main issue is brought by economic activities not being disaggregated beyond some broad groups. For example, all agricultural activities are put together, thus, not allowing us to identify banana workers. In order to circumvent this problem, we use the so-called “Post-Harvest” modules of the survey; a set of questions directed at every smallholder farm about their agricultural production. Thanks to these modules, we are able to identify banana plantations and distinguish among employers, own-account workers and unpaid family workers based on the characteristics of the plantation and the workers’ responsibilities within the farm.

Unfortunately, the above-described strategy does not solve the problem of identifying employees in the banana sector. In order to have an estimate on the number of employees hired in the plantations, their wages and their characteristics we use the Ethiopian Household Survey as if it were an enterprise survey. Based on the information reported by each farm regarding the people hired during the last harvesting season we are able to collect information on average wages as well as the number of employees hired. For both variables the information comes disaggregated by gender and by age group (children vs. adults). It should be noted that employees may have been counted more than once since some of them may be going from farm to farm during the harvesting period. In this sense, the number of employees should not be compared to figures from other countries.

Assigning status in employment in Ethiopia. A recurrent issue when assigning statuses in employment to smallholder farmers relates to the own-account/unpaid family worker distinction. Usually women and children tend to be classified as unpaid family workers while men tend to hold the own-account worker title. In Ethiopia, we used the households’ own responses with respect to who in the household was responsible for banana tree parcels when assigning these statuses. As a result, every person named as responsible of at least 1 parcel was assigned own-account worker status (usually the husband and the wife). The rest of the household members - if working in agricultural activities - are given an unpaid family worker status. Even though the results (see Figure 4) shows a much more balanced gender split of statuses in employment than in other countries we did not make any attempt to re-balance it as the criteria used seems to do justice to family members’ self-reported managerial roles.

Earnings. Data on earnings exist for all four countries -with some limitations.⁶ The most challenging dataset was Ethiopia. Smallholder farms are not asked about their average monthly earnings -as it is done in other surveys. Instead, they reported how many bananas were produced, how many bananas they have already sold, the price at which they sold them and the percentage of bananas they plan to sell (out of their total production). Farmers who did not sell and did not expect to sell bananas (own consumption only) were not considered employed even if they carried out farm activities during the reference week. For those who had already sold some bananas the earnings were calculated by multiplying the price per kilo received by the amount of output that is for sale. In the event farmers expect to sell some bananas but have not done so yet, an average price calculated at the region level is applied to calculate their expected yearly earnings. Then, the earnings are divided by 12 so that the figure can be compared to those found in the other countries.

To facilitate the comparability across countries, earnings were deflated/inflated to 2011 using the World Bank’s inflation rates. Then, all local currencies were converted to \$USD using the exchange rate that prevailed in 2011 and inflated to 2020 using, again World Bank inflation rates. All figures shown in this report are, thus, provided in 2020 \$USD. The reader may notice that even in the countries where employer’s earnings are available, they are seldom reported throughout the report. This has to do with the small sample size usually surrounding this group of workers.

⁶ India 2000 and Viet Nam 2011-2014 only provide earnings for employees. Indonesia does not provide earnings for employers



3. Working conditions in the banana sector

3.1 Employment levels in the banana sector

Banana is an activity that allows households to obtain a regular income all year long. It may not seem like an important characteristic at first but it can make a difference for many workers; from employees that may not need to move from one area to another to smallholder farmers that manage to secure a steadier flow of income irrespective of the season.

Employment figures (see Table 2 for an overview) vary widely as does the impact on local labour markets. For example, in India more than half million workers are employed annually in the banana sector, a likely consequence of the country being the number one producer of banana worldwide. Figures are more modest in the other countries of the study; for example, in Indonesia and Viet Nam, who are respectively 5th and 12th in the ranking⁷ of banana producers, estimates suggest that there are slightly less than one hundred thousand workers in each country.⁸ The similar number of workers in Indonesia and Viet Nam contrast with their output levels, 2,045 Tons in Viet Nam and 7,163 in Indonesia.

TABLE 2. THE BANANA SECTOR, NUMBER OF WORKERS AND IMPORTANCE AT THE NATIONAL LEVEL

Country	Number	(%) of all workers	Share of women
Costa Rica, 2018	35,316	1.68	15.4
Ethiopia, 2016	273,363	0.69	40.6
India, 2012	572,229	0.14	25.3
Indonesia, 2018	92,736	0.07	32.5
Viet Nam, 2018	91,960	0.17	na

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available.

Notes: The table shows the country-specific number of workers employed in the banana sector, the country-specific share of workers employed in the banana sector and the country and sector-specific share of women working in the banana sector.

Costa Rica hosts relatively productive banana plantations, although the small size of the country limits the number of workers involved at 35,316. Still, in terms of impact at the national level it ranks first among the five countries, with 1.7 per cent of the workers employed in the sector. This figure does not do justice to the impact that banana plantations have on the Huetar Caribe region, though. In this region, the banana sector not only provide jobs to almost one in five workers but also plays a critical part in the local economy.

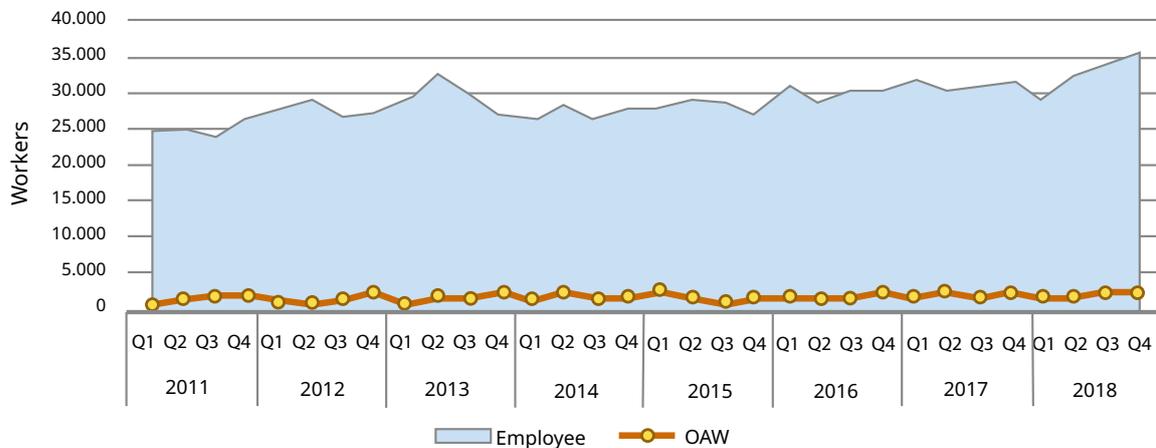
Costa Rica is not the only country where banana production is relatively concentrated.⁹ The same phenomenon also happens in India and Ethiopia. As a result, the slim impact on employment shown by banana producers at the national level is overturned in certain regions. For example, five Indian states, Tamil Nadu, Kerala, Andhra Pradesh, Maharashtra, and Karnataka concentrate more than 88 per cent of all the banana workers. Moreover, in the rural areas of Kerala and Tamil Nadu nearly 1 per cent of the workforce is employed in banana plantations, seven times higher than the national share.

7 Deagostinigeografia.com

8 See Appendix B for an explanation of how they were estimated.

9 The interested reader may find maps with the distribution of employment by country in Appendix C.

FIGURE 1. EMPLOYMENT LEVELS IN THE BANANA SECTOR OF COSTA RICA, 2011-2018, QUARTERLY DATA



Source: Harmonized labour force survey of Costa Rica and author's own calculations, quarterly data, 2011-2018.

Notes: The figure shows the number of own-account workers (OAW) and employees in the Costa Rican banana sector between 2011 and 2018.

Ethiopia also concentrates more than 98 per cent of the banana-related employment in the Southern Nations, Nationalities and Populations (SNNP) and Oromia regions. This figure refers to farm owners and unpaid family workers of plantations where (1) banana is sold, (2) the product brings at least 50 per cent of the farm's earnings and (3) the farmers worked during the reference week. In spite of the effort made to restrict non-market-oriented farms from employment figures more than a quarter million workers are still recorded. This is counter intuitive because Ethiopia's banana output is 60 times lower than that of India. Obviously, Ethiopian farms are much smaller, yet the reader interested in Ethiopia's banana sector may want to read Box I below titled "Banana in Ethiopia: Interpreting statistics".

Time series figures are only available for Costa Rica. Two trends emerge from the analysis of 2011-2018 quarterly data; on the one hand the banana industry is creating jobs, with the number of workers increasing from the 1st quarter of 2011 to the 4th quarter of 2018 by 44.3 per cent. On the other hand glimpses of seasonality can be observed. Even if by no means as sharp as in the coffee or the tea sector, the number of employees fluctuates, on average, by 11.4 per cent within a year. Changes in the number of own-account workers are even higher, up to 46.0 per cent, but they should not be taken too literally because of the small sample and their relatively little relevance in the Costa Rican banana sector. Ideally it would be interesting to test possible seasonality effects on self-employed workers in countries like Indonesia and Viet Nam. Unfortunately such data is not available.

3.2 Socio-demographics of banana workers

Our analysis suggest that in India and Costa Rica the age of banana workers is close to the average age of workers in their respective country. The same cannot be said for Ethiopia and Indonesia, where workers tend to be, respectively, younger, and older. A reason for this difference may be found in the structure of employment. For example, in Indonesia there is a majority of own-account workers which tend to be older.

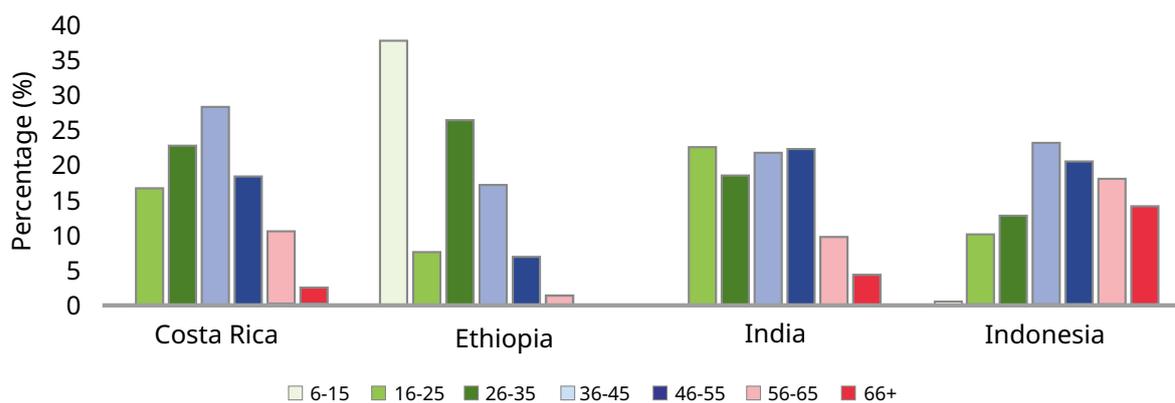
TABLE 3. AGE DISTRIBUTION OF BANANA WORKERS, SUMMARY STATISTICS

Country	All Workers		Banana sector		
	Average		Median	10th percentile	90th percentile
Costa Rica	40.65	39.78	40	22	58
Ethiopia	29.14	24.97	26	8	43
India	37.83	40.81	42	22	60
Indonesia	40.49	47.33	47	25	69

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The table shows the average, median, 10th and 90th percentiles of the age distribution of banana workers. It also shows the average age of all workers for comparison purposes.

In Ethiopia, the status in employment also plays a role but in a different way. Half of the banana workers are classified as unpaid family workers. Moreover, most of these unpaid family workers are young, thus, bringing the average age down (see Figure 2 for the complete age distribution). Status in employment also shapes the age at which workers retire. In Huetar-Caribe (Costa Rica) 92.3 per cent of the workers aged less than 65 are employees; the share decreases to 66.6 per cent among those aged 65 or over. This suggests that the share of employees decrease within older age group of workers.

Employment opportunities are also dependent on the level of education achieved by individuals. Banana workers have spent, on average, less years in education than other workers. For example, the share of banana workers with at least completed secondary education is, respectively for Costa Rica, Ethiopia, India, and Indonesia, 25.8, 0.0, 41.2 and 31.1 per cent while for all the workers in the country is up to 51.9, 10.1, 43.6 and 58.6 per cent. In the countries where the difference between the above figures is smaller the share of sector-specific share of young people working in the banana sector is higher.

FIGURE 2. AGE DISTRIBUTION OF BANANA WORKERS, DISTRIBUTION

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The figure shows the country-specific share of banana workers in a given age range for 7 age groups.

Box I. Banana in Ethiopia: Interpreting statistics.

The implementation of the ILO employment definition in Ethiopia yields 273,363 workers in the banana sector. Interestingly, the figure may be, at the same time, too high and too low. Too high when compared with the number of active workers and the output officially generated in India, Indonesia, Costa Rica, or Viet Nam. In principle, this could be explained (see the table below) with an extremely low worker productivity. At the same time, the employment figure of Ethiopia may also be regarded as being too low when compared with all the smallholder farms that had ever produced banana in 2016, 15.1 million people and 2.6 million households. Does it mean productivity is close to zero?

OUTPUT AND WORKFORCE, ILO DEFINITION

Country (year)	Workers	Output (000' tons)	000' tons per worker
Costa Rica (2018)	35,316	2,195	0.062
Ethiopia (2016)	273,363	538	0.002
India (2012)	572,229	24,869	0.043
Indonesia (2018)	92,736	7,162	0.077
Viet Nam (2018)	91,960	2,045	0.022

Source: Household and labour force surveys, deagostinigeografia.com and author's own calculations.

Notes: The output figures for Indonesia, Viet Nam, and Costa Rica refer to 2017.

The answer is simpler, we are comparing things that should not be compared. If we are to interpret Ethiopian banana data correctly, we should know that the Ethiopian household survey is very unlikely to be representative of the whole banana sector of the country. The banana farms sampled in the data produced 141,784 tons of banana in 2016, just 26.4 per cent of the official country's output in 2016, see table above. As a comparison, Berzuneh (1975) reports family plantations to account for 35 per cent of total production. The 8.6 percentage points difference is probably due to the figure being quite dated, the sector have become more export oriented since the 70's. Nonetheless, the interpretation is clear, most bananas are being produced in large plantations that are not covered by the microdata. As a result, the data shown in the table above for Ethiopia is not comparable with the ones from the other countries -it mixes output from large plantations with labour from small farms whose output may not even have been included in the official figure.

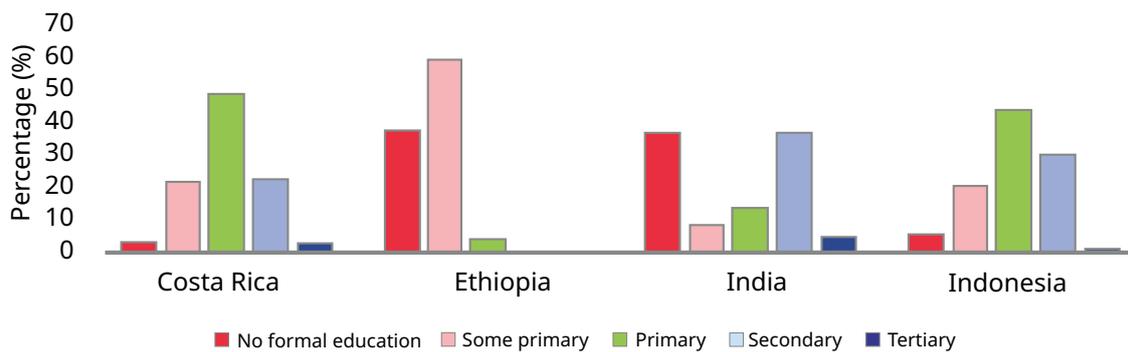
What can we learn from the Ethiopian data, then? First, we know that smallholder farms represent around one quarter of Ethiopia's banana output. Moreover, there are 2.5 million families cultivating banana across the southern regions of the country but only 1.1 million sold any of the fruits and a much lower number, 80,258, can be considered market oriented in the sense of cultivating areas larger than 500 square metres with an average production of 476.4 kg. per year. Still, in spite of the relatively high volume produced by these market-oriented farms, their total output is just 38,234 tons of banana, i.e. roughly 100,000 tons of banana are likely missing from the official statistics because they are either consumed by the farmers' families or sold in small quantities locally.

A similar perspective can be obtained by looking at the hiring behaviour of banana farmers: Most of the plantations covered are tiny and rely on family helpers. It can be observed that only 6,041 farms (out of 80,258 market-oriented farms) sought help from paid workers during the last harvest season. In total, no more than 20 thousand hires. The picture does not change when looking at area planted; the share of farms with more than 500 square metres planted is just slightly above five per cent. Looking at it from another angle, we find that half of the households had planted less than 60 square metres.

With regards to this report we apply the ILO definition when defining employment in the banana sector. As a result, the data from Ethiopia used throughout these pages covers **37,094 smallholder farms** that account for **6.9 per cent** of the country's output. It certainly cannot be taken as representative of the country's sector and the reader is advised to treat the information provided bearing this in mind.

Education certainly increases the number of job opportunities away from banana plantations, but it may also offer higher earnings within the banana sector. This can be seen by the returns to education estimated separately for self-employed and employees in Costa Rica, and Indonesia. Note that results for Indian employees are not displayed in Table 4 because the overall sample size is too small.

FIGURE 3. EDUCATIONAL ATTAINMENT OF BANANA WORKERS, BY COUNTRY



Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The figure shows the country-specific share of banana workers in a given level of education for 5 levels of educational attainment. Levels are completed unless otherwise stated.

In both countries earnings are correlated with the level of education yet the education level that triggers the rise in pay varies by country. For instance, in Indonesia primary schooling already seems to provide a significant earnings' prime. This is not the case in Costa Rica, where schooling makes a difference only after having finished secondary education. The Costa Rican delay is probably due to most workers having finished at least primary education (i.e. it is no longer an advantage), which is not the case in Indonesia.

Perhaps more interestingly from the perspective of bringing skill to the agricultural sector is the return to education of Costa Rican workers with tertiary degrees. They earn between 3 to 4 times the monthly salary of field workers -around 2,338.2 \$USD of 2020. These results are based on a sample size of 28 workers with tertiary education. Moreover, there has been a constant presence of workers with tertiary education in the banana sector of Costa Rica in all the years under analysis (2001-2018). Even though they constitute a small percentage of the workforce it shows there is space for them and, more importantly, they have potential to increase the profitability of the plantations.

TABLE 4. RETURNS TO SCHOOLING IN THE BANANA SECTOR (% INCREASE IN MONTHLY EARNINGS)

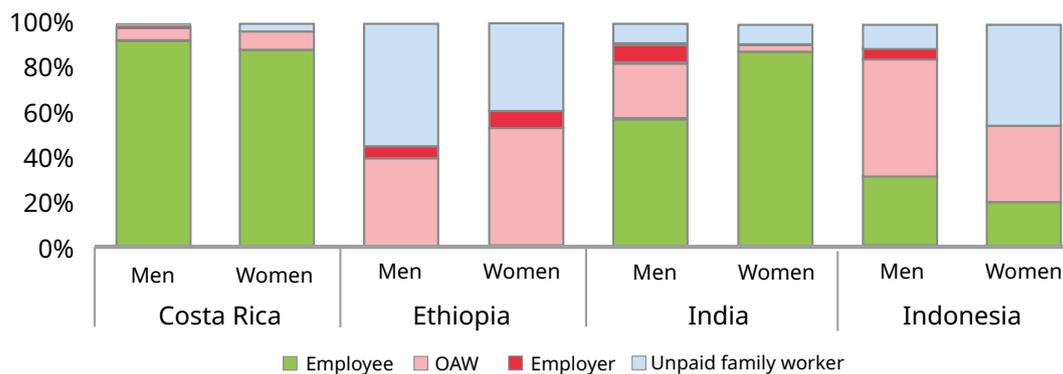
Level	Costa Rica		Indonesia	
	Employees	Self-employed	Employees	Self-employed
No formal educ. (default=0)				
Primary	7.5***	5.4	65.6***	32.9
Secondary	54.8***	126.7***	74.1**	69.3**
Tertiary	340.0***	543.1***	204.4**	68.5
Observations	14,269	672	80	330
R2 coefficient	0.2232	0.093	0.2292	0.032

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** Country level regressions for Costa Rica (2001-2018), India (2012) and Indonesia (2018). Log earnings regressed on binary indicators for education. Earnings expressed in 2011 \$USD. No other controls are added. Numbers in red signal small samples (less than 10 observations) in the respective group. Significance, *** at 1%, ** at 5%, * at 10%.

3.3 Structure of the workforce in the banana sector

One of the variables that characterizes a sector is the status in employment of its workers. The data available allows us to identify three cases, Costa Rica, with 92.4 per cent of its banana workers being employees, India with a slightly mixed production structure and 64.5 per cent of its workforce hired as employees and Indonesia, with a majority (72.6 per cent) of its workers classified as self-employed.

FIGURE 4. STATUS IN EMPLOYMENT, BANANA SECTOR, BY COUNTRY AND SEX



Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The figure shows country, sector, and sex-specific percentages of banana workers in four employment statuses, employee, own-account worker (OAW), employer and unpaid family worker.

Gender roles and a gender-biased statistical classification for status in employment also generates gender differences. For example, in Indonesia there is a gender imbalance among the types of self-employed workers; while men tend to be classified as own-account workers or employers the majority of women are classified as unpaid family workers. This gender imbalance is also visible in India and Costa Rica although to a much lower extent for two reasons; first, paid employment is widespread. Second, in India women tend to be out of labour market activities more often than men do in Indonesia. This becomes apparent when noting that in 2010 42.4 of the Indonesian women were working (all ages included) while only an estimated 18.8 per cent did so in India (2012).

It is apparent from Figure 4 that the Ethiopian employment structure is quite unique in comparison with the ones of the other three countries. Not only there are no employees but there is also a higher share of unpaid family workers among men than among women. With respect to the mentioned lack of employees, care should be taken; the Ethiopian data only represents a small subgroup of self-employed banana producers, hence the lack of employees. The lower gender-specific share of unpaid family workers among women is more revealing, though. We took care of the classification of workers into own-account worker and unpaid family worker statuses in a gender-neutral way. Men or women were assigned OAW status whenever they themselves reported to have been in charge of at least one of the parcels in which their farm is split. In this regard, it is striking to observe much more balanced shares of unpaid family workers and other self-employed workers.

The status in employment is also related to the type of occupations within the banana sector. Higher shares of employees tend to be associated to a higher degree of vertical integration of business processes -accounting, finance, sales, marketing. The kind of tasks performed in these occupations has potential for increasing the value added created by the company and may perhaps explain the higher earnings earned by Costa Rican banana workers.

TABLE 5. OCCUPATIONS OF BANANA WORKERS, BY COUNTRY

Country	Costa Rica	Ethiopia	India	Indonesia
Professionals and technicians	6.3	0.0	0.0	0.5
Salesmen, clerks	5.5	0.0	0.0	1.2
Factory workers	24.1	0.0	0.0	0.0
Field workers	64.1	100.0	100.0	98.4

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The table shows country and sector-specific shares of banana workers in four occupations. Occupations are defined using ISCO-08 codes, "Professionals and technicians" refer to major groups 1, 2 and 3; "Salesmen, clerks" to groups 4 and 5; "Factory workers" to groups 7, 8 and subgroups 91, 93, 94, 95 and 96; at last, "Field workers" refer to the group 6 and the subgroup 92.

As it can be seen in Table 5 only 64.1 per cent of the Costa Rican banana workers are banana pickers. The next group in terms of share size is made of so-called "factory workers" holding occupations defined in the International Standard Classification of Occupations (ISCO-08) groups 7, 8 and 9 (excluding code 92, agricultural labourers). In practice, a closer inspection of the activities at the 2 digit level reveals that most of these factory workers are banana pickers preparing the fruit to be exported. Moreover, there is also room in the sector for salesmen (5.5 per cent) and, more importantly, high skilled professionals, 6.3 per cent of the workforce. In contrast, the banana sector in India only includes field workers. However, it should be noted that the sample size in India is seven times smaller than in Costa Rica (225 vs. 1,405) and it could be part of the reason for not finding a different workforce composition.

3.4 Earnings and hours worked in the banana sector

The information available allows us to compare average wages that range from as low as \$24.1 in Ethiopia to \$604.0 in Costa Rica, in both cases for field workers, measured in 2020 \$USD. In contrast, monthly earnings among own-account workers shows much less variability.

TABLE 6. MONTHLY LABOUR EARNINGS IN THE BANANA SECTOR, BY STATUS IN EMPLOYMENT

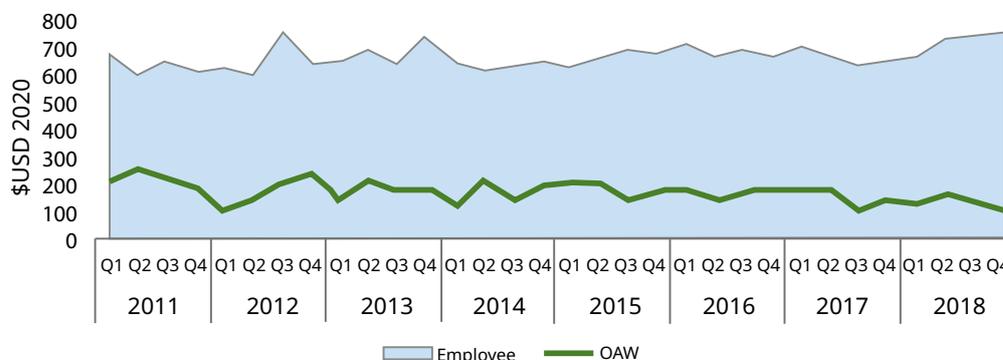
Country	Average			Median		
	Employee	OAW	Employer	Employee	OAW	Employer
CR-Agricultural	604.0			567.2		
CR-Factory	635.4			609.6		
CR-Sales	710.3	134.9	1033.4	679.9	94.5	661.7
CR-Professionals	2338.2			2063.8		
Ethiopia	24.1	7.0	170.3	17.6	6.1	170.3
India	90.4	188.9	na	94.0	162.5	na
Indonesia	124.4	116.2	na	109.9	73.3	na

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The table shows summary statistics on monthly labour earnings by status in employment and occupation (the latter only for Costa Rica-CR). Earnings measured in 2020 \$USD.

The cross-country wage differences found among employees are harder to explain merely based on output levels. For example, the plantations of Indonesia seem to be more productive than the ones found in Costa Rica (see Appendix B for the data and the source) yet Indonesian field workers earn five times less than the Costa Rican ones. This hints that wage levels have a strong local component and may be negotiated based on comparable jobs locally, i.e. the jobs field workers would have access to if they were not picking bananas. In light of these wage differences there seems to be room for higher wages in Indonesia, India or Ethiopia.

Figure 5 provides average monthly earnings for Costa Rican workers from 2011 to 2018. It shows banana employees have actually increased their purchasing power (measured in constant \$USD of 2020) by 14.0 per cent since 2011 (2011 average vs. 2018 average). At the same, the earnings of smallholder farms has decreased by 39.1 percent in real terms, a figure that highlights the difficulties faced by the families who sustain this type of farms.

FIGURE 5. MONTHLY LABOUR EARNINGS IN COSTA RICA, 2011-2018 BY STATUS IN EMPLOYMENT



Source: Harmonized labour force survey of Costa Rica and author's own calculations. **Notes:** The figure shows average monthly labour earnings by status in employment in Costa Rica, 2011-2018, 2020 \$USD.

The vertical integration existing in the Costa Rican banana sector -Robinson (2010)- also shows it is able to attract high skilled workers and pay them accordingly. Professionals not only have the highest salaries in the sector at \$1,994 per month, they are also higher than the national average for the same occupational group, \$1,383. However, gender pay differentials are also among the highest in the category -see Table 7.

Status in employment plays, once again, a role when analyzing gender pay gaps. The fact that women who work limited hours are classified as unpaid family worker increases monthly pay gaps (see Table 7, all workers' columns). This phenomenon plays a minor role in Costa Rica due to the high share of employees in the sector, but it makes a noticeable difference in India and Indonesia.

TABLE 7. MONTHLY LABOUR EARNINGS IN THE BANANA SECTOR, BY SEX

Country	All workers				Employees			
	Average		Median		Average		Median	
	Men	Women	Men	Women	Men	Women	Men	Women
CR-Agricultural	566.7	292.8	557.7	113.4	605.9	541.6	572.8	538.8
CR-Factory	652.9	607.6	620.1	580.3	652.9	611.2	620.1	581.9
CR-Sales	725.0	663.8	661.1	679.9	725.0	663.8	661.1	679.9
CR-Professionals	2415.5	1525.1	2378.9	1441.5	2415.5	1525.1	2378.9	1441.5
Ethiopia	22.9	26.7	4.7	9.5	na	na	na	na
India	135.2	66.7	109.6	55.3	103.5	65.1	94.0	55.3
Indonesia	130.0	83.7	109.9	73.3	127.0	115.3	109.9	132.4

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available. **Notes:** The table shows summary statistics on monthly labour earnings by sex and occupation (the latter only for Costa Rica-CR). Earnings measured in 2020 \$USD.

Irrespective of whether we compare gender pay gaps based on median or average earnings they are in favour of men in all countries. For example, the gender wage gap is 10.6 per cent in Costa Rica (field workers), 37.1 per cent in India, and 9.2 in Indonesia. Let us bear in mind that women work, on average, fewer hours than men and, thus, rigorous earnings comparisons are better kept for data on hourly earnings. Please, note that data on Ethiopian employees by gender is not shown in Table 7 due to the small size of the sample.

Once the number of hours worked are considered we find, for employees, the following gender wage gaps: 19.9 per cent in Costa Rica, 35.4 per cent in India and 9.6 per cent in Indonesia. As a

curiosity, gender wage gaps are negatively correlated with female labour force participation¹⁰ in the respective countries, 46.2 per cent (Costa Rica), 27.1 per cent (India) and 52.1 per cent (Indonesia). On the contrary, among own-account workers hourly gender pay gaps remain relatively similar across countries, ranging between 28.6 per cent in Indonesia and 33.9 per cent in Costa Rica.

TABLE 8. HOURLY EARNINGS AND MINIMUM WAGE IN THE BANANA SECTOR, BY STATUS IN EMPLOYMENT

Country	Hourly wages (employees)			Minimum Wage	Hourly earnings (OAW)		
	Banana	Agriculture	Country		Banana	Agriculture	Country
Costa Rica	3.14	2.87	4.51	2.38	1.18	2.34	3.23
Ethiopia	0.12	na	0.90	na	0.19	1.39	1.25
India	0.45	0.37	0.74	0.27-0.53	1.02	0.70	0.72
Indonesia	0.74	0.77	1.29	0.79-1.49	1.03	1.07	1.17

Source: Harmonized household and labour force surveys of the relevant countries, official minimum wages and author's own calculations, latest year available. **Notes:** The table shows average hourly labour earnings in 2020 \$USD for employees and own-account workers. In addition, it shows hourly minimum wages wherever applicable; ranges are shown for countries where minimum wages vary by region, only the regions with banana workers are considered.

Minimum wage compliance. The wages paid to banana workers compare well to minimum wages in Costa Rica and, to a lesser extent, in India. In fact, Figure 8 shows that in Costa Rica the average hourly wage in the banana sector (3.14) is higher than the minimum wage and higher than the average hourly wage paid in the agricultural sector. In India, we observe that the hourly wage paid in the banana sector (0.45) fall into the range of minimum wages and is also higher than the average hourly wage paid in the agricultural sector. The same cannot be said for Indonesia where the average hourly wage is slightly lower than the lowest of the applicable minimum wages (the one found in Java) and slightly lower than the average hourly wage paid in the agricultural sector. A different comparison can be done by calculating the ratio of banana wage to national average wage. By calculating this ratio we find that Indonesia (57.2 per cent) is not that far from India (61.9) or Costa Rica (69.7).

Table 9 provides some indication of compliance levels with the minimum wages in the banana sector. Compliance rates with the minimum wages are calculated for all countries except for Ethiopia where no minimum wage exists. In the case of Costa Rica, in addition to higher occupational rates, there is a national minimum wage (the minimum minimorum) that applies in all regions. On the contrary, India and Indonesia have regional minimum wages, sometimes combined with occupational minimum wages. In these countries compliance is calculated at the state (India) or province (Indonesia) level. In India, although most banana production is concentrated in Tamil Nadu, Kerala, Andhra Pradesh, Maharashtra, and Karnataka, it is also produced in 10 more states in 2012. Compliance is calculated separately for each state with the respective minimum wage and then aggregated. As for Indonesia, banana is ubiquitous and is produced in 29 of the 32 provinces of the country. We use the 2018 minimum wages of each of the 29 provinces of Indonesia where banana producers were found.¹¹

¹⁰ Female labour force participation among working age (15-65) women in the same years the data for earnings come from.

¹¹ The only provinces where banana was not detected are Bantem, Di Yogyakarta and Dki Jakarta.

TABLE 9. MINIMUM WAGE COMPLIANCE IN THE BANANA SECTOR

Minimum wage	Costa Rica		India		Indonesia	
	Employees	OAW	Employees	OAW	Employees	OAW
<95%	40.3	94.4	33.0	13.8	81.7	70.8
95%-105%	12.9	1.1	11.3	1.1	10.0	2.8
>105%	47.0	4.6	55.7	85.1	8.3	26.4

Source: Harmonized household and labour force surveys of the relevant countries, official minimum wages and author's own calculations, latest year available. **Notes:** The table shows the country, sector and status in employment-specific share of workers earnings less than 95%, between 95% and 105% and above 105% of the applicable hourly minimum wage. Minimum wages do not apply to own-account workers (OAW), their potential compliance levels are shown for informative purposes.

Compliance levels are available in Table 9, where the share of employees whose earnings fall below 95 per cent of the minimum wage value, between 95 and 105 per cent of the minimum wage value, and above 105 per cent of the minimum wage value are reported. We can observe that compliance with minimum wage is higher in India than in Costa Rica in spite of the high hourly wages paid, on average, in the latter country. Behind this result, probably lies the particularly high number of high skilled workers found in the Costa Rican banana sector; these workers are likely pulling the average hourly wage up but not that much the compliance level. On the other hand, low compliance level is observed among Indonesian field workers, where only 18.3 per cent earn around or above the applicable minimum wage.

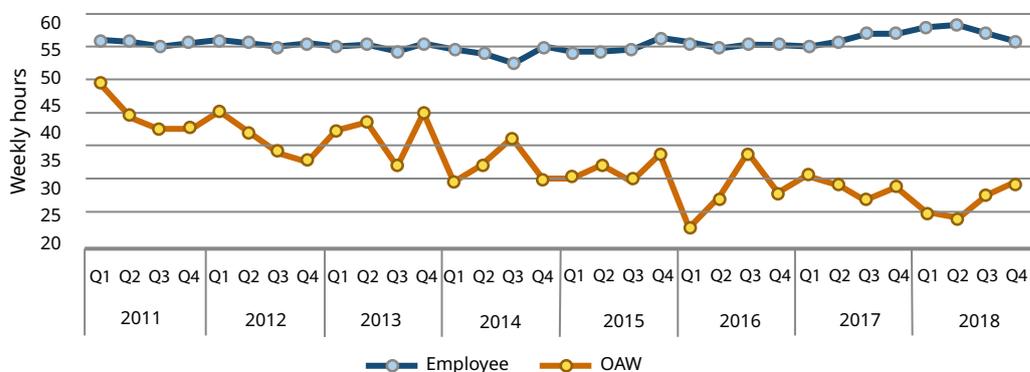
Weekly hours worked. The reason why Costa Rican wages compare more favourably in monthly than in hourly terms has to do with the high number of weekly hours worked by Costa Rican banana employees. In terms of occupations we find that banana packers work, on an average week, 62.3 hours and field workers do so for 56.5. It is worth remembering that the usual workweek in the country is limited to 48 hours. In addition, an estimated 31.4 per cent of the Costa Rican banana packers seem to work in excess of 72 hours per week. This workweek is compatible with 10.5 hours workdays, 7 days a week or 12 hours workdays 6 days a week. These numbers are similar to the ones reported by Mainieri Camacho (2012): workweeks between 60 to 90 hours.

TABLE 10. WEEKLY HOURS WORKED IN THE BANANA SECTOR, A COMPARISON

Country	Employees			Own-account workers			
	Banana	Agriculture	Country	Banana	Agriculture	Country	Workweek
Costa Rica	57.6	46.3	44.4	27.9	37.5	36.0	48
Ethiopia	na	na	39.9	17.7	22.6	24.6	48
India	46.2	47.6	51.0	48.1	50.6	51.3	48
Viet Nam	39.8	39.9	44.4	30.1	33.0	40.9	40

Source: Harmonized household and labour force surveys of the relevant countries, official minimum wages and author's own calculations, latest year available. **Notes:** The table shows the country-specific number of weekly hours worked in the tea sector, in the agricultural sector and in the country as a whole.

In India, the average number of weekly hours worked is in line with the standard workweek. Still, around one third (36.4 per cent) of the banana workers spend 56 or more hours a week on the field. The country where employees have shorter workweeks is Indonesia, probably because the standard workweek has been established at 40 hours. Only 13.1 per cent of the Indonesian banana workers work 56 or more hours per week while this figure is up to 54.6 per cent in Costa Rica.

FIGURE 6. WEEKLY HOURS WORKED IN COSTA RICA, 2011-2018, QUARTERLY DATA

Source: Harmonized labour force survey of Costa Rica and author's own calculations, 2011-2018. **Notes:** The figure shows average weekly hours worked in the Costa Rican banana sector by status in employment for employees and own-account workers.

In Costa Rica up-to-date and comparable time-series data exists since the creation of the labour force survey in 2010. In Figure 8 we show weekly hours worked by status in employment using quarterly data. The data seems to lack seasonality, at least for employees -the majority. It is unclear for own-account workers, but the variability may also be due to the small size of the sample. Despite of its variability, the trend for own-account workers is negative. On top of this, it can also be observed that the number of hours worked by employees has not only remained high but even increased in the recent quarters approaching the 60 weekly hours threshold.

3.5 The role of company size in Costa Rica

The rich time series data available for Costa Rica (2001-2018) allows for a careful study of its employment structure. In this section we divide workers by the size of the company they work for, less than 10 employees or 10 or more, (see Table 11). It can be observed that 88.5 per cent of the employment is generated by plantations with 100 or more workers.

TABLE 11. COMPANY SIZE DISTRIBUTION IN THE BANANA SECTOR OF COSTA RICA

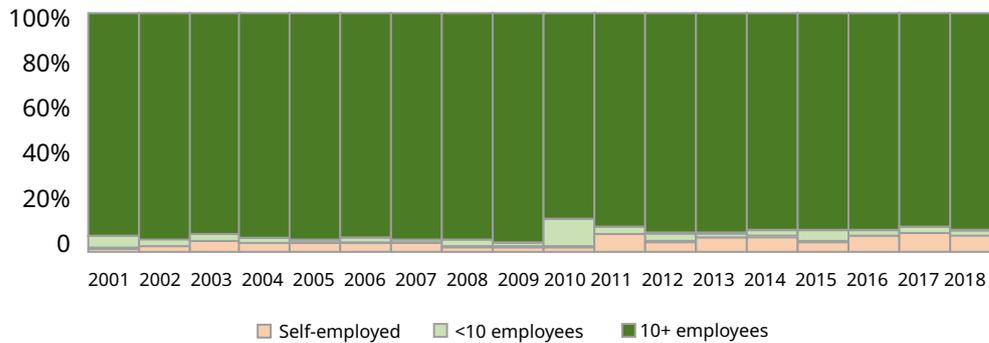
Type	Employment share	Observations
Own-account worker	4.6	65
2-9 workers	4.5	66
10-99 workers	2.3	31
100+ workers	88.5	1,243

Source: Harmonized labour force survey of Costa Rica 2018 and author's own calculations. **Notes:** The table shows the country and sector-specific share of workers in banana companies with 1 person (OAW), less than 10 workers, between 10 and 99 and 100 or more employees.

Large plantations are the norm in the regions of Central, Huetar Caribe and Huetar Norte (these three regions concentrate 98.5 per cent of the employment in the sector). The few remaining workers live in Brunca and are mostly smallholder plantations. This picture has not changed in the last 20 years. A quick glance at Figure 7 confirms this extent. The increase in the share of self-employed workers that is observed is, most likely, artificially produced by a change in survey

methodology. The household survey is utilized between 2001 and 2009 while the LFS provide the data since 2010.¹²

FIGURE 7. EMPLOYMENT STRUCTURE OF THE BANANA SECTOR IN COSTA RICA, 2001-2018, THIRD QUARTER



Source: Harmonized household and labour force survey of Costa Rica and author's own calculations, 2001-2018.

Notes: The figure shows the country and sector-specific share of banana workers in three categories, self-employed (own-account workers, employers, and unpaid family workers), employees in companies that have less than 10 employees and employees in companies with 10 or more employees.

It can be seen throughout the report that Costa Rica tends to stand out from the group of countries under analysis for different reasons; much higher earnings, extremely high working hours, use of high skilled workers and a vertical integration of the banana production process. These features have in common the large size of the plantations located in Costa Rica. In order to inform about the potential role played by company size we analyse a number of indicators for four type of companies, own-account workers, micro farms consisting of 2 to 9 workers, medium-sized farms with 10 to 99 workers and larger plantations with 100 or more workers.

According to the results of Table 12, larger companies pay higher wages, provide work on a more regular basis and create high skilled jobs more often than smaller plantations. There is only one indicator, wages, where companies with 10-99 workers fare slightly better than even larger companies - yet this might be due to the small sample size (see Table 11). In spite of these positive outcomes, weekly hours worked grow dramatically in large plantations; this may be due to the vertical integration of its activities and, thus, the hiring of factory workers -banana packers.

TABLE 12. CHARACTERISTICS OF BANANA SECTOR EMPLOYEES IN COSTA RICA, BY COMPANY SIZE

Company size	Statistic			
	Hourly wage	Hours worked	Secondary+	High skilled
OAW	1.20	28.0	16.8	0.00
2-9 workers	1.99	27.2	37.0	0.63
10-99 workers	3.68	53.6	34.2	1.20
100+ workers	3.13	58.1	35.8	1.96

Source: Harmonized household and labour force surveys of the relevant countries and author's own calculations, latest year available, surveys represent the yearly average, not a particular quarter. **Notes:** The table shows country, sector and size-specific average hourly wages in \$USD 2020, weekly hours worked, share of workers with secondary or tertiary education and share of high skilled workers in the banana industry of Costa Rica. High skilled refers to employees classified within groups 1, 2 or 3 of the ISCO-08 classification.

¹² The was not a labour force survey before 2010, hence why I have to rely on the household survey to build the time series.



4. Conclusions

This report analyzes the wage and the employment structure of the banana sector in Costa Rica, Ethiopia, India, Indonesia, and Viet Nam, all of which (except Ethiopia) are major producers. This report benefits from the harmonization of 22 households and labour force surveys. Unfortunately, representative data for the Vietnamese banana sector cannot be retrieved and only an estimate for its employment level is provided. Moreover, the available Ethiopian data only represents family farms that produce less than 10 per cent of the total banana output in the country.

To complicate matters further time-series data is only available in India and in Costa Rica due to different constraints. In spite of the mentioned data constraints, the findings suggests that the number of workers in India and Costa Rica seem to have increased and wages in Costa Rica have increased. Nevertheless, time series data is not available for all countries and more research is needed on this end.

The report also attests the existence of diverse employment structures; a majority of own-account workers in Indonesia, a mixed model in India and a large plantation setup with most companies employing more than 100 employees in Costa Rica. The employment structure proves to be a critical factor when explaining hours worked. Larger plantations increase the regularity of work -with almost no seasonality detected in quarterly data- and are associated with higher weekly hours worked. The extent of this increase reaches a peak in Costa Rica where 20.9 per cent of the employees work more than 72 hours per week.

Lastly, this report also takes a gender perspective when looking at working conditions. Women are regularly hired in the banana sector and their share in total employment ranges from 15.4 per cent in Costa Rica to 32.5 per cent in Indonesia. This report finds wage differentials against women in all groups under analysis. It does not matter whether women are employees or own-account workers, field workers or factory workers, live in Costa Rica or in Indonesia. They always earn less per hour. Hourly gender wage gaps range from 9.6 per cent in Indonesia to 35.4 per cent in India.



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Appendices

Appendix A. Data availability and periodicity

TABLE A.1 SOURCES, TYPE OF DATA AND YEARS AVAILABLE, BY COUNTRY

Year	Country				
	Costa Rica	Ethiopia	India	Indonesia	Vietnam
2000					
2001	HS				
2002	HS				
2003	HS				
2004	HS				
2005	HS				
2006	HS				
2007	HS				
2008	HS				
2009	HS				
2010	LFS				
2011	LFS				
2012	LFS		E-U NSSO		
2013	LFS				
2014	LFS				
2015	LFS				
2016	LFS	HS			
2017	LFS				
2018	LFS			LFS	LFS

Monthly	Quarterly	3rd quarter	1st quarter
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Appendix B. Banana employment in Indonesia and Viet Nam

TABLE B.1 FINDING THE NUMBER OF BANANA WORKERS IN INDONESIA AND VIET NAM

Variable	Costa Rica, 2018	Indonesia, 2018	Viet Nam, 2018
Employment, LFS ¹	35,316	173,322	1,226,977
Yield (kg.) per hectare ²	50,000	60,100	16,303
Total output (Tons) ³	2,194.9	6,862.5	1,857.6
Output (tons.) per worker	0.0621	0.074= 0.0621*(60,100*50,000)	0.0202= 0.0621*(16,303/50,000)
Employment, adjusted	35,316	92,736 =6,862.5/0.074	91,960 =1,857.6/0.0202
Share within code	na	0.535 =92,736/173,322	0.074 =91,960/1,226,977

Source: Costa Rica and Indonesia LFS's of 2018. **Notes:** The "share within code" is defined as the percentage of workers in KBLI code 1220 and in SIC code 121 who are actually banana workers.

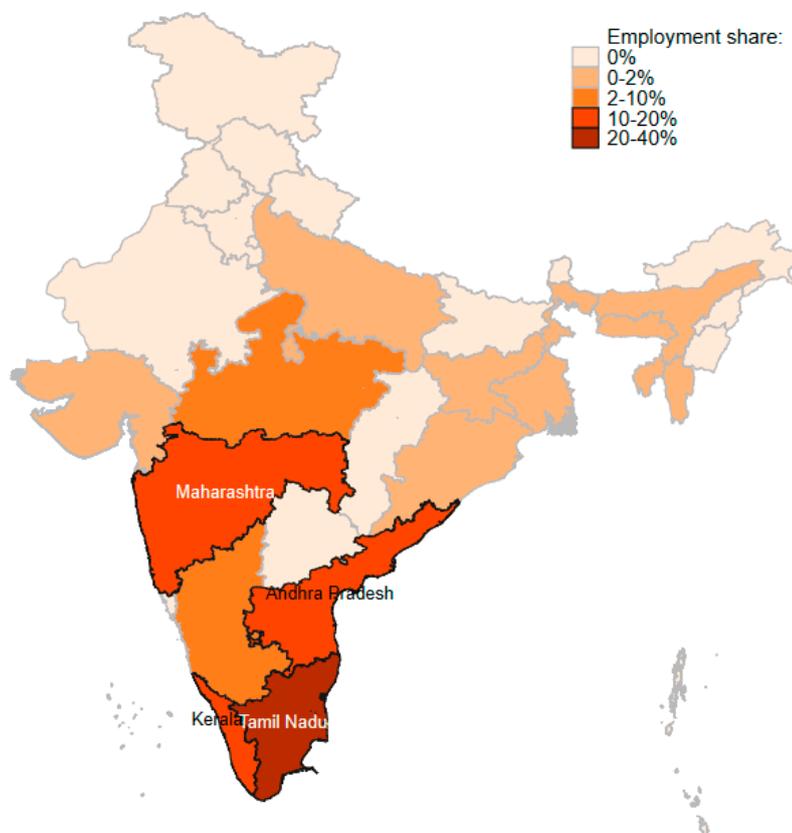
¹ Note the employment figure from the LFS of Indonesia and Viet Nam do not just represent banana workers because workers from other fruit growing activities are included.

² See <https://www.tilasto.com/en/country/indonesia/geography-and-agriculture/bananas-yield>, <https://www.statista.com/statistics/1054193/costa-rica-banana-crop-yield/> and <https://www.tilasto.com/en/country/vietnam/geography-and-agriculture/bananas-yield>

³ Figures from deagostinigeografia.com.

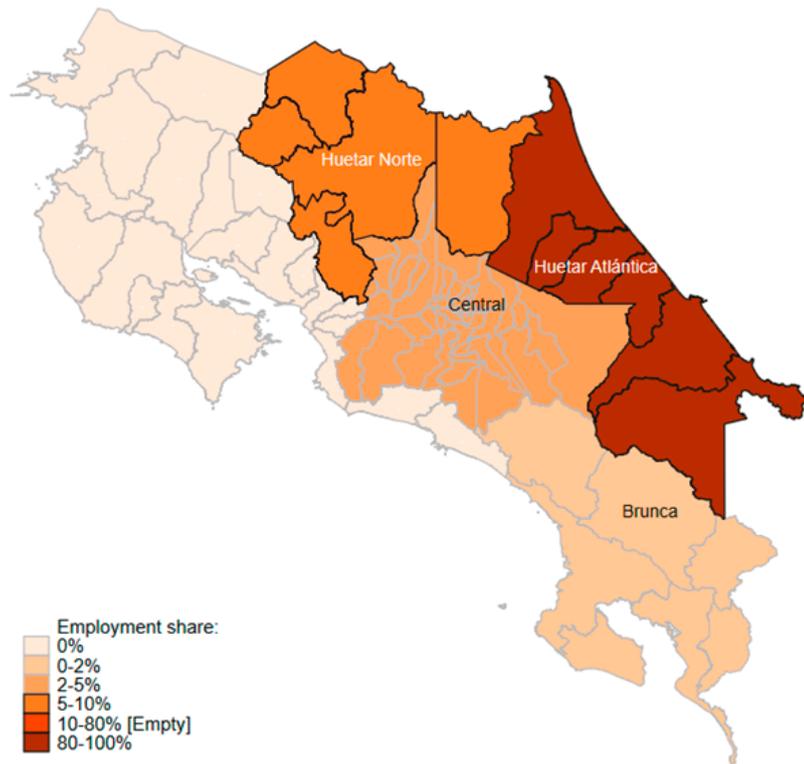
Appendix C. Employment distribution, by country

FIGURE C.1 INDIA, BANANA WORKERS DISTRIBUTION IN 2012



Source: Harmonized labour force survey of India and author's own calculations. **Notes:** The map shows the geographical distribution of 572,229 workers in 2012. The borders may not show the latest administrative changes occurred in India.

FIGURE C.2 COSTA RICA, BANANA WORKERS DISTRIBUTION IN 2018



Source: Harmonized labour force survey of Costa Rica and author's own calculations. **Notes:** The map shows the geographical distribution of 35,316 workers in 2018. Data is at the socio-economic region level. The source data for the map is at the canton level and some socio-economic regions cannot be perfectly built since some cantons are present in two regions (split is at the district level).

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