ICC 124-6

4 March 2019
Original: English

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International Coffee Council
124th Session
25 – 29 March 2019
Nairobi, Kenya

Profitability of coffee farming in selected Latin American countries – interim report

Background

1. The International Coffee Agreement 2007 and the Programme of Activities for coffee year 2018/19 provide the International Coffee Organization with a mandate to conduct analytical work on socio-economic aspects of the coffee sector, informing Members and sector stakeholders.

2. As part of the implementation of ICC Resolution 465 on Coffee Price Levels, approved by the International Coffee Council at its 122nd Session held in London in September 2018, the Secretariat is collaborating with the Department of Agricultural and Resource Economics at University of California, Davis, in conducting research to improve the understanding of production costs and factors driving farm profitability. This ongoing research project aims at providing new empirical evidence on the economic situation of coffee growers in select Latin American countries and will help formulate strategies to increase farm incomes and improve the economic sustainability of coffee production.

3. This document contains an interim report of the analysis of a representative dataset of coffee-producing households located in Colombia, Costa Rica, and Honduras. The results of the analysis indicate a large variation in production costs both between and within countries. Sample farmers in Honduras spent significantly less per hectare than their Costa Rican and Colombian counterparts. In this country, cash outlays represent 64% of full production costs, as compared to 73% and 70% in Colombia and Costa Rica respectively. Labour represents the highest share of costs for each of the countries, accounting for 75% in Colombia, 57% in Costa Rica, and 56% in Honduras. The overall analyses show that especially Colombian farmers struggle to cover their costs. One-third of the farmers in the

Colombian sample did not cover their cash outlays. When the full costs of producing coffee are considered, a staggering 53% of Colombian farmers are operating at a loss. These producers thus face both short- and long-term challenges to profitability. Growers in Costa Rica and Honduras performed slightly better over the same period.

4. The study concludes with an outlook on further analyses that will be carried out during the remainder of coffee year 2018/19. The final report will be presented at the 125th Session of the International Coffee Council in September 2019.

Action

5. The Council is requested to take note of this document.

PROFITABILITY OF COFFEE FARMING IN SELECTED LATIN AMERICAN COUNTRIES – INTERIM REPORT[1]

(March 2019)

I. INTRODUCTION

1. Since 2016 the coffee market has experienced a serious downward trend and today coffee prices are close to 30% below the 10-year average (ICO, 2019). The downturn of the market directly affects farm incomes and livelihoods of 25 million producers worldwide. Prolonged periods of low coffee prices hamper the ability to invest in modernisation of farms as well as climate change adaptation, affecting the volume and quality of coffee supplies in the future. In view of rising demand for coffee worldwide, especially in emerging markets, this poses a serious challenge for the global coffee sector (ICO, 2018).

2. Low world market prices for coffee increase pressure on high-cost origins and tend to accelerate concentration of production in a few, highly competitive origins. Today, the top five producers supply over 70% of the world's coffee. If the consolidation trend of previous years continues, this share could increase to more than 80% over the next decade. Less spatial diversification of production exposes the global coffee sector to greater supply risks related to extreme weather events, infrastructure failure or political instability affecting key coffee egr-3 (s3049 Tw30 [(g)2 (re)1 (e)-2 (wo)2 ng)1 (m).61 0.285( )Tj -0.006 Tw 0.002 Tw 10.37

II. EXISTING LITERATURE ON COFFEE PRODUCT

7. This study adds to the debate by examining in-depth farmer-level data that allows an investigation of the distribution of costs and profitability across farmers in three important

B. Conceptual discussion of costs

11. Farmers incur different costs for coffee production. Broadly, these costs can be divided into cash costs and economic costs. Cash costs, often referred to as variable costs, comprise agricultural inputs, remuneration for agricultural labour, transportation, and fuel for machinery operation. Farmers are considered profitable in the short term if they meet their variable costs. However, in order to achieve long-term profitability, the full economic costs of coffee production must be taken into account. These additional costs include fixed installation costs, taxes, financing costs, administration, overhead, machinery depreciation and the opportunity costs of land and labour.[3] (Fairtrade USA & Cornell University, 2017; ICO, 2016; Specialty Coffee Association, 2017)

12. In this paper, profitability is measured under two cost scenarios. In the first scenario, only cash outlays for maintenance and harvest of the crops are taken into account. These cash operating costs are generally what coffee farmers consider the relevant costs when they think about profitability. The second scenario considers the full economic costs of coffee production. In addition to the cash outlays described above, the full economic cost of production includes two additional categories. The first category is unpaid labour. The reason unpaid labour should be factored into economic profitability is because there is an opportunity cost associated to it. The second is a general category of additional costs that farmers might not typically include in their consideration of profitability. They include the following items: fixed installation costs, finance costs, depreciation of machinery and equipment, and the opportunity cost of land. For simplicity, we call them fixed costs.

13. In order to assign values to these costs, the following assumptions are made:

- Unpaid labour is valued at 60% of the average local wage paid by sample growers for each specific activity.[4]
- Installation or establishment costs of coffee are calculated as follows. First, in each country, the average installation cost per hectare is calculated for those sample farmers who installed new trees in the 12 months prior to the survey.[5] Next, the average cost is divided by 20 to spread out the cost evenly over the productive life of a coffee plantation per hectare. Installation costs are thus assumed identical for all farmers within a country.

[3] *Some of the most comprehensive efforts to estimate costs and returns for agricultural commodities have been conducted by the Economic Research Service of the United States Department of Agriculture and the Agricultural Issues Center of the University of California, Davis (https://coststudies.ucdavis.edu/en/). Where possible, this study uses the methodology of the latter organization.*

[4] *In Colombia and Costa Rica, average wages are calculated for each of the three and five cooperatives respectively. In Honduras, a single average wage for the Honduran sample was calculated.*

[5] *33%, 41% and 51% of sample farmers installed new trees in the previous 12 months in Colombia, Honduras and Costa Rica, respectively.*

- The opportunity cost of land is calculated as the annual interest payment on a loan for the investment in land.[6]
- Depreciation costs of machinery and equipment are calculated by dividing their total value by ten, as an approximation of their years of productive life. Since the productive assets may be used in other crops and activities outside of coffee, the cost is scaled by the fraction of the total farm area in coffee. Finally, since the age of the assets is not available in this dataset, these costs are further scaled by 0.5 to roughly account for the likelihood that most productive assets are not new.
- Finance costs are calculated as the annual interest paid by farmers that borrowed in the 12 months prior to the survey.[7]

14. While these were the assumptions chosen to conduct this analysis, future work will explore the sensitivity of the results to different assumptions.

IV. RESULTS

A. Breakdown of costs/ha by country

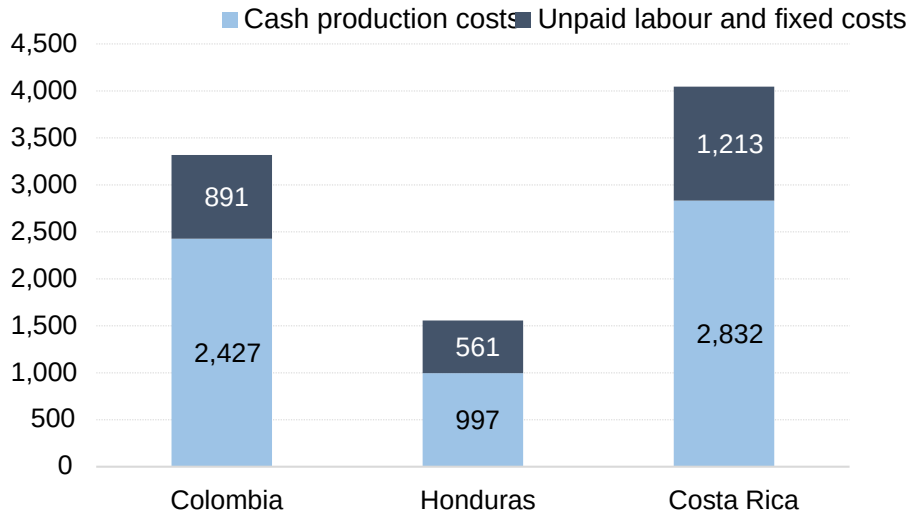
15. Table 1 presents detailed breakdowns of average production costs per hectare for Colombia, Honduras and Costa Rica, respectively. Costs are disaggregated into four main categories: paid labour, unpaid labour, inputs (chemical and organic) and fixed costs. More disaggregated categories, such as the specific labour task and type of input, are also provided. The main categories were chosen in order to compare costs under the two scenarios described above. In the first scenario, only paid labour and inputs are included. In the second scenario, unpaid family labour and fixed costs are included as described above. These two scenarios allow us to evaluate profitability and break-even prices if losc (at)132H Tw [(a)-1 (r)to

Table 1: Average production costs per hectare in 2015/16 (in US$)

	Colombia (n=720)	Honduras (n=644)	Costa Rica (n=493
Paid labour	1,907.92	583.86	2,173.91
Labour pruning and weeding	245.13	137.47	148.44
Labour fertilizing	75.39	39.29	26.91
Labour spraying	48.99	25.63	55.17
Labour harvest	1,538.41	381.47	1,408.99
Permanent labour (manageria	-	-	534.39
Unpaid labour	586.11	295.61	150.19
Labourpruning and weeding	79.57	55.55	96.49
Labour fertilizing	27.24	17.92	19.42
Labour spraying	12.11	9.11	34.29
Labour harvest	467.19	213.02	-
Inputs	519.18	412.79	658.36
Herbicides	2.16	3.65	29.42
Pesticides	22.46	27.94	122.92
Fertilizer	494.57	381.19	506.02
Fixed costs	304.59	265.02	1,062.54
Distributed fixed cost			
- Installation costs	40.80	47.76	142.14
- Depreciation of machinery	112.93	84.67	523.85
Opportunity cost of land	97.50	91.00	357.50
Finance cost	53.36	41.59	39.05
	3,317.80	1,557.26	4,045.01

17. Figure 1 summarizes both the magnitude and relative importance of short-run cash costs versus full economic costs across the three countries. Costa Rica and Colombia present relatively similar pictures with full costs per hectare of US$4,045 and US$3,318 respectively. The Costa Rica sample spent about US$400 per hectare more in short-run cash outlays than their counterparts in Colombia (US$2,832 versus US$2,427). Similarly, annualized fixed costs per hectare in Costa Rica were about US$320 higher than in Colombia (US$1,213 versus US$891). Sample farmers in Honduras spent significantly less per hectare than their Costa Rican and Colombian counterparts. Full costs per hectare were only US$1,557, US$997 corresponding to cash outlays and US$561 to fixed costs.

Figure 1: Full economic costs by country in 2015/16 (US$/ha)



18. Honduras is also an outlier compared to the other two countries with respect to the relative importance of cash versus fixed costs. While short-run cash outlays represent 73% and 70% of full production costs in Colombia and Costa Rica respectively, they are only 64% of full production costs in Honduras. Closer inspection of Table 1 reveals that this is primarily due to the fact that unpaid family labour represents a significantly higher fraction of total labour costs in Honduras (34% = 296/(296 + 583)) than in Colombia (23% = 586/(1,907 + 586)) and Costa Rica (6% = 150/(2,174 + 150)). The especially low number in Costa Rica reflects the fact that Costa Rican coffee farmers tend to pay cash wages to family workers. Given that labour is by far the largest cost component in coffee production, a point we shall return to shortly, this difference, at least partially, explains the lower relative importance of cash costs in Honduras. Similarly, failure to account for non-cash and fixed costs would lead to a relatively larger overstatement of the profitability of coffee production in Honduras compared to the other two countries.

19. Figure 2 provides a breakdown of the full economic costs per hectare (scenario 2) by three main components: labour (both paid and unpaid), inputs and fixed costs. Labour represents over half of total production costs in all three countries, with the highest fraction in Colombia (75%), followed by Costa Rica (57%) and Honduras (56%). Within the category of labour, harvesting is by far the most important task. On average, per hectare labour costs for harvest were US$594 in Honduras, US$1,408 in Costa Rica and US$2,005 in Colombia, representing 68%, 61% and 80% of total labour costs in the three countries.

Figure 2: Cost structure of full economic costs by country in 2015/16 (US$/ha)

20. After labour, inputs represent the next largest fraction of total cost in both Colombia and Honduras, although this fraction was much higher in Honduras (27%) than Colombia (16%). Fixed costs represent the smallest fraction of total costs in these two countries. In contrast, fixed costs represent the second largest fraction of total costs in Costa Rica (24%), followed by inputs at 16%. The relatively greater importance of fixed costs in Costa Rica can be attributed to two factors: the significantly higher value of farm equipment and machinery owned by coffee farmers in Costa Rica and the higher price of land.

21. The differences in the absolute level of costs per hectare across the higher cost countries of Costa Rica and Colombia on one hand and Honduras on the other as well, as the differences in the relative importance of different cost categories are striking. As mentioned above, for example, labour costs per hectare ranged from US$579 in Honduras to just under US$3,500 in Colombia and Costa Rica. Are these differences across countries due primarily to differences in input prices across countries, or quantities used, or both? Table 2 provides a partial answer to this question by presenting the average per unit prices for a number of key inputs that are common across the three countries including daily wage rates for specific tasks, the per litre price of the herbicide glyphosate, and the price of a 45kg bag of urea. The most striking feature is the difference in labour costs across the three countries. Daily wages for non-harvest tasks were three times higher in Costa Rica (US$15.7) than in Honduras (US$5.5). Wages in Colombia were in the middle, at US$11.5 per day. This pattern is maintained for harvest labour, where the daily wage is approximately 40 to 50% higher than for non-labour tasks in each country.

22. The order is inverted for the two inputs reported in Table 2. The per litre cost of glyphosate averaged US$6.5 in Honduras, US$6.3 in Costa Rica and US$4.6 in Colombia. Similarly, a 45kg bag of fertilizer in Honduras was 15% more expensive than in Colombia

(US$21.3 versus US$18.2) and 30% more expensive than in Costa Rica (US$21.3 versus US$16.4). One possible explanation for the input price differentials is the role of cooperatives. Specifically, sample farmers in both Costa Rica and Colombia all belong to cooperatives, while those in Honduras do not. Cooperatives are able to purchase inputs in bulk and thus may be able to offer them to members at prices lower than those available to non-cooperative members.

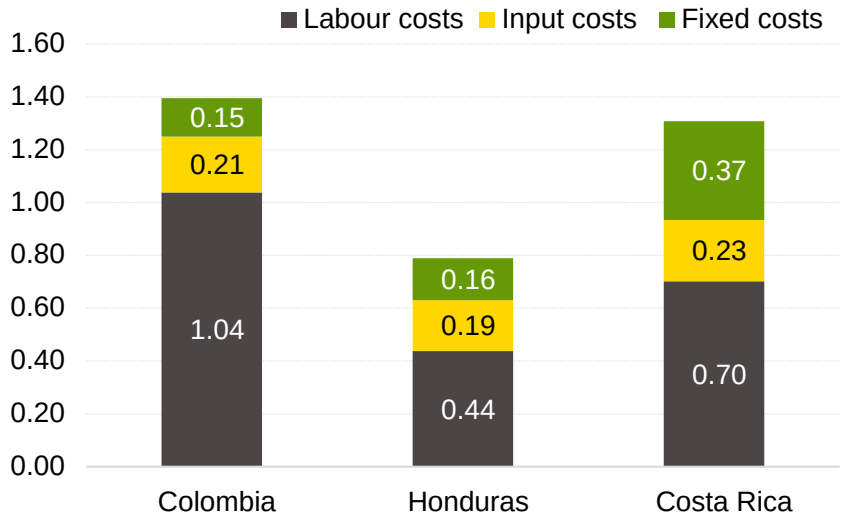
Table 2: Average per unit costs for key inputs in 2015/16 (US$)

	Colombia	Honduras	Costa Rica
Labour costs per day			
Labour pruning and weedin	11.48	5.54	15.69
- Labour fertilizing	11.48	5.54	15.69
- Labour spraying	15.22	5.54	15.69
- Labour harvest	16.29	8.37	22.18
Input costs per unit			
- Herbicides (glyphosate 1L)	4.62	6.51	6.31
- Fertilizer (urea 45kg)	18.18	21.28	16.45
Installation costs per unit			
- Cost per plant	0.09	0.18	0.38

23. The other notable difference is the price of coffee seedlings across the three countries. The price per plant ranges from a low of

need to receive a price of US$1.39 of green coffee in order to break even when considering the full costs of production. If, instead, only cash costs are considered, Colombian farmers

Figure 4 Cost structure of full economic costs by country in 2015/16 (US$/lb)



27. So far, these costs and breakeven points represent the "average" farmer. However, there is high heterogeneity of growers within each country and within each cooperative, which in turn affects the structure of their costs. In the next analyses, this variation is taken into consideration to show the distribution and fraction of farmers breaking even under different farm-gate prices. This is done in two different manners: i) assuming all individual growers receive the same price; ii) using farmer-specific prices for the year 2015.

C. Break-even analysis

Homogeneous prices

28. International coffee prices are highly volatile. Production costs can also experience variation depending on the year and external factors such as changes in input costs, weather shocks, pests and diseases. However, for the purpose of this study, the assumption is that the cost structure of each farmer remains somewhat constant. Therefore, the costs collected for year 2015/16 would provide an approximation of production costs in different coffee years. This allows us to conduct our first exercise, which is to calculate the proportion of sample farmers in each country that would breakeven for a given price received by all farmers.

29. Figures 5, 6 and 7 present the cumulative distribution functions of cash cost and full cost per pound in each of the three countries. Cost per pound is depicted on the horizontal axis. The height of the curve represents the fraction of sample farmers whose cost per pound is equal to or less than the cost on the horizontal axis. The higher (blue) curve corresponds to cost per pound when only considering cash costs, while the lower (red) curve corresponds to full costs of production.

30. For this analysis, the focus will be on the farm-gate prices needed to ensure that 75% of farmers breakeven. In Colombia, if only cash costs are considered, the required farm-gate price is US$

Figure 6: Distribution of production costs per pound, Honduras (2015/16)

Figure 7: Distribution of production costs per pound, Costa Rica (2015/16)

31.

as dire. 10% of producers are not meeting their cash expenses, while 25% are below the break-even point when full economic costs are considered. In Costa Rica, the distribution is similar to the Honduran case, with only 9% of growers failing to cover their cash expenses, and 28% are failing to break even when all costs are accounted for.

34. The major differences between Colombia and the two other countries can be explained as follows: in year 2015/16, Colombian farmers produced a considerable amount of low quality coffee, which they sold at a discounted price. On the other hand, Honduran farmers in the study regions remain competitive despite receiving significantly lower prices because their production costs are very low. Costa Rican farmers have higher yields per hectare, which decreases their production costs per pound, and also receive better prices than their Latin American peers.

Figure 9: Gross margins of Colombian farmers in 2015/16

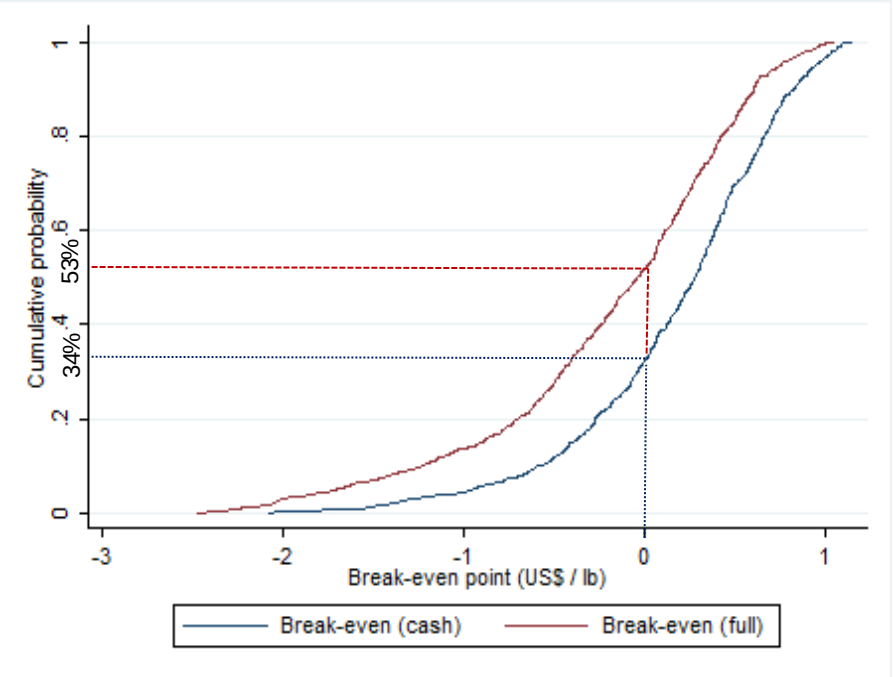


Figure 10: Gross margins of Honduran farmers in 2015/16

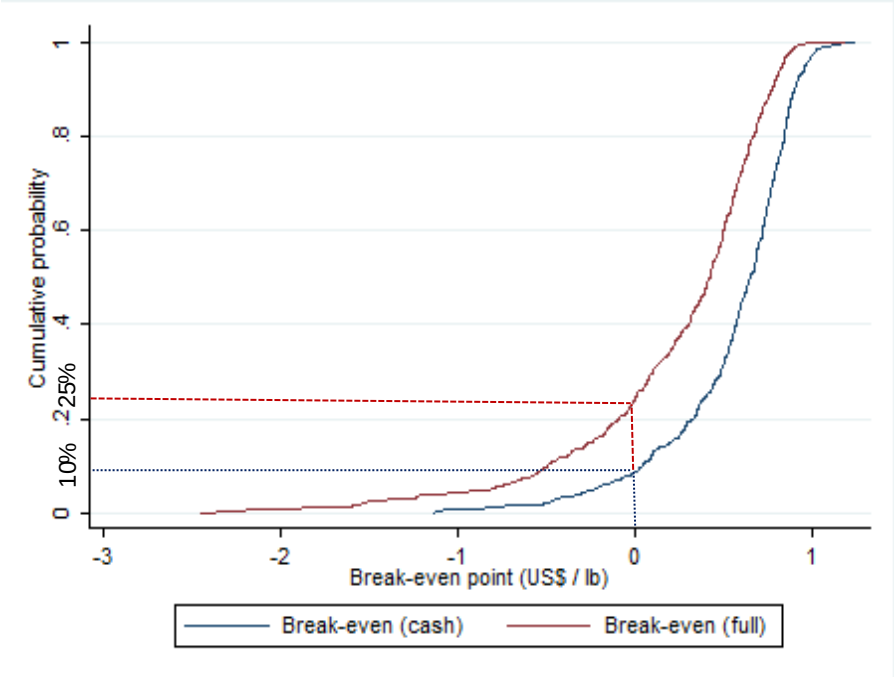
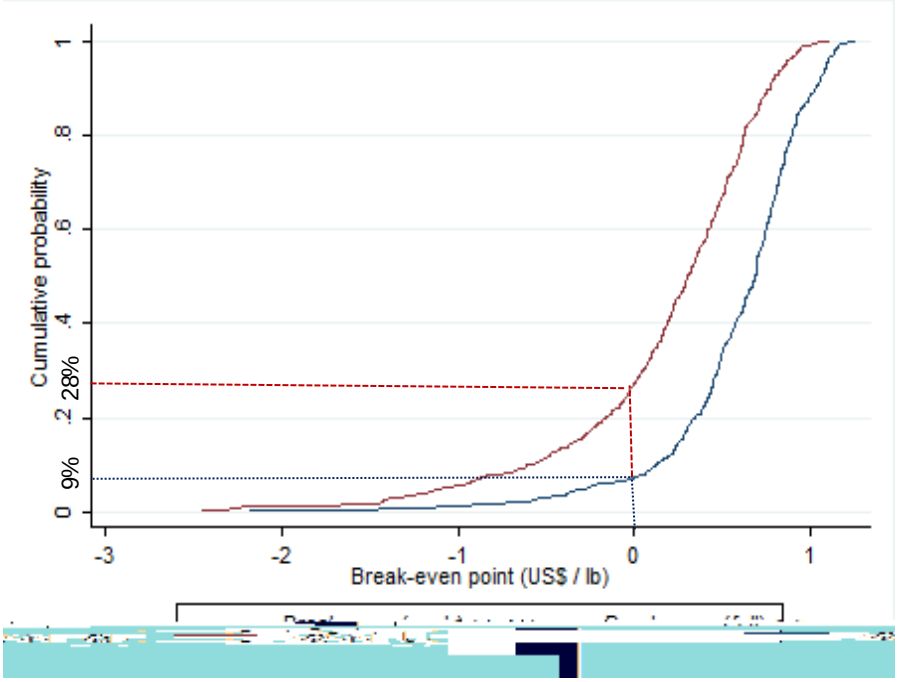


Figure 11: Gross margins of Costa Rican farmers in 2015/16



40. It is also worth remarking that this study was conducted in important coffee regions in each of the three countries. Thus, the coffee sector in these areas has received more public and private support than in other regions where this crop is less prominent. This also translates, for the most part, into higher yields. Therefore, these results cannot be generalized at the country level.

C. Next steps

41. Future work include extending the analysis by taking advantage of additional information contained in the dataset that can help to explain observed differences in production costs and profitability between individual producers within and across regions and countries

42. The next stage of the analysis will identify the factors driving efficiency of production and profitability. The econometric analysis will shed light on and quantify the association between production costs and fixed characteristics at the household, farm, and plot level. Such characteristics include: household size, age, gender and education, farm size, production system/technology, dependence on coffee farming, age of coffee plants, plant density, shade cover, and coffee varieties. Moreover, the links between farming decisions, such as the adoption of Voluntary Sustainability Standards, investments in the production of high quality coffee and increasing yields and profitability will be examined.

43. Some of the driving questions will be: How does the composition of costs change with these different strategies? Does producing higher quality coffee compensate for the additional costs involved, if any? How much do costs increase by adding a sustainability standard? The final results will provide a robust estimate of the cost-effectiveness of investing in these production practices.

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