Supplementary Materials - Modeling Profitability in the Jamaican Coffee Industry

Supplementary File S1: Profitability Calculation Values

The formula used to calculate profitability:

$$Y_i = ((Yld_i - L_i) * P * SYld_i) - ((C_i * CT_i) * SC_i)$$

Where Y is the profit (or loss) in US dollars per unit area in area *i* at farm gate ; Yld is the coffee yield (in 60 lb. boxes) per unit area; L is the percentage crop loss (including loss due to pests and diseases) per unit area; P is the price paid per 60 lb. box of coffee cherry (price per box); SYld is a yield scale factor derived from the suitability model in Mighty (2015) and incorporates JACRA's yields estimations; C is the production costs (per unit area); CT is the contingency cost (accounting for various unforeseen expenses) per unit area; SC is the production scale factor derived from the suitability model in Mighty (2015).

All values are per unit area (per 0.222 acre or 0.09 hectare) and figures in tables below are in US (Jamaican) dollars. Price and cost data provided by JACRA.

Conversion to US dollars utilized the following exchange rates:

- 2016-2017 exchange rate: 1USD = 128.6 JMD
- 2018-2019 exchange rate: 1USD = 131.5 JMD

Income			Expenses				
Variables	Variables Values for		Variables	Values for	Values for		
	2016/2017	2018/2019		2016/2017	2018/2019		
Ideal mature	193.58	193.58	Labor Cost	\$204.09	\$201.98		
tree count				(J\$26,245.73)	(J\$26,560.86)		
Coffee berry	1258.27	1258.27	Insecticide	\$6 (J\$771.29)	\$5.95 (J\$782.12)		
production			Cost				
(lbs.)							
Coffee berry	20.97	20.97	Fungicide Cost	\$12.51	\$12.24		
production				(J\$1,609.06)	(J\$1609.03)		
(60 lb. boxes)							
Price per box	\$77.76 (J\$ 10,000)	\$38.02 (J\$5,000)	Fertilizer Cost	\$82.29	\$81.65		
	- JBM Region	- JBM Region		(J\$10,582.30)	(J\$10,736.59)		
	\$38.88 (J\$5,000) -	\$26.62 (J\$3,500)					
	NBM Region	- NBM Region					
Percentage	9.63% (JBM Re-	9.63% (JBM Re-	Herbicide Cost	\$5.94 (J\$764.12)	\$5.86 (J\$773.88)		
production	gion)	gion)					
loss	10% (NBM Re-	10% (NBM Re-					
	gion)	gion)					
Yield per box	Final yield values	Final yield val-	Other Materi-	\$44.65	\$44.23		
	after accounting	ues after ac-	als Cost	(J\$5,741.59)	(J\$5,816.28)		
	for production	counting for					
	losses:	production					
		losses:					

					[]
	18.95 (JBM Re-	18.95 (JBM Re-			
	gion)	gion)			
	18.87 (NBM Re-	18.87 (NBM Re-			
Income Total	gion) Formula = Price	gion) Formula = Price	Transportation	\$17.26 (J\$2,220)	\$16.88 (J\$2,220)
income rotai	per box * Yield	per box * Yield	Cost (fertilizer	\$17.20 (1\$2,220)	\$10.00 (1\$2,220)
	per box	per box field	and other ma-		
	Final value will	Final value will	terials to the		
	vary based on the	vary based on	farm)		
	scenario:	the scenario:			
	\$1,1473.56	\$720.53			
	(J\$189,500) - JBM	(\$94,750) - JBM			
	Region;	Region;			
	\$733.67	\$502.24			
	(J\$94,350) - NBM	(J\$66,045) -			
	Region	NBM Region			
Yield scale	Based on coffee	Based on coffee	Equipment	\$14.67 (J\$1,887)	\$14.35
factor	production suita-	production suit-	Rental Cost	+=	(J\$1,886.96)
	bility. Areas rated	ability. Areas			(0+=)000000
	7-9 = 1.0 (maxi-	rated 7-9 = 1.0			
	mum level of pro-	(maximum level			
	duction); areas	of production);			
	rated 4-6 = 0.95	areas rated 4-6			
	(95% of maximum	= 0.95 (95% of			
	yield); areas rated	maximum			
	1-3 = 0.9 (90% of	yield); areas			
	maximum yield).	rated 1-3 = 0.9			
		(90% of maxi-			
		mum yield).			
Adjusted yield	Final value influ-	Final value influ-	Harvesting	Cost = \$7.21	Cost = \$7.14
per box	enced by yield	enced by yield	Cost	(J\$927) per box.	(J\$939) per box.
	scale factor. For-	scale factor.		Formula = Yield	Formula = Yield
	mula = Yield per	Formula = Yield		per box * \$7.21	per box * \$7.14
	box * Yield scale	per box * Yield		(J\$927) →	(J\$939) →
	factor	scale factor		\$136.60	\$132.32
				(J\$17,566.65) -	(J\$17,794.05) -
				JBM Region;	JBM Region;
				\$136.02	\$134.74
				(J\$17,492.49) -	(J\$17,718.93) -
				NBM Region	NBM Region
Adjusted In-	Final value influ-	Final value influ-	Contingency	5% of the total	10% of the total
come	enced by yield	enced by yield	Cost	above-mentioned	above-mentioned
	scale factor. For-	scale factor. Formula = Ad-		cost Formula = Sum of	cost Formula = Sum of
	mula = Adjusted yield per box *			all above costs *	all above costs *
	Price per box	justed yield per box * Price per		0.05	0.10
		box		0.05	0.10
			Production To-	Total of above-	Total of above-
			tal	mentioned costs	mentioned costs
				(including the	(including the con-
				contingency	tingency costs)
				costs)	Formula = sum of
					all above costs
	1	l	I	1	

	Famile and of	
	Formula = sum of	
	all above costs	
Production	Based on coffee	Based on coffee
cost scale fac-	production suita-	production suita-
tor	bility. Areas rated	bility. Areas rated
	7-9 = 1.0 (base	7-9 = 1.0 (base
	level production	level production
	costs); areas	costs); areas rated
	rated 4-6 = 1.05	4-6 = 1.05 (5% in-
	(5% increase in	crease in produc-
	production costs);	tion costs); areas
	areas rated 1-3 =	rated 1-3 = 1.1
	1.1 (10% increase	(10% increase in
	in production	production costs).
	costs).	
Adjusted har-	Final value influ-	Final value influ-
vesting cost	enced by produc-	enced by produc-
_	tion cost scale	tion cost scale fac-
	factor:	tor:
	Formula = Ad-	Formula = Ad-
	justed yield per	justed yield per
	box * \$7.21	box * \$7.14
	(J\$927)	(J\$939)
Adjusted con-	Final value influ-	Final value influ-
tingency cost	enced by produc-	enced by produc-
	tion cost scale	tion cost scale fac-
	factor:	tor:
	5% of the total	10% of the total
	above-mentioned	above-mentioned
	cost but using <i>ad</i> -	cost but using <i>ad</i> -
	justed harvesting	justed harvesting
	<i>costs</i> instead of	costs instead of in-
	initial harvesting	itial harvesting
	cost.	cost.
	Formula = Sum of	Formula = Sum of
	all above costs	all above costs
	(but using <i>ad</i> -	(but using <i>ad</i> -
	justed harvesting	justed harvesting
	costs) * 0.05	costs) * 0.10
Adjusted pro-	Total of above-	Total of above-
duction cost	mentioned costs	mentioned costs
	but using <i>ad</i> -	but using <i>adjusted</i>
	-	• •
	justed harvesting	harvesting and
	and contingency	<i>contingency costs</i> instead of initial
	costs instead of	
	initial values.	values.
	Formula = Total	Formula = Total of
	of above-men-	above-mentioned
	tioned costs (but	costs (but using
	using <i>adjusted</i>	adjusted harvest-
	harvesting and	ing and adjusted
	adjusted contin-	contingency costs)
	gency costs)	

Revenue	Profit (Loss) based	Profit (Loss)	Adjusted Rev-	Profit (Loss)	Profit (Loss) based
	on net revenue.	based on net	enue	based on ad-	on adjusted net
	Formula = Income	revenue.		justed net reve-	revenue.
	Total – Production	Formula = In-		nue.	Formula= Ad-
	Total	come Total –		Formula= Ad-	justed income –
		Production To-		justed income –	Adjusted produc-
		tal		Adjusted produc-	tion costs.
				tion costs.	

Note: a complete excel table with even more production details can be obtained by contacting the Data Coordinator at JACRA (<u>info@jacra.org</u>).

Supplementary Table S1: Key Profitability Statistics for the 2016-2017 and 2018-2019 coffee years

2016-2017 Coffee Year										
Area / Region	Estimated I	stimated Income per unit area: \$US			Estimated Production Costs per unit area: \$US			Estimated Profit per unit area: \$US		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Мах	
Overall	723.31	660.46	1,473.72	580.32	549.64	605.25	142.99	55.86	923.49	
JBM	1,418.27	1,326.35	1,473.72	570.93	550.23	605.25	847.35	721.10	923.49	
NBM	692.32	660.46	733.84	580.74	549.64	604.60	111.58	55.86	184.20	
Eastern	908.81	660.46	1,473.72	577.84	549.64	605.25	330.96	55.86	923.49	
Northern	693.59	660.46	1,473.72	580.19	549.64	604.60	113.40	55.86	923.49	
Central	690.12	660.46	733.84	582.39	549.64	604.60	107.73	55.86	184.20	
Western	695.77	660.46	733.84	578.16	549.64	604.60	117.61	55.86	184.20	

All values are per unit area (per 0.222 acre or 0.09 hectare) and figures in tables below are in US dollars

2018-2019 Coffee Year										
Area / Region	Estimated Income per unit area: \$US			Estimated	Estimated Production Costs per unit area: \$US			Estimated Profit per unit area: \$US		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	
Overall	483.31	452.13	720.61	572.28	542.03	596.86	-88.91	-143.99	177.87	
JBM	693.50	648.55	720.61	563.02	542.60	596.86	130.58	51.65	177.87	
NBM	473.94	452.13	502.36	572.70	542.03	596.23	-98.69	-143.99	-39.63	
Eastern	539.40	452.13	720.61	569.84	542.03	596.86	-30.42	-143.99	177.87	
Northern	474.60	452.13	720.61	572.15	542.03	596.23	-97.48	-143.99	177.87	
Central	472.43	452.13	502.36	574.32	542.03	596.23	-101.82	-143.99	-39.63	
Western	476.30	452.13	502.36	570.15	542.03	596.23	-93.78	-143.99	-39.63	

2016-2017 exchange rate: 1USD = 128.6 JMD

2018-2019 exchange rate: 1USD = 131.5 JMD