The Economics of Certification

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Agenda, Qualitative analysis

1. Reasons for Certification
2. Externality Management
3. Economic Issues Associated with Certification

Reasons for certification

Externality control

- Production externalities: deforestation, GHG, biodiversity, pollution
- Consumer/buyer externalities OR "conscience-based" externalities: child labor, price exploitation
- Differences in governance btw countries give rise to NGO action

Externalities are location specific

Reasons for certification, continued

Incomplete information:

- Lack of transparency of production processes may give rise to 3rd party certification if consumers are interested in the manner in which a product is produced

Reduced risk of adverse perception

- Advocacy groups target the largest companies in an industry for 'negative' production activities

Value added through consumer willingness to pay

- Consumers may be willing to pay a premium for products produced under specific conditions

Externality management

Optimal externality control:

- Optimal level of externality is not zero. It is where the marginal benefit is equal to the marginal cost
- Optimal externality control policies should vary by location. They should not be generic, but specific.

Existing certification treats this as generic, rather adjusting according to location and balancing benefits with cost of control

- Design of externality control should be science based and balanced.

Economic issues associated with certification

***Certification costs depend on area, not volume**

Yield effects of certification

- Certification may reduce yields by restricting certain activities (e.g. application of chemicals)
  - Increases cost of certification
- Outreach activities may run parallel to certification may increase yield
  - Reduces cost of certification per tonne
- Certification may be associated with increased yields by providing access to technology and new knowledge
  - Reduces cost of certification per tonne
  - Reduces cost of cocoa to the buyer

Agenda, Quantitative analysis

1. The Grand Scenarios, an overview
2. The model
3. Main findings
4. Data
5. Conclusion

The Grand Scenarios, an overview

Scenario #1: Business-as-usual

- Assumes major players of the cocoa industry honor their existing commitments to certification until 2020 (total amount of certified cocoa in 2020: 1.5 million tonnes)

Scenario #2: "Mainstream certification"

- 50% of cocoa produced will be certified by 2020 (total amount of certified cocoa in 2020: 2.0 million tonnes)

The model

Using statistics and economic theory, this model investigates:

- How certification impacts price and earnings of farmers (both participants and non-participants) and buyers
- Impact of and linkages between certification and of increased productivity (and yields)
- Volume of certification and its impact on the incremental cost of certification
- Primary drivers of program costs and benefits

Uncertainty and randomness

- The future is uncertain by definition, but in this case there is an added randomness of
  - Large degree of uncertainty regarding impact of certification on productivity
  - Impact of other parallel and/or independent activities on productivity
  - Heterogeneity across nations

Main findings

- The introduction of certification will **increase** the price of cocoa, unless it is associated with increased productivity due to technological change.
- Yields are the primary long-term driver of certification costs. If the increase of productivity is sufficient, the price of cocoa will decline and quantity produced will increase because of certification.
- If certification provides access to yield increasing, certification may be self-financing and may induce voluntary participation.
- Certification that increases productivity, because it confers lower costs on participating farmers, will lead to some industry restructuring, with higher cost, non-certified farmers exiting farming or switching to other crops.
- From Mars' perspective, there are optimal levels of certification which occurs when the incremental benefit in terms of revenue and goodwill is equal to the incremental cost.

Certification costs

$$Cost = B * A^{\beta}$$

$$B = cons\tan t$$

$$A = area$$

$$\beta = M\arg inal\ \cos t\ coefficicnt$$

$$A = Q / y \quad Q = output \quad y = Yield\ per\ Hectare$$

$$Cost = B * (Q / y)^{\beta}$$

$$Yield\ increase\ reduces\ \cos t$$

$$Net\ Cost = Cost - \Delta P * Q$$

$$If\ certification\ increase\ productivity\ it\ reduces\ \Pr ice$$

Table 1: Global Supply and Demand Trends in Cocoa Certification

	Actual			Estimate							
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Global Certified Supply[1]	141,766	293,694	492,349	621,860	824,330	1,026,800	1,124,550	1,220,600	1,316,650	1,412,700	1,508,750
Global Certified Demand[2]											
Based on current committments[3]	75,341	148,781	309,994	430,423	533,634	683,922	800,610	979,254	1,139,467	1,340,658	1,471,614
Based on expected committments[4]	75,341	148,781	309,994	543,340	757,822	929,079	1,157,118	1,446,893	1,718,501	2,031,005	2,124,184
Based on 100% uptake of Big 5[5]	75,341	148,781	309,994	620346.44	908,123	1,081,280	1,383,370	1,746,865	2,092,950	2,479,916	2,530,324
1. Certifying bodies forecasts of supply, less 15% double counting											
2. 12% added to certified demand for 2013-2020 to reflect certified demand from "other" sources											
3. Currently declared commitments. Assumes that where there is no future commitment, company continues at its 2012 % commitment											
4. Assumes Lindt at 30%, Kraft at 75% and Nestle at 60% in 2020											
5. Assumes Lindt, Kraft and Nestle at 100% in 2020											

*Sourced from Mars

Table 2: Quantities of Cocoa Produced by Country

Origin		2012	2013	2014	2015	2016	2017
Cote d'Ivoire	Certified Cocoa	85,000	100,000	125,000	150,000		
	All Cocoa	1,396,000	1,396,000	1,396,000	1,396,000	1,396,000	1,396,000
Ghana	Certified Cocoa	25,000	40,000	60,000	80,000		
	All Cocoa	850,000	887,000	949,000	1,016,000	1,087,000	1,163,000
Nigeria	Certified Cocoa	7,500	15,000	30,000	40,000		
	All Cocoa						
Cameroon	Certified Cocoa	1,000	6,000	12,000	20,000		
	All Cocoa						
Indonesia	Certified Cocoa	20,000	40,000	55,000	70,000		
	All Cocoa	575,000	590,000	605,000	620,000	635,000	650,000
Ecuador	Certified Cocoa	1,000	5,000	15,000	20,000		
	All Cocoa						
Brazil	Certified Cocoa	5,000	10,000	15,000	20,000		
	All Cocoa						

Table 3: Average Global Certification Costs

	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
Farms in ha	500	500	500	500	500	500	500	500	500	500
Est. Yield ton/ha	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5
Est. Volume in tonne	300	350	400	450	500	550	600	650	700	750
Certification Cost ($/tonne)	267.89	117.55	109.03	102.73	98.01	94.44	91.77	89.79	88.38	87.44

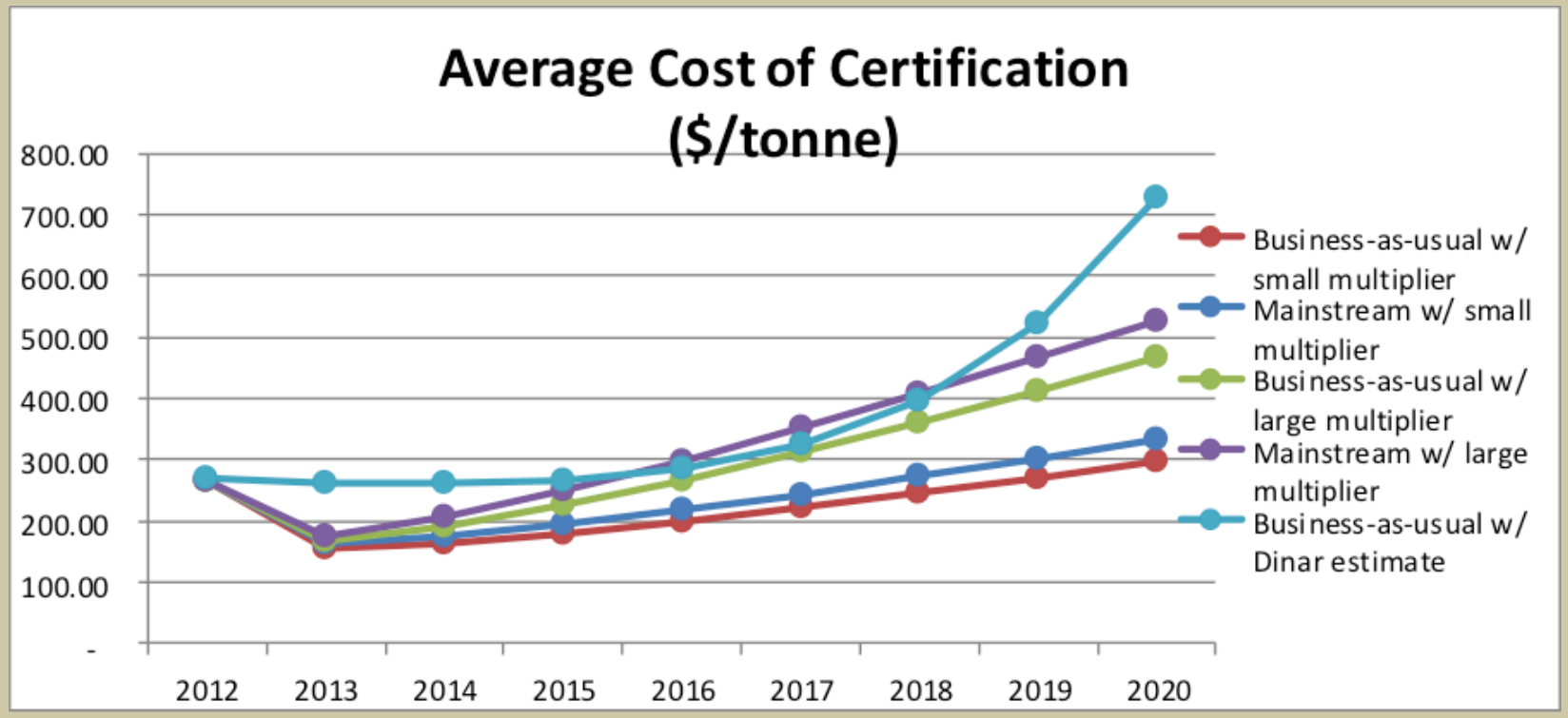


Table 4: Country Certification Projections

Origin		2012	2013	2014	2015
Cote d'Ivoire	Certified Cocoa	85,000	100,000	125,000	150,000
	All Cocoa	1,396,000	1,396,000	1,396,000	1,396,000
Ghana	Certified Cocoa	25,000	40,000	60,000	80,000
	All Cocoa	850,000	887,000	949,000	1,016,000
Indonesia	Certified Cocoa	20,000	40,000	55,000	70,000
	All Cocoa	575,000	590,000	605,000	620,000

Table 5: Estimated Cocoa Certification Costs/Tonne

		2012	2013	2014	2015	2016	2017	2018	2019	2020
Cert cost per tonne		$260	$271	$257	$244	$230	$216	$202	$189	$175

*source: Alastair Child

Table 6: Scenario 1

Scenario 1: Business-as-Usual

Year	Mars certified demand	Certified production	Yield (T/ha)	Productivity Source		Revenue Effect ($M)	Certification Cost			
				Other	Certified		Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	621,860	0.45	0.00	0.00	$ 169	$ -	$ 169	$ 31	$ 272
2014	137,943	824,330	0.45	0.00	0.00	$ 237	$ -	$ 237	$ 40	$ 288
2015	182,663	1,026,800	0.45	0.00	0.00	$ 309	$ -	$ 309	$ 55	$ 301
2016	210,963	1,124,550	0.45	0.00	0.00	$ 344	$ -	$ 344	$ 65	$ 306
2017	250,250	1,220,600	0.45	0.00	0.00	$ 380	$ -	$ 380	$ 78	$ 311
2018	296,250	1,316,650	0.45	0.00	0.00	$ 416	$ -	$ 416	$ 94	$ 316
2019	364,500	1,412,700	0.45	0.00	0.00	$ 453	$ -	$ 453	$117	$ 320
2020	415,000	1,508,750	0.45	0.00	0.00	$ 490	$ -	$ 490	$135	$ 325

Note: Based on the existing commitments of Mars and others (Ferrero, Hershey, etc.). Certifying body's forecasts of Certified Production, less 15% double counting.

Table 7: Scenario 2

Scenario 2: Certification Mainstream

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	680,805	0.45	0.00	0.00	$ 189	$ -	$ 189	$ 31	$ 277
2014	137,943	869,262	0.45	0.00	0.00	$ 253	$ -	$ 253	$ 40	$ 291
2015	182,663	1,057,718	0.45	0.00	0.00	$ 320	$ -	$ 320	$ 55	$ 302
2016	210,963	1,246,175	0.45	0.00	0.00	$ 389	$ -	$ 389	$ 66	$ 312
2017	250,250	1,434,631	0.45	0.00	0.00	$ 461	$ -	$ 461	$ 80	$ 321
2018	296,250	1,623,087	0.45	0.00	0.00	$ 535	$ -	$ 535	$ 98	$ 329
2019	364,500	1,811,544	0.45	0.00	0.00	$ 610	$ -	$ 610	$123	$ 337
2020	415,000	2,000,000	0.45	0.00	0.00	$ 687	$ -	$ 687	$143	$ 343

Subscenarios

Scenario 2.1: Mainstream - 30% Productivity Growth by 2020 - Certified

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	680,805	0.47	0.00	0.04	$ 180	$ (5)	$ 175	$ 29	$ 257
2014	137,943	869,262	0.48	0.00	0.08	$ 232	$ (16)	$ 215	$ 34	$ 248
2015	182,663	1,057,718	0.50	0.00	0.11	$ 281	$ (34)	$ 247	$ 43	$ 234
2016	210,963	1,246,175	0.52	0.00	0.15	$ 329	$ (59)	$ 270	$ 46	$ 217
2017	250,250	1,434,631	0.53	0.00	0.19	$ 375	$ (93)	$ 282	$ 49	$ 197
2018	296,250	1,623,087	0.55	0.00	0.23	$ 419	$(135)	$ 284	$ 52	$ 175
2019	364,500	1,811,544	0.57	0.00	0.26	$ 461	$(185)	$ 276	$ 56	$ 152
2020	415,000	2,000,000	0.58	0.00	0.30	$ 501	$(244)	$ 258	$ 53	$ 129

Scenario 2.2: Mainstream - 30% Productivity Growth by 2020 - Non-Certified

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	680,805	0.47	0.04	0.00	$ 180	$ -	$ 180	$ 30	$ 265
2014	137,943	869,262	0.48	0.08	0.00	$ 232	$ -	$ 232	$ 37	$ 267
2015	182,663	1,057,718	0.50	0.11	0.00	$ 281	$ -	$ 281	$ 49	$ 266
2016	210,963	1,246,175	0.52	0.15	0.00	$ 329	$ -	$ 329	$ 56	$ 264
2017	250,250	1,434,631	0.53	0.19	0.00	$ 375	$ -	$ 375	$ 65	$ 262
2018	296,250	1,623,087	0.55	0.23	0.00	$ 419	$ -	$ 419	$ 77	$ 258
2019	364,500	1,811,544	0.57	0.26	0.00	$ 461	$ -	$ 461	$ 93	$ 255
2020	415,000	2,000,000	0.58	0.30	0.00	$ 501	$ -	$ 501	$104	$ 251

Subscenarios

Scenario 2.3: Mainstream - 70% Productivity Growth by 2020 - Certified

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	680,805	0.49	0.00	0.09	$ 170	$ (12)	$ 159	$ 26	$ 233
2014	137,943	869,262	0.53	0.00	0.18	$ 208	$ (35)	$ 173	$ 28	$ 200
2015	182,663	1,057,718	0.57	0.00	0.26	$ 242	$ (70)	$ 172	$ 30	$ 162
2016	210,963	1,246,175	0.61	0.00	0.35	$ 272	$(118)	$ 153	$ 26	$ 123
2017	250,250	1,434,631	0.65	0.00	0.44	$ 298	$(179)	$ 119	$ 21	$ 83
2018	296,250	1,623,087	0.68	0.00	0.53	$ 322	$(252)	$ 70	$ 13	$ 43
2019	364,500	1,811,544	0.72	0.00	0.61	$ 344	$(338)	$ 6	$ 1	$ 3
2020	415,000	2,000,000	0.76	0.00	0.70	$ 363	$(435)	$ (72)	$ (15)	$ (36)

Scenario 2.4: Mainstream - 70% Productivity Growth by 2020 - Non-Certified

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	680,805	0.49	0.09	0.00	$ 170	$ -	$ 170	$ 28	$ 250
2014	137,943	869,262	0.53	0.18	0.00	$ 208	$ -	$ 208	$ 33	$ 240
2015	182,663	1,057,718	0.57	0.26	0.00	$ 242	$ -	$ 242	$ 42	$ 229
2016	210,963	1,246,175	0.61	0.35	0.00	$ 272	$ -	$ 272	$ 46	$ 218
2017	250,250	1,434,631	0.65	0.44	0.00	$ 298	$ -	$ 298	$ 52	$ 208
2018	296,250	1,623,087	0.68	0.53	0.00	$ 322	$ -	$ 322	$ 59	$ 199
2019	364,500	1,811,544	0.72	0.61	0.00	$ 344	$ -	$ 344	$ 69	$ 190
2020	415,000	2,000,000	0.76	0.70	0.00	$ 363	$ -	$ 363	$ 75	$ 182

Figure 2

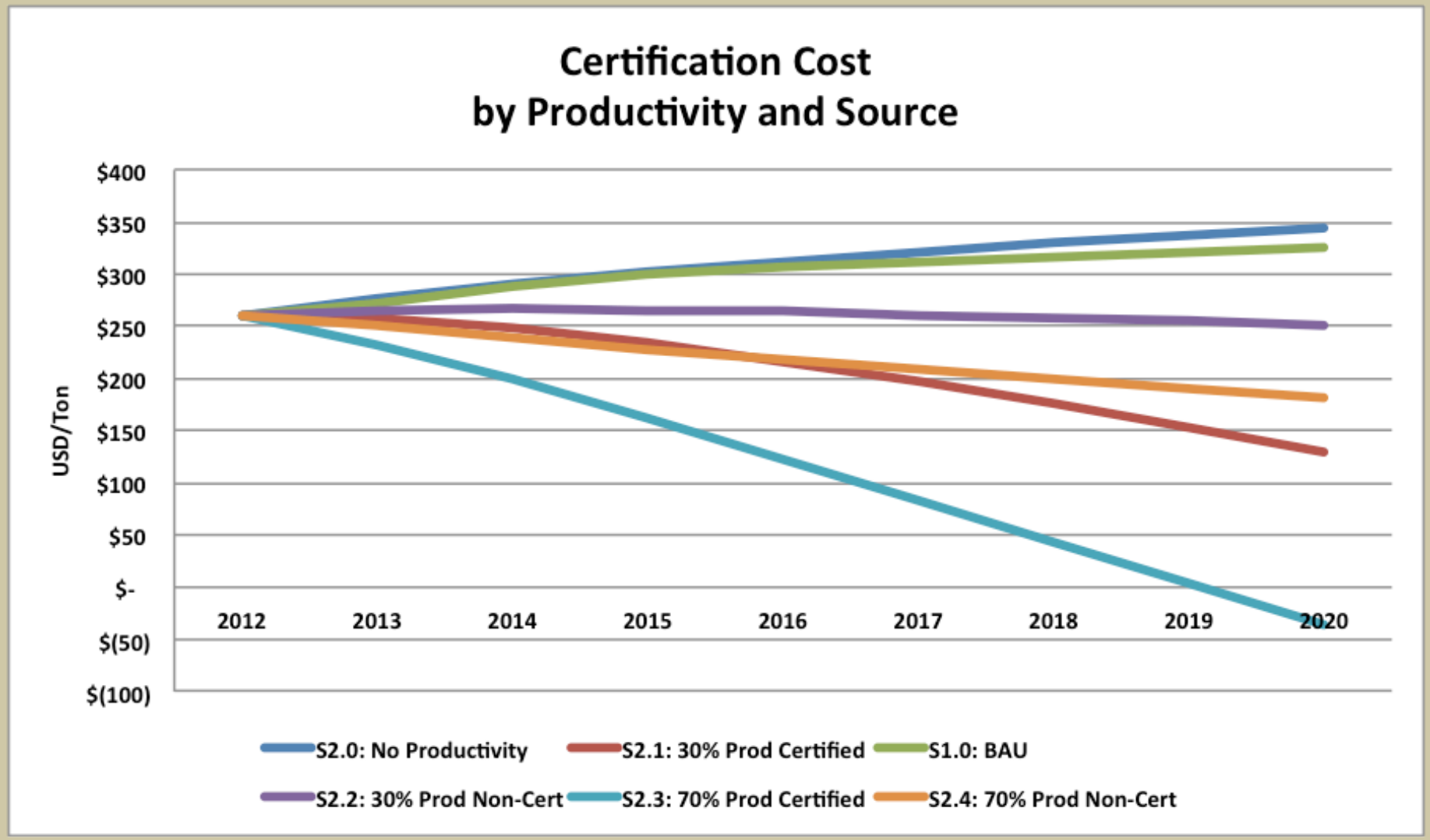
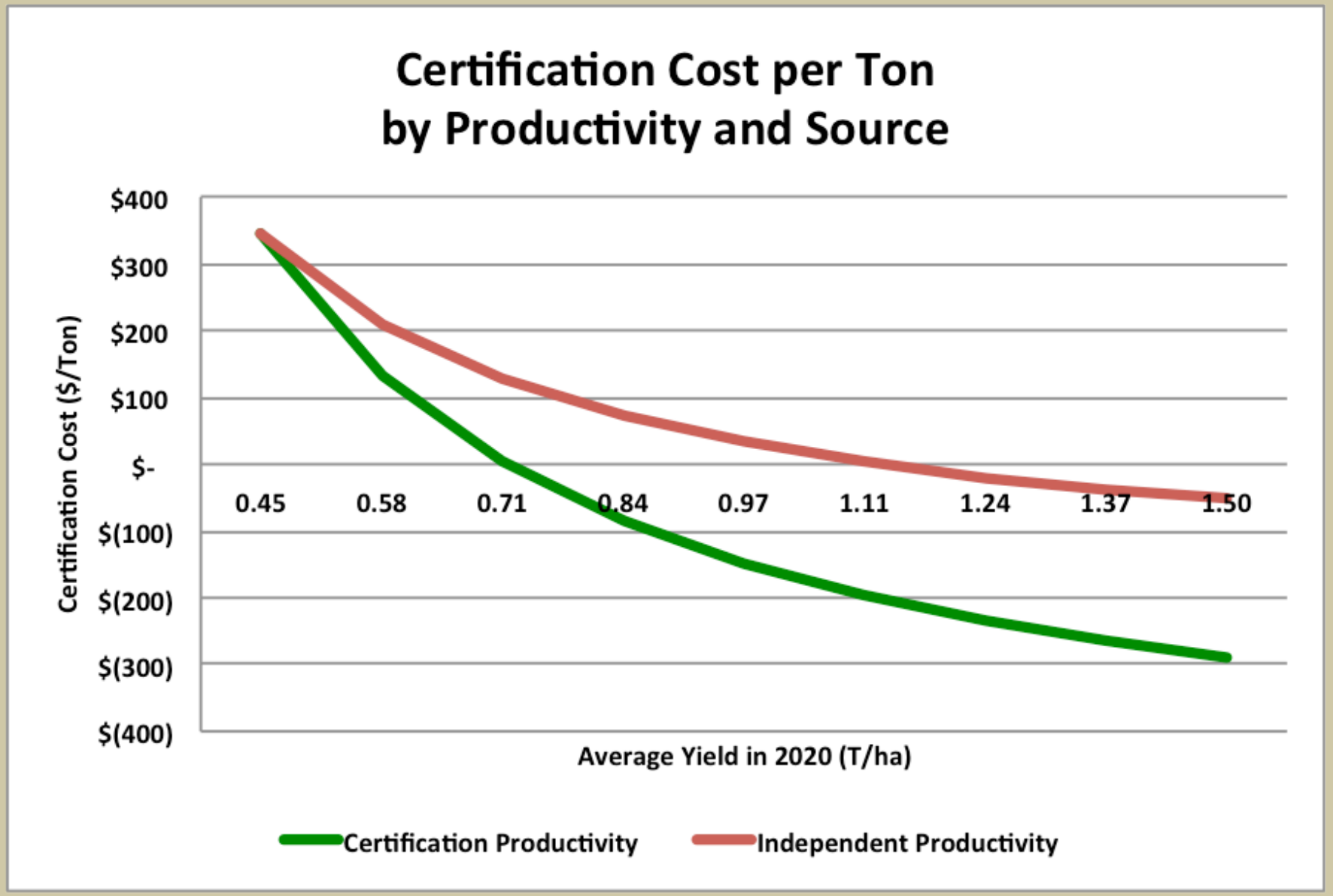

Certification Cost
by Productivity and Source
$400
$350
$300
$250
$200
$150
$100
$50
$-
$(50)
$(100)
USD/Ton
2012
2013
2014
2015
2016
2017
2018
2019
2020
S2.0: No Productivity
S2.1: 30% Prod Certified
S1.0: BAU
S2.2: 30% Prod Non-Cert
S2.3: 70% Prod Certified
S2.4: 70% Prod Non-Cert

Figure 3


Certification Cost per Ton
by Productivity and Source
$400
$300
$200
$100
$-
$(100)
$(200)
$(300)
$(400)
Certification Cost ($/Ton)
0.45
0.58
0.71
0.84
0.97
1.11
1.24
1.37
1.50
Average Yield in 2020 (T/ha)
Certification Productivity
Independent Productivity

Subscenarios

Scenario 1.01: Scenario 1 with Beta=1

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	621,860	0.45	0.00	0.00	$ 165	$ -	$ 165	$ 30	$ 266
2014	137,943	824,330	0.45	0.00	0.00	$ 225	$ -	$ 225	$ 38	$ 273
2015	182,663	1,026,800	0.45	0.00	0.00	$ 287	$ -	$ 287	$ 51	$ 279
2016	210,963	1,124,550	0.45	0.00	0.00	$ 317	$ -	$ 317	$ 59	$ 282
2017	250,250	1,220,600	0.45	0.00	0.00	$ 347	$ -	$ 347	$ 71	$ 284
2018	296,250	1,316,650	0.45	0.00	0.00	$ 377	$ -	$ 377	$ 85	$ 286
2019	364,500	1,412,700	0.45	0.00	0.00	$ 407	$ -	$ 407	$105	$ 288
2020	415,000	1,508,750	0.45	0.00	0.00	$ 438	$ -	$ 438	$120	$ 290

Scenario 2.01: Scenario 1 with Beta=1

				Productivity Source			Certification Cost			
Year	Mars certified demand	Certified production	Yield (T/ha)	Other	Certified	Revenue Effect ($M)	Total ($M)	Net ($M)	Mars ($M)	Cost/Ton ($)
2012	94,587	492,349	0.45	0.00	0.00	$ 128	$ -	$ 128	$ 25	$ 260
2013	112,600	680,805	0.45	0.00	0.00	$ 182	$ -	$ 182	$ 30	$ 268
2014	137,943	869,262	0.45	0.00	0.00	$ 239	$ -	$ 239	$ 38	$ 275
2015	182,663	1,057,718	0.45	0.00	0.00	$ 296	$ -	$ 296	$ 51	$ 280
2016	210,963	1,246,175	0.45	0.00	0.00	$ 355	$ -	$ 355	$ 60	$ 285
2017	250,250	1,434,631	0.45	0.00	0.00	$ 414	$ -	$ 414	$ 72	$ 289
2018	296,250	1,623,087	0.45	0.00	0.00	$ 475	$ -	$ 475	$ 87	$ 292
2019	364,500	1,811,544	0.45	0.00	0.00	$ 536	$ -	$ 536	$108	$ 296
2020	415,000	2,000,000	0.45	0.00	0.00	$ 597	$ -	$ 597	$124	$ 299

Figure 5

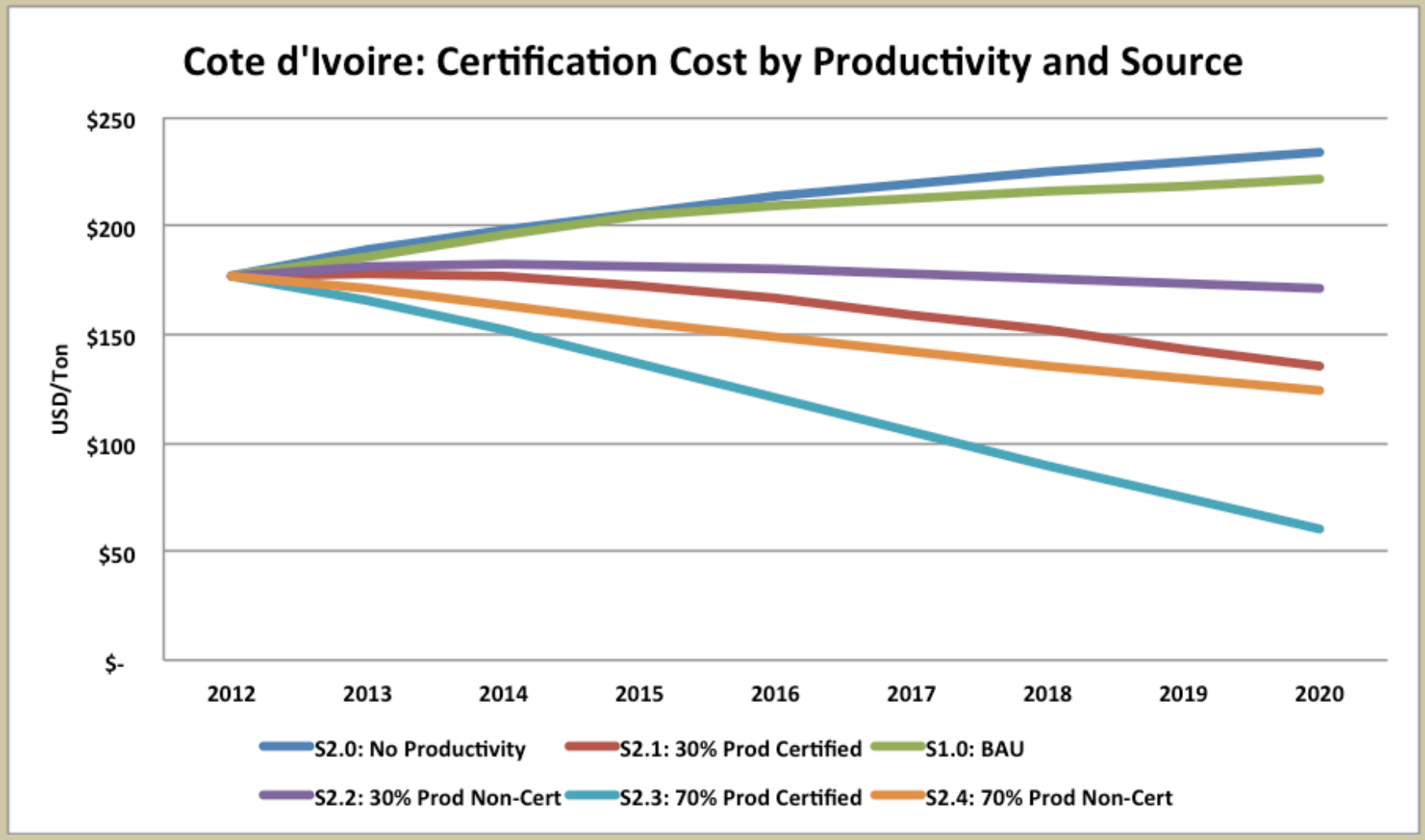

Cote d'Ivoire: Certification Cost by Productivity and Source
$250
$200
$150
$100
$50
$-
USD/Ton
2012
2013
2014
2015
2016
2017
2018
2019
2020
S2.0: No Productivity
S2.1: 30% Prod Certified
S1.0: BAU
S2.2: 30% Prod Non-Cert
S2.3: 70% Prod Certified
S2.4: 70% Prod Non-Cert

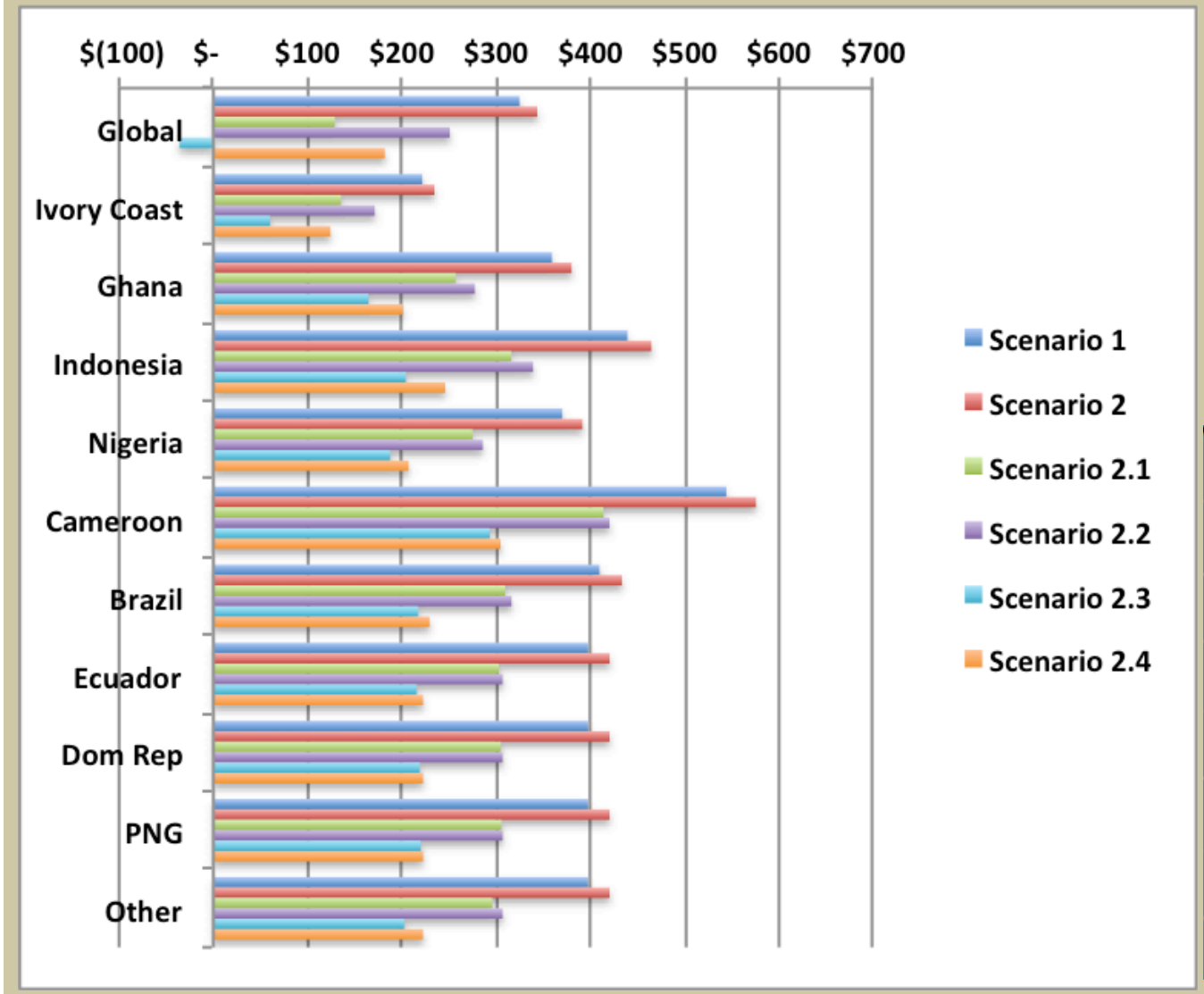
Table 8

Certification Costs by Country and Scenario, 2020 (USD/Ton)

	Global	Ivory Coast	Ghana	Indonesia	Nigeria	Cameroon	Brazil	Ecuador	Dom Rep	PNG	Other
Scenario 1	$ 325	$ 221	$ 359	$ 439	$ 370	$ 544	$ 409	$ 397	$ 397	$ 397	$ 397
Scenario 2	$ 343	$ 234	$ 380	$ 464	$ 391	$ 575	$ 433	$ 420	$ 420	$ 420	$ 420
Scenario 2.1	$ 129	$ 135	$ 257	$ 316	$ 275	$ 414	$ 309	$ 303	$ 305	$ 305	$ 296
Scenario 2.2	$ 251	$ 171	$ 277	$ 339	$ 286	$ 420	$ 316	$ 307	$ 307	$ 307	$ 307
Scenario 2.3	$ (36)	$ 60	$ 164	$ 204	$ 187	$ 293	$ 217	$ 215	$ 219	$ 220	$ 202
Scenario 2.4	$ 182	$ 124	$ 201	$ 246	$ 207	$ 304	$ 229	$ 222	$ 222	$ 222	$ 222

	Scenario
1	Business as Usual
2	Certification Becomes Mainstream
2.1	Scenario 2 with 30% Productivity Growth by 2020, Certified
2.2	Scenario 2 with 30% Productivity Growth by 2020, Non-Certified
2.3	Scenario 2 with 70% Productivity Growth by 2020, Certified
2.4	Scenario 2 with 70% Productivity Growth by 2020, Non-Certified
1.01	Scenario 1 with Program Scale Elasticity = .01
2.01	Scenario 2 with Program Scale Elasticity = .01

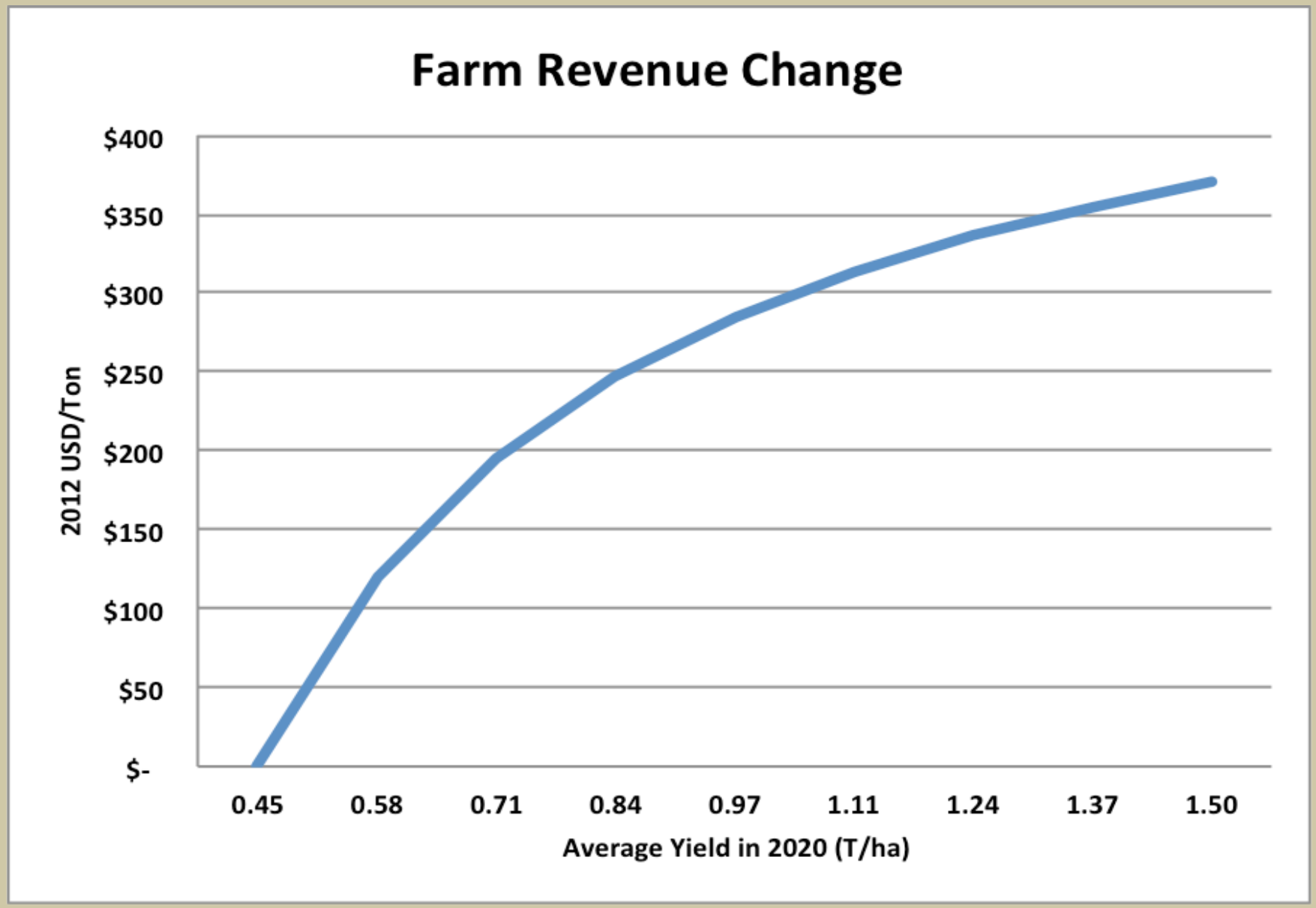
Figure 6: Certification Costs by Country and Scenario, 2020



legend

1	Business as Usual
2	Certification Becomes Mainstream
2.1	Scenario 2 with 30% Productivity Growth by 2020, Certified
2.2	Scenario 2 with 30% Productivity Growth by 2020, Non-Certified
2.3	Scenario 2 with 70% Productivity Growth by 2020, Certified
2.4	Scenario 2 with 70% Productivity Growth by 2020, Non-Certified
1.01	Scenario 1 with Program Scale Elasticity = .01
2.01	Scenario 2 with Program Scale Elasticity = .01

Figure 4


Farm Revenue Change
$400
$350
$300
$250
$200
$150
$100
$50
$-
2012 USD/Ton
0.45
0.58
0.71
0.84
0.97
1.11
1.24
1.37
1.50
Average Yield in 2020 (T/ha)

Impact on farmer income

- If certification increases yield **AND** affects price, if the net revenue is greater than the cost of compliance, farmers will gain from certification.
- If certifiers pay the farmers their compliance costs and the farmer pays for inputs such as fertilizer or genetic materials, and these costs are less than the added revenue then they gain extra net income.
- If the extra net income is very high, then even if the farmers are not paid for their certification activities, they will participate voluntarily
  - In principle, they may even pay to participate, if there are large yield gains.
  - We have some scenarios that suggest this (e.g. negative cost of certification)
- If fertilizer and genetic material covers 50-60% of the extra net income, then if the farmer gains $500 in extra revenue, they may make $200 in extra net income.
- We don't have solid numbers for exact estimates, but if you pay $2000/tonne and you get extra 0.5 tonne/hectare, then you may have extra net income of $400/hectare.

The BIG questions??

- What are the objectives of certification?
- We do not have clear indicator of who will pay for the yield increasing activities

- It seems reasonable that farmers would pay for fertilizer.
- They may also pay for better genetic materials.
- But who will pay for extension and training?
  - Nurseries for genetic material: development of genetic material that accommodates varying conditions

Conclusions

- The cost of certification depends on its ability to improve productivity; with 70% productivity increases, certification could more than pay for itself by 2020; with no productivity increase, it could be $343/tonne by 2020
- Potential cost reductions vary inversely with initial yields, i.e. countries with the lowest efficiency levels can reduce certification costs the most with yield enhancement
- Thus yield-enhancing programs can promote economic convergence, with the poorest farmers advancing the most rapidly in percentage terms.
- Costs of certifying more remote, less organized farmers are expected to increase steeply, but these increases cannot be quantified

“…in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs.”

- The Brundtland Report, 1987