

Impact of Agricultural Price Policy on Main Crops in Egypt

ABSTRACT

Agricultural production, like other economic activities, is affected by the success of agricultural economic policies pursued by government from leaving the farmer free to cultivate his land with the desired crops, and to take his production and marketing decisions in light of the mechanisms of supply and demand and the movement of prices in the markets without any intervention by the government. Therefore, the government's intervention influences the farmers' desire to grow any of the crops through its agricultural policies by imposing taxes or subsidizing inputs. Wheat, maize, rice, and potatoes are among the most crucial strategic food and industrial crops in Egypt. The Policy Analysis Matrix (PAM) can be calculated by calculating nominal and effective protection coefficients, and then identifying the policy adopted by the government, whether it is a protectionist policy or a policy of direct or indirect taxes on the producers of those crops, as well as the calculation of the cost of domestic resources to determine the relative advantage. The results showed that the financial value of workers' wages in the production of wheat, maize, rice, and potatoes at market prices exceeded the border prices, while the values of the nominal protection coefficients of outputs were about 0.81, 0.81, 0.80, and 0.83, respectively for wheat, maize, rice, and potatoes. Nominal protection coefficient values for production inputs were 0.83, 0.83, 0.85, and 0.84, respectively for the four crops, while the effective protection plant values for wheat, maize, rice, and potato crops were 0.80, 0.80, 0.80 and 0.84, respectively. The values of the comparative advantage of the four crops, respectively, were 0.49, 0.52, 0.38, and 0.37.

Formatted: Space After: 0 pt

Keywords: Policy Analysis Matrix, Nominal Protection Coefficient, Effective Protection Coefficient, Domestic Resource Costs.

Formatted: Space After: 0 pt

1. INTRODUCTION

Formatted: Line spacing: 1.5 lines

As Egypt progressed from a largely agricultural country to a country with a more diverse economy, agriculture itself slowly declined in prominence as a pillar of the Egyptian economy. Trends in the contribution of agriculture to national income give an indication of this. Between 1970 and 2000, agriculture's contribution had fallen from 29.0 to 16.5 percent of GDP, with output falling at an annual average of 2.8 percent between 1960 and 1980 [1,2]. This slow progress is also reflected in high unemployment and poverty levels. Nevertheless, today, agriculture is still expected to generate hard currency revenue via high-quality products for export and to provide food security for the country's population via the cultivation of enough staple

22 crops. That is, agriculture is to provide income, employment, and food for the Egyptian population
23 [3].

24 Cereal crops, mainly wheat, maize and rice, are staple food crops for many nations, especially in
25 developing countries. They also play a strategic role in the policies of developed countries as they
26 use such crops as a tool for practicing pressure on other countries. That is why most developing
27 countries seek to achieve self-sufficiency in cereal crops. In Egypt, official statistics indicate that
28 cereal production reached 22.37 million tons, while domestic consumption reached 47.47 million
29 tons, indicating a gap of 25 million tons worth US\$ 4.3 billion. In 2017, self-sufficiency in cereals
30 reached 47.12% [4].

31 In addition, cereal crops occupy an important position in Egypt's agriculture, either in terms of
32 contribution to national income, or to resources, with cultivated land area estimated at 12.19
33 million ~~acers~~ acres representing 76% of total cropped area, estimated at 16.04 million acres [5].

34 Also, Vegetables crops occupy an important position in Egypt's agriculture, either in terms of
35 contribution to national income, or to resources, with cultivated land area estimated at 1.88 million
36 acres representing 11.72% of total cropped area [6].

37 Wheat, maize, rice and potatoes are major crops in Egypt, domestic wheat production declined
38 from 9.34 million tons in 2016 to 8.42 million tons in 2017, down by 9.9%. In 2017, average per
39 capita share of wheat amounted to 163.9 kg/year and self-sufficiency rate amounted to 34.5%.
40 While Maize production increased from 7.17 million tons in 2016 to 7.66 million tons in 2017,
41 average per capita share of maize amounted to 52.2 kg/year and self-sufficiency rate amounted to
42 46.10%. Rice production also declined from 5.31 million tons in 2016 to 4.96 million tons in
43 2016, down by 10.2%. In 2017, average per capita share of rice amounted to 38.7 kg/year and self-
44 sufficiency rate amounted to 87.96%. Potatoes production also declined from 5.02 million tons in
45 2016 to 4.84 million tons in 2017, average per capita share of potatoes amounted to 25.4 kg/year
46 and self-sufficiency rate amounted to 116.28% [7].

47 The current research investigates the problems arising from impact of agricultural price policy in
48 agricultural production through adopting development strategies that aim to achieve free market
49 economy [8] and dependency on interaction between supply and demand forces as main pillar to
50 raise efficiency of the national economy and achieve the hoped for development, which all
51 resulted in producers bearing the burden of paying indirect taxes (implicit) due to price distortions

52 resulting from imbalances between domestic and international prices [9].Such situation obstructs
53 efforts exerted to achieve optimum economic efficiency in domestic resources' use as well as the
54 welfare of producers and consumers. As a result, producers started choosing to cultivate other
55 crops that are not subject to taxes and in the same time are profitable [10].

56 Accordingly, the current research mainly aims at assessing the impact of agricultural price policy
57 by studying and analyzing the indicators that can be deduced from PAM, which can help identify
58 trends of agricultural policies implemented in the agricultural sector and measure the efficiency of
59 economic resources' use. To assess the impact of the implemented policy by measuring Nominal
60 Protection Coefficient for outputs and inputs, Effective Protection Coefficient and Comparative
61 Advantage Coefficient (Domestic Resource Cost Coefficient).

62

63 **2. MATERIALS AND METHODS**

64

65 To achieve the research objectives, the impacts of agricultural price policy will be assessed for
66 main crops in Egypt, as follows:

67

68 **2.1 Policy Analysis Matrix (PAM)**

69 Policy analysis matrix is one of the most important modern methods used in policy analysis,
70 where it helps examine the impacts of government's intervention policies across different stages of
71 the flow of goods, which in turn helps assess and measure such policies' efficiency in achieving
72 the hoped for objectives and examine their impacts on producers, consumers and the macro-level
73 economic conditions [11]. The set of indicators that can be deduced from PAM can help identify
74 trends of agricultural policies implemented in the agricultural sector and measure the efficiency of
75 economic resources' use [12]. PAM is usually built using farm budget, including revenues and
76 costs, which occur in the form of tradable inputs (production inputs) and domestic resources (land
77 and labor). In PAM, both revenues and costs are evaluated financially (at market prices) and
78 economically (at border prices) to assess the impact of the implemented policy by measuring
79 Nominal Protection Coefficient for outputs and inputs, Effective Protection Coefficient and
80 Comparative Advantage Coefficient (Domestic Resource Cost Coefficient). The general structure
81 of PAM is presented as follows:

Formatted: Space After: 0 pt, Line spacing:
1.5 lines

82
83

Table 1: General Structure of Policy Analysis Matrix

	Total revenue	Total production input	Total cost of domestic			Net Revenue	Value Added
			Total labor	Total rent (land)	Total		
Financial prices	A	B	C	D	E	F	G
Economic prices	H	I	J	K	L	M	N
Policy impact	O	P	Q	R	S	T	U

Formatted Table

84
85

86 **2.1.1 Nominal Protection Coefficient on Tradable Outputs (NPC_O):** Nominal Protection
87 Coefficient on Tradable Outputs provides a comparison between domestic and economic prices of
88 outputs. It represents such kinds of protection or taxes that prevent equating domestic prices with
89 border prices. It reflects the level of incentives or non-incentives offered to domestic farmers. It
90 can be calculated as follows:

$$NPC = \frac{A}{H}$$

Formatted: Centered, Space After: 0 pt, Line spacing: 1.5 lines, Don't keep with next

91

- 92 • NPC > 1 means that domestic prices are higher than border prices, indicating implicit subsidy for producers.
- 93
- 94 • NPC < 1 means that domestic prices are lower than border prices, indicating that producers incur implicit taxes.
- 95
- 96 • NPC = 1 means absence of intervention in price policy, as well as absence of protection.

97

98 **2.1.2 Nominal Protection Coefficient on Tradable Inputs (NPC_I):** Nominal Protection
99 Coefficient on Tradable Inputs is the ratio between domestic and economic prices of outputs:

$$NPC_I = \frac{B}{I}$$

Formatted: Line spacing: 1.5 lines

- 100 • NPC_I > 1 means that the government subsidizes production inputs.
- 101 • NPC_I < 1 means that the government imposes taxes on inputs.
- 102 • NPC_I = 1 means lack of distortions in input prices.

103

104 | **2.1.3 Effective Protection Coefficient (EPC):** Effective Protection Coefficient is an extension of
105 | the concept of the Nominal Protection Coefficient. However, it measures price distortions at the
106 | level of output and input markets, where it measures the net impact of economic policy on
107 | domestic output and input markets. It is the ratio of the value added ⁽¹⁾ of a particular product in
108 | domestic market price to the value added in economic price:

$$\text{EPC} = \frac{\text{G}}{\text{N}}$$

- 109 | • EPC = 1 means lack of distortions.
- 110 | • EPC > 1 means effective protection or incentives for producers.
- 111 | • EPC < 1 means negative protection in the form of taxes imposed on producers.

112

113 | It should be noted that the nominal protection coefficient for both inputs and outputs is used to
114 | estimate the structure of incentives at the commodity level, while effective protection coefficient is
115 | a measure of price incentives.

117 | **2.1.4 Local Resource Cost Ratio (DRC):** it is the ratio between benefits and costs. It is a measure
118 | of efficiency or comparative advantage of a certain commodity system. A commodity system is
119 | considered to enjoy a comparative advantage when DRC is less than or equal to the equilibrium
120 | exchange rate. It can be computed as follows:

$$\text{DRC} = \frac{\text{L}}{\text{N}}$$

- 122 | • DRC < 1 means that using less than one unit of domestic resources yields one unit of hard
123 | currency, indicating that the country enjoys a comparative advantage.
- 124 | • DRC > 1 means that more than one unit of domestic resources is used to acquire one unit of
125 | hard currency, indicating that country has no comparative advantage in the global market.
126 | Alternatively, the opportunity cost of using domestic resources exceeds the value added
127 | estimated at world prices, indicating that the economic activity is unprofitable.

128

(4) Value added = Revenue – Inputs excluding domestic factors

Formatted: Space After: 0 pt, Line spacing: 1.5 lines

Formatted: Line spacing: 1.5 lines

129 **2.2 Sources of Data**

130 The research relied on published and unpublished secondary data from various sources, including:
131 the Ministry of Agriculture and Land Reclamation, the Central Agency for Public Mobilization
132 and Statistics (CAPMAS), the National Planning Institute, websites of Food and Agriculture
133 Organization of the United Nations, the United Nations and the World Bank, in addition to other
134 websites specialized in publishing data statistics. The research also used some references and
135 researches relevant to the study subject.

137 **3. RESULTS AND DISCUSSION**

139 **Input Cost Analysis using Domestic and Border Prices**

140 Financial analysis of average production cost per acre has been computed using domestic farmgate
141 prices and border prices over the period 2000-2017. Findings reveal the following:

143 **3.1 Domestic Resource Cost**

144 **3.1.1 Labor Wages**

145 Figures in Table 2, indicate that wages of labor hired for wheat, maize, rice and potatoes
146 production in market prices is higher than wages computed in border prices. Average value of
147 labor wages in financial prices reached 108.6, 140.89, 126.97, and 173.92 US\$, respectively while
148 that computed in economic prices reached 81.75, 105.67, 95.23, and 130.44 US\$, respectively.

151 **Table 2: Production Cost Items Assessed in Financial and Economic Prices of main crops**
152 **Grown in Egypt over the period 2000-2017**

		Wheat		Maize		Rice		Potatoes	
		Financial Prices	Economic prices*	Financial Prices	Economic prices*	Financial Prices	Economic prices*	Financial Prices	Economic prices*
Total cost of domestic	Labor Wages	108.6	81.75	140.89	105.67	126.97	95.23	173.92	130.44
	Wages of Draft Animals	3.7	3.7	1.01	1.01	5.83	5.83	5.94	5.94
	Wages of	75.4	84.45	56.64	63.44	93.81	105.07	68.05	76.22

Formatted: Font: Bold

	Machinery								
	General Expenses	28.4	28.4	28.66	28.66	31.02	31.02	93.92	93.92
	Rent	213.5	189.11	175.89	240.41	240.41	157.89	148.46	240.41
	Total cost of domestic resource	429.6	387.41	403.09	438.52	498.04	395.04	490.29	546.93
Total production inputs	Seeds Cost	26.9	30.13	28.66	32.09	26.18	29.32	576.41	645.58
	Manure	11.6	11.6	24.01	24.01	4.6	4.6	46.69	46.69
	Fertilizers	51.2	74.24	60.81	88.17	45.51	65.99	127.59	185.00
	Insecticides	11.3	12.32	8.02	8.74	17.61	19.19	44.67	48.69
	Total production inputs	129.44	156.69	150.16	181.67	124.92	150.12	889.28	1020
	Total costs	230.44	284.98	271.66	334.68	218.82	269.22	1684.62	1945.96

153 Source: Author Calculation, 2019.

154

155 * Economic value has been computed using conversion factors estimated by experts from the
 156 World Bank in 2000, as follows: 1.12 for seeds; 1.45 for chemical fertilizers; 1.09 for pesticides;
 157 0.75 for human labor; 1.12 for machinery. Other items remained unchanged. As for land,
 158 opportunity cost is the revenue producer can get from his land without bearing the burdens of risks
 159 in agricultural production, which is usually the economic rent (leasing to others for one year)
 160 assessed on the basis of duration of crop stay in land (World Bank, 2000).

161

162 3.1.2 Cost of Machinery

163 Figures in Table (2) indicate that cost of machinery rented for wheat, maize, rice and potatoes
 164 production in market prices is less than that computed in border prices. Average rent in financial
 165 prices reached 75.4, 56.64, 93.81, and 68.05 US\$, respectively while that computed in economic
 166 prices reached 84.45, 63.44, 105.07, and 76.22 US\$, respectively.

167

168 3.1.3 Cost of Production Inputs

169 Figures in Table (2) indicate that average cost of production inputs in financial prices (including
 170 fertilizers, pesticides and seeds) reached 89.4, 97.49, 89.3, and 748.67 US\$, respectively while
 171 that computed in economic prices reached 116.69, 129, 114.5, and 879.27 US\$, respectively.

172

173

Comment [HH1]: Did not count numerically ???
add as [13]???

174 | **3.2 Impact of Agricultural Price Policy on wheat Crop:**

175 | It is also clear from Table 3, which illustrates the results of PAM applied to wheat grown in Egypt
176 | over the period (2000-2017), that average revenue reached US\$ 735.43 in financial prices, while
177 | reached US\$ 925.55 in economic prices, resulting in a policy impact of US\$ 190.12, indicating
178 | that wheat producers incurred implicit taxes estimated at US\$ 190.12 as average of the study
179 | period.

180 |

181 | **Table 3: Policy Analysis Matrix for wheat Grown in Egypt over the Period 2000-2017**

182 |

	Total revenue	Total production input	Total cost of domestic			Net Revenue	Added Value
			Total labor	Total rent (land)	Total		
Financial prices	735.43	129.42	187.65	213.48	401.13	204.9	606.01
Economic prices	925.55	152.69	168.42	189.11	357.53	415.33	772.86
Policy impact	(190.12)	(23.27)	19.23	24.37	43.6	(210.43)	(166.85)

183 | Numbers between the brackets are Negative

184 | Source: Author Calculation, 2019.

185 |

186 | Results also show that wheat farmers bear costs of production inputs during the study period
187 | (2000-2017), estimated at US\$ 129.42 in financial prices, corresponding to US\$ 152.69 in
188 | economic prices, resulting in a policy impact of US\$ 23.27, which means that cost of production
189 | inputs declined by US\$ 23.27 during the study period.

190 | In addition, wheat farmers incurred implicit taxes on hired labor (as domestic resource) estimated
191 | at US\$ 19.23 as average of the study period. As for net revenue, which reflects implicit taxes
192 | incurred by producers and subsidy received, it can be noted from Table (3) that it amounted to
193 | US\$ 204.9 in financial prices and US\$ 415.33 in economic prices, resulting in a policy impact of
194 | US\$ 210.43, indicating that wheat producers incurred implicit taxes amounting to US\$ 210.43 as
195 | average of the study period.

196 |

197 | **3.2.1 Nominal Protection Coefficient on Outputs (NPC_o)**

198 | As shown in Table (4), Nominal Protection Coefficient on Outputs amounted to 0.79, which is less
199 | than unity, indicating absence of fair production policy over the study period 2000-2017. In other

Formatted: Line spacing: 1.5 lines

200 words, domestic prices of wheat is lower than international prices, resulting in wheat producers
201 incurring implicit taxes amounting to 21% due to receiving only 79% of the real price they should
202 get for their product. Such result means that the implemented policy was not in favor of domestic
203 wheat producers.

204 **Table 4: Nominal Protection Coefficient, Effective Protection Coefficient and Domestic**
205 **Resource Cost Ratio for Wheat Grown in Egypt over the Period 2000-2017**

Items	Value
NPC_o	0.79
NPC_I	0.85
EPC	0.78
DRC	0.46

207
208 | Source: Calculated from [Table 2](#).
209

210 **3.2.2 Nominal Protection Coefficient on Inputs (NPC_I)**

211 | Results in Table (4) show that Nominal Protection Coefficient on Inputs amounted to 0.85, which
212 is less than unity, indicating very low subsidy on inputs used in wheat production over the study
213 period 2000-2017. In other words, wheat producers received a subsidy as low as 15% on
214 production inputs. This also means that subsidy to wheat producers is diminishing, which
215 complies with the implemented agricultural policy of gradual removal of subsidy on production
216 inputs until reaching price levels proportionate to their economic cost thus international prices.
217 Such finding indicates that the implemented economic liberalization policy resulted in very
218 limited subsidy on production inputs for wheat producers.

219 220 **3.2.3 Effective Protection Coefficient (EPC)**

221 It is clear from Table 4 that Effective Protection Coefficient amounted to 0.78, which is less than
222 unity, indicating that wheat producers incur implicit taxes. In other words, value added in
223 domestic prices is lower than that in international prices, which means absence of protection
224 policy during the study period. Such result means that the government has been imposing taxes,
225 either direct or indirect, or it has been subsidizing wheat imports.

226 227 **3.2.4 Domestic Resources Cost Ratio DRC (Comparative Advantage)**

228 Results in Table 4 show that Domestic resource Cost Ratio amounted to 0.46, indicating that
 229 Egypt enjoyed a comparative advantage in wheat production during the study period 2000-2017,
 230 which means that domestic production of wheat is preferred to dependency on imports.

232 3.3 Impact of Agricultural Price Policy on maize Crop

233 It is also clear from Table (5), which illustrates the results of PAM applied to maize grown in
 234 Egypt over the period (2000-2017), that average revenue reached US\$ 799.63 in financial prices,
 235 while reached US\$ 1006.34 in economic prices, resulting in a policy impact of US\$ 206.71,
 236 indicating that maize producers incurred implicit taxes estimated at US\$ 206.71 as average of the
 237 study period.

239 **Table 5: Policy Analysis Matrix for maize Grown in Egypt over the Period 2000-2017**

	Total revenue	Total production input	Total cost of domestic			Net Revenue	Added Value
			Total labor	Total rent (land)	Total		
Financial prices	799.63	150.15	198.54	175.89	374.43	275.05	649.48
Economic prices	1006.34	178.26	170.76	240.41	411.17	416.91	828.08
Policy impact	(206.71)	(28.11)	27.78	(64.52)	(36.74)	(141.86)	(178.6)

241 Numbers between the brackets are Negative
 242 Source: Author Calculation, 2019.

243
 244 Results also show that maize farmers bear costs of production inputs during the study period
 245 (2000-2017), estimated at US\$ 150.15 in financial prices, corresponding to US\$ 178.26 in
 246 economic prices, resulting in a policy impact of US\$ 28.11, which means that cost of production
 247 inputs declined by US\$ 28.11 during the study period.

248 In addition, maize farmers incurred implicit taxes on hired labor (as domestic resource) estimated
 249 at US\$ 27.78 as average of the study period. As for net revenue, which reflects implicit taxes
 250 incurred by producers and subsidy received, it can be noted from Table 5 that it amounted to US\$
 251 275.05 in financial prices and US\$ 416.91 in economic prices, resulting in a policy impact of US\$
 252 141.86, indicating that maize producers incurred implicit taxes amounting to US\$ 141.86 as
 253 average of the study period.

Formatted: Space After: 0 pt, Don't keep with next

Formatted: Space After: 0 pt, Don't keep with next

Formatted: Space After: 0 pt, Don't keep with next

254

255 3.3.1 Nominal Protection Coefficient on Outputs (NPC_o)

256 | As shown in Table (6), Nominal Protection Coefficient on Outputs amounted to 0.79, which is less
257 | than unity, indicating absence of fair production policy over the study period 2000-2017. In other
258 | words, domestic prices of maize is lower than international prices, resulting in maize producers
259 | incurring implicit taxes amounting to 21% due to receiving only 79% of the real price they should
260 | get for their product. Such result means that the implemented policy was not in favor of domestic
261 | maize producers.

262

263 **Table 6: Nominal Protection Coefficient, Effective Protection Coefficient and Domestic**
264 **Resource Cost Ratio for maize Grown in Egypt over the Period 2000-2017**

265

Items	Value
NPC _o	0.79
NPC _i	0.84
EPC	0.78
DRC	0.46

266

267 | Source: [Calculated from Table 6.???](#)

268

269 3.3.2 Nominal Protection Coefficient on Inputs (NPC_i)

270 | Results in Table (6) show that Nominal Protection Coefficient on Inputs amounted to 0.84, which
271 | is less than unity, indicating very low subsidy on inputs used in maize production over the study
272 | period 2000-2017. In other words, maize producers received a subsidy as low as 16% on
273 | production inputs. This also means that subsidy to maize producers is diminishing, which
274 | complies with the implemented agricultural policy of gradual removal of subsidy on production
275 | inputs until reaching price levels proportionate to their economic cost thus international prices.
276 | Such finding indicates that the implemented economic liberalization policy resulted in very
277 | limited subsidy on production inputs for maize producers.

278

279 3.3.3 Effective Protection Coefficient (EPC)

280 | It is clear from Table 6 that Effective Protection Coefficient amounted to 0.78, which is less than
281 | unity, indicating that maize producers incur implicit taxes. In other words, value added in

Formatted: Font color: Red

Formatted: Font color: Red

282 domestic prices is lower than that in international prices, which means absence of protection
 283 policy during the study period. Such result means that the government has been imposing taxes,
 284 either direct or indirect, or it has been subsidizing maize imports.

285

286 3.3.4 Domestic Resources Cost Ratio DRC (Comparative Advantage)

287 Results in Table 6 show that Domestic resource Cost Ratio amounted to 0.50, indicating that
 288 Egypt enjoyed a comparative advantage in maize production during the study period 2000-2017,
 289 which means that domestic production of maize is preferred to dependency on imports.

290

291 3.4 Impact of Agricultural Price Policy on Rice Crop:

292 It is also clear from Table (7), which illustrates the results of PAM applied to rice grown in Egypt
 293 over the period (2000-2017), that average revenue reached US\$ 950.99 in financial prices, while
 294 reached US\$ 1169.89 in economic prices, resulting in a policy impact of US\$ 218.9, indicating
 295 that rice producers incurred implicit taxes estimated at US\$ 218.9 as average of the study period.

296

297 **Table 7: Policy Analysis Matrix for Rice Grown in Egypt over the Period 2000-2017**

298

	Total revenue	Total production input	Total cost of domestic			Net Revenue	Added Value
			Total labor	Total rent (land)	Total		
Financial prices	950.99	124.92	226.61	240.41	467.02	359.05	826.07
Economic prices	1169.89	146.86	205.71	175.89	381.6	641.43	1023.03
Policy impact	(218.9)	(21.94)	20.9	64.52	85.42	(282.38)	(196.96)

299 Numbers between the brackets are Negative

300 Source: Author Calculation, 2019.

301

302 Results also show that rice farmers bear costs of production inputs during the study period (2000-
 303 2017), estimated at US\$ 124.92 in financial prices, corresponding to US\$ 146.86 in economic
 304 prices, resulting in a policy impact of US\$ 21.94, which means that cost of production inputs
 305 declined by US\$ 28.11 during the study period.

306 In addition, rice farmers incurred implicit taxes on hired labor (as domestic resource) estimated at
 307 US\$ 20.9 as average of the study period. As for net revenue, which reflects implicit taxes incurred

308 | by producers and subsidy received, it can be noted from Table (7) that it amounted to US\$ 359.05
309 | in financial prices and US\$ 641.43 in economic prices, resulting in a policy impact of US\$ 282.38,
310 | indicating that rice producers incurred implicit taxes amounting to US\$ 282.38 as average of the
311 | study period.

312

313 **3.4.1 Nominal Protection Coefficient on Outputs (NPC_o)**

314 | As shown in Table (8), Nominal Protection Coefficient on Outputs amounted to 0.81, which is less
315 | than unity, indicating absence of fair production policy over the study period 2000-2017. In other
316 | words, domestic prices of rice is lower than international prices, resulting in rice producers
317 | incurring implicit taxes amounting to 19% due to receiving only 81% of the real price they should
318 | get for their product. Such result means that the implemented policy was not in favor of domestic
319 | rice producers.

320 | **Table 8: Nominal Protection Coefficient, Effective Protection Coefficient and Domestic**
321 | **Resource Cost Ratio for Rice Grown in Egypt over the Period 2000-2017**

322

Items	Value
NPC _o	0.81
NPC _i	0.85
EPC	0.81
DRC	0.37

323

324 | Source: Calculated from table 6.

325

326 **3.4.2 Nominal Protection Coefficient on Inputs (NPC_i)**

327 | Results in Table (8) show that Nominal Protection Coefficient on Inputs amounted to 0.85, which
328 | is less than unity, indicating very low subsidy on inputs used in rice production over the study
329 | period 2000-2017. In other words, rice producers received a subsidy as low as 15% on production
330 | inputs. This also means that subsidy to rice producers is diminishing, which complies with the
331 | implemented agricultural policy of gradual removal of subsidy on production inputs until reaching
332 | price levels proportionate to their economic cost thus international prices. Such finding indicates
333 | that the implemented economic liberalization policy resulted in very limited subsidy on production
334 | inputs for rice producers.

335

336 **3.4.3 Effective Protection Coefficient (EPC)**

337 It is clear from Table 8 that Effective Protection Coefficient amounted to 0.81, which is less than
 338 unity, indicating that rice producers incur implicit taxes. In other words, value added in domestic
 339 prices is lower than that in international prices, which means absence of protection policy during
 340 the study period. Such result means that the government has been imposing taxes, either direct or
 341 indirect.

343 **3.4.4 Domestic Resources Cost Ratio DRC (Comparative Advantage)**

344 Results in Table 8 show that Domestic resource Cost Ratio amounted to 0.37, indicating that
 345 Egypt enjoyed a comparative advantage in rice production during the study period 2000-2017,
 346 which means that domestic production of rice is preferred to dependency on imports.

348 **3.5 Impact of Agricultural Price Policy on Potatoes Crop:**

349 It is also clear from Table (9), which illustrates the results of PAM applied to Potatoes grown in
 350 Egypt over the period (2000-2017), that average revenue reached US\$ 1986.60 in financial prices,
 351 while reached US\$ 2389.51 in economic prices, resulting in a policy impact of US\$ 402.91,
 352 indicating that Potatoes producers incurred implicit taxes estimated at US\$ 402.91 as average of
 353 the study period.

355 **Table 9: Policy Analysis Matrix for Potatoes Grown in Egypt over the Period 2000-2017**

	Total revenue	Total production input	Total cost of domestic			Net Revenue	Added Value
			Total labor	Total rent (land)	Total		
Financial prices	1986.60	889.26	247.92	184.46	432.38	664.96	1097.34
Economic prices	2389.51	1058.2	222.54	240.41	462.95	868.36	1331.31
Policy impact	(402.91)	(168.94)	25.385	(55.95)	(30.57)	(203.4)	(233.97)

357 Numbers between the brackets are Negative

358 Source: Author Calculation, 2019.

360 Results also show that Potatoes farmers bear costs of production inputs during the study period
 361 (2000-2017), estimated at US\$ 889.26 in financial prices, corresponding to US\$ 1058.2 in

362 economic prices, resulting in a policy impact of US\$ 168.94, which means that cost of production
363 inputs declined by US\$ 168.94 during the study period.

364 In addition, Potatoes farmers incurred implicit taxes on hired labor (as domestic resource)
365 estimated at US\$ 25.385 as average of the study period. As for net revenue, which reflects implicit
366 taxes incurred by producers and subsidy received, it can be noted from Table (9) that it amounted
367 to US\$ 664.96 in financial prices and US\$ 868.36 in economic prices, resulting in a policy impact
368 of US\$ 203.4, indicating that Potatoes producers incurred implicit taxes amounting to US\$ 203.4
369 as average of the study period.

370

371 3.5.1 Nominal Protection Coefficient on Outputs (NPC_o)

372 As shown in Table (10), Nominal Protection Coefficient on Outputs amounted to 0.83, which is
373 less than unity, indicating absence of fair production policy over the study period 2000-2017. In
374 other words, domestic prices of Potatoes is lower than international prices, resulting in Potatoes
375 producers incurring implicit taxes amounting to 17% due to receiving only 83% of the real price
376 they should get for their product. Such result means that the implemented policy was not in favor
377 of domestic Potatoes producers.

378 **Table 10: Nominal Protection Coefficient, Effective Protection Coefficient and Domestic**
379 **Resource Cost Ratio for Potatoes Grown in Egypt over the Period 2000-2017**

380

Items	Value
NPC _o	<u>0.830.81</u>
NPC _i	<u>0.840.85</u>
EPC	<u>0.820.81</u>
DRC	<u>0.350.37</u>

381

382 Source: Calculated from table 8.

383

384 3.5.2 Nominal Protection Coefficient on Inputs (NPC_i)

385 Results in Table (10) show that Nominal Protection Coefficient on Inputs amounted to 0.84,
386 which is less than unity, indicating very low subsidy on inputs used in Potatoes production over
387 the study period 2000-2017. In other words, Potatoes producers received a subsidy as low as 16%
388 on production inputs. This also means that subsidy to Potatoes producers is diminishing, which
389 complies with the implemented agricultural policy of gradual removal of subsidy on production

390 inputs until reaching price levels proportionate to their economic cost thus international prices.
391 Such finding indicates that the implemented economic liberalization policy resulted in very
392 limited subsidy on production inputs for Potatoes producers.

393

394 **3.5.3 Effective Protection Coefficient (EPC)**

395 It is clear from Table 10 that Effective Protection Coefficient amounted to 0.82, which is less than
396 unity, indicating that Potatoes producers incur implicit taxes. In other words, value added in
397 domestic prices is lower than that in international prices, which means absence of protection
398 policy during the study period. Such result means that the government has been imposing taxes,
399 either direct or indirect.

400

401 **3.5.4 Domestic Resources Cost Ratio DRC (Comparative Advantage)**

402 Results in Table 10 show that Domestic resource Cost Ratio amounted to 0.35, indicating that
403 Egypt enjoyed a comparative advantage in Potatoes production during the study period 2000-
404 2017, which means that domestic production of Potatoes is preferred to dependency on imports.

405

406 **4. Conclusion and recommendations**

407 ~~Wheat, maize, rice and potatoes are major crops in Egypt, domestic wheat production declined~~
408 ~~from 9.34 million tons in 2016 to 8.42 million tons in 2017, down by 9.9%. In 2017, average per~~
409 ~~capita share of wheat amounted to 163.9 kg/year and self sufficiency rate amounted to 34.5%.~~
410 ~~While Maize production increased from 7.17 million tons in 2016 to 7.66 million tons in 2017,~~
411 ~~average per capita share of maize amounted to 52.2 kg/year and self sufficiency rate amounted to~~
412 ~~46.10%. Rice production also declined from 5.31 million tons in 2016 to 4.96 million tons in~~
413 ~~2016, down by 10.2%. In 2017, average per capita share of rice amounted to 38.7 kg/year and self~~
414 ~~sufficiency rate amounted to 87.96%. Potatoes production also declined from 5.02 million tons in~~
415 ~~2016 to 4.84 million tons in 2017, average per capita share of potatoes amounted to 25.4 kg/year~~
416 ~~and self sufficiency rate amounted to 116.28%. The current research investigates the problems~~
417 ~~arising from impact of agricultural price policy in agricultural production through adopting~~
418 ~~development strategies that aim to achieve free market economy and dependency on interaction~~
419 ~~between supply and demand forces as main pillar to raise efficiency of the national economy and~~
420 ~~achieve the hoped for development, which all resulted in producers bearing the burden of paying~~
421 ~~indirect taxes (implicit) due to price distortions resulting from imbalances between domestic and~~

Comment [HH2]: Repeating exactly what you used before in the Table... No need

Formatted: Font color: Red

Formatted: Font color: Red

422 | ~~international prices. Such situation obstructs efforts exerted to achieve optimum economic~~
423 | ~~efficiency in domestic resources' use as well as the welfare of producers and consumers.~~

424 | The research applied Policy analysis matrix to determine indicators that can ~~be~~ help to identify
425 | trends of agricultural policies implemented in the agricultural sector and measure the efficiency of
426 | economic resources' use. PAM is usually built using farm budget, including revenues and costs,
427 | which occur in the form of tradable inputs (production inputs) and domestic resources (land and
428 | labor). In PAM, both revenues and costs are evaluated financially (at market prices) and
429 | economically (at border prices) to assess the impact of the implemented policy by measuring
430 | Nominal Protection Coefficient for outputs and inputs, Effective Protection Coefficient and
431 | Comparative Advantage Coefficient (Domestic Resource Cost Coefficient).

432 | The results showed that the financial value of workers' wages in the production of wheat, maize,
433 | rice, and potatoes at market prices exceeded the border prices, while the values of the nominal
434 | protection coefficients of outputs were about 0.81, 0.81, 0.80, and 0.83, respectively for wheat,
435 | maize, rice, and potatoes. Nominal protection coefficient values for production inputs were 0.83,
436 | 0.83, 0.85, and 0.84, respectively for the four crops, while the effective protection plant values for
437 | wheat, maize, rice, and potato crops were 0.80, 0.80, 0.80 and 0.84, respectively. The values of the
438 | comparative advantage of the four crops, respectively, were 0.49, 0.52, 0.38, and 0.37,
439 | respectively.

440 |

441 | **Based on the research results, we recommend the following: Validate with reported research**

- 442 | I. Expansion of wheat and maize crops to reduce the quantity imported.
- 443 | II. Revisiting governmental policies and devoting more attention to increasing wheat, maize,
444 | rice and potatoes planted areas in main producing governorates based on production
445 | efficiency indicators, and taking into account wheat, maize, rice and potatoes profitability
446 | relative to the profitability of competing crops.
- 447 | III. Vertical expansion in wheat, maize, rice and potatoes production via developing new high
448 | yielding varieties to boost wheat, maize, rice and potatoes production.
- 449 | IV. Providing support to wheat, maize, rice and potatoes farmers in the form of good varieties
450 | of seed, fertilizers and other production inputs to encourage farmers cultivate the crop.
- 451 | V. Setting a procurement price, close to the international prices of wheat, maize, rice and
452 | potatoes, three months prior to wheat, maize, rice and potatoes planting season, such that

Formatted: Space After: 0 pt

453 the announced price is fair to producers, i.e., it covers production cost and provide a fair
454 profit margin, and in the same time is a fair price for consumers.

455
456 **REFERENCES REVIEW CAREFULLY FOR CONSISTENCY TO MATCH THE**
457 **JOURNAL'S REFERENCES STYLE...**

- 459 1. EL-Batran, Ramzia., Mohamed, Abd El-Wahab. Evaluation of some Agricultural Policies
460 Applied in Egypt during the 1980s and 1990s; MSc. Thesis(unpublished), Department of
461 Agricultural Economics, Faculty of Agriculture, Cairo University, 2002 pp. 227- 239.
- 462 2. Owen, R., and Ş. Pamuk. A History of Middle East Economies in the Twentieth Century.
463 Cambridge, Massachusetts: 1998; Harvard university Press.
- 464 3. El-Qalla, Hasan., Ramzy, Agricultural Exports' Role in Agricultural Economics Development in
465 Egypt". Egyptian Journal of Agricultural Economics, 2002; 12 (1): 340-355.
- 466 4. CAPMAS. Foreign Trade Database, Foreign Trade Bulletins, Govt. Egypt., Cairo. 2017.
- 467 5. MALR. Economic Affairs Sector, Central Administration for Agricultural Economics, Bulletin
468 of Agricultural Economics. 2017.
- 469 6. Ahmed, Moataz. E. An Economic Study of Egyptian Exports of Potatoes crop. M.Sc. Thesis
470 (unpublished). 2016; Department. Of Agri. Economics., Univ. Agri., Minia.
- 471 7. The Central Agency for Public Mobilization and Statistics. (CAPMAS), Annual Bulletin of
472 Agricultural Commodities' Production, Foreign Trade and Consumption Statistics 2017.
- 473 8. Ahmed, H. An Economic study to evaluate the impact of the direct and indirect government
474 intervention on wheat crop in Egypt. Egyptian J. of Agri. Eco. 2015; 25(4): 1963-1974.
- 475 9. Said, M, A. The effect of the agriculture pricing policies on the Maize crop in Egypt. J. Agric.
476 Economic. and Social Sci., Mansoura Univ. (2013); 12 (4): 2393-2404.
- 477 10. EL-Sayed, A. Impacts of the agricultural price policy on onion crop in Egypt. Alex. J. of
478 Environmental and Agri. Sci. (2007);6(2): 1-23.
- 479 11. Kamel, A. and Saleh, A. Analyzing of the agricultural policies on the economic indicators of
480 the cropping patterns in Egypt. Egyptian J. of Agri. Eco. (2015) ;25(4): 1891-1904.
- 481 12. Moataz Eliw Mostafa, Abd El-Wakil M. Abou-Taleb and Umar Ijaz Ahmed. Impact of
482 Governmental Intervention on Wheat Crop Grown in Egypt, Journal of Social Sciences
483 and Humanity Studies, (2019); 5(5)1-17.

Formatted: Indent: Left: 0", Hanging: 0.56"

Formatted: Indent: Left: 0", Hanging: 0.56"