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|       | F    | R <sup>2</sup> |  |
|-------|------|----------------|--|
| 1.74  | 26.4 | 0.77           | $\hat{Y}_i = 284.4 + 8.03x - 0.37x^2$<br>(5.8)** (-4.7)**                |
| 0.013 | 17.7 | 0.69           | $\hat{Y}_i = 46.95 + 0.829x - 0.048x^2$<br>(5.8)** (-5.95)**             |
| 90.1  | 46.1 | 0.86           | $\hat{Y}_i = 13298.3 + 656.2x - 33.3x^2$<br>(9.03)** (-8.02)**           |
| 22.26 | 79.4 | 0.84           | $\hat{Y}_i = 21.16 + 22.26x$<br>(8.91)**                                 |
| 0.797 | 8.1  | 0.59           | $\hat{Y}_i = 16.7 + 1.4x - 0.163x^2 + 0.01x^3$<br>(3.54)* (-2.9)* (2.6)* |
| 446.1 | 87.8 | 0.85           | $\hat{Y}_i = 447.6 + 446.1x$<br>(9.37)**                                 |

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|       | F    | R <sup>2</sup> |   |
|-------|------|----------------|---|
| 20.31 | 73.1 | 0.83           | $\hat{Y}_i = 27.9 + (8.55)^{**} x$                          |
| 50.29 | 71.4 | 0.82           | $\hat{Y}_i = 84.798 + 50.29 x (8.45)^{**}$                  |
| 0.06  | 3.86 | 0.39           | $\hat{Y}_i = 2.21 + 0.111 x - 0.006 x^2 (2.75)^* (-2.78)^*$ |
| 54.36 | 94.3 | 0.86           | $\hat{Y}_i = 1055.8 + 54.36 x (9.71)^{**}$                  |

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|       | %     | %     | %    | % |      |
|-------|-------|-------|------|---|------|
| 11.96 | 95.6  | 88.04 | 84.1 |   | 1997 |
| 19.97 | 94.1  | 80.03 | 80.7 |   | 1998 |
| 25.55 | 100.0 | 74.45 | 75.2 |   | 1999 |
| 25.53 | 97.6  | 74.47 | 80.0 |   | 2000 |
| 28.23 | 100.0 | 71.77 | 84.9 |   | 2001 |
| 28.86 | 100.0 | 71.14 | 77.3 |   | 2002 |
| 26.99 | 95.8  | 73.01 | 76.6 |   | 2003 |
| 26.84 | 99.1  | 73.16 | 75.2 |   | 2004 |
| 30.02 | 100.0 | 69.98 | 75.5 |   | 2005 |
| 31.95 | 98.8  | 68.05 | 73.1 |   | 2006 |
| 38.83 | 99.0  | 61.17 | 73.3 |   | 2007 |
| 32.05 | 91.3  | 67.95 | 79.0 |   | 2008 |
| 37.08 | 86.2  | 62.92 | 73.6 |   | 2009 |
| 49.71 | 93.9  | 50.29 | 73.1 |   | 2010 |
| 48.10 | 94.4  | 51.90 | 73.7 |   | 2011 |
| 50.07 | 93.4  | 49.93 | 72.8 |   | 2012 |
| 33.75 | 96.2  | 66.25 | 76.8 |   |      |

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|--------|--------|--------|--|
| 325    | 318.4  |        |  |
| 20.34  | 49.49  | /      |  |
| 2.56   | 4.12   | /      |  |
| 3994.7 | 8483.8 | /      |  |
| 7      | 12     |        |  |
| 2099.3 | 4710.1 | /      |  |
| 1895.4 | 3773.6 | /      |  |
| 0.903  | 0.801  |        |  |
| 0.129  | 0.067  |        |  |
| 570.7  | 707    | /      |  |
| 1.9    | 1.8    |        |  |
| 2090   | 90.41  |        |  |
| 9.73   | 5.47   | /      |  |
| 1.22   | 0.46   | /      |  |
| 906.9  | 417.4  | ( )    |  |
| 270.77 | 314.47 | .( / ) |  |

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|-------|-------|------|--------|--------|------|------|--|
| 72.05 | 438.8 | 26.1 | 1570   | 1131.2 | 60.1 | 1997 |  |
| 72.96 | 432.6 | 26.1 | 1600   | 1167.4 | 61.3 | 1998 |  |
| 74.05 | 435.4 | 26.8 | 1678   | 1242.6 | 62.6 | 1999 |  |
| 77.41 | 406.7 | 28.2 | 1800   | 1393.3 | 63.9 | 2000 |  |
| 77.85 | 400.1 | 27.7 | 1806   | 1405.9 | 65.2 | 2001 |  |
| 68.60 | 628.0 | 30.1 | 2000   | 1372.0 | 66.5 | 2002 |  |
| 61.20 | 814.7 | 30.9 | 2100   | 1285.3 | 67.9 | 2003 |  |
| 62.25 | 830.6 | 31.7 | 2200   | 1369.4 | 69.3 | 2004 |  |
| 61.60 | 934.0 | 34.4 | 2432   | 1498.0 | 70.7 | 2005 |  |
| 61.71 | 977.6 | 35.4 | 2553   | 1575.4 | 72.2 | 2006 |  |
| 67.61 | 842.1 | 35.3 | 2600   | 1757.9 | 73.6 | 2007 |  |
| 58.81 | 1108  | 35.8 | 9026   | 1582.0 | 75.2 | 2008 |  |
| 58.62 | 1137  | 35.7 | 4827   | 1611.0 | 76.9 | 2009 |  |
| 75.75 | 637.5 | 33.4 | 2629   | 1991.5 | 78.7 | 2010 |  |
| 69.02 | 852.0 | 34.5 | 2750   | 1898.0 | 79.6 | 2011 |  |
| 69.14 | 895.0 | 35.6 | 2900   | 2005.0 | 81.4 | 2012 |  |
| 68.04 | 735.6 | 31.7 | 2253.5 | 1517.9 | 70.3 |      |  |

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|       | F     | R <sup>2</sup> |   |
|-------|-------|----------------|---|
| 54.36 | 94.3  | 0.86           | $\hat{Y}_i = 1055.8 + 54.36 x$<br>(9.71)                    |
| 95.1  | 334.1 | 0.96           | $\hat{Y}_i = 1445.1 + 95.1 x$<br>(18.3)                     |
| 40.75 | 14.5  | 0.64           | $\hat{Y}_i = 166.4 + 115.04 x - 4.37 x^2$<br>(3.26) (-2.2)* |
| 0.74  | 65.4  | 0.89           | $\hat{Y}_i = 23.01 + 1.59 x - 0.05 x^2$<br>(5.7) (-3.2)*    |

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$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + EX_i$$

(Y)

(X's)

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(X<sub>1i</sub>)

(X<sub>2i</sub>)

/

(X<sub>3i</sub>)

/

(X<sub>4i</sub>)

/

(X<sub>6i</sub>)

(X<sub>i</sub>)

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$$\ln \hat{Y}_i = -2.164 + 3.234 \ln X_1 - 2.163 \ln X_2 + 3.123 \ln X_4$$

(8.6)

(-15.5)

(18.1)

R<sup>2</sup> = 0.99

F = 789.4

:  $\hat{Y}_i$  :

**Horizontal Integration Strategy**

i

: X<sub>1i</sub>

: X<sub>2i</sub>

: X<sub>4i</sub>

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**Vertical Integration Strategy**

**Forward Vertical**

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**Integration**

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**Backward Vertical**

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**Integration**

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## SUMMARY

### **An Economic Study of Production, Consumption and Sugar Industry in Egypt**

Hany Said Abd- Elrhman El- Shatla, Amr Abdel Hamied Refaat

The problem of this research has been identified as the growing gap of sugar despite the increase achieved in the production of sugar and the increase in the number of plants of sugar beet in recent years. Therefore, the main objective of this research is to study and analyze some economic variables associated with the production, consumption and sugar industry in Egypt.

The results of this research show that the area of sugar cane and sugar beet crops during the period (1997- 2012), has increased by 1.74, 22.3 thousand feddan respectively, while production has increased by 90.1, 446.1 thousand tons respectively. This means an increase in the total amount of sugar output of both crops by 1517.9 thousand tons. Economic indicators for sugar cane and sugar beet showed an increase in the profitability per Egyptian pound invested in the season by about 12.7%, as well as the measure of the ratio of total revenue to the costs by about 5.6%. Efficiency indicators per unit of water show that sugar beet is higher than sugar cane by about 117.3%.

The result shows that the total sugar production is increasing annually at significant statistically rate of 54.4 thousand tons. National consumption of sugar has increased by 95.1 thousand tons; sugar is growing annually by 40.8 thousand tons, and average per capita consumption increased by 0.74 kg/year. Results show that the most important factors affecting sugar gap in Egypt are per capita consumption of sugar, the number of Population, and total amount of sugar.

Due to necessity of sugar and lack of production, too much consumption, the researchers have tried to propose different scenarios to maintain self- sufficiency in sugar at least in short run, upon calculations it seems possible in short run, while in long- run the only possible way to achieve self- sufficiency is to expand cultivated area of sugar beet and improve the Efficiency of both agriculture and Industry.

**Keywords;** Consumption of sugar cane and sugar beet, Sugar Production, Efficiency Indicators, Sugar Gap.

|        | /     |        |         | /     |       |      |
|--------|-------|--------|---------|-------|-------|------|
| 1143.0 | 17.89 | 63.90  | 13725.5 | 47.16 | 291.0 | 1997 |
| 1951.2 | 18.80 | 103.78 | 14352.8 | 49.24 | 291.5 | 1998 |
| 2559.7 | 19.94 | 128.40 | 15253.6 | 49.65 | 307.2 | 1999 |
| 2890.4 | 21.31 | 135.62 | 15705.8 | 49.25 | 318.9 | 2000 |
| 2857.7 | 20.04 | 142.64 | 15571.5 | 49.91 | 312.0 | 2001 |
| 3168.3 | 20.60 | 153.80 | 16030.3 | 49.53 | 323.6 | 2002 |
| 2691.5 | 20.50 | 131.32 | 16245.5 | 49.65 | 327.2 | 2003 |
| 2860.5 | 20.29 | 140.98 | 16334.8 | 49.92 | 327.2 | 2004 |
| 3429.5 | 20.50 | 167.33 | 16317.3 | 50.77 | 321.4 | 2005 |
| 3904.0 | 20.95 | 186.40 | 16656.3 | 50.96 | 326.9 | 2006 |
| 5458.2 | 22.00 | 249.2  | 17014.2 | 50.7  | 335.1 | 2007 |
| 5132.6 | 19.92 | 257.67 | 16470.2 | 50.90 | 323.6 | 2008 |
| 5333.5 | 20.16 | 264.60 | 15482.2 | 48.88 | 316.7 | 2009 |
| 7840.3 | 20.33 | 385.69 | 15708.9 | 49.04 | 320.3 | 2010 |
| 7486.1 | 20.69 | 422.8  | 15765.2 | 48.43 | 325.5 | 2011 |
| 9126.1 | 21.54 | 432.4  | 15550.5 | 47.74 | 325.7 | 2012 |
| 4239.5 | 20.34 | 210.4  | 15761.5 | 49.49 | 318.4 |      |

| ( / ) | ( )    | ( )    | ( / ) | ( )     | ( )   |      |
|-------|--------|--------|-------|---------|-------|------|
| 2.21  | 135.3  | 61.1   | 4.07  | 995.9   | 244.8 | 1997 |
| 2.39  | 233.1  | 97.7   | 3.97  | 934.3   | 235.3 | 1998 |
| 2.47  | 317.5  | 128.4  | 4.00  | 925.1   | 231.0 | 1999 |
| 2.69  | 355.7  | 132.3  | 4.07  | 1037.6  | 255.2 | 2000 |
| 2.78  | 396.9  | 142.6  | 3.81  | 1009.5  | 265.0 | 2001 |
| 2.58  | 396.1  | 153.8  | 3.90  | 976.5   | 250.3 | 2002 |
| 2.76  | 346.9  | 125.8  | 3.74  | 938.4   | 250.6 | 2003 |
| 2.63  | 367.5  | 139.7  | 4.07  | 1001.9  | 245.9 | 2004 |
| 2.69  | 449.7  | 167.3  | 4.32  | 10148.3 | 242.5 | 2005 |
| 2.73  | 503.3  | 184.2  | 4.48  | 1072.1  | 239.1 | 2006 |
| 2.77  | 682.6  | 246.8  | 4.38  | 1075.3  | 245.6 | 2007 |
| 2.16  | 507.2  | 2395.3 | 4.20  | 1075.3  | 255.8 | 2008 |
| 2.62  | 597.2  | 228.0  | 4.35  | 1013.5  | 233.1 | 2009 |
| 2.73  | 990.0  | 362.0  | 4.28  | 1001.5  | 234.0 | 2010 |
| 2.29  | 913.0  | 399.0  | 4.10  | 985.00  | 240.0 | 2011 |
| 2.49  | 1004.0 | 404.0  | 4.22  | 1001.0  | 237.0 | 2012 |
| 2.56  | 512.3  | 200.5  | 4.12  | 1006.0  | 244.1 |      |