# Appendix 1. Parameter Estimation

We employ ordinary least squares (OLS) and linear specifications in tandem with annual data from (USDA ERS, 2017) for the 1980-2013 timeframe to estimate behavioral parameters that describe U.S. sugar supply and demand in the modeling framework. OLS and linear specifications were used to save degrees of freedom, given the relatively small annual time series used for estimation. We use parameters from Elobeid and Beghin (2006) for all other modeled regions. Parameter estimates for the U.S. sugar market largely reflect those employed in the FAPRI/CARD model and are included in Appendix Tables A1-A6, below.

Table A1. U.S. Area Harvested

|  |  |  |
| --- | --- | --- |
| Variables | Sugar Beets | Sugarcane |
| Lagged Area Harvested | 0.720\*\*\* (0.117) | 0.909\*\*\* (0.103) |
| Lagged Crop Price | 109.000\*\*\* (25.120) | -2.506 (16.340) |
| Lagged Soybean Price | -13.78\*\*\* (3.554) |  |
| Lagged Corn Price | 9.711 (5.820) |  |
| Year | -0.747 (0.714) | -0.155 (0.416) |
| Constant | 1517 (1383) | 346.8 (790.500) |
| Observations | 31 | 31 |
| R-squared | 0.784 | 0.866 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Standard errors in parentheses |

Source: Authors’ estimation

Table A2. U.S. Crop Yields

|  |  |  |
| --- | --- | --- |
| Variables | Sugar Beets | Sugarcane |
| Lagged Crop Yield | 0.235 (0.175) | 0.435\*\* (0.173) |
| Year | 0.512\*\*\* (0.125) | -0.095 (0.0094) |
| Constant | -982.1 (242.700) | 235.006 (193.080) |
| Observations | 31 | 31 |
| R-squared | 0.707 | 0.281 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Standard errors in parentheses |

Source: Authors’ estimation

Table A3. Consumption

|  |  |
| --- | --- |
| Variable | Per Capita Consumption of Raw Sugar |
| Refined Sugar Price | 0.153\*\*\* (0.039) |
| Real GDP | -0.00056\*\*\* (0.000124) |
| Constant | 32.07\*\*\* (1.175) |
| Observations | 36 |
| R-squared | 0.387 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Standard errors in parentheses |

Source: Authors’ estimation

Table A4. Ending Stocks

|  |  |
| --- | --- |
| Variables | Ending Stocks |
| Beginning Stock | 0.216 (0.176) |
| Consumption | 0.121\*\* (0.056) |
| Raw Price | -26.54\*\* (10.580) |
| Constant | 676.2 (411.600) |
| Observations | 31 |
| R-squared | 0.349 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Standard errors in parentheses |

Source: Authors’ estimation

Table A5. TRQ Allocation

|  |  |
| --- | --- |
| Variables | U.S. TRQ Allocation |
| Lagged Production | -0.560\*\*\* (0.117) |
| Lagged Consumption | 0.209\*\* (0.094) |
| Constant | 3473\*\*\* (615.200) |
| Observations | 34 |
| R-squared | 0.457 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Standard errors in parentheses |

Source: Authors’ estimation

Table A6. TRQ Fulfillments

|  |  |
| --- | --- |
| Variables | U.S. TRQ Fulfillment |
| U.S. Price | 2.264\*\*\* (0.552) |
| World Price | -2.048\*\*\* (0.430) |
| Constant | 63.49\*\*\* (9.106) |
| Observations | 34 |
| R-squared | 0.423 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Standard errors in parentheses  |

Source: Authors’ estimation