# **Appendix**

Figure A 1: The largest five wheat export markets for Russia, 2005-2017.

Note: Export volumes to Egypt (private) are obtained by subtracting exports to the GASC from the total exports to Egypt. ROW denotes ‘Rest of World’. The largest five export markets are selected based on shares in 2017.

Source: UN Comtrade Database (2019), authors’ illustration.

Table A 1: Key characteristics of major wheat procurement agencies

|  |  |  |  |
| --- | --- | --- | --- |
|  | **GASC** | **OAIC** | **SAGO** |
| Country | Egypt | Algeria  | Saudi Arabia |
| Organization’s imports | 5.5 mmt (49%) | 5.7 mmt (73%) | 3.1 mmt (91%) |
| Average volume per tender  | 207.640 mt | 507.692 mt | 624.273 mt |
| Top sources of wheat in 2016 | Russia (51%), Ukraine (24%) | France (43%), Canada (13%) | Germany (44%), Poland (22%) |
| Tender frequency (days) | 12  | 29 | 68 |
| Main port | Alexandria | Algiers | Jeddah (Dammam) |
| Distance to Russia’s port of Novorossiyk (in nautical miles) | 1178 nm | 1840 nm | 1965 (4363) nm |

Note: Averages are calculated based on data for seasons 2013/14 through 2016/17. Tender frequency calculated as total number of calendar days divided by tenders issued. One nautical mile equals approximately 1.852 km.

Source: Zerno Online (2019).

Table A 2: Seller concentration within GASC tenders

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Season** | **HHI** | **CR4** | **CR8** | **Total sellers** | **Total sellers of Russian wheat** |
| 2011/12 | 0.107 | 53% | 88% | 16 | 12 |
| 2012/13 | 0.108 | 55% | 80% | 16 | 6 |
| 2013/14 | 0.087 | 46% | 77% | 17 | 9 |
| 2014/15 | 0.083 | 45% | 73% | 16 | 9 |
| 2015/16 | 0.091 | 48% | 80% | 18 | 12 |
| 2016/17 | 0.075 | 42% | 65% | 22 | 15 |
| 2017/18 | 0.146 | 65% | 86% | 18 | 14 |
| 2018/19 | 0.091 | 48% | 77% | 18 | 12 |

Note: CR4 (CR8) refers to the combined market shares of the top 4 (8) suppliers. Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared market shares of all companies delivering at least one cargo to the GASC within the regarding season.

Source: Authors’ calculations.

Table A 3: Descriptive statistics of price series data

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Min. | Mean | Max. | St. Dev. | Skewness | Kurtosis | NAs |
| **Argentina** |  | 168 | 251.9 | 372.5 | 57.3 | 0.55 | 2.09 | 0 |
| **Australia** |  | 172.2 | 251 | 347 | 43.8 | 0.30 | 2.34 | 0 |
| **Canada** |  | 202.8 | 293.5 | 448.2 | 66.2 | 0.55 | 2.02 | 0 |
| **France** |  | 166.8 | 236.9 | 351.8 | 50.7 | 0.61 | 2.24 | 0 |
| **GASC** |  | 178 | 254.5 | 373.9 | 49.1 | 0.51 | 2.27 | 16 |
| **Kazakhstan** |  | 154.2 | 217.2 | 355 | 52.6 | 0.84 | 2.67 | 0 |
| **Russia** |  | 167 | 237.9 | 365 | 51.4 | 0.77 | 2.77 | 0 |
| **Ukraine** |  | 167.4 | 234.2 | 345 | 47.6 | 0.64 | 2.47 | 0 |
| **USA** |  | 157.5 | 227.1 | 346.4 | 46.5 | 0.65 | 2.64 | 0 |

Note: Sample period runs from July 2011 to June 2019 (96 observations). Minimum, average, maximum and standard deviation expressed in USD/t.

Table A 4: Top exporters’ share on world wheat and Egyptian wheat tender market

|  |  |  |
| --- | --- | --- |
|  | World wheat market | Egyptian wheat tender market |
| *Exporter* | *2011/12 – 2014/15* | *2015/16 – 2018/19* | *2011/12 – 2014/15* | *2015/16 – 2018/19* |
| Russia | 11.9% | 18.3% | 37.0% | 63.0% |
| European Union  | 17.1% | 15.3% | -- | -- |
| * France
 | -- | -- | 18.7% | 6.2% |
| * Romania
 | -- | -- | 19.9% | 18.1% |
| USA | 17.9% | 14.0% | 9.1% | 2.2% |
| Canada | 13.4% | 12.4% | 0.6% | 0.0% |
| Ukraine | 5.4% | 9.7% | 10.6% | 8.4% |
| Argentina | 3.9% | 6.8% | 2.2% | 1.3% |
| Australia | 12.6% | 8.6% | 0.0% | 0.0% |
| Kazakhstan | 5.1% | 4.5% | 1.2% | 0.0% |
| ROW | 12.7% | 10.3% | 0.6% | 0.8% |

Note: USDA reports aggregate export quantities for the European Union, while Zerno Online records GASC imports from single EU countries. Typically, France is the EU’s largest wheat exporter, followed by Romania.

Source: USDA (2020), Zerno Online (2019).

Table A 5: Results of ADF unit root and KPSS stationarity tests

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **ADF test** |  | **KPSS test** |
|  |  | Price in levels | Price in differences |  | Price in levels | Price in differences |
|  |  | Intercept | Intercept + Trend | Intercept |  | Intercept | Intercept + Trend | Intercept |
| **Argentina** |  | -2.02 | -2.35 | -6.30\*\*\* |  | 0.77\*\*\* | 0.15\*\* | 0.09 |
| **Australia** |  | -1.53 | -1.67 | -8.19\*\*\* |  | 0.43\* | 0.17\*\* | 0.11 |
| **Canada** |  | -1.97 | -2.14 | -9.58\*\*\* |  | 1.03\*\*\* | 0.25\*\*\* | 0.16 |
| **France** |  | -1.67 | -1.78 | -7.20\*\*\* |  | 0.82\*\*\* | 0.21\*\* | 0.13 |
| **GASC** |  | -1.14 | -1.74 | -8.40\*\*\* |  | 0.76\*\*\* | 0.19\*\* | 0.09 |
| **Kazakhstan** |  | -2.69\* | -3.20\* | -6.44\*\*\* |  | 0.61\* | 0.11 | 0.07 |
| **Russia** |  | -1.09 | -1.75 | -8.30\*\*\* |  | 0.77\*\*\* | 0.17\*\* | 0.12 |
| **Ukraine** |  | -1.32 | -1.91 | -7.93\*\*\* |  | 0.79\*\*\* | 0.18\*\* | 0.10 |
| **USA** |  | -1.56 | -1.81 | -8.86\*\*\* |  | 0.93\*\*\* | 0.19\*\* | 0.14 |

Note: Table reports t-statistics and LM-statistics for ADF and KPSS tests, respectively. Sample runs from July 2011 to June 2019. All prices are in lateral logarithms. Null hypothesis for ADF test is series has a unit root against alternative of stationarity. Null hypothesis for KPSS test is series stationary against alternative of non-stationarity. Lag length determined using the Schwarz Information Criterion for ADF and the Newey-West bandwidth method for KPSS tests. One-sided p-values for ADF test are from MacKinnon (1996). P-values for KPSS test are from Kwiatkowski et al. (1992). \*\*\*, \*\* and \* denote rejection at the 1, 5 and 10 percent level of significance, respectively.

Source: Authors’ calculations.

Table A 6: Bivariate long-run equations with dummy variable for imputed observations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | GASC-Russia | GASC-France | GASC-USA |
| *Unrestricted long-run price transmission parameters* |
| Price transmission elasticity $β\_{1}^{i}$ |  | 0.913 [0.030] | 0.903 [0.030] | 0.885 [0.042] |
| Parameter of interaction dummy $β\_{1, d}^{i}$ |  | -0.077 [0.067] | -0.060 [0.065] | 0.049 [0.099] |
| Constant $β\_{0}^{i}$ (for unrestricted $β\_{1}^{i}$) |  | 0.544 [0.163] | 0.600 [0.161] | 0.614 [0.226] |
| Dummy shift for constant $β\_{0}^{i}$ |  | 0.399 [0.370] | 0.320 [0.358] | -0.278 [0.543] |
| *Testing Law of One Price* |
| Wald test: $β\_{1}^{i}=1$ |  | (0.005) | (0.002) | (0.007) |
| $β\_{0}^{i}$ (for $β\_{1}^{i}=1)$ |  | 0.074 [0.006] | 0.075 [0.006] | 0.115 [0.008] |
| *Implied vs. observed freight costs* |
| Implied transaction costs, $tc\_{t}^{i}=β\_{0}^{i}×$ $\overbar{p}^{i}$ |  | 17.6 USD/t | 17.8 USD/t | 26.1 USD/t |
| Average observed freight costs, $\overbar{tc}^{i}$ |  | 13.5 USD/t | 15.5 USD/t | 29 USD/t |
| Wald test on equality of implied and observed freight costs: $β\_{0}^{i}=\frac{\overbar{tc}^{i}}{\overbar{p}^{i}} $ |  | (0.006) | (0.125) | (0.129) |

Note: Cointegrating vectors are normalized to represent pairwise cointegration with GASC tender prices.

Standard errors are in []. P-values are in ().

Source: Authors’ estimations.