Russia-Ukraine War-Led Supply Disruption of Staple Foods in the Net Food Importing Countries

Soojung Ahn and Sandro Steinbach

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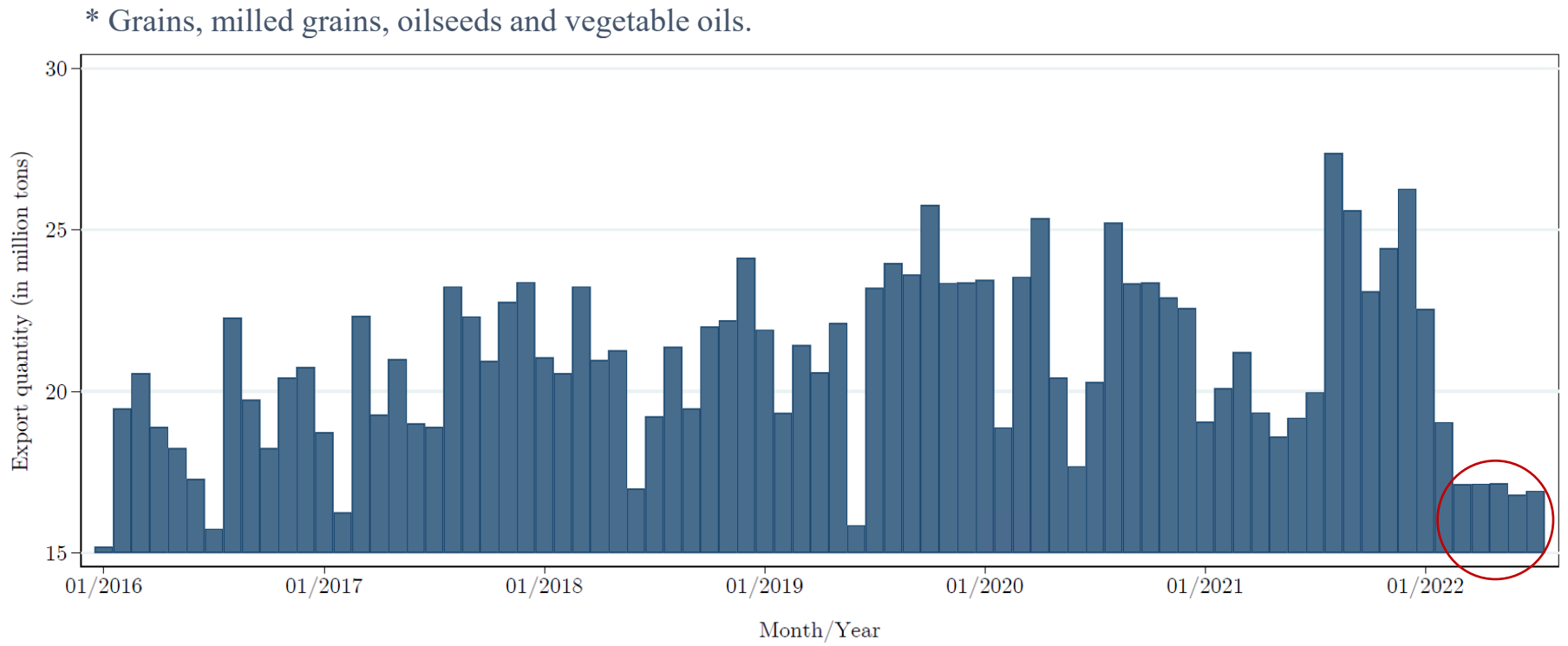
Motivation

- Volatile agricultural markets, disruptions in the global food supply chain.
- Logistical restrictions through Azov and Black Sea ports by Russia-Ukraine war since 2022/02.



Trend of Staple Food Export Volumes (92 Exporters)

Motivation

- Ukraine is one of the "**major exporter of staple foods**" in the world.

(2021/22 marketing year, Source: FAS USDA, 2022)

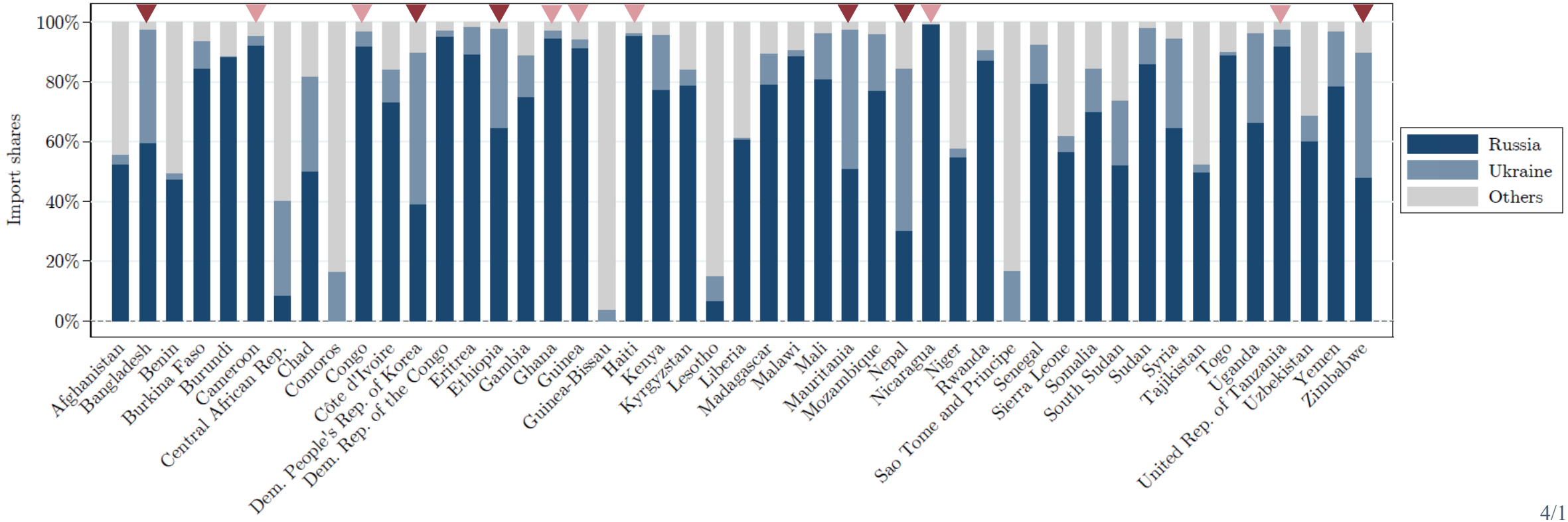
- Grain: wheat (9% , #5), maize (12% , #4), barely (17%, #3).
- Oilseeds and vegetable oils: sunflower oil (46% , #1), sunflower meal (54%, #1), sunflower (3%, #9), rapeseed (20%, #3).

- "**Food security concerns**" by Russia-Ukraine war (FAO, 2022; OECD, 2022)
- Low-Income Food Deficit Countries (LIFDCs), highly dependent on Russian and Ukrainian food supplies.
- Need to find alternative sources of food supply to meet their consumption needs.

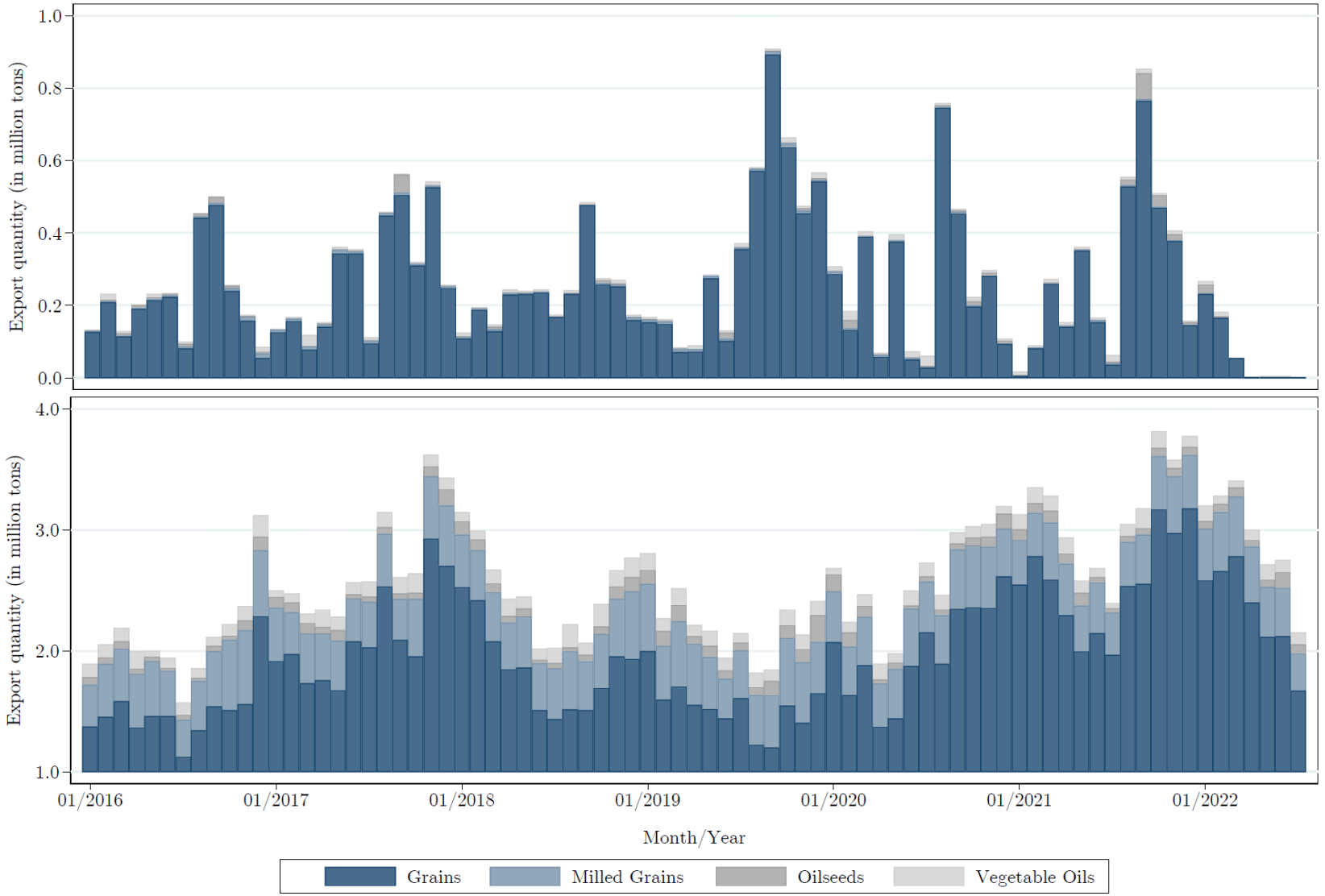
Motivation: Import Shares of LIFDCs

- LIFDCs' share of imports from Russia and Ukraine (Average 2016/2021, Quantity, 47 countries)
- Russia and Ukraine are the main staple food suppliers to LIFDCs.
- We focus on Ukraine's trade impacts on LIFDCs (No data available for Russia after the war).

* Grains, milled grains, oilseeds, and vegetable oils



Motivation: Staple Food Exports to LIFDCs



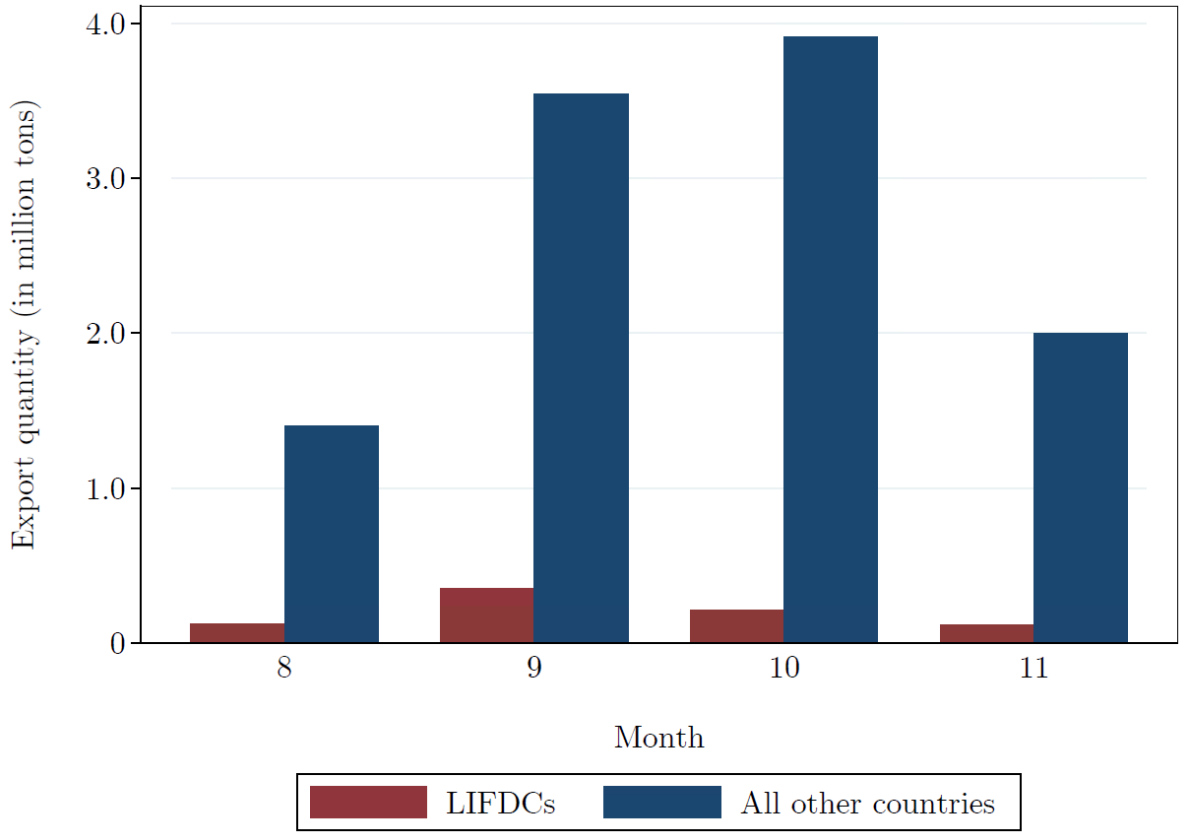
Ukraine's Exports to LIFDCs

- The Largest exporting product is **grain**, followed by oilseeds.

Other Countries' Exports to LIFDCs

- The largest exporting products are **grain** & **milled grain**.
  - Grain is an important source of nutrients (Lang and Jebb, 2003).
  - Among LIFDCs' imports, grain is the most important product.

Motivation: The Black Sea Grain Initiative



Ukraine's Staple Food Exports from 2022/08

Source: The Black Sea Grain Initiative (2022).

- The **"Black Sea grain initiative"**
- Recognize the critical importance of global food security and significant dependence on the supply of staple foods produced in Ukraine and Russia.
- Focus on exporting grain, other food stuff and fertilizer from Ukraine.

- Most of the grains/oilseeds/vegetable oils are going to all other countries (non-LIFDCs).

- Is the initiative working for LIFDCs?

What we do

- Research Questions:

1. What is the trade effects of Russia-Ukraine war on staple food exports to LIFDCs?
2. Is the Black Sea grain initiative working as intended?

- This study examines "the trade effects of the Russia-Ukraine war on LIFDCs."
  - **Differential trade effects** of Russia-Ukraine war on exports to LIFDCs.

  - **Destruction** and **diversion effects**
  - Destruction effects: Ukraine's staple food exports to LIFDCs.
  - Diversion effects: all other countries' staple food exports to LIFDCs excluding Russia and Ukraine.
  - Examine the impacts of the Black Sea grain initiative on staple food securement of LIFDCs.

Data

Data	Sources	Use
Export data	US Trade monitor	• Bilateral monthly product (HS 4-digit) export data from 2016 to 2022. • Do not see Russia's perspective as their official report on their export has been stopped since February. • Use export data as it is hard to get the comprehensive import data from LIFDCs perspective (74 reporters, 197 partners).
Ukraine's grain export data from August 2022	The Black Sea grain initiative	• Cargo destination data from Ukraine's port. • Include grains, oilseeds, and vegetable oils.

Commodity	HS 4-Digit	Commodity Description
Grains	1001-1008	Wheat, rye, barely, oats, maize, rice, etc.
Milled Grains	1101-1108	Wheat flour, maize flour, buckwheat flour, rice flour, rye flour, cereal groats, meal and pellets, etc.
Oilseeds	1201-1211, 1213,1214	Soybeans, peanuts, copra, flaxseed, rape or colza seeds, sunflower seeds, other oilseeds, flours, and meals of oilseeds
Vegetable Oils	1507, 1512, 1514, 1517	Soybean oil, sunflower-seed, safflower or cottonseed oil, etc.

Empirical Strategy

- Event study design to estimate the causal effect of Russia-Ukraine war on the staple food exports to LIFDCs in a non-linear panel data model.

$$X_{ijk,t} = \exp\left(\alpha_{ijs,y} + \gamma_{ijs,m} + \sum_{c=-5}^{c=5} \beta_k \, Treatment_{ijk,t-c}\right) \varepsilon_{ijk,t} \ ,$$

- $\boldsymbol{X_{ijk,t}}$ **:** agri-food exports from country i to j at the HS 4-digit level, and event-time.
- $\boldsymbol{Treatment_{ijk,t-c}}$ **:** a dummy for the time period after Russia-Ukraine war (2022/02).
- $\boldsymbol{\alpha_{ijk,y}}$ **and** $\boldsymbol{\gamma_{ijk,m}}$ **:** exporter-importer-product-event year and exporter-importer-product-event month fixed effects that capture unobserved demand and supply shifters and trade cost factors in a particular time.
- $\boldsymbol{\varepsilon_{ijk,t}}$**:** the multiplicative error term.

Identification Strategy

- **Outcome variables:**
- Export quantity (in count or in kilogram)
- Unit value (value/quantity)

- **Treatment/ Control group:**
- Treatment group: staple food exports to LIFDCs at the HS 4-digit product level for event-year 2022.
- Control group: the same export group from event-year 2017 to 2021.

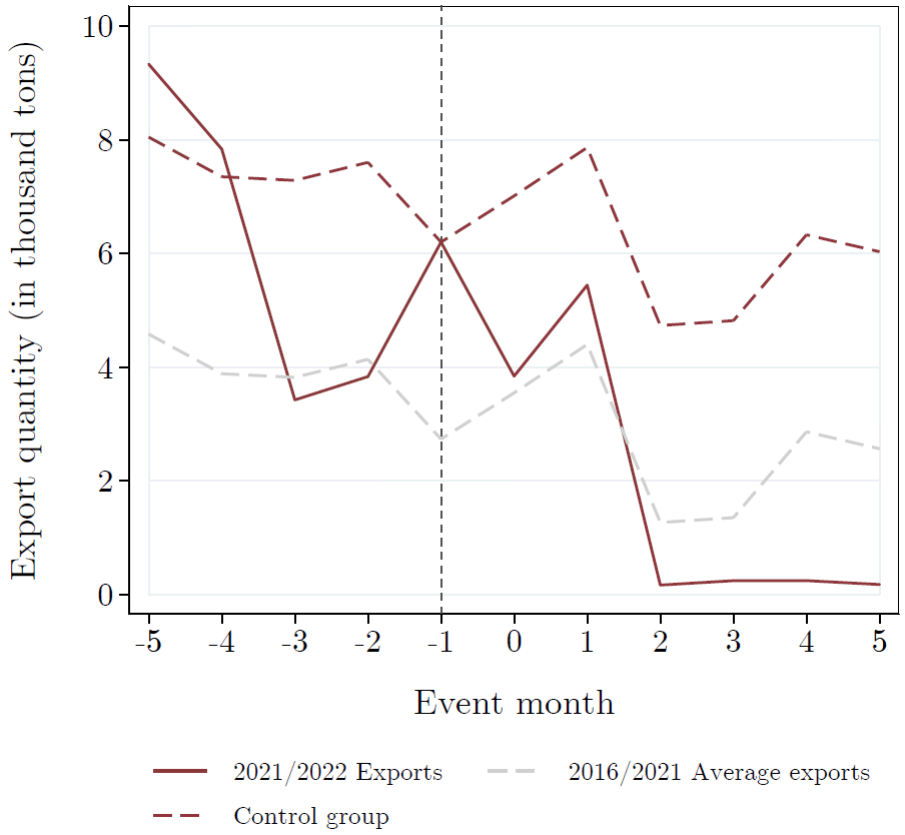
- $\sum_{c=-5}^{c=5} \beta_k \, Treatment_{ijk,t-c}$ measures the dynamic treatment effects of Russia-Ukraine war on staple exports to LIFDCs from Ukraine and all other countries excluding Ukraine and Russia (Freyaldenhoven et al., 2021).

- **Fixed effects:** all latent confounders are invariant at the exporter-importer-product-event year and exporter-importer-product-event month levels (Carter et al., 2022; Larch et al., 2019).

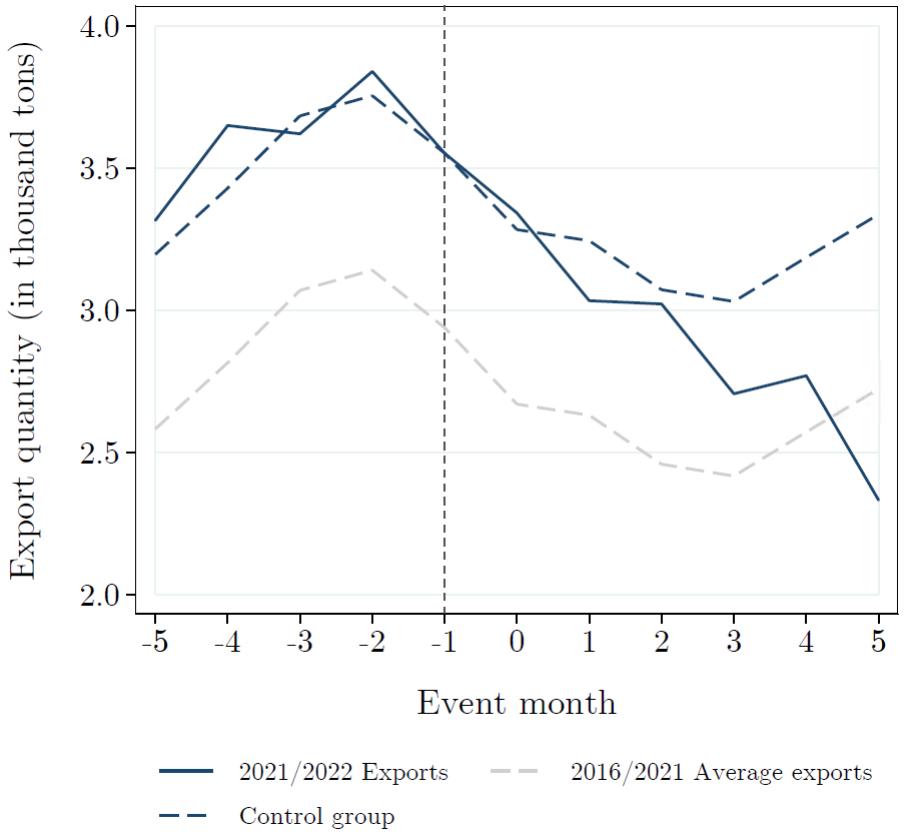
- Parallel trend assumption needs to be hold: no pre-trends, which is not affected by Russia-Ukraine war.

Event Windows

Ukraine's Exports to LIFDCs



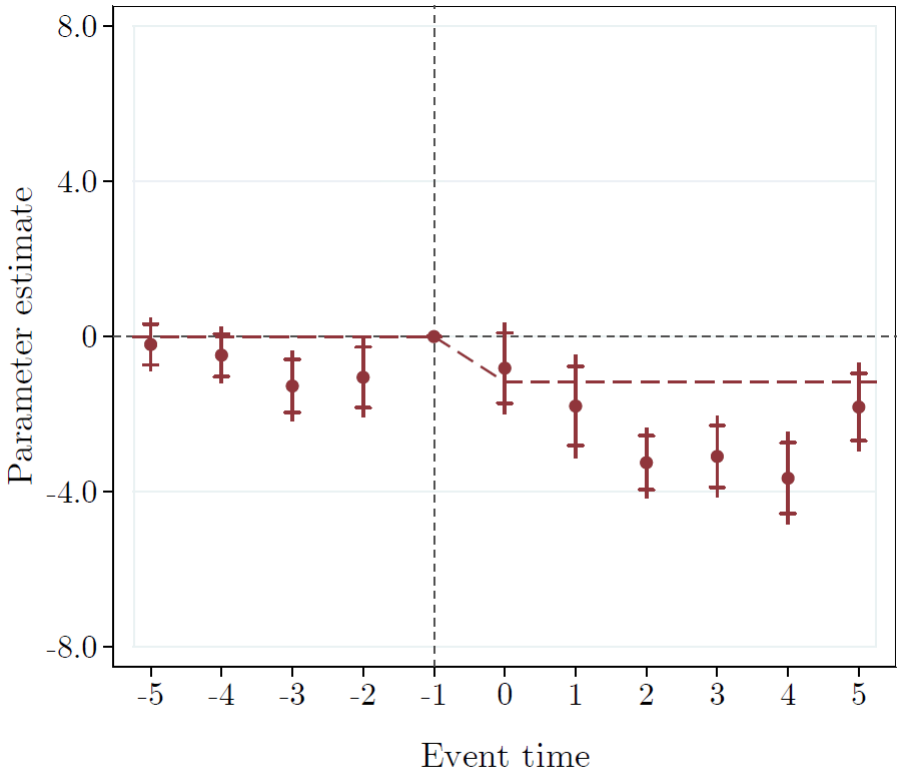
Other Countries' Exports to LIFDCs



* Excluding Russia and Ukraine

Destruction and Diversion: Quantity Effects

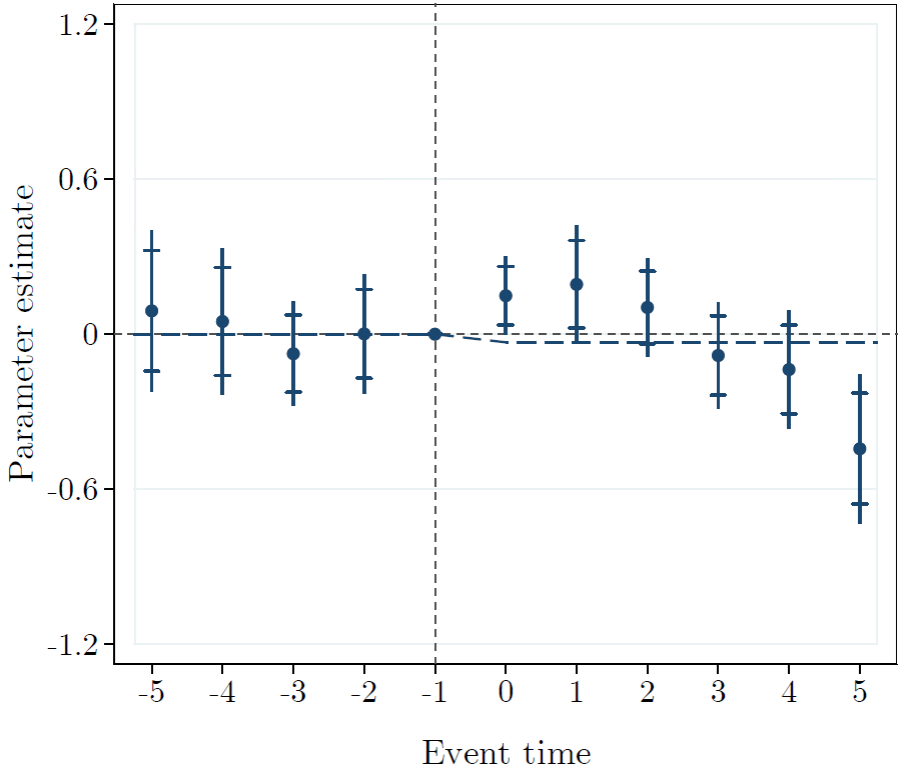
Ukraine's Exports to LIFDCs



Pre-trends p-value: 0.164 - Leveling off p-value: 0.106 - Static effect p-value: 0.002
Pseudo R-squared: 0.856 - Observations: 2,148

* Average post-event trade effect: -90.9%

Other Countries' Exports to LIFDCs

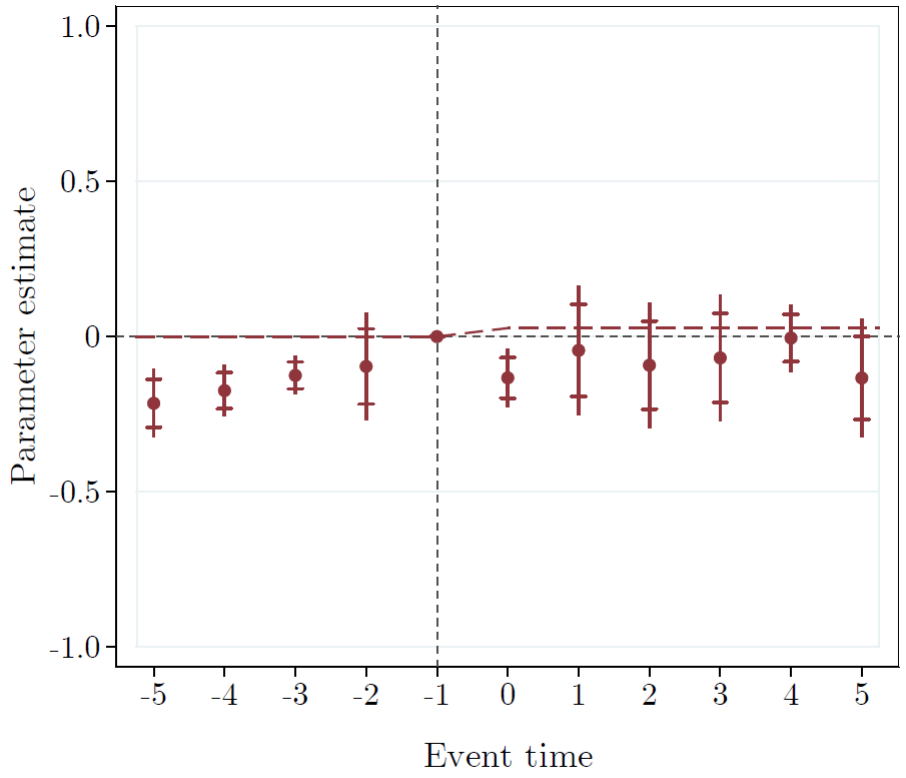


Pre-trends p-value: 0.913 - Leveling off p-value: 0.087 - Static effect p-value: 0.682
Pseudo R-squared: 0.948 - Observations: 87,359

* Average post-event trade effect: -3.6%

Destruction and Diversion : Price Effects

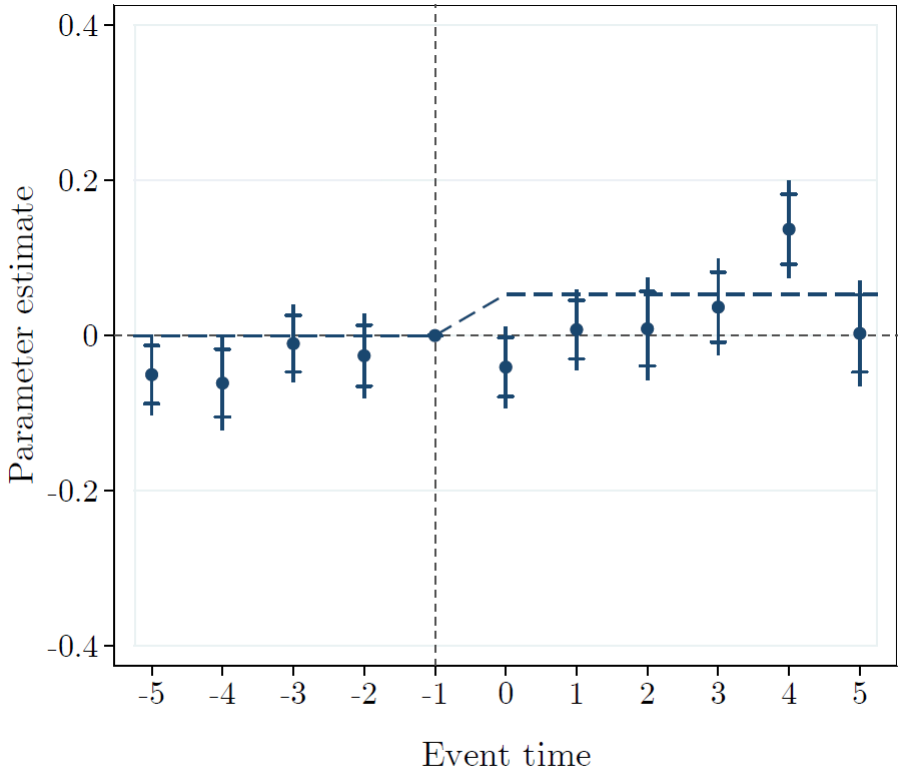
Ukraine's Exports to LIFDCs



Pre-trends p-value: 0.002 - Leveling off p-value: 0.195 - Static effect p-value: 0.629
Pseudo R-squared: 0.919 - Observations: 1,156

* Average post-event price effect: -7.6%

Other Countries' Exports to LIFDCs



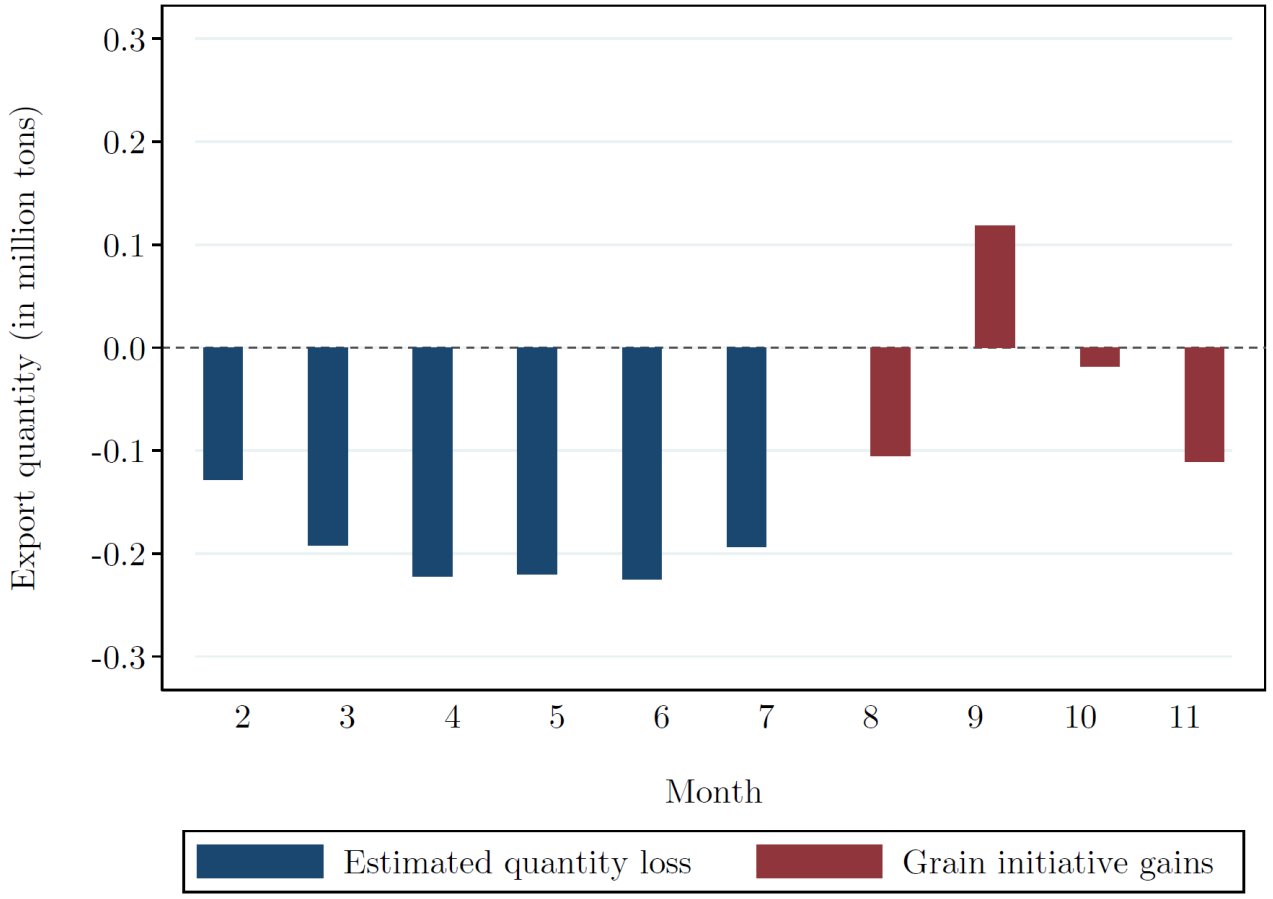
Pre-trends p-value: 0.157 - Leveling off p-value: 0.001 - Static effect p-value: 0.002
Pseudo R-squared: 0.868 - Observations: 49,835

* Average post-event price effect: +2.6%

Product and Regional Analysis

	Exporter	Grains	Milled Grains	Oilseeds	Vegetable Oils
Destruction Effects	Ukraine	-98.3%	-97.8%	-98.9%	-81.1%
Diversion Effects	Other Countries (Quantity)	+16.8% (Africa)	3.1% (Asia)	72.2% (Africa) 77.9% (Asia)	+322.6% (South America)
	Other Countries (Unit Value)	-1.1% (Africa)	-0.2% (Asia)	+0.2% (Africa) +0.4% (Asia)	+10.6% (South America)

The Black Sea grain initiative



Estimated quantity loss and actual quantity changes (Base month: 2022/01)

- Use the quantity from the grain initiative to compare the counterfactual trade effects with the actual quantity changes.

- Since 2022/08, Ukraine's grain exports to LIFDCs have increased.
  - Recorded increase in 2022/09.
  - Still less quantity of staple food is exported to LIFDCs from Ukraine.
  - Most of the exports to LIFDCs is "wheat".

- The grain initiative is operating as intended for LIFDCs but not fully recovered to the previous supply level.

Conclusion

Key Takeaways

- ✓ Russia & Ukraine play significant roles for food-importing countries, particularly Low-Income Food Deficit Countries (LIFDCs) => Food security concerns by the war.

- ✓ Ukraine's staple food exports to LIFDCs has dropped by **90.9%** during the first 5 months after Russia's aggression. Other countries' exports to LIFDCs also decreased by **3.5%**.
  - Destruction effects: oilseeds (-98.9%) > grains (-98.3%) > milled grains (-97.8%) > vegetable oils (-81.1%).
  - Diversion effect: **Grains** (Africa), milled grains (Asia), oilseeds (Africa & Asia), vegetable oils (South America).

- ✓ The Black Sea Grain Initiative is working in a sense, but still requires LIFDCs to get more stock to restore food consumption levels. Grains are the most important food energy source.

- ✓ Need to facilitate exports via alternative routes, establish an internationally binding legal protection of trade routes for LIFDCs.

Thank you! ☺