

2

The impacts of economic sanctions on food (prices) security: Evidence from targeted countries

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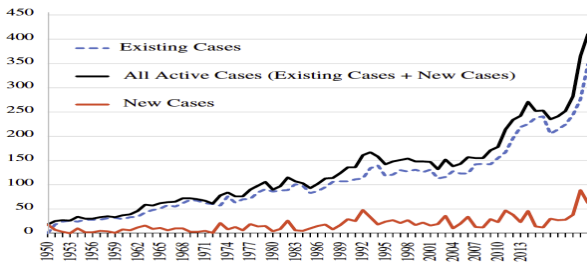
Outline

- 1 Motivation ✗
- 2 Literature review ✗
 - Use of sanctions
 - Previous literature
 - Current literature
 - Contribution
- 3 Theoretical Perspectives ✗
- 4 Data & Methodology
 - Global sanctions database
 - Food price index
 - Prevalence of undernourishment
- 5 Results

Motivations from the literature (1)

Economic sanctions

- The ubiquitous and continuous use of sanctions within diplomatic circles
- Evolution of sanction cases over the years (GSDB)



- Average number of sanctions per year between 1990-2009 was 250 compared to 482 between 2010-2019 (van Bergeijk 2021)

sanctions decade

Motivations from the literature (2)

Food prices and sanctions

- Food prices, a critical food security indicator, directly affect affordability, a key aspect of food security related to access to food
- Sanctioned countries experienced a surge in food prices aftermath sanctions
 - Iran experienced a 30% increase in consumer prices following sanctions after its nuclear enrichment program
 - inflation increased by 15% in 2015 in Russia after sanctions imposed after its annexation of Crimea
 - The Trump Administration's imposition of broader financial sanctions on Venezuela in 2018 led to an alarming inflation rise to one million in that year
- These events present anecdotal evidence there is a link between sanctions and food (consumer) prices

Motivations from the literature (3)

Food security and sanctions

- Food security is a pertinent and continuous global concern
 - to eradicate hunger and famine
 - demonstrated through the UN MDG 1 and SDG 2
- In a more recent report, the FAO (2022) links the surge in food prices as a significant factor contributing to an increase in the number of people lacking access to a healthy diet
 - the number of people lacking access to healthy has risen by 112 million to nearly 3.1 billion in 2022
 - an increasing crisis level and worsening food insecurity in 51 countries
- Most of the food insecure countries in the world are also sanctioned states. (e.g., Burundi, Eritrea, Yemen, Afghanistan, Chad, Ethiopia, Sudan, Somalia, North Korea)

Historical and recent food sanctions

Using sanctions to curtail food supply

- Historical use of sanctions
 - The US Embargo Act of 1807 that restricted trade between the US and the UK
 - embargo contributed to price jump in corn prices in the UK (Pond, 2007)
 - 1980 Grain Embargo imposed by the US on Russia
 - 1994 Glenn Amendment that required the US to restrict exports of farm products to countries that had nuclear enrichment program such as Pakistan and India
- Recent use of sanctions in diplomatic circles
 - sanctions and counter sanctions on agri-food products by the EU and Russia following Russia's annexation of Crimea in 2014
 - current sanctions on Russia for the Ukraine invasion is generally blamed for the global food inflation

What empirical studies say about sanctions?

Previous literature

- Effectiveness of sanctions
 - change the behavior of targets towards the sender (cf. Pape 1997, Torbat 2005 and Hufbauer et al 2007)
 - sanctions are only successful in limited number of cases (only 1 out of 3 cases)
- Nutrition and health
 - hunger and famine in Cuba (Garfield & Santana 1997)
 - fall in nutritional value in Cuba (Gibbons & Garfield 1999)
 - increased under-five mortality and infectious diseases in Iraq (Ali and Shah 2000)

Empirical literature

Current literature

- Sanctions affect growth, poverty and inequality
 - skew the income distribution in uneven manner (Afesorgbor and Mahadevan 2016)
 - lead to a decrease in economic growth, increase poverty and widen the poverty gap (Neuenkirch and Neumeier 2015, 2016)
- The impact of sanctions on trade
 - leads to a greater demand for protectionist policies (Pond 2017)
 - decreases trade from the sender to target, including essential products, food and medicines (Afesorgbor 2019)
 - trade sanctions decreases agri-food trade by 73% between senders and targets (Larch et al. 2021)
- The impact of sanctions on food prices
 - counter-sanctions by Russia on agri-food products led to increased consumer prices and a decline in welfare (Hinz and Monastyrenko 2022)

What are our contributions?

- Our objective is to quantify the causal relationship between sanctions and food prices, and to assess its broader implications for prevalence of undernourishment (PoU) within the affected nations
- How different instruments of sanctions affect food prices and PoU?
 - trade, financial, and travel sanctions
- How sanctions by different senders affect food prices and PoU?
 - The US, the EU, the UN and Other Western senders

What are the theoretical arguments?

Theoretical link between sanctions and food security

- 1 Political-economy model (Oeschlin 2014)
 - sanctions make gov'ts of targeted countries reduce the private sector productivity
 - centralize the distribution of essential goods and services to punish any public dissent
- 2 Amartya Sen's entitlement theory
 - sanctions can undermine production, labor or livelihoods, trade and social transfers
- 3 Supply and demand-side constraints
 - agricultural production declines (isolation leads to lack of new technology)
 - trade restrictions impose barriers to free trade
 - reduces income-generating opportunities for individuals
 - undermine social protection programs

What are the research questions?

- Do sanctions affect food prices and PoU in the targeted countries?
- Do different instruments of sanctions have heterogeneous effect on the different dimensions of food security?
 - financial sanctions (freezing of financial assets, international money transfers, financial aid, etc.)
 - trade sanctions (export embargoes, import restriction, prohibitive tariffs)
- What is the effect of sanctions imposed by different senders?
 - the US
 - the EU
 - the UN
 - other Western senders (mostly OECD countries)

What data was used?

Sanctions, food prices and food security

- In all, we have data spanning the period 2000-2021 for 112 developing countries by 4 major senders/groups
- Economic sanctions
 - Global sanctions database
- Food CPI (FAO)
 - measures the price change between the current and reference periods of the average basket of goods and services purchased by households
 - we deflated nominal FPI using CPI to obtain real (inflation-adjusted) FPI
- Prevalence of undernourishment (FAO)
 - the indicator used to measure progress towards SDG Target 2.1
- Control variables
 - economic variables (GDPpc, trade, exchange rate, popn growth) from WDI
 - weather and agricultural variables (agricultural stress index, cereal yield) from WDI and FAO
 - political variables (physical violence and coup d'etats) from V-Dem

Definition of the variables

Summary statistics

Variable	Definition	Sources of Data	Obs	Mean	Std. Dev.
food price index	Real food price	FAOSTAT	9656	0.970	0.140
pou	Prevalence of undernourishment (%)	FAOSTAT	8520	12.404	12.391
Sanctions	An indicator variable that indicate presence or absence of sanctions	GSDB	10264	0.176	0.381
Trade sanctions	An indicator variable that indicate presence or absence of trade sanctions	GSDB	7698	0.0765	0.266
Financial sanctions	An indicator variable that indicate presence or absence of financial sanctions	GSDB	7698	0.142	0.349
Travel sanctions	An indicator variable that indicate presence or absence of travel sanctions	GSDB	7698	0.092	0.290
lngdp_cap	GDP per capita at current prices	WDI	9552	9.018	1.166
trade.open	Trade (% of GDP)	WDI	10264	73.575	58.836
lnexch_rate	Official exchange rate (LCU per US\$, period average)	WDI	9720	3.414	2.800
popn.growth	Population growth (annual %)	WDI	10172	1.535	1.697
lnyield_cereal	Cereal yield (kg per hectare)	WDI	9420	7.719	0.703
agr_stressind	Agricultural Stress Index (% of area with Mean VHI below 35)	FAOSTAT	8660	10.076	10.613
agr_gdp	Agriculture, forestry, and fishing, value added (% of GDP)	WDI	9636	13.397	11.737
rural_popn	Rural population (% of total population)	WDI	10172	44.081	23.144
v2x.clphy	Physical violence index	V-Dem	8888	0.011	0.110
e_pt_coup	Number of successful coup attempts in a year	V-Dem	9800	0.625	0283

Empirical strategy

Determinants of food security

- Baseline model is interested in identifying the determinants of food (price) security

$$Y_{it} = \gamma \text{Sanctions}_{ijt} + \beta \mathbf{X}_{it} + \alpha_i + \alpha_j + \alpha_{ij} + \alpha_t + \epsilon_{it} \quad (1)$$

- Y_{it} measures food price and PoU for country i at time t
- Sanction_{it} is measured as an indicator variable which takes the value 1 during sanctions period, and zero otherwise
- X_{it} is a vector of control variables that are likely to confound the effect of sanctions on food security
- $\alpha_i, \alpha_j,$ and α_{ij} capture target, sender and target-sender fixed effects

Sanctions is endogenous

Entropy balancing

- Imposition of sanctions could be as a result of negative economic, social, and political environment of the target
- Any negative effect could possibly be the negative environment that push the sender into imposing the sanctions
- The matching technique to obtain a synthetic control group (country-year observations without sanctions) that is comparable to treatment group (country-year observations with sanctions)
- Pre-treatment characteristics are used to obtain a close control group comparable to treatment group (Hainmueller, 2012)

$$\tau_{ATT} = \mathbf{E}[Y_{it}(1)|S = 1, X = x] - \mathbf{E}[Y_{it}(0)|S = 0, X = x] \quad (2)$$

- ATT (τ_{ATT}) is difference in mean outcomes between the treated group and re-weighted control group
- This constitutes the estimated impact of sanctions on the outcome variables

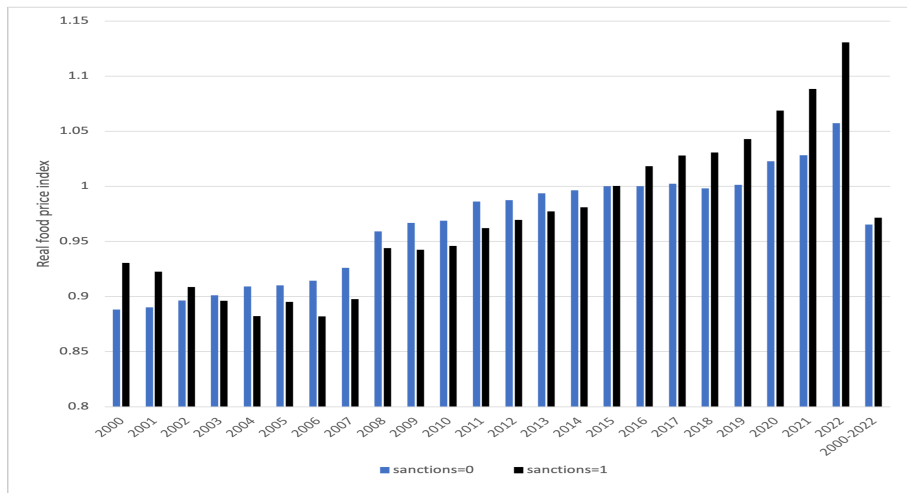
Covariate balancing

Mean comparisons of covariates before and after entropy balancing

Variables	Before balancing			After balancing		
	Sanctions	No sanctions	Diff	Sanctions	No sanctions	Diff
lngdp_cap	8.686	9.038	-0.352 ***	8.686	8.687	-0.001
trade_open	60.640	74.420	-13.780 ***	60.640	60.65	-0.010
lnexch_rate	4.330	3.375	0.955 ***	4.330	4.329	0.001
popn_growth	1.631	1.572	0.059	1.631	1.631	0.000
lnyield_cer	7.541	7.834	-0.293 ***	7.541	7.541	0.000
agr_stress_ind	9.696	9.417	0.279	9.696	9.697	-0.001
agr_gdp	16.970	13.290	3.680 ***	16.97	16.97	0.000
rural_popn	48.330	43.990	4.340 ***	48.33	48.33	0.000
conflict(coups)	0.031	0.007	0.024 ***	0.03057	0.03056	0.000
phy_vio_ind	0.526	0.682	-0.156 ***	0.5261	0.5261	0.000
observation	1145	6275		1145	6275	

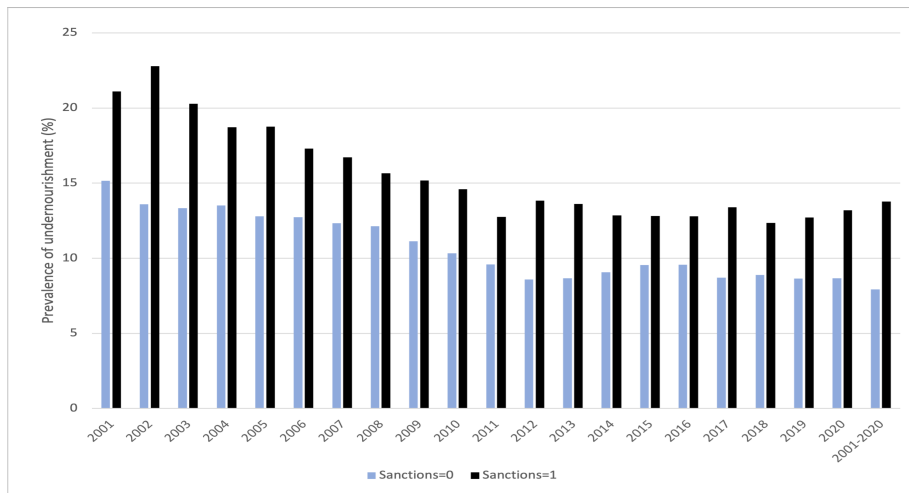
Descriptive analysis

Evolution of food prices between sanction and non-sanction periods



Descriptive analysis

Evolution of PoU between sanction and non-sanction periods



The impact of economic sanctions on food prices

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Real FPI	Real FPI	Real FPI	Real FPI	Real FPI	Real FPI
sender_sanction	0.0233*** (0.00350)	0.0121*** (0.00323)	0.0119*** (0.00370)	0.0127*** (0.00329)	0.00955** (0.00387)	0.0144*** (0.00421)
Constant	0.787*** (0.0309)	1.103*** (0.104)	1.210*** (0.0560)	1.101*** (0.104)	2.029*** (0.164)	1.998*** (0.163)
Observations	7,420	7,420	7,420	7,420	7,420	7,420
R-squared	0.033	0.539	0.263	0.539	0.534	0.550
Target FE	NO	YES	NO	YES	YES	YES
Sender FE	NO	NO	NO	YES	YES	YES
Target-Sender FE	NO	NO	NO	NO	NO	YES
Year FE	NO	YES	YES	YES	YES	YES
Balancing	NO	NO	YES	NO	YES	YES

Impact of different types of sanctions on food prices

VARIABLES	(1) Real FPI	(2) Real FPI	(3) Real FPI	(4) Real FPI	(5) Real FPI	(6) Real FPI	(7) Real FPI
trade	0.0338*** (0.0118)						
financial		0.0306*** (0.00703)					
travel			0.0224** (0.0103)				
trade_financial				0.0198** (0.00894)			
trade_travel					0.0254* (0.0134)		
financial_travel						0.0314** (0.0128)	
trade_travel_financial							0.0415** (0.0161)
Constant	1.975*** (0.187)	1.886*** (0.191)	1.946*** (0.186)	2.010*** (0.189)	1.992*** (0.190)	1.914*** (0.184)	1.381*** (0.218)
Observations	5,565	5,565	5,565	5,565	5,565	5,565	5,565
R-squared	0.551	0.553	0.548	0.533	0.548	0.550	0.469
Target FE	YES	YES	YES	YES	YES	YES	YES
Sender FE	YES	YES	YES	YES	YES	YES	YES
Target-Sender FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	YES	YES	YES	YES	YES	YES	YES

The impacts of different senders of sanctions on food prices

VARIABLES	(1) EU	(2) US	(3) UN	(4) Other Western
sender_sanction	0.0302*** (0.00763)	0.00572 (0.00719)	-0.00363 (0.0141)	0.0258*** (0.00909)
Constant	2.047*** (0.334)	1.747*** (0.316)	2.346*** (0.356)	2.003*** (0.302)
Observations	1,855	1,855	1,855	1,855
R-squared	0.553	0.572	0.516	0.568
Target FE	YES	YES	YES	YES
Sender FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Balancing	YES	YES	YES	YES

The impact of economic sanctions on PoU

VARIABLES	(1) PoU	(2) PoU	(3) PoU	(4) PoU	(5) PoU	(6) PoU
sender_sanction	1.167*** (0.292)	0.932*** (0.181)	1.140*** (0.290)	0.984*** (0.190)	1.419*** (0.207)	2.083*** (0.275)
Constant	94.90*** (2.621)	103.7*** (4.980)	120.5*** (4.331)	103.6*** (4.980)	113.9*** (6.626)	112.1*** (6.640)
Observations	7,164	7,164	7,164	7,164	7,164	7,164
R-squared	0.549	0.885	0.599	0.885	0.896	0.899
Target FE	NO	YES	NO	YES	YES	YES
Sender FE	NO	NO	NO	YES	YES	YES
Target-Sender FE	NO	NO	NO	NO	NO	YES
Year FE	NO	YES	YES	YES	YES	YES
Balancing	NO	NO	YES	NO	YES	YES

Impact of different types of sanctions on PoU

VARIABLES	(1) PoU	(2) PoU	(3) PoU	(4) PoU	(5) PoU	(6) PoU
trade	2.471*** (0.471)					
financial		2.029*** (0.323)				
trade_financial			1.535*** (0.375)			
trade_travel				2.361*** (0.512)		
financial_travel					1.840*** (0.435)	
trade_travel_financial						2.341*** (0.587)
Constant	112.9*** (7.496)	108.2*** (7.411)	113.8*** (7.545)	113.9*** (7.523)	111.9*** (7.654)	131.3*** (7.061)
Observations	5,373	5,373	5,373	5,373	5,373	5,373
R-squared	0.902	0.903	0.899	0.902	0.901	0.898
Target FE	YES	YES	YES	YES	YES	YES
Sender FE	YES	YES	YES	YES	YES	YES
Target-Sender FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Balancing	YES	YES	YES	YES	YES	YES

The impacts of different senders of sanctions on PoU

VARIABLES	(1) EU	(2) US	(3) UN	(4) Other Western
sender_sanction	2.696*** (0.404)	0.587 (0.486)	5.676*** (1.078)	2.587*** (0.497)
Constant	120.8*** (12.76)	108.1*** (12.81)	85.82*** (14.34)	110.7*** (13.64)
Observations	1,791	1,791	1,791	1,791
R-squared	0.901	0.906	0.908	0.890
Target FE	YES	YES	YES	YES
Sender FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Balancing	YES	YES	YES	YES

Conclusion

- Food prices
 - sanctions result in a real-term increase in food prices
 - during the sanctions period, food prices are higher by 0.01-0.014 compared to non-sanctions period
 - various types of sanctions exhibit similar effects on food prices, with a more pronounced impact observed when a combination of trade, travel, and financial sanctions is imposed
 - EU and other Westerners' sanctions influence the effect of sanctions on food prices compared to US and UN sanctions
- Prevalence of undernourishment
 - Sanctions contribute to a higher PoU by 1.419-2.083 during the sanctions years compared to non-sanctions years
 - various types of sanctions exhibit a similar effect in this regard
 - multilateral sanctions involving the EU, UN, and Western senders demonstrate positive and significant effects on PoU, while US sanctions show no discernible effect.

Thank you

- Questions and comments are welcome