TRADE OPENNESS AND FOOD SECURITY: A CROSS-COUNTRY ANALYSIS

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POSITIVE EFFECTS OF TRADE ON FOOD SECURITY

Dithmer and Abdulai (2017, Food Policy)

Large cross-country dataset (developed and developing countries). Trade openness and economic growth exert positive and significant impacts on dietary energy consumption and diversity.

❑ Direct effect through **increased food availability and diversity** (food availability and utilization).

❑ Indirect effects through **economic and agricultural development** (higher incomes, inputs at lower costs) induced by trade, conditional on domestic provision of transport infrastructure and social security mechanisms for absorbing potential shocks (food access).

Wood et al. (2020, Nature Sustainability)

Impact of international trade on nutrient availability. Trade versus non-trade comparison. Results: **The disparity in nutrient av. among countries is much higher under non-trade scenarios.**

Lower-income countries tend to **gain nutrient potential with trade,** for almost all nutrients except iron and folate.

Limitations:

❑ Food items that are most easily traded—such as staple grains—are often lowest in composition of micronutrients in which many countries are deficient.

❑ There is no guarantee that **availability** of imported nutrients translates into access by the ones who need them (ability to pay).

❑ Consumers who purchase food benefit from the lower cost of imports, whereas domestic producers may not.

Baldos and Hertel (2015, Food Security) (literature review and theoretical simulation): trade and climate change

-extreme weather events increase volatility of food supply and of food price which hit hardest those who are already vulnerable to poverty and undernourishment

- the long run shift in temperature and precipitation trends could potentially dampen agricultural productivity growth in regions with high food insecurity.

-As a consequence, fully integrated markets can **compensate local food deficits** related to the climate change-related shocks.

Some studies on specific countries:

- Dorosh et al. (2009 Food Policy). Production and trade of maize and cassava in Zambia in 2006 (Theoretical and empirical study). Regional trade as a tool for **moderating price volatility** domestically (indirect effect). Given a favorable policy environment, private imports and increased cassava consumption could **compensate maize shortfall** during drought years (direct effects).

-Burgess and Donaldson (2010, American Economic Review). Role of trade openness in **mitigating the effects of agricultural productivity shocks** on famine in colonial-era India (Empirical study).

-Davalos et al. (2020, Europ. Rev. Agr. Econ.) Impact of trade liberalisation on **the price of chemical fertilisers** on farm and non-farm labour in rural Vietnam. Results: liberalisation increased rural household participation into farm employment while non-farm participation was generally unaffected.

MORE SPECIFIC ISSUES ON THE POSITIVE SIDE

NEGATIVE EFFECTS OF TRADE ON FOOD SECURITY

Mary (2019, Food security)

- **55 developing countries** (where food exporters are represented more than importers)

- the author can't find a variable to instrument trade openness and estimates the **residual trade openness which does not depend on undernutrition.**

- he finds that **10% changes in food trade openness would increase the prevalence of undernourishment by about 6% (**driven by decreased GDP per capita in the food sector and decreased agricultural producer prices despite gains in the food supply as a result of increased food trade openness**).**

THE CONTRIBUTION OF OUR PAPER

-UNLIKE PREVIOUS CROSS-COUNTRY STUDIES (Dithmer and Abdulai, 2017, and Mary, 2019), WE TEST AND IDENTIFY A **VALID INSTRUMENT** FOR TRADE OPENNESS (OPENNESS OF THE RoW) TO CONTROL FOR POTENTIAL ENDOGENEITY.

- UNLIKE WOOD ET AL. (2020), WE USE AN **OUTCOME MEASURE OF FOOD SECURITY** (prevalence of undernourishment, SDG2 indicator).

-AS STAPLE FOOD IS MOST EASILY TRADED AND ENERGY UNDERNUTRITION IS STILL IMPORTANT IN MOST DEVELOPING COUNTRIES (BROOKS AND MATTHEWS 2015), WE INVESTIGATE SPECIFIC IMPACTS OF **CEREALS TRADE OPENNESS** (cereals and non-cereals TO).

-WE ALSO INVESTIGATE THE EFFECTS OF **IMP AND EXP SEPARATELY** (as Mary, 2019, but with a more representative sample).

MODEL SPECIFICATION AND DATA

$$U_{it} = \alpha + \beta_1 TO_{it} + \sum_k^K \gamma_k X_{k,it} + u_{it}$$

❑ U_{it} is the percentage of undernourished on country population, as provided by FAO FAOStat,

❑ TO is the (instrumented) Trade openness measured as the sum of a country's exports and imports as a share of country's GDP. For total trade, we take this variable from World Bank World Development indicators, while we construct a measure of trade openness for the cereals subsector, based on import and export values and on production values from FAOStat. All the trade openness measures enter our models as natural logarithms (i.e. linearlog) reflecting decreasing return of trade on our dependent variable, also in line with Mary (2019).

x_{it} is a set of control variables supposed to affect FS:

real GDP per capita
% of rural population
average cereal yields
 % of arable land
population growth
inflation
share of country population affected by natural disasters
occurence of conflicts (dummy)

POTENTIAL ENDOGENEITY AND IDENTIFICATION STRATEGY

Potential reverse causality between hunger and trade because developing countries may be implementing more protectionist policies as a response to past food security shocks (Dithmer and Abdulai 2017, Mary 2018).

Romalis (2007) proposes an instrument (US Most Favored Nation tariff rates) to identify whether international trade causally affects countries' growth rates, recognizing that how internationally integrated a country is also depends on the policies of its trading partners.

For each country and year we calculate a measure of the **trade openness of the Rest of the World** (taking the aggregate world value of import, export and production, subtracting from each the corresponding value for the country and then calculating the trade openness of the rest of the world by dividing).

❑ TO is instrumented by TO of the RoW; cereal TO by the cereal TO of the RoW; non-cereal TO by the non-cereal TO of the RoW.

❑ IO for cereals is instrumented by EO for cereals of the RoW; EO for cereals is instrumented by IO for cereals of RoW

INSTRUMENTING TRADE OPENNESS

Dep. var.: prevalence of undernourishment	IV FE			FE
	(1a)	(1b)	(1c)	(d)
Log Trade openness	-31.9936	-15.7439	-9.3199	0.7436
	(-3.37)***	(-3.28)***	(-2.56)**	(1.27)
Per capita GDP (constant USD 2010)		-.0014	-0.0008	-0.0007
		(-3.55)***	(-1.89)*	(-6.58)***
Rural Population (%)			0.3412	0.03550
			(2.80)***	(8.84)***
Cereal Yield (kg per ha)			-0.0003	-0.0006
			(-0.80)	(-3.13)***
Population growth			0.5051	0.5360
			(0.88)	(2.27)***
Arable land (% of land area)			-0.3982	-0.3313
			(-3.24)***	(-5.58)***
Natural disasters (persons affected by country population)			-1.2280	0.2472
			(-0.44)	(0.13)
Inflation (CPI)			0.0164	-0.0405
			(0.56)	(-2.53)***
Conflicts			0.4336	0.2782
			(1.34)	(2.17)**
Constant				2.5259
				(0.68)
N of countries	80	80	80	80
N of observations	1094	1094	1094	1094
F	11.19***	11.23***	6.83***	43.20***
Hausman test (p-value)				0.0000
Anderson-Rubin Wald test (Chi squared p value)	0.0000	0.0000	0.0021	
Davidson-MacKinnon test F (p-value)	0.0000	0.0000	0.0000	

Dep. var.: prevalence of undernourishment	IV FE			FE	IV FE
	(2a)	(2b)	(2c)	(2d)	2(e)
Log Cereal Trade openness	-12.0091 (-3.58)***	-11.4247 (-2.97)***	-6.6768 (-2.54)**	0.0986 (0.52)	
Log Cereal import openness					-7.8239 (-2.28)**
Log Cereal export openness					1.1796 (0.63)
Log Non-cereal Trade openness			-1.8527 (-0.60)	0.5882 (1.01)	-2.5936 (-0.71)
Per capita GDP (constant USD 2010)		-.0001 (-0.20)	-.0001 (-0.14)	-0.0008 (-6.56)***	-0.0006 (-0.99)
Rural Population (%)			0.2512 (1.34)	0.3558 (8.83)***	0.0399 (0.18)
Cereal Yield (kg per ha)			-0.0009 (-1.59)	-0.0006 (-3.07)***	-0.0020 (-2.11)**
Population growth			-0.3142 (-0.36)	0.5480 (2.30)**	-0.2968 (-0.34)
Arable land (% of land area)			-0.4121 (-2.58)**	-0.3314 (-5.58)***	-0.5139 (-2.94)***
Natural disasters (persons affected by country population)			3.4201 (0.95)	0.1864 (0.10)	1.1019 (0.23)
Inflation (CPI)			-0.0091 (-0.26)	-0.0401 (-2.50)**	0.0050 (0.11)
Conflicts			0.5588 (2.06)**	0.2776 (2.17)**	0.6419 (1.62)
Constant				2.7606 (0.75)	
N of countries	80	80	80	80	79
N of observations	1094	1094	1094	1094	1055
F	12.64***	6.96***	4.69***	38.82***	3.14***
Hausman test (p-value)			0.0073		
Anderson-Rubin Wald test (Chi squared p value)	0.0000	0.0000	0.0001		0.0000
Davidson-MacKinnon test F (p-value)	0.0000	0.0000	0.0000		0.0000

SENSITIVITY ANALYSIS

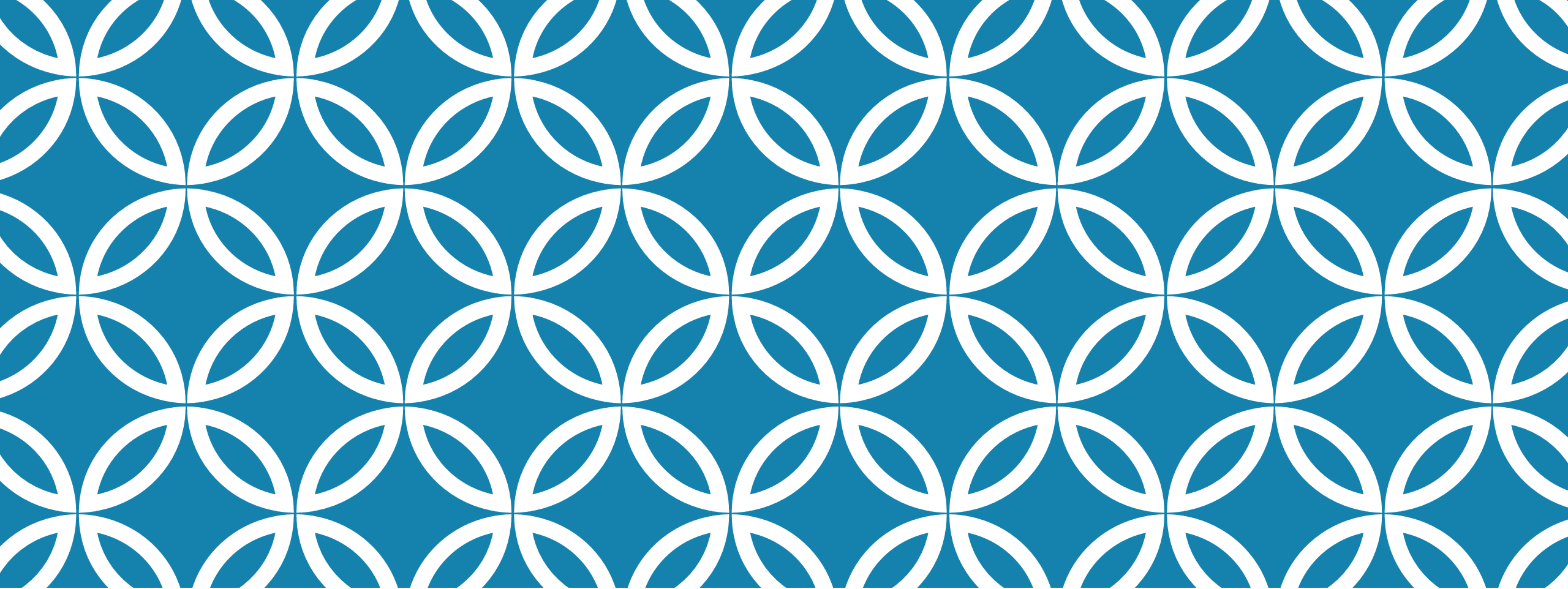|	Reduced samples (IV FE)							
	Net exporters only	Net importers only	Without South Asia	Without East Asia and Pacific	Without SSA	Without LAC	Without MENA	Without Europe and Central Asia
Log Cereal Trade openness	-12.3117 (-0.32)	-7.1116 (2.51)**	-6.0964 (-2.24)**	-7.7433 (-2.31)**	-4.6538 (-2.15)**	-7.0287 (-2.13)**	-8.5215 (-2.28)**	-6.6214 (-2.51)**
N of countries	24	62	75	72	58	64	71	60
N of observations	239	803	1014	966	793	874	974	849

PRELIMINARY CONCLUSIONS

❑**Endogeneity** of trade is confirmed and correctly addressed by our instrumental variables.

❑Trade openness has a negative (i.e. **beneficial effect**) on undernutrition.

❑**Cereal trade openness** is found to drive this effect of trade openness, while openness in the trade of products other than cereals is not found to be significant.

❑**Cereal import openness** is found to drive this effect of cereal trade openness, while **export openness** is not found to be significant.

❑The robustness test on reduced samples also confirm the significance of cereal trade openness for **net importers** only, which represent most of our sample.

LIMITATIONS AND WAYS FORWARD

❑Still to check models with **alternative measures of undernutrition** (i.e. average dietary energy consumption)

❑Still to carry out robustness tests for **outliers and extremes.**

❑We found that import reduces undernutrition but we don't know how trade openness affect net food importers vs exporters in the **long run**.

❑As our dependent variable is not normally distributed, we also tried (still to finalize) **quantile regressions** to assess how the coefficient of trade openness varies with the dependent variable, i.e. for countries with different levels of undernutrition.

❑Still to calculate, based on our models, the impact of the decrease in international trade due to the **pandemic** on undernutrition.

❑**More**?

THANK YOU FOR THE ATTENTION! | Q&A