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A Perfect or Persistent Storm for Global Agricultural Markets? High Energy Prices and the War in Ukraine

**Christian Elleby, Ignacio Pérez Dominguez, Giampiero Genovese,
Wyatt Thompson, Marcel Adenäuer, and Hubertus Gay**

Selected presentation for the International Agricultural Trade Research Consortium's (IATRC's) 2022 Annual Meeting: Transforming Global Value Chains, December 11-13, 2022, Clearwater Beach, FL.

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A perfect or persistent storm for global agricultural markets?

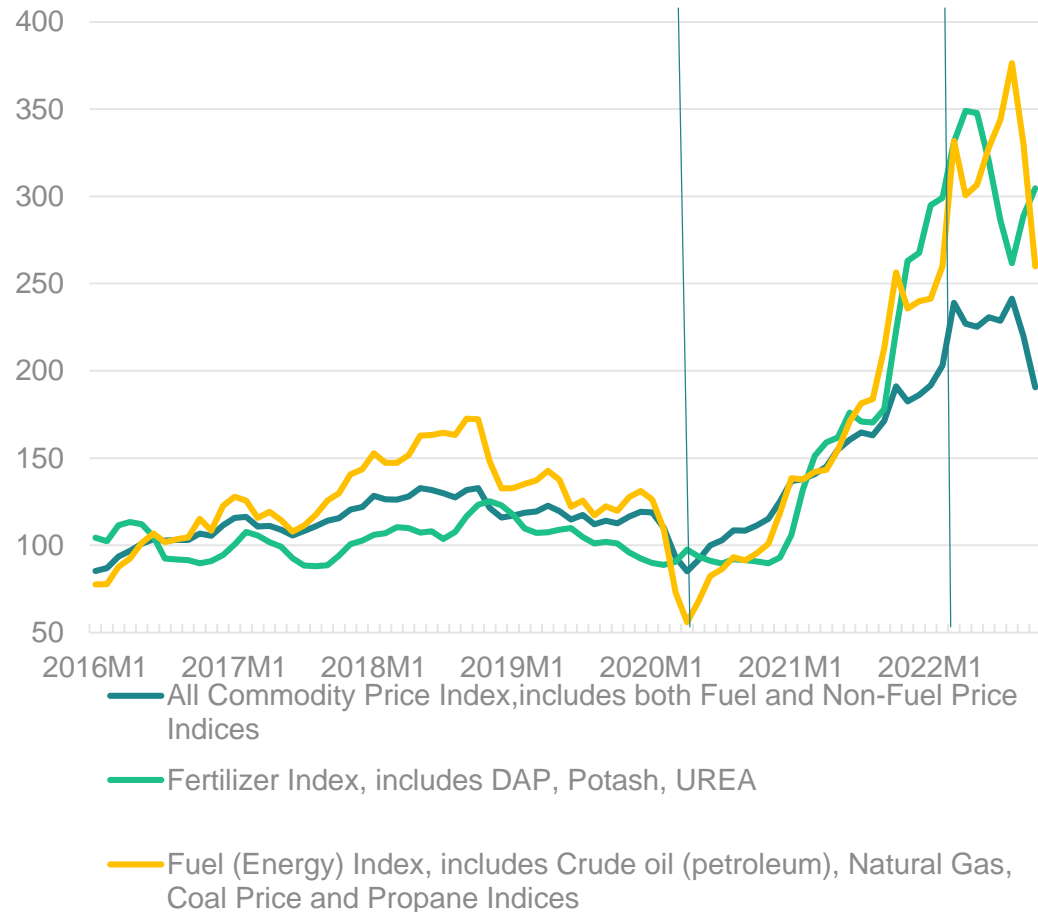
High energy prices and the war in Ukraine

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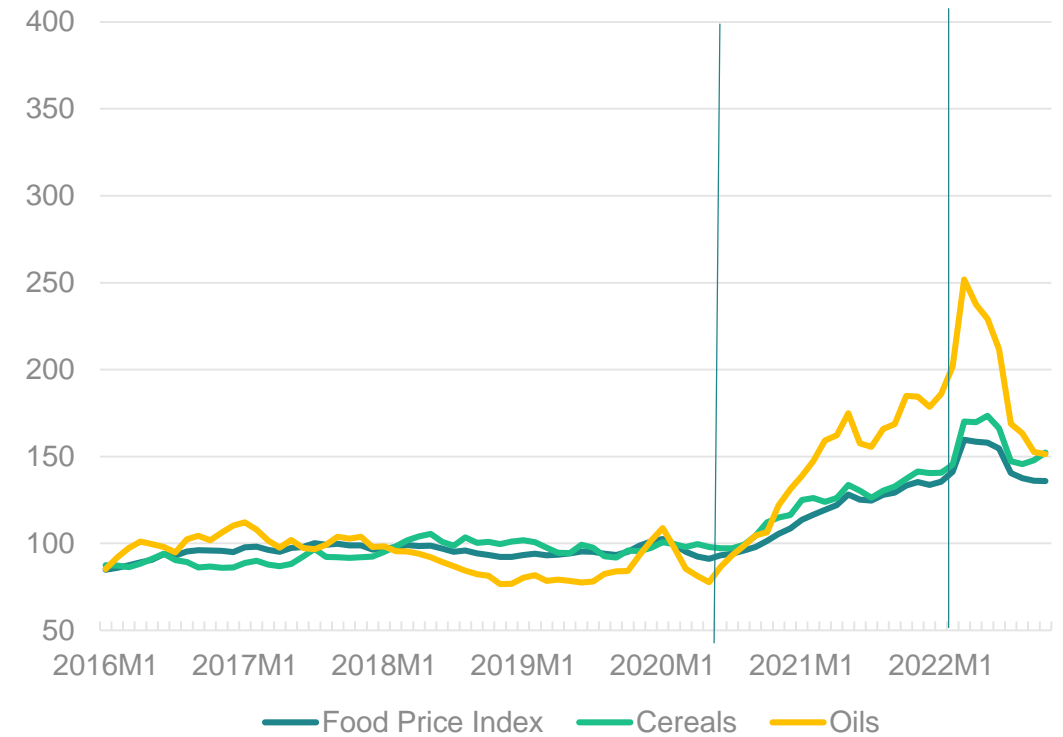
*IATRC Annual Meeting 12/12-2022,
Clearwater Beach, FL*

Run-up in commodity prices prior to the Russian invasion of Ukraine in Feb 2022

IMF commodity price indices



FAO food price indices



Scenarios: High input costs and supply disruptions

Main scenario

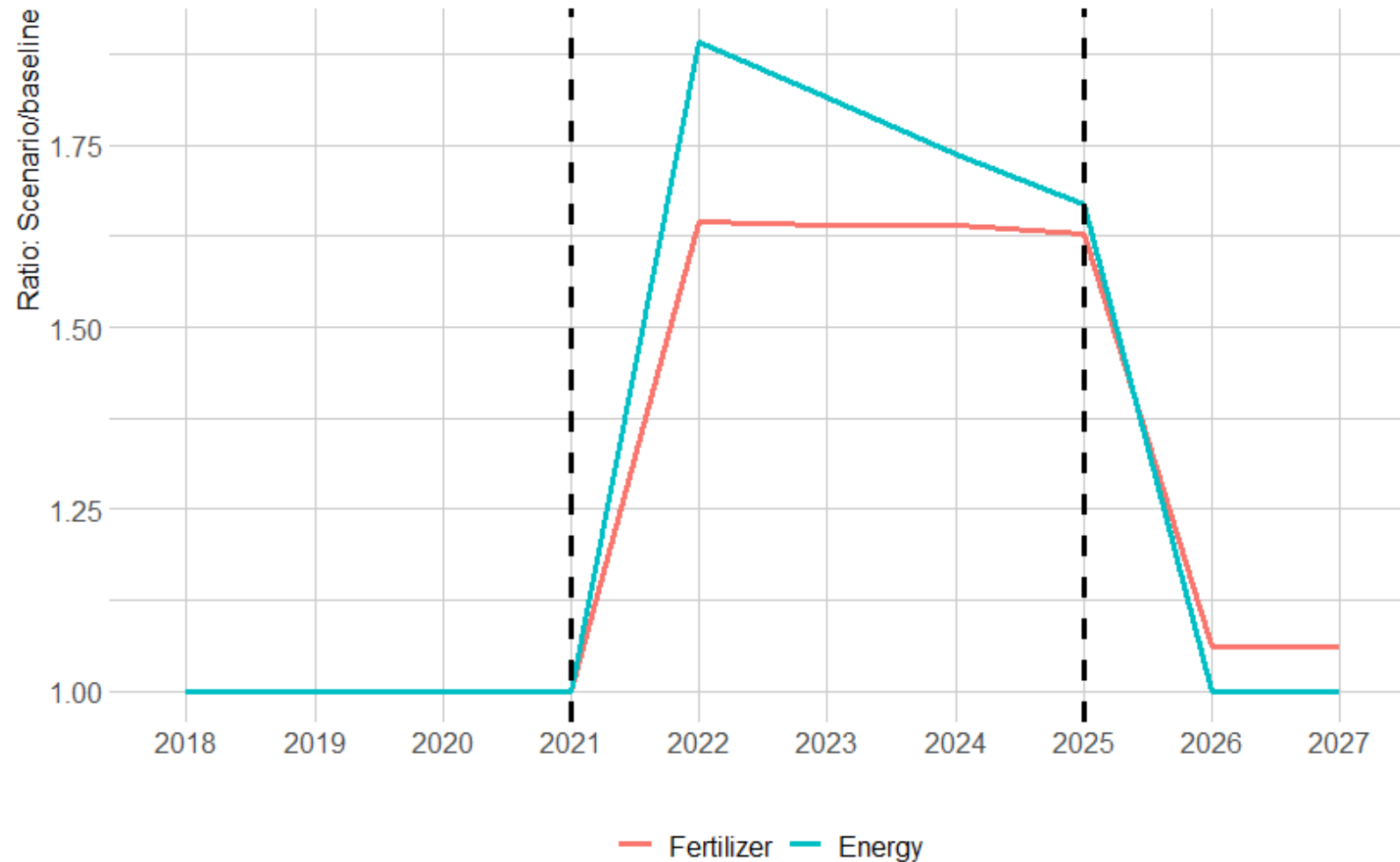
- Persistent increase in energy and fertilizer prices (\uparrow 66% compared to the 2021 baseline)
- Lower UKR export supply of wheat (\downarrow 50% = 11.7Mt), coarse grains (\downarrow 40% = 15.7Mt), and soybeans (\downarrow 30% = 0.6Mt).
- Reduced UKR export supply of wheat (\downarrow 15% = 6.7Mt). Other exports fixed at the 2021 baseline

Additional scenarios

- Additional crop area in the EU (+1.6 Mha) and US (+0.5 Mha) due to a transitional derogation of ecological set-aside
- Endogenous Russian export supply and no wheat export shock

We focus on 2025/26 marketing year. Scenario shocks applied to 2022-2025

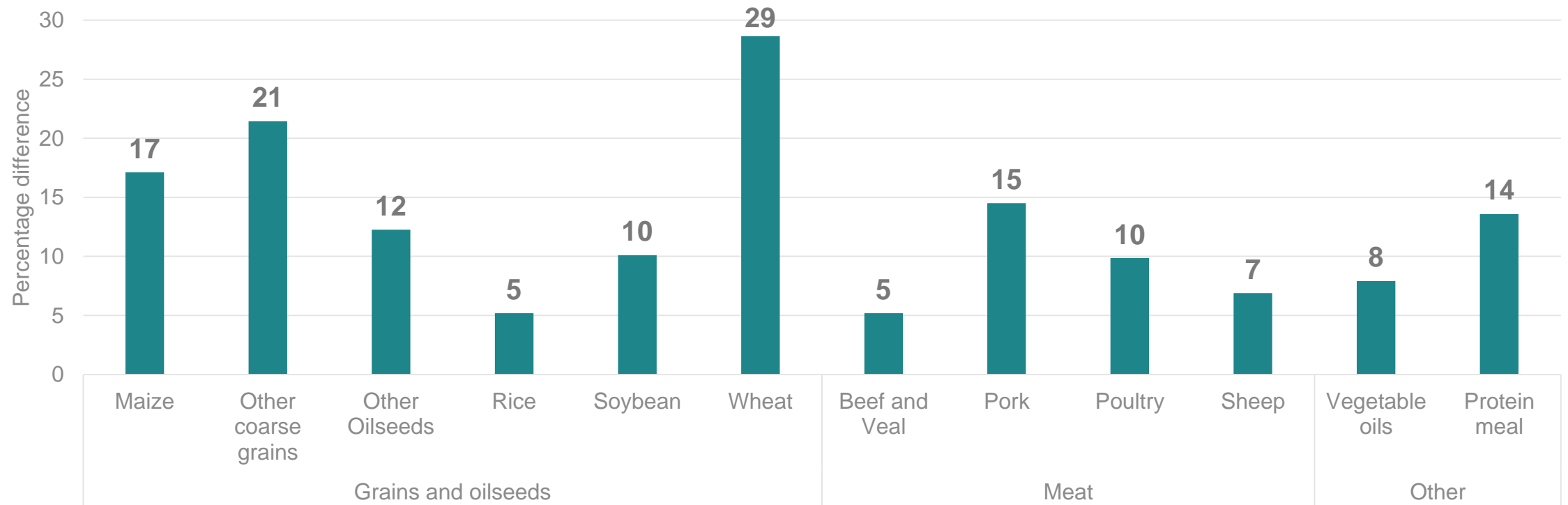
Illustration of the energy and fertilizer shocks



The Aglink-Cosimo model

- Large-scale recursive-dynamic partial equilibrium model of the global agri-food markets incl. biofuels
- Managed by the Secretariats of the OECD and FAO. JRC a key collaborator
- Used in connection with the OECD-FAO Global Agricultural Outlook and the EU Agricultural Outlook baseline projections
- Homogenous goods, each country trades with the world market
- ~90 commodities, 39 world market-clearing prices, all main producers/exporters
- Energy (Brent) and fertilizer prices important inputs in the production cost index

Substantial price impacts on the world market. Energy and fertilizer price shock contribute apprx. 30-50% to the total impact (50-70% from lower exports)



Impacts in percentage difference between scenario and baseline after three years of conflict. Main scenario

Comparison of world price impacts across scenarios: Wheat price response sensitive to the assumptions regarding RUS exports

	Scen1	Scen2	Scen3
Maize	17.1	16.0	16.1
Other coarse grains	21.4	18.6	18.2
Soybean	10.1	9.1	9.6
Wheat	28.6	26.3	22.1
Other Oilseeds	12.3	11.2	10.9
Protein Meal	13.6	12.2	12.8
Vegetable oils	7.9	7.4	7.6

Impacts in percentage difference between scenario and baseline after three years of conflict. Scen1: same as above. Scen2: Scen1 + additional farm land in EU and US. Scen3: Scen1 + endogenous export response in Russia.

Dom. producer price response depends on level of protection and the trade position. Margins reduce pass-through from producer to consumer prices

Price impacts in percentage difference between scenario and baseline after three years of conflict. PP: Producer prices. CP: Consumer prices. Main scenario

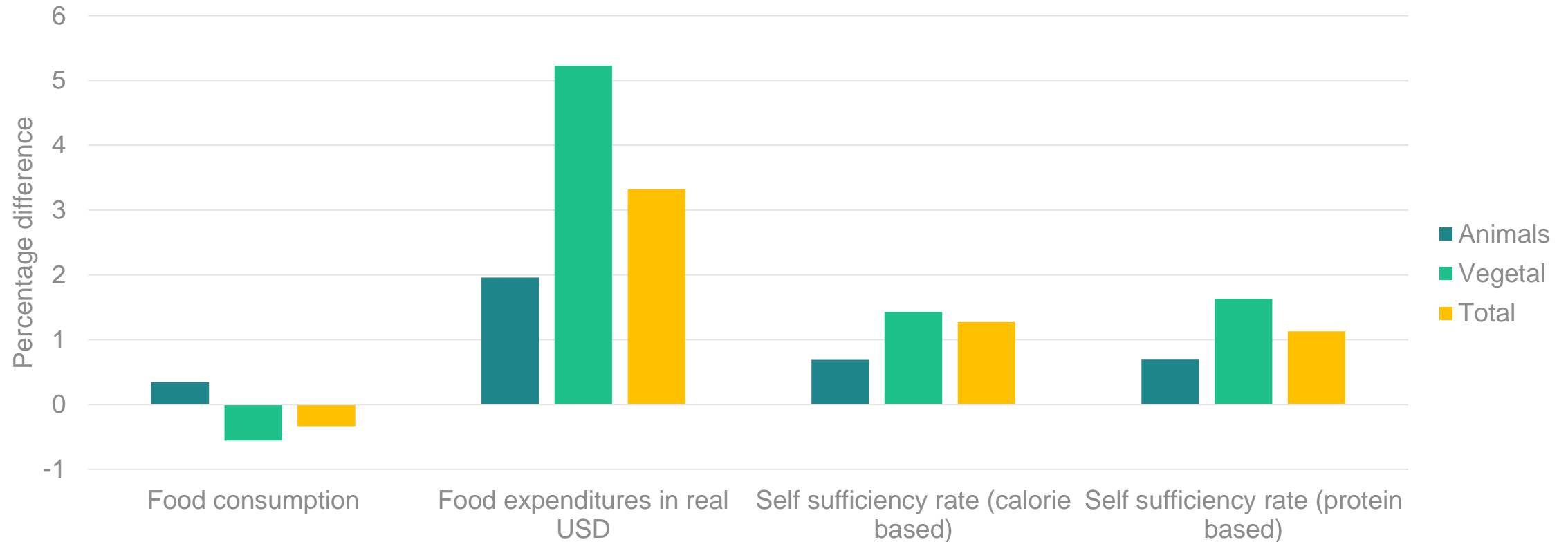
	EU		USA		Egypt		Nigeria		Pakistan	
	PP	CP	PP	CP	PP	CP	PP	CP	PP	CP
Meat										
Sheep	7.1	2.5	7.0	2.8	2.0	1.1	0.5	0.3	0.9	0.5
Beef and Veal	7.4	2.6	7.0	2.3	3.4	1.8	1.8	0.9	0.7	0.3
Pork	16.2	3.3	14.8	2.6	14.2	4.2	4.7	1.1		
Poultry	8.8	3.8	12.4	2.4	3.1	1.6	3.3	1.6	0.6	0.3
Dairy										
Cheese	5.8	1.8	7.8	2.3	6.4	3.0	4.7	2.0	7.0	2.9
Whole milk powder	4.7	1.1	5.1	1.8	6.0	2.6	5.9	2.3		
Butter	9.2	3.9	11.4	4.5	10.8	5.2	10.6	4.5	5.9	2.4
Grains										
Wheat	26.1	5.2	29.3	1.2	28.1	11.0	28.4	9.6	17.6	6.6
Maize	14.7	13.9	15.7	1.2	17.4	3.6	14.8	3.0	10.7	2.2
Other coarse grains	18.0	1.1	20.2	1.6	21.3	5.4	5.3	1.0	20.6	4.6
Rice	5.3	1.3	5.7	0.9	5.5	3.1	5.0	2.1	5.3	2.3
Other processed products										
Sugar	9.4	0.0	8.5	3.9	10.0	5.1	8.7	3.9	9.1	3.9
Vegetable oils	9.2	2.6	7.9	2.2	7.7	2.9	7.5	2.5	7.8	2.6
Biofuels										
Biodiesel	21.4	13.1	20.2	11.8						
Ethanol	13.4	7.5	17.6	11.6						

Scenario impacts on exports: Major exporters compensating for most of the shortfall from UKR and RUS

	Ukraine	Russia	Australia	Brazil	Canada	EU	USA	World
Maize	-13.49	0.00	0.02	2.04	-0.13	0.21	7.37	-0.31
Other coarse grains	-2.20	0.00	1.34	0.00	-0.88	1.72	1.15	0.85
Wheat	-11.65	-6.67	2.12	0.00	7.07	6.31	-1.28	-2.89
Soybean	-0.63	0.00	0.00	0.29	-0.16	0.00	1.18	0.45
Other Oilseeds	0.00	0.00	0.06	0.00	-0.89	0.01	0.01	-0.70
Protein Meal	0.00	0.00	0.00	0.71	-0.18	-0.02	0.45	0.52
Vegetable oils	0.00	0.00	0.00	-0.26	-0.20	-0.07	0.01	-0.51

Note: Impacts in Mt. Difference between scenario and baseline exports after three years of conflict. Main scenario

Modest food security impacts in the MENA region



Impacts in percentage difference between scenario and baseline after three years of conflict. Main scenario

Conclusions

1. Energy, fertilizer and ag. prices started to increase well before the Russian invasion of Ukraine. The supply disruptions drove prices further up. Higher input costs and lower grain export supply → substantial effect on world prices of especially wheat, coarse grains, protein meal. Derived meat, dairy, biofuel impacts. Energy and fertilizer price shock contribute appr. 30-50 percent to total world market price impacts in the main scenario depending on the commodity
2. Lower grain export supply from UKR and RUS to a large extent compensated by grain from other sources. Seemingly modest food security impacts, but Aglink-Cosimo is not well suited for distributional impact analysis
3. The additional crop area in the EU and US resulting from temporary land use policies have marginal effects on price impacts. Worth the negative environmental impacts?

Thank you



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