Food production shocks across land and sea

Supplementary information

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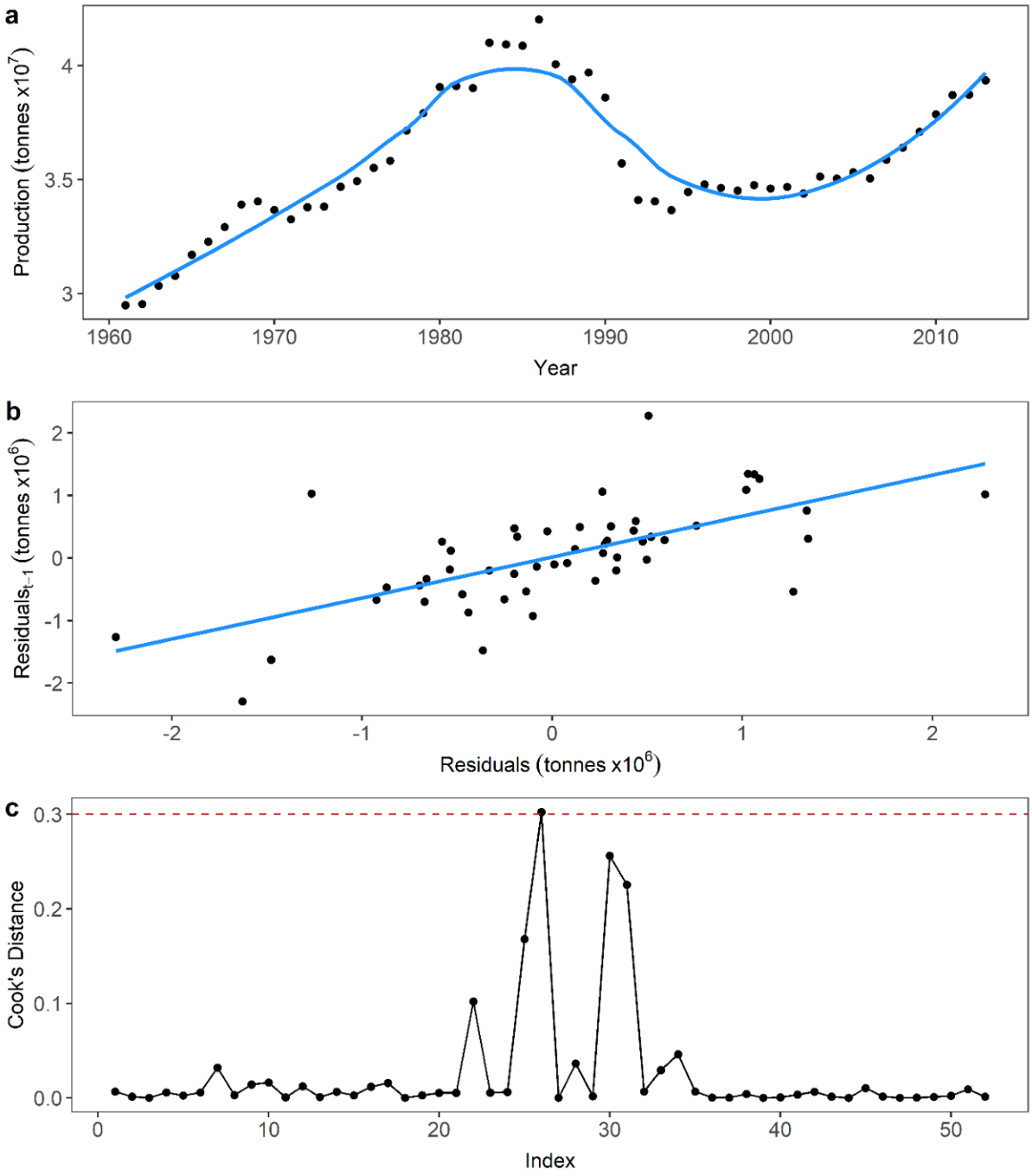

Figure S1 - Statistical shock detection method. a. Local polynomial regression (LOESS) model fitted to food production time-series **b.** Regression of model residuals against lag-1 residuals **c.** Production shock in 1991 identified as outlier from regression in b using Cook's Distance measures

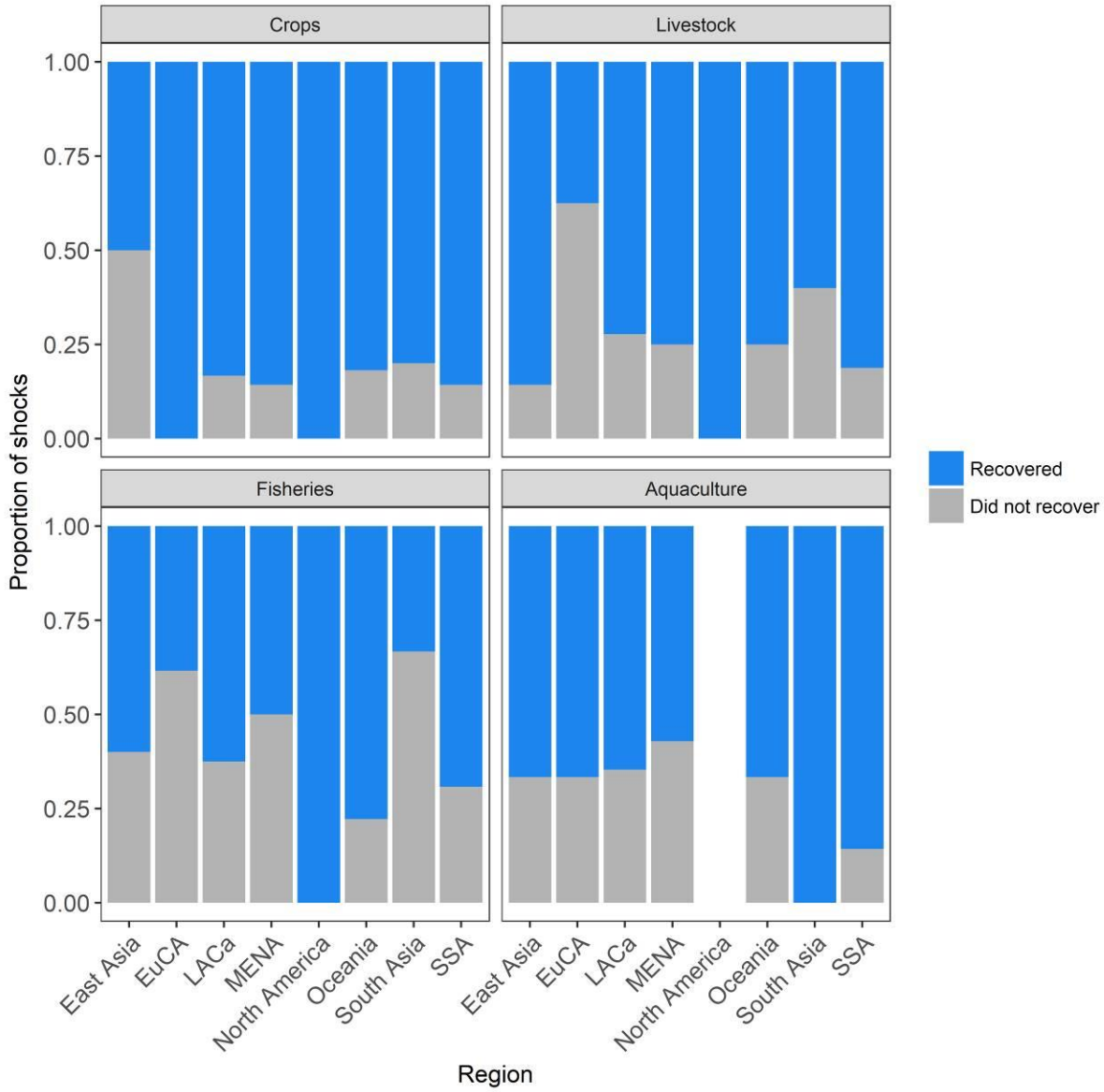

Figure S2 – Proportion of shocks recovered or not during study period in crops, livestock, fisheries and aquaculture sectors across geographic region.

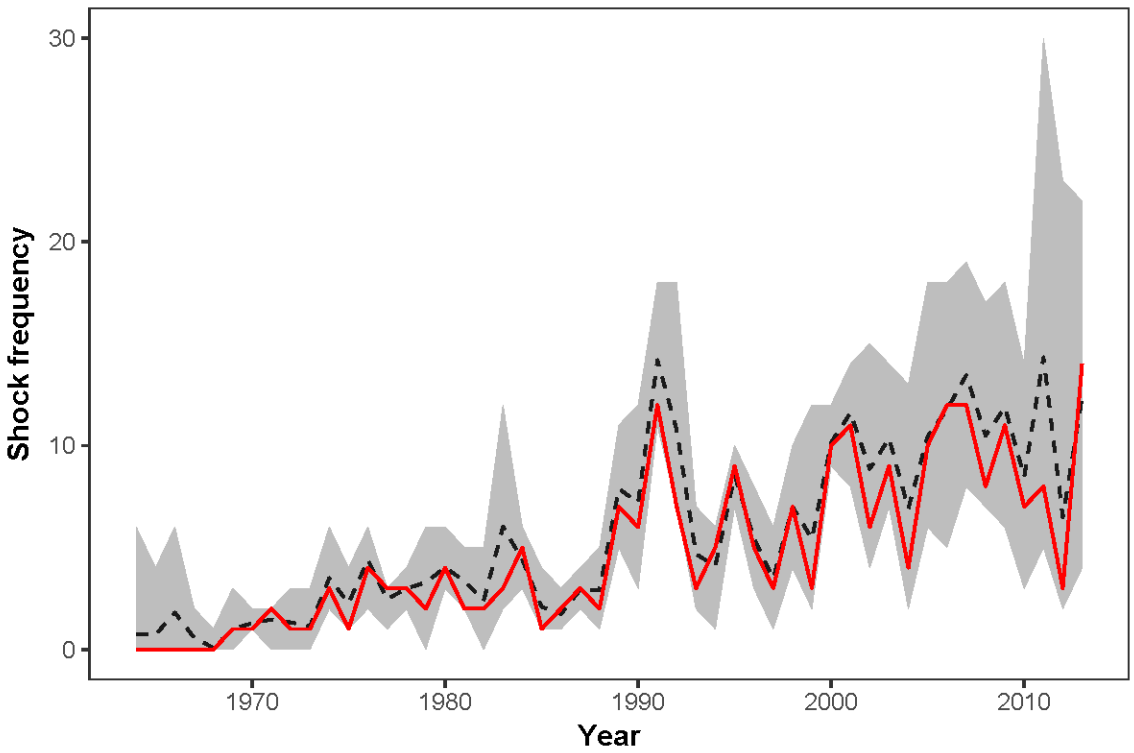

Figure S3 – Shock frequency through time summed across all sectors for a range of parameter combinations. Light grey confidence interval represents range of plausible shock frequencies dependent on span, baseline and average type used in shock detection. Dashed black line is mean of the confidence interval frequencies. Solid red line represents parameter combination that minimizes the sum of squared residuals with the confidence interval mean (parameters selected for this analysis).

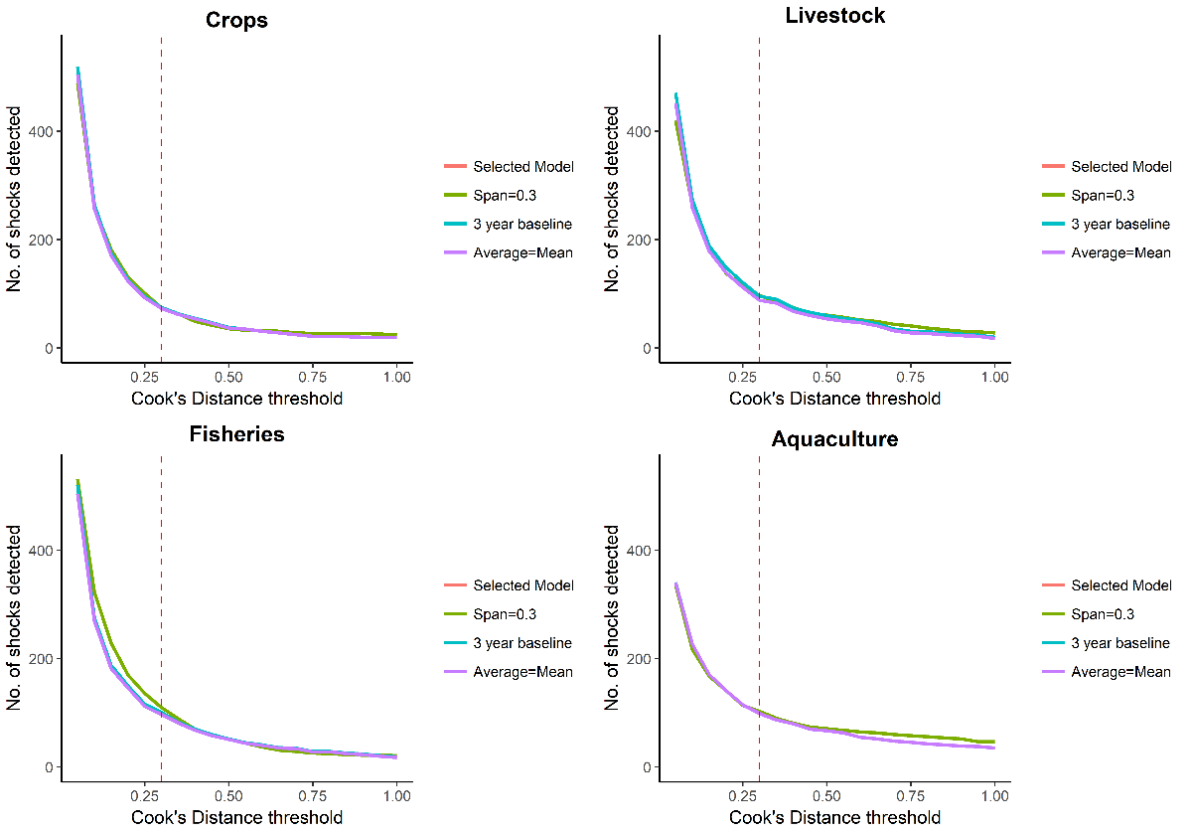

Figure S4– Comparisons of number of shocks detected in crop, livestock, fisheries and aquaculture time series with incremental changes to Cook's distance values. Lines represent either the combination of model parameters used in this study ('Selected Model', LOESS span = 0.6, production baseline = 7 years and average type used = median), or repeated with changes to model span, production baseline or average type. Vertical dashed line represents the Cook's distance value of 0.3 used in this study

Table S1 – Proportion of imposed shocks detected in simulated time series for different time series standard deviations and shock size combinations.

		STANDARD DEVIATION									
		0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**
MAGNITUDE	**0**	0.003	0.001	0.001	0.001	0.003	0.001	0.002	0.001	0.001	0.003
	0.5	0.82	0.159	0.043	0.023	0.018	0.012	0.006	0.006	0.006	0.006
	1	1	0.805	0.345	0.161	0.061	0.036	0.018	0.017	0.008	0.01
	1.5	1	0.995	0.786	0.459	0.246	0.122	0.089	0.052	0.035	0.026
	2	1	1	0.982	0.81	0.526	0.352	0.22	0.133	0.082	0.065
	2.5	1	1	0.997	0.97	0.781	0.603	0.408	0.273	0.177	0.131
	3	1	1	1	0.994	0.954	0.813	0.651	0.469	0.301	0.22
	3.5	1	1	1	1	0.99	0.934	0.813	0.666	0.506	0.41
	4	1	1	1	1	1	0.973	0.911	0.802	0.652	0.565
	4.5	1	1	1	1	1	0.995	0.974	0.906	0.824	0.668
	5	1	1	1	1	1	1	0.99	0.957	0.902	0.821
	5.5	1	1	1	1	1	1	0.997	0.984	0.952	0.878
	6	1	1	1	1	1	1	0.999	0.995	0.976	0.942

Drivers of shocks

Table S2 – Identified causes for production shocks across all sectors. Asterisks indicate possible drivers for shocks of an unknown cause based on events occurring in country at the shock point. We highlight shocks that did not recover by the end of the time series (2013) by ^{NR} adjacent to the number of years between the shock point and 2013.

See "Supplementary Information – Table S2.xlsx" for table. References for shock drivers contained in excel file and listed below.

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