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Distribution of Agricultural NRAs across Countries and Products, 1955-84 and 1985-2007

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This is part of a Working Paper series (see www.worldbank.org/agdistortions) that is designed to promptly disseminate the findings of work in progress for comment before they are finalized. The views expressed are the authors' alone and not necessarily those of the World Bank and its Executive Directors, nor the countries they represent, nor of the institutions providing funds for this research project.

Abstract

The global database developed as an integral part of the World Bank's research project on Distortions to Agricultural Incentives, which is publicly available at www.worldbank.org/agdistortions, provides around 30,000 estimates of nominal rates of assistance to agricultural industries (NRAs) and associated consumer tax equivalents for 75 countries that together account for between 90 and 95 percent of the world's population, farmers, agricultural output and total GDP. They also account for more than 85 percent of farm production and employment in each of Africa, Asia, Latin America and the transition economies of Europe and Central Asia as well as all OECD countries. More than 70 products are included (an average of 11 per country), which represents around 70 percent of the gross value of agricultural production in each of the focus countries, and just under two-thirds of global farm production valued at undistorted prices over the period covered. Not all countries had data for all of the entire 1955-2007 period, but the average number of years covered is 41 per country. This paper provides details of the coverage of the database. It also summarizes the distributions of the NRAs by showing two sets of Box plots for 1955-84 and 1985-2007, one set for various regions of the world, the other for all the covered products for each focus country.

Keywords: Agricultural price and trade policies, nominal rates of assistance

JEL codes: F13, F59, H20, N50, O13, Q18

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The core global database that was developed as an integral part of the World Bank's research project on Distortions to Agricultural Incentives is publicly available at www.worldbank.org/agdistortions (Anderson and Valenzuela 2008). The case studies from which it is derived cover a total of 75 countries that together account for between 90 and 96 percent of the world's population, farmers, agricultural output and total GDP. They also account for more than 85 percent of farm production and employment in each of Africa, Asia, Latin America and the transition economies of Europe and Central Asia as well as all OECD countries.¹ The only countries not well represented in the sample are those in the Middle East and the many small ones that together account for less than 5 percent of the global economy.

Nominal rates of assistance and consumer tax equivalents (NRAs and CTEs) are estimated for more than 70 different products, with an average of 11 per country. In aggregate the coverage represents around 70 percent of the gross value of agricultural production in the focus countries, and just under two-thirds of global farm production valued at undistorted prices over the period covered. Not all countries had data for all of the entire 1955-2007 period, but the average number of years covered is 41 per country. Estimates for the transition economies of Europe start in 1992 and for China and Vietnam in 1981 and 1986, respectively. Estimates for two other large Asian countries start later too (India in 1965, Indonesia and Thailand in 1970).

Of the 30 most valuable agricultural products, the NRAs cover 77 percent of global output, ranging from two-thirds for livestock, three-quarters for oilseeds and tropical crops, and five-sixths for grains and tubers. Those products represent an even higher share (85 percent) of global agricultural exports. Tables A.1 to A.5 provide further details of the above

¹ A global overview of the results is provided in Anderson (2009), and the detailed country case studies are reported in four regional volumes covering Africa (Anderson and Masters 2009), Asia (Anderson and Martin 2009), Latin American (Anderson and Valdés 2008) and Europe's transition economies (Anderson and Swinnen 2008).

product and country coverage statistics. Figure A.1 shows the number of countries for which NRA and CTE estimates are produced for each of 30 key farm products, while Figure A.2 shows the share of global production of each of those 30 key farm products that is covered by NRA and CTE estimates.

This book is focused primarily on explaining the differences across countries, products and time of distortions to farmers' incentives, particularly as summarized by nominal rates of assistance. Figure A.3 summarizes the distributions and shows, for various regions of the world, a set of Box plots. The long bar in those plots shows the range within which 95 percent of the NRAs fall: 50 percent fall in the shaded area, and the vertical line within the shaded area is the median NRA for the sample time period. Then in Figure A.4 we provide similar Box plots of all the covered products for each focus country.² In both figures the sub-periods before and from 1985 are shown separately. A break in the mid-1980s roughly coincides with when many developing countries and some high-income countries began to reform their agricultural and trade policies. Also, the earlier period coincides with that covered by the seminal World Bank study of 18 developing countries by Krueger, Schiff and Valdés (1991), and the later period coincides with the time series of estimates of agricultural distortions in high-income countries by the OECD (2008).

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² We are grateful to Kishore Gawande for suggesting this type of plot be used to summarize the data.

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Krueger, A.O., M. Schiff and A. Valdés (1991), *The Political Economy of Agricultural Pricing Policy, Volume 1: Latin America, Volume 2: Asia, and Volume 3: Africa and the Mediterranean*, Baltimore: Johns Hopkins University Press for the World Bank.

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Table A.1: Summary of NRA coverage statistics, World Bank agricultural distortions project

Number and size of countries	Number	2000-04 % of global:	
		Popn.	Ag GDP
Africa	21	11	7
Asia	12	51	37
Latin America	8	7	8
SUB-TOTAL, all DCs	41	69	52
European transition econs	14	7	7
High-income countries	20	14	33
TOTAL	75	92	92
Number of years covered	Maximum	Av. per country	
Africa	51	43	
Asia	53	42	
Latin America	51	39	
SUB-TOTAL, all DCs	53	43	
European transition econs	47	17	
High-income countries	53	52	
TOTAL	51	41	
Number of products covered	Maximum	Av. per country	
Africa	44	8	
Asia	35	8	
Latin America	27	10	
SUB-TOTAL, all DCs	59	9	
European transition econs	25	12	
High-income countries	39	15	
TOTAL	74	11	
Total number of NRA ests. (years and products)	Total	Av. per country	
Africa	7318	348	
Asia	3546	296	
Latin America	2881	360	
SUB-TOTAL, focus DCs	13745	335	
European transition econs	2847	203	
High-income countries	13377	669	
TOTAL, focus countries	29969	400	
Share of global agric. prod'n of 30 key covered products, 2000-04	%		
Africa	5		
Asia	28		
Latin America	7		
SUB-TOTAL, focus DCs	41		
European transition econs	6		
High-income countries	29		
TOTAL, focus countries	77		

Source: Calculated from data in Anderson and Valenzuela (2008)

Table A.2: Coverage of gross value of global agricultural production at undistorted prices, for 30 key products and four product groups, 2000-04

	Coverage of product's global GVOP, %	Product's share of global GVOP of 30 key products, %
Grains and tubers	85	31.4
Rice	92	9.5
Wheat	89	8.0
Maize	94	7.2
Cassava	41	2.4
Barley	83	1.6
Sorghum	70	0.7
Yam	77	0.8
Millet	29	0.6
Oat	61	0.3
Oilseeds	78	8.1
Soybean	96	4.0
Groundnut	34	1.2
Palmoil	90	1.0
Rapeseed	64	1.0
Sunflower	77	0.6
Sesame	9	0.3
Tropical crops	74	7.6
Sugar	87	2.5
Cotton	88	1.9
Coconut	60	0.9
Coffee	75	0.7
Rubber	74	0.7
Tea	21	0.6
Cocoa	71	0.4
Chickpea	61	0.3
Livestock products	72	52.9
Pigmeat	91	12.4
Milk	83	12.0
Beef	69	10.5
Poultry	81	7.6
Egg	35	6.5
Sheepmeat	27	3.3
Wool	42	0.6
All above products	77	100.0

Note: Fruit and vegetables, which account for around 23 percent of global ag GVOP in 2001 (according to GTAP database – see Dimaranan 2006) are not included in this table, even though several fruits and vegetables for selected countries are included in the analysis.

Source: Calculated from data in Anderson and Valenzuela (2008).

Table A.3: Current project's coverage of national agricultural production in focus countries at undistorted prices, regional averages, 1980 to 2004
(percent)

	1980-84	1990-94	2000-04
Africa	67	66	68
Asia	75	73	66
Latin America	65	69	70
SUB-TOTAL, focus DCs	72	72	67
European transition econs	62	61	63
High-income countries	73	73	72
TOTAL, all focus countries	72	71	68

Source: Calculated from data in Anderson and Valenzuela (2008)

Table A.4: Derived shares of global agricultural production for 30 major covered products, Africa, Asia, Latin America, Europe's transition economies and high-income regions, 2000-04

	Regional shares (%) of global gross value of agric production (GVOP)							Product share (%) of global GVOP of 30 products	
	Covered products in focus countries						Residual		World
	Africa	Asia	LAC	ECA	HIC	All			
Grains+tubers	11	40	5	6	23	85	15	100	31
Rice	3	81	2	0	5	92	8	100	9
Wheat	6	32	4	14	33	89	11	100	8
Maize	11	26	13	5	40	94	6	100	7
Cassava	39	2	0	0	0	41	59	100	2
Barley	0	0	1	25	57	83	17	100	2
Sorghum	26	13	14	0	17	70	30	100	1
Yam	77	0	0	0	0	77	23	100	1
Millet	29	0	0	0	0	29	71	100	1
Oat	0	0	0	28	33	61	39	100	0
Oilseeds	4	22	20	4	28	78	22	100	8
Soybean	0	15	37	0	43	96	4	100	4
Groundnut	17	17	0	0	0	34	66	100	1
Palmoil	8	81	2	0	0	90	10	100	1
Rapeseed	0	12	0	4	47	64	36	100	1
Sunflower	3	5	16	39	14	77	23	100	1
Sesame	8	0	0	0	0	9	91	100	0
Tropical crops	10	36	12	5	11	74	26	100	8
Sugar	5	43	17	6	16	87	13	100	2
Cotton	17	30	5	14	22	88	12	100	2
Coconut	0	60	0	0	0	60	40	100	1
Coffee	11	12	52	0	0	75	25	100	1
Rubber	0	74	0	0	0	74	26	100	1
Tea	11	10	0	0	0	21	79	100	1
Cocoa	68	0	3	0	0	71	29	100	0
Chickpea	0	61	0	0	0	61	39	100	0
Livestock products	3	21	6	7	36	72	28	100	53
Pigmeat	0	49	3	6	34	91	9	100	12
Milk	3	21	4	12	43	83	17	100	12
Beef	6	1	16	5	41	69	31	100	10
Poultry	2	27	9	5	38	81	19	100	8
Egg	0	1	3	7	23	35	65	100	6
Sheepmeat	5	0	0	3	18	27	73	100	3
Wool	0	0	0	0	42	42	58	100	1
Total of above 30 products	6	28	7	6	29	77	23	100	100

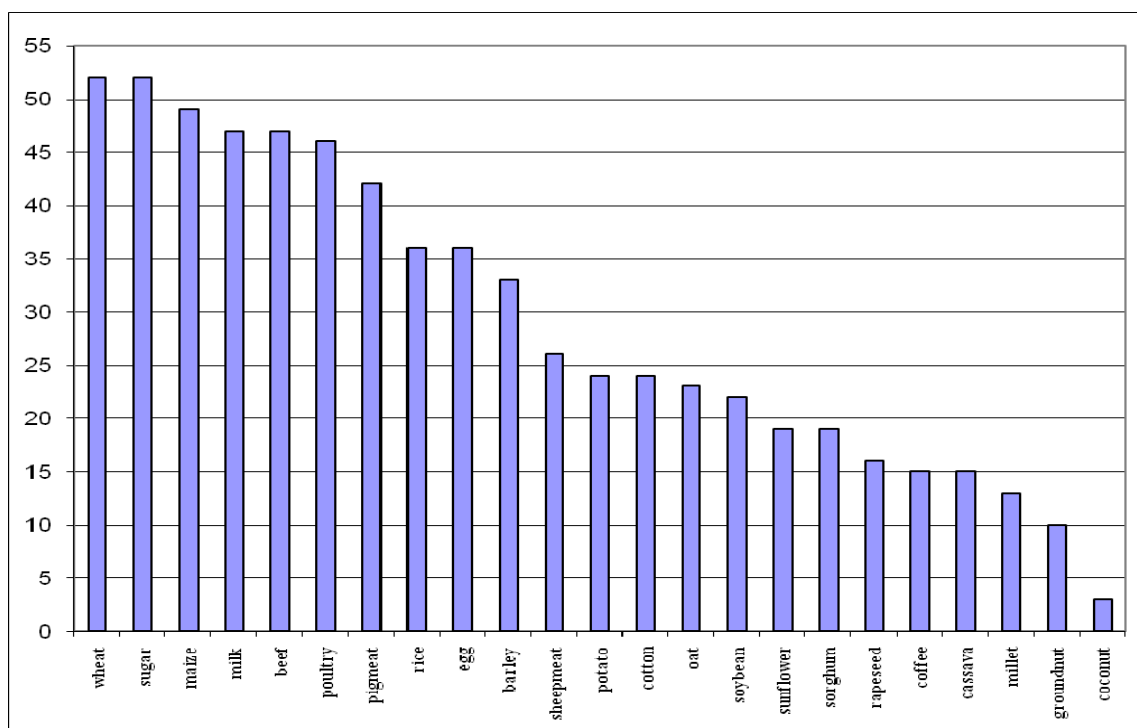
Sources: Authors' calculations based on FAO commodity balance, to get volume of production data, and the Agricultural Distortions database to convert this to value of production at undistorted prices so we can add up across commodities.

Table A.5: Share of regional agricultural production for 30 major covered products, Africa, Asia, Latin America, Europe's transition economies and high-income regions, 2000-04

Covered product shares (%) of regional gross value of agricultural production of focus countries						
	Africa	Asia	LAC	ECA	HIC	All
Grains + tubers	37.3	21.8	14.3	16.8	15.2	19.6
Rice	2.8	13.6	1.9	0.1	1.0	6.3
Wheat	4.7	4.6	3.0	10.2	5.6	5.3
Maize	8.4	3.3	8.3	2.7	6.2	5.0
Cassava	9.8	0.1	0.0	na	na	0.7
Barley	na	0.0	0.2	3.2	2.0	1.0
Sorghum	2.5	0.2	0.9	na	0.3	0.4
Yam	7.0	na	na	na	na	0.5
Millet	2.1	na	na	na	na	0.1
Oat	na	na	na	0.6	0.2	0.1
Oilseeds	3.3	3.1	14.5	2.2	4.8	4.5
Soybean	0.0	1.1	13.3	0.0	3.6	2.8
Groundnut	2.0	0.4	0.0	na	na	0.3
Palmoil	0.9	1.4	0.1	na	na	0.6
Rapeseed	na	0.2	na	0.2	1.0	0.4
Sunflower	0.2	0.1	0.9	2.0	0.2	0.4
Sesame	0.2	na	0.0	na	na	0.0
Tropical crops	7.9	5.1	8.1	3.5	1.7	4.2
Sugar	1.2	1.9	3.8	1.3	0.8	1.6
Cotton	2.3	1.0	0.9	2.1	0.9	1.1
Coconut	na	0.8	na	na	na	0.3
Coffee	0.8	0.1	3.3	na	na	0.4
Rubber	na	0.9	na	na	na	0.4
Tea	0.7	0.1	na	na	na	0.1
Cocoa	3.0	0.0	0.1	na	na	0.2
Chickpea	na	0.3	na	na	na	0.1
Livestock products	13.7	19.0	29.9	30.5	40.4	27.9
Pigmeat	na	10.6	3.0	6.6	8.9	8.3
Milk	3.5	4.5	4.4	11.8	11.1	7.3
Beef	6.8	0.2	14.7	4.6	9.1	5.3
Poultry	1.6	3.6	5.9	2.9	6.2	4.5
Egg	na	0.1	1.9	3.7	3.2	1.7
Sheepmeat	1.8	na	na	0.9	1.3	0.7
Wool	na	na	na	na	0.6	0.2
Total of above 30	62.2	48.8	66.7	52.9	62.2	56.2
All covered	68.2	66.1	70.3	60.9	72.4	68.3
Non-covered	31.8	33.9	29.7	39.1	27.6	31.7
All agric	100.0	100.0	100.0	100.0	100.0	100.0

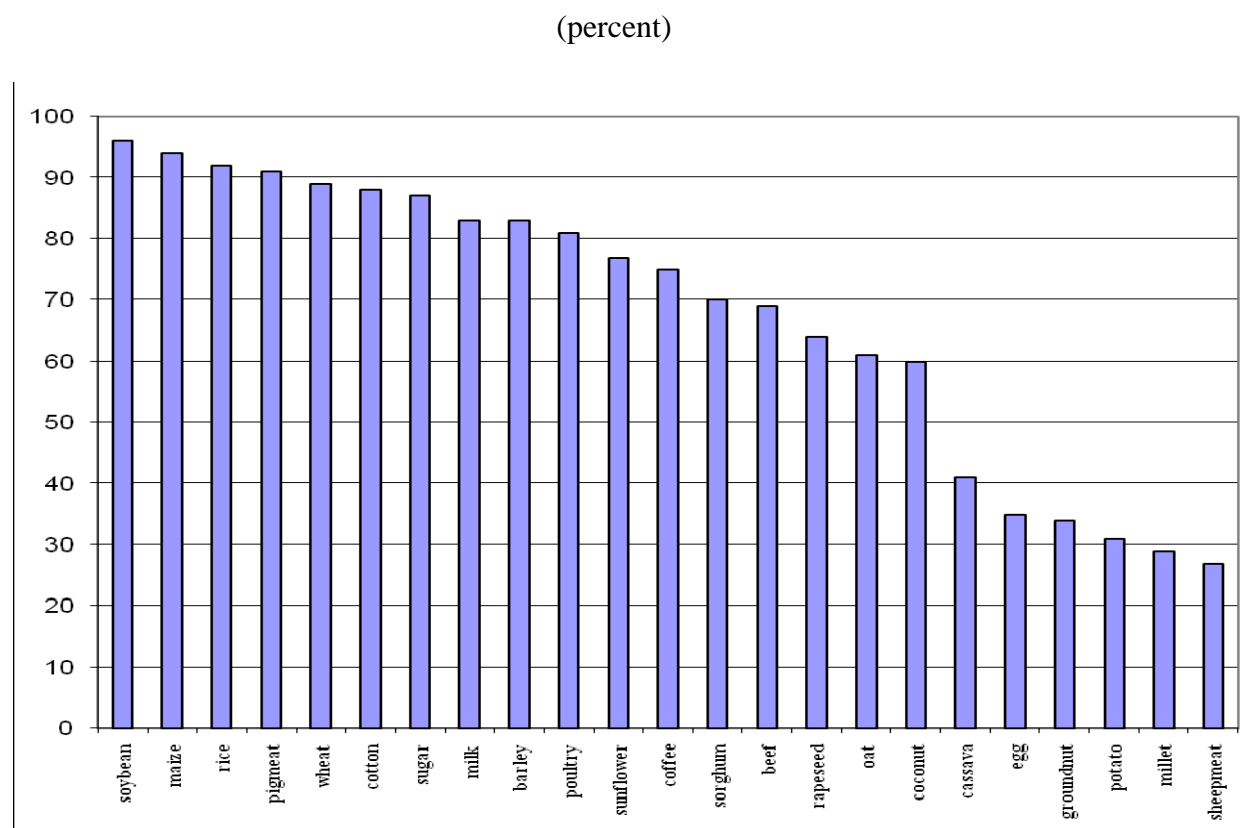
Source: Calculated from data in Anderson and Valenzuela (2008).

Figure A.1: Number of countries for which NRA and CTE estimates are provided for 30 key farm products



Source: Drawn from estimates in Anderson and Valenzuela (2008).

Figure A.2: Shares of global production of 30 key farm products covered in NRA and CTE estimates

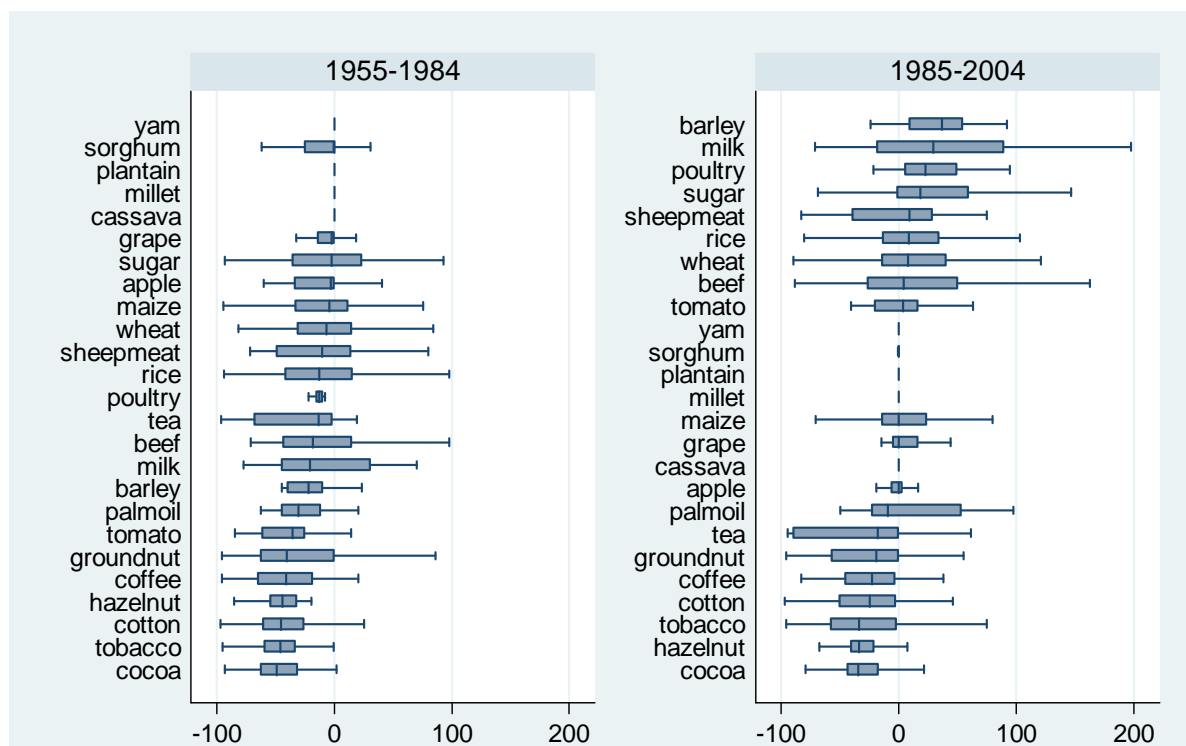


Source: Drawn from estimates in Anderson and Valenzuela (2008).

Figure A.3: Box plot distributions of NRAs for 25 major agricultural products, various regions of the world, 1955 to 2007

(long bar shows range within which 95 percent of the NRAs fall: 50 percent fall in the shaded area, and the vertical line within the shaded area is the median NRA for the sample period)

(a) All 21 focus African countries, plus Turkey (n = 7988)



(b) All 12 focus Asian developing economies (excluding Japan) (n = 5410)

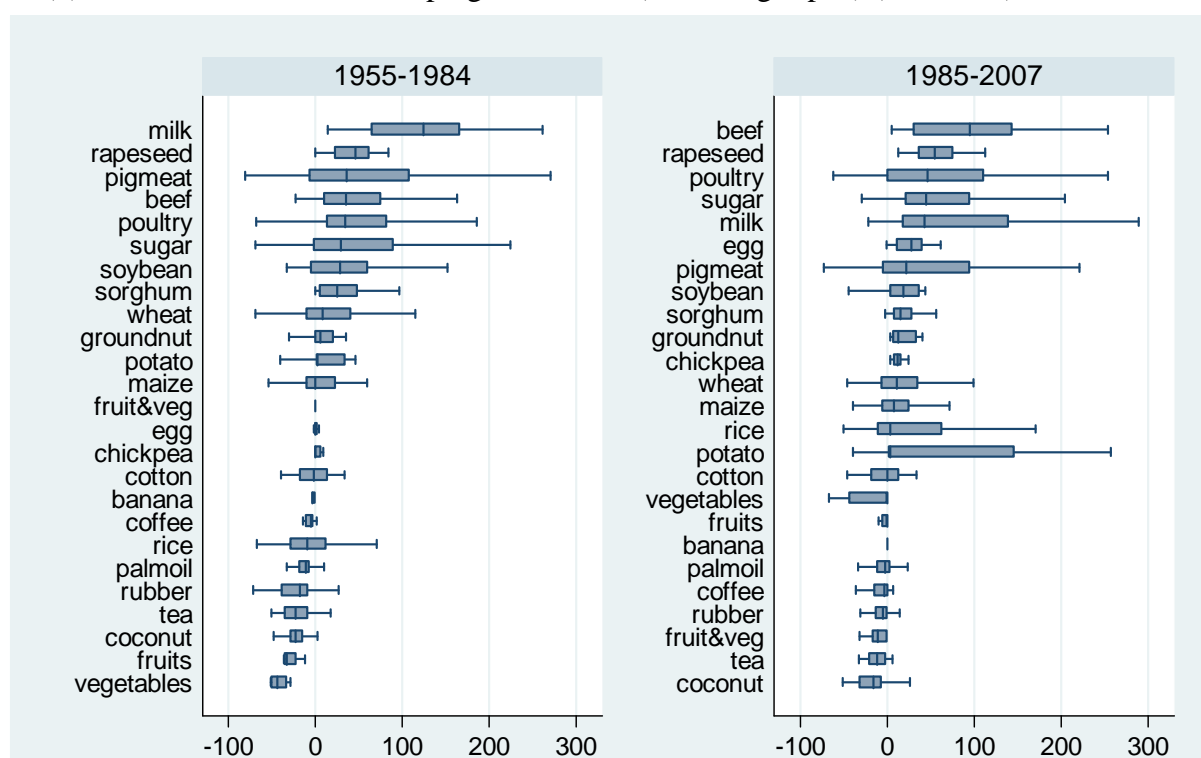
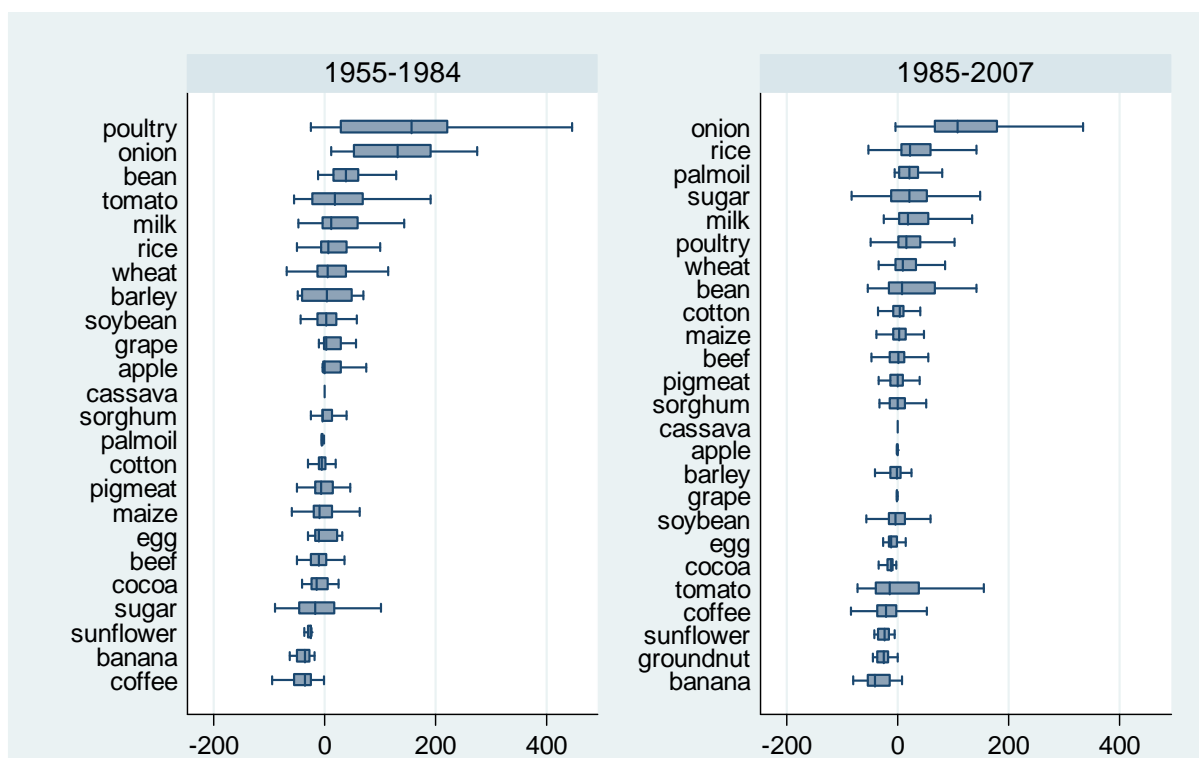


Figure A.3 (continued): Box plot distributions of NRAs for 25 major agricultural products, various regions of the world, 1955 to 2007

(c) All 8 focus Latin American countries (n = 4180)



(d) All 12 focus European transition economies (excluding Turkey) (n = 2398)

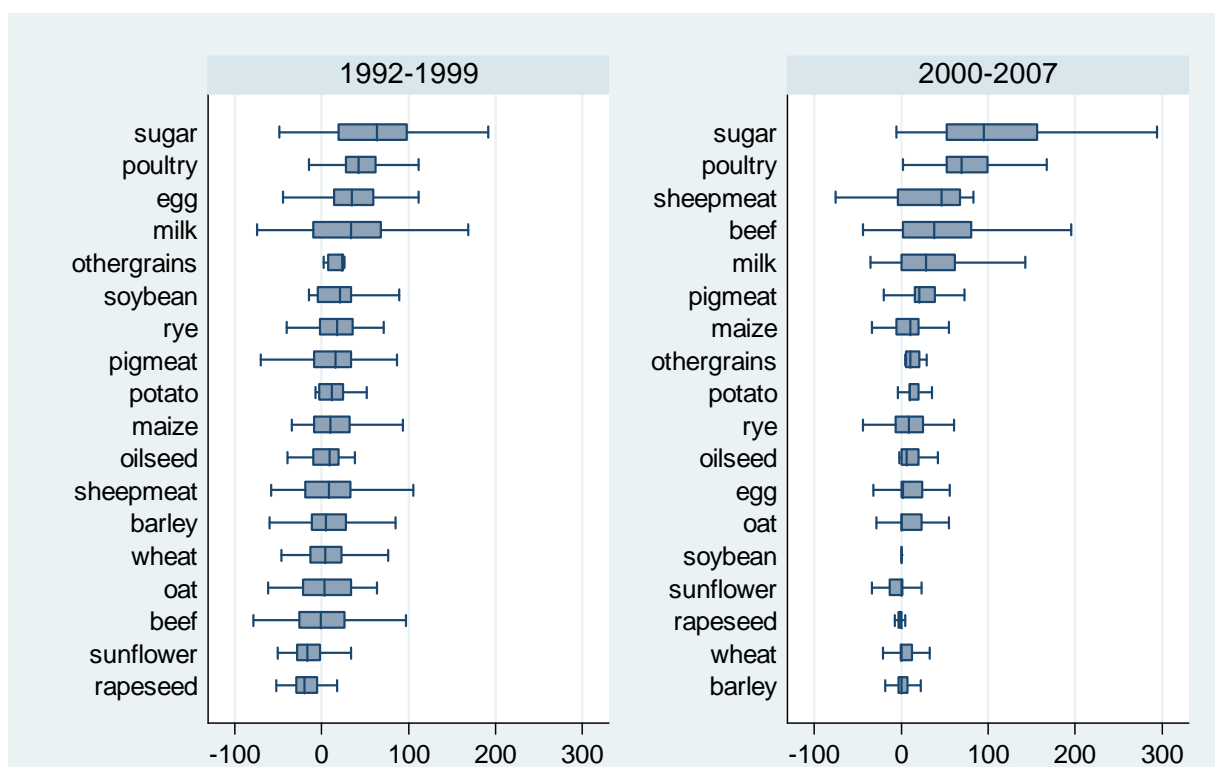
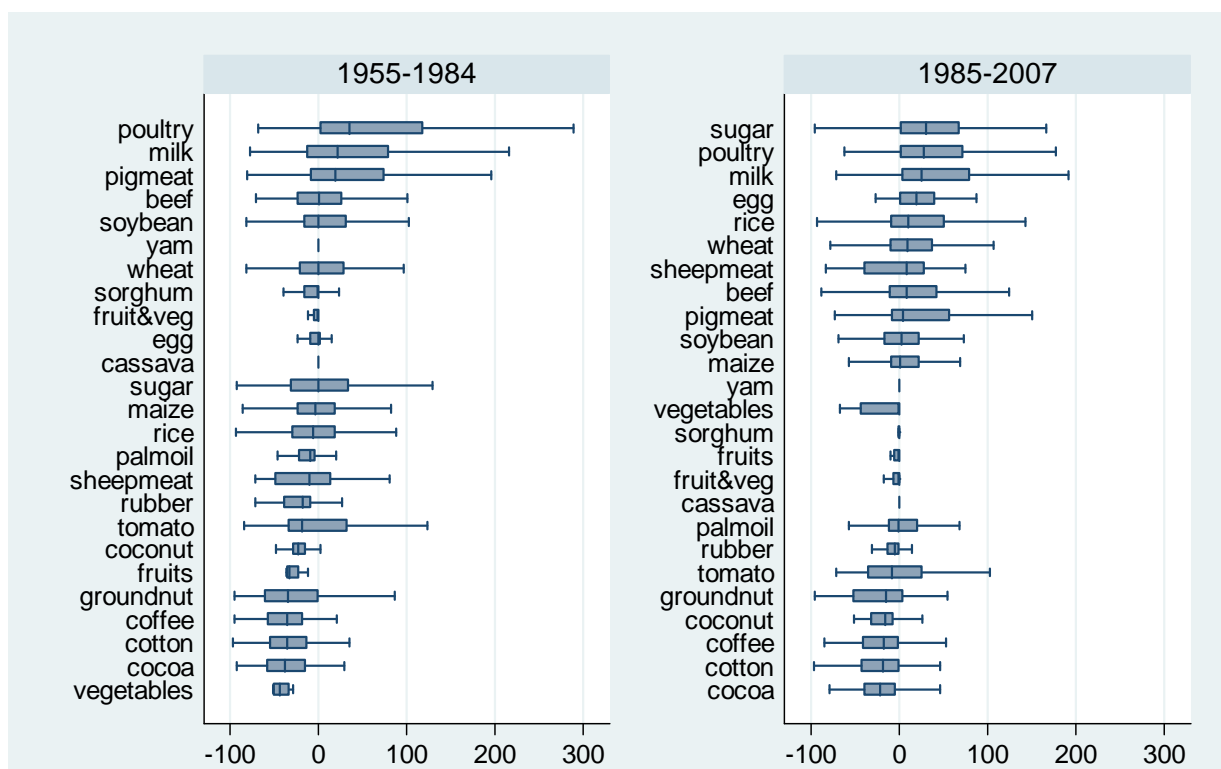


Figure A.3 (continued): Box plot distributions of NRAs for 25 major agricultural products, various regions of the world, 1955 to 2007

(e) All 41 focus developing economies (including Turkey) (n = 14392)



(f) All 20 focus high-income countries (n = 12970)

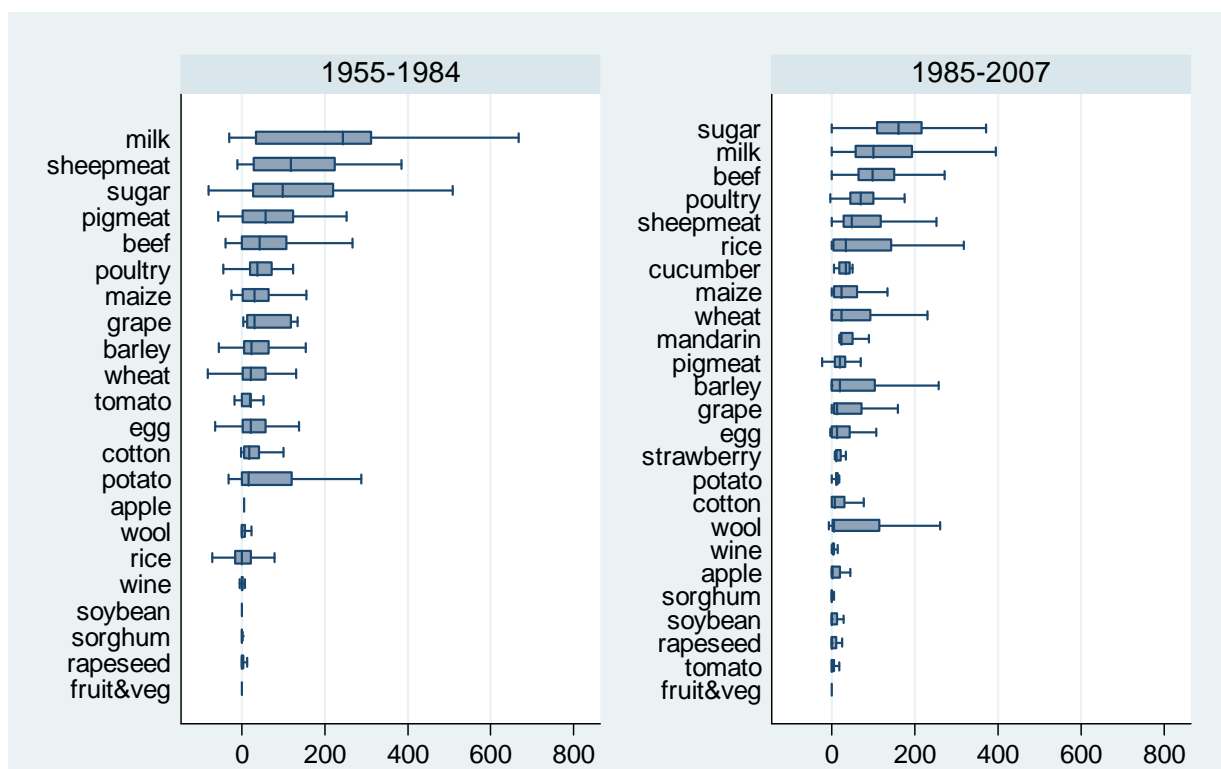
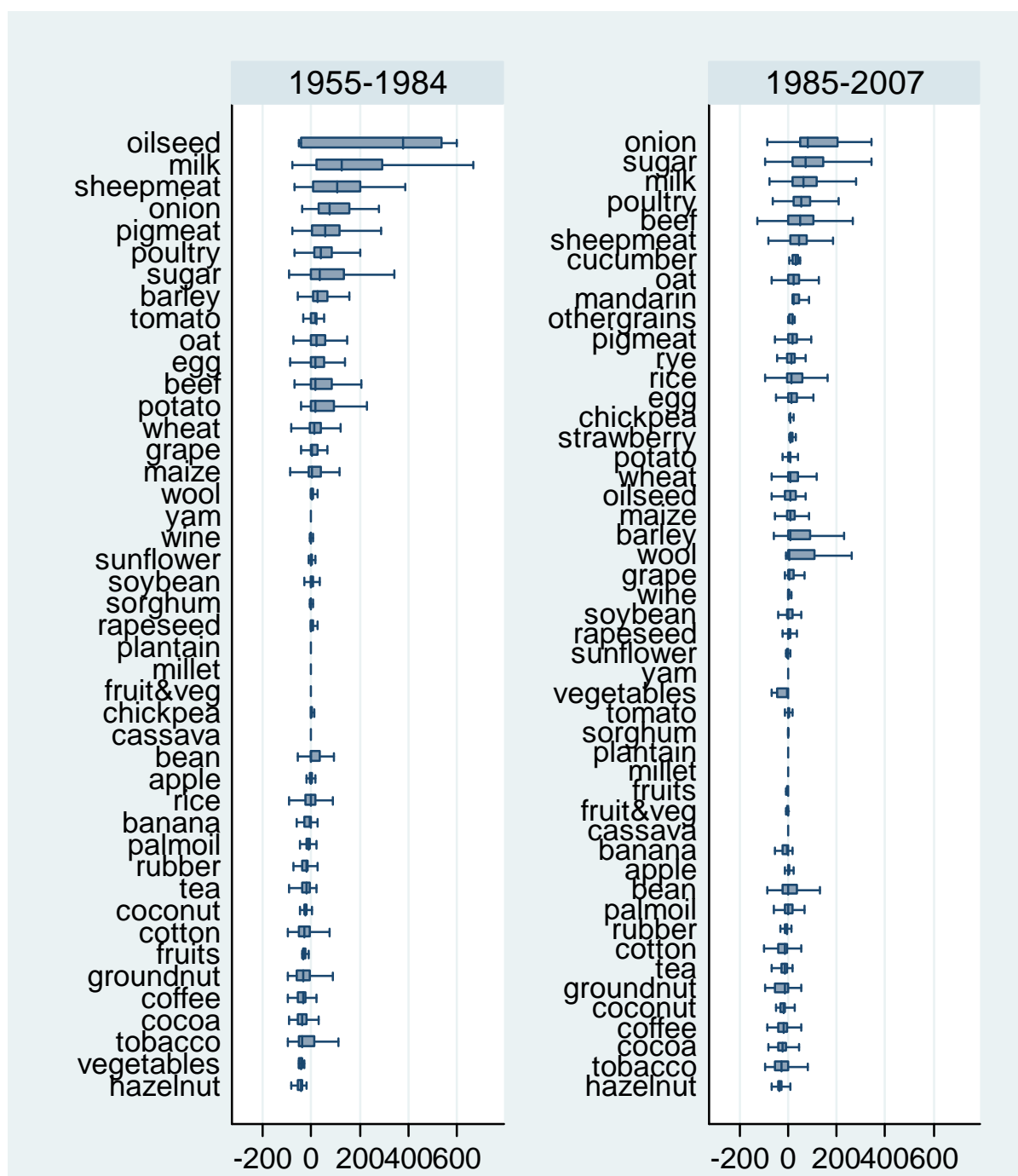


Figure A.3 (continued): Box plot distributions of NRAs for 25 major agricultural products, various regions of the world, 1955 to 2007

(g) All 73 focus economies of the world (n = 34833)

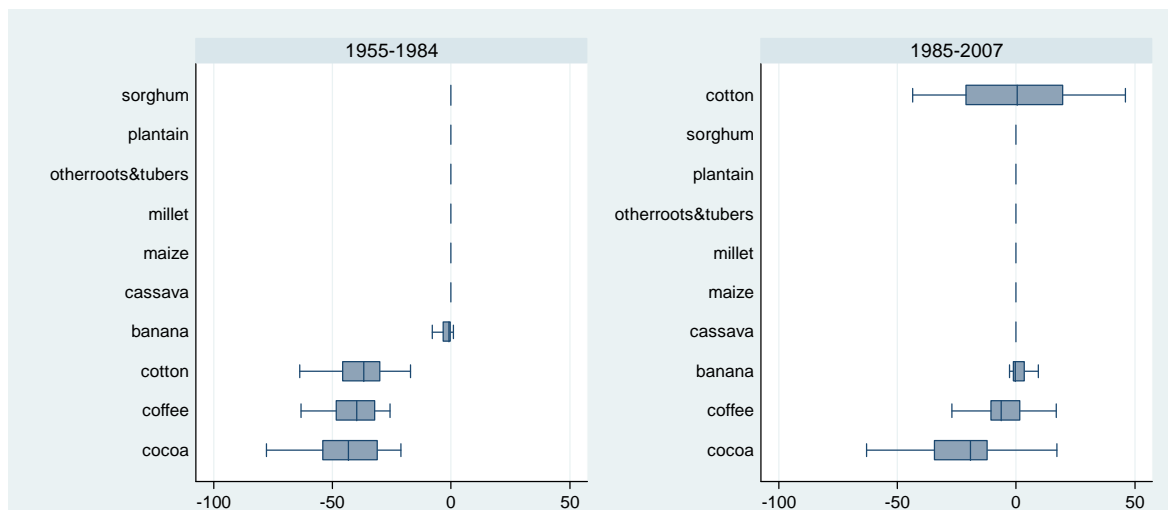


Source: Drawn from estimates in Anderson and Valenzuela (2008).

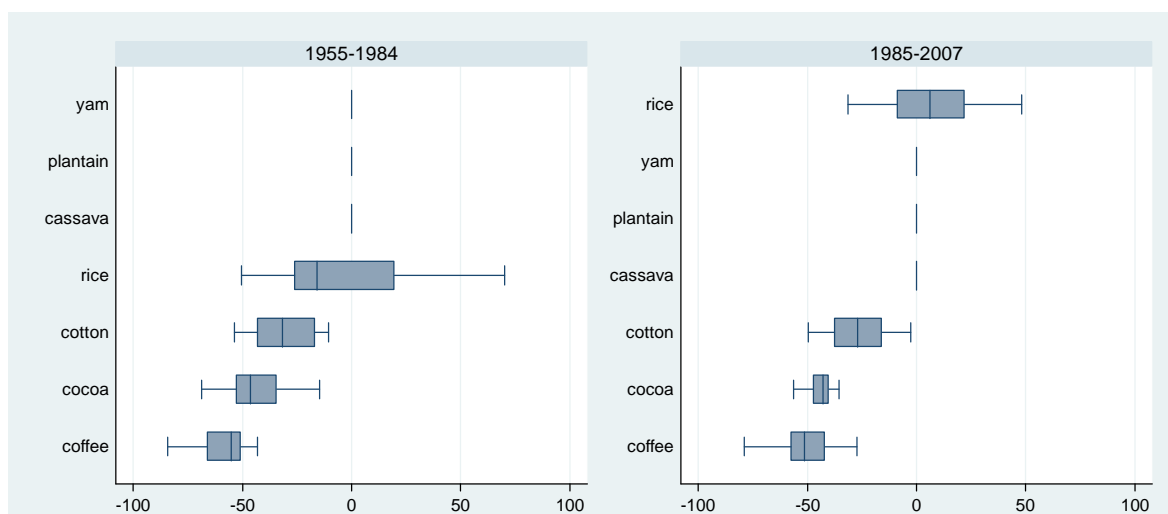
Figure A.4: Box plot distributions of NRAs of all covered agricultural products for each focus economy, 1955 to 2007 (long bar shows range within which 95 percent of the NRAs fall: the shaded area has 50 percent of NRAs, and the vertical line within the shaded area is the median NRA for the available sample period)

(a) 16 African countries (excluding 5 cotton-only countries) and Turkey

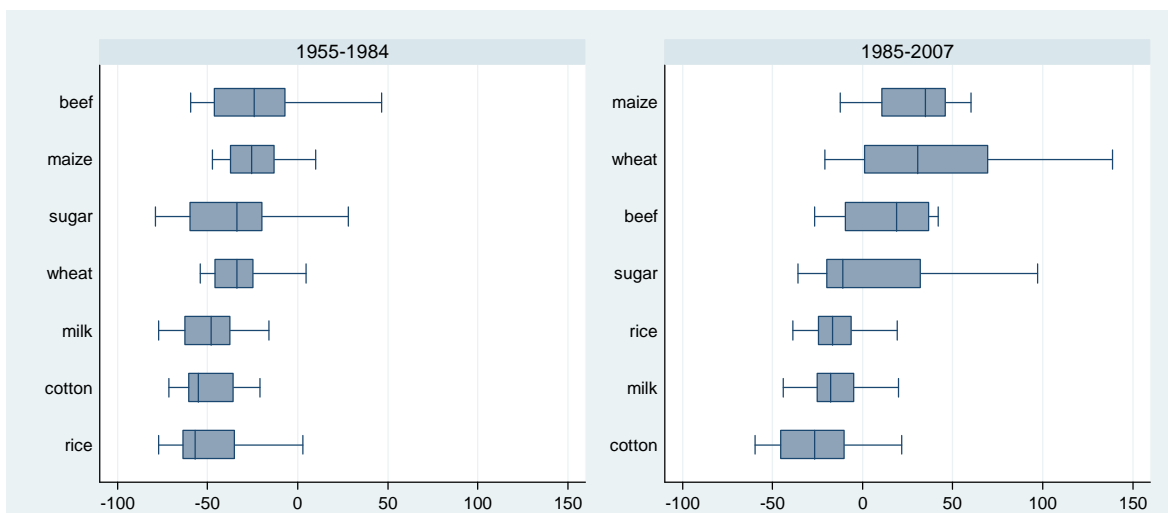
Cameroon (n = 510)



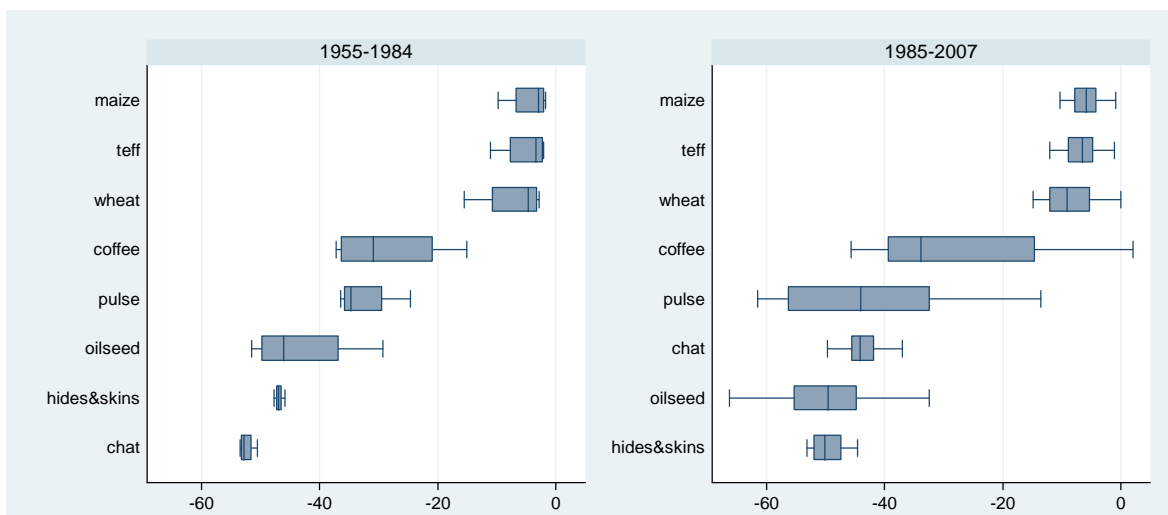
Cote d'Ivoire (n = 357)



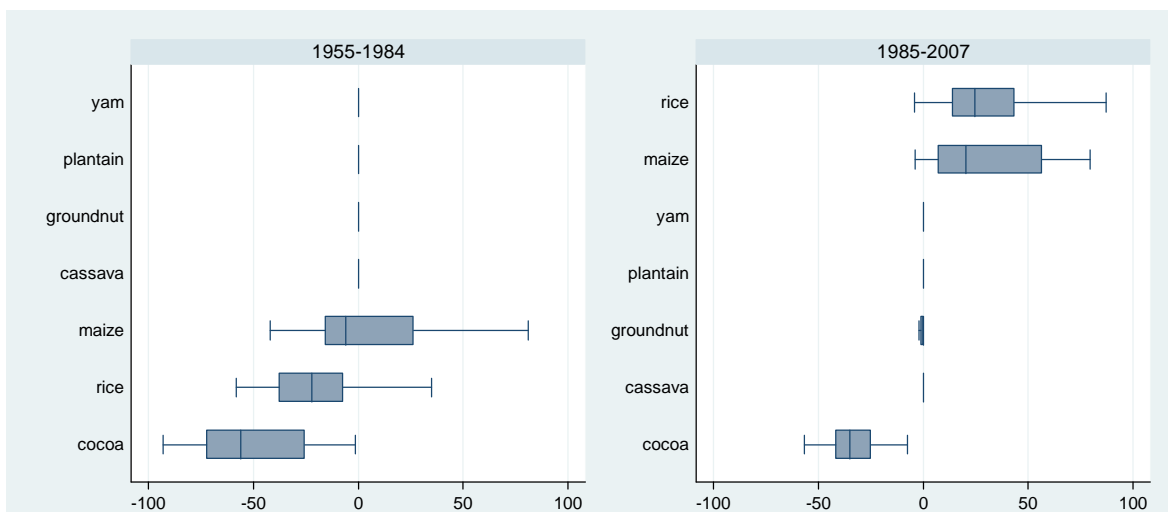
Egypt (n = 357)



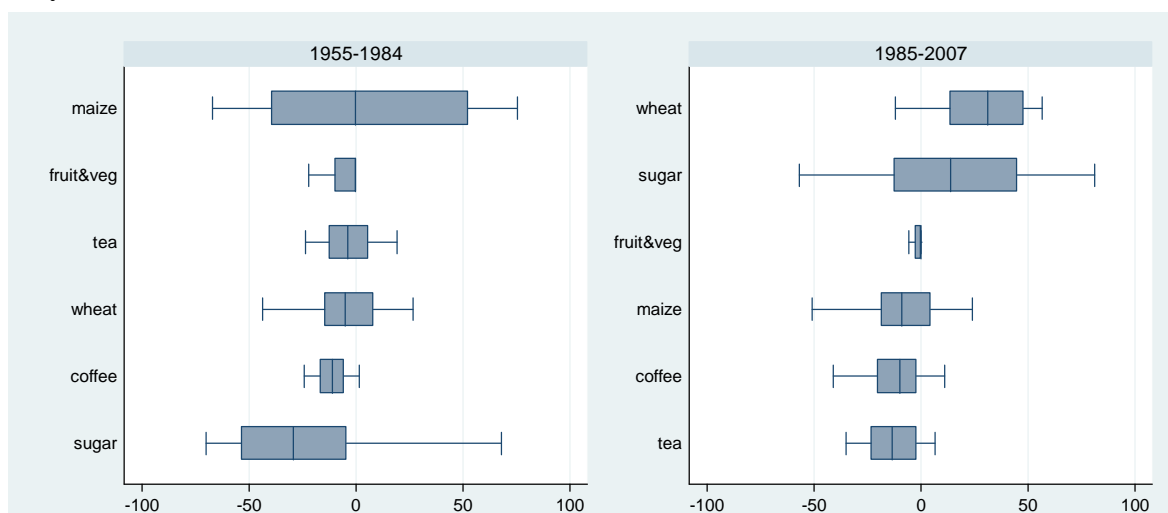
Ethiopia (n = 408)



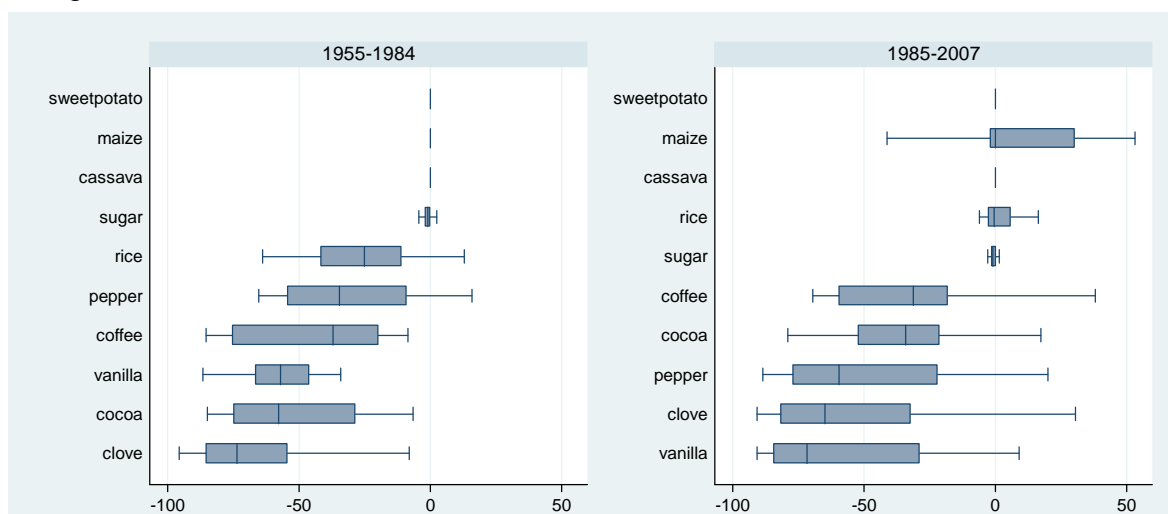
Ghana (n = 357)



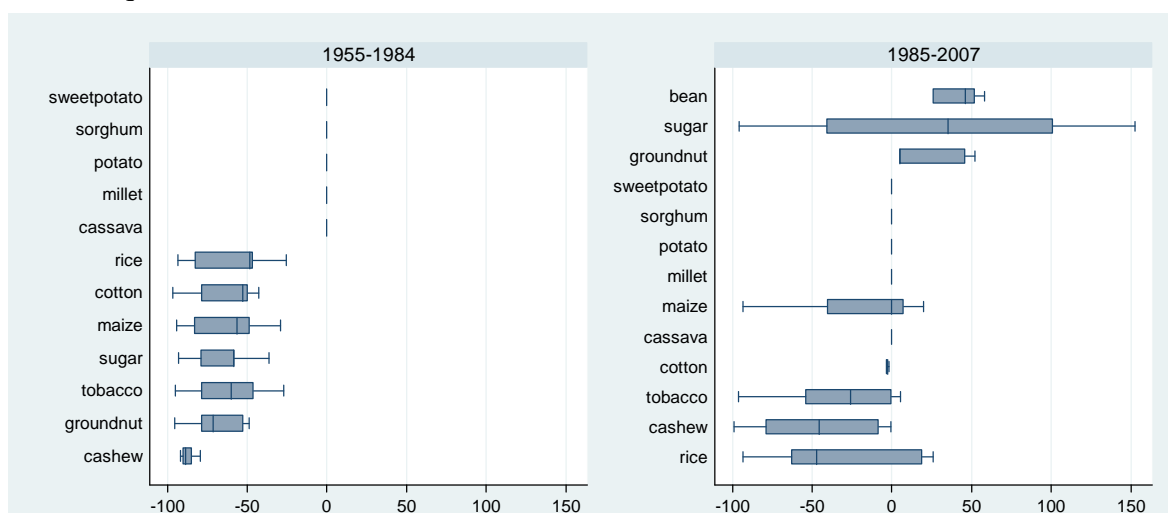
Kenya (n = 343)



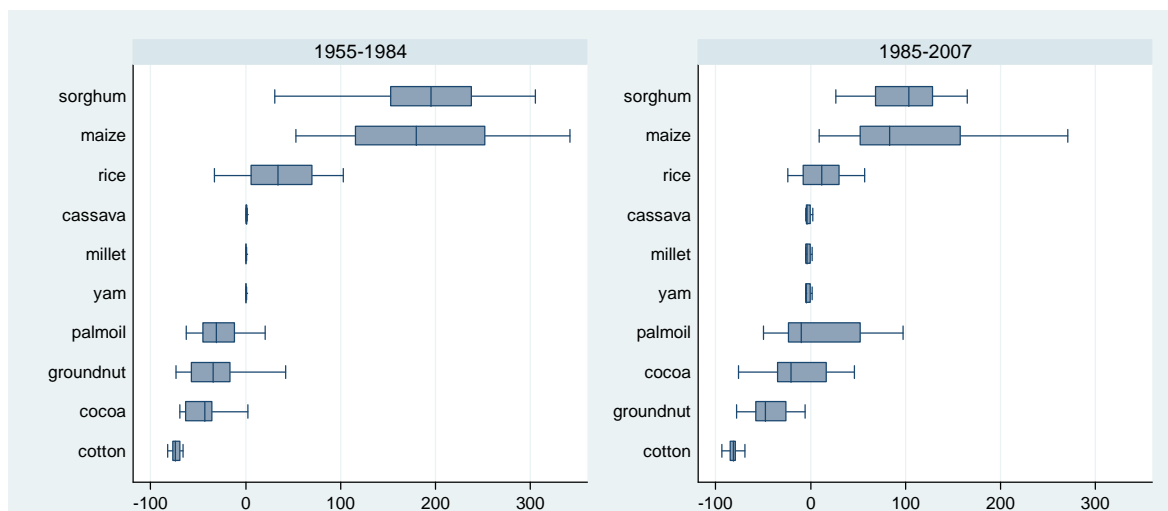
Madagascar (n = 510)



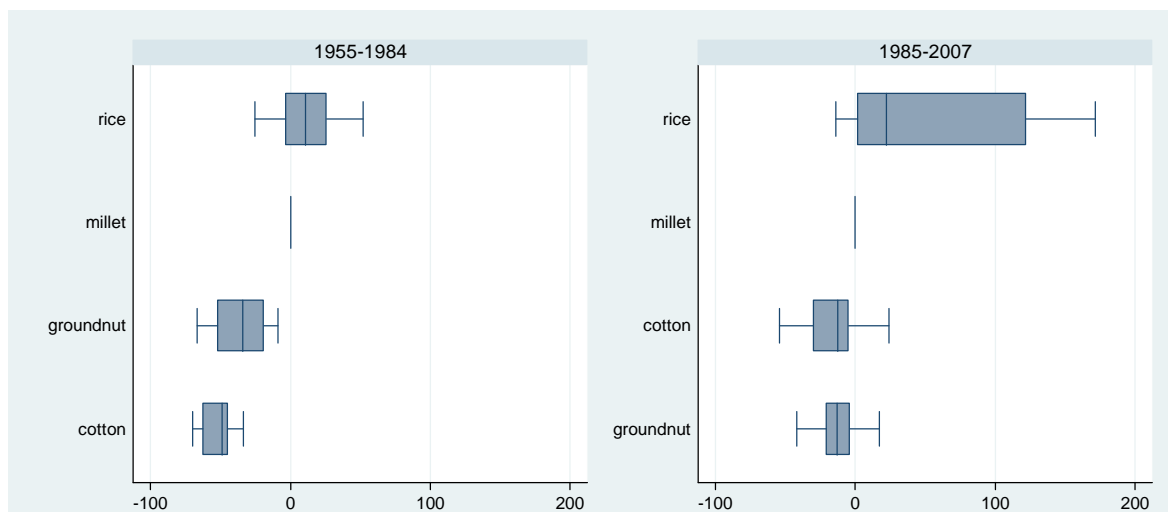
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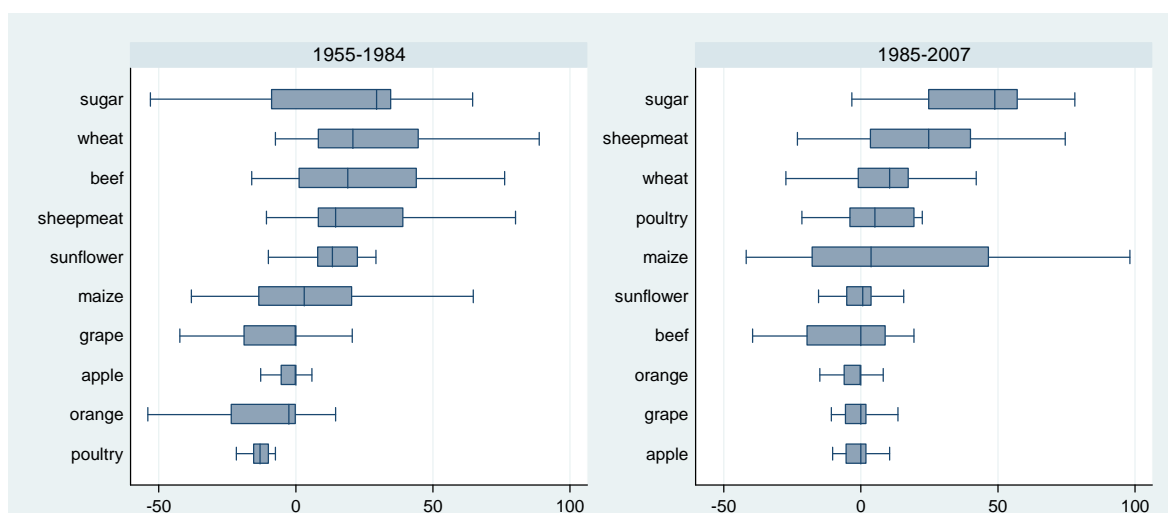
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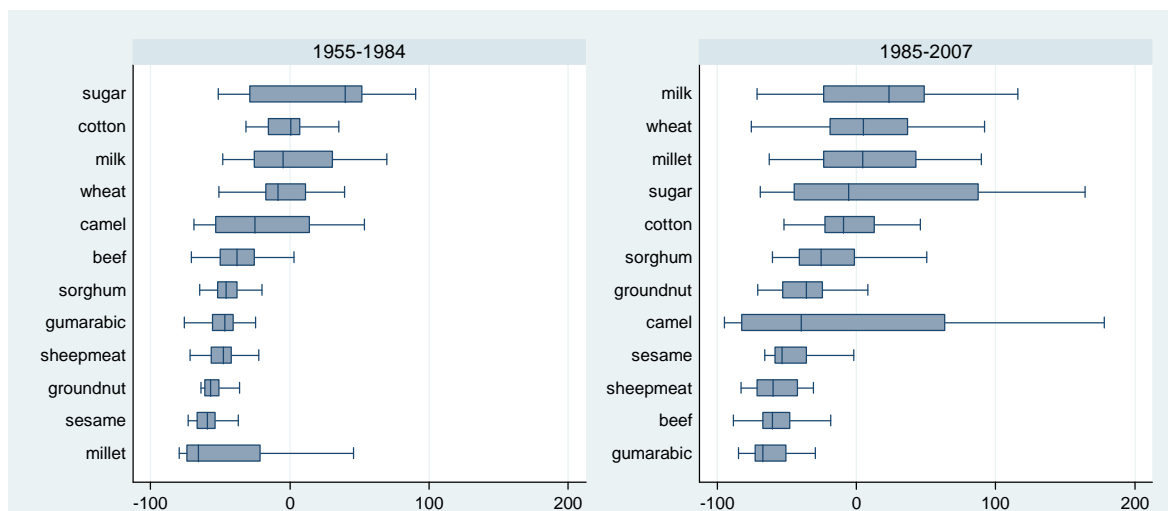
Senegal (n = 204)



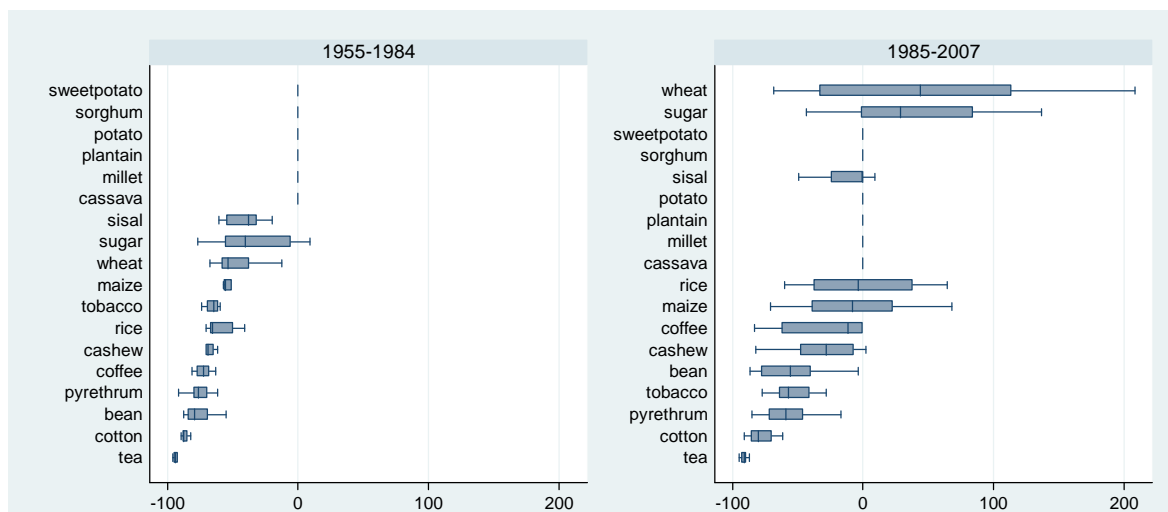
South Africa (n = 643)



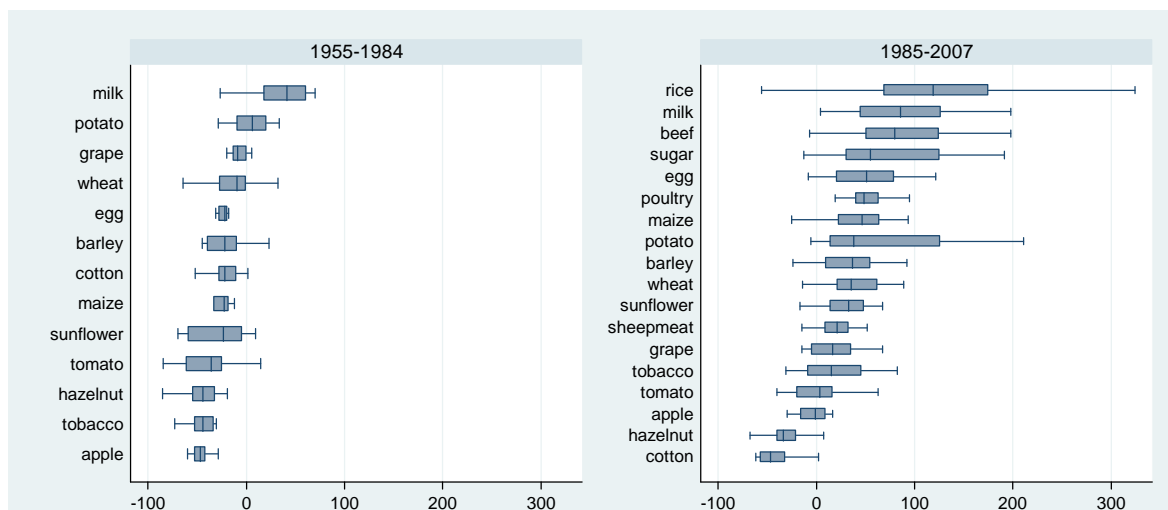
Sudan (n = 611)



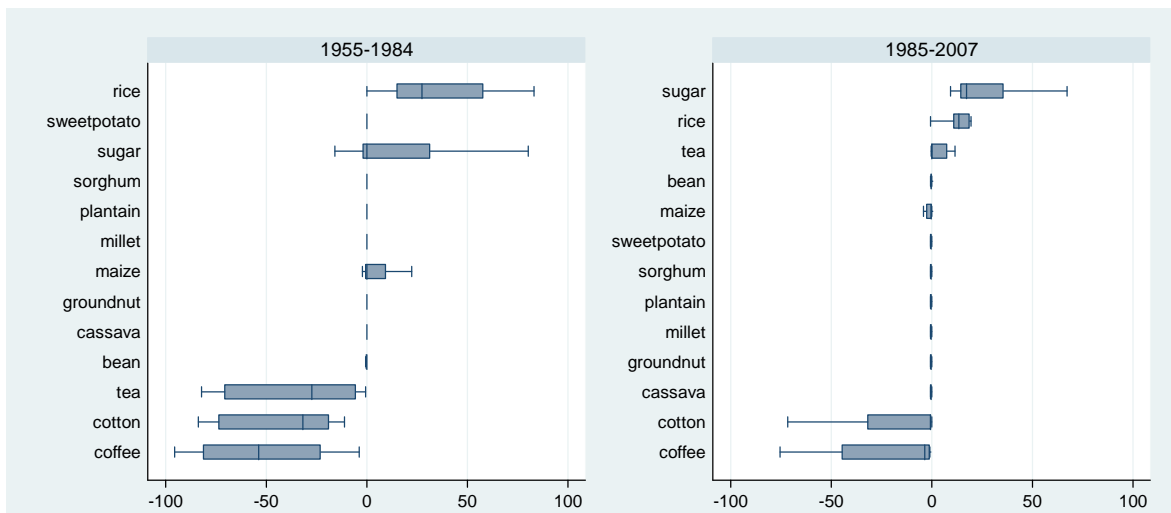
Tanzania (n = 918)



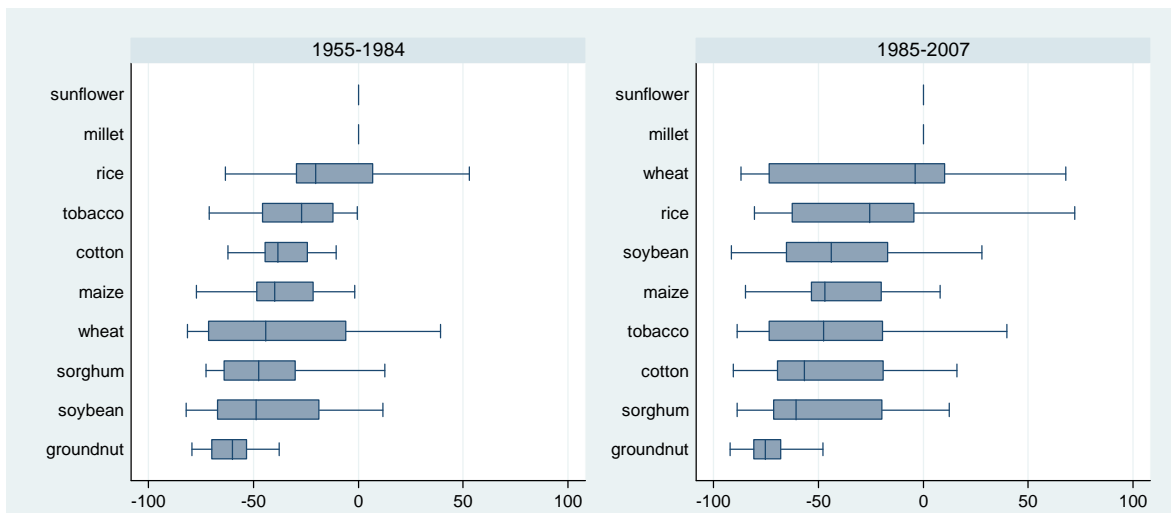
Turkey (n = 609)



Uganda (n = 663)



Zambia (n = 510)



Zimbabwe (n = 408)

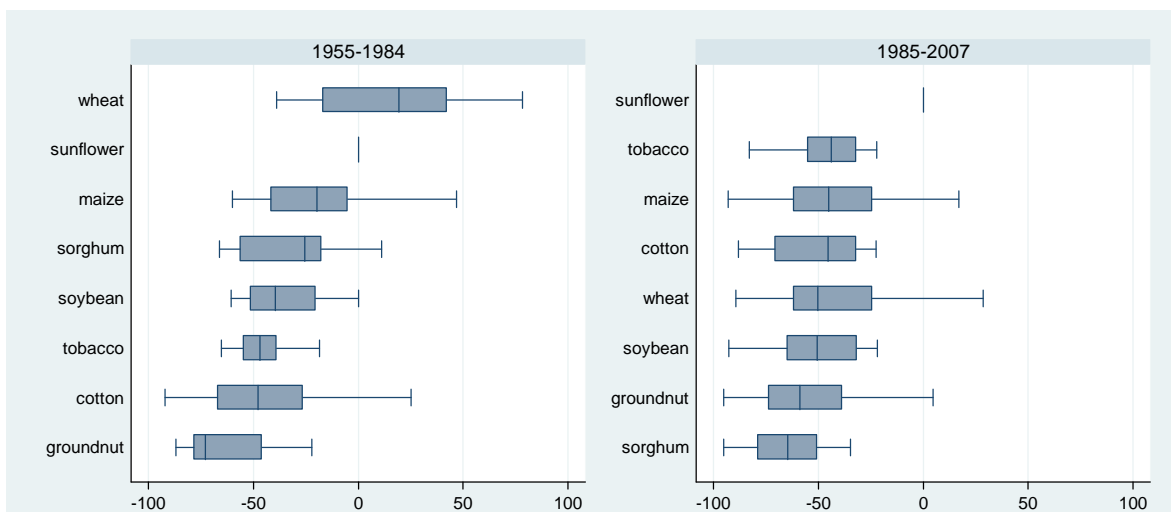


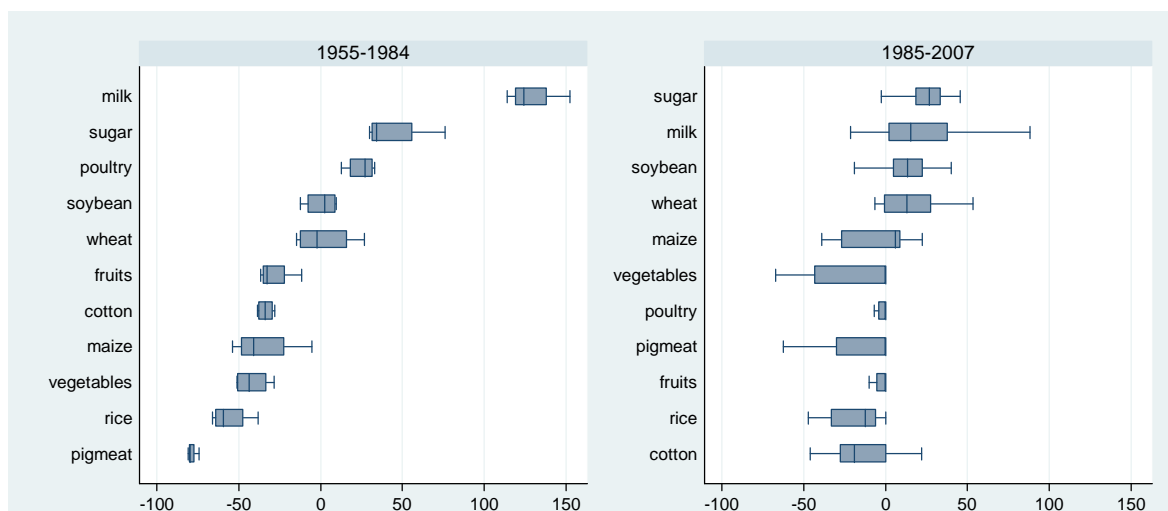
Figure A.4 (continued): Box plot distributions of NRAs of all covered agricultural products for each focus country, 1955 to 2007

(b) 12 Asian developing economies

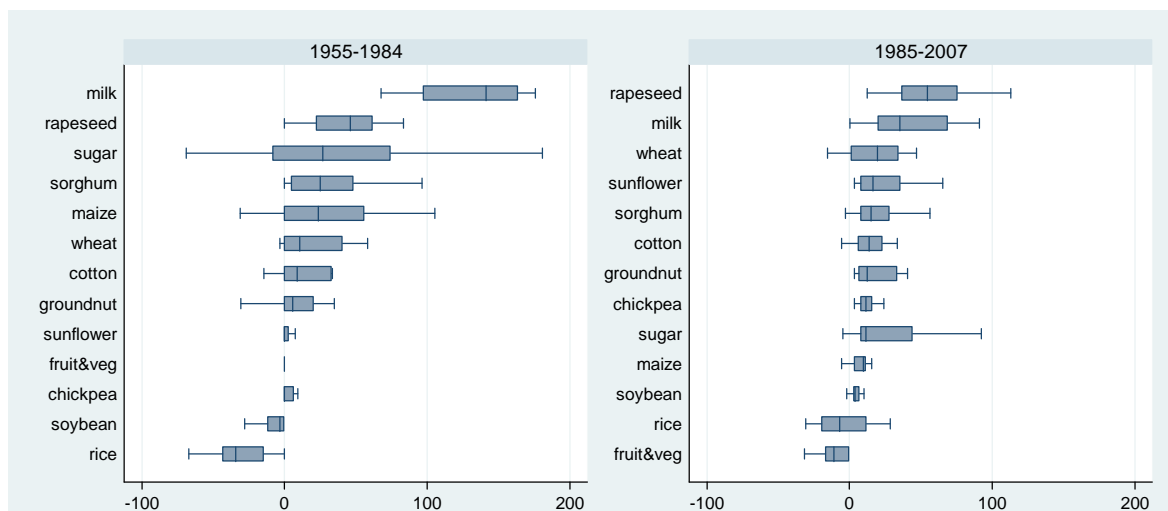
Bangladesh (n = 306)



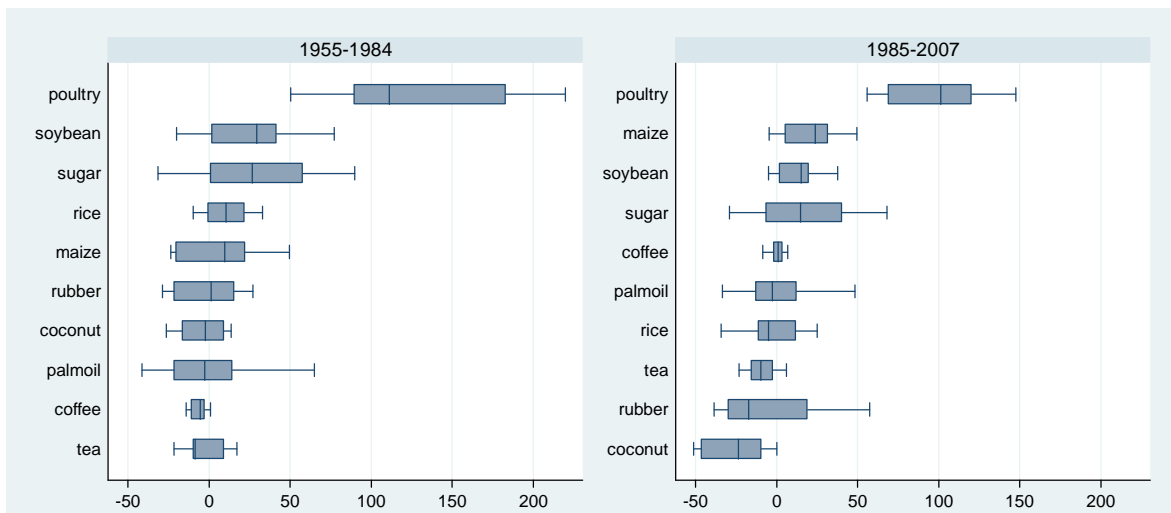
China (n = 561)



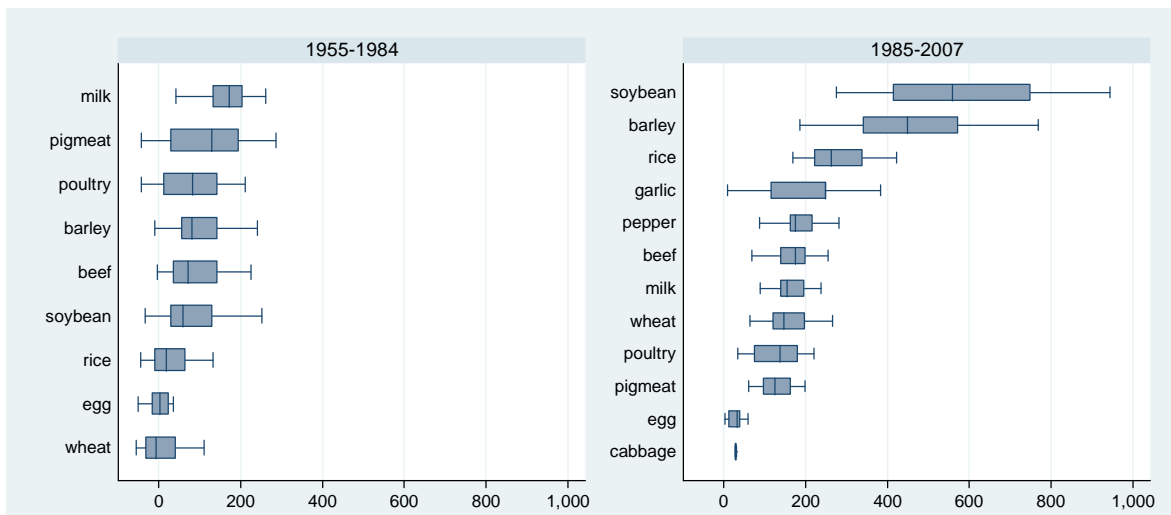
India (n = 663)



Indonesia (n = 510)



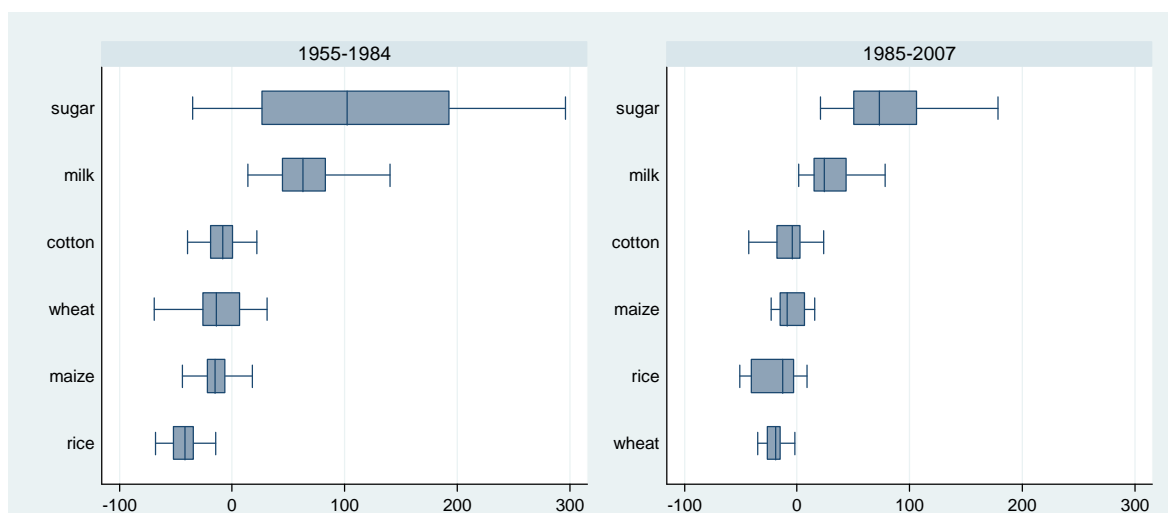
Korea (n = 634)



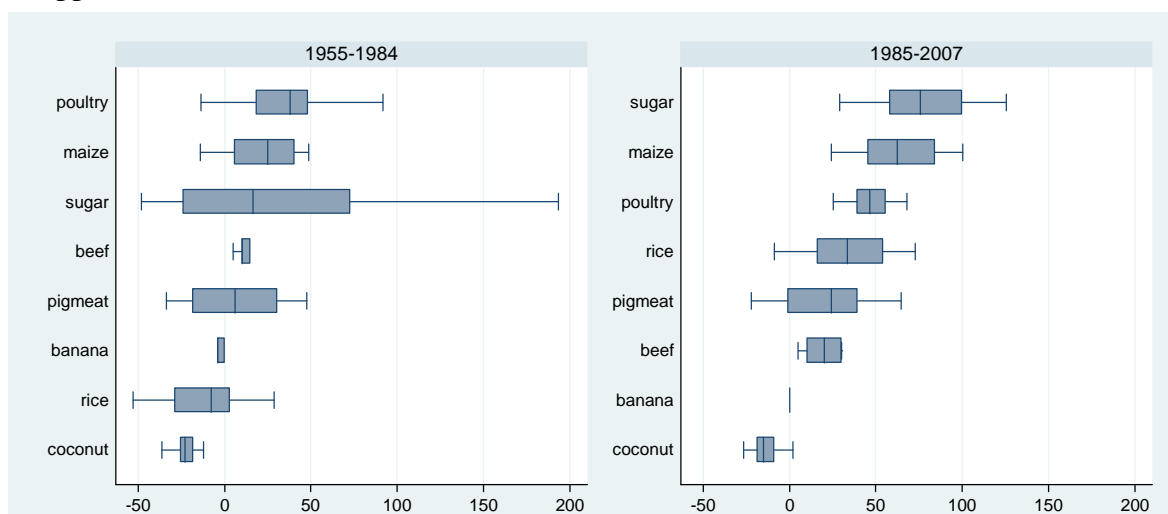
Malaysia (n = 204)



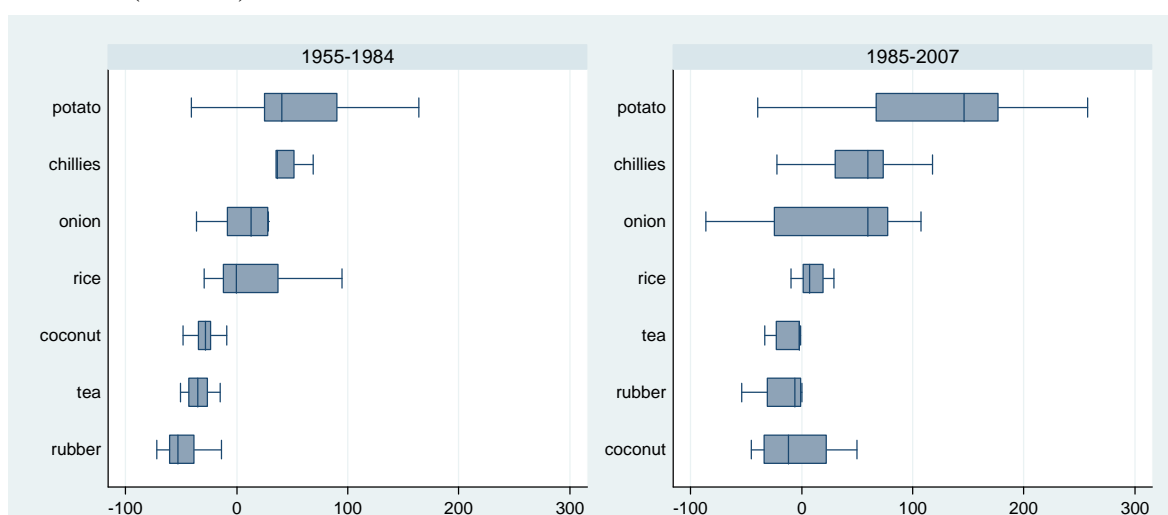
Pakistan (n = 306)



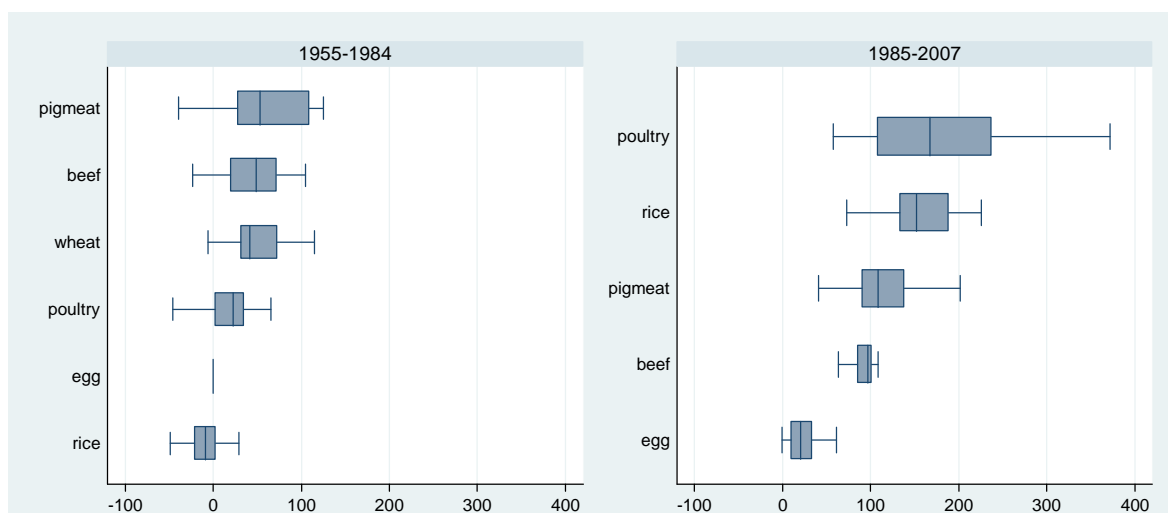
Philippines (n =)



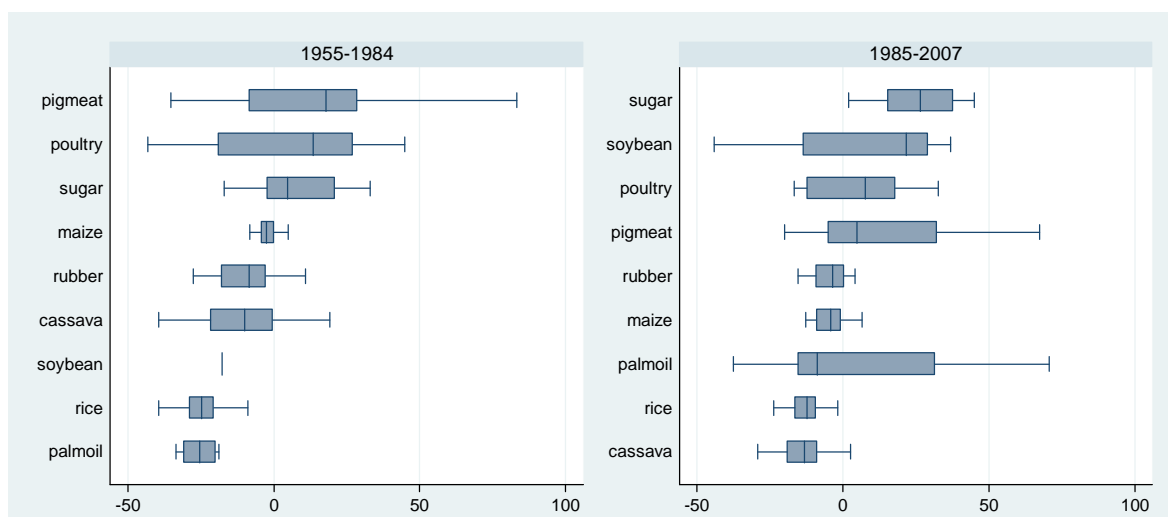
Sri Lanka (n = 357)



Taiwan (n = 357)



Thailand (n = 459)



Vietnam (n = 306) (note: no data in 1955-85)

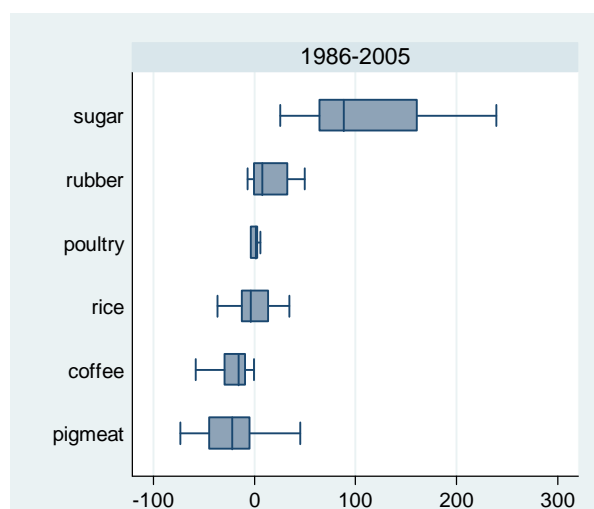
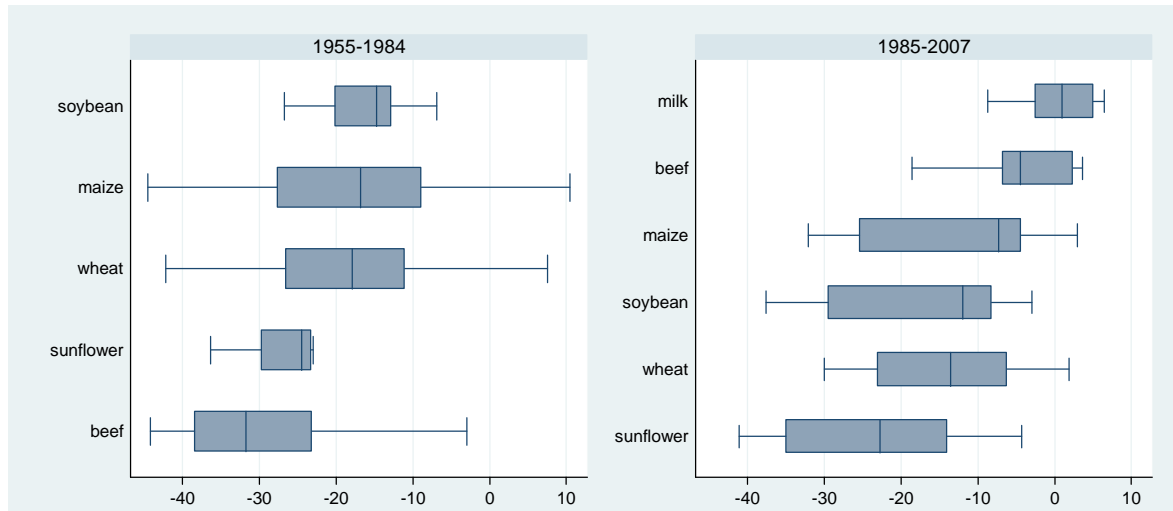


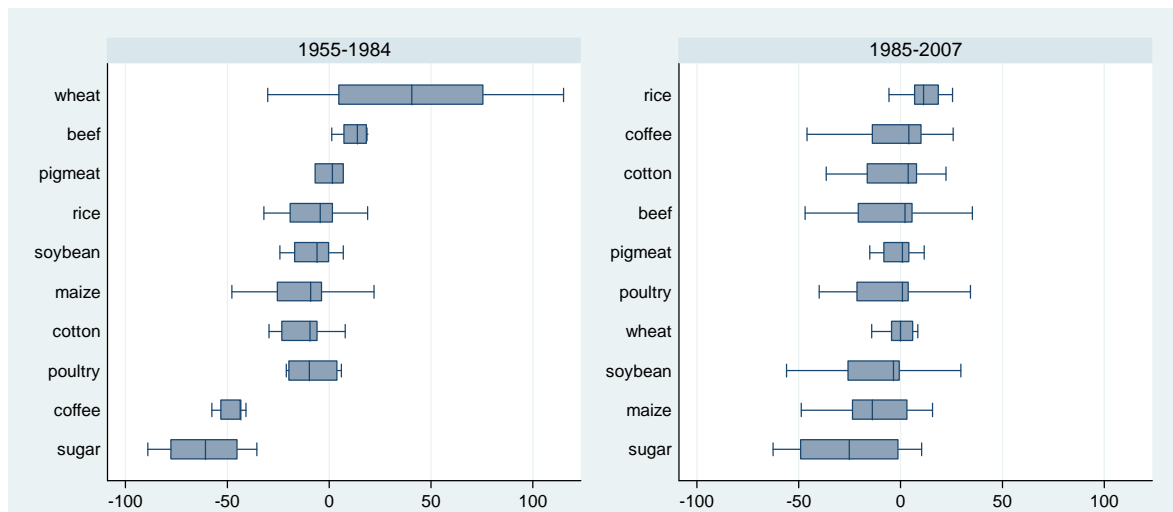
Figure A.4 (continued): Box plot distributions of NRAs of all covered agricultural products for each focus country, 1955 to 2007

(c) 8 Latin American countries

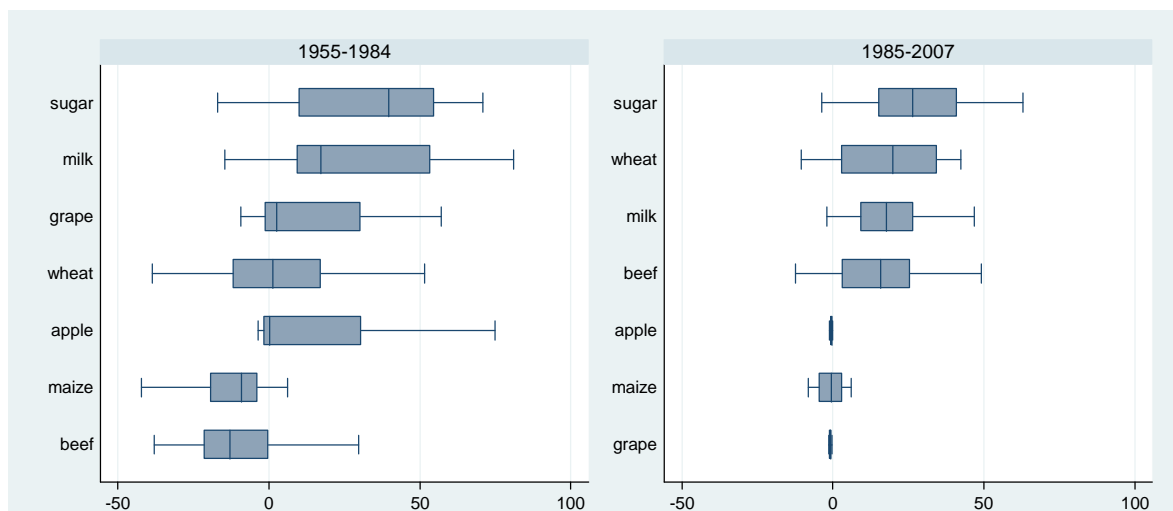
Argentina (n = 306)



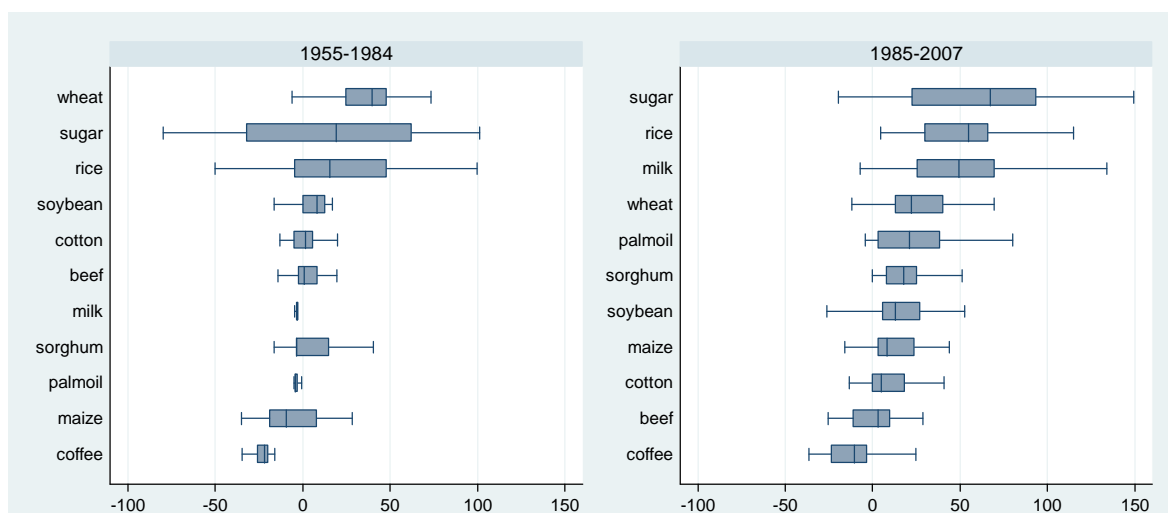
Brazil (n = 510)



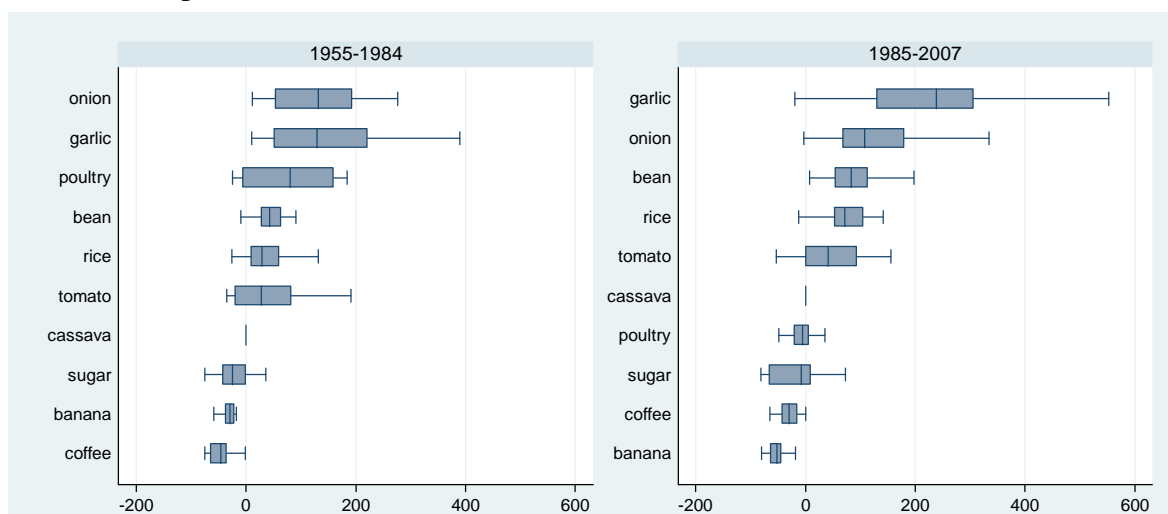
Chile (n = 357)



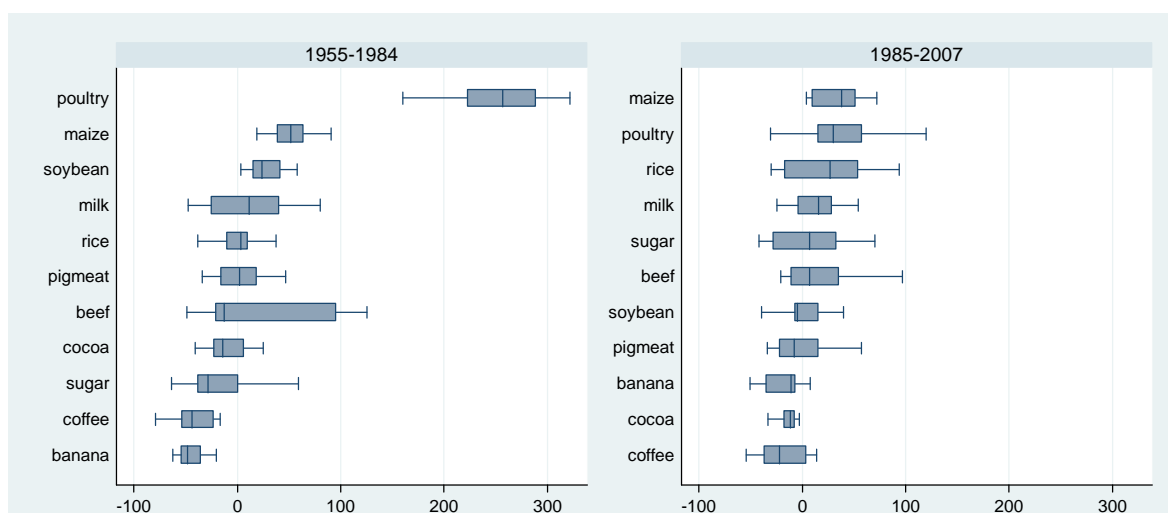
Colombia (n = 561)



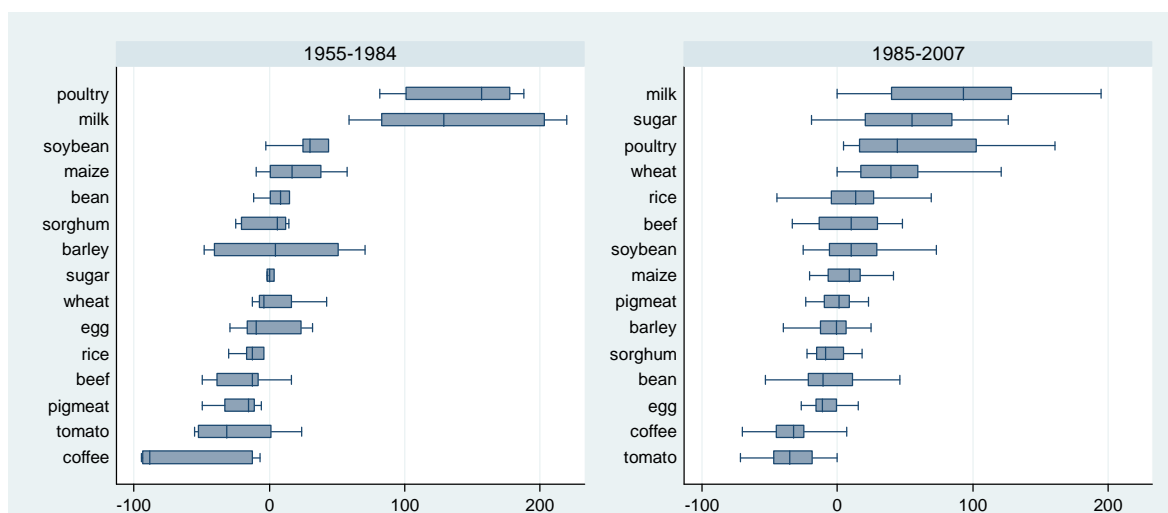
Dominican Republic (n = 510)



Ecuador (n = 561)



Mexico (n = 793)



Nicaragua (n = 612) (note: Nicaragua only has data for 1993 to 2004)

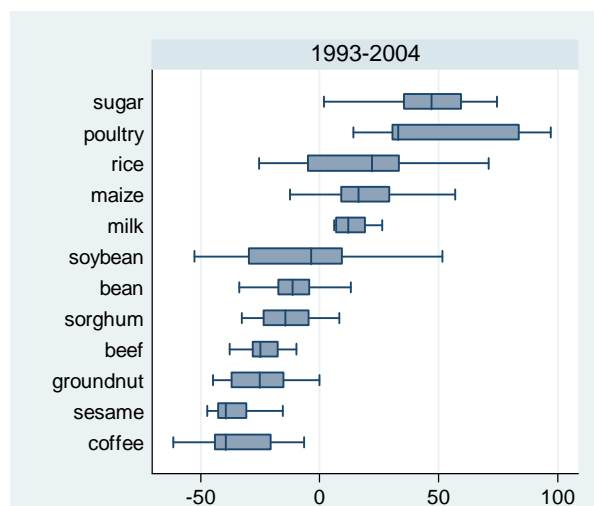
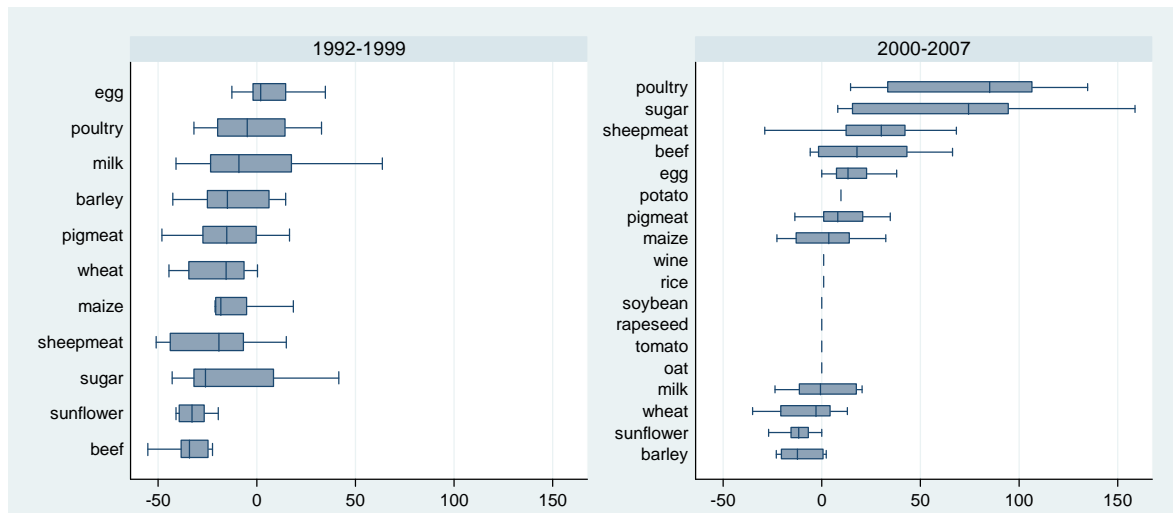


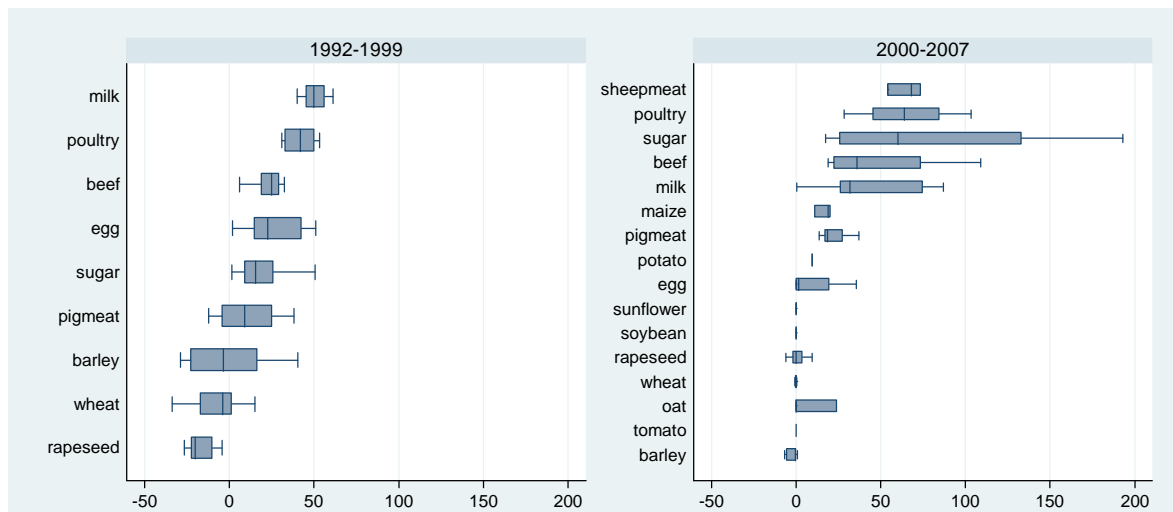
Figure A.4 (continued): Box plot distributions of NRAs of covered agricultural products for each focus country, 1955 to 2007

(d) 12 European transition economies

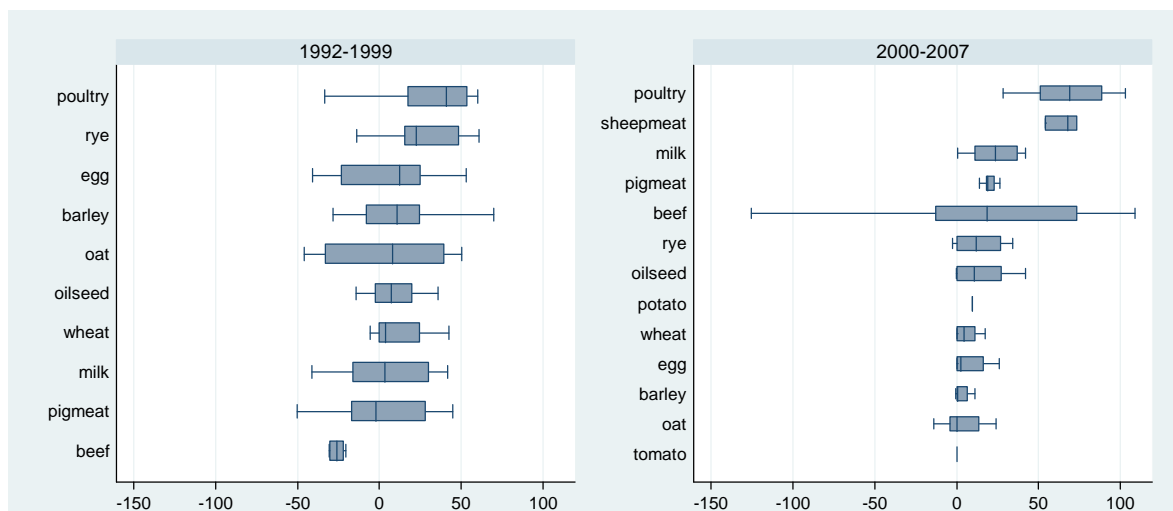
Bulgaria (n = 183)



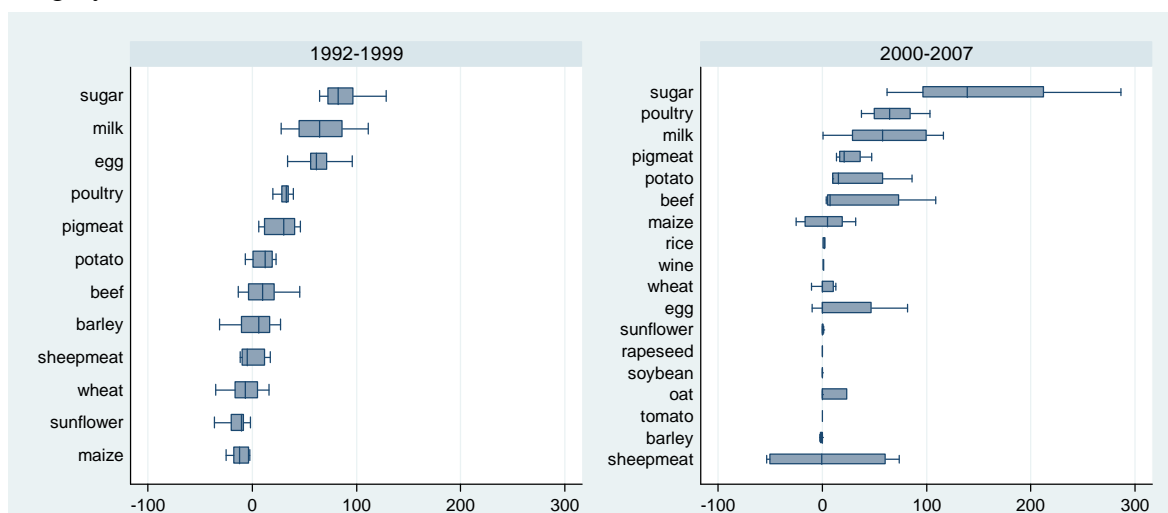
Czech Rep. (n = 165)



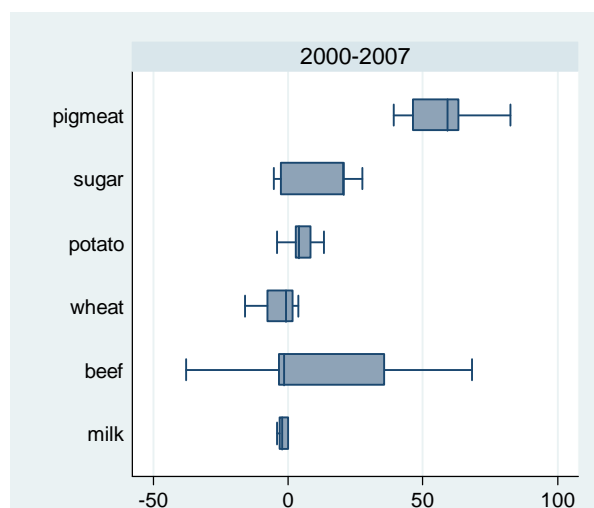
Estonia (n = 167)



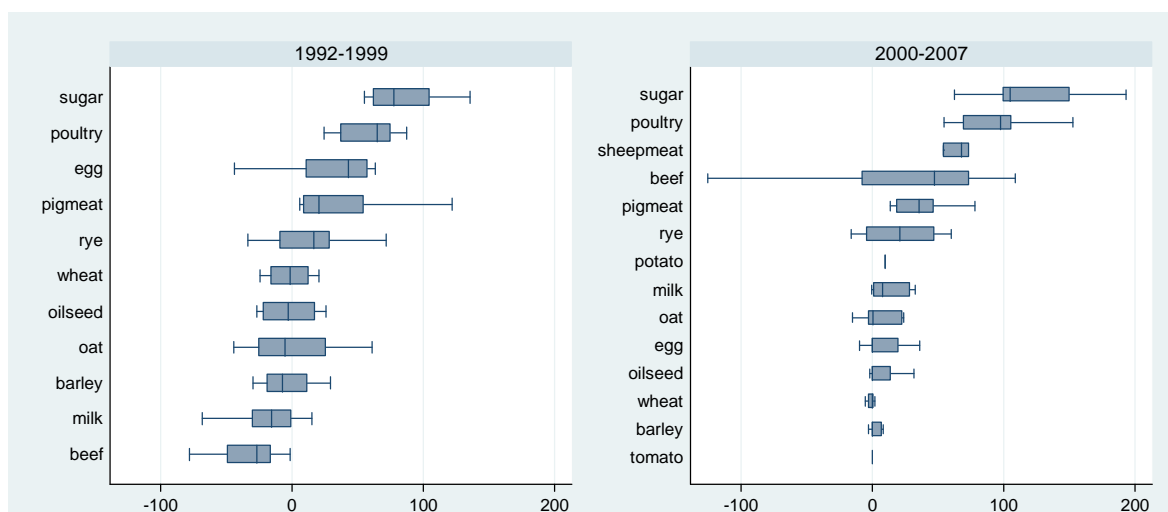
Hungary (n = 210)



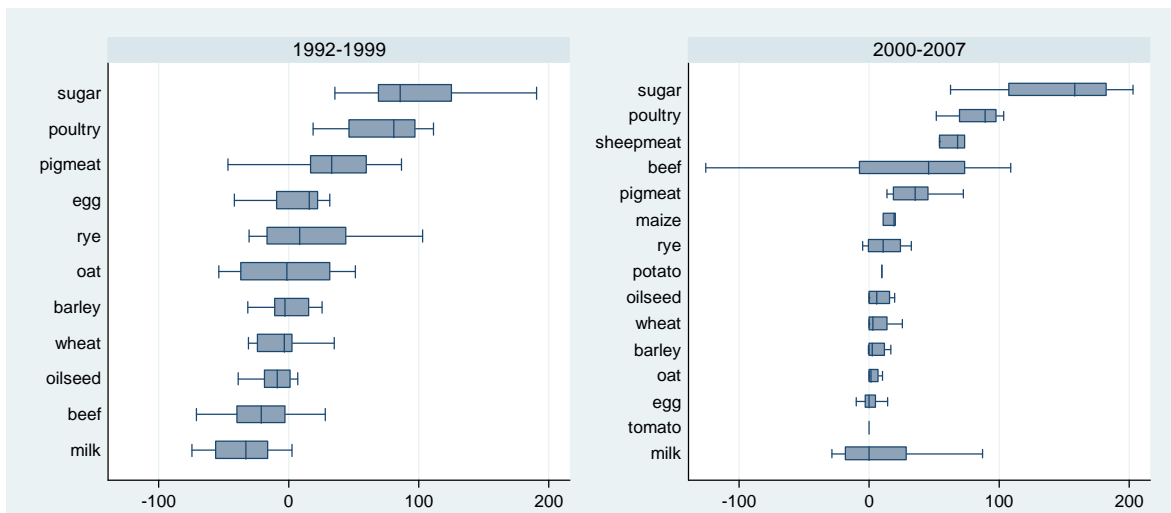
Kazakhstan (n = 30)



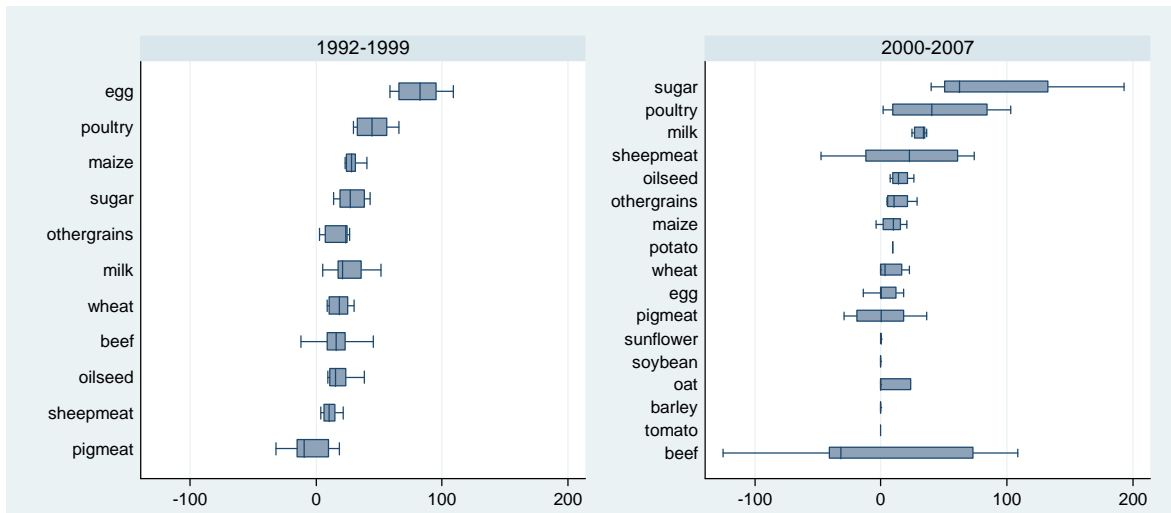
Latvia (n = 181)



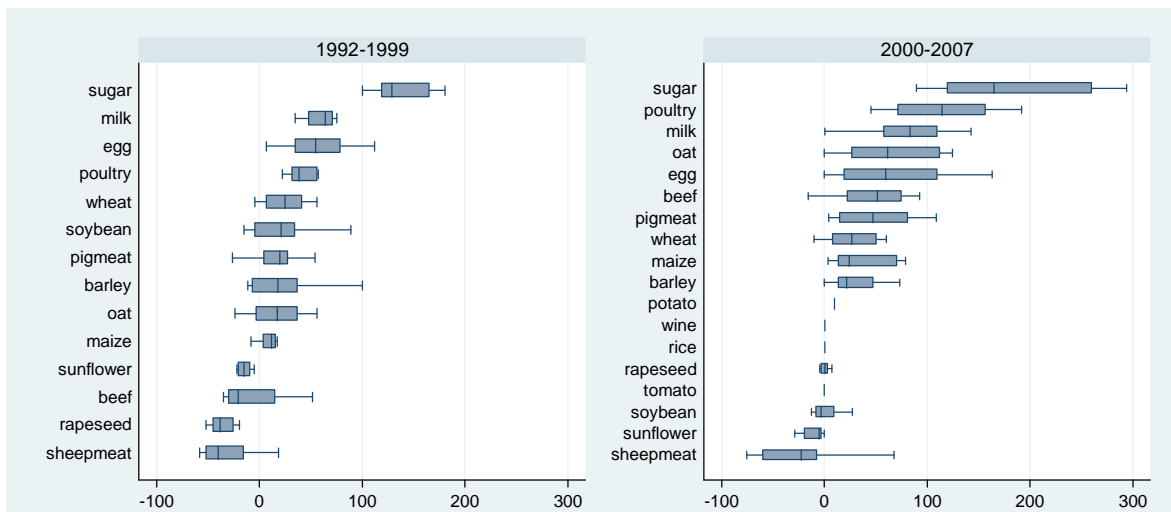
Lithuania (n = 184)



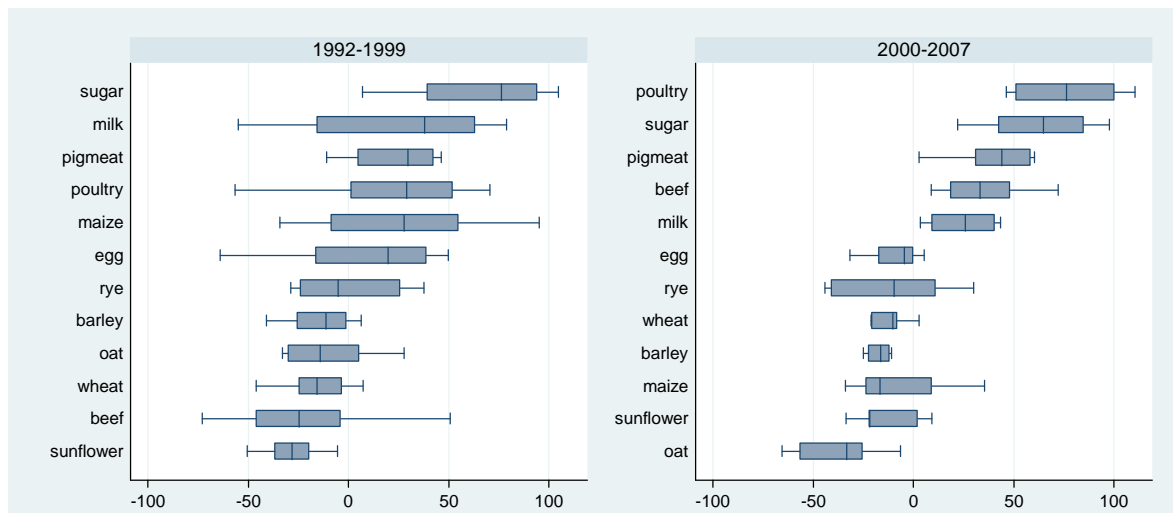
Poland (n = 186)



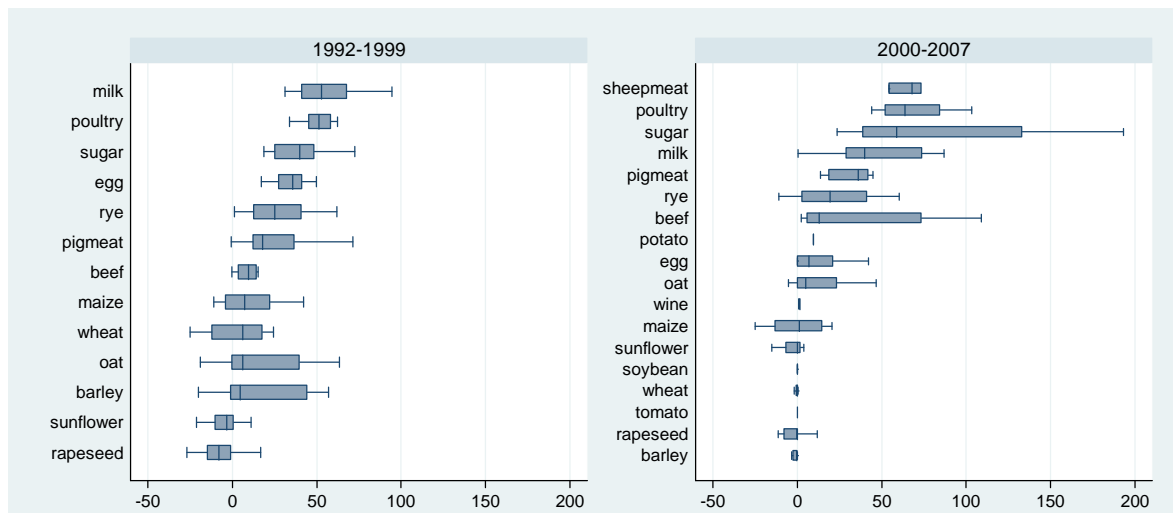
Romania (n = 228)



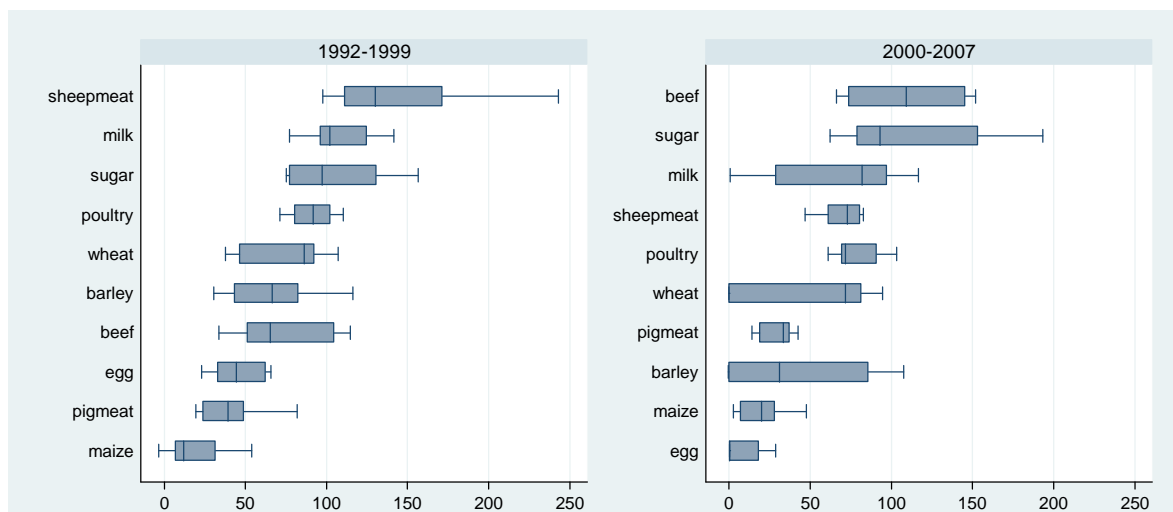
Russia (n = 168)



Slovakia (n = 219)



Slovenia (n = 159)



Ukraine (n = 178)

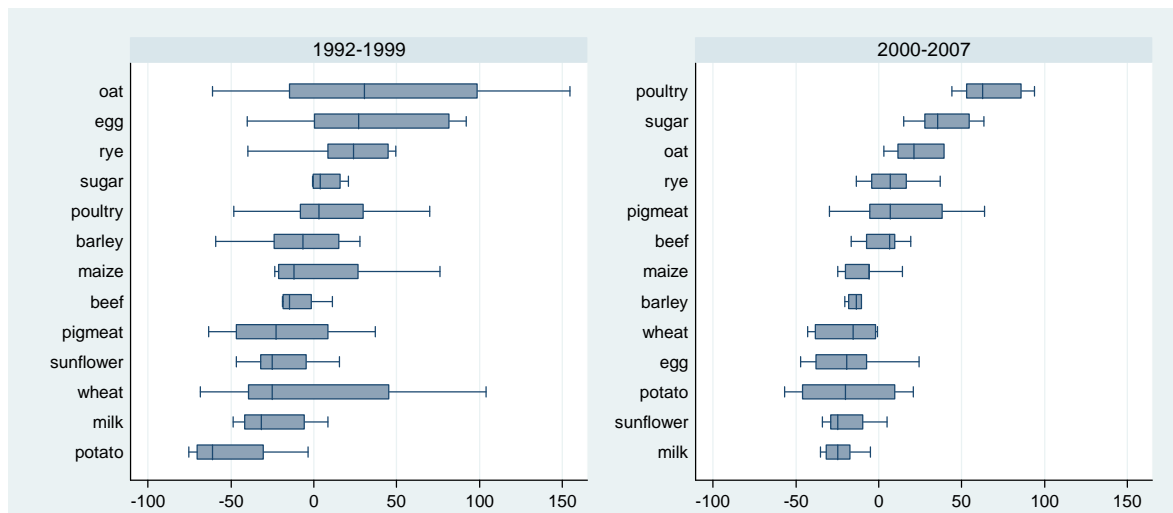
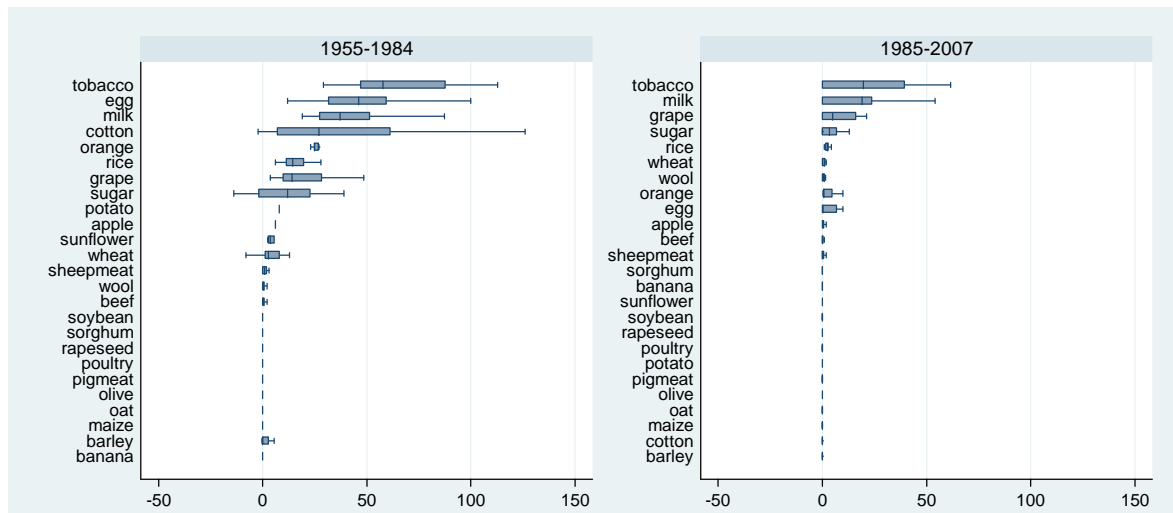


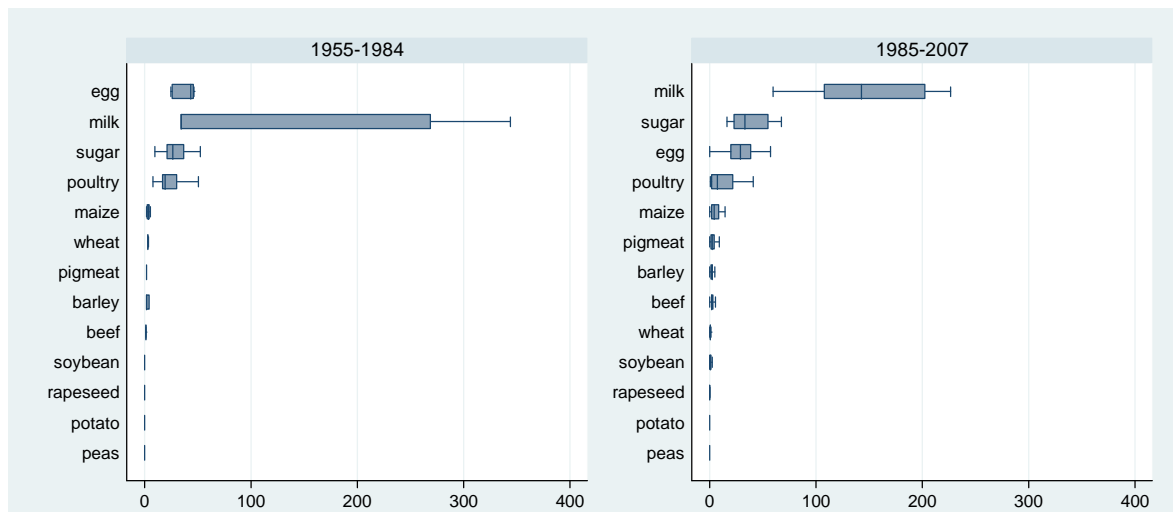
Figure A.4 (continued): Box plot distributions of NRAs of covered agricultural products for each focus country, 1955 to 2007

(e) 9 high-income economies (counting as 1 the EU member countries as of 1/1/2004)

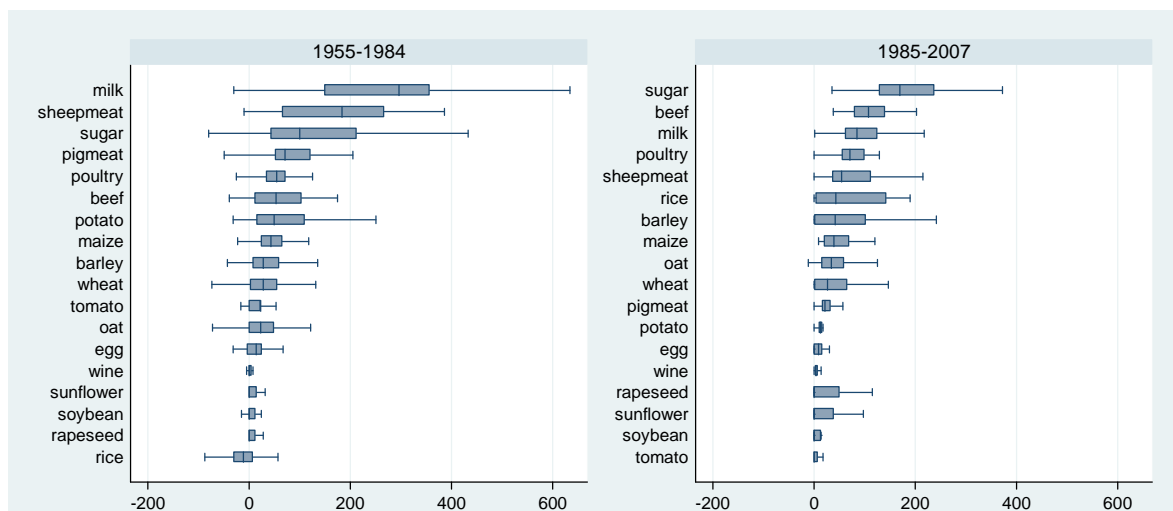
Australia (n = 1317)



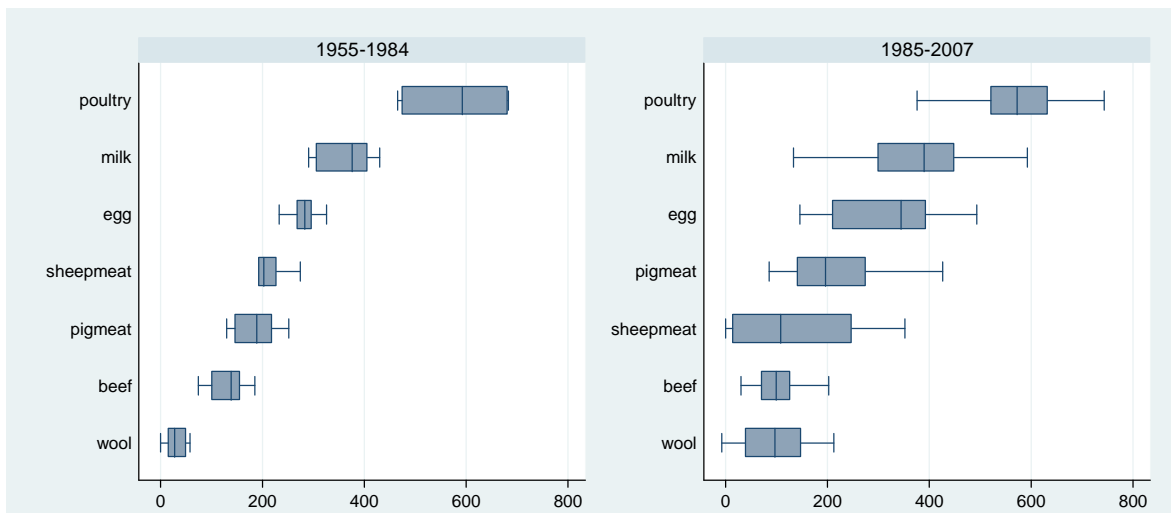
Canada (n = 630)



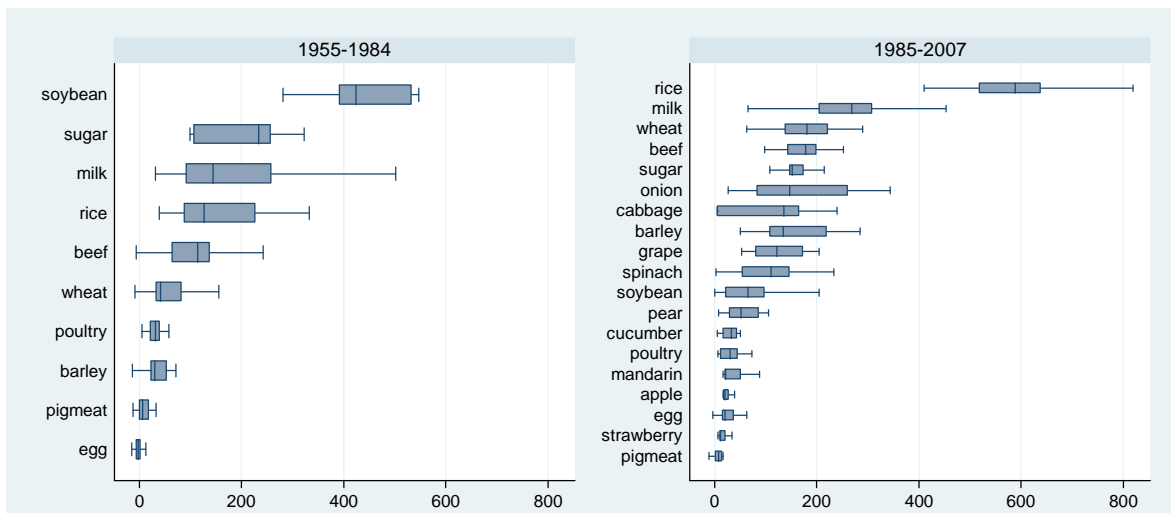
EU-15 countries (as of 1/1/2004) (n = 8157)



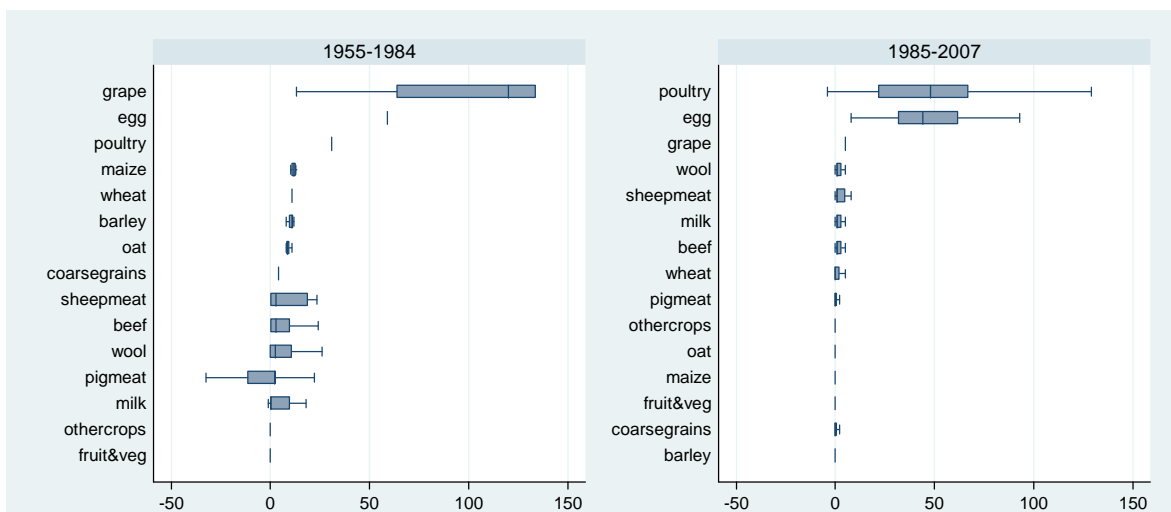
Iceland (n = 203)



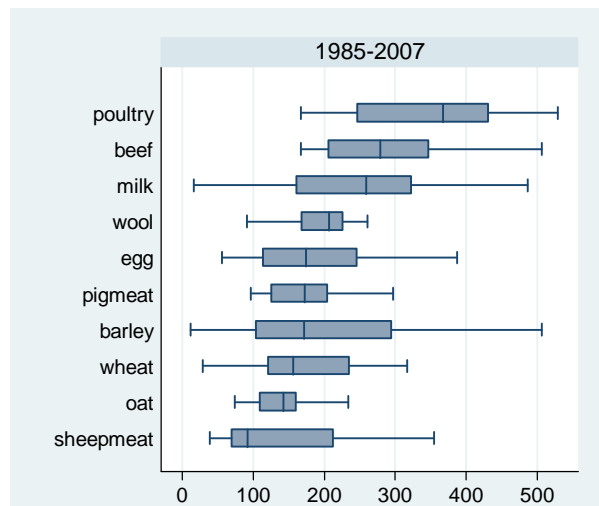
Japan (n = 1007)



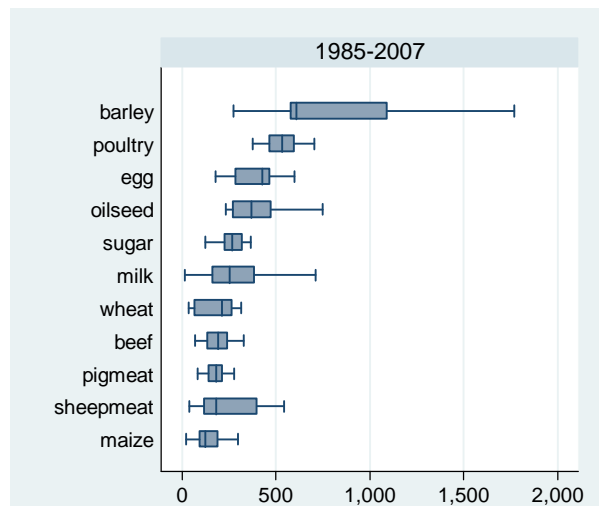
New Zealand (n = 723)



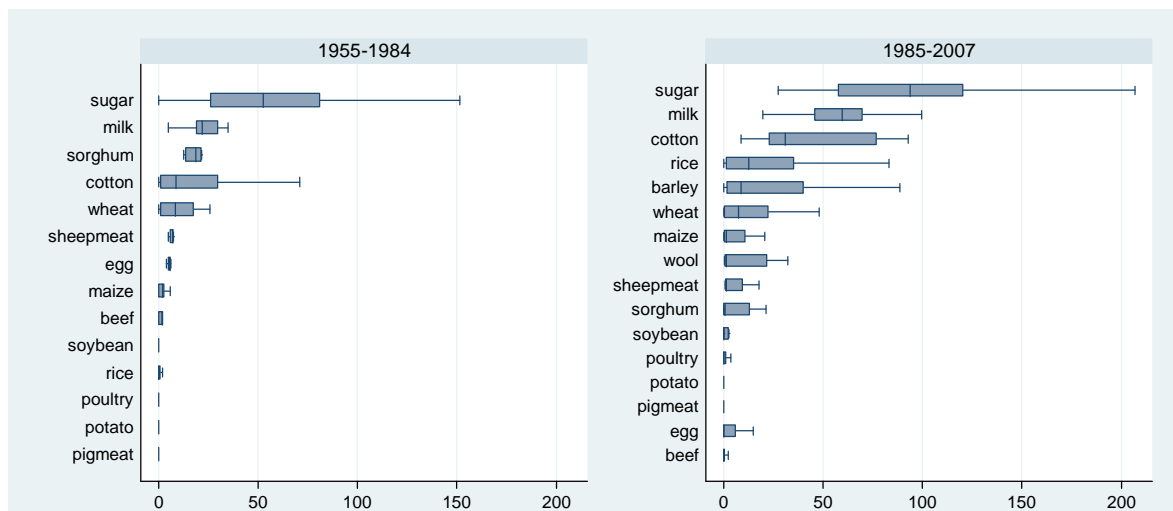
Norway (n = 249)



Switzerland (n = 268)



US (n = 721)



Source: Drawn from estimates in Anderson and Valenzuela (2008).