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Agricultural Policy and Food Security in China

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大国小农 A large country with a large population of smallholders, **农耕文明** : 5000多年

History of farming : Over 5000 years, **中国小农** : 传统农耕文明的重要载体、农业农村经济的基本单元

Chinese smallholders : Vital role in conserving traditional farming culture, and basic units of agriculture and rural economy

全国耕地总面积 : 1.35亿公顷

Total cultivated land :
135 million ha.

人均耕地面积 : 0.097公顷

Per capita availability:
0.097 ha.

< 2ha.
2.58亿农户
258 million
households

> 2ha.
1076.6万农户
10.766 million
households

> 13.3ha.
36.6万农户
366,000
households



总体成效 Overall achievement

9%

中国用占世界9%的耕地
9% of global cultivated land

6.4%

6.4%的淡水资源
6.4% of global freshwater
resource

20%

解决了占世界近20%人口的吃饭问题
The ability to feed 20% of world's
population



Outline

- ◆ **Food Security Status in China**
- ◆ **Policies to Achieve Food Security in China**
 - **Domestic production**
 - **International trade**
- ◆ **Challenges and Future Perspective**

Outline

◆ Food Security Status in China

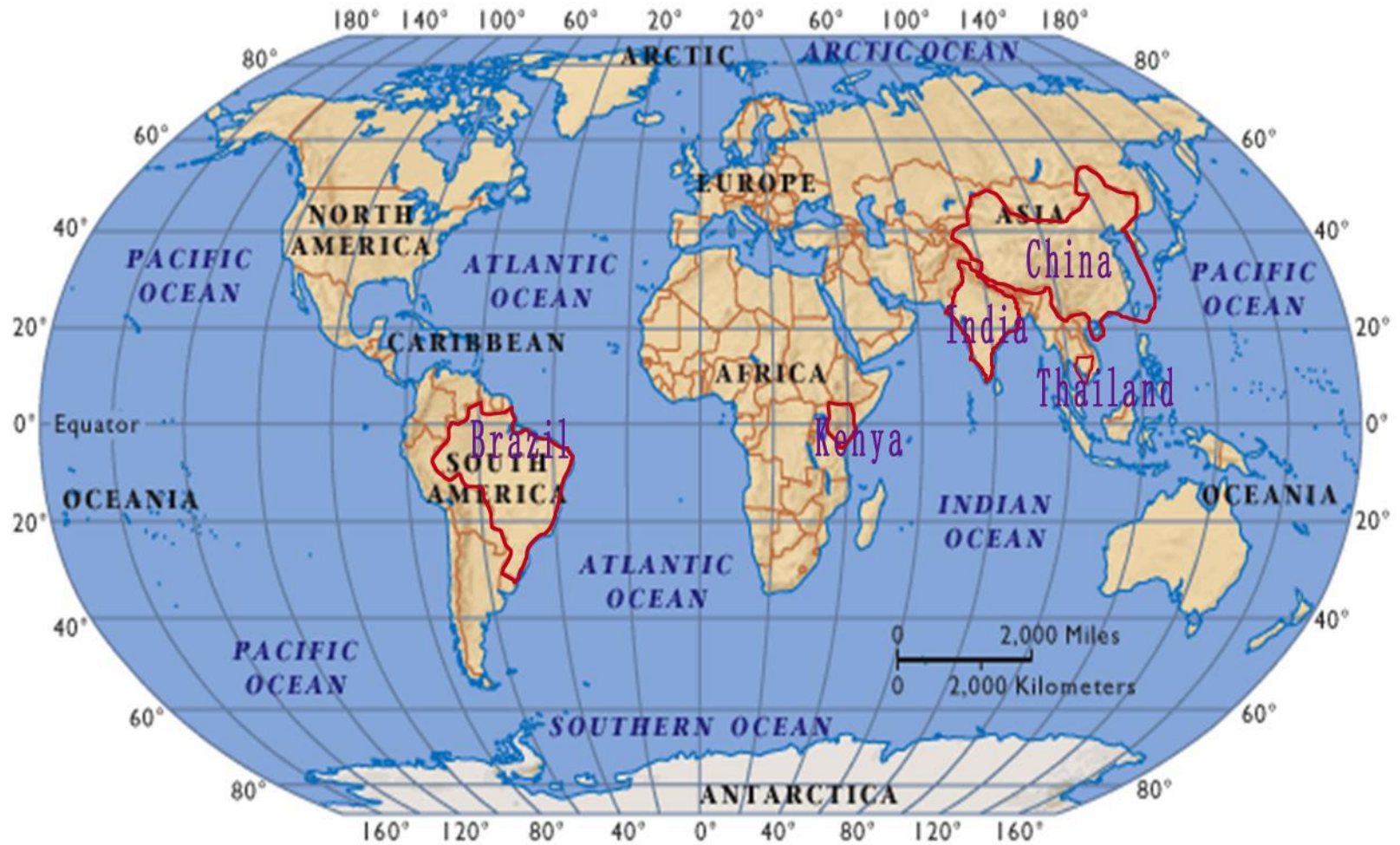
◆ Policies to Achieve Food Security in China

- Domestic production

- International trade

◆ Challenges and Future Perspective

The World



China:

– Country Area: 963405 (1000Ha)

– Population: 1.39 billion in 2010

1.44 billion in 2018



Brazil:

Country Area: 854740(1000Ha)

Population : 0.19billion in 2010

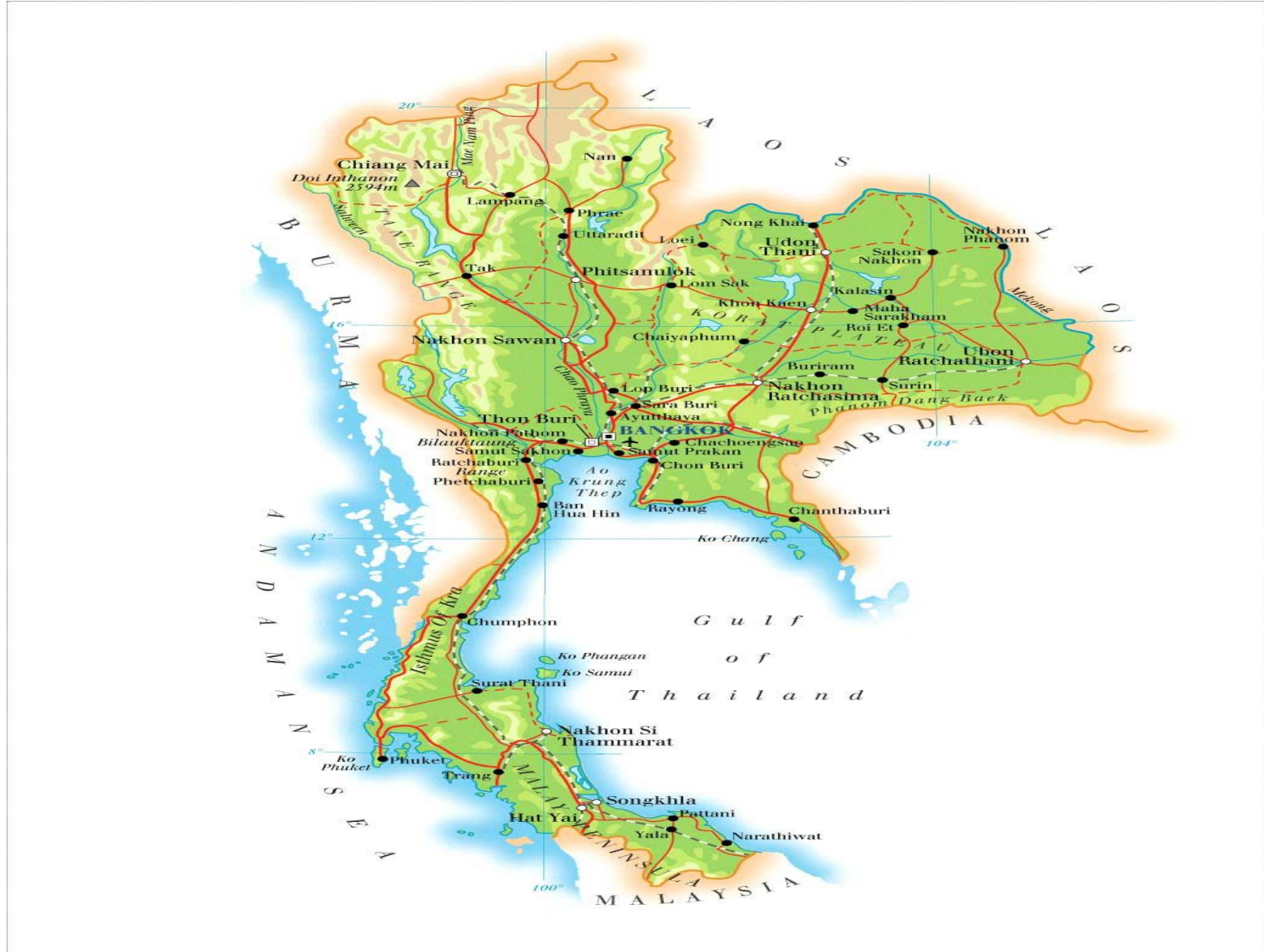
0.21billion in 2018



India: Country Area: 298000(1000Ha)
Population : 1.23billion in 2010
1.35billion in 2018

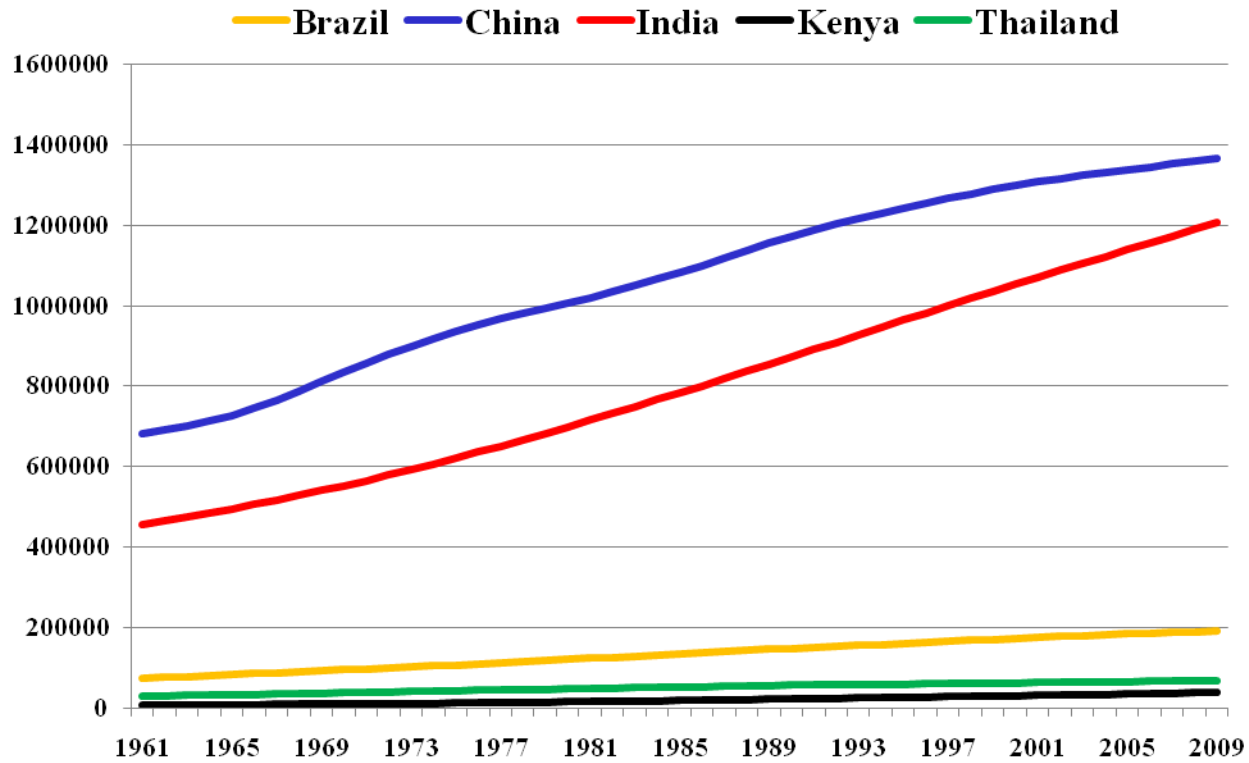


Thailand: Country Area: 51312(1000Ha)
Population : 0.07billion in 2010
0.07billion in 2018



Total Population in Five Countries

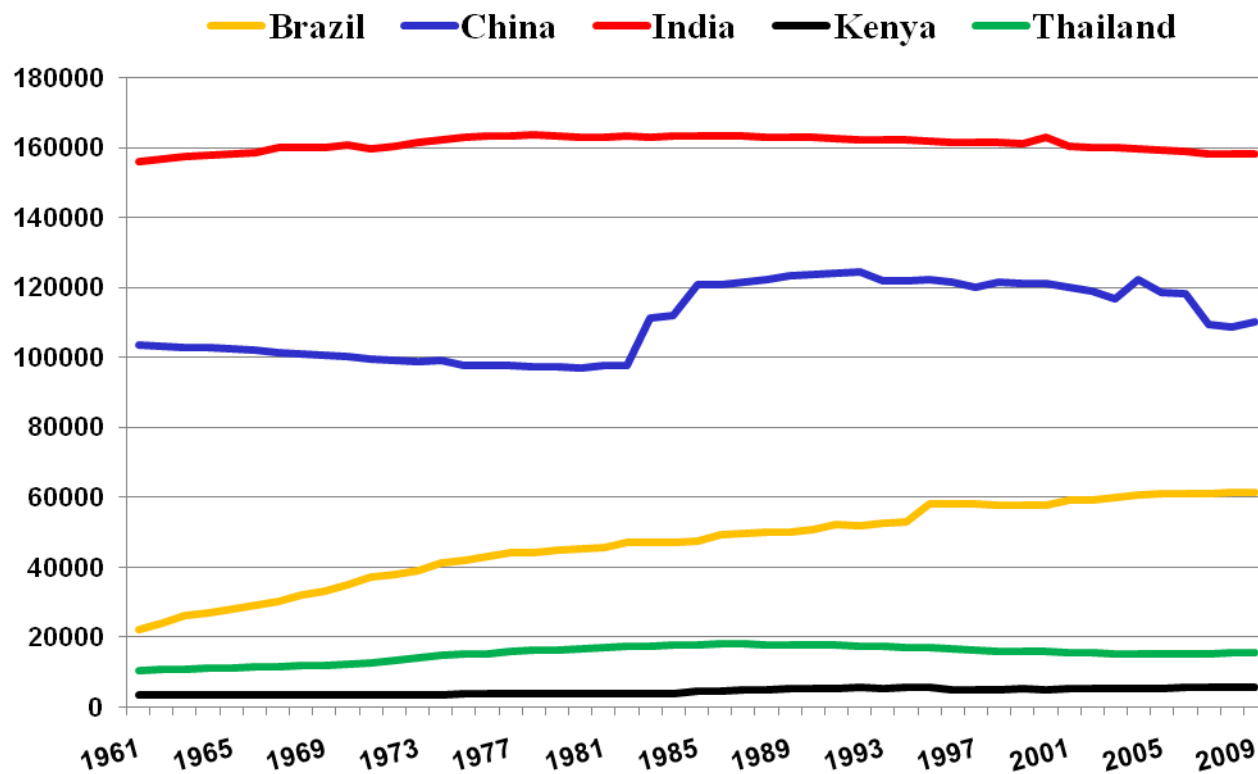
1961-2009 (1000 person)



Source:FAOSTAT

Arable land in Five Countries

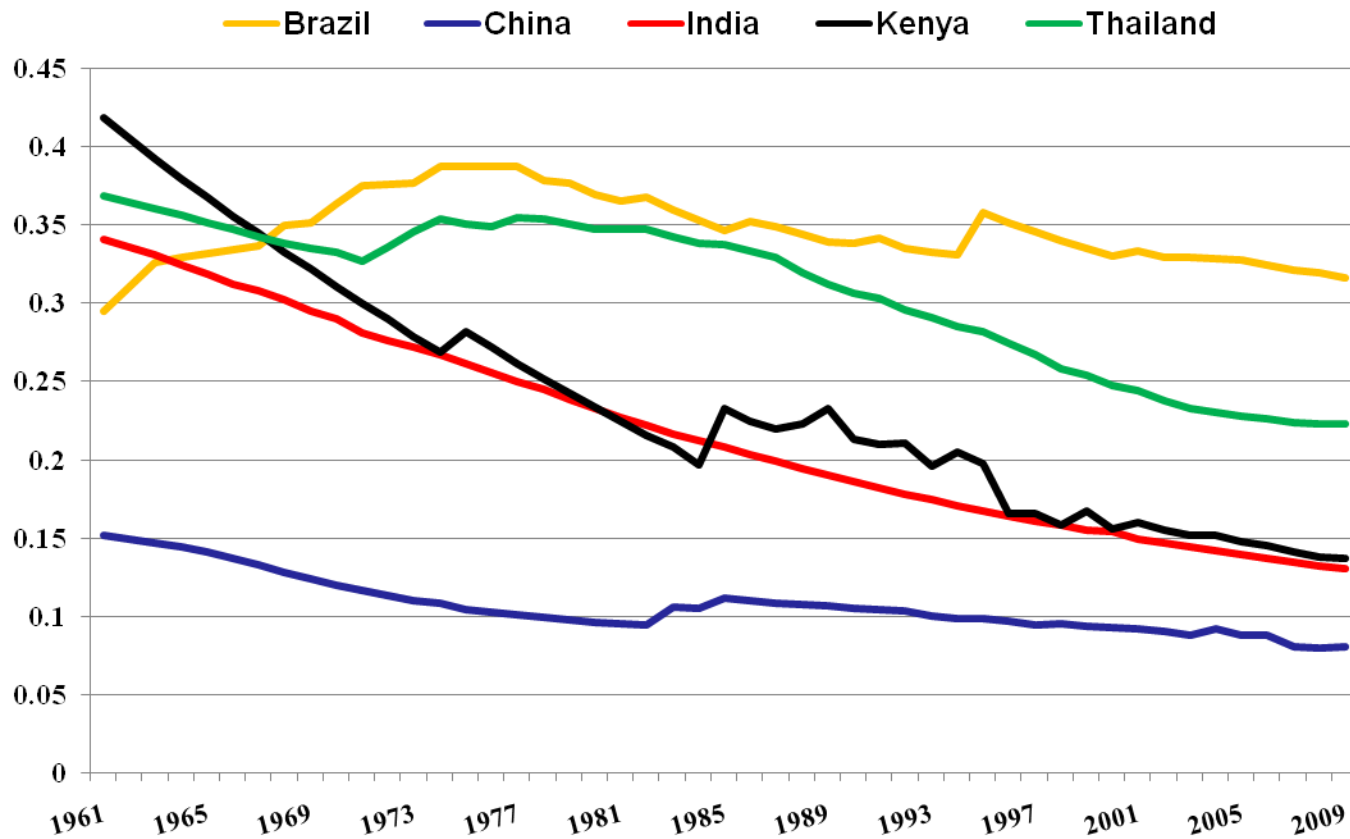
1961-2009(1000Ha)



Source:FAOSTAT

Arable Land Per Capita in Five Countries

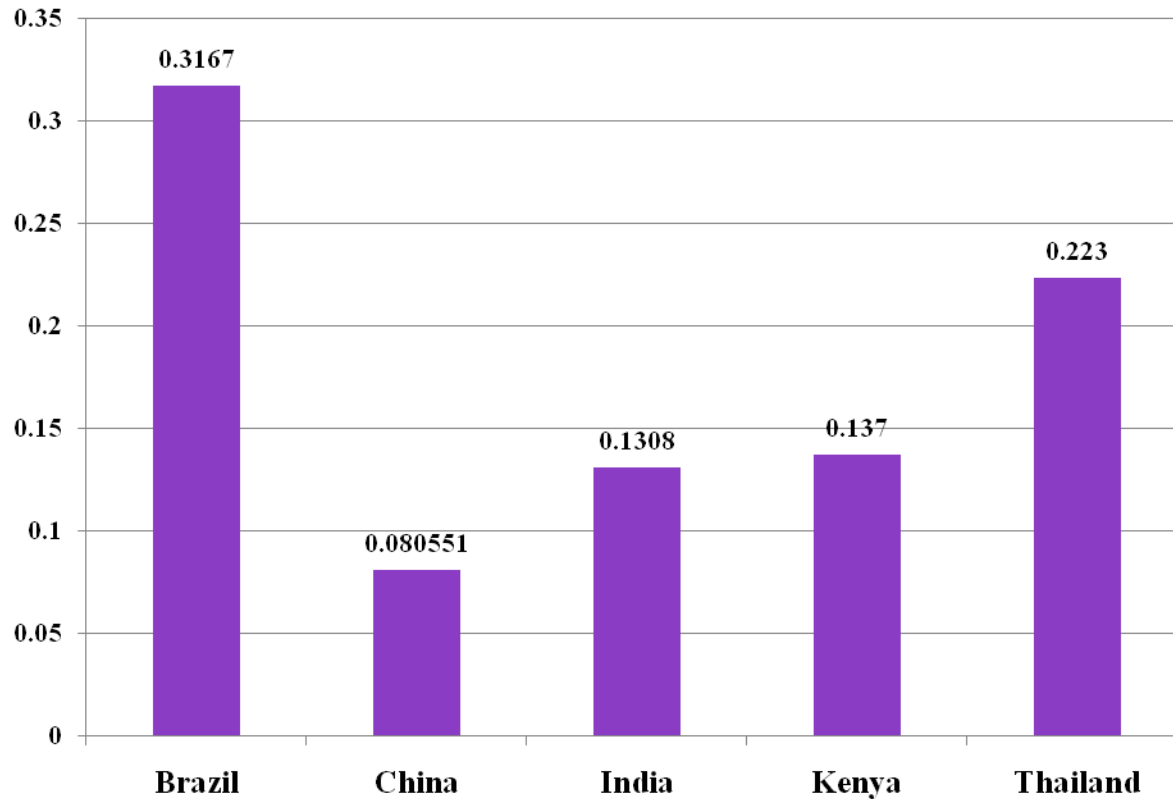
1961-2009 (Ha)



Source: Calculated based on the data from FAOSTAT

Arable Land Per Capita in Five Countries

Year 2009 (Ha)



China/Brazil=25.4%

China/India=61.6%

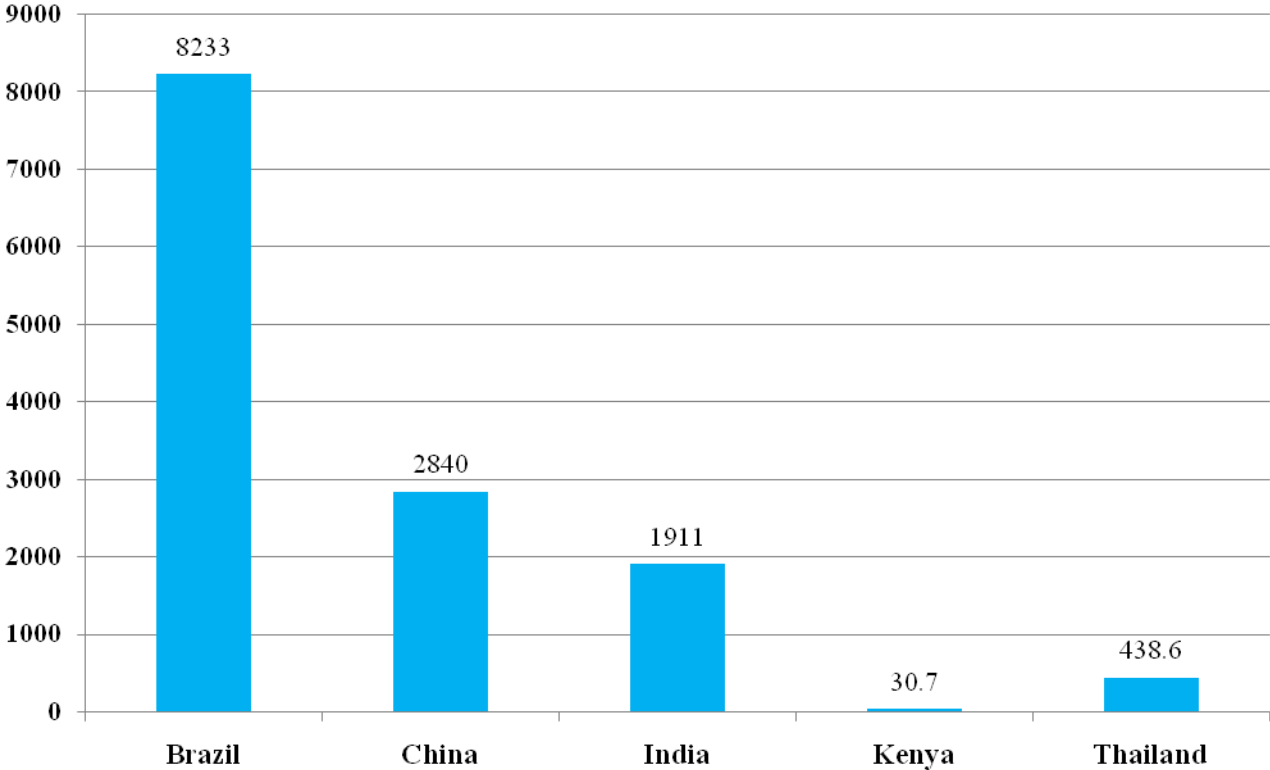
China/Kenya=58.8%

China/Thailand=36.1%

Source: Calculated based on the data from FAOSTAT

Water Resources in Five Countries

--Total renewable Year 2009, ($10^9 m^3/yr$)



China/Brazil=34.5%

China/India=149%

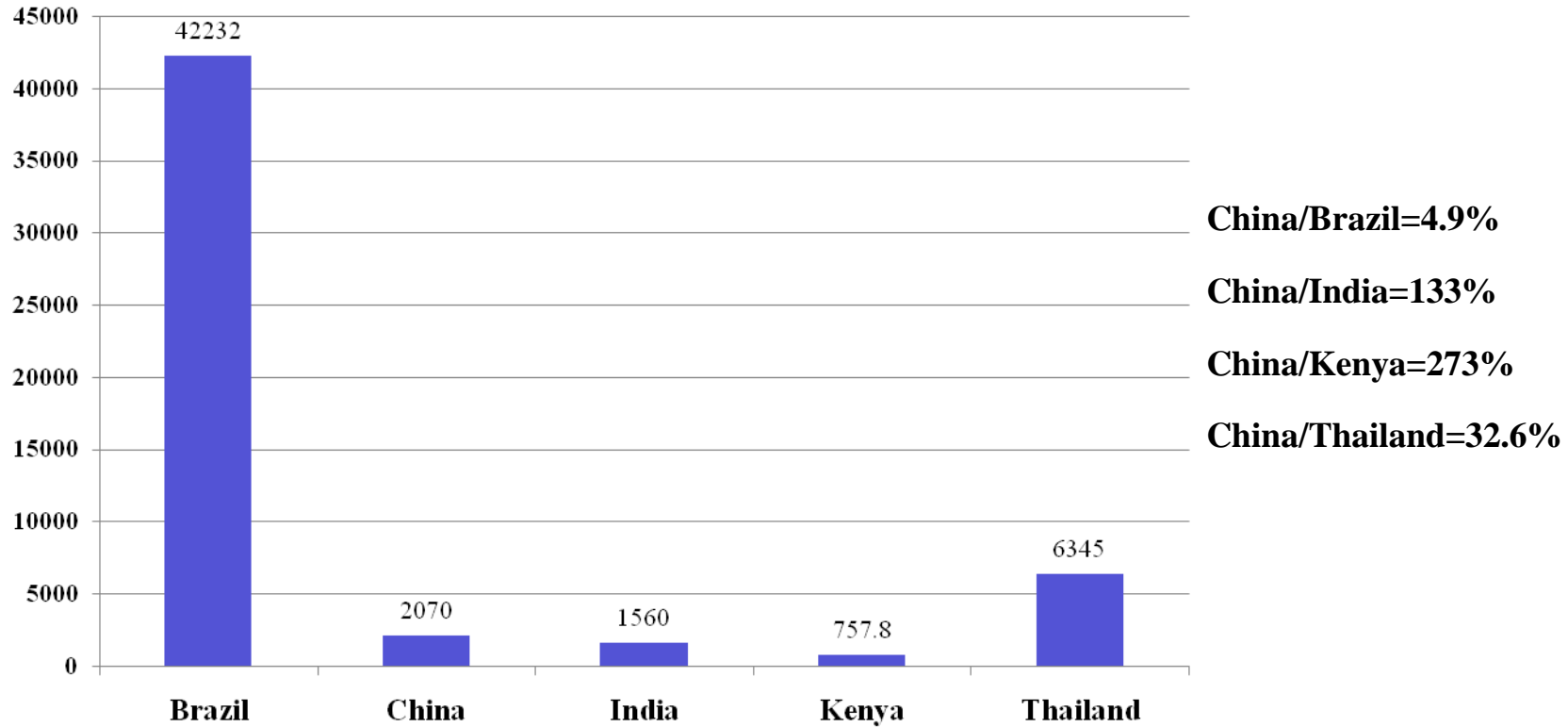
China/Kenya=9200%

China/Thailand=648%

Source: FAOSTAT

Water Resources in Five Countries

--Total renewable per capita, Year 2009, ($m^3/inhab/yr$)

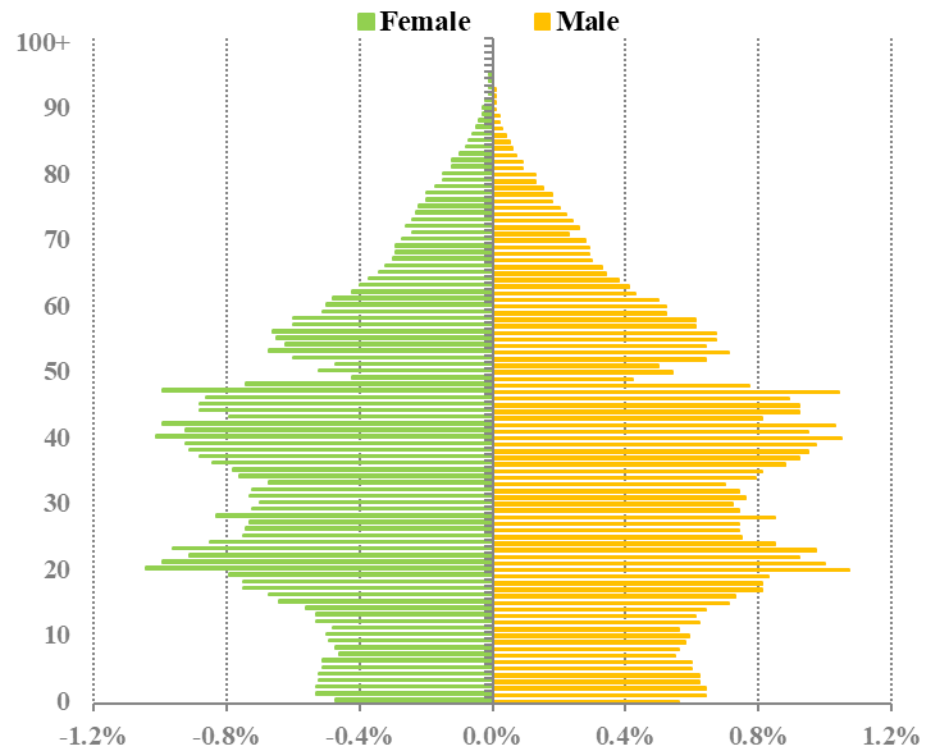


Source: Calculated based on the data from FAOSTAT

Concerns on food security in China

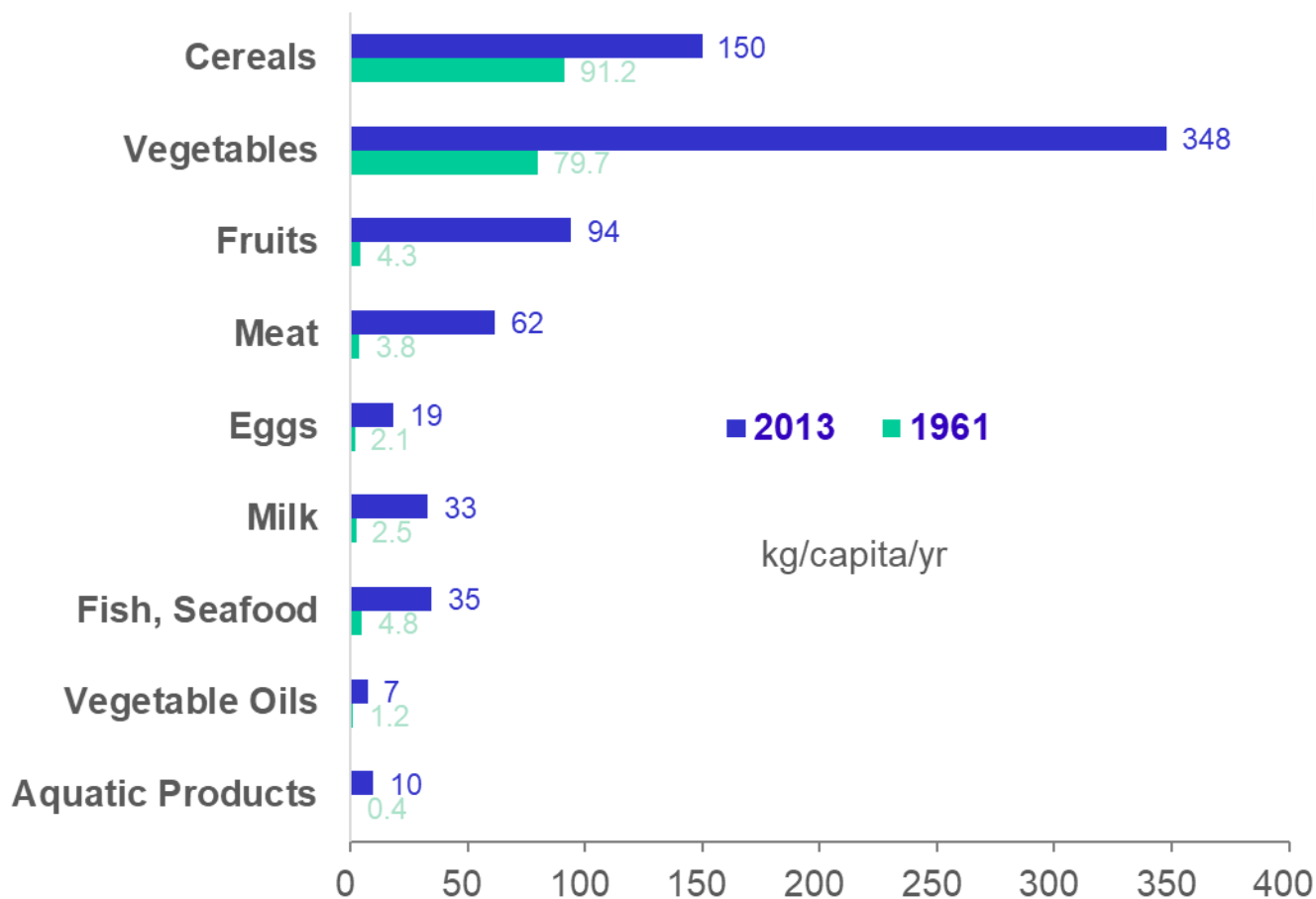
- ***Famine in 1942–43***
 - ✓ Mainly occurred in Henan province
 - ✓ 2 to 3 million people died
- ***Famine in 1959–61***
 - ✓ Claimed the lives of 17~30 million, the highest number of fatalities of any single historical event (Qian, Meng & Yared, 2015)

Population Pyramid in China (2010)



➤ Improvement in Food Consumptions in China

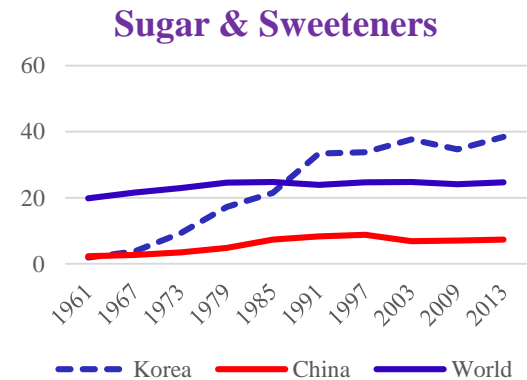
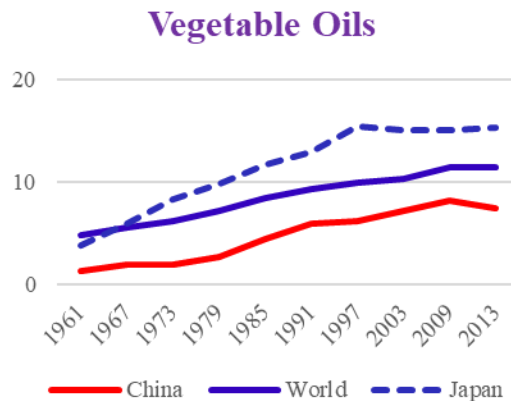
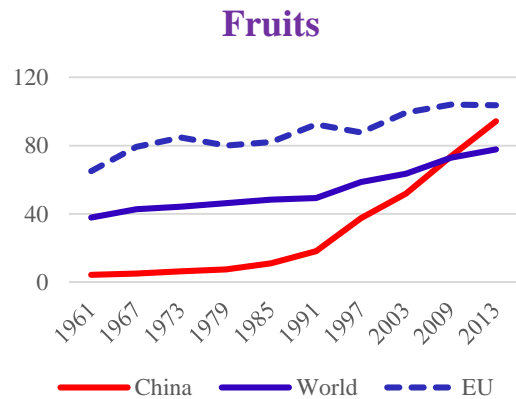
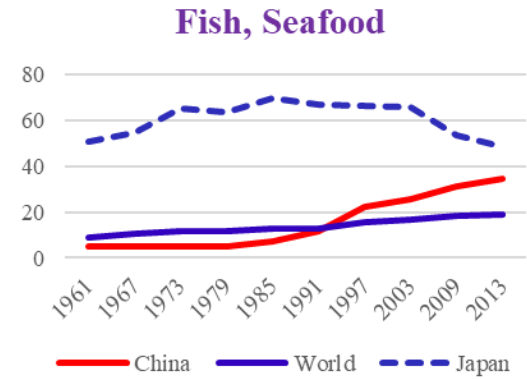
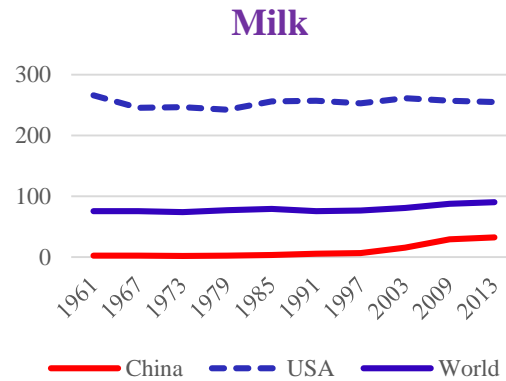
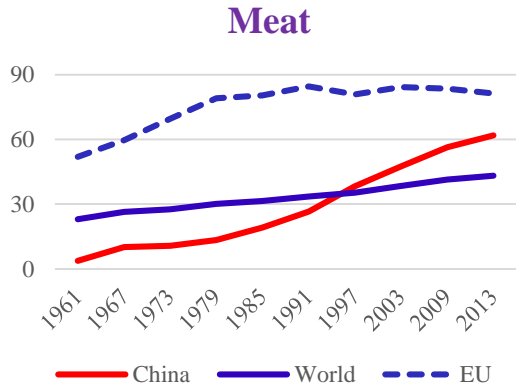
Per Capita Consumption of Major Food Items in China, 1960s-2010s



Note: Cereals excludes beer, fruits excludes wine, milk excludes butter, aquatic Products include aquatic animals & plants.
Sources: FAOSTAT “Food Balance Sheets”

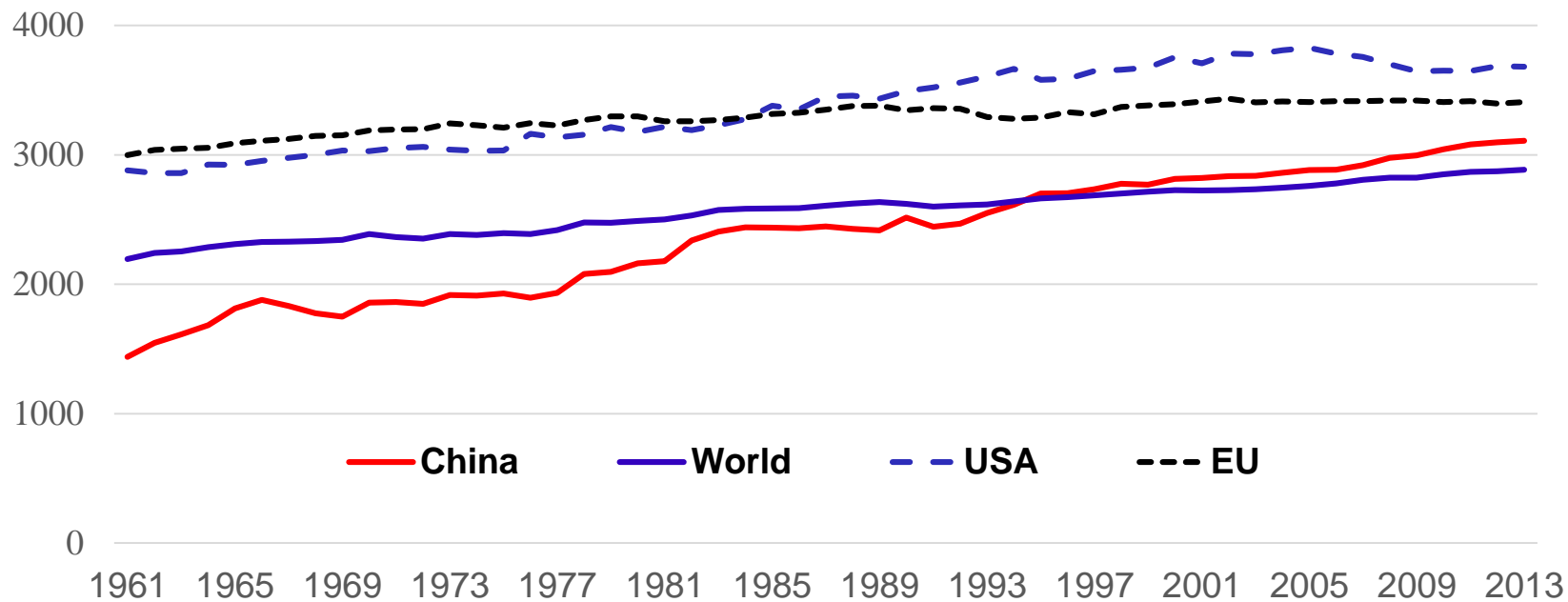
➤ Consumption of Food: China vs the World

**Food Supply Quantity Per Capita Year in China & World,
1960s-2010s (kg/capita/yr)**



➤ Daily Energy Intake: China vs World

Daily Energy Intake Per Capita in China & World, 1960s-2010s (kcal/capita/day)

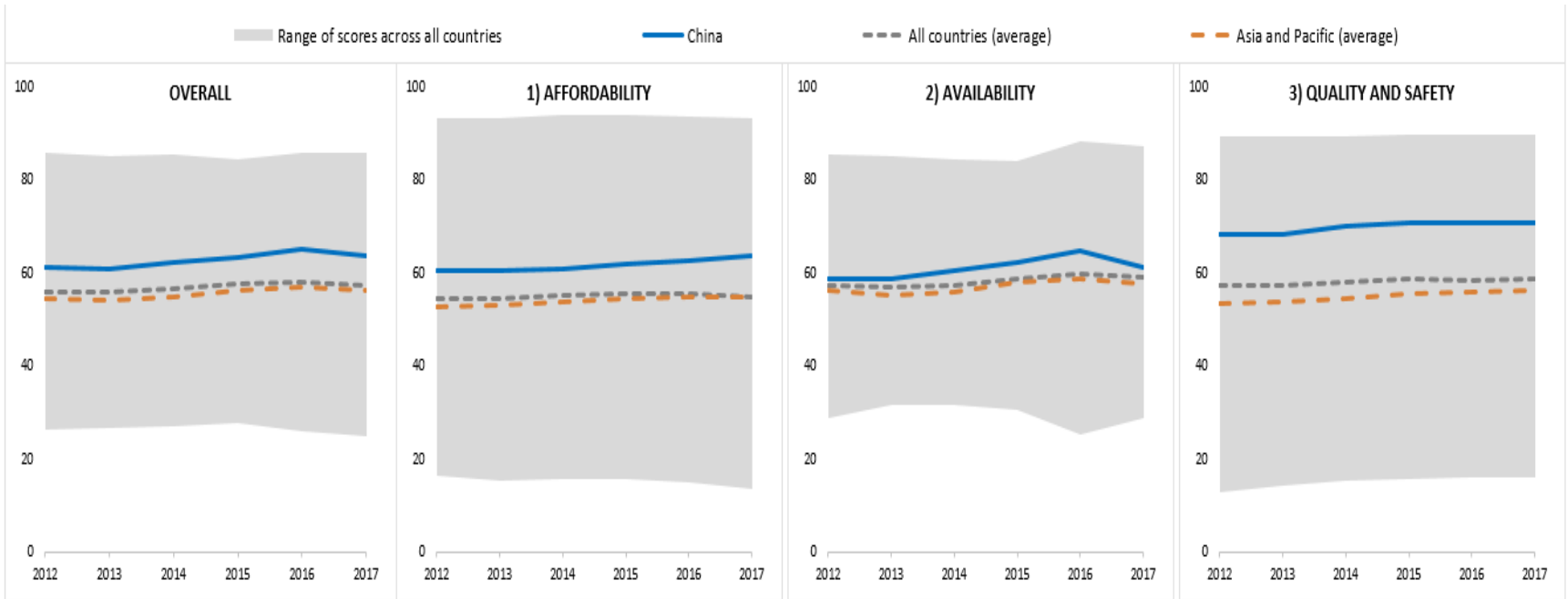


Sources: FAOSTAT "Food Balance Sheets"



➤ China Ranked 45th among 113 Countries in the 2017 GFSI Ranking

GFSI Scores Comparison between China and Other Countries (2012-2017)



Notes: score 0-100 where 100=best. Sources: EUI(2017) "Global Food Security Index 2017".



Outline

◆ Food Security Status in China

◆ **Policies to Achieve Food Security in China**

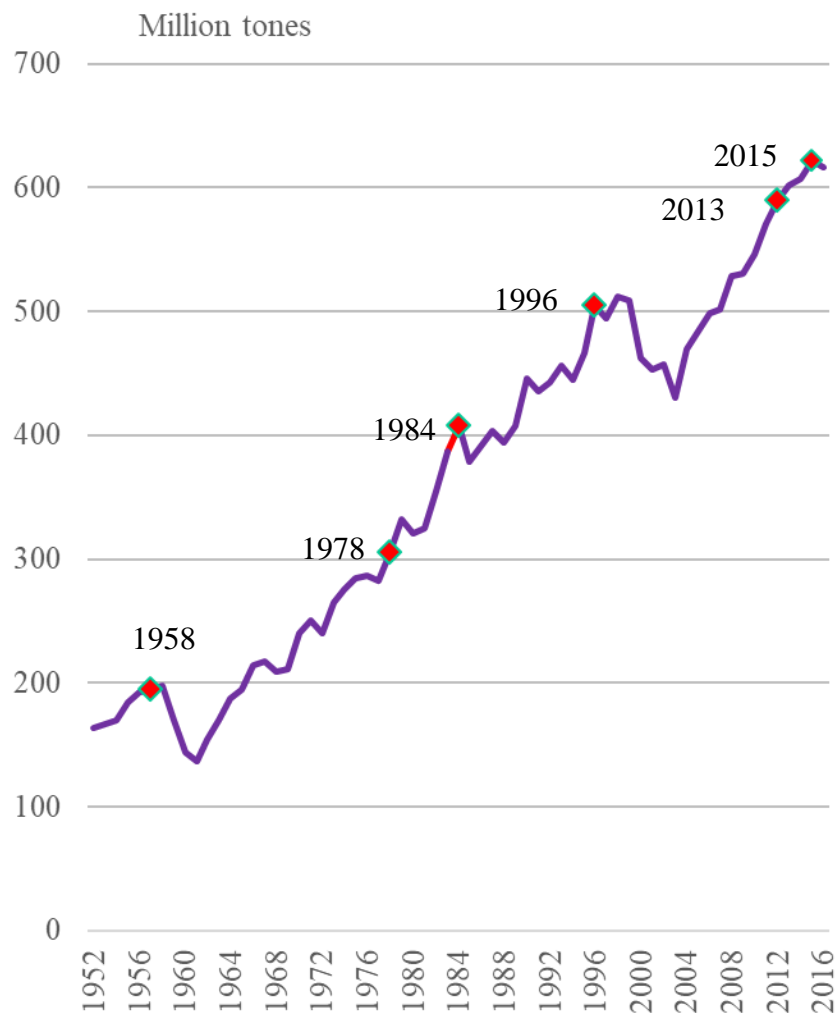
□ **Domestic production**

□ **International trade**

◆ Challenges and Future Perspective

□ Domestic production

China's Grain Output Growth, 1952-2016



China's Other Major Food Products output growth, 1980-2016 (Million tonnes)

Year	Meat	Fruits	Vegetables
1980	12	7	
1985	19	12	
1990	29	19	
1995	41	42	
2000	60	62	
2001	61	67	484
2002	62	70	529
2003	64	145	540
2004	66	153	551
2005	69	161	565
2006	71	171	540
2007	69	181	565
2008	73	192	592
2009	76	204	618
2010	79	214	651
2011	80	228	679
2012	84	241	709
2013	85	251	735
2014	87	261	760
2015	86	274	785
2016	85	284	798

Sources: NBSC "China Statistics Yearbook"(various years)

□ Domestic production

Policy Objective:

Self-sufficiency rate of >95% for grain supply, imports <5% of domestic consumption

*--State Council Information Office of the People's Republic of China:
The Grain Issue in China (Oct. 1996)*

Policy Measures:

- ✓ **Institutional reform:**
- ✓ **Investment in agricultural technology**
- ✓ ***From taxation to overall support***

✓ Institutional reform:

Before 1978:

supply—limited

demand—rationed

price—controlled low

**Compulsory procurement & rationing at
administered low prices, under the planned
economy and communal system**

✓ Institutional reform:

- * **From collective farming to household responsibility system**
 - **Organizational reform: greater incentive provided by output-related reward system, various household responsibility system, family farming;**

- * **From central planned distribution to market system**
 - 1985: from central purchasing system
to two-track purchasing system**
 - 1990: 30% by private operator;
+ 70% by government enterprises (semi-business)**
 - 1998: “three-policies”
against oversupply and low price since 1996**
 - 2004: market system; overall integration**

✓ Institutional reform:

Reform after 1978:

production: Household responsibility system

price: raised, two-tracked

Organizational reform: greater incentive provided by output-related reward system, various household responsibility system, family farming;

Marketing reform: raising procurement price, opening free market with increasing shares, freer market;

✓ Investment in agricultural technology

- **R&D, infrastructure, & inputs:**

Development of biotech: dwarf & semi-dwarf varieties, hybrid rice, GM crops, and etc.;

Extension of improved farming practice;

Public investment in irrigation, roads, transportation & storage facilities;

Increased supply of modern inputs (sometimes subsidized);

Widely spread of machinery services to individual farmers

✓ Investment in agricultural technology

- **Government Agricultural R&D + Intensity**

1978: ¥0.4 billion ; 0.39%

2000: ¥2.4 billion ; 0.16%

2015: ¥26.0 billion ; 0.60%

- **TFP growth**

1985-2004: 3% annually on average

Yield increase

Breeding, fine variety, soil improvement, cropping management, plant protection, etc.

✓ Taxation to support

From taxation to overall support

Before 2004: agricultural tax

Since 2004:

- remove agricultural tax

- start agricultural direct subsidy

Ag-machinery subsidy, ag-inputs subsidy, fine variety seeds subsidy, grain production direct payment; (2012: ¥ 170billion)

from 2016: general support subsidy

- **Start price support:**

2004: minimum purchase price for rice and wheat

2008: temporary storage price for maize and soybean

2011 and 2012: temporary storage price for cotton and sugar

Grain production:

consecutive growth for 12 years (2004-2016)

□ **Agricultural international trade**

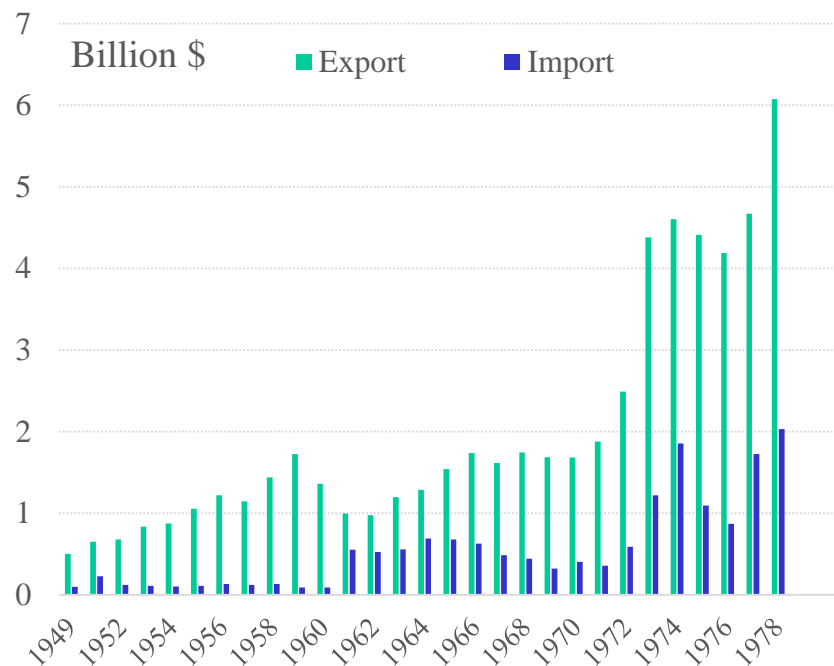
- **Before 1978: trade “as needed”**
- **1979-1991**
 - **Dual system, exploration of opening up**
- **1992-2001**
 - Deepening reform, acceleration of opening up**
- **2002-**
 - **Integration with world market**

Phase I: 1949-1978

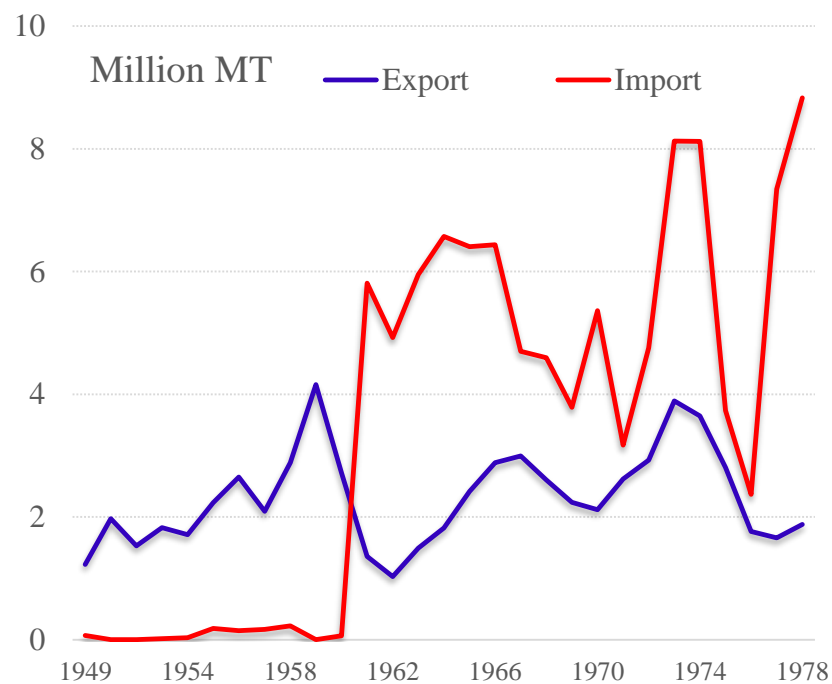
– Low level

– Net exporter *foreign exchange earner*

China's Agricultural Trade, 1949-1978



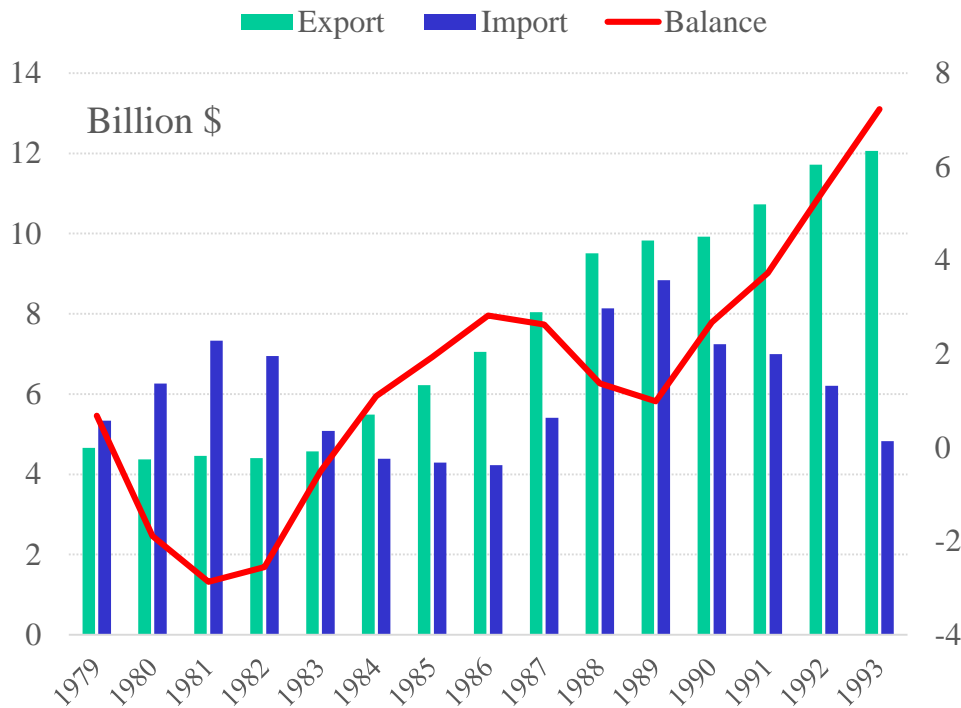
China's Cereals Trade, 1949-1978



Phase II: 1979-1991

- Growing in volume
- Comparative advantage
- Net exporter

China's Agricultural Trade Balance, 1979-1993



Source: China Customs

China's Trade of Selected products, 1980-1990

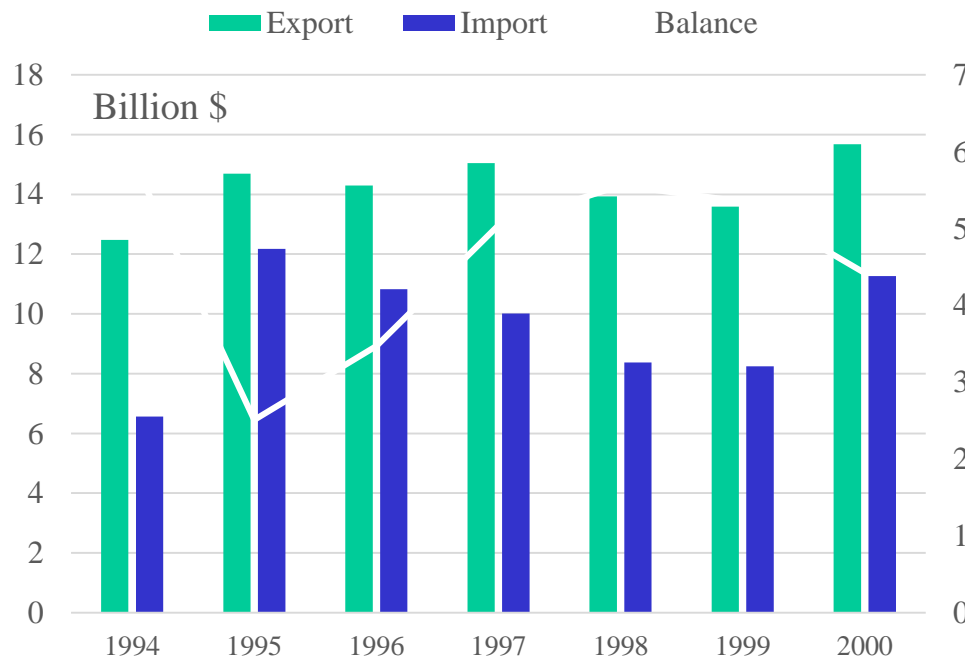
Billion \$	1980	1985	1990
Export			
Live Animals and Meat	0.8	0.8	1.2
Aquatic products	0.4	0.3	1.4
Cereals, Oilseeds and Vegetable Oil	0.5	1.3	1.2
Vegetable and Fruits	1.1	1.3	2.3
Import			
Live Animals and Meat	0.0	0.0	0.1
Aquatic products	0.0	0.0	0.1
Cereals, Oilseeds and Vegetable Oil	2.5	1.1	2.5
Vegetable and Fruits	0.1	0.1	0.1

Phase III: 1992-2001

- Fluctuation
- Adjusting to domestic production-consumption
- Soybean imports growing

Preparing to join WTO

China's Agricultural Trade



Net Import of China's Cereals (Million MT)

	Cereals	Rice	Wheat	Maize	Soybean
1994	2.6	-1.0	7.2	8.7	-0.8
1995	19.8	1.6	11.4	5.1	-0.1
1996	9.6	0.5	7.7	0.2	0.9
1997	-4.2	-0.6	1.5	-6.7	2.7
1998	-5.0	-3.5	1.3	-4.4	3.0
1999	-4.0	-2.5	0.3	-4.3	4.1
2000	-10.7	-2.7	0.7	-10.5	10.2

Source: China Customs

Notes: "+" means net import, while "-" means net export

Phase IV: 2002--

- **Joined WTO** (2001.12)



- **Tariff cuts**

- ✓ *17.9% in 2001 to 15.2% in 2016*

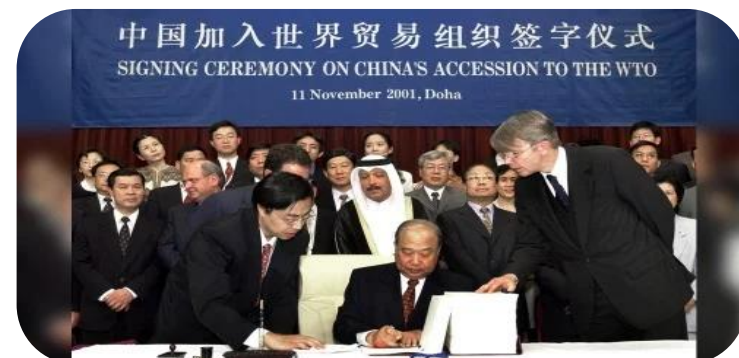
- **Establish a Tariff Rate Quota (TRQ) import system**

- ✓ *wheat, corn, rice, sugar, cotton, wool*

- **Reduce the export subsidies and state trading**

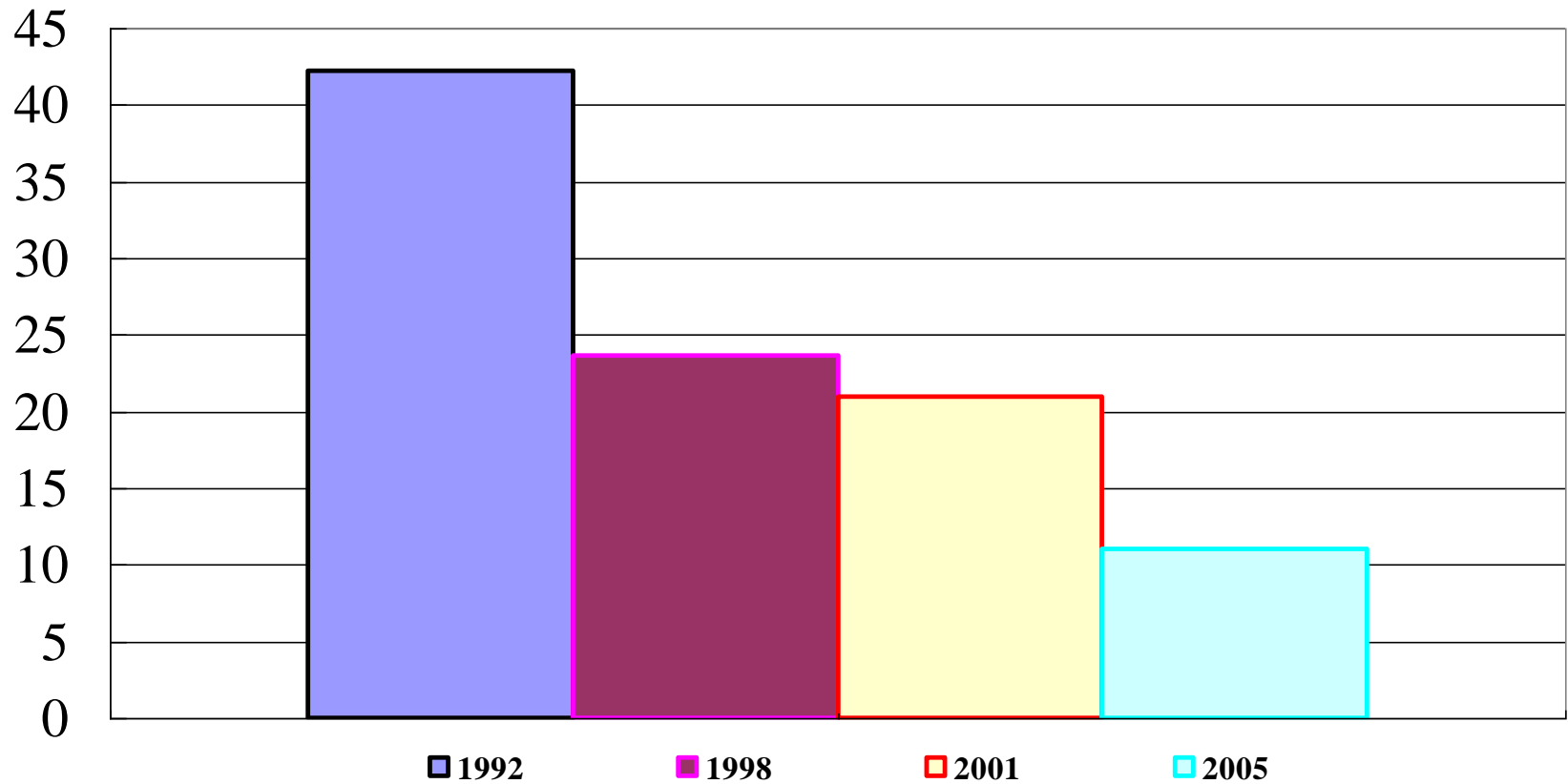
- **Cap domestic agricultural support**

- *8.5% AMS*



-- Tariffication and reduction of tariff

Agricultural tariff rate (%):

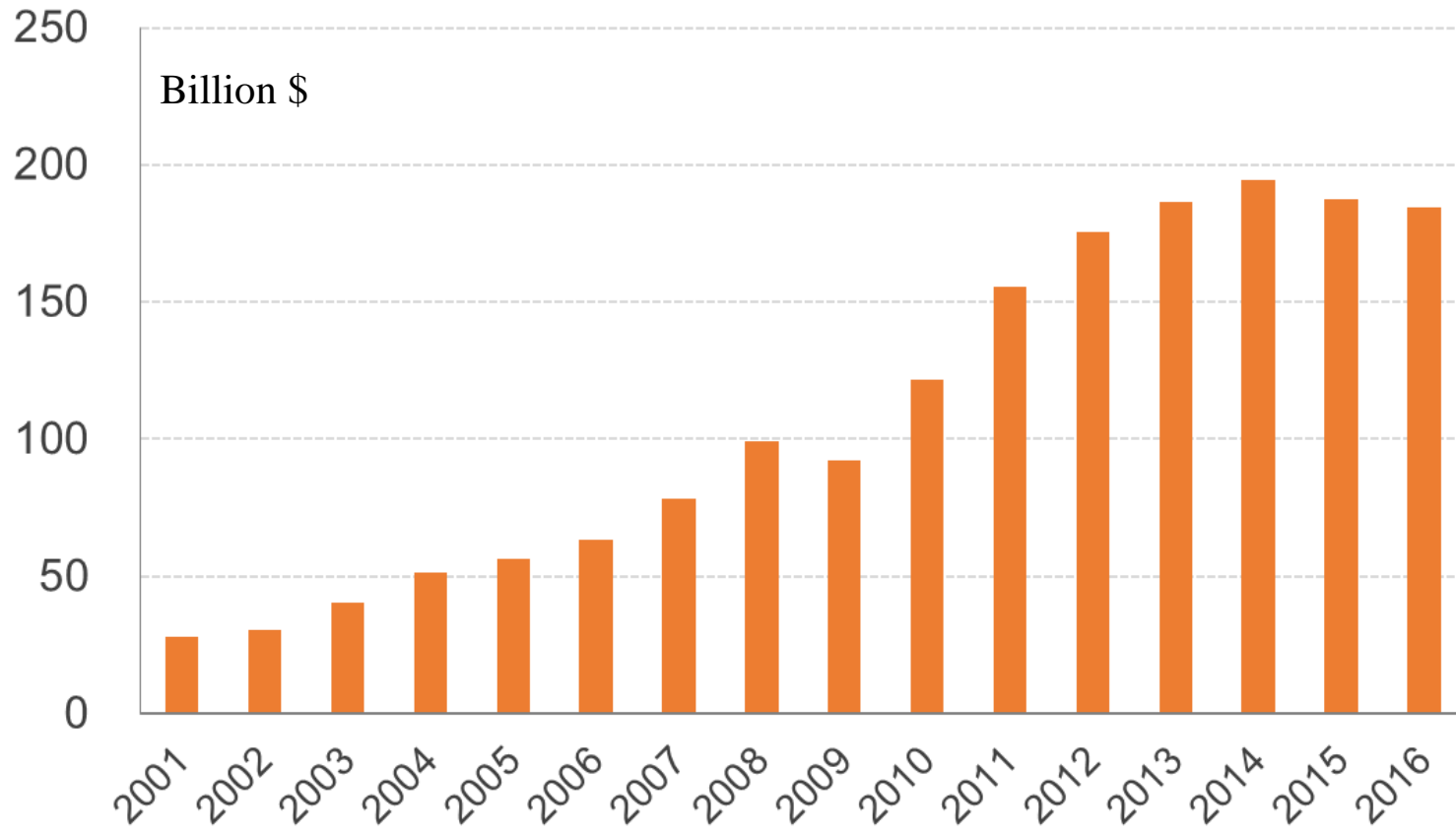


TRQs of Main Agricultural Products in China (Unit: mmt)

Item	2002	2003	2004
Wheat	8.47	9.05	9.64
Maize	5.85	6.52	7.20
Rice	3.99	4.66	5.32
Soybean	2.52	2.82	3.12
Sugar	1.76	1.85	1.94
Cotton	0.82	0.86	0.89

- **Increasing Trade Volume**

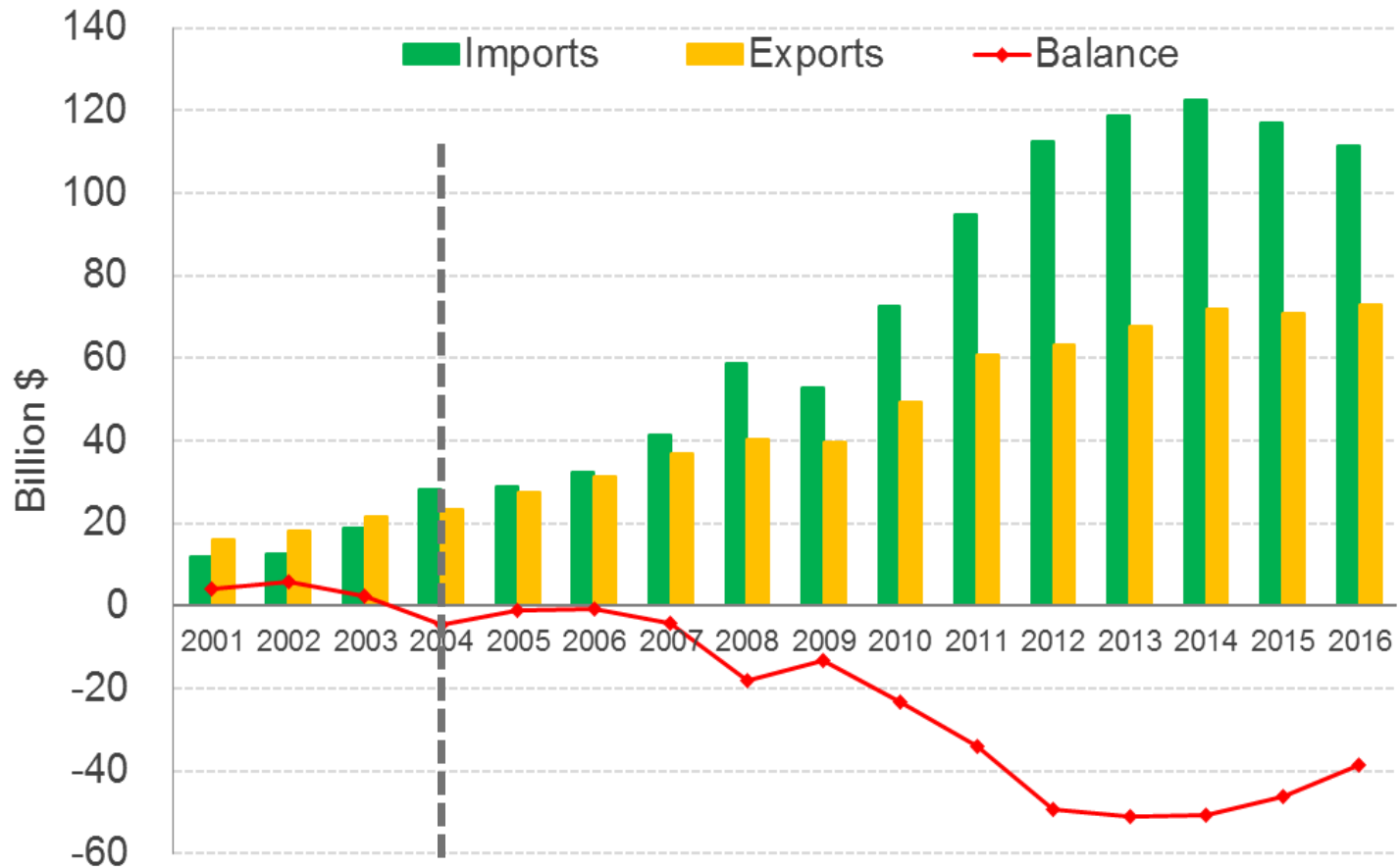
China Agricultural Trade, 2001-2016



Source: China Customs

- **Growing Net Importer**

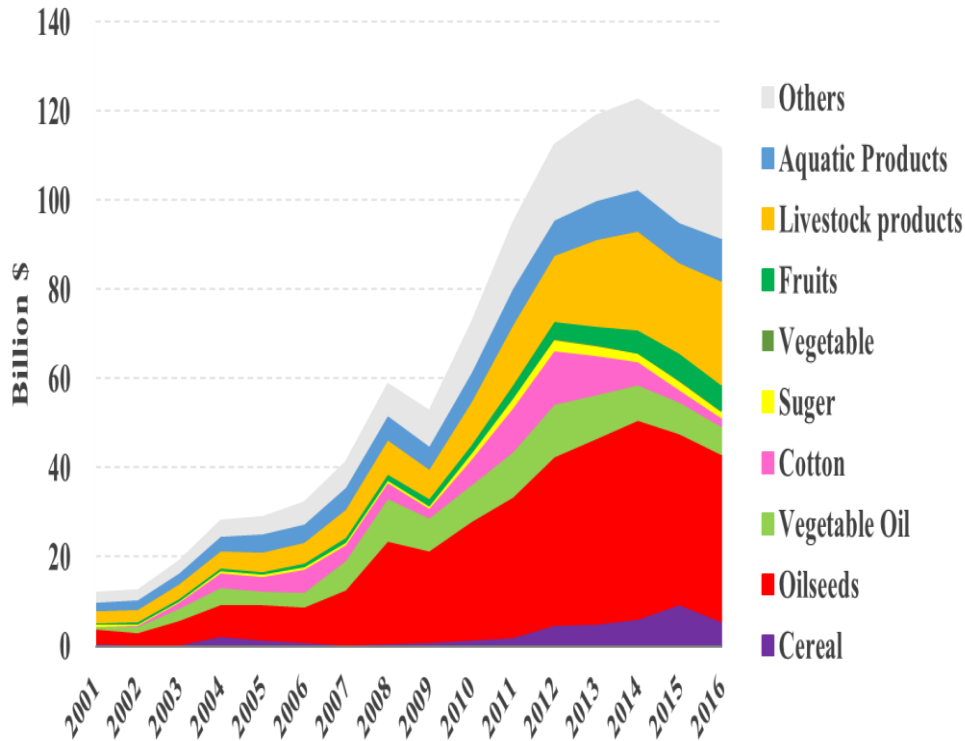
China Agricultural Trade Balance, 2001-2016



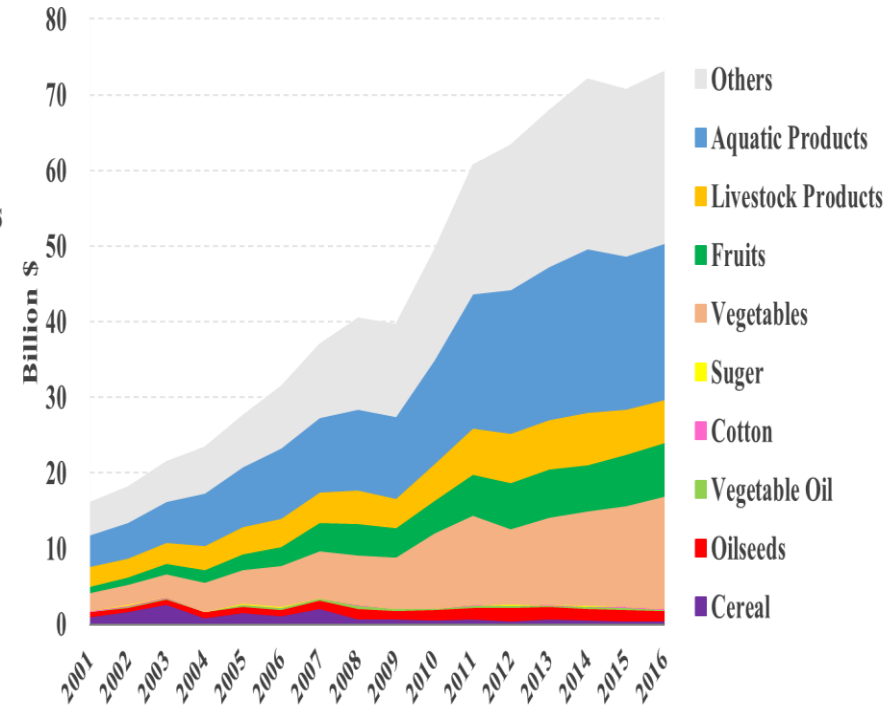
Source: China Customs

- Increasingly Revealed Comparative Advantage/Disadvantage

China's Agricultural Import Structure, 2001-2016



China's Agricultural Export Structure, 2001-2016



- Import **land-intensive** products
 - cereal, oilseeds

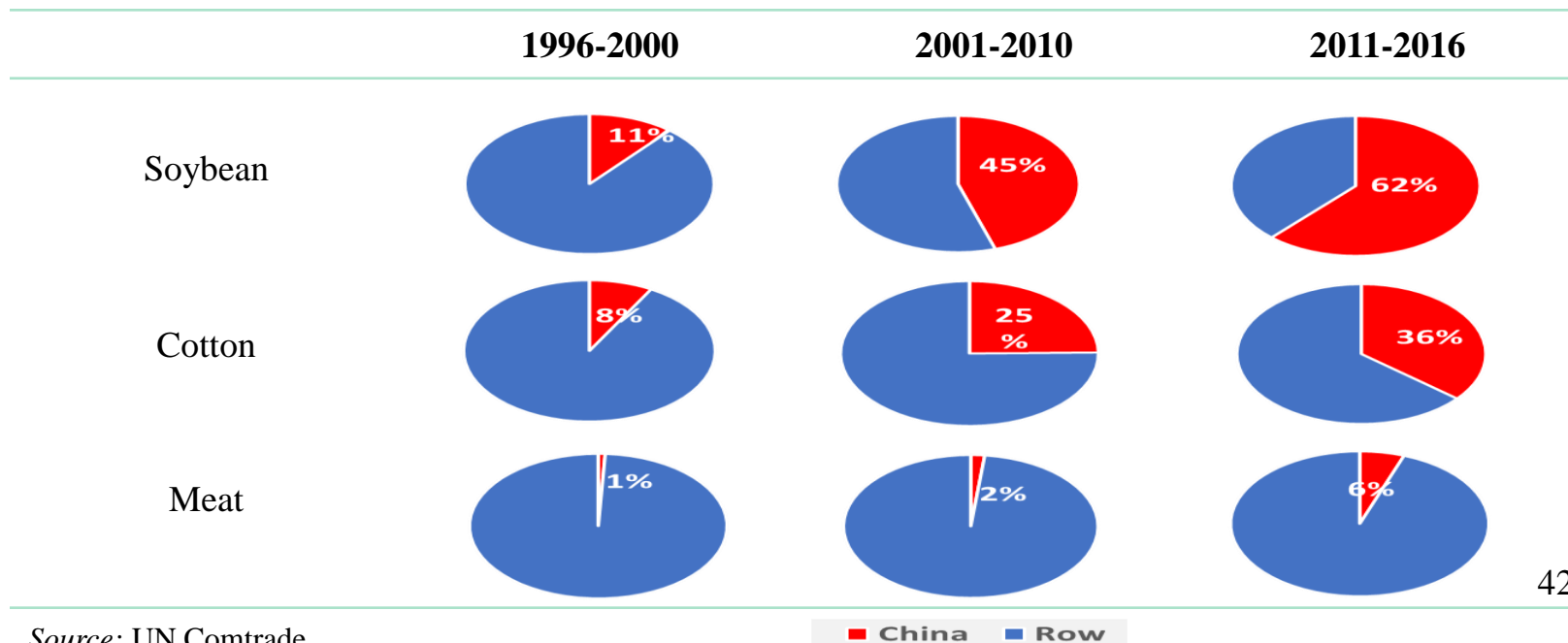
- Export **labor-intensive** products
 - vegetables, fruits,

• Growing Imports: China vs the World

Changes of Top 5 Importers of Agro-products in the World

Rank	2000	2005	2010	2012	2014	2016
1	EU	EU	EU	EU	EU	EU
2	USA	USA	USA	China	China	USA
3	Japan	Japan	China	USA	USA	China
4	China	China	Japan	Japan	Japan	Japan
5	Canada	Canada	Russia	Russia	Russia	Canada

China's Share of Global Agricultural Import Market

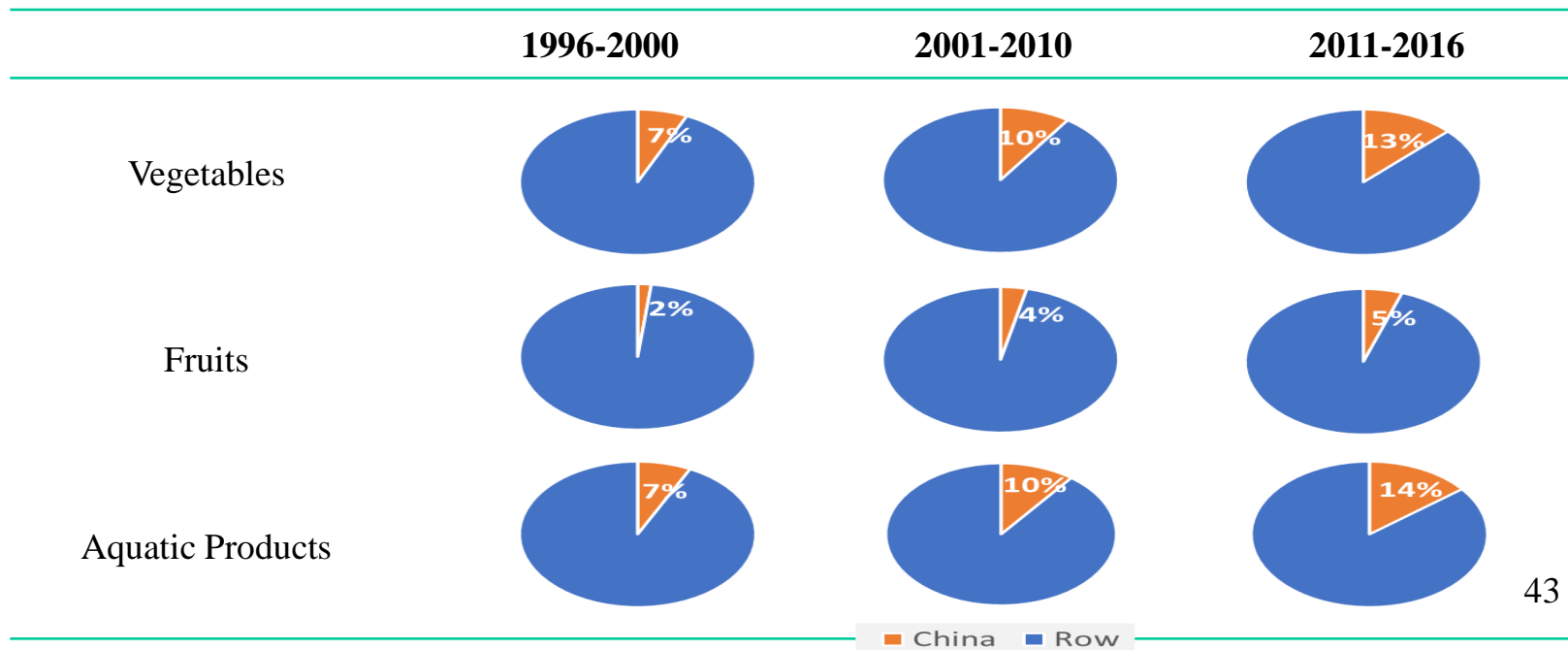


• Growing Exports: China vs the World

Changes of Top 5 Exporters of Agro-products in the World

Rank	2000	2005	2010	2012	2014	2016
1	EU	EU	EU	EU	EU	EU
2	USA	USA	USA	USA	USA	USA
3	Canada	Canada	Brazil	Brazil	Brazil	Brazil
4	China	Brazil	China	China	China	China
5	Australia	China	Canada	Canada	Canada	Indonesia

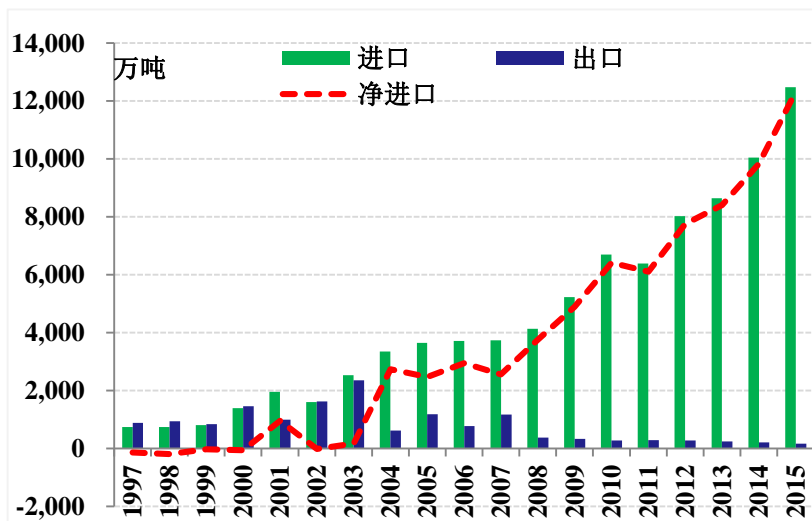
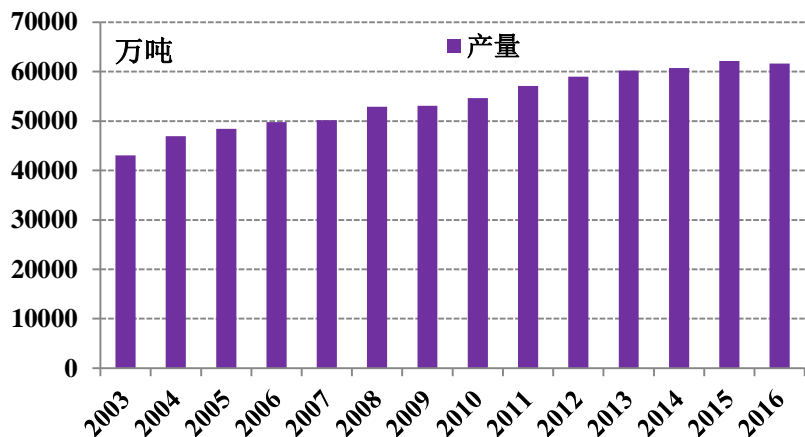
China's Share of Global Agricultural Export Market



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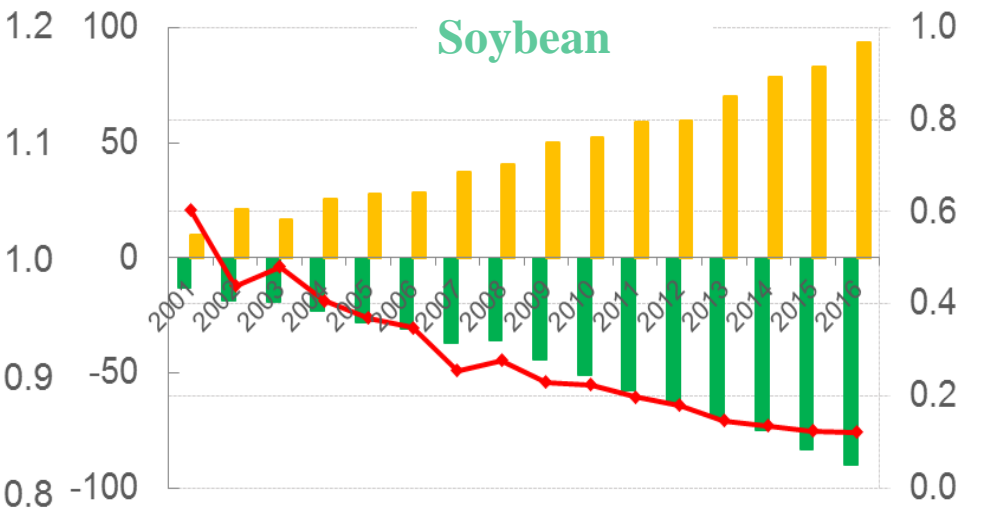
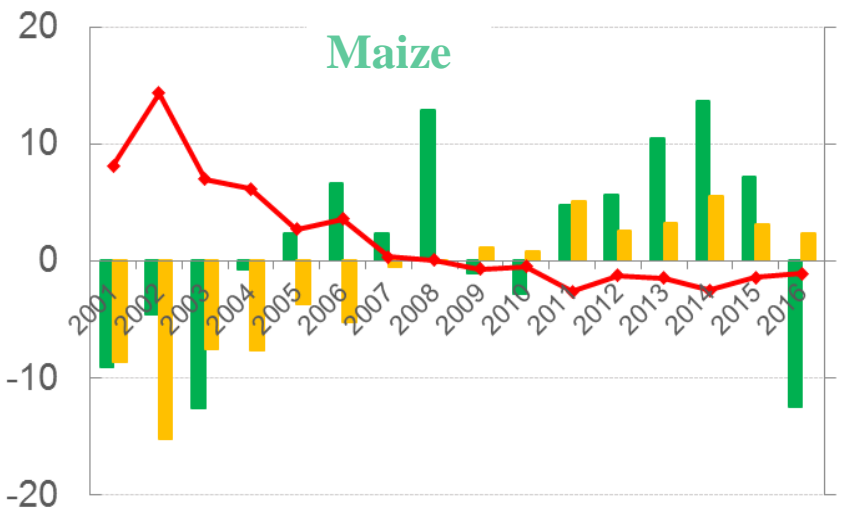
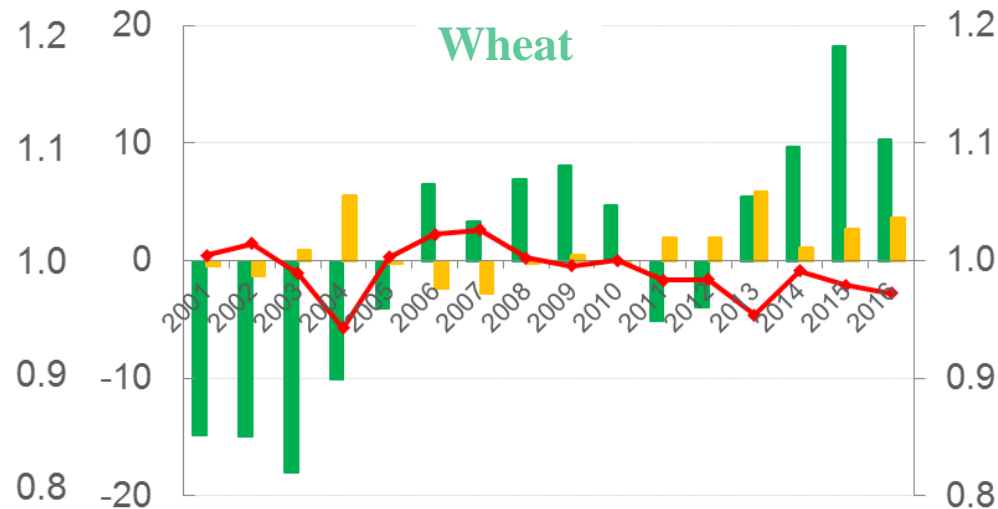
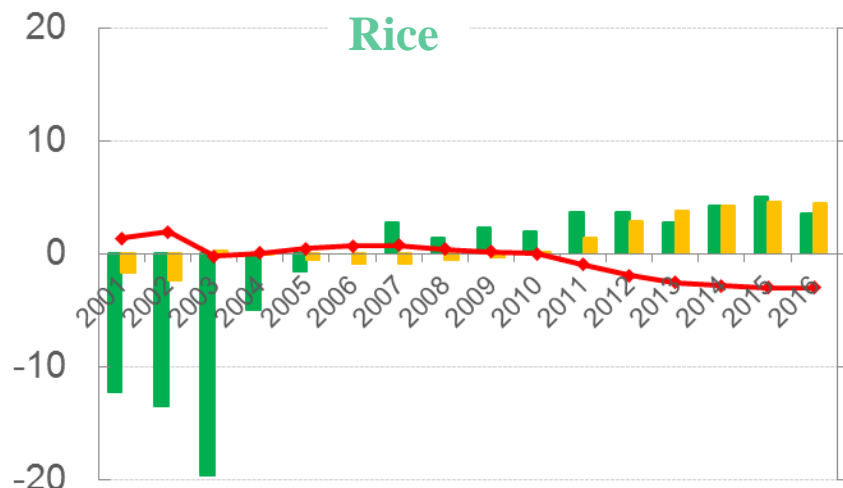
“Triple-high” : production, import and storage



item	year	Supply (10000mt)	consumption (10000mt)	Year-end storage (10000mt)
Rice	2012	20914	17284	3572
	2013	21437	17117	4272
	2014	22410	17485	4862
	2015	23401	17392	5423
wheat	2012	13880	12500	2804
	2013	13873	11650	3409
	2014	14993	11650	4135
	2015	16149	11400	5560
maize	2012	20998	16765	4225
	2013	24860	16389	8469
	2014	30662	14307	16314
	2015	37794	15447	22341
soybean	2012	8014	7459	529
	2013	8839	7953	871
	2014	10076	8892	1168
	2015	10599	9196	1385

SSRs of Selected Food Products in China, 2001-2016

■ Gap (Production - Consumption) (mn MT)
 ■ Net Imports (mn MT)
 —●— Self-sufficiency Rate (right axis)



Source: USDA

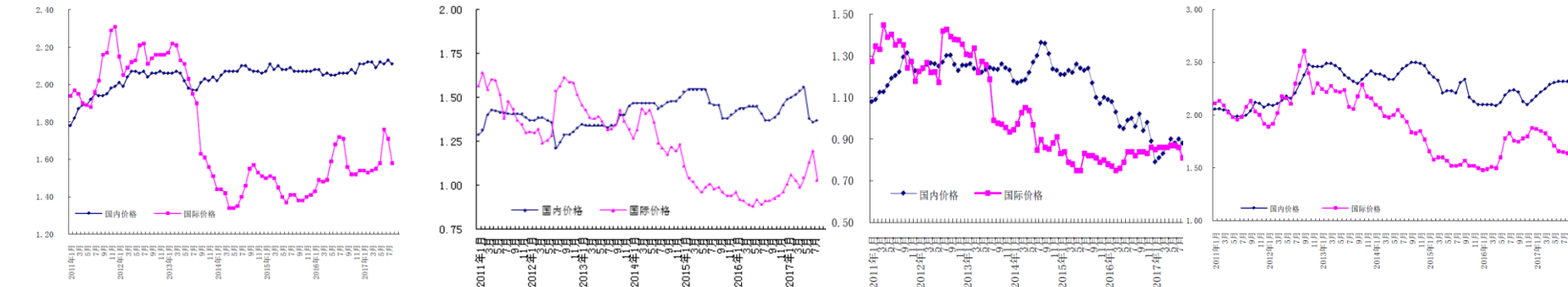
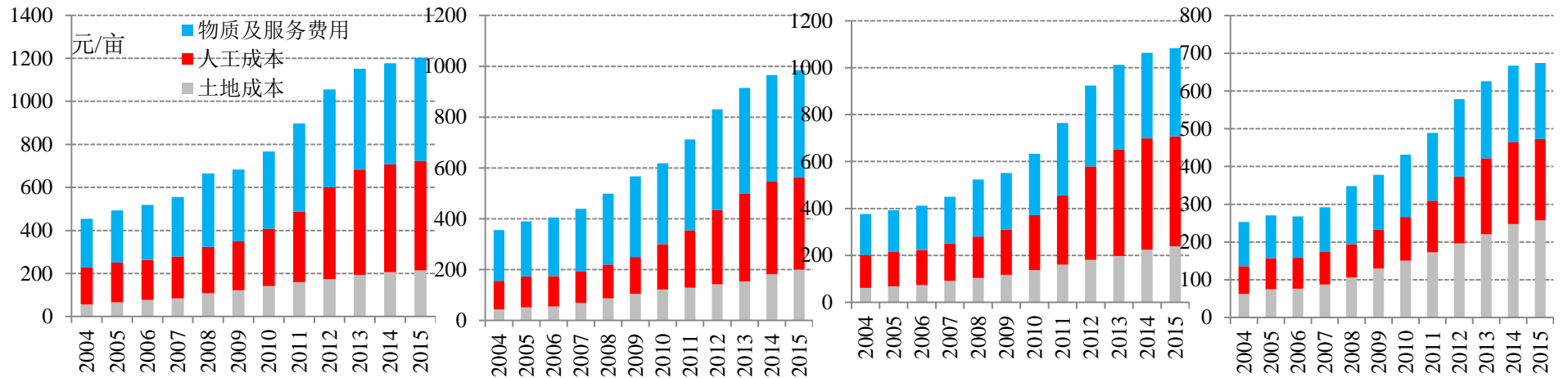
➤ “Double-pressure” : increasing production cost vs. decreasing world price

(a) 稻米

(b) 小麦

(c) 玉米

(d) 大豆



2019/8/28

Cost Changes of Selected Crops, China vs. US, 2010-2015 (RMB/kg)

		2010	2011	2012	2013	2014	2015	Growth Rate (2010-2015)
Rice	CHN	1.68	1.90	2.17	2.41	2.40	2.41	43.5%
	USA	1.75	1.86	1.76	1.75	1.72	1.64	-6.3%
Wheat	CHN	1.63	1.78	2.11	2.39	2.21	2.29	40.5%
	USA	1.42	1.79	1.57	1.82	1.93	1.76	23.9%
Maize	CHN	1.36	1.58	1.83	2.02	2.08	2.15	58.1%
	USA	1.00	1.10	1.35	1.06	0.98	0.99	-1.0%
Soybean	CHN	2.85	3.27	3.87	4.45	4.56	4.78	67.7%
	USA	2.02	2.18	2.33	2.48	2.24	2.27	12.4%
Cotton	CHN	14.21	16.00	18.01	20.72	19.07	19.93	40.3%
	USA	11.65	18.78	14.71	16.50	14.06	13.37	14.8%

➤ **“Double constraints” : “Amber box” measures & environmental degradation**

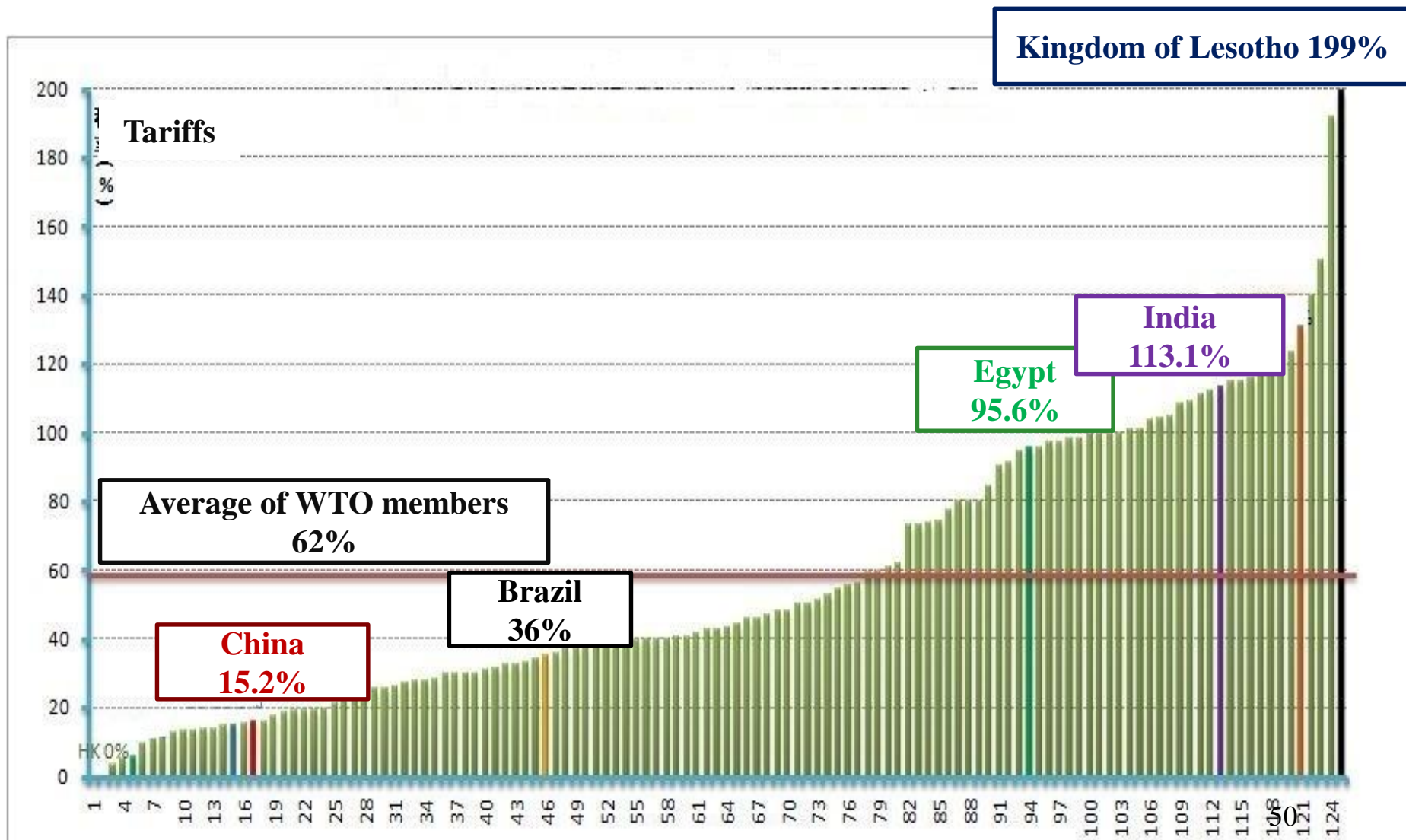
Estimates of “Amber-box” support level and percentage

(2005-2013) ,100 million Yuan; %

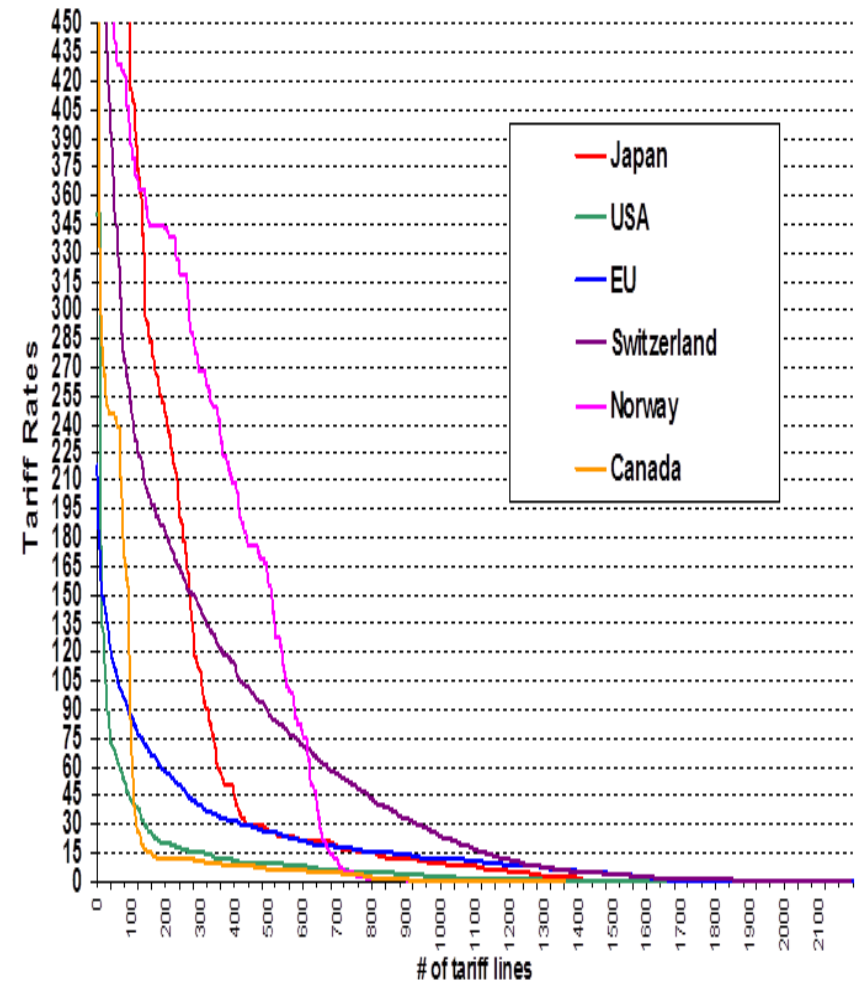
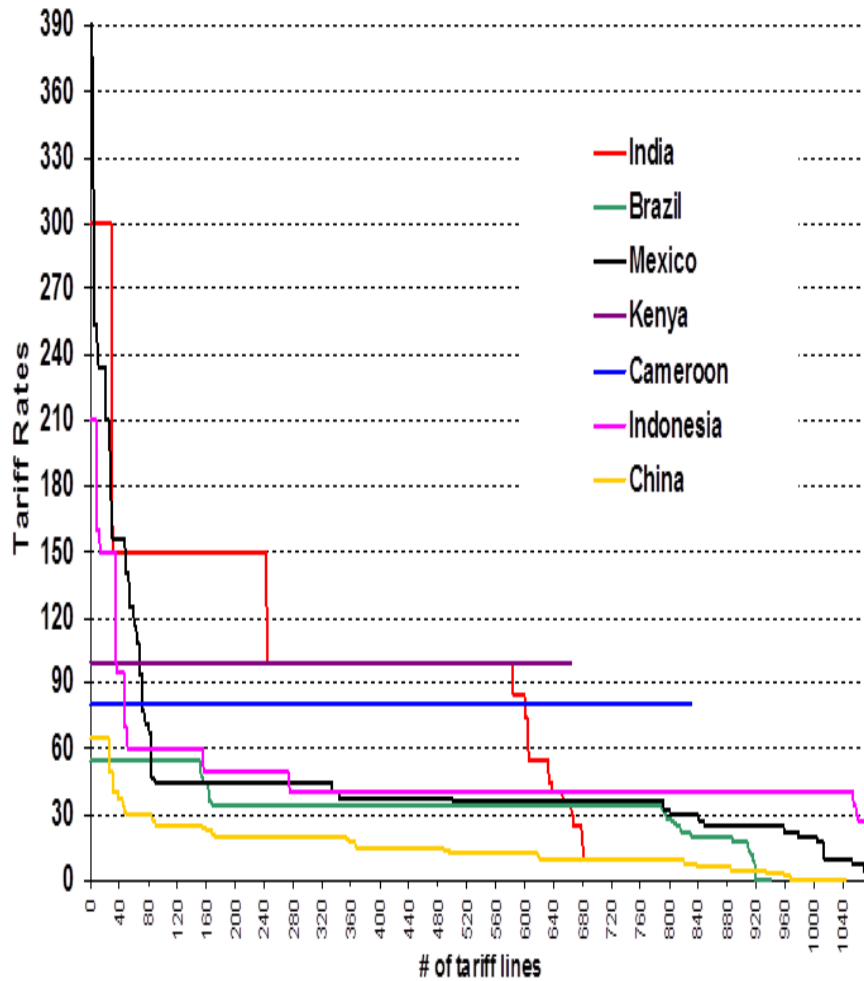
item	项目	2005	2006	2007	2008	2009	2010	2011	2012	2013
wheat	value	1619	1614	1828	1862	2128	2281	2441	2622	2873
	Amber support	10.6	-106.4	-72.3	-65.2	44.5	58.5	37.6	116.5	82.5
	%	0.7	-6.6	-4.0	-3.5	2.1	2.6	1.5	4.4	2.9
rice	value	2980	2777	3285	3650	3866	4620	5408	5640	5559
	Amber support	28.4	29.3	40.2	73.8	83.2	75.6	79.2	77.5	78.8
	%	-4.0	-3.1	1.1	0.8	2.1	1.6	1.5	1.4	2.8
maize	value	1993	2087	2367	2405	2689	3319	4090	4570	4755
	Amber support	1.8	3.7	3.7	61.7	142.6	58.2	48.9	50.4	73.1
	%	0.1	0.2	0.2	2.6	5.3	1.8	1.2	1.1	1.5
soybean	value	646	531	495	573	552	584	591	617	560
	Amber support	1.1	1.1	1.1	5.8	25.5	23.8	23.2	44.4	22.1
	%	0.2	0.2	0.2	1.0	4.6	4.1	3.9	7.2	4.0

source: Zhu and Cheng (2015)

Average Agriculture Tariff Rate of WTO Members



Tariff Rates of Major Developing and Developed Countries



Source: WTO

WTO: domestic support

- **Amber box measures**
- **Green box measures**
- **Blue box measures**

Limits on **AMS support**

- ***De minimis* limits on AMSs: 103 members**
 - 10% of value of production for 97 developing countries
 - **8.5% for China** and Kazakhstan
 - 5% of value of production for 4 developed countries
- **Bound Total AMS: 32* members**
 - 17 developing countries
 - 15 developed countries
 - Ranging from USD 0.5 million to USD 99 billion



WTO: China-US dispute **DS 511**



What is the DS511 dispute about?

- **Support through some policies is subject to limits**
 - One AMS for each product *Aggregate Measurement of Support*
 - Product's AMS = market price support (MPS) + payments
 - » WTO MPS is different from economic MPS
 - Administered price, not domestic market price
 - Fixed external reference price FERP, not contemporaneous border price
 - 1986-88 fixed years for original members
 - Eligible production, not total production
- **China's WTO limits on AMSs**
 - 8.5% of product's value of production in each year
- **US claims AMSs exceeded limits**
 - Wheat, rice (*Indica* and *Japonica*) and corn
 - In 2012, 2013, 2014, and 2015
 - » Can calculate excess in 2015 of RMB 665 billion or more than \$100 billion

WTO: DS 511

2016年9月13日，美国向WTO起诉中国，

2016年9月20日WTO秘书处向成员国发送（circulate）

2016年 10月20日，磋商会议，

2016.12.5.美国要求WTO 争端解决机构(Dispute Settlement Body, DSB) 建立专家组

2017.6.26 WTO文件（WT/DSS11/9）宣布专家组成员名单，以及28个利益相关第三方国家名单

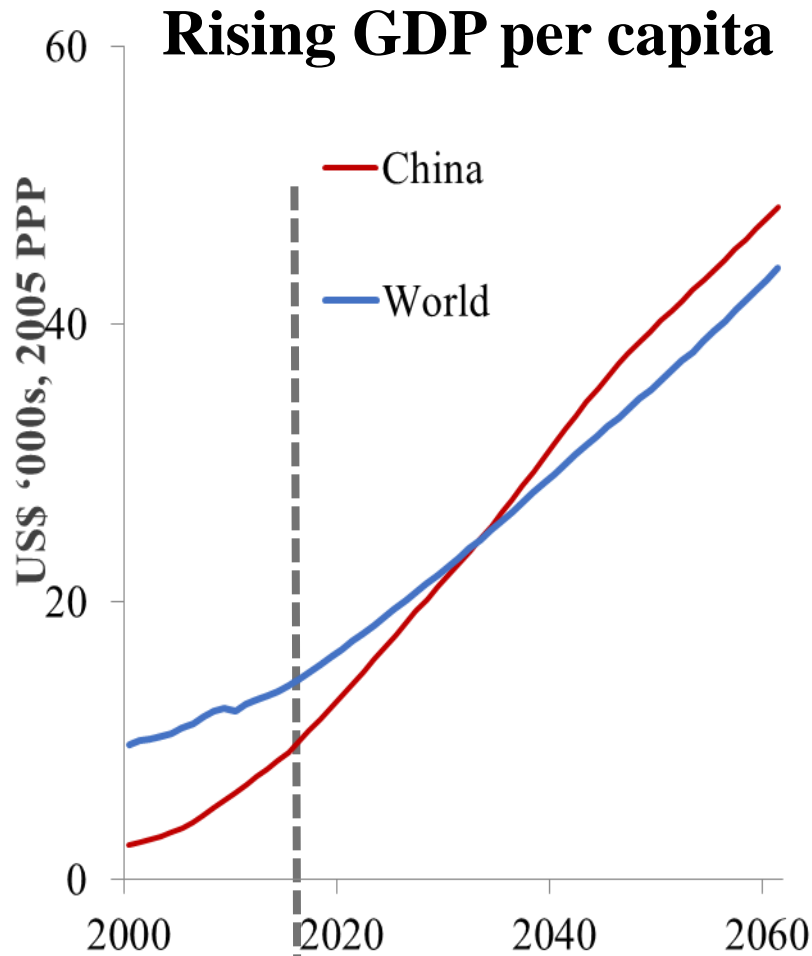
2019. 2. 28. final result released

Outline

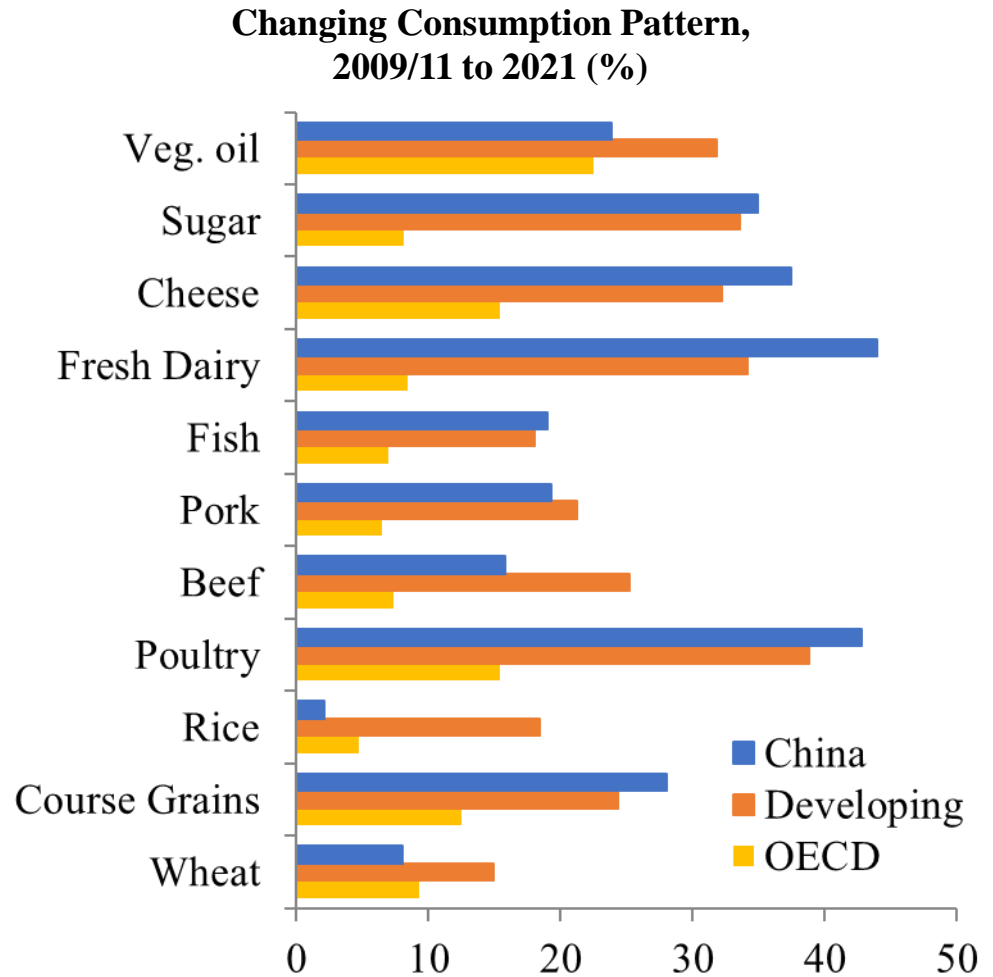
- ◆ Food Security Status in China
- ◆ Policies to Achieve Food Security in China
 - Domestic production
 - International trade
- ◆ **Challenges and Future Perspective**

➤ China's Food Demand : Still Growing

- Rising population & incomes, urbanization, and diet changes

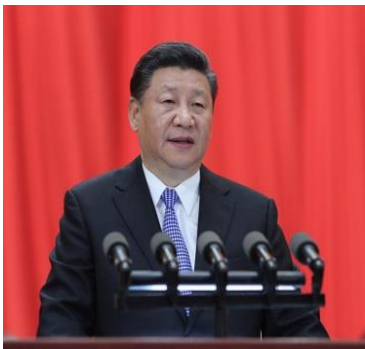


Source: OECD



Source: FAO

Food Security: Policy Priority



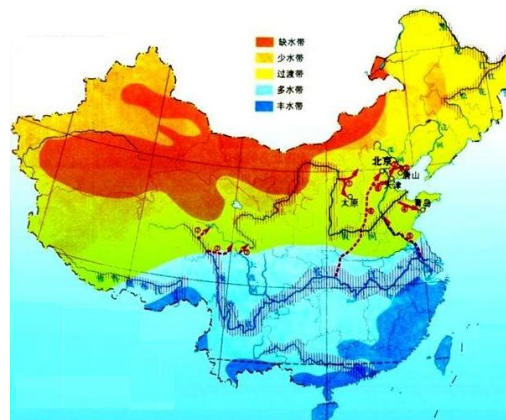
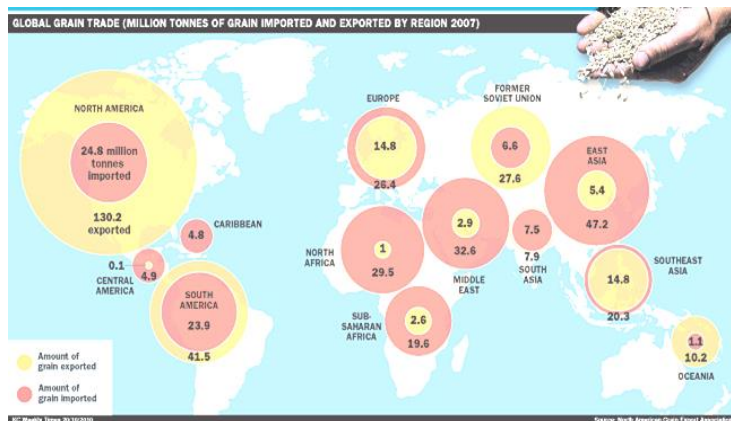
- 中国人的饭碗任何时候都要牢牢端在自己手上。我们的饭碗应该主要装中国粮。
- 保障国家粮食安全是一个永恒的课题，任何时候这根弦都不能松。



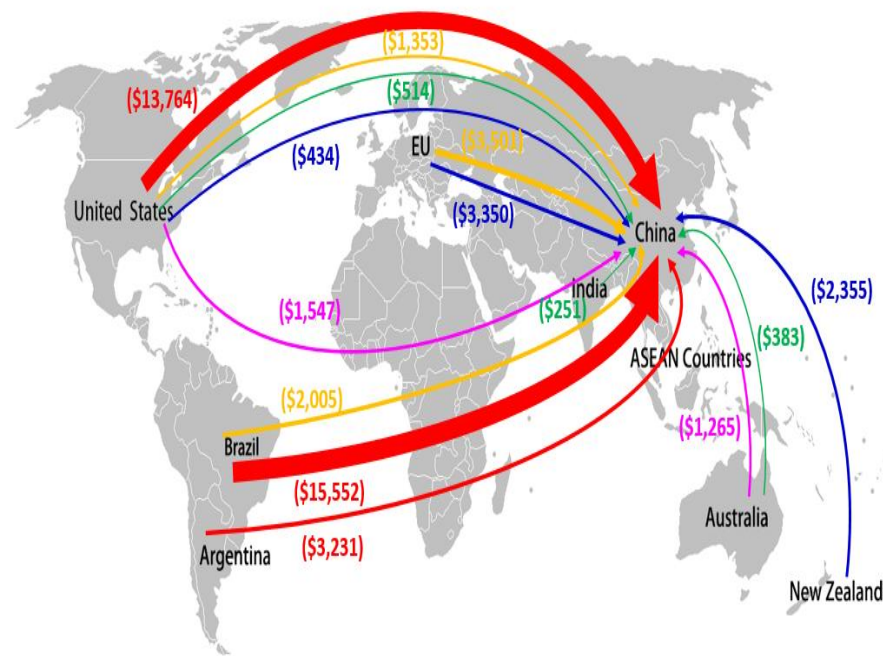
- 国家粮食安全战略：
以我为主，立足国内，确保产能，
适度进口，科技支撑。



Open-door Policy



需求：快速增长
 供应：资源约束
 人均耕地：2/5
 人均淡水：1/4
 消费 > 世界平均
 净进口 > 30% 耕地
 趋势：➔



➤ Imports of Virtual Land & Water:

Resources Saving Domestically and Globally

China's Net VL& VW Imports via Major Food Products (2000-2015)

Year	Domestic savings		Global savings	
	Water (km3)	Land (Mha)	Water (km3)	Land (Mha)
2000	18.3	3.6	11.4	1.9
2005	61.4	14.1	28.8	4.9
2010	140.1	31.0	62.0	11.7
2015	215.5	46.7	95.4	15.2



Source: Ali, Huang, Wang & Xie. (2017)

□ What if China's cereal SSR *equivalent to* JPN, KOR and Chinese TPE?

Items	Cereal Self-sufficiency (%)	Import Quantity (1000 ton)	% of world market (%)
JPN	24.2	25718	7.0
KOR	21.7	14292	3.9
TPE	17.1	6070	1.7
CHN	98.1	11504	3.1
— <i>at JPN's level</i>	24.2	363326	98.8
— <i>at KOR's level</i>	21.7	375309	102.0
— <i>at TPE's level</i>	17.1	397358	108.0

Source: calculated from data in FAOSTAT.



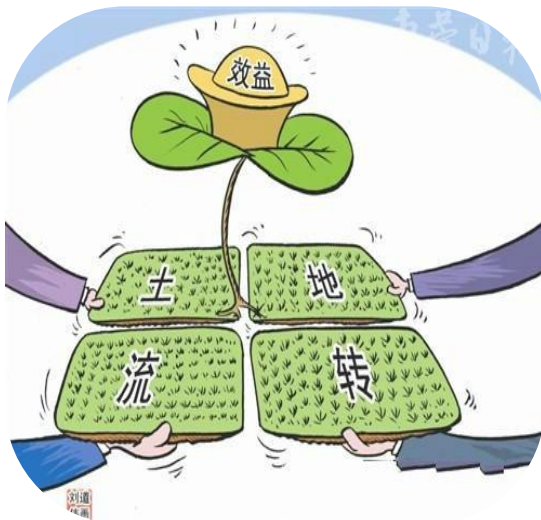
□ What if China's cereal import quantity *equivalent to* JPN, KOR and Chinese TPE?

Items	Import Quantity (1000 ton)	% of world market (%)	Cereal Self-sufficiency (%)
JPN	25718	7.0	24.2
KOR	14292	3.9	21.7
TPE	6070	1.7	17.1
CHN	11504	3.1	98.1
— <i>at JPN's level</i>	25718	7.0	95.3
— <i>at KOR's level</i>	14292	3.9	97.5
— <i>at TPE's level</i>	6070	1.7	99.2

Source: calculated from data in FAOSTAT.

➤ Improving Agricultural *Competitiveness*

- ✓ *Cut down production cost* : foster land rental market and land consolidation; provide social service for agricultural production operations
- ✓ *Reform domestic support policy*: separate income support from pricing policy



➤ Moving Towards *Sustainable* Agriculture

✓ “*Cang-liang-yu-di*”: storage food in land

✓ “*Cang-liang-yu-ji* ”: storage food in technology

✓ *Environment friendly*: reduce fertilizer & pesticide use; control soil & water pollution



Thanks !

