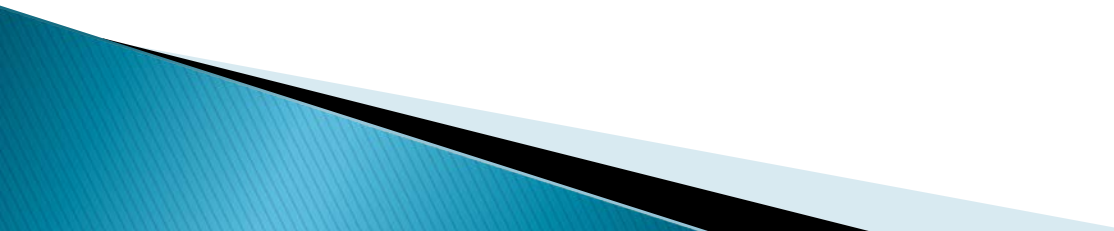


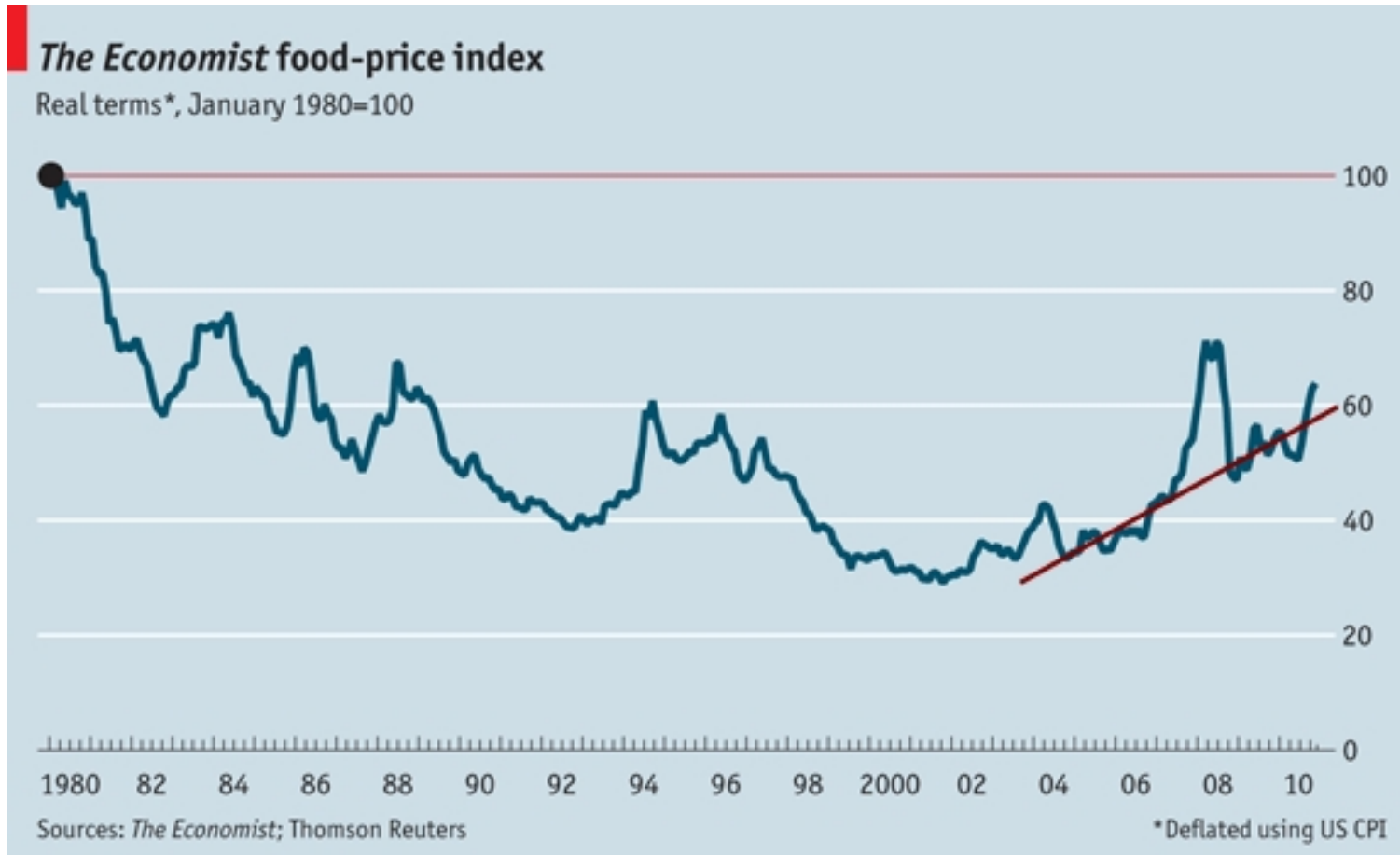
# Climate Change, Urbanization, and Food Security

Jayatilleke S Bandara  
Yiyong Cai  
Naiquan Sang

# Global Food Crisis – 2007/2008

- ▶ Massive Increase in food prices
  - ▶ Street riots in different parts of the world
  - ▶ South Asia suffered a lot
  - ▶ Poverty
- 

# Global food price



# Export price

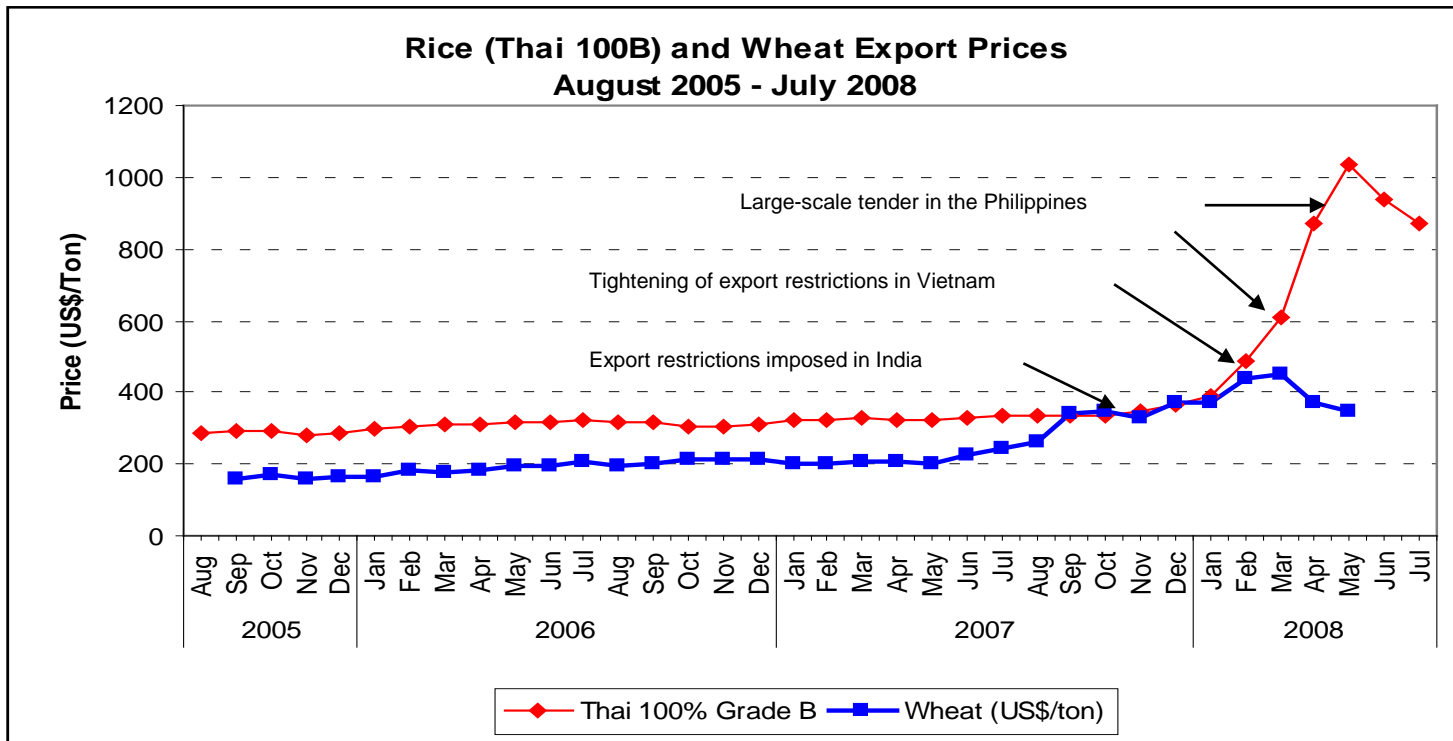
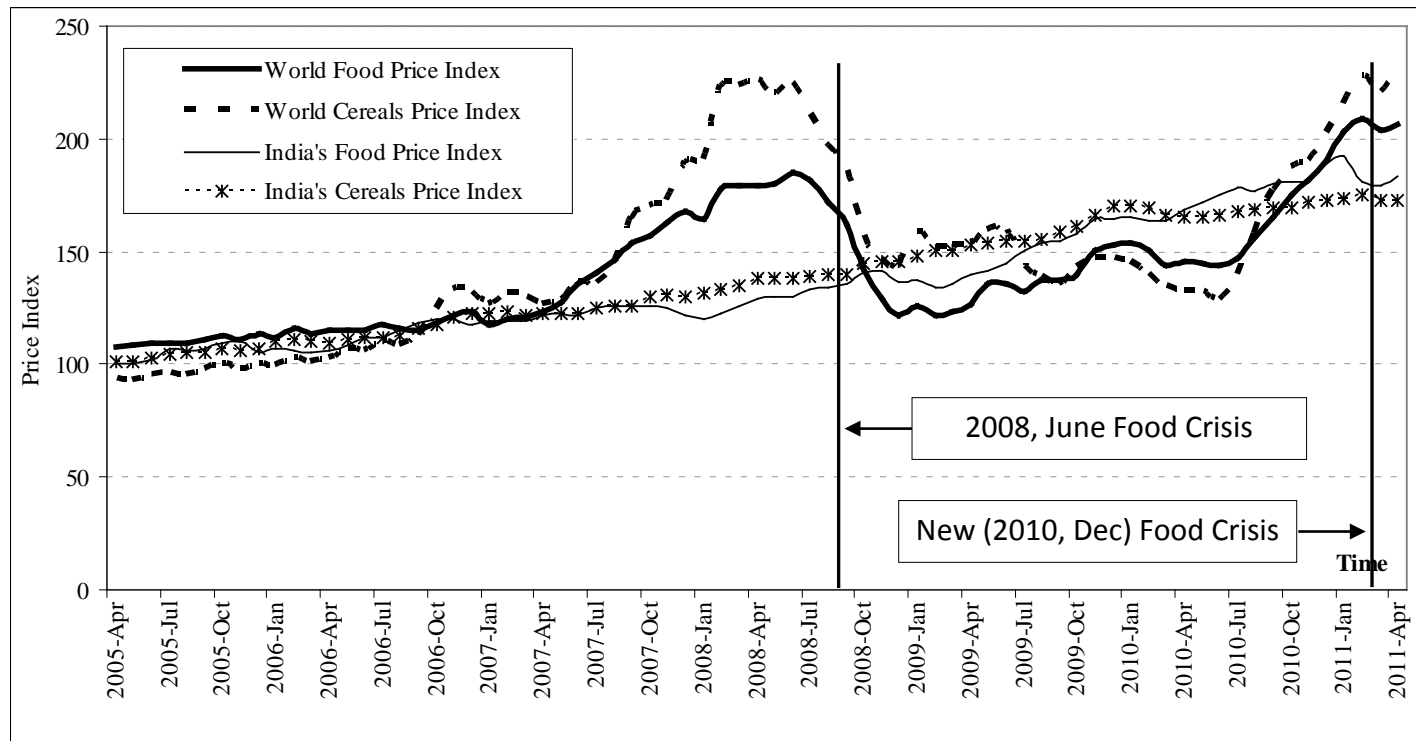


Figure 1: Export prices of rice and wheat, and government intervention policies, August 2005-July 2008

[Source: FAO, <http://www.fao.org/giews/english/fo/index.htm>.]

# Domestic price: India

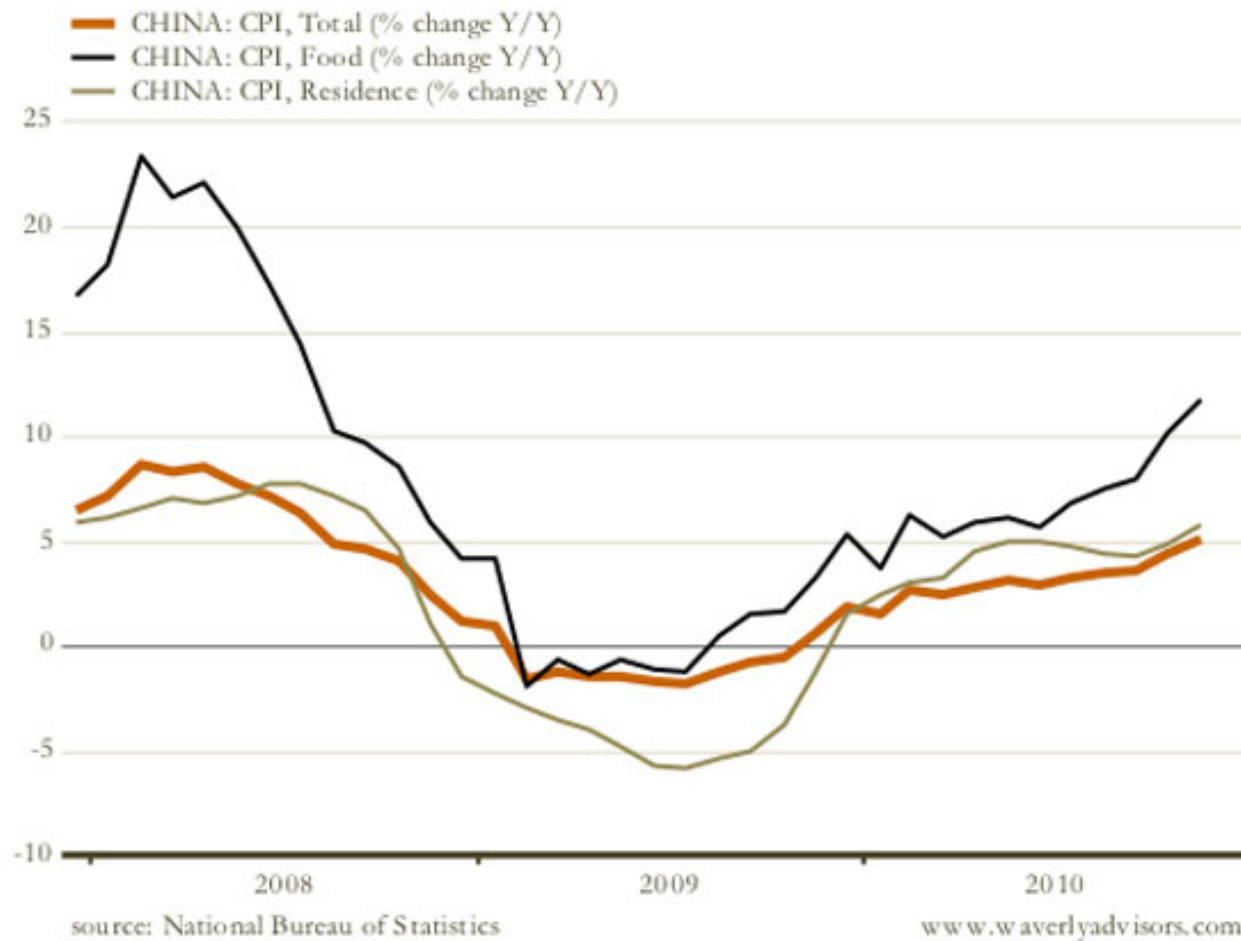


**Figure 1: Food and Cereals Price Indexes**

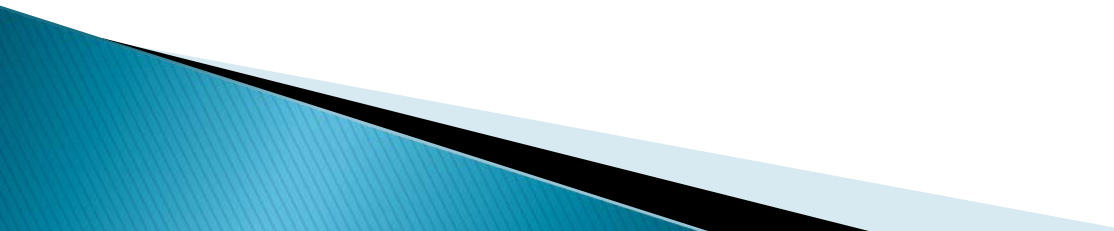
Sources: India's food and cereals price indexes are from Office of Economic Adviser, Ministry of Commerce and Industry, <http://eaindustry.nic.in/> (accessed 12 June 2011).

World food and cereals price indexes are from FAO

# Domestic price: China



# Driving forces of food price

- ▶ Bio-fuel
  - ▶ Rising oil price
  - ▶ Increase in demand from China and India
  - ▶ Market speculation
  - ▶ Climate change
  - ▶ Change of land use due to urbanisation
- 

# Focus: climate change



## When the Rains Don't Fall

By [Amantha Perera](#) Reprint |



# Focus: land use



Binhai, China in 1992 (L) and 2012 (R)

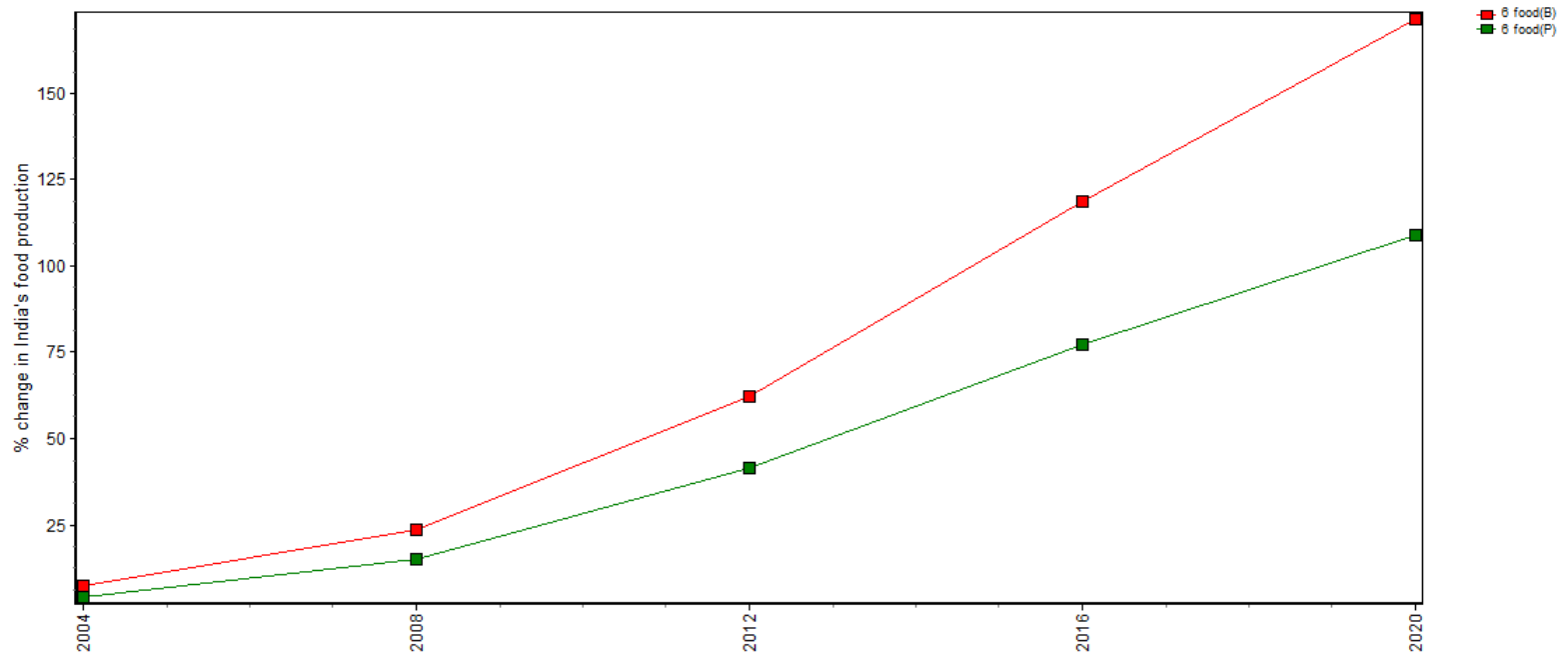
# Modelling food crisis

- ▶ Cannot capture all driving forces – complex
- ▶ Our focus is on climate change and urbanization
- ▶ Cannot model directly within our time framework
- ▶ Decided to use
  - Land productivity shock (“safe”) as proxy for climate change
  - Land supply shock (“qfactsup”) as proxy for urbanization

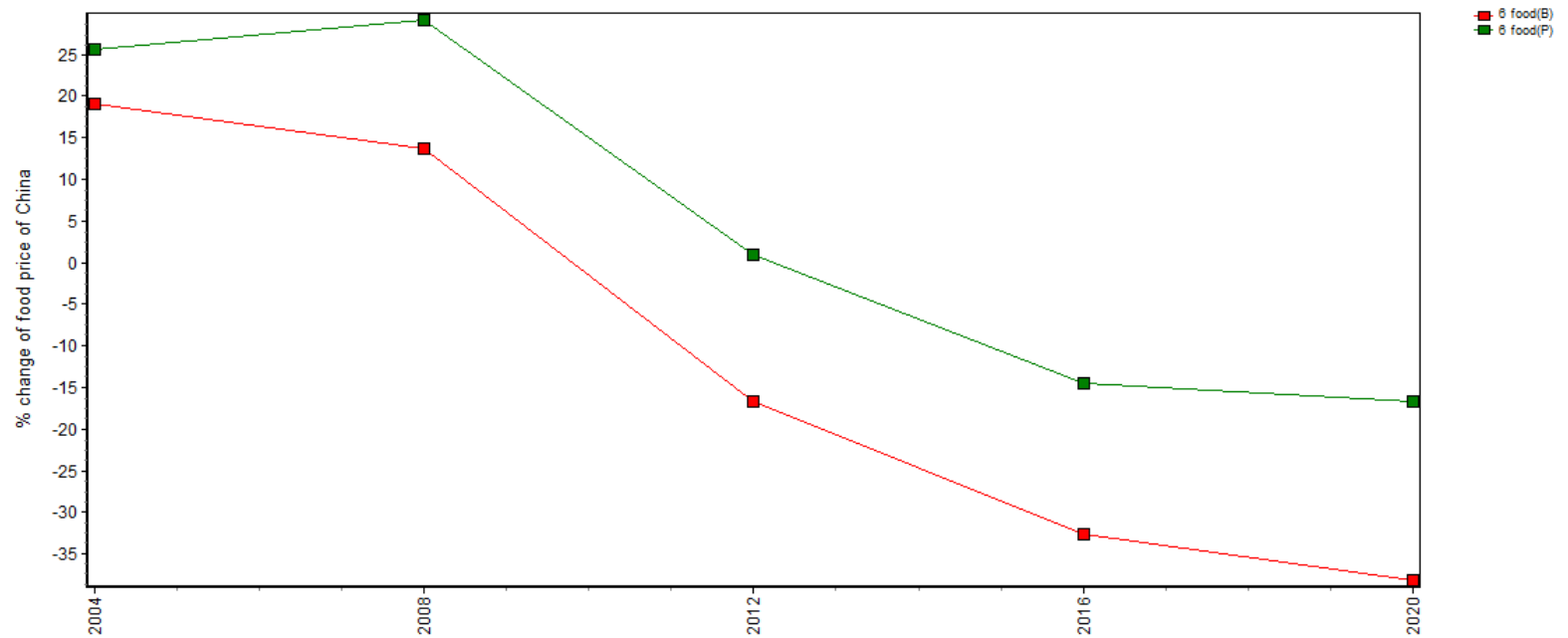
# Scenarios

Base Re-Run	Policy 1 (Hungry India)	Policy 2 (Urbanizing China)
afereg	afereg	afereg
pop	pop	pop
qfactsup("Unsklab", REG)	qfactsup("Unsklab", REG)	qfactsup("Unsklab", REG)
qfactsup("Sklab", REG)	qfactsup("Sklab", REG)	qfactsup("Sklab", REG)
	safe("land", "food", Climate) = -10	safe("land", "food", Climate) = -10
		qfactsup("land", REG) = -2
		safe("land", "food", China) = 2

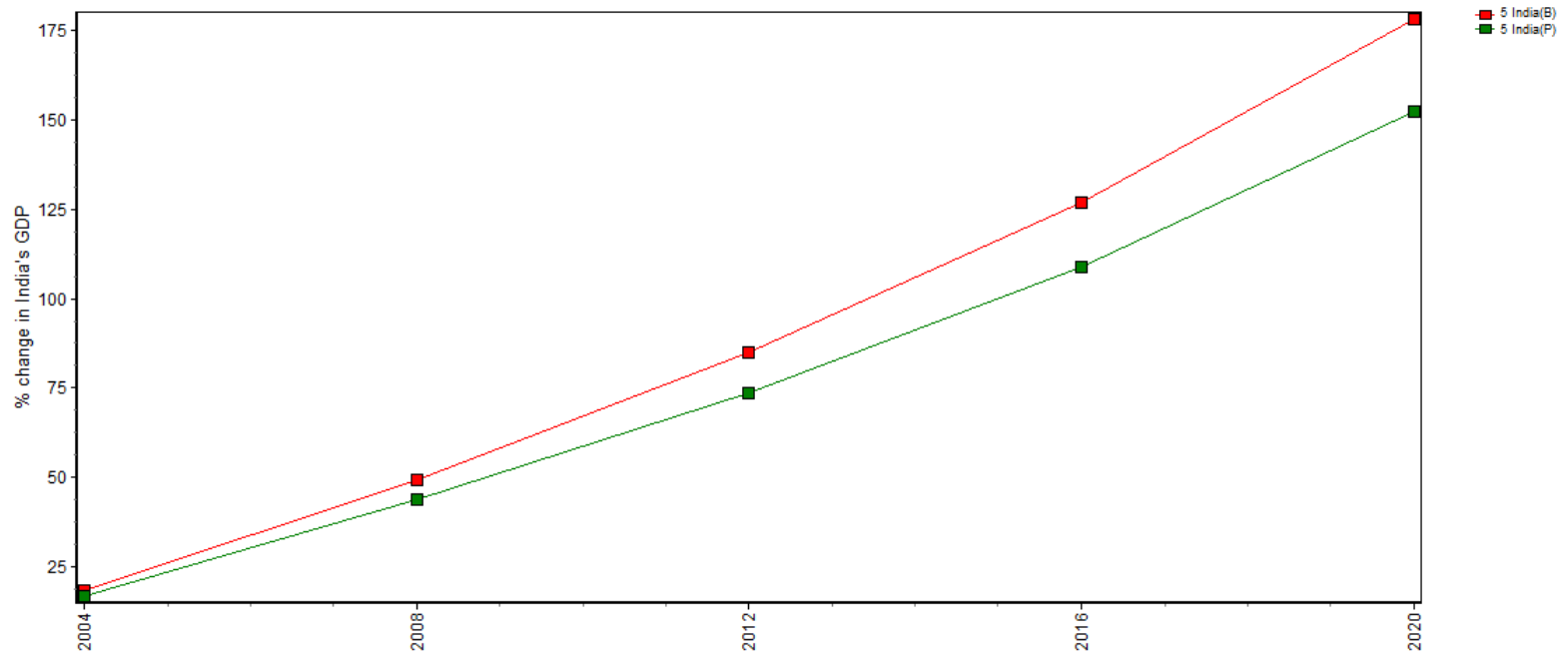
# Hungry India: Food Production



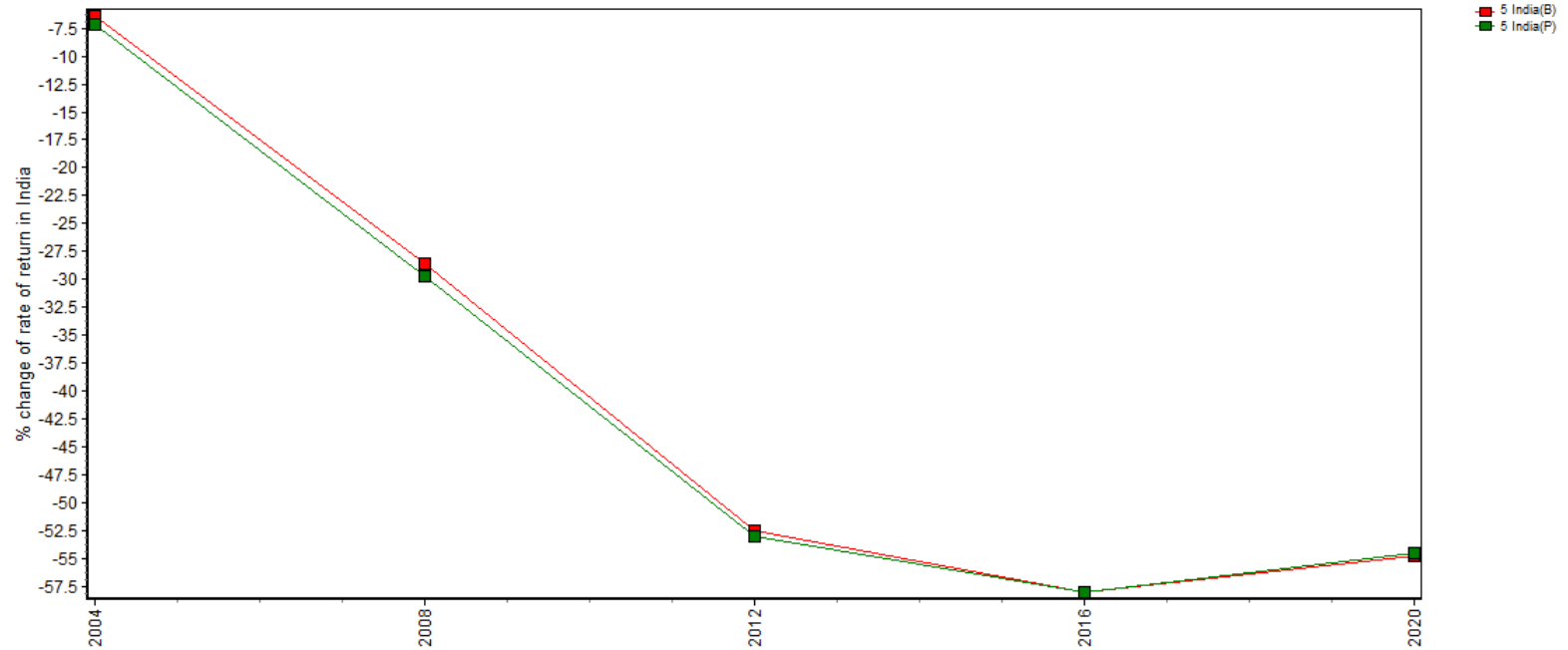
# Hungry India: Food Price



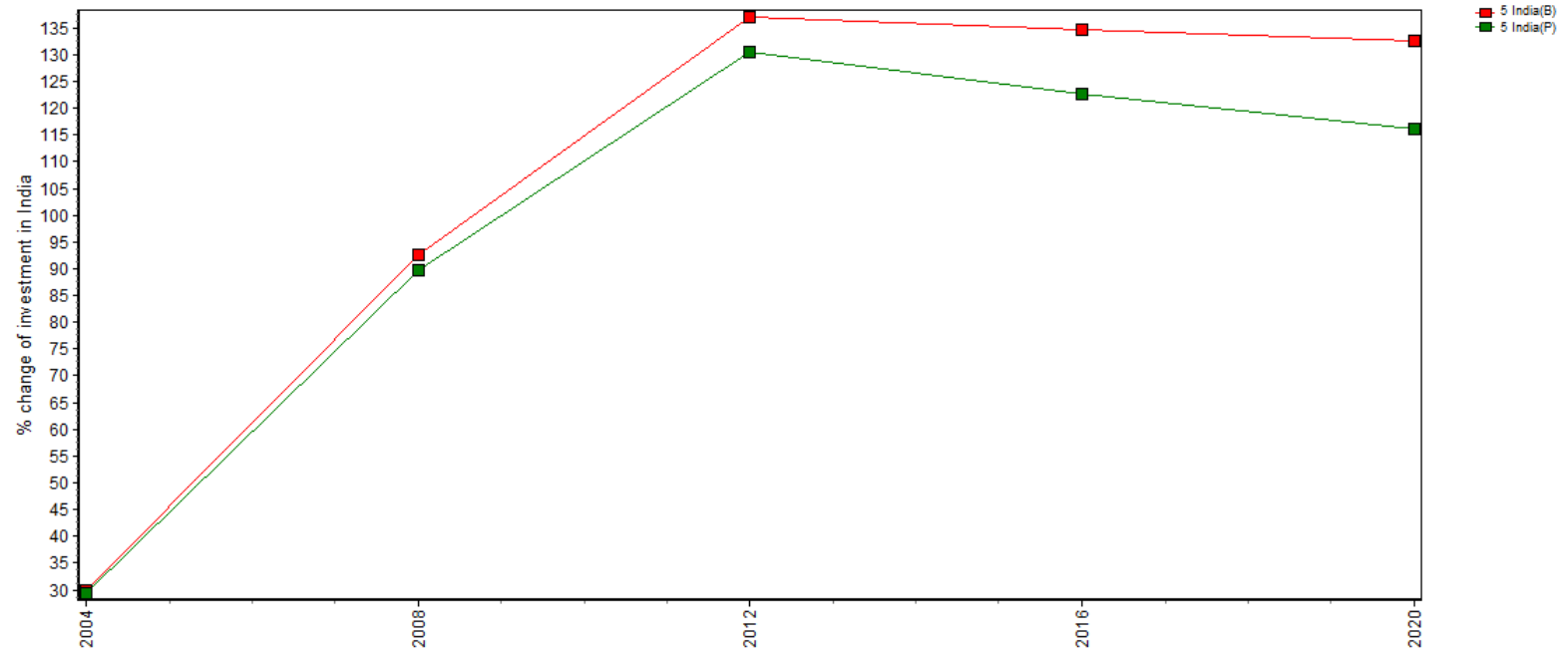
# Hungry India: GDP



# Hungry India: Rate of Return

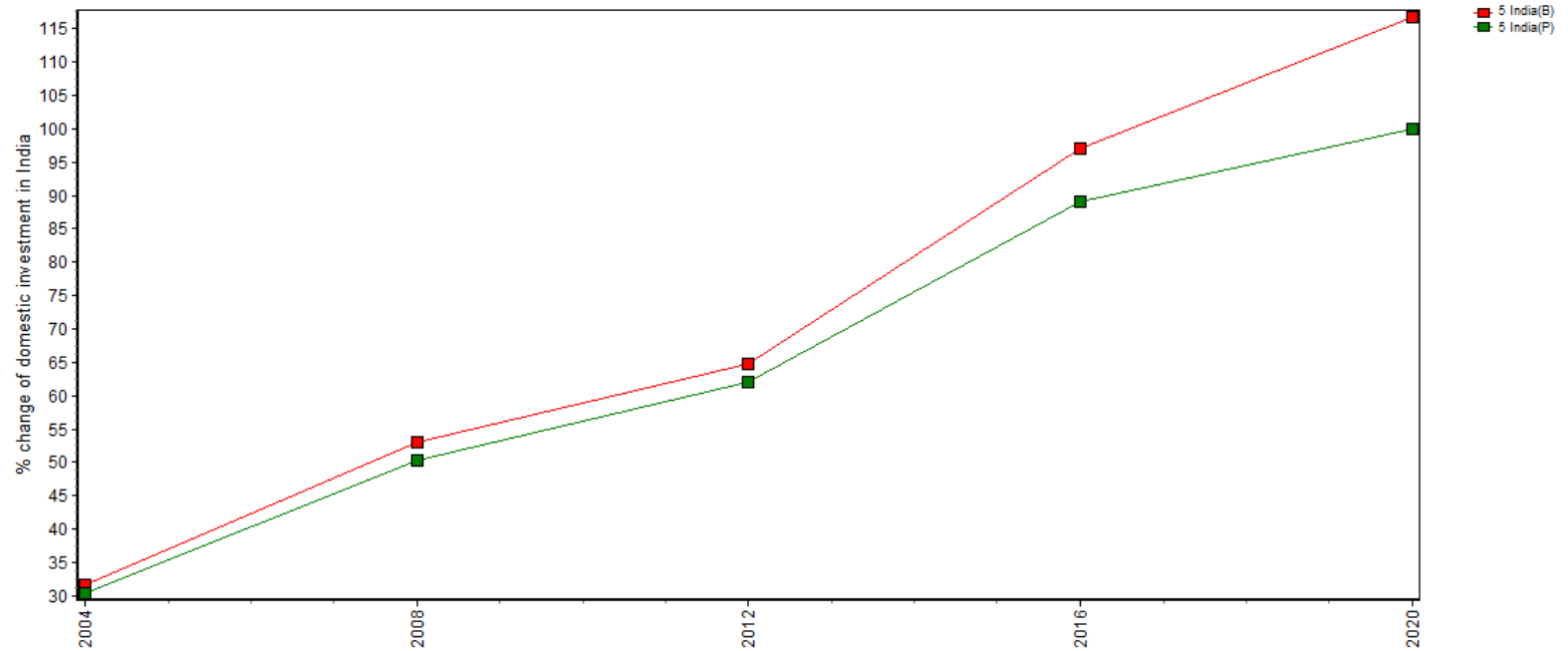


# Hungry India: Capital Accumulation

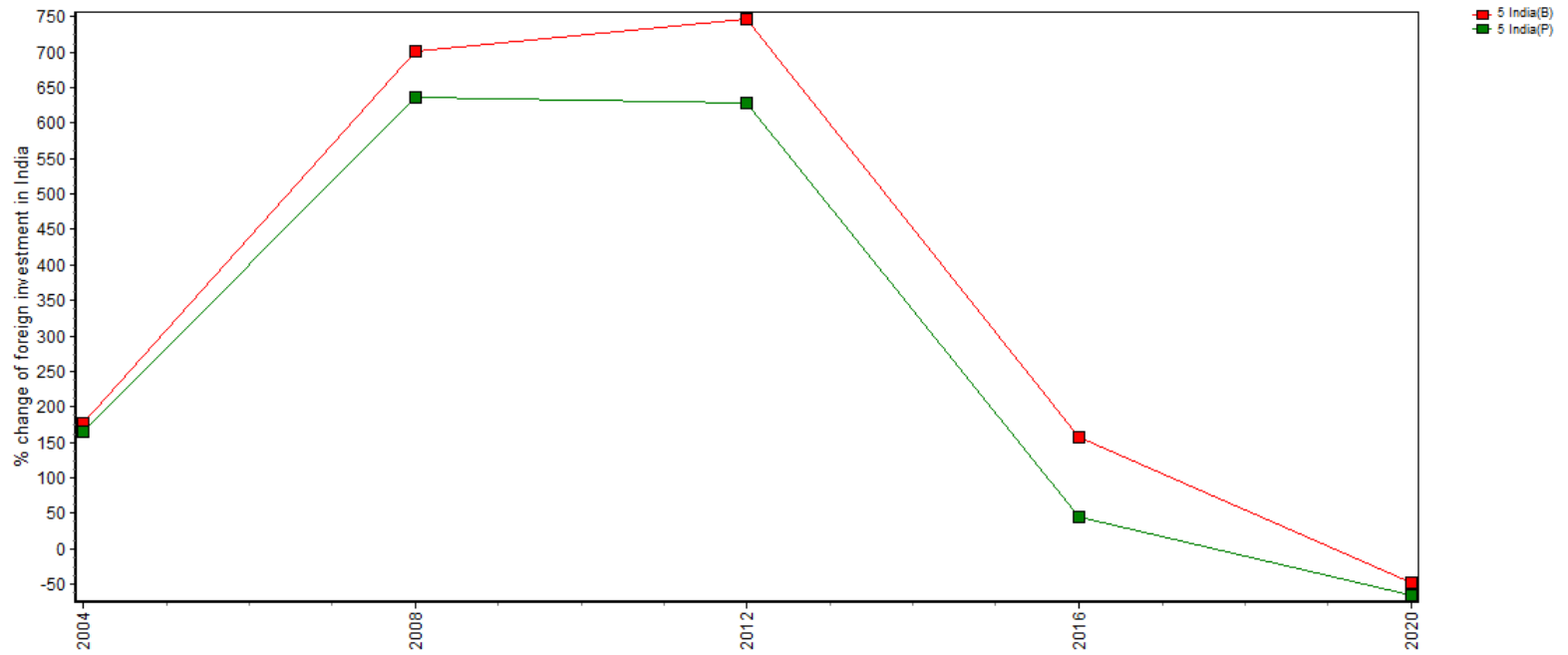




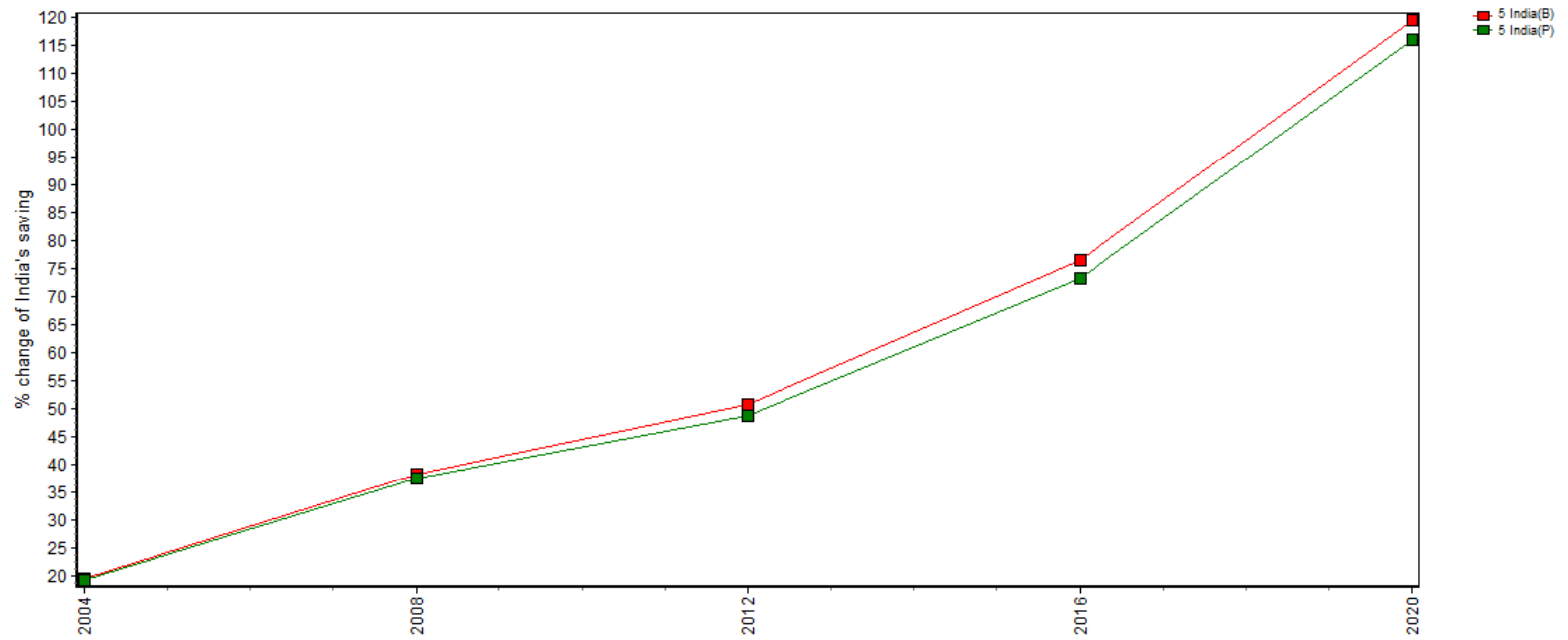
# Hungry India : Domestic Investment



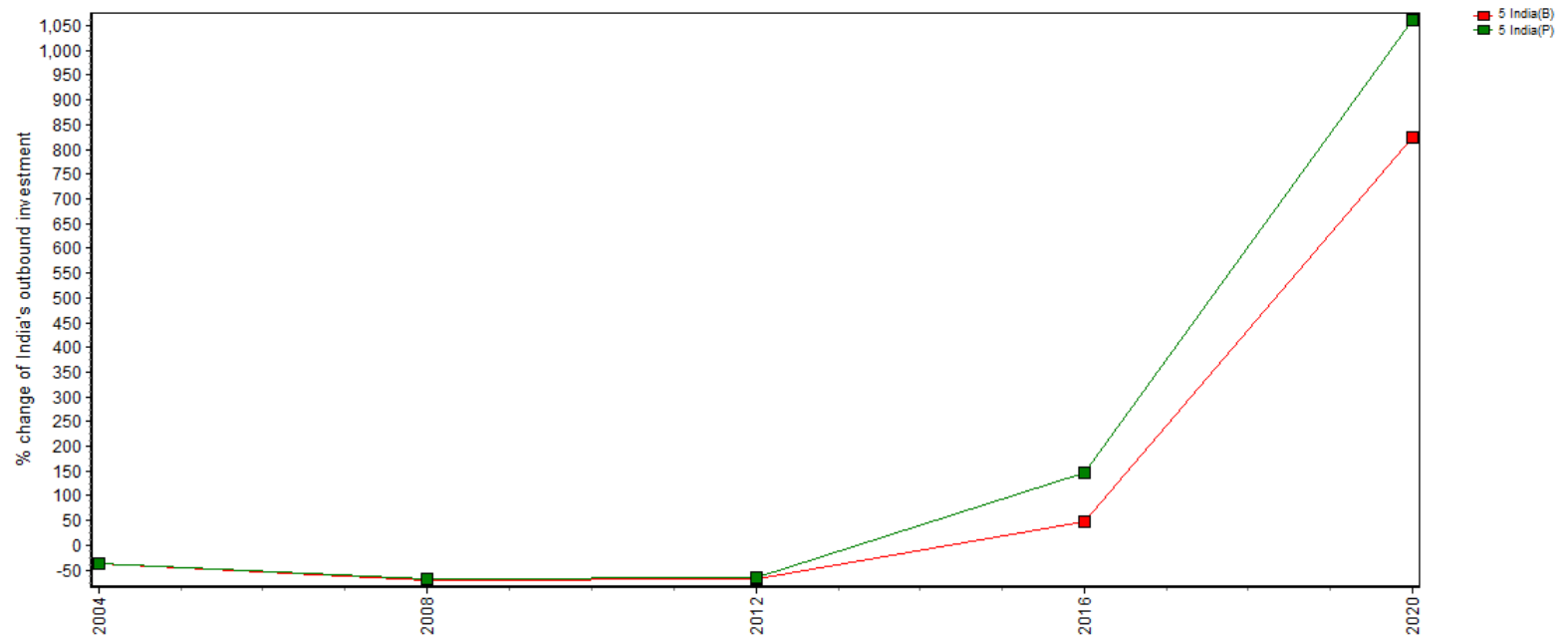
# Hungry India: Foreign Investment



# Hungry India: Saving



# Hungry India: Outbound Investment



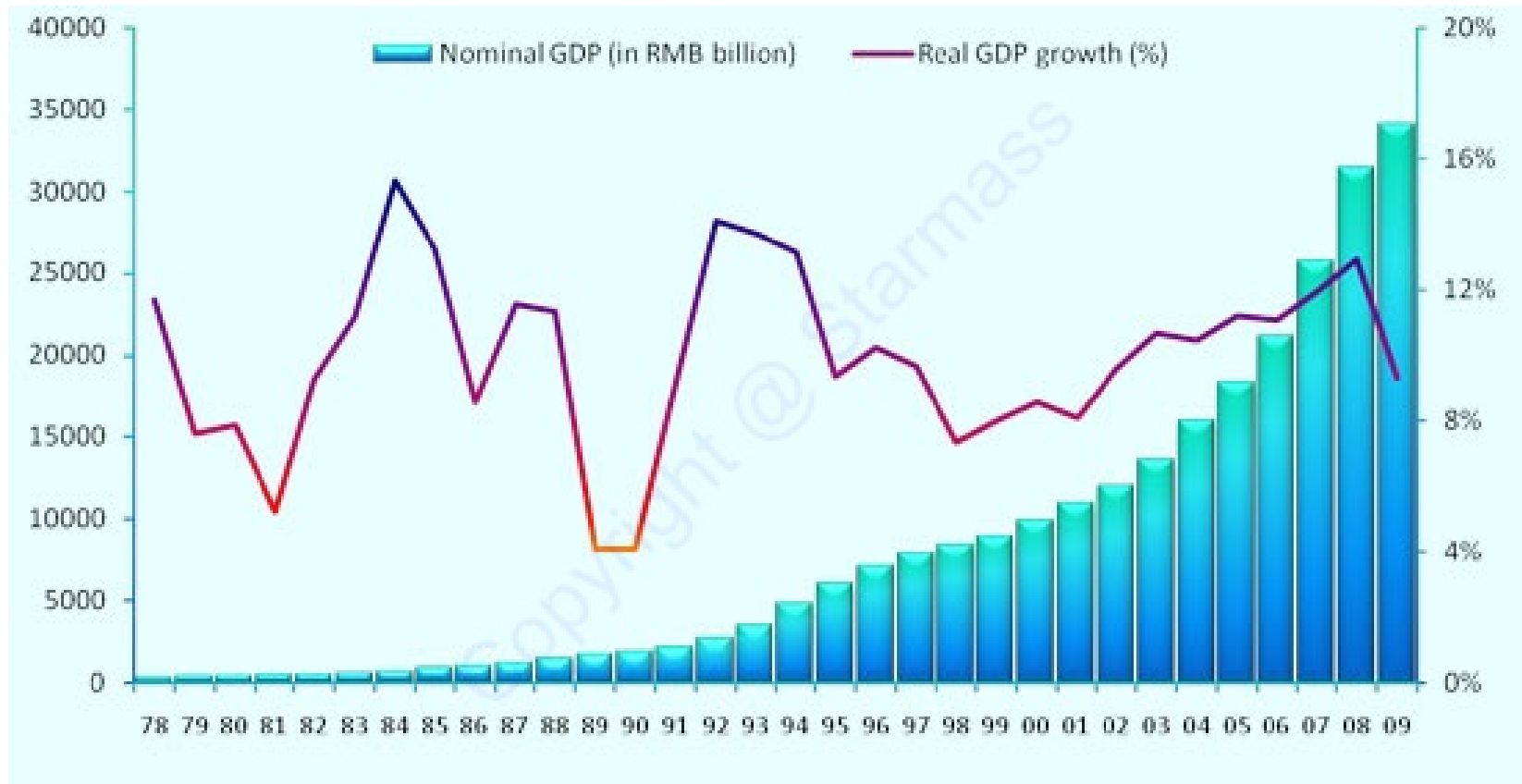
# Hungry India: Trade Balance

DTBALi[*India](D)	2004	2008	2012	2016	2020
1 food	-1578.8	-4373.9	-12127.6	-24195.4	-36132.1
2 extract	396.5	2431.6	8583.1	14326.4	22482.0
3 LghtMnfc	291.1	509.5	-2833.9	-5735.3	-7078.9
4 mnfc	2555.5	7444.5	9356.0	9366.1	12242.1
5 serv	892.5	2526.7	3868.2	4248.3	4905.8
Balance of Trade	2556.8	8538.3	6845.9	-1989.8	-3580.0

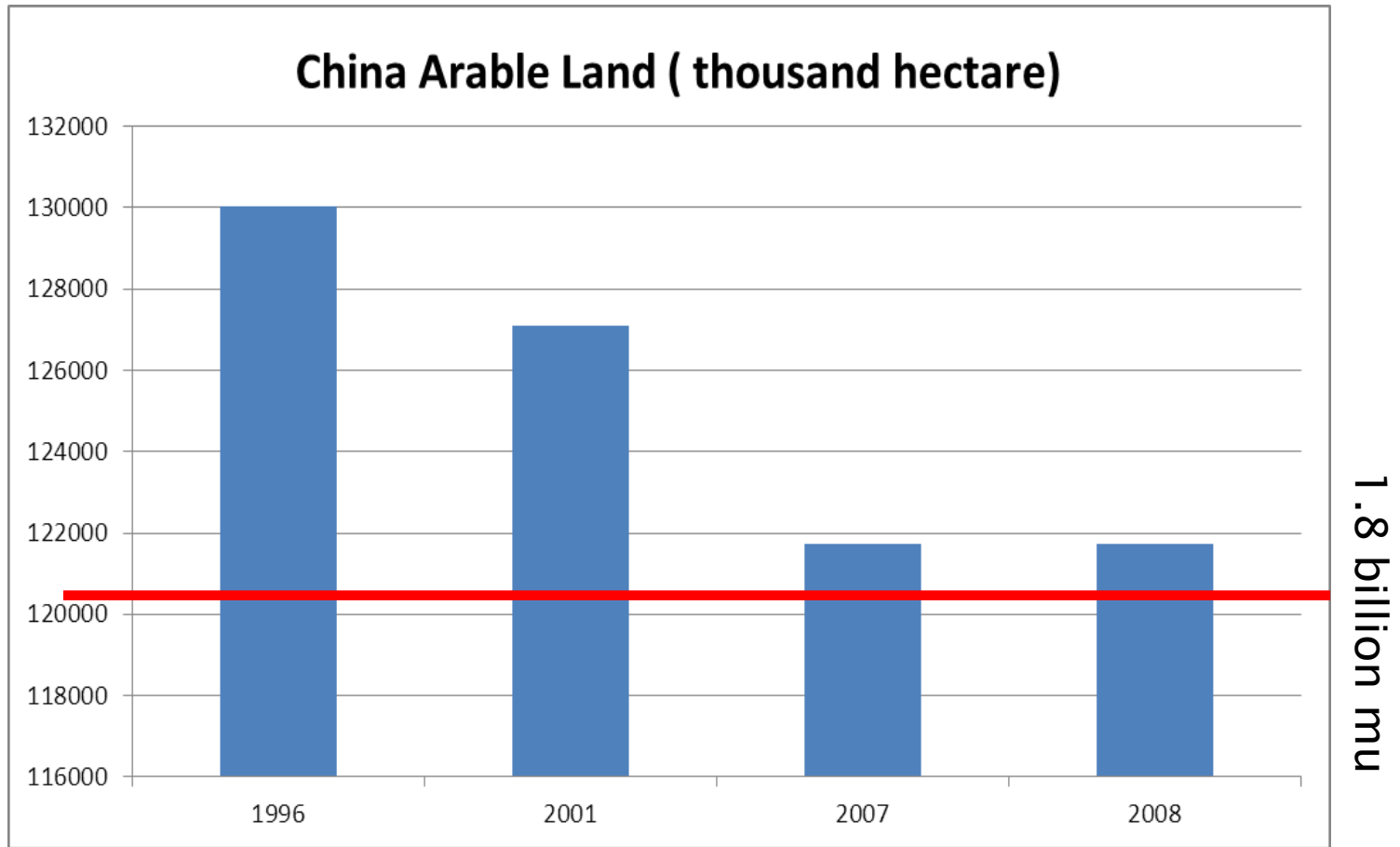
# Hungry India: Summary

- ▶ Climate Change matters in food security, and decline in food production will have massive long-term negative impacts on the economy
- ▶ Limitations of our exercise
  - arbitrary productivity shocks
  - single channel of climate damages
- ▶ Future research agenda
  - calibrate a more realistic baseline
  - disaggregate food sector

# Urbanizing China: Need New Growth Engine

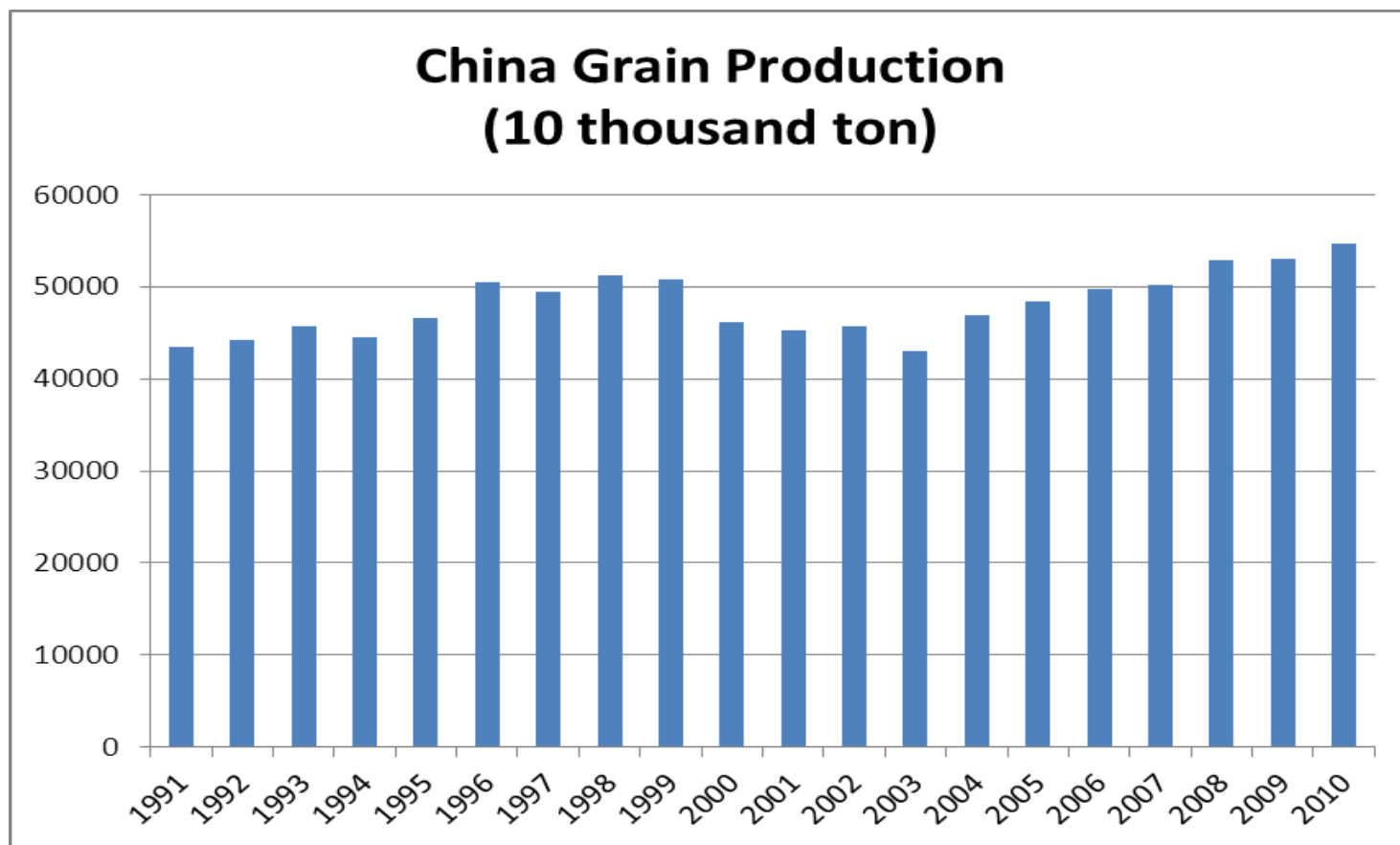


# Urbanizing China: Booming Real Estate

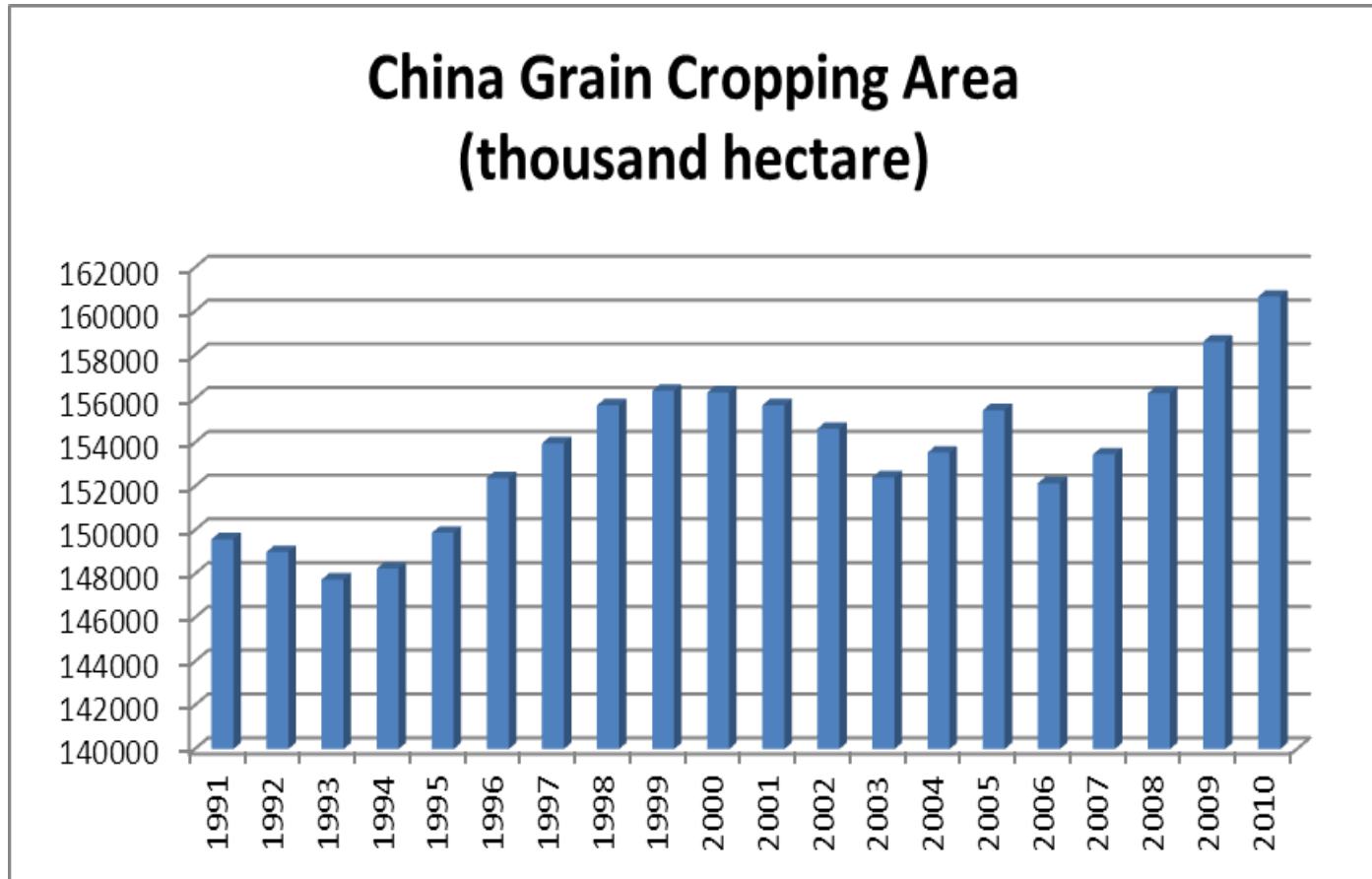




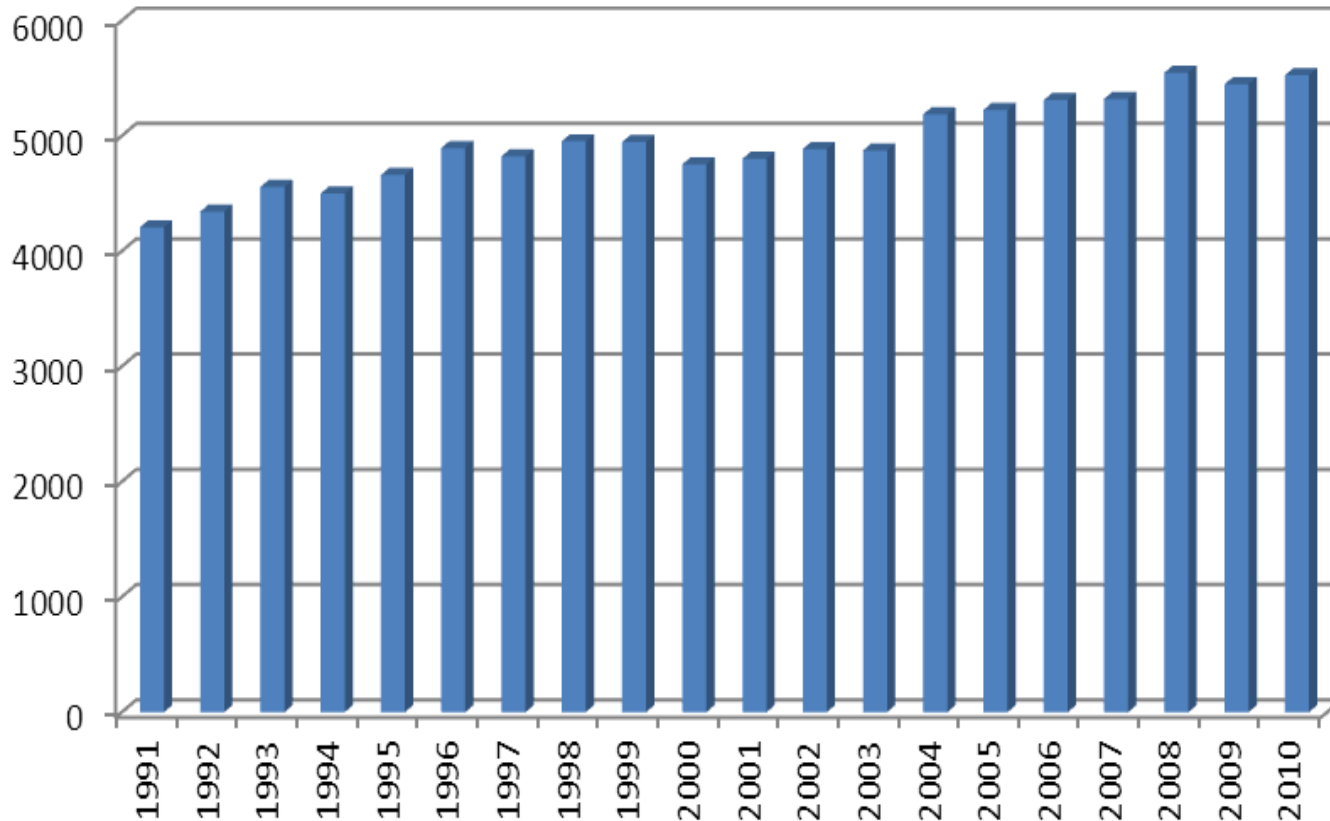
# Urbanizing China: Yield Productivity Gain



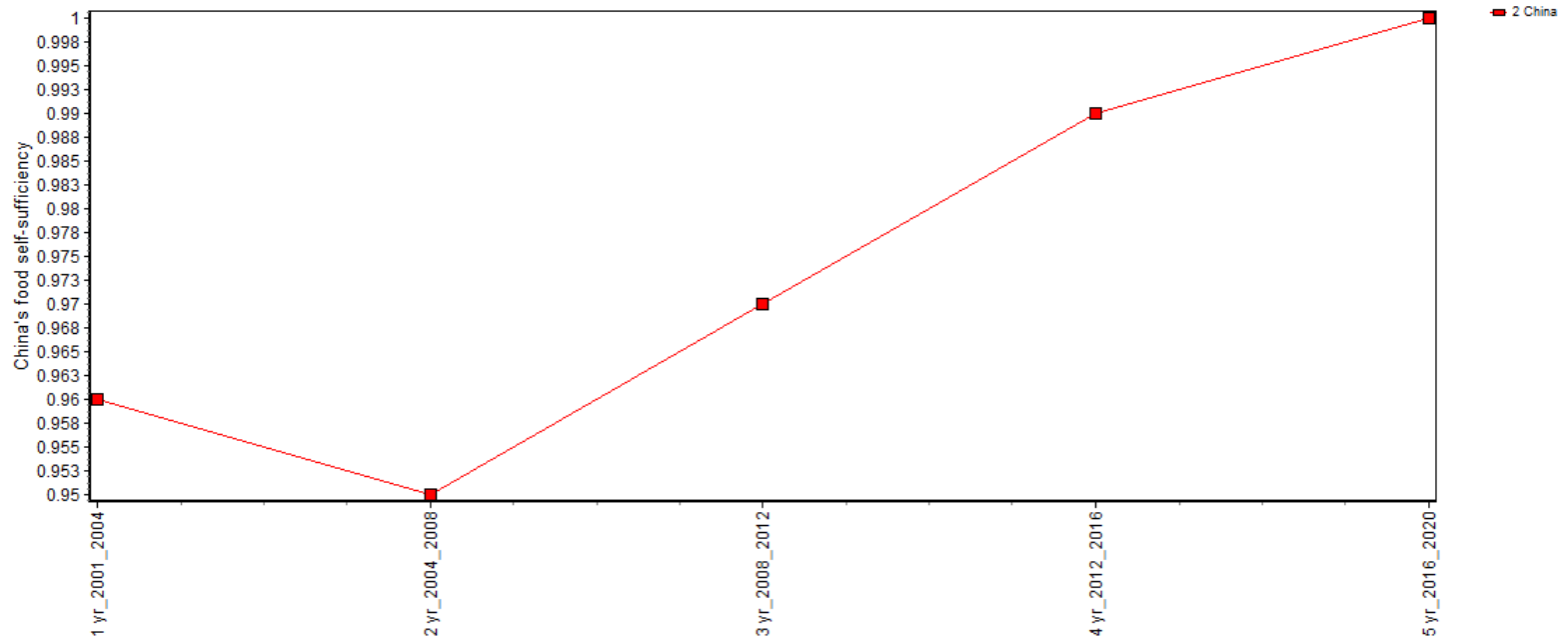
# Urbanizing China: Yield Productivity Gain



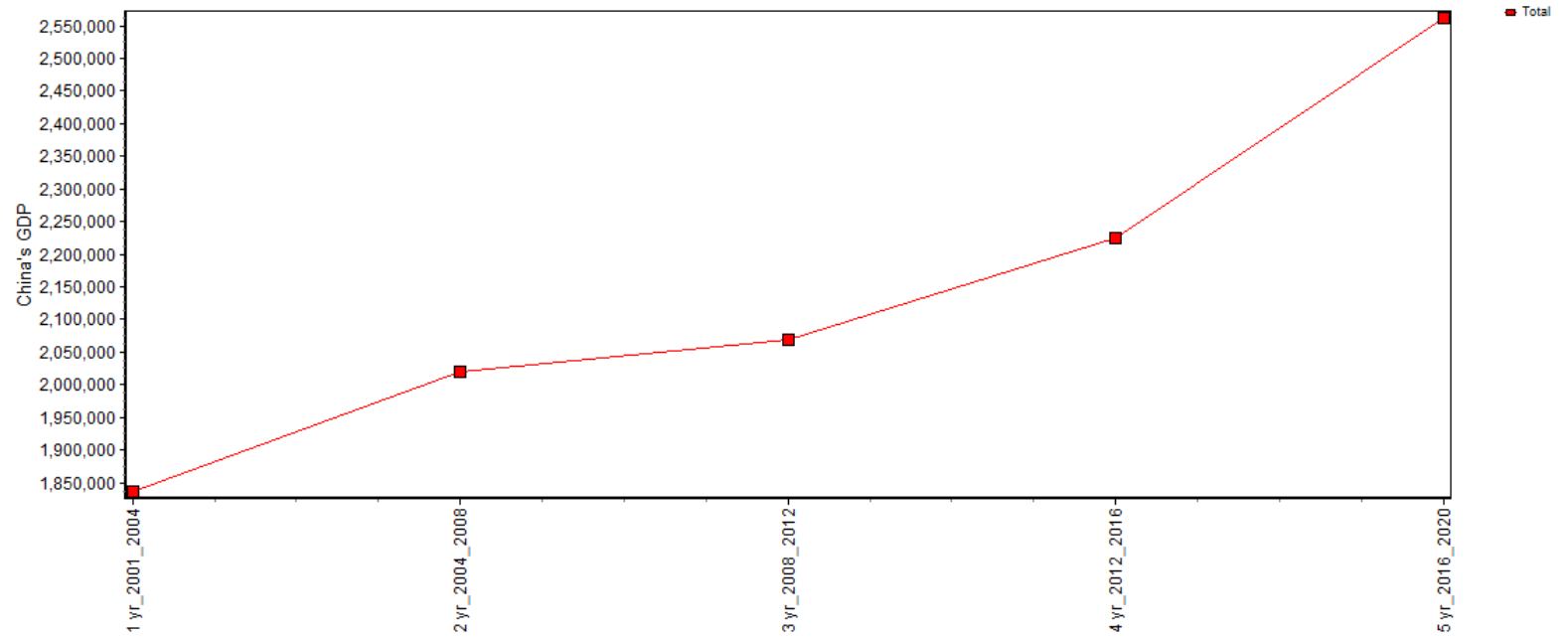
## China Grain Yield (kg/hectare)



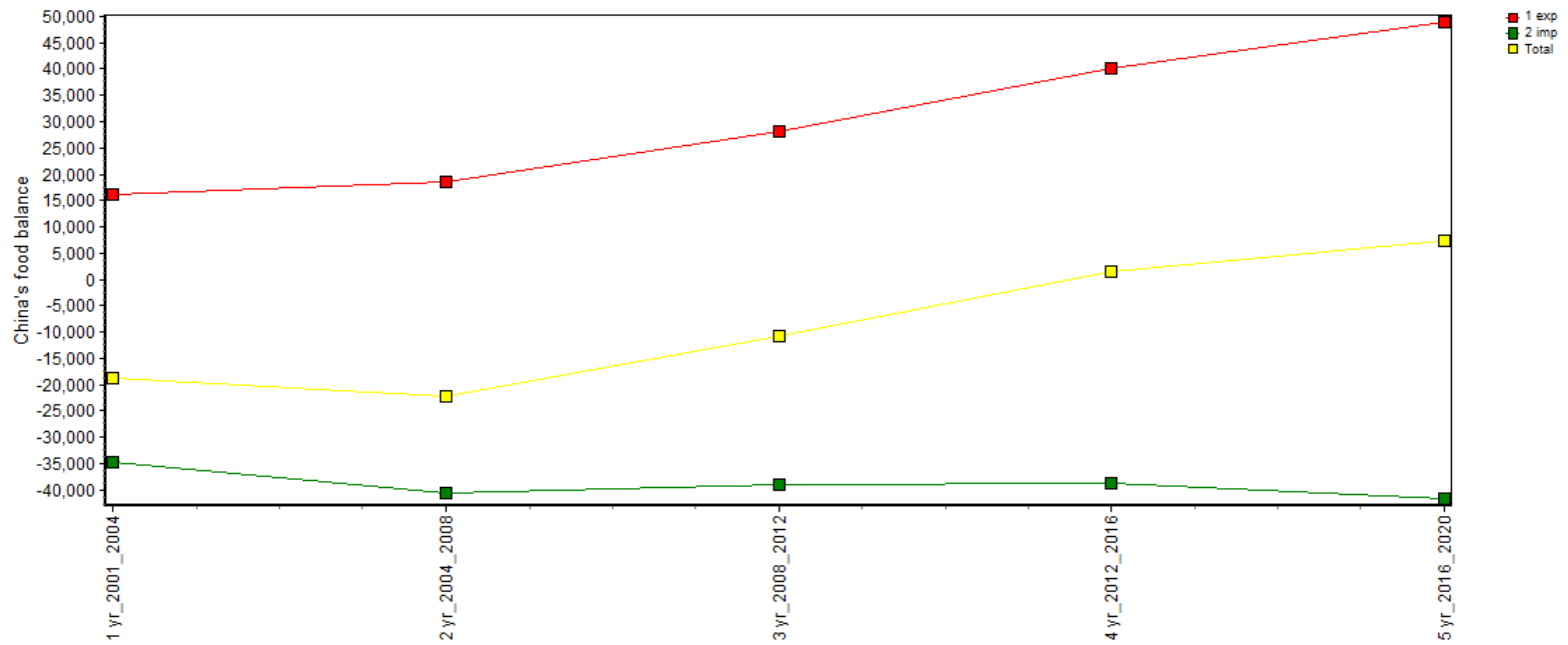
# Urbanizing China: Food Self-Sufficiency



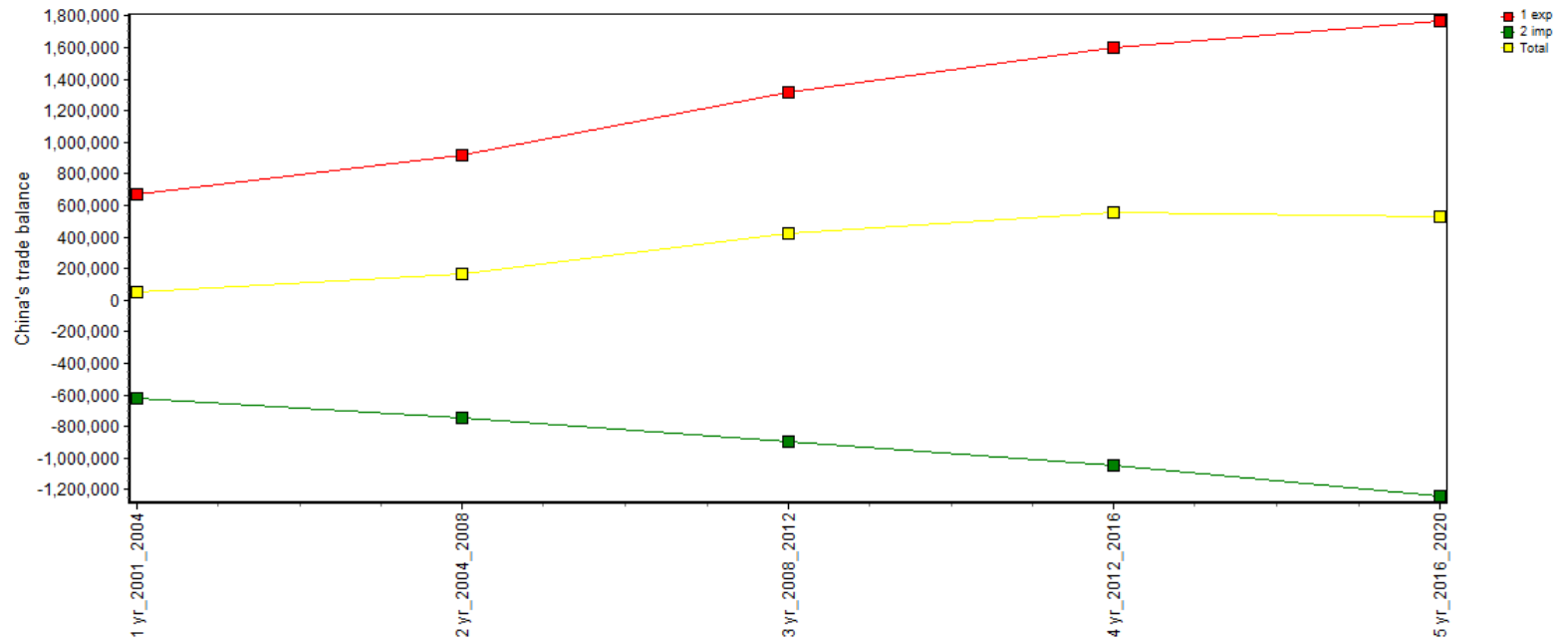
# Urbanizing China: GDP



# Urbanizing China: Food Balance



# Urbanizing China: Yield Productivity Gain



# Urbanizing China: Land Price

pfe[**China](D)	1 food	2 extract	3 LghtMnfc	4 mnfc	5 serv	6 CGDS
1 Land	14.507293	21.499784	12.039191	12.269451	11.686988	18.292927
2 UnSkLab	2.035906	2.035906	2.035906	2.035906	2.035906	2.035906
3 SkLab	1.911438	1.911438	1.911438	1.911438	1.911438	1.911438
4 Capital	0.583228	0.583228	0.583228	0.583228	0.583228	0.583228
5 NatRes	3.380479	-1.385445	1.632443	2.006759	1.90616	10.449885



# Urbanizing China: Factor Uses

qfe[**China](D)	1 food	2 extract	3 LghtMnfc	4 mnfc	5 serv	6 CGDS
1 Land	-9.60792	-4.087963	-11.55619	-11.37445	-11.83421	-6.619551
2 UnSkLab	0.843673	-0.679738	-0.494992	-0.032321	-0.17159	8.258447
3 SkLab	0.922119	-0.655462	-0.341885	0.121636	-0.003929	8.390729
4 Capital	1.770194	-0.394593	1.318949	1.79001	1.815175	9.821818
5 NatRes	0.00472	0	0.003014	0.003382	0.003283	0.011335