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# **Agricultural Growth in India: Examining the Post-Green Revolution Transition**

*Research Conducted by Nicholas Rada, Economic Research Service, USDA*

*and*

*Presented by Keith Fuglie, Economic Research Service, USDA*

*at the*

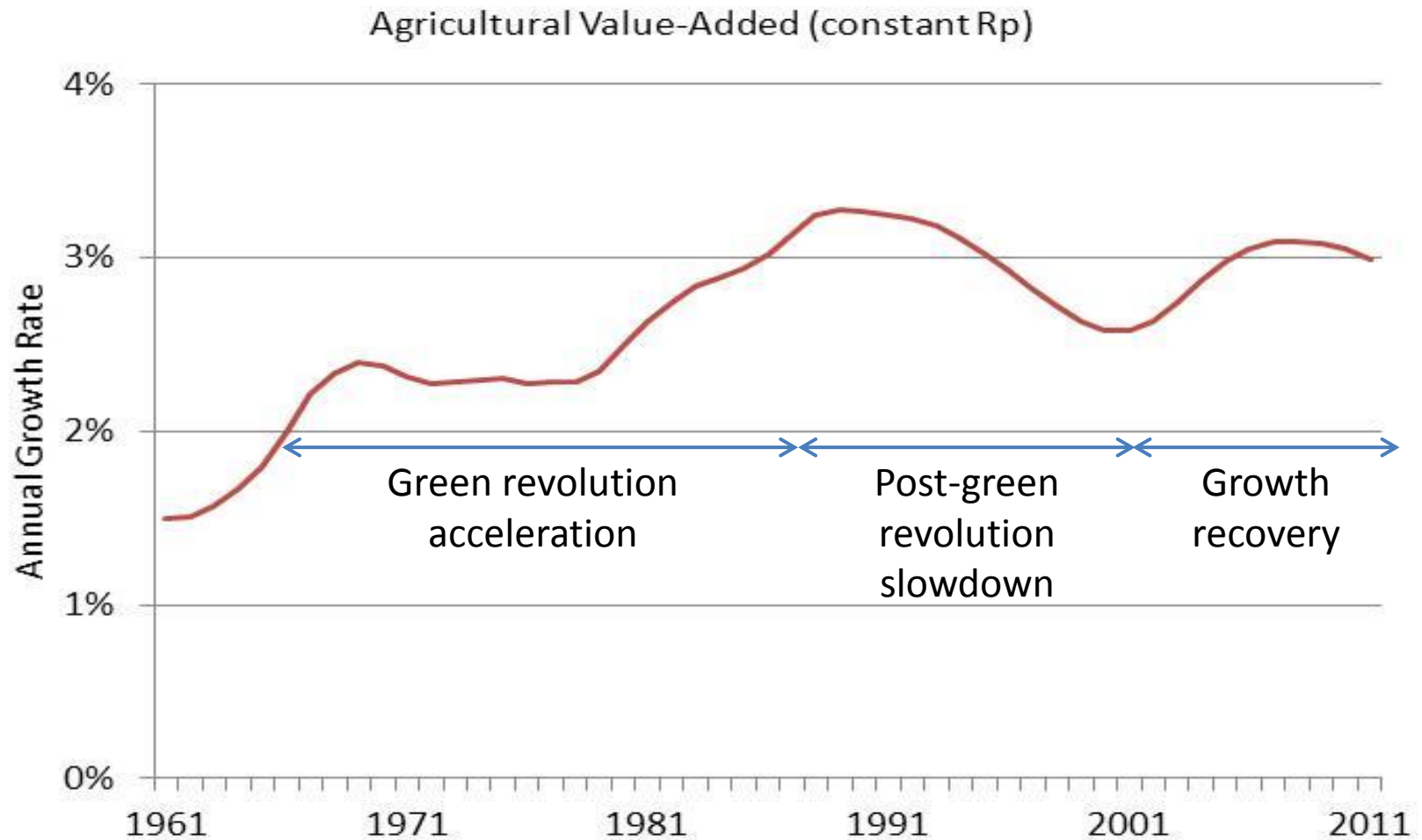
*International Agricultural Trade Research Consortium's  
(IATRC's) 2013 Symposium:  
Productivity and Its Impacts on Global Trade,  
June 2-4, 2013, Seville, Spain*



**United States Department of Agriculture, Economic Research Service**

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# Long-term growth trends in Indian agriculture



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# What explains post-green revolution growth slowdown and recovery?

## View 1

- Stagnation in crop yields and resource degradation constrained growth
- New growth from renewed policy emphasis on food grains through price supports & input subsidies
- Focus on northern grain belt
- Sustainable?

## View 2

- Rapid economic growth increasing consumer demand for diversified diet
- Farmers shifting resources to higher-valued commodities
- Growth opportunities not limited to north
- More sustainable if market- & productivity-led



# Analysis: Construct a more complete production account of Indian agriculture for measuring TFP

## Outputs

- 59 crop commodities
  - Cereal, pulse, oilseed, fruit, vegetable, spice, & other specialty crops
- 4 livestock commodities

## Coverage and Methods

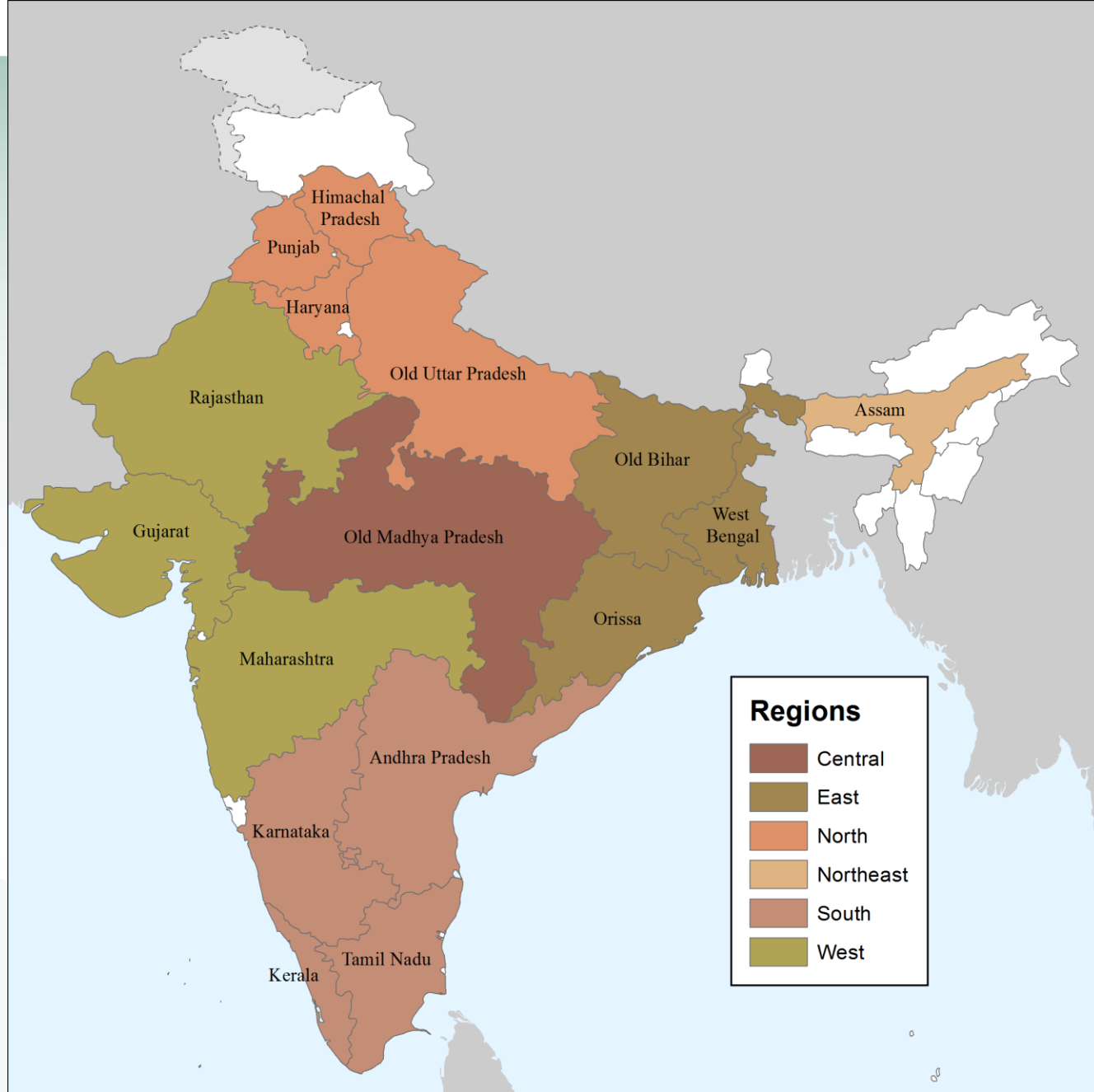
- 1980-2008 period
- States, regions & national aggregate
- Tornqvist-Thiel indexes of output, input and TFP

## Inputs

- 6 production factors
  - Land (rainfed, irrigated, pasture)
  - Labor (male, female)
  - Machinery Capital
  - Livestock Capital
  - Materials (fertilizer)
  - Energy (electricity)



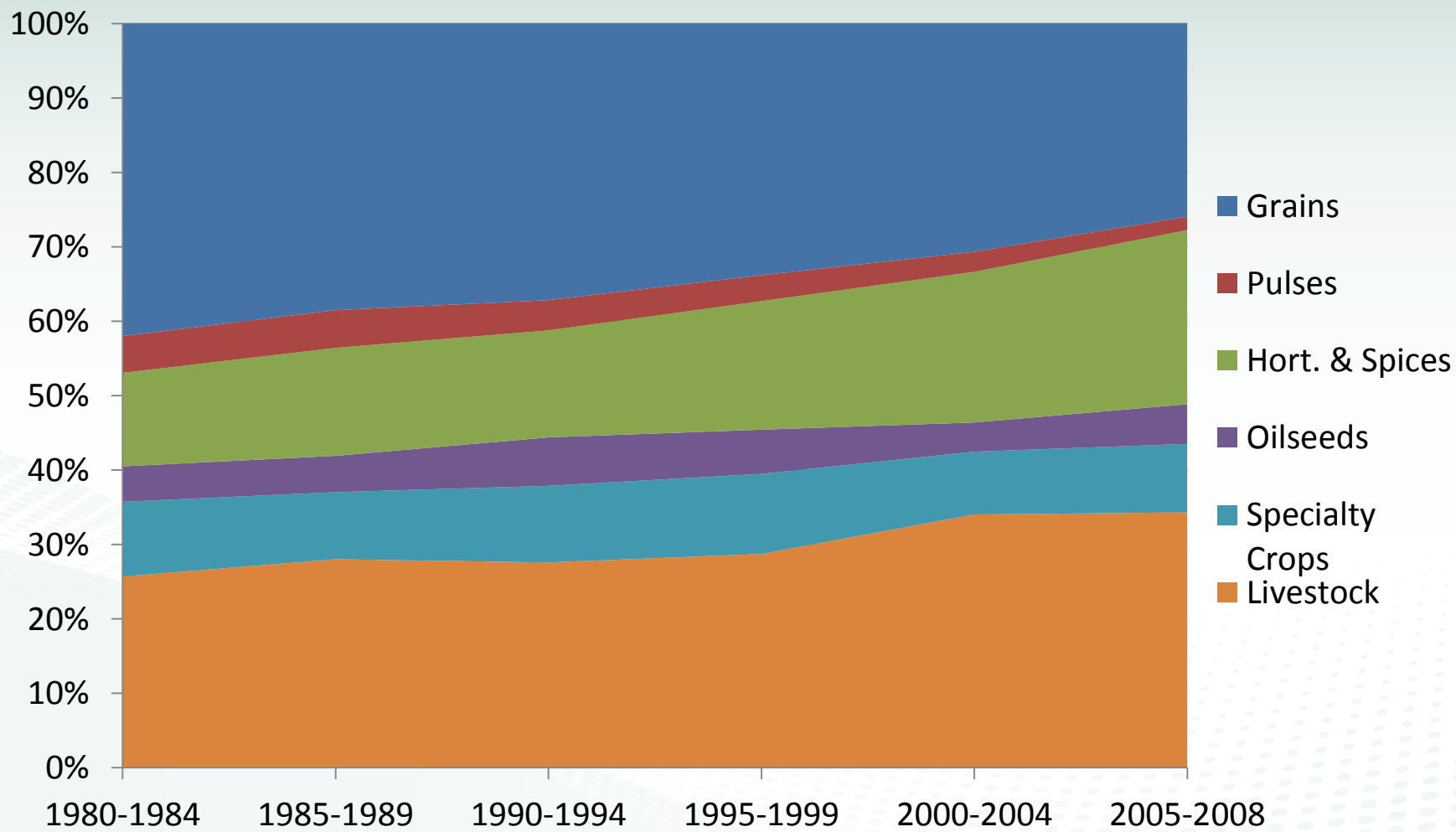
Definition of  
regions  
(national aggregate  
includes all states)



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# Output Shares by Commodity



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# Production Growth by Region and Commodity Group

	All Agriculture	Livestock Products	All Crops	Grains	Pulses	Hort. & Spices	Oilseeds	Specialty Crops
	<i>Average Annual Growth Rates</i>							
<b>India</b>	3.14%	4.02%	2.81%	2.27%	1.33%	3.84%	2.84%	3.08%
<b>North</b>	2.93%	4.10%	2.44%	2.96%	-1.34%	2.17%	0.56%	1.76%
<b>West</b>	3.52%	4.32%	3.16%	1.82%	2.18%	6.44%	3.41%	1.74%
<b>Central</b>	3.47%	4.12%	3.17%	1.79%	2.10%	4.15%	7.99%	0.86%
<b>East</b>	2.67%	3.18%	2.46%	2.52%	-3.33%	3.60%	-1.88%	1.29%
<b>Northeast</b>	1.97%	1.26%	2.14%	1.74%	0.87%	2.59%	4.15%	0.91%
<b>South</b>	3.38%	4.49%	2.95%	1.16%	3.33%	4.71%	1.61%	3.42%



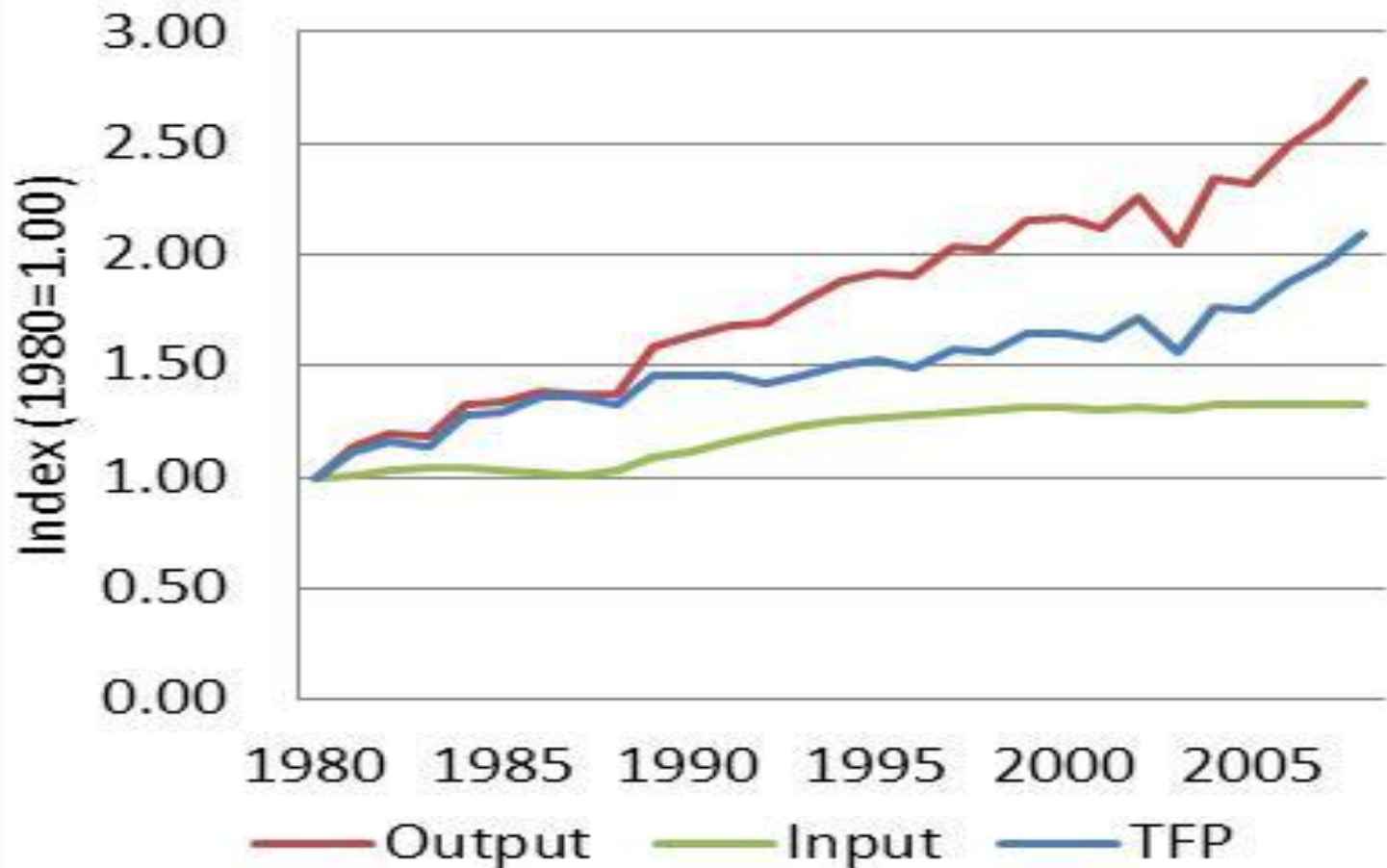
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Source: Author's estimates.



## Output, input and TFP indexes

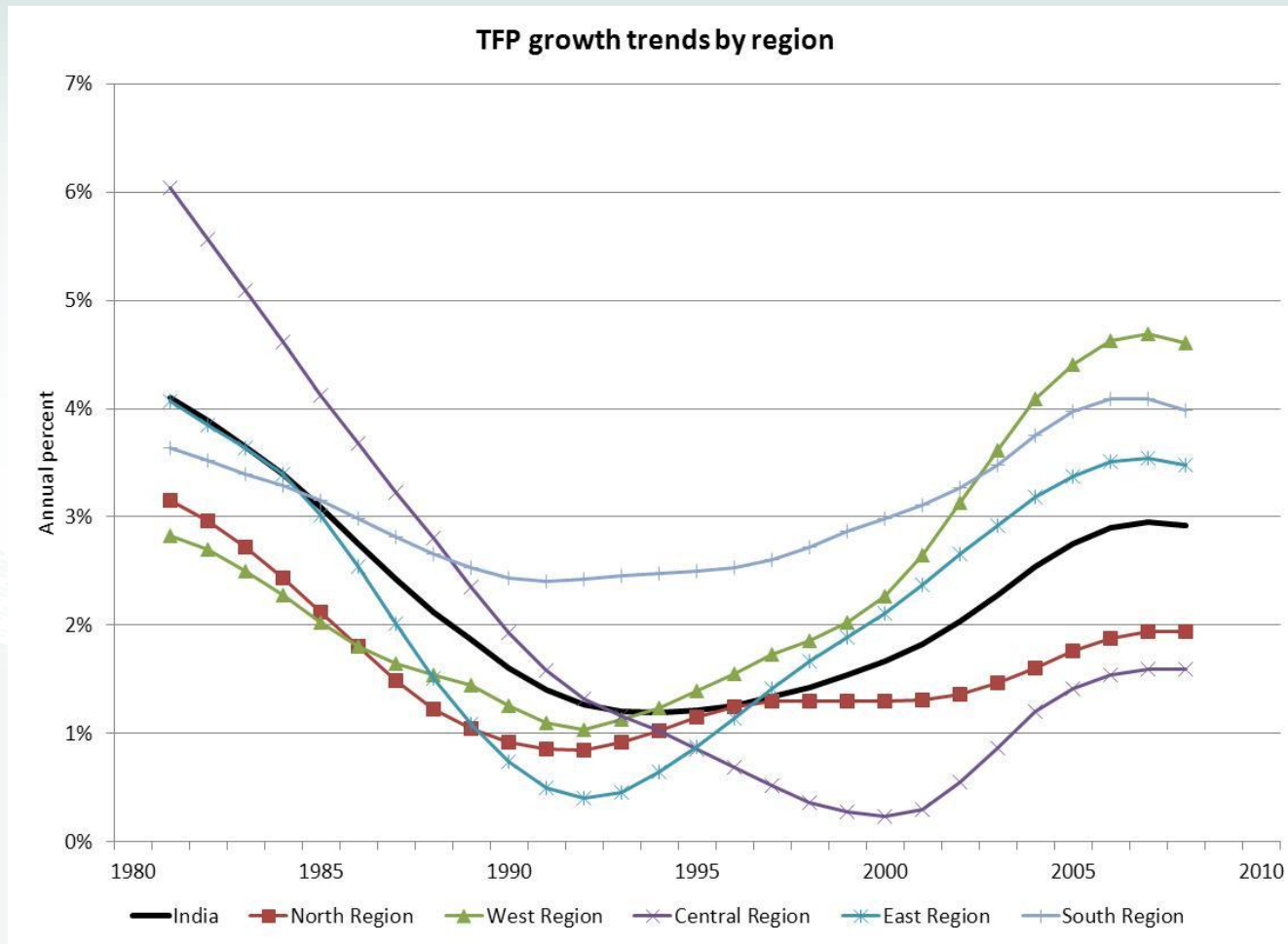


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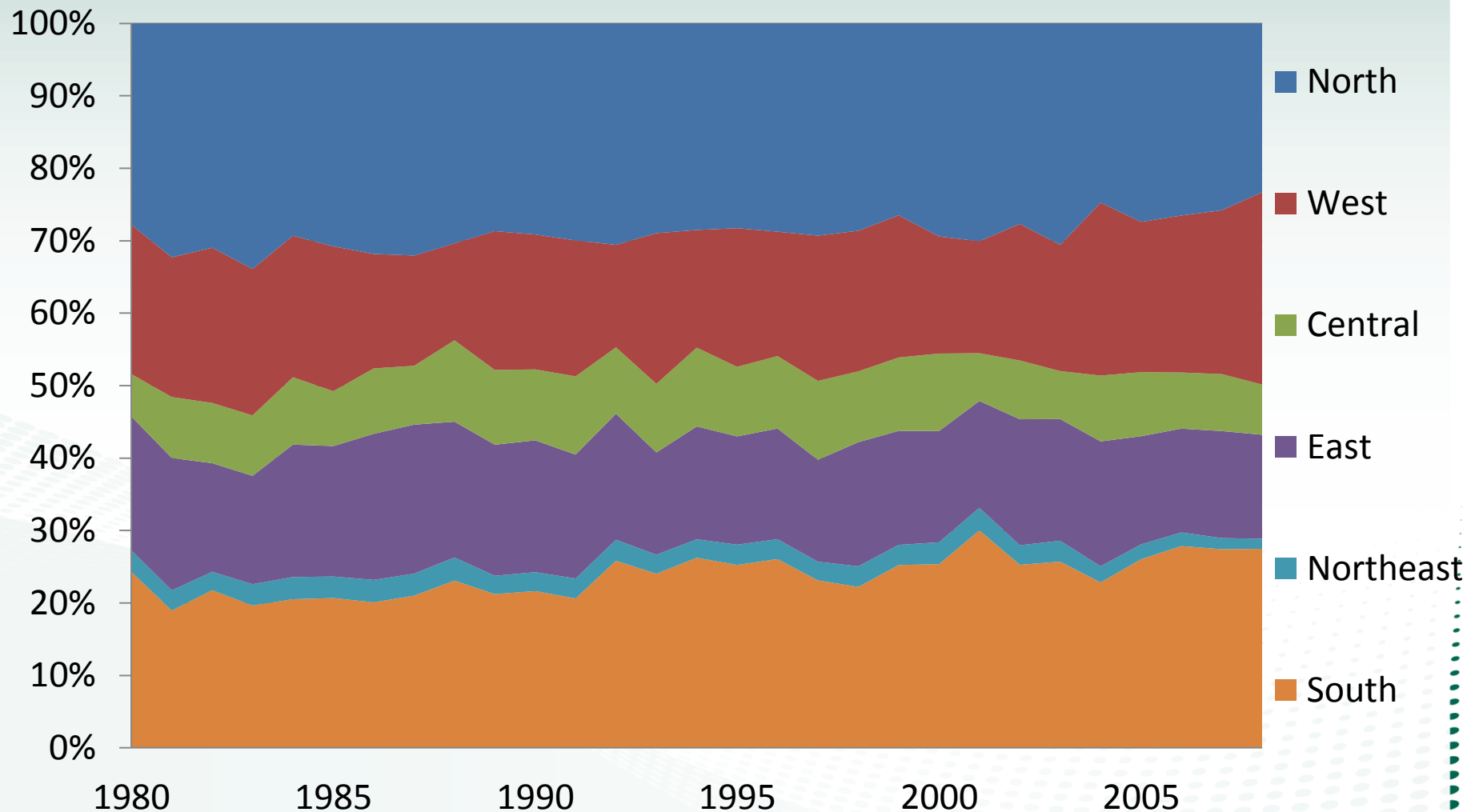
# TFP growth recovery more pronounced in west, south and eastern regions



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# Regional Shares of National TFP Growth

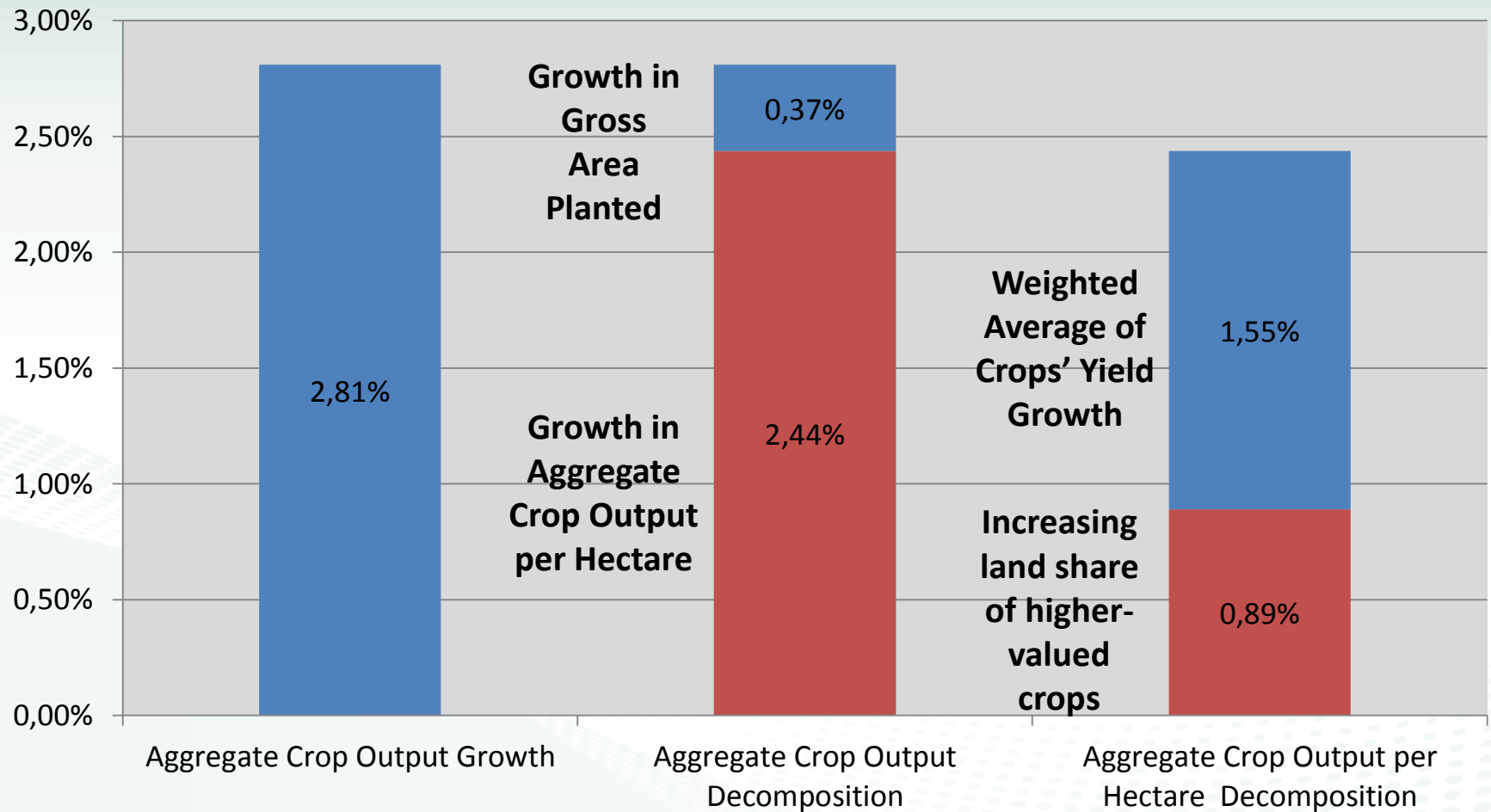


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Source: Author's estimates.

# Decomposing Crop Output Growth into Area, Yields, and Land Shares



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# Conclusions

- Agricultural growth shifting away from northern “grain belt” to broader national participation
- Diversification away from staple crops to higher-valued commodities is contributing to TFP growth
- Market-led TFP growth likely to be more sustainable than growth relying on government subsidies
- Policies that stimulate more rapid technological change contributing to TFP growth recovery



# Thank you!

## Questions or Comments?

*You may also address comments or questions to Nicholas Rada,  
[nrada@ers.usda.gov](mailto:nrada@ers.usda.gov)*

*The paper may be accessed at:  
<http://ageconsearch.umn.edu/handle/149547>*



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# Regional Output, Input, & TFP Growth

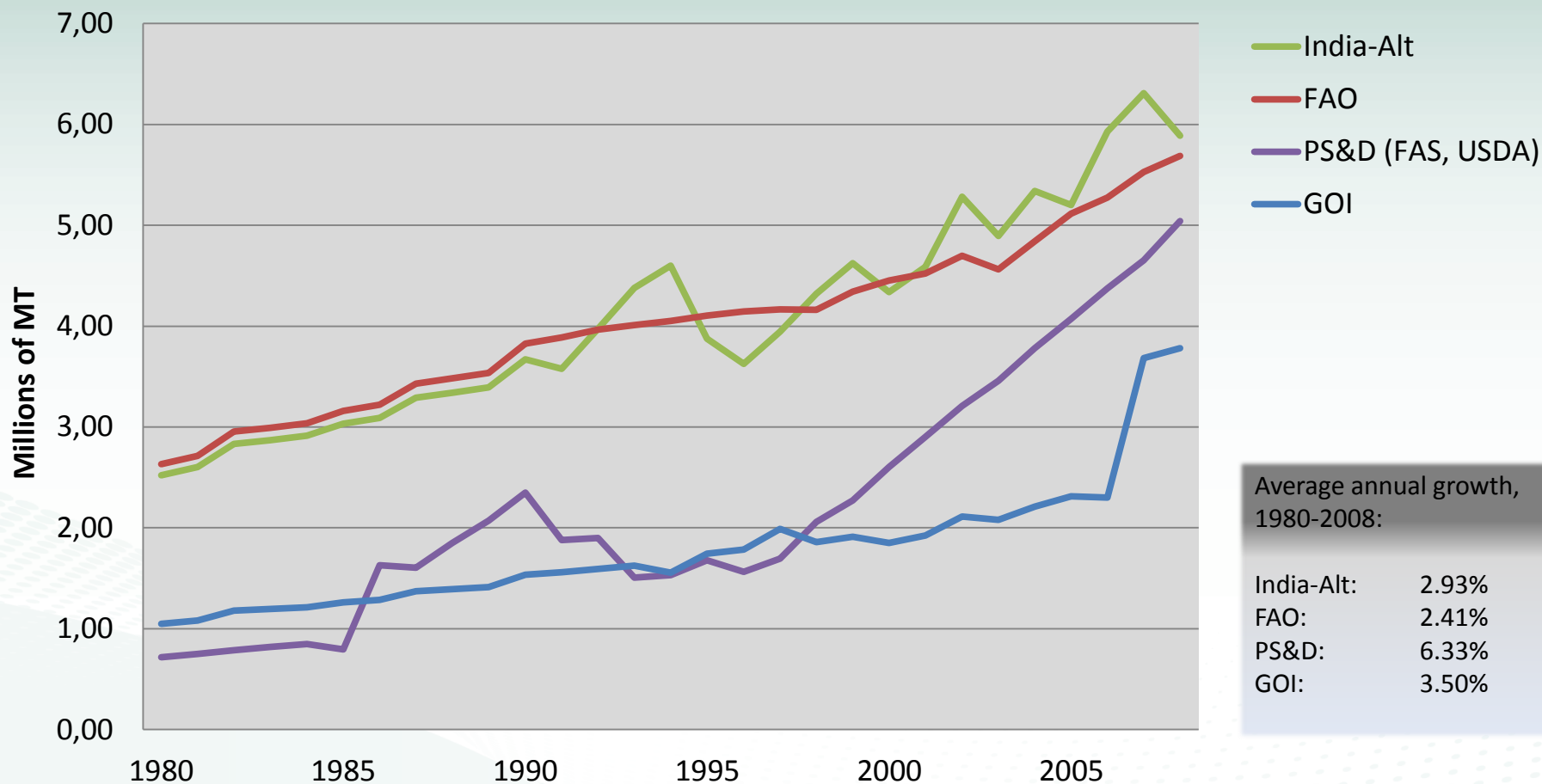
	Output Growth	Input Growth	TFP Growth
	<i>Average Annual Growth Rates</i>		
<b>North</b>	2.93%	1.55%	1.38%
<b>West</b>	3.52%	1.50%	2.02%
<b>Central</b>	3.47%	1.85%	1.62%
<b>East</b>	2.67%	0.88%	1.79%
<b>Northeast</b>	1.97%	0.48%	1.49%
<b>South</b>	2.95%	0.51%	2.86%
<b>India</b>	3.14%	1.23%	1.91%



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# Indian Meat Production



Note: The India-Alt series employs GOI meat values and the FAO average price of meat across all meat types (cattle, buffalo, chicken, duck, goat, and sheep).



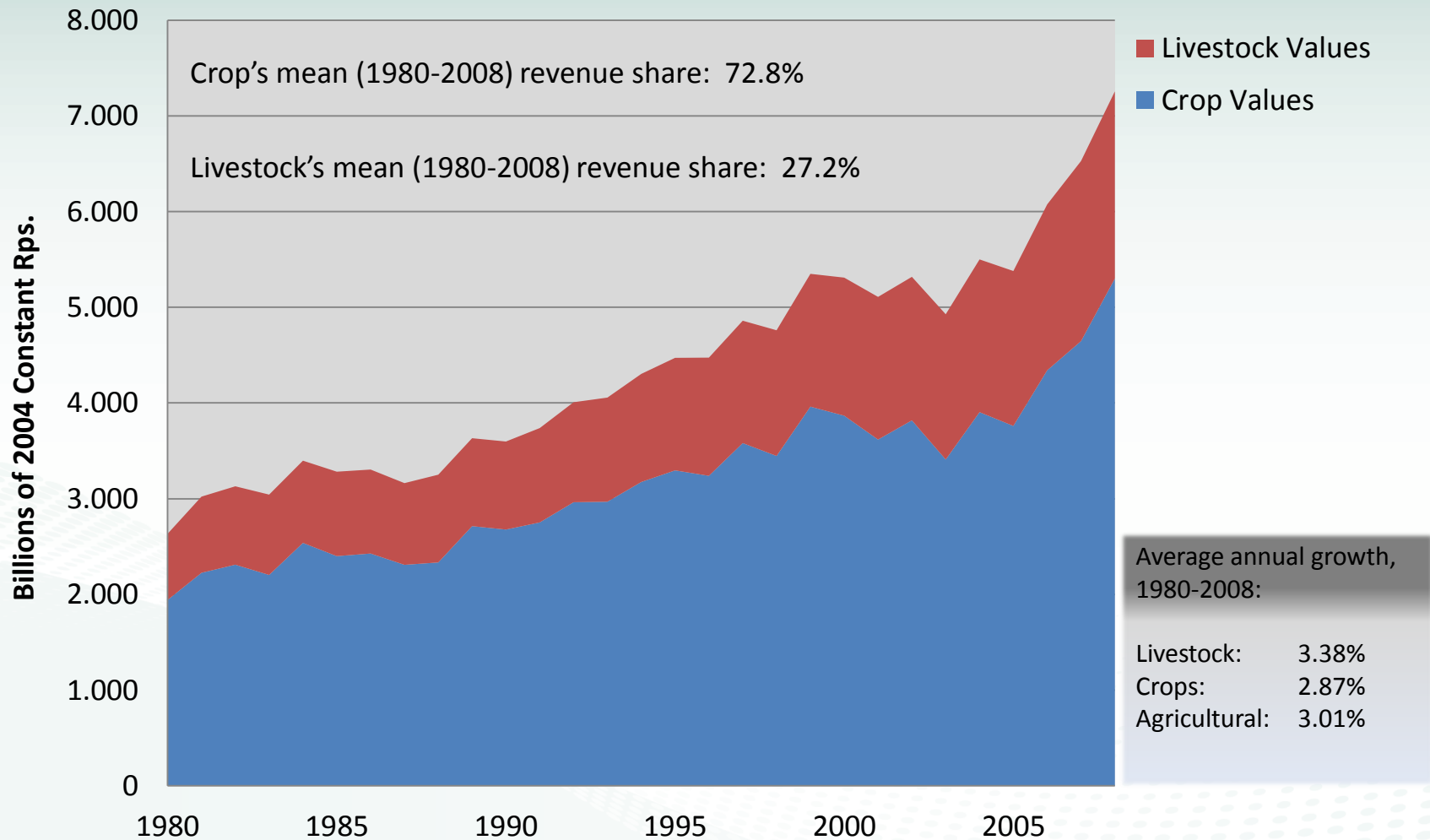
Source: GOI reflects data from the Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India; FAO is the Food and Agricultural Organization; PSD is the Production, Supply, and Distribution database from the Foreign Agricultural Service (USDA).

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# Agricultural Growth



Source: Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India.

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