

# DEMAND GROWTH FOR ANIMAL PRODUCTS IN BRIIC COUNTRIES

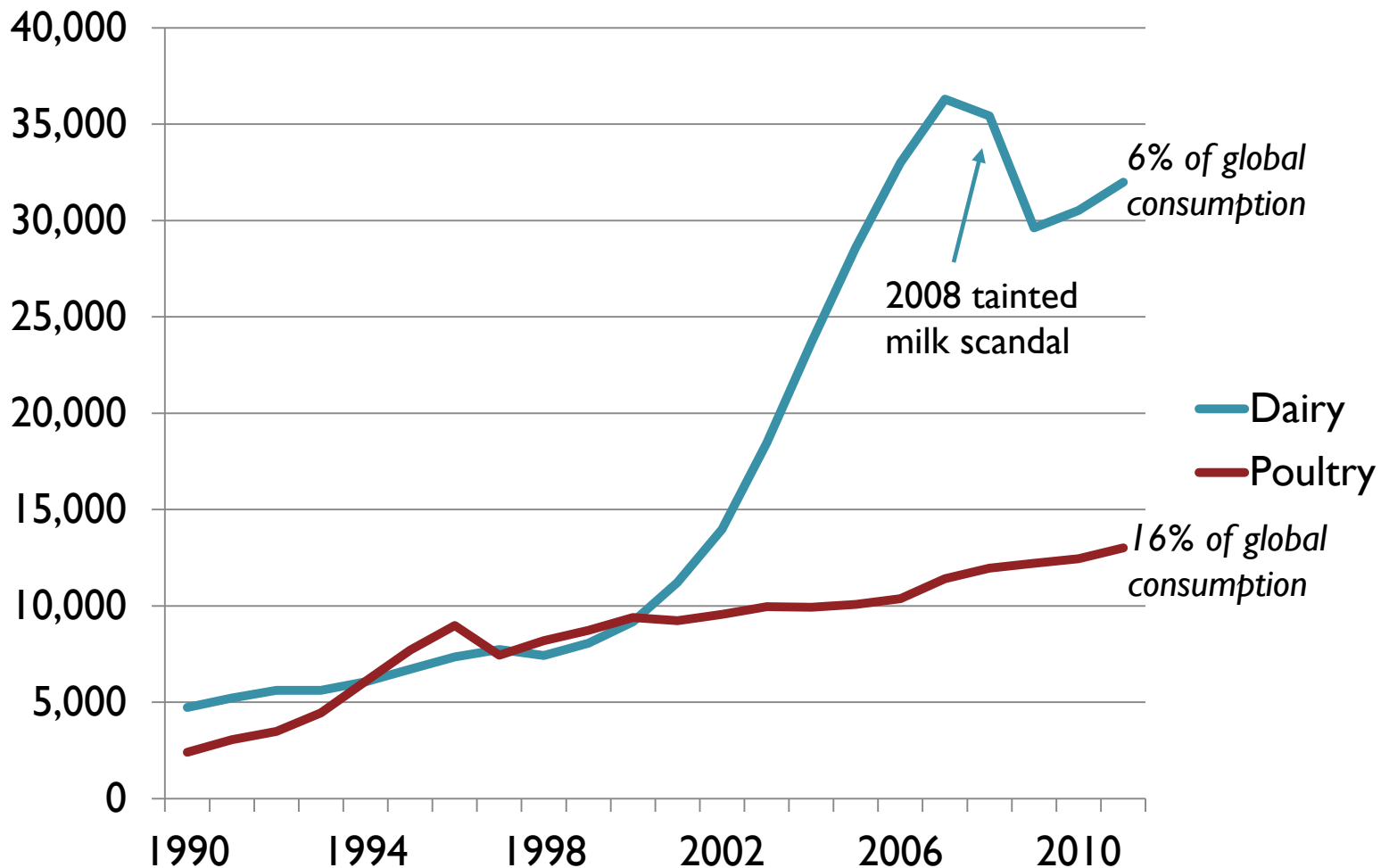
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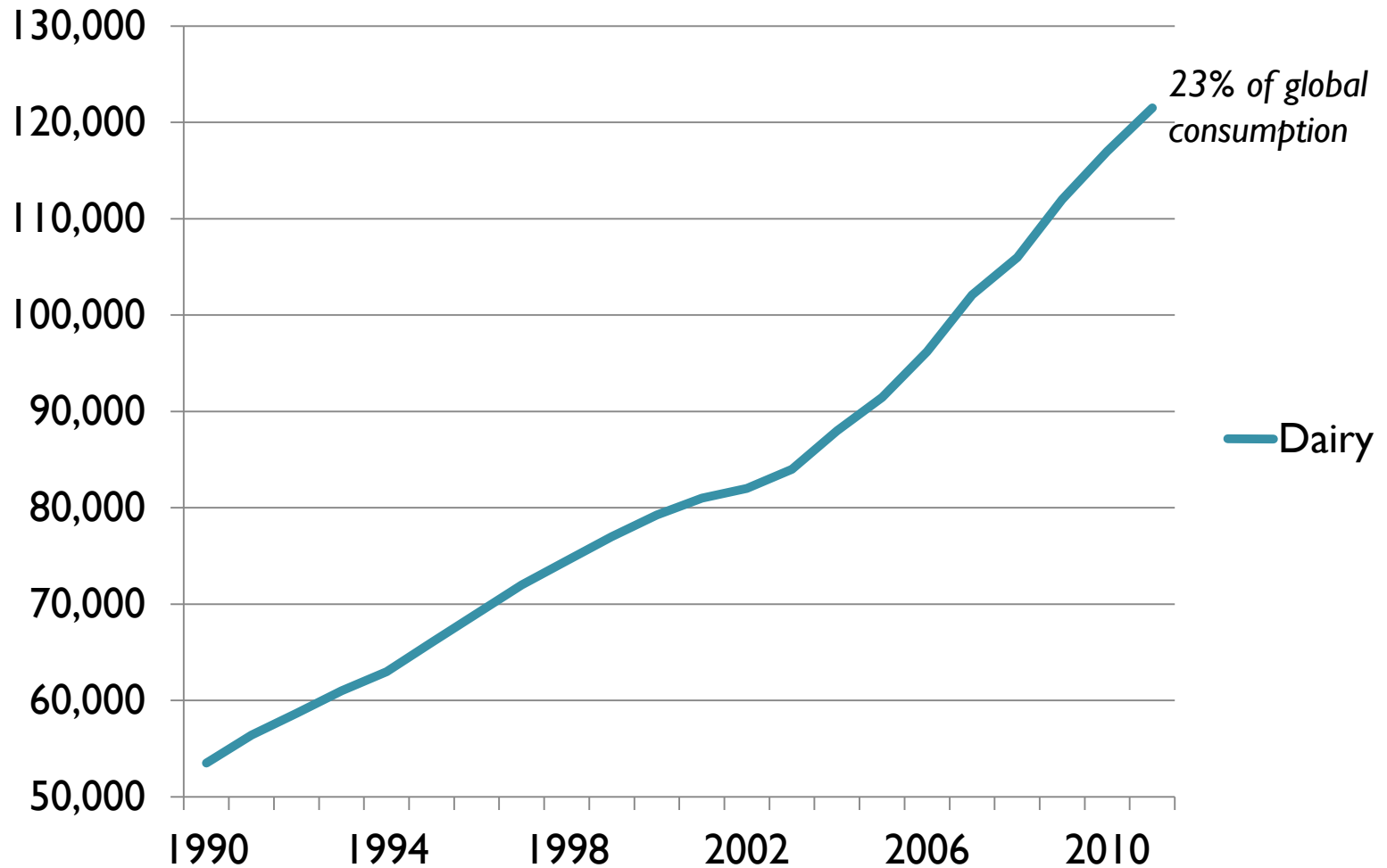
# Focus of this Paper

- BRIC – Brazil, Russia, India, Indonesia, and China
- More than one-fourth of global GDP in PPP terms in 2010
- Rapid projected economic growth for 2011-2021 (%/year)
  - China: 8.0%, India: 8.1%
  - Indonesia: 5.5%
  - Brazil 4.5%, Russia 4.0%

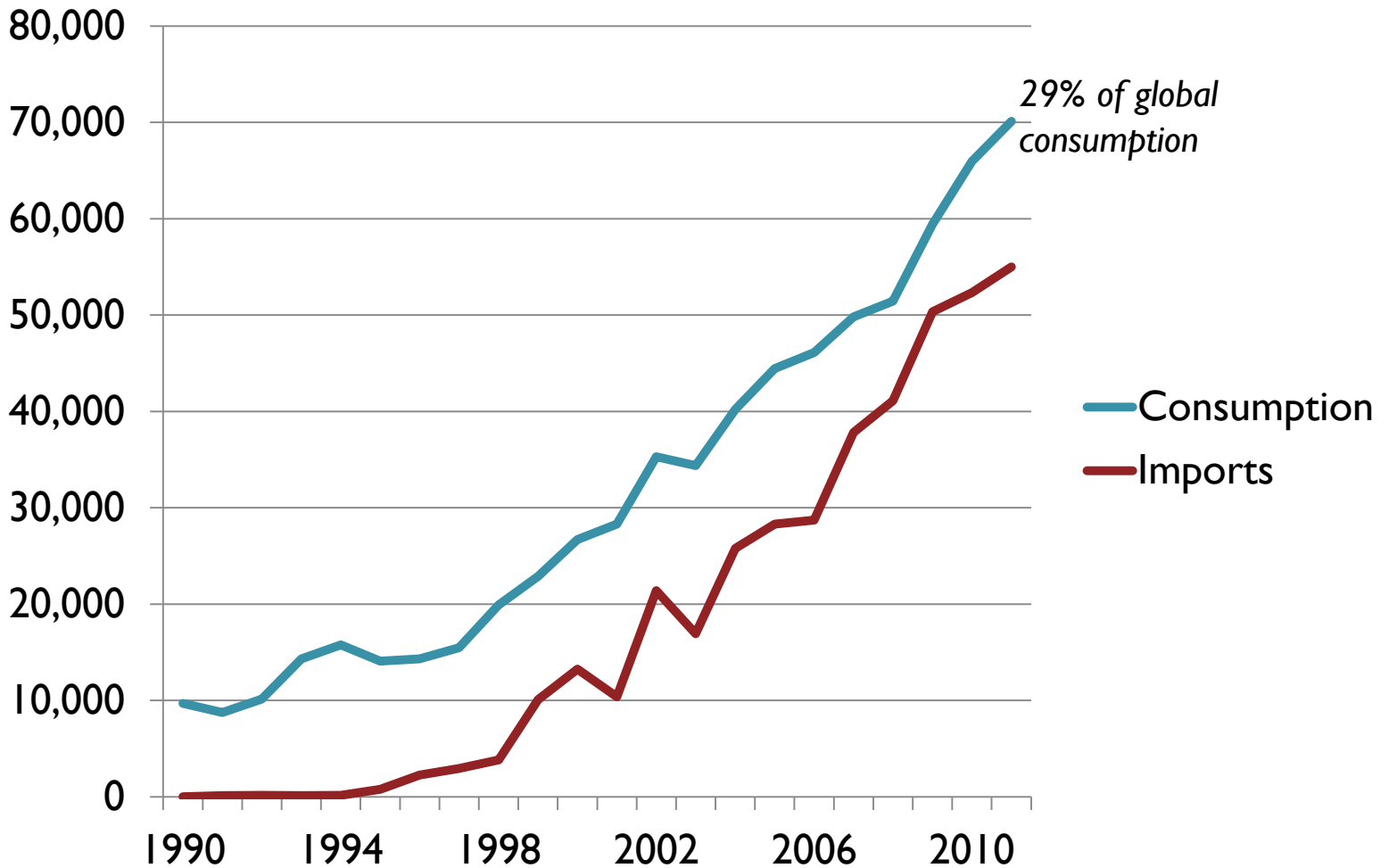
# Dairy and Poultry Consumption in China, 1990–2011 (1000 MT)



# Dairy Consumption in India, 1990–2011 (1000 MT)



# Soybean Consumption and Imports in China, 1990–2011 (1000 MT)



# Projecting Future Demand Growth

- Future animal product consumption in the BRIC countries will depend largely on
  - Income growth in BRIC countries
  - Income elasticities of demand
- How quickly are BRIC elasticities moving toward the low elasticities seen in high-income countries?

# What Do We Know About Demand Elasticities?

- Economists' stock of knowledge about demand elasticities turns over slowly
- Many elasticities used in models of global agricultural markets can be traced to studies from the 1960s
- Duality theory led to a round of elasticity estimation in the 1970s and 1980s, but not much since then

# Demand Elasticity Estimates for the BRIIC Countries

- China is an exception to the lack of recent interest in estimating demand elasticities
- The other BRIIC countries are not
- Estimates for each BRIIC country differ significantly from study to study
- No one to date has systematically collected and reconciled these estimates



# Objectives of this Research

- Conduct a meta-analysis of food demand elasticity estimates for the BRIC countries
- Use the results to arrive at current and projected future values of income and price elasticities

# Meta-Regression Analysis

- Dependent variables: parameters of interest, in our case income and own-price elasticities
- Explanatory variables: characteristics of each study such as sample and model

# Why Do Study Results Differ?

What are the income levels for the data analyzed?

Which country is being analyzed?

What are the methodological details of the study (single-stage vs. multi-stage)?

**Income Levels**

**Country**


**Metho-  
dology**

**Study Results**

# The 70 Studies

- 48 studies of consumer animal product demand in China
- 4 studies for Brazil
- 2 studies for Russia
- 7 studies for India
- 8 studies for Indonesia
- 1 study for Asia including China, India and Indonesia
  
- Studies located through searches of
  - Google, Google Scholar
  - AgEcon Search
  - USDA/ERS elasticity database
  - Citations within each study
  
- Study data range from 1978 to 2007

# The 9 Animal Products

- Pork
  - Beef
  - Mutton
  - Poultry
  - Eggs
  - Aquatic products
  - Dairy products
  
  - Meat
  - Meat and Fish
- 
- Reference Groups

# The Elasticities

- 2,744 income and price elasticity estimates
  - 753 income
  - 517 own-price
  - 1,474 cross-price
- Average of 40 per study, with a range from 1 to 264

Product	Income Elasticity Estimates		
	n	Mean	Standard Deviation
Pork	32	0.53	0.24
Beef	45	0.69	0.28
Mutton	13	0.98	0.87
Poultry meat	55	0.83	2.25
Eggs	38	0.49	0.57
Aquatic products	57	0.62	0.38
Dairy products	220	0.99	0.96
Meat	41	0.63	0.41
Meat and Fish	24	1.26	0.31

Product	Marshallian Own-Price Elasticity Estimates		
	n	Mean	Standard Deviation
Pork	27	-0.67	0.39
Beef	32	-0.80	0.83
Mutton	8	-1.20	1.26
Poultry meat	42	-0.71	0.69
Eggs	31	-0.82	0.48
Aquatic products	38	-0.62	0.38
Dairy products	81	-0.78	0.52
Meat	30	-0.77	0.32
Meat and Fish	43	-2.28	0.55



# Multi-Stage Budgeting

- Assumes preferences to be separable among broad groups of goods (e.g. food, clothing, housing, etc.)
- Within each group of goods, some studies assume separability among subgroups (e.g. livestock products, grains, edible oils)

# Multi-Stage Budgeting

- Within each group, demands are a function of prices within that group and group expenditure
  - Conditional elasticities
- Carpentier and Guyomard (2001): formulas for converting conditional elasticities into elasticities with respect to household income and prices
  - Unconditional elasticities

# Study Characteristics

- Did study report conditional elasticities? If yes...
  - With respect to food expenditures?
  - Or with respect to a more specific food group?
- Type of demand system
  - AIDS or similar
  - QUAIDS or similar
  - QES or LES at upper level, AIDS at lower
  - All other demand systems
  - No demand system (reference category)

# Income Elasticity Results

	Model 1			Model 2			Model 3	
2 Stage-Food	0.26807	3.02***		0.22212	2.70***		0.24902	2.83***
2 Stage-Other	0.20262	1.57		0.03728	0.30		0.19559	1.51
QUAIDS	0.14140	0.98		0.21194	1.49		0.13033	0.90
AIDS	0.10787	0.82		0.08039	0.63		0.15847	1.23
QES-LES/AIDS	0.17846	0.94		0.16375	0.86		0.24288	1.31
Other Demand Systems	-0.24987	-1.60		-0.28702	-1.85*		-0.23379	-1.50
Pork	0.00156	0.01		0.05369	0.32		0.00027	0.00
Beef	0.07417	0.47		0.28408	1.92*		0.05959	0.38
Mutton	0.37036	1.43		0.50371	1.93*		0.36805	1.42
Poultry	0.28774	2.06**		0.40334	2.98***		0.28078	2.01**
Egg	-0.05569	-0.36		0.02487	0.16		-0.07173	-0.47
Aquatic	0.10186	0.77		0.15753	1.18		0.09289	0.70
Dairy	0.03337	0.27		0.41510	4.63***		0.01824	0.15
ln(PCI-PPP)	-0.09856	-1.82*		-0.16992	-3.68***			
Brazil	0.18212	0.91					0.10834	0.55
Russia	0.32918	1.92**					0.24646	1.49
India	0.60285	4.58***					0.70158	5.85***
Indonesia	0.36745	2.58***					0.36182	2.53**
Constant	1.01097	2.24**		1.6712	4.34***		0.222658	1.79*

# Own-Price Elasticity Results

	Model 1			Model 2			Model 3	
2 Stage-Food	-0.03083	-0.35		-0.12361	-1.56		-0.00598	-0.07
2 Stage-Other	-0.24334	-2.14**		-0.09727	-0.88		-0.21408	-1.87*
QUAIDS	-0.41406	-2.64***		-0.37775	-2.35**		-0.48757	-3.14***
AIDS	-0.37735	-2.38**		-0.01921	-0.13		-0.36940	-2.32**
QES-LES/AIDS	-0.11095	-0.47		0.56576	2.26**		0.05829	0.25
Other Demand Systems	-0.37570	-2.17**		0.08038	0.46		-0.40828	-2.35**
Pork	0.36122	2.85***		0.35809	2.57***		0.37202	2.91***
Beef	0.33322	2.68***		0.09882	0.75		0.32601	2.60***
Mutton	-0.09007	-0.40		-0.24757	-0.99		-0.08647	-0.38
Poultry	0.34127	3.27***		0.27321	2.38**		0.33767	3.22***
Egg	0.22074	1.90		0.18670	1.44		0.20514	1.75*
Aquatic	0.46856	4.23***		0.43732	3.61***		0.46158	4.14***
Dairy	0.75339	8.73***		0.39108	4.43***		0.73925	8.53***
ln(PCI-PPP)	-0.13175	-2.70***		0.05172	1.19			
Brazil	-0.40659	-1.48					-0.48833	-1.78*
Russia	-0.46053	-3.71***					-0.56749	-4.79***
India	-1.06026	-9.91***					-0.92488	-9.72***
Indonesia	-0.34102	-2.85***					-0.29892	-2.50**
Constant	0.61526	1.49		-1.25037	-3.41***		-0.44100	-3.25***

# Income Growth and Income Elasticities

- Doubling of per capita income estimated to lower income elasticities by about 0.1
- Slow convergence to the low elasticities of high-income countries
- Income growth during this decade should still lead to strong demand growth, especially for dairy and poultry

# Income Growth and Price Elasticities

- Doubling of per capita income estimated to lower own-price elasticities by about 0.1 (more price-elastic)
- Income growth brings with it access to more types of food products and greater inter-product substitutability



**THANK YOU!**