

Farmland Values: Where Do We Go From Here?

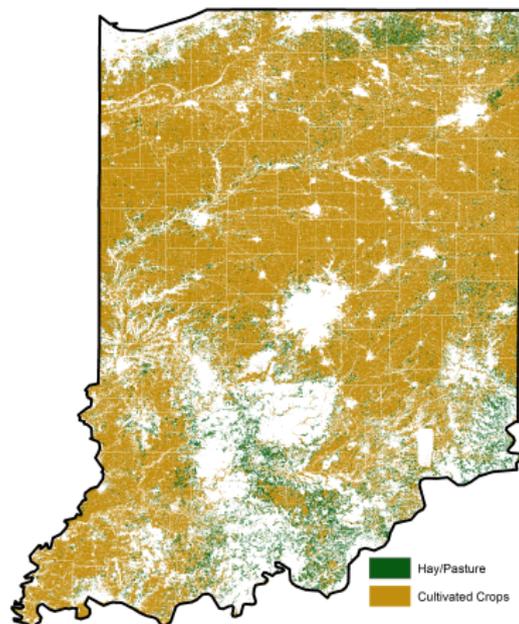
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Schrader Chair in Farmland Economics
Department of Agricultural Economics

Purdue Top Farmer Conference
January 10, 2020



Farmland in Indiana



Source: Indiana MAP (2011 Land Cover)

- 56,649 farms
- 14,969,996 acres
- \$1.7 million land and buildings per farm
- \$11.1 billion of agricultural products sold

Source: 2017 Census of Agriculture

Indiana farm balance sheet (\$ billions)

	2005	2010	2015	2016	2017
Farm Assets	35.8	59.9	69.6	68.7	75.3
Real estate	26.9	43.6	54.7	53.1	59.1
Non real estate	8.9	16.3	14.9	15.6	16.2
Farm Debt	4.3	6.5	9.1	8.9	10.2
Real estate	2.3	3.8	4.7	5.0	5.5
Non real estate	2.0	2.7	4.3	4.0	4.7
Equity	31.5	53.4	60.5	59.8	65.1
Select measures					
Debt/Equity	13.7	12.1	15.0	15.0	15.7
Debt/Asset	12.0	10.8	13.0	13.0	13.6
Real estate/Assets	75.2	72.8	78.6	77.2	78.4
Real estate debt/Total debt	52.9	58.9	52.2	55.8	53.8

Source: USDA Economic Research Service

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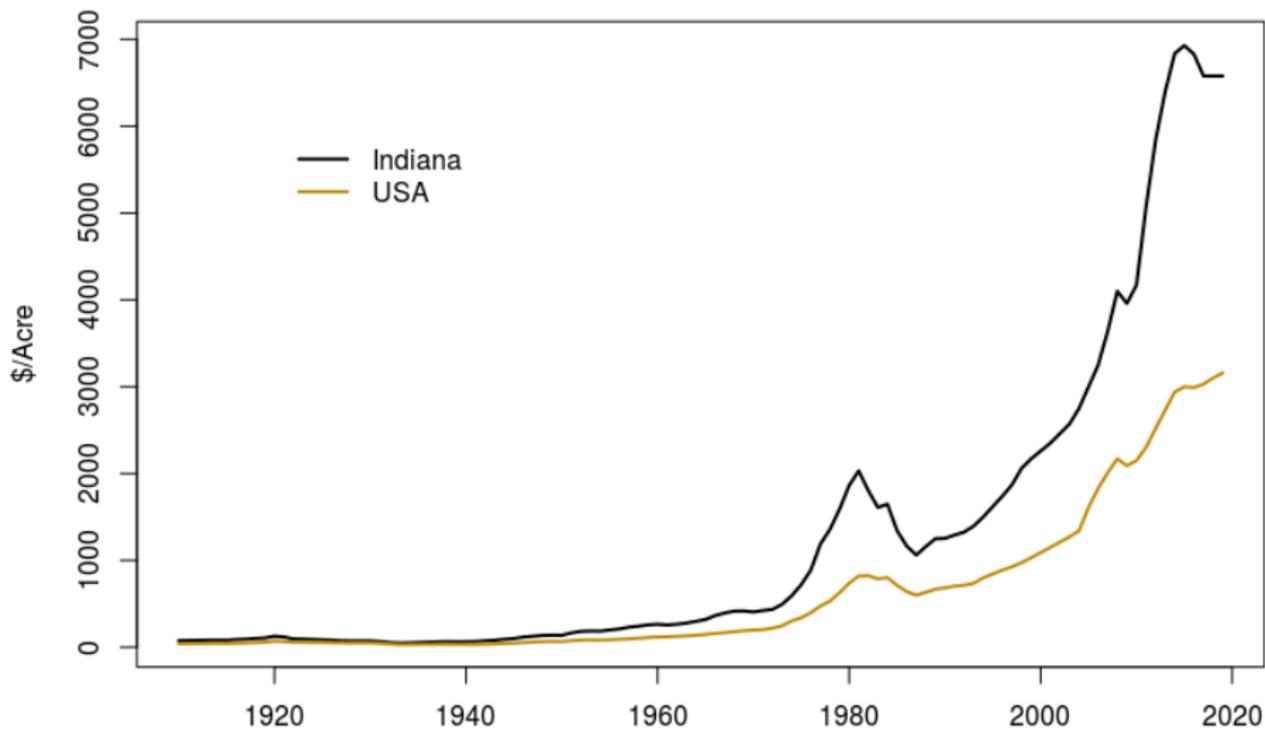
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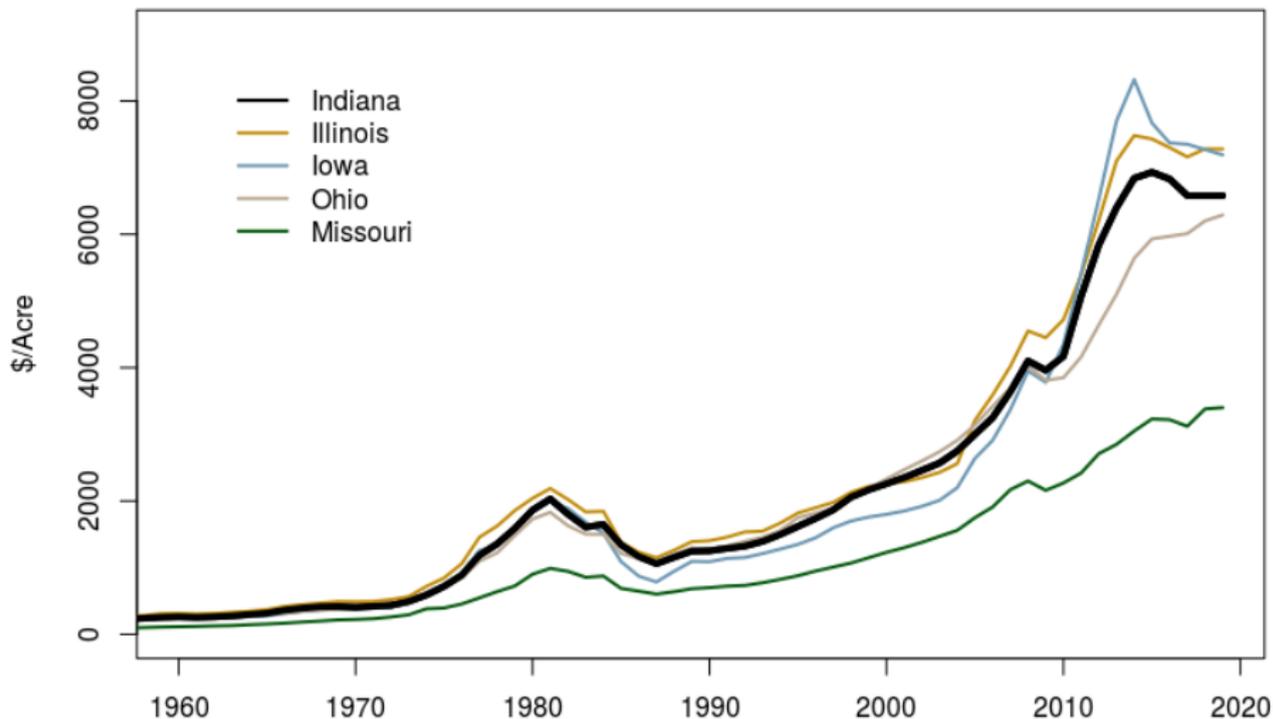
Source: USDA Economic Research Service

Long-run Indiana farmland prices



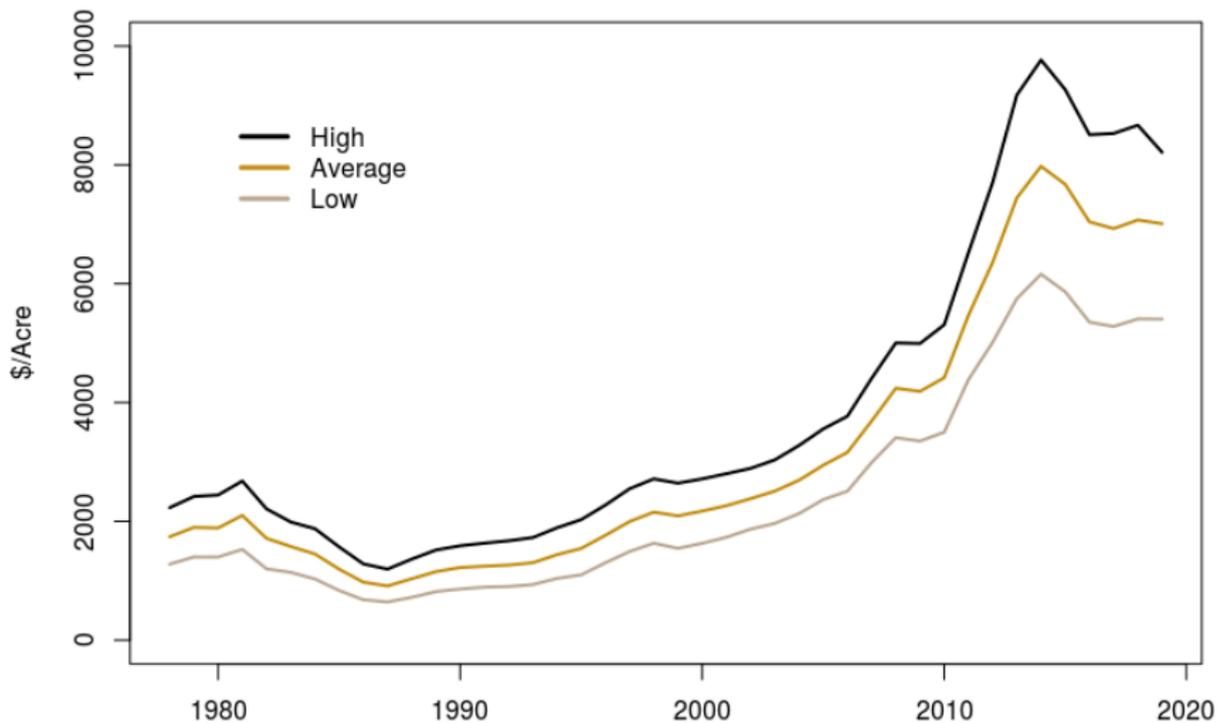
Source: USDA National Agricultural Statistics Service

Farmland prices across the Corn Belt



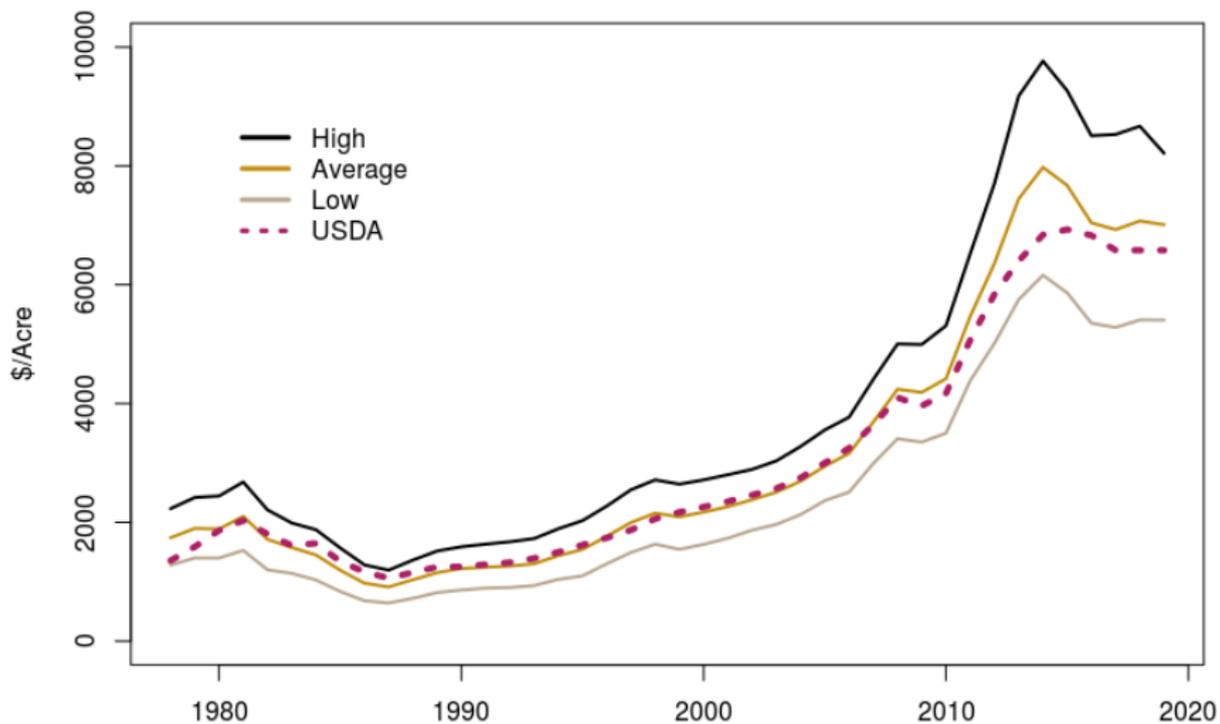
Source: USDA National Agricultural Statistics Service

Purdue Farmland Values and Cash Rent Survey



Source: Purdue Center for Commercial Agriculture

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How are farmland prices determined?

The value of an asset is determined by the *discounted* stream of returns obtained through ownership

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A simple model of farmland prices

$$P = \frac{E(R)}{(i - g)}$$

Present value formula:

- P : price of farmland
- $E(R)$: expected returns
- i : cost of capital
- g : growth rate for future returns

Farmland price determination

A simple model of farmland prices

$$P = \frac{E(R)}{(i - g)}$$

Assuming a growth rate of 1%:

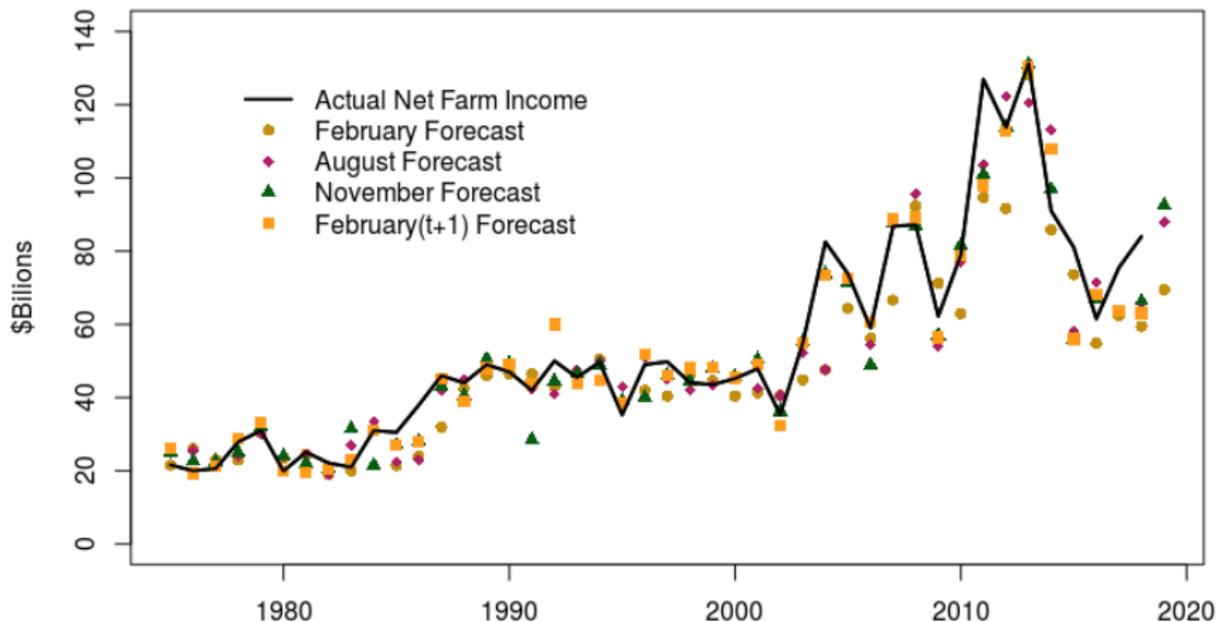
		Discount rate i		
		3.0%	4.5%	6.0%
$E(R)$	200	10,000	5,714	4,000
	300	15,000	8,571	6,000
	400	20,000	11,429	8,000

How are farmland prices determined?

We need to examine three pieces of information:

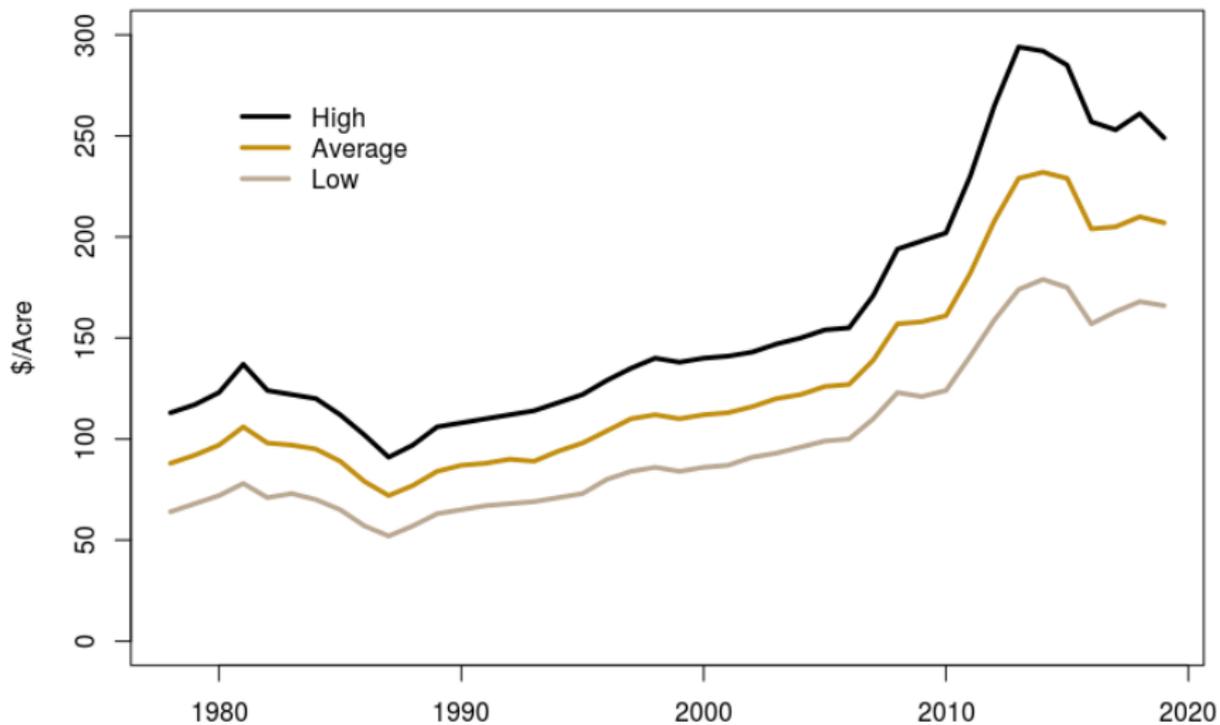
- Farmland returns
- Discount rates
- Potential for growth in returns

USDA's Net Farm Income Forecast



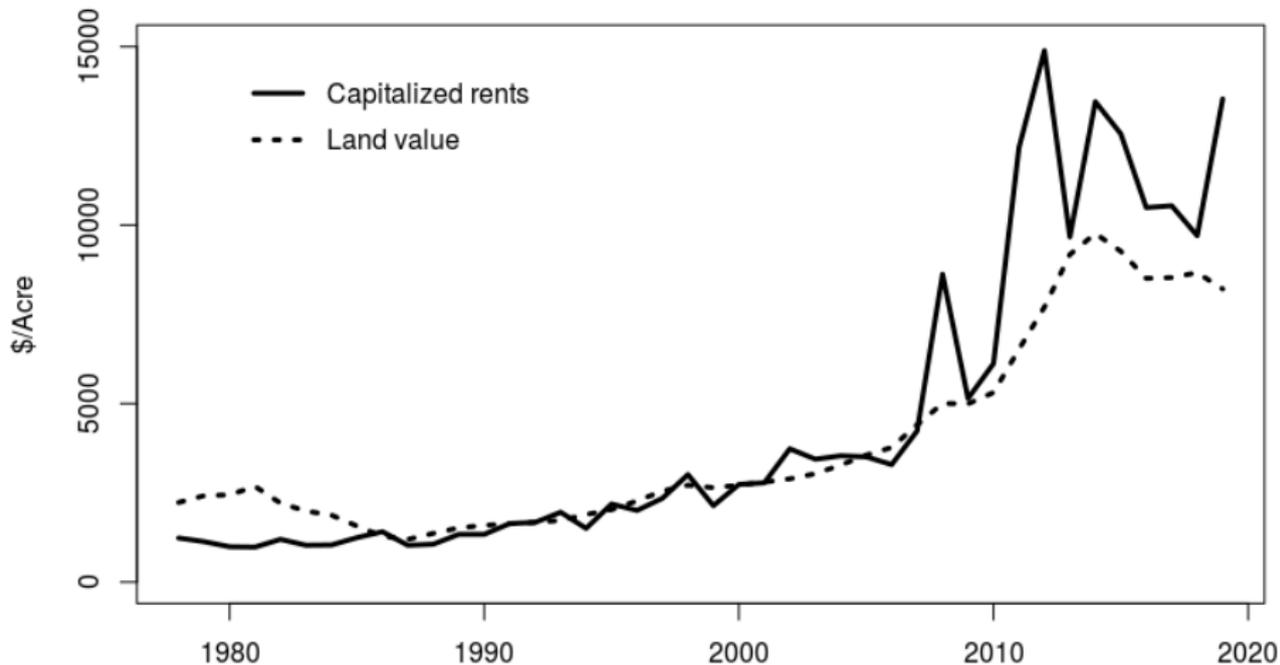
Source: USDA Economic Research Service

Indiana cash rents

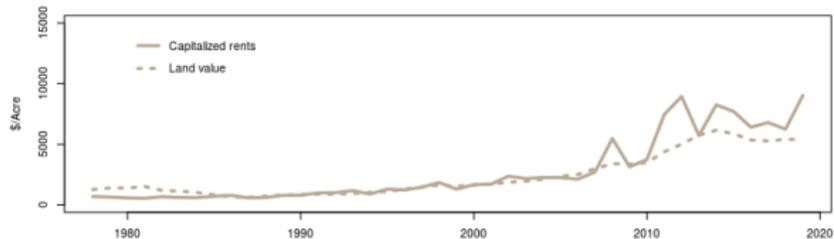
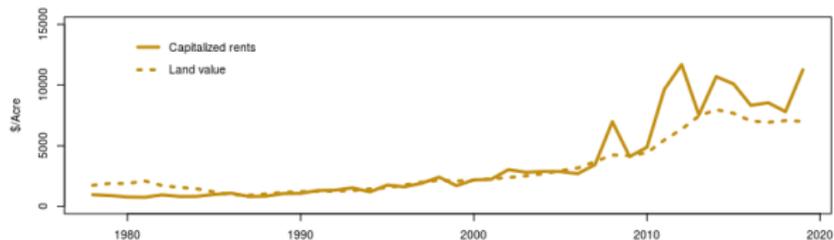
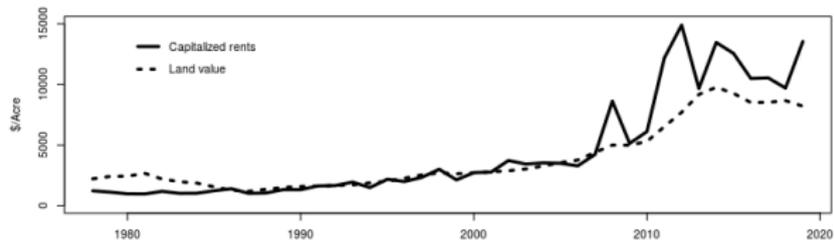


Source: Purdue Center for Commercial Agriculture

Capitalized rents (rental rate/10 year treasury)



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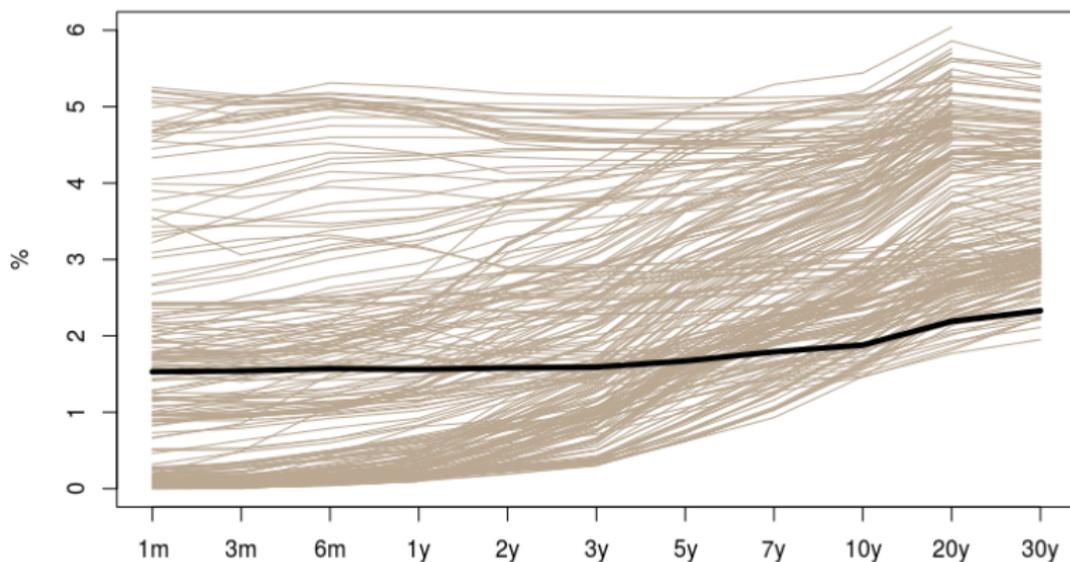


Discount Rates

- Yield on fixed-interest securities relative to maturity
- Yield curve: 2001 – today

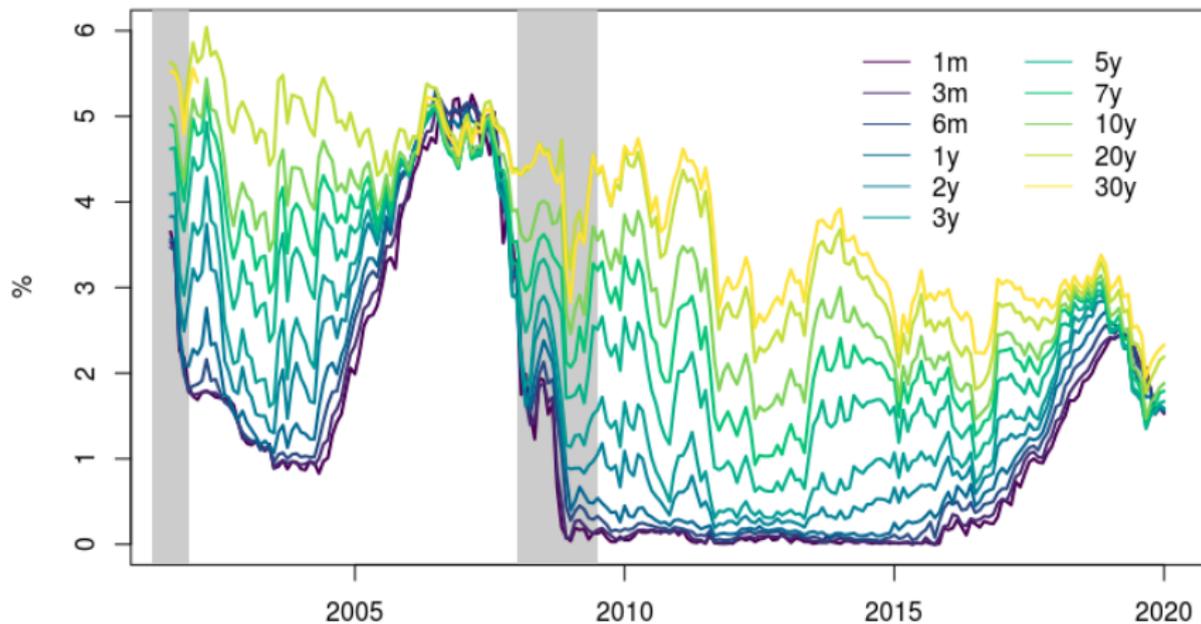
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Source: U.S. Department of the Treasury

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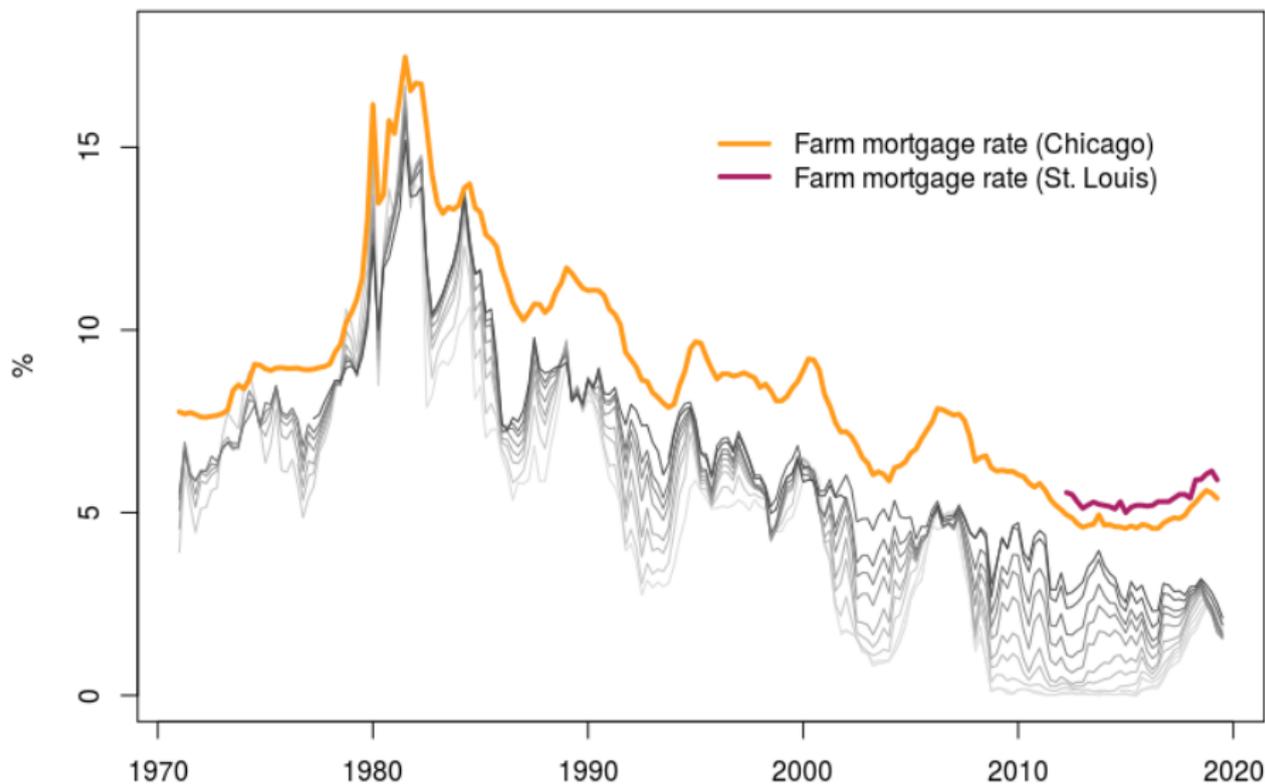
Federal Reserve districts



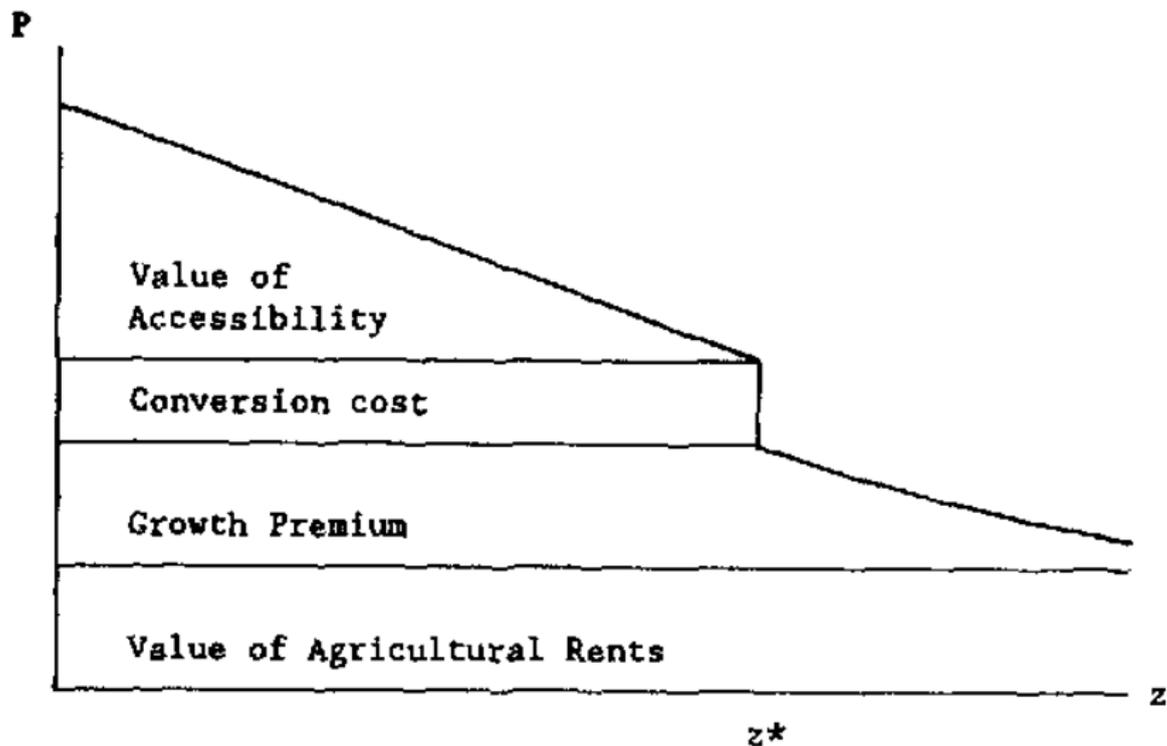
92 counties in Indiana

- 68 in Chicago
- 24 in St. Louis

Farm mortgage rates (fixed)

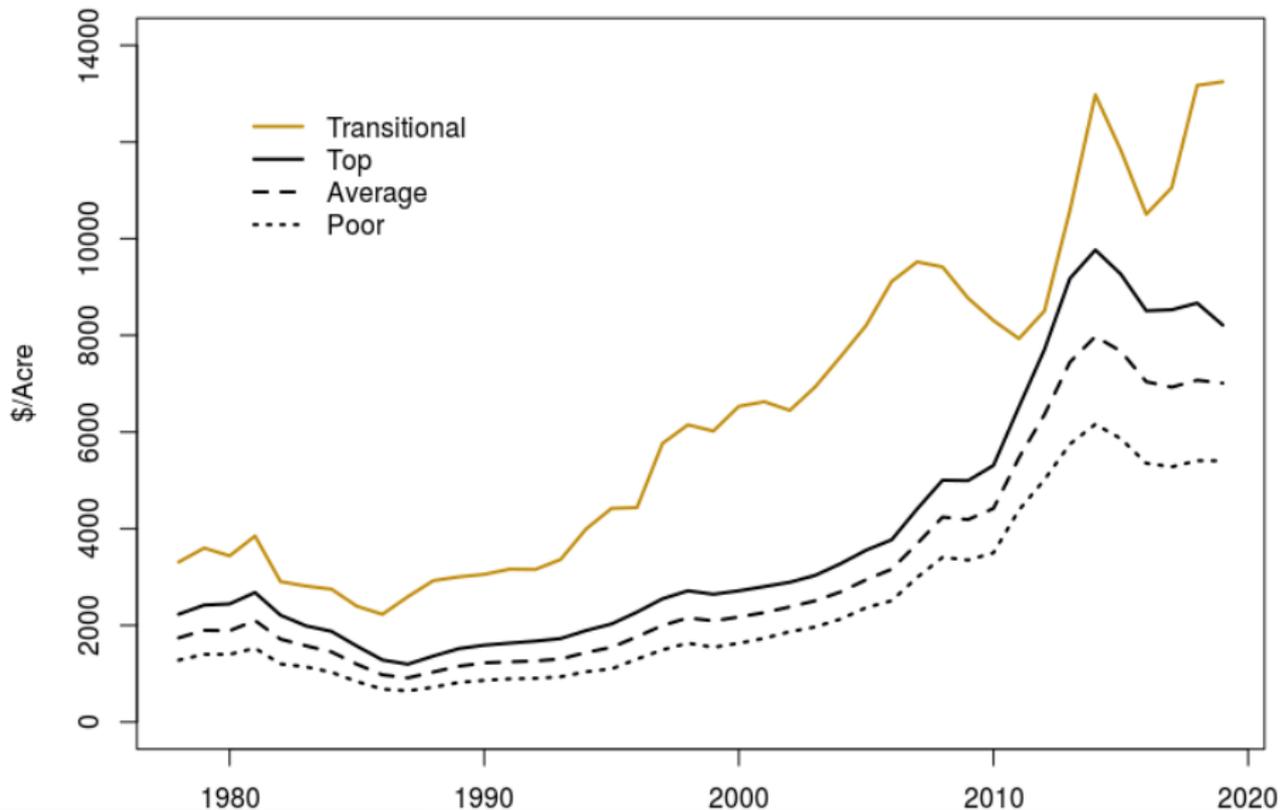


Farmland conversion and the development premium

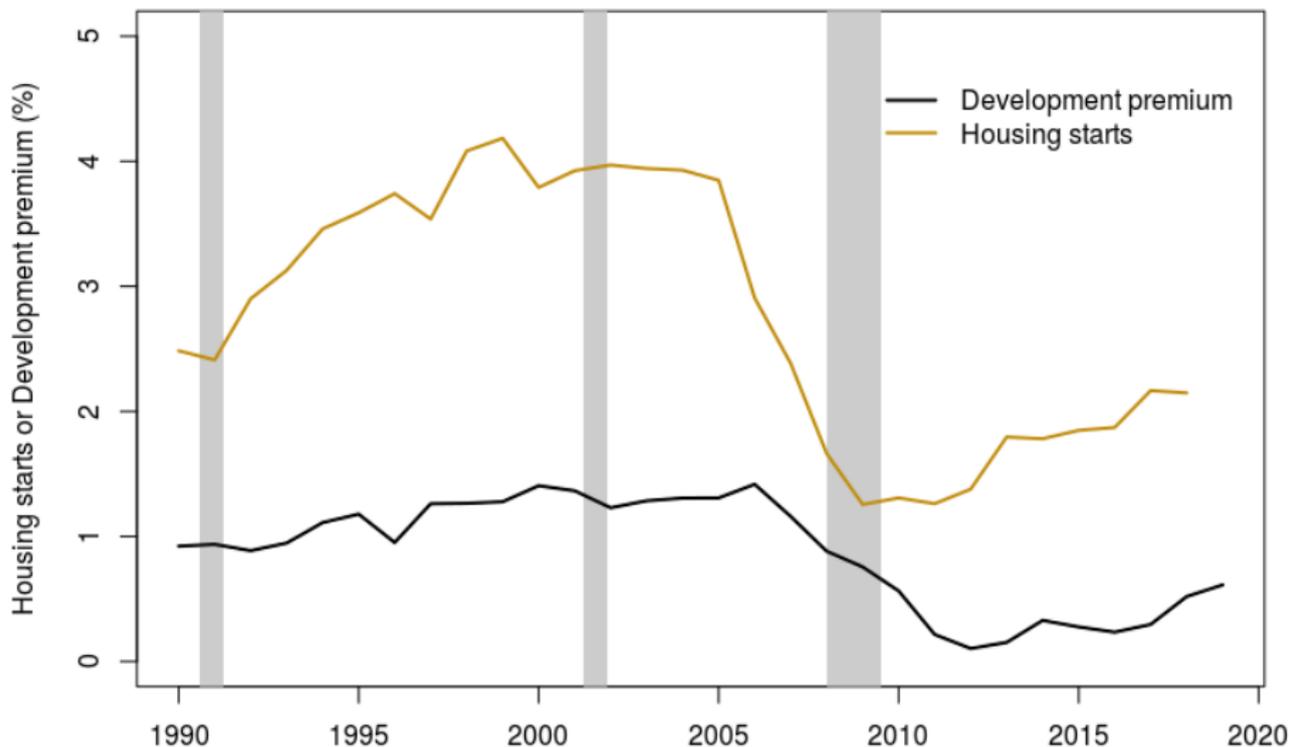


Source: Capozza and Helsley (1989)

Development premium

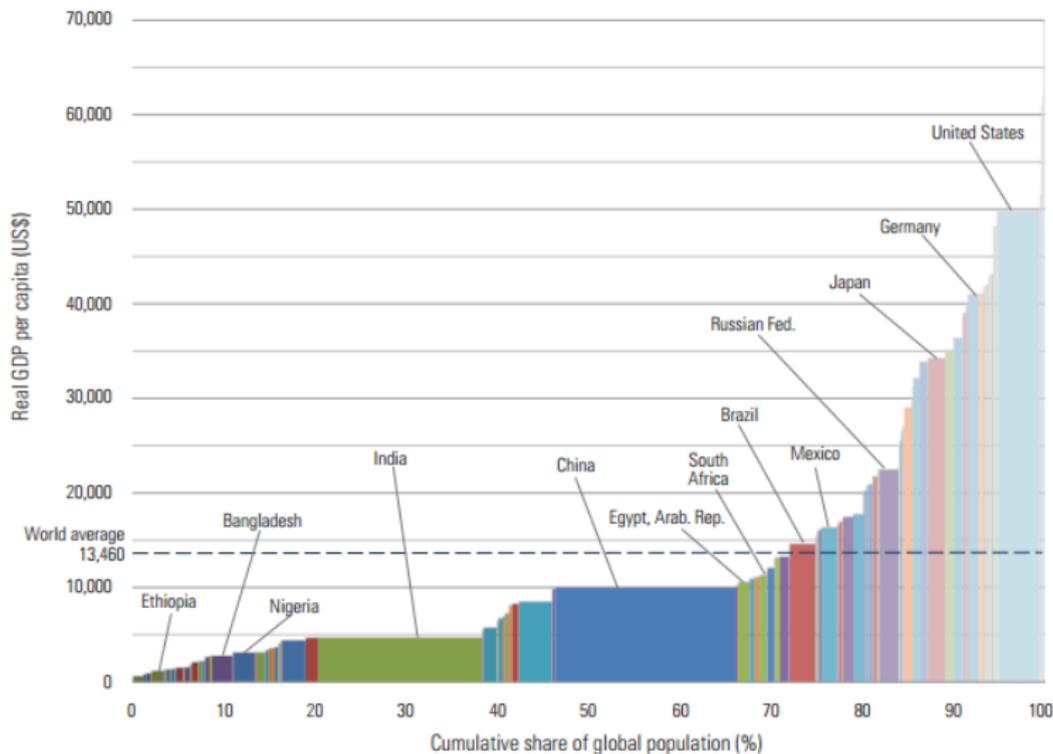


Development premium



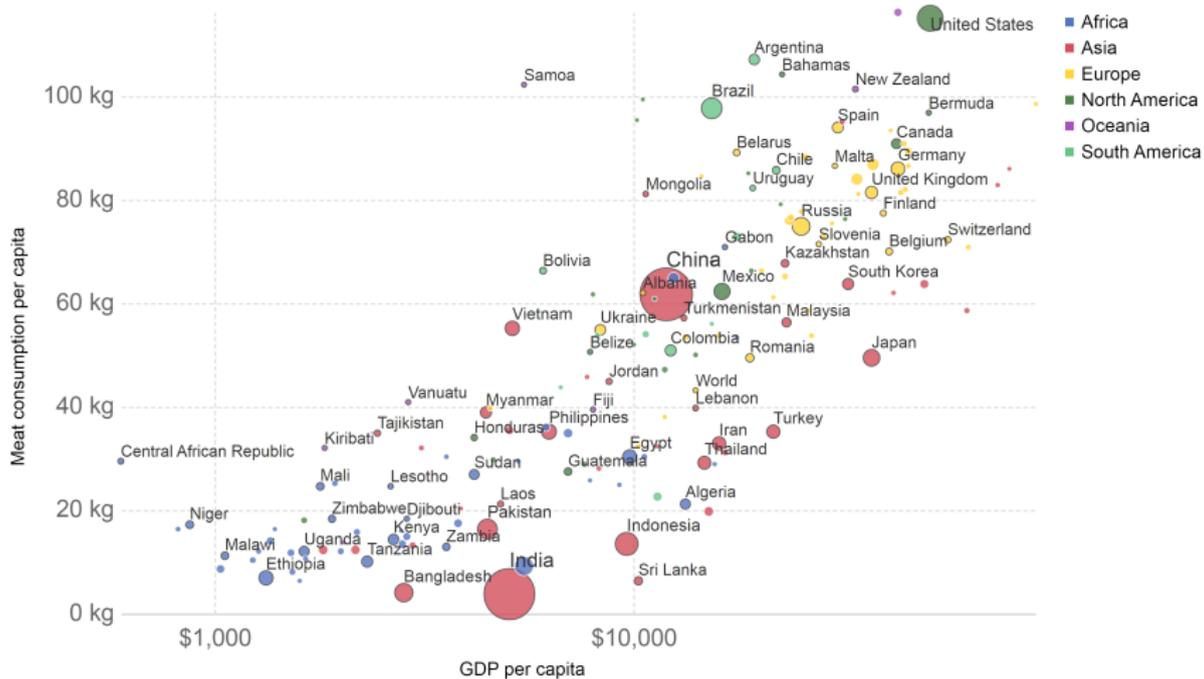
Source: StatsINDIANA

Gross domestic product and global population



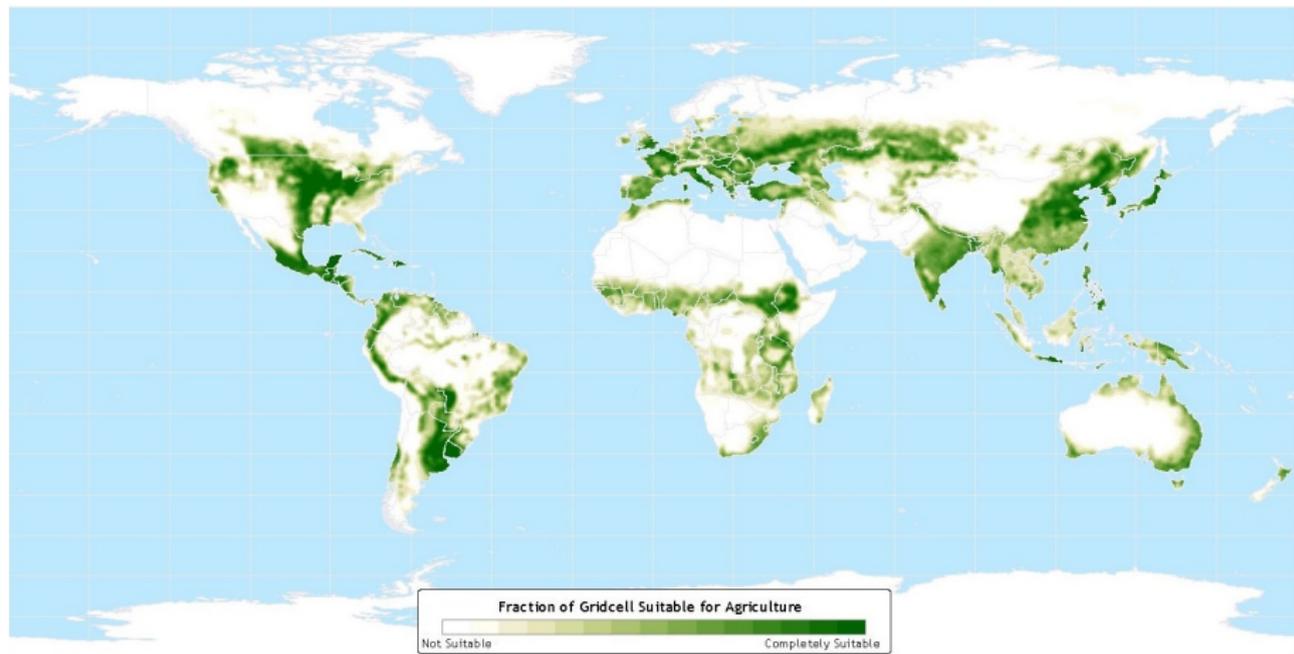
Source: "Purchasing Power Parities and Real Expenditures of World Economies" World Bank

Meat consumption and gross domestic product



Source: Our World in Data

Agricultural suitability



Source: University of Wisconsin, Center for Sustainability and the Global Environment

The race to improve returns through digital agriculture

AGTECH LANDSCAPE 2019



IN-FIELD SENSORS & SYSTEMS

POST-HARVEST MONITORING & EFFICIENCY

Field Monitoring Sensors & Solutions

IoT Monitoring Platforms

Crop / Farm Management Software

Automation / Robotics

Next Gen Logistics

Quality Mgmt / Compliance

Yield Forecasting

Soil Sensing / Analysis

Precision Irrigation

AgDNA

Processing Technology

Freshness Control

ERP Specialty

Supply Analytics

Insect Sensing / Monitoring

Water Monitoring

Digital Marketplaces

Post-Harvest Monitoring

Cold Chain Monitoring

ERP Commodity

Crop Marketing / Trading Platforms

Precision Applications

Labor Management

Food Safety Detection

Food Safety Track & Trace

Food Recovery

Food Safety Analytics

Finance & Insurance

VALUE CHAIN ENABLERS

Blockchain

Food Safety Detection

Food Safety Track & Trace

Food Safety Analytics

Food Safety Track & Trace

Food Safety Analytics

Food Safety Analytics

Data Aggregators

Data Analytics (Platform)

The Mixing Bowl

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References I

Capozza, D. R. and R. W. Helsley (1989). The fundamentals of land prices and urban growth. Journal of Urban Economics 26(3), 295–306.