



Innovation and Climate Induced Volatility: Food Security in Canada and the US

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Agricultural and Resource Economics

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FOOD SECURITY | WHAT IS IT?

- Quantity
- Quality
- Availability





Canada¹

- 8.4% Households
- Nunavut: > 40%

US²

- 15.6M HH insecure
- 6.1M **very** insecure
- 3.1M HH w/ children

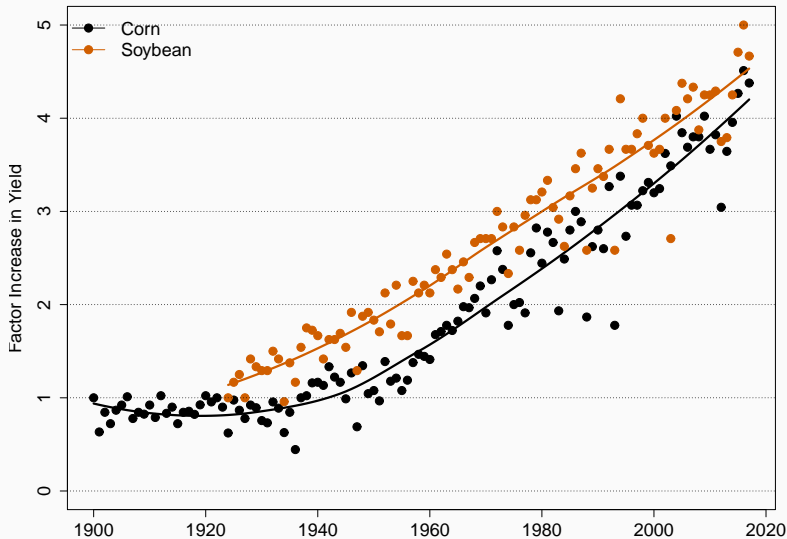
¹Source: Health Canada. Latest national estimate 2011-12. Nunavut for 2013-14.

²Source: USDA ERA. Latest estimates 2016.

1. Consumption
2. Distribution
3. **Production**



TECHNOLOGY LED TO LARGE AVERAGE PRODUCTIVITY GAINS



BUT WHAT ABOUT DOWNSIDE RISK?

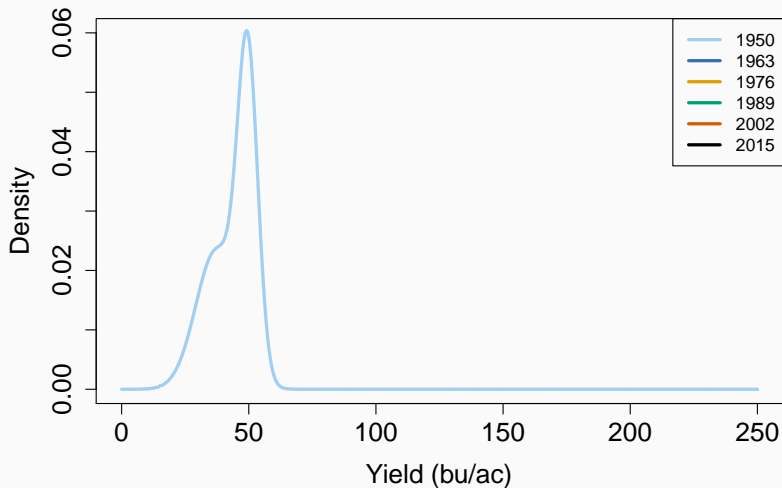


- Agriculture is risky
- Determinant: bundle of adopted technologies
- Interacts with climate/soil

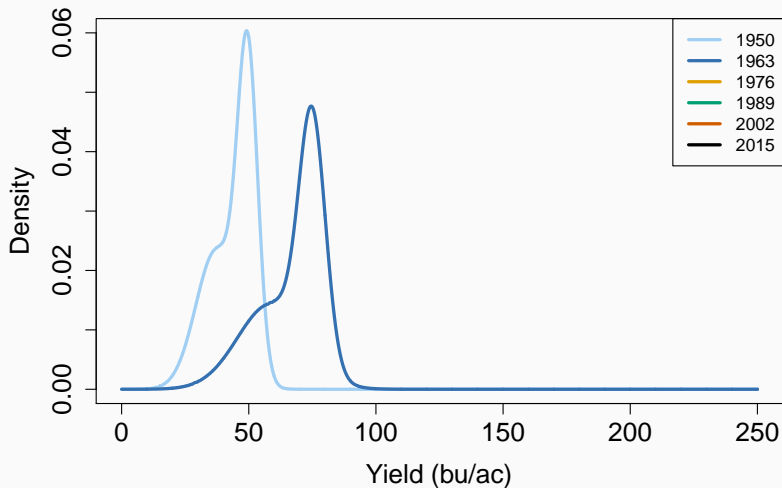
1. Technology is the big driver
 - less resiliency
 2. Interacts with climate
 - to interesting effect
 3. Interacts with soil
 - spatial heterogeneity
- ⇒ **Impacts food security**



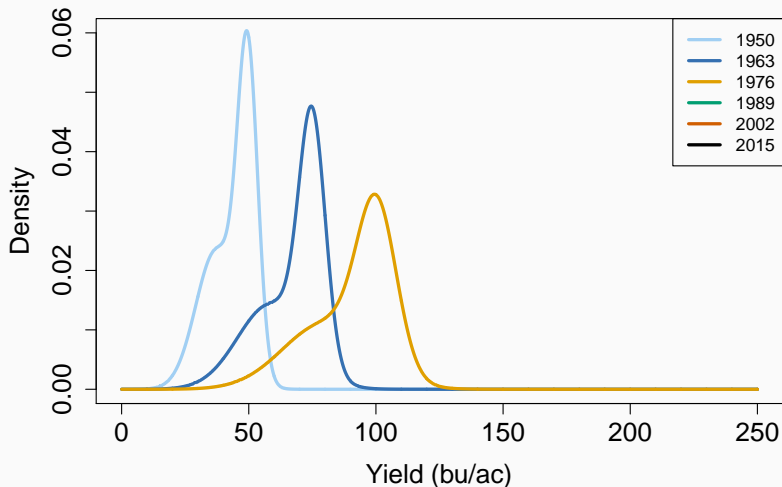
YIELDS CHANGING IN THREE INTERESTING WAYS



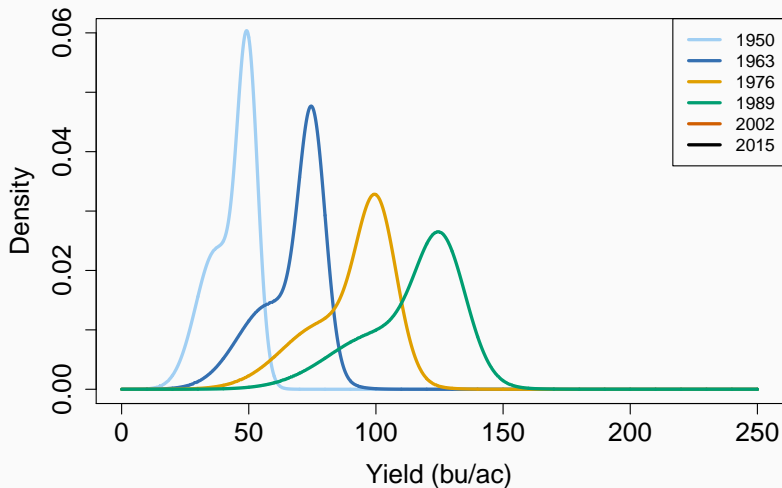
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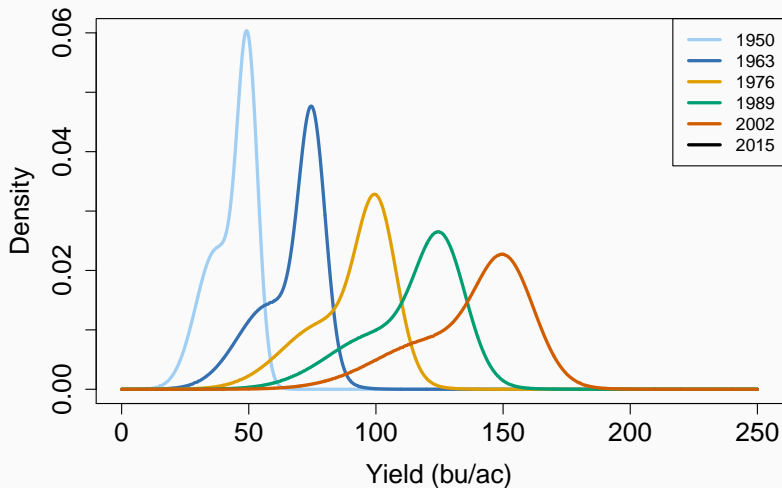
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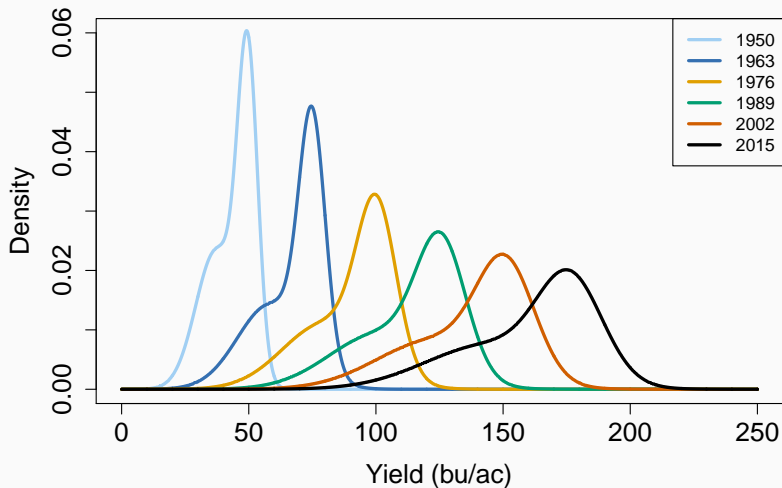
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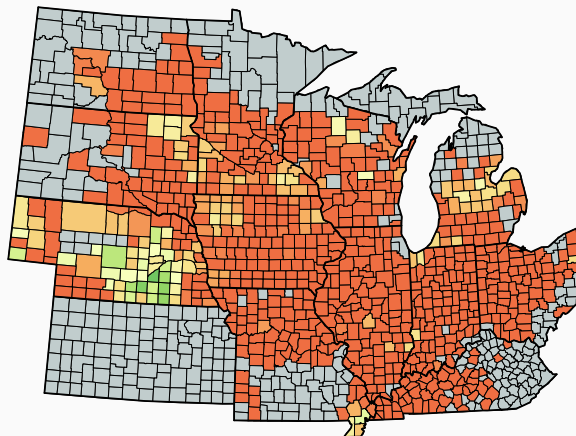


YIELDS CHANGING IN THREE INTERESTING WAYS



PATTERN OF CHANGES PREVALENT | HIGHER RISK

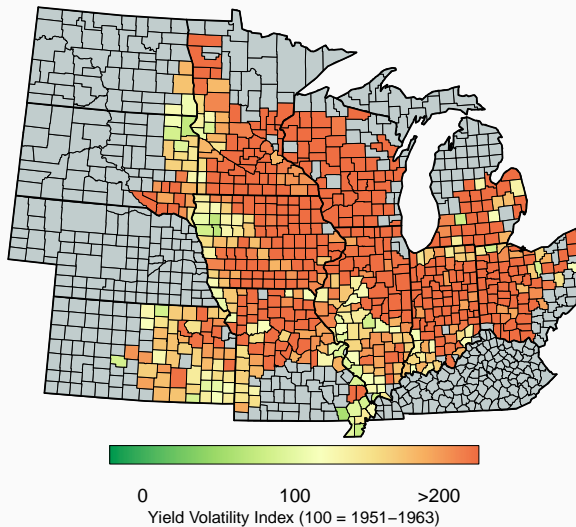
Corn



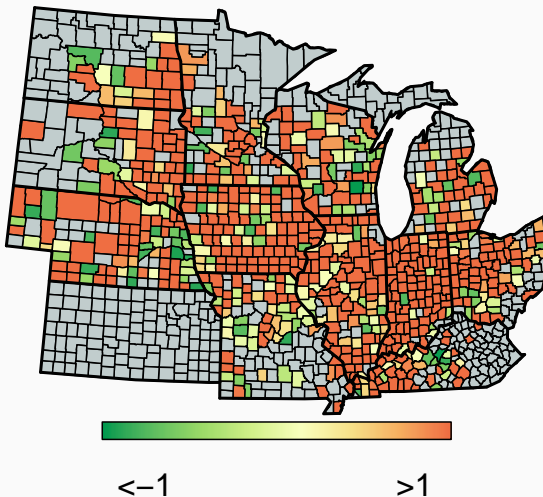
0 100 >200
Yield Volatility Index (100 = 1951–1963)

PATTERN OF CHANGES PREVALENT | HIGHER RISK

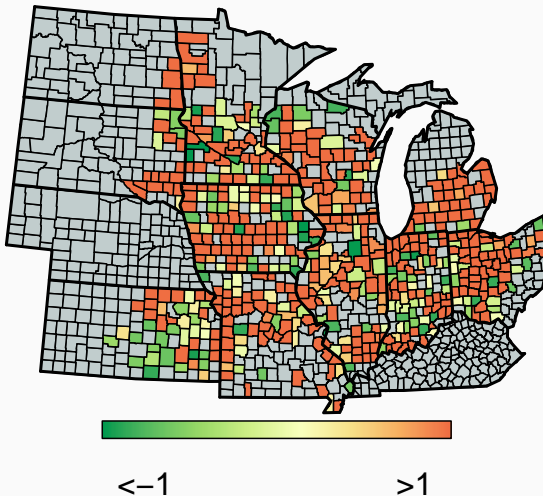
Soybean



Panel A. Corn



Panel B. Soybean





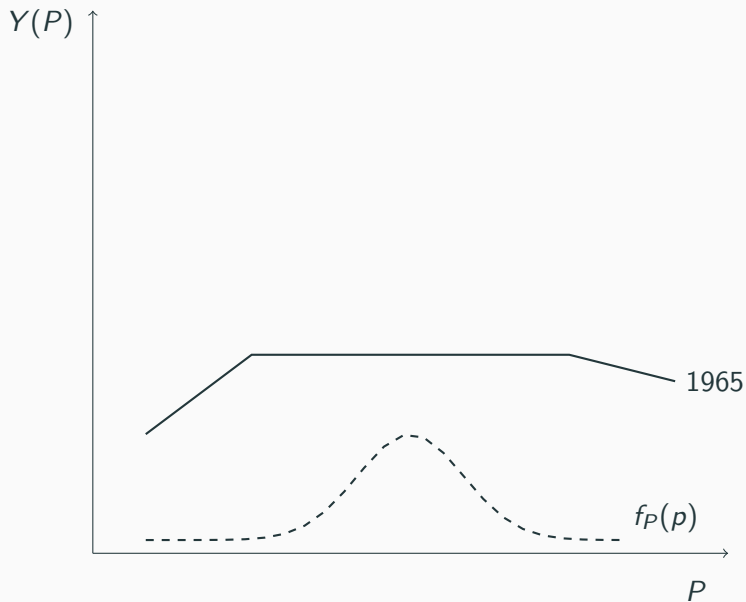
Explanatory power

corn	33%	18%
soybean	22%	13%

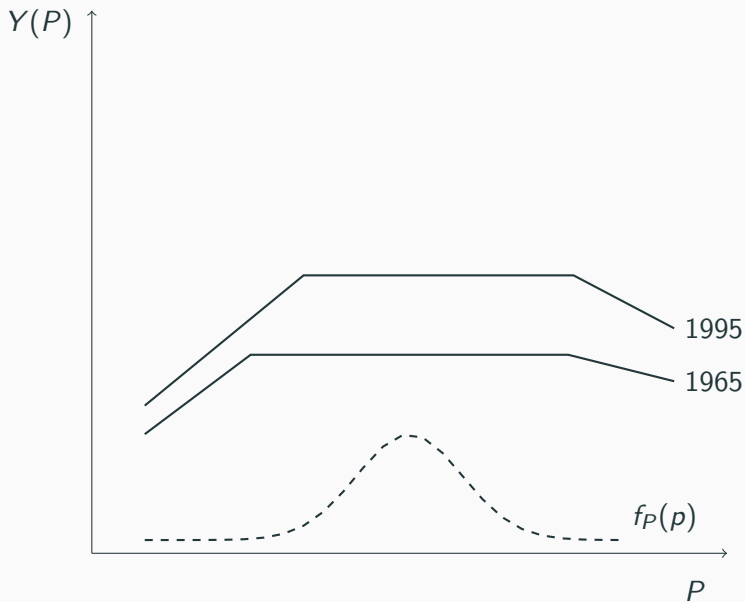
Effect size

corn	-17%	-38%
soybean	7%	20%

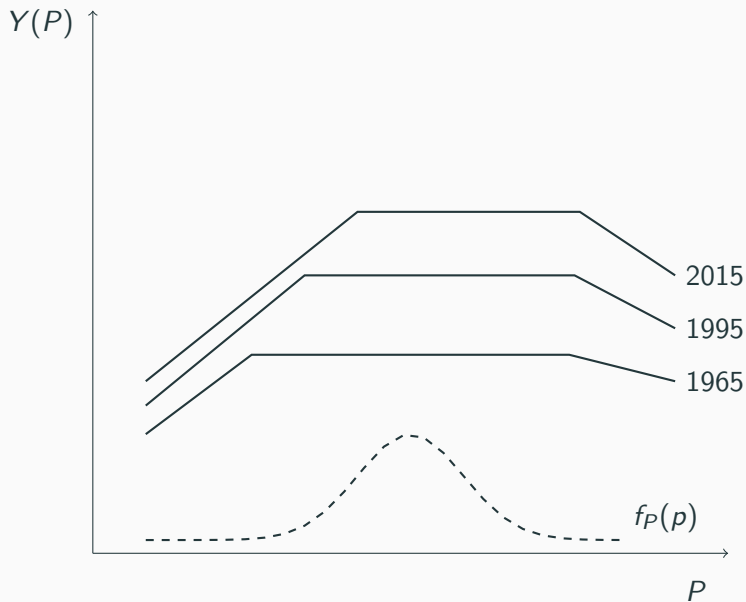
EFFECT OF TECHNOLOGY | BUT HOW?



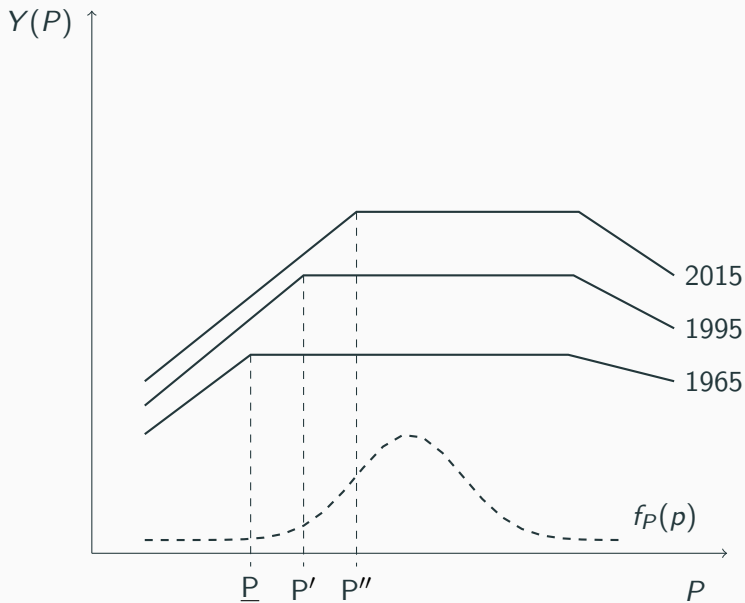
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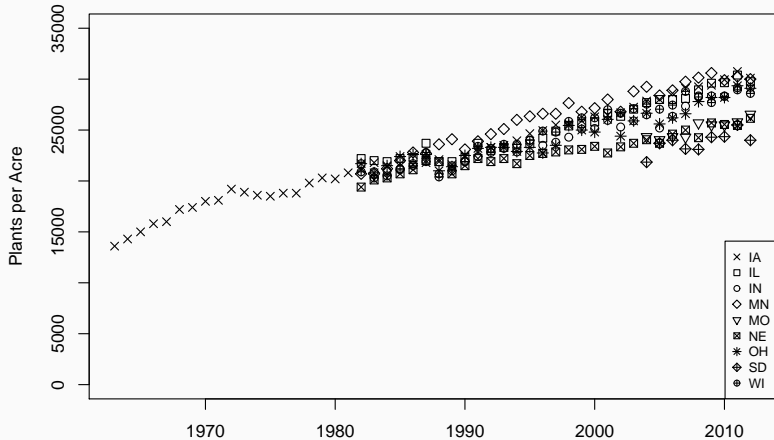
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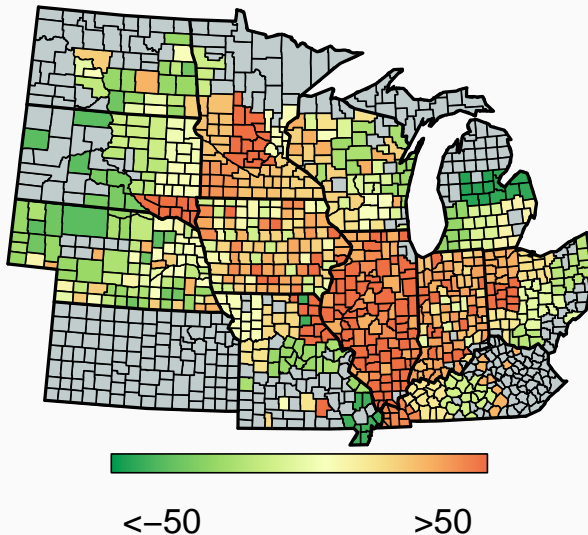
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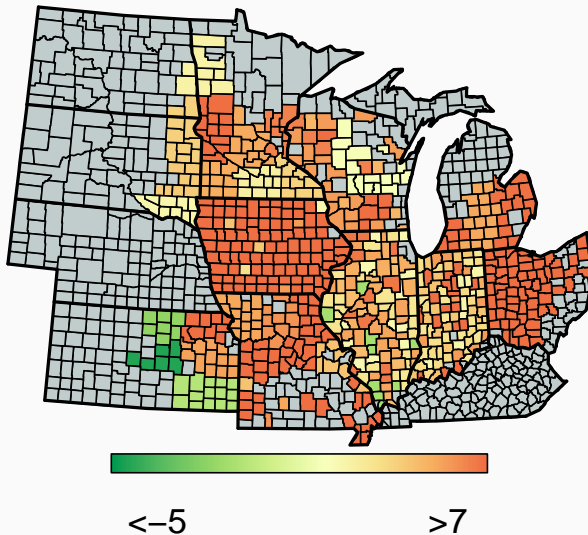
EFFECT OF TECHNOLOGY | BUT HOW?



Corn



Soybean



SUMMARY

1. Food security

- Prevalent
- Persistent
- Complex

2. Production volatility

- Driver: tech.
- Climate & soil interactions



CONCLUSION



- Events → food insecurity
- Analysis beyond averages
- Key finding
- Future research

THANK YOU



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- Slide 2: Patrick Fore on Unsplash
- Slide 3: Megan Hodges on Unsplash
- Slide 4: Yogesh Rahamatkar on Unsplash
- Slide 6: Flickr
- Slide 13: Gabriel Jimenez on Unsplash
- Slide 15-16: Brooke Lark on Unsplash
- Slide 17: Jake Gard on Unsplash