

Climate Change, Crop Yields, and Farmer Perceptions



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Introduction

- Farmers are at ground zero for climate change
- They are vulnerable to its effects
 - Droughts, floods, cold, heat, hail
 - In 2012, \$17.4 billion in crop insurance indemnities paid out



Key Question

- Are existing cropping systems becoming **more** or **less** sensitive to climate variations?
 - Active area of research
 - Answer to this question has important implications for **climate change adaptation and mitigation in agriculture**

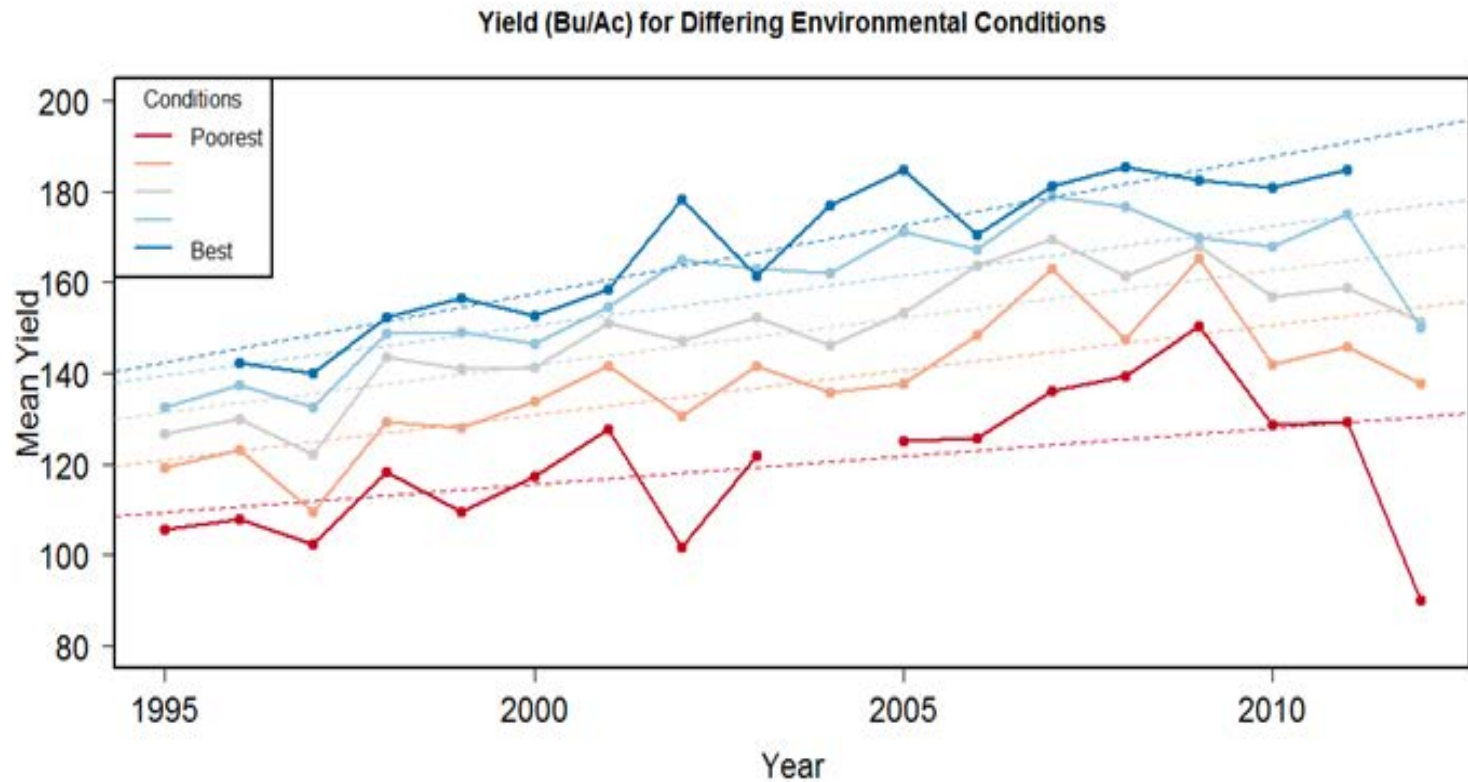
Our study

- Lobell et al. 2014. “Greater Sensitivity to Drought Accompanies Maize Yield Increase in the U.S. Midwest.” *Science*. Vol. 344, p. 516-519.
- Use field level data on maize and soybean yields from 1995-2012 for Midwestern States
 - Linked to weather (drought) data

What we found

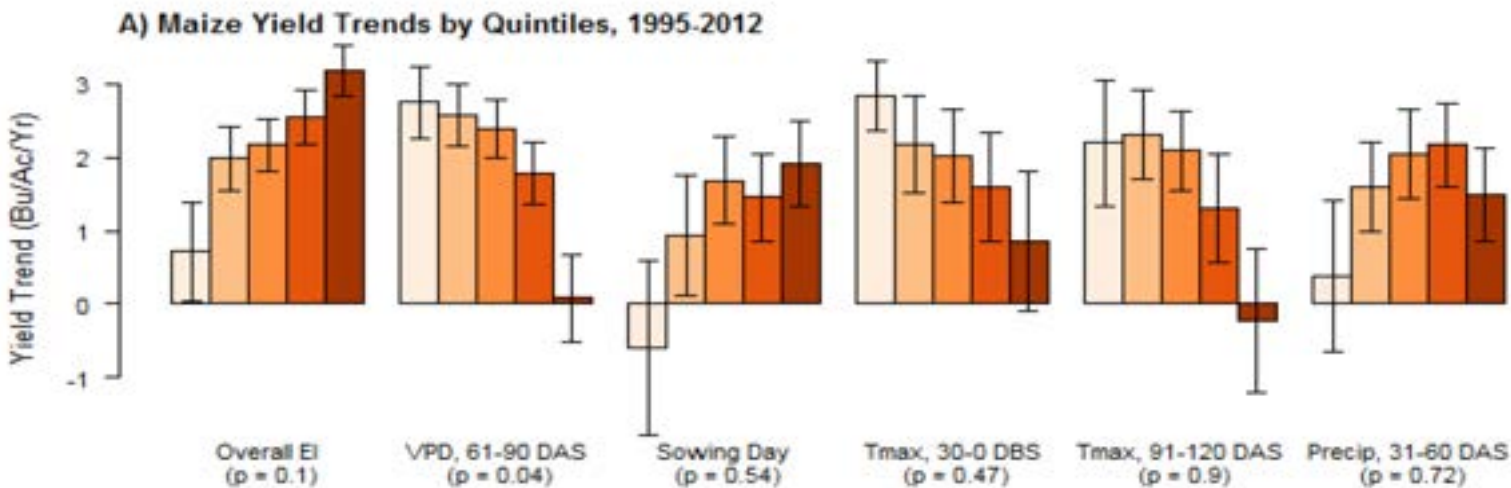
- **Corn yields** under drought conditions improved over time (in absolute value), but....
 - **Yields have been rising more slowly in more severe drought stress conditions**

What we found



What we found

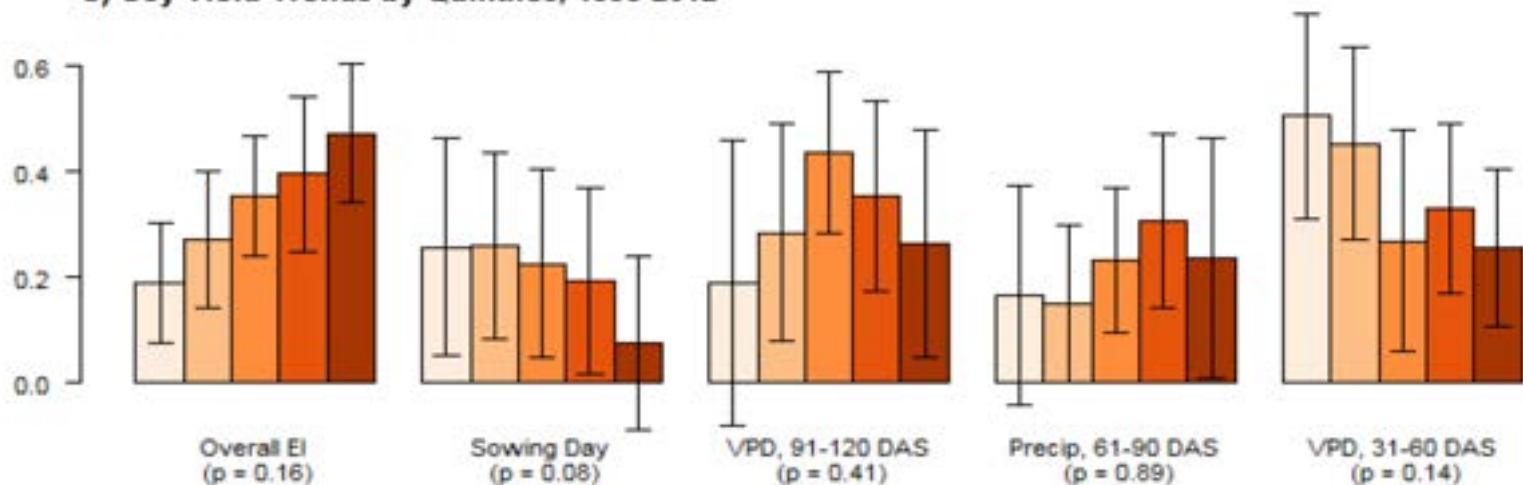
- Main factor that drives “poor environmental conditions” for corn is **Vapor Pressure Deficit (VPD)**



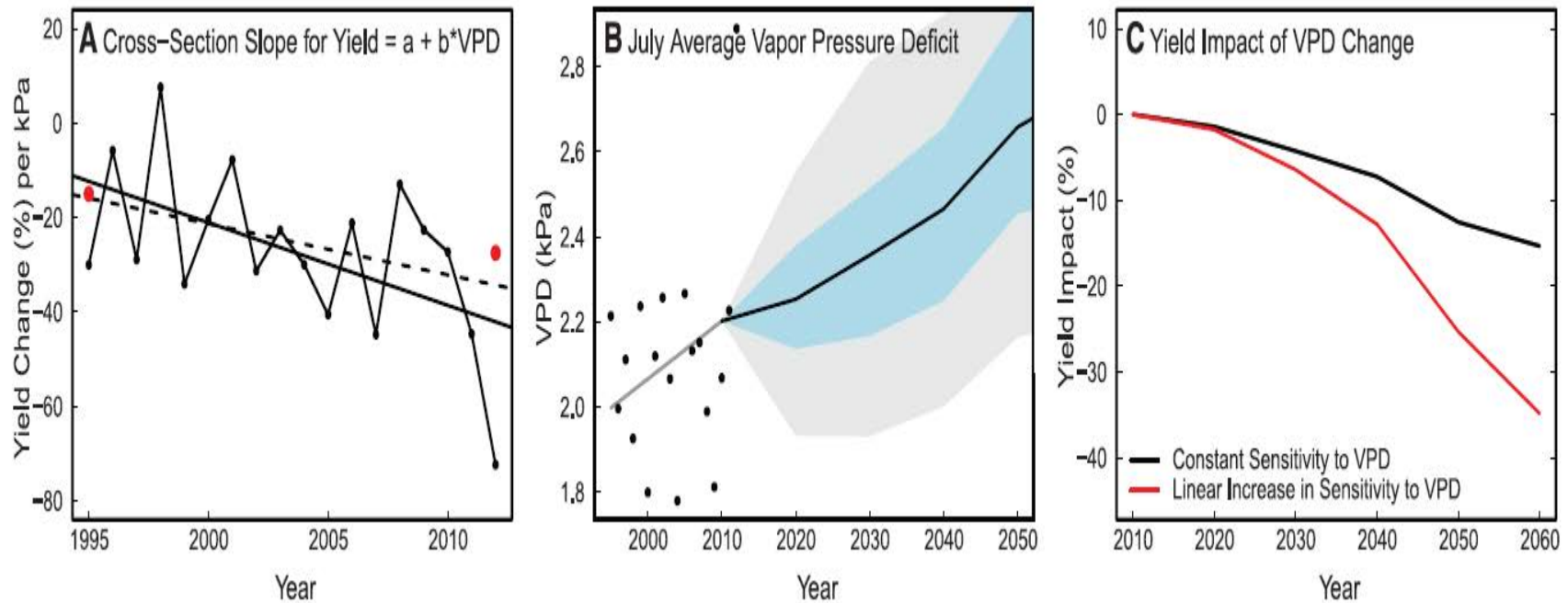
What about soybeans?

- No strong link between soybean yields and VPD

C) Soy Yield Trends by Quintiles, 1995-2012

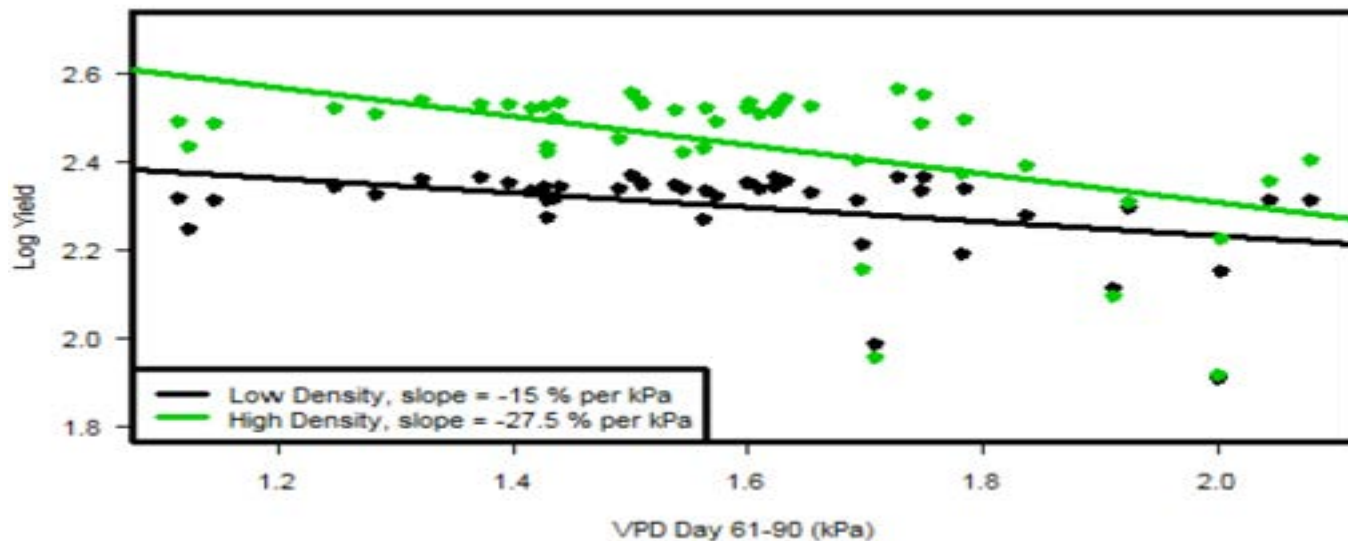


What can happen in the future?



What may have caused this?

- Likely explanation – higher corn sowing densities over time



What do farmers think?

- Rejesus et al. 2013. “U.S. Agricultural Producer Perceptions of Climate Change.” *J. Ag. and Applied Econ.* 45:701-718
- Mail survey in **2009**
 - 1300 farmers in
MS, NC, TX, WI



What do farmers think?

- They tend to be climate change skeptics
 - About **50% disagreed** with the statement “I believe climate change has been scientifically proven.”
 - **20-30%** said they have no opinion
- Consistent with other studies
 - Arbuckle et al. (2013) for Midwest farmers
 - **8%** thinks climate change is human caused
 - **31%** uncertain about climate change

What do farmers think?

- When asked about climate change impact on yields
 - 70% think that climate change will **NOT affect average crop yields** by more than 5%
 - 70% think that climate change will **NOT affect crop yield variability** by more than 5%

Concluding thoughts

- Evidence of **adverse climate change effects** on agriculture
 - Increased sensitivity to drought conditions
- But farmers are **skeptical!**
- Opportunity for **creatively engaging farmers** about this issue
 - Focus on economic benefits of mitigation practices

Thank you!

- Questions?

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