

The Adoption of Conservation Agriculture in China

Ling Yao (PhD Candidate)

Department of Applied Economics, University of Minnesota



Background

- Global soil degradation threatens food security and development.
 - 95% of people relying on degrading agricultural land in developing countries (Barbier and Hochard, 2016).
 - More than 40 % of arable land is experiencing degradation in China (Reuters, 2014).
- Conservation agriculture (CA) as a solution: no/reduced till, crop residue management, crop rotation
 - Improves soil texture, prevents runoff, add to soil organic matter
 - Reduces agricultural carbon footprint
- Low CA adoption in developing countries
 - Yield reduction (Pittelkow et al., 2015)
 - Biophysical constraints due to specific ecologic, climatic, and pedologic factors
 - Competing needs for crop residue, e.g. livestock feed, fuel (Lal, 2007)
 - General lack of incentive to invest on soil due to low food price, small farm size and insecure land right
- Measures to promote CA adoption
 - Government: incentive payments, technical assistance
 - Private: carbon credit market (Antle and Diagana, 2003)
- In China: 1.5 % of cultivated land in 2010 (Wang et al., 2010); 4.9 % of total crop sown area in 2020 (author's calculation based on administrative data)

Policy

- From 2002 to 2015, CA was promoted in all 15 northern provinces. Measures mainly include demonstration sites and R&D investment. Recommend CA practices varies by location.
- Since 2017, the focus narrowed down to 4 northeastern provinces. The central government published the Guideline on Protecting Black Soil in Northeast China (2017-2030), with the goal to promote crop residue return and reduced/no till in four northeastern provinces.
 - Set up demonstration sites and soil monitoring sites.
 - Subsidize CA-related machinery operation (26 dollars per acre).
 - Set administrative acreage goals for each county.
- Since 2015, the Machinery Purchase Subsidy policy covers CA-related machinery such as no-till seeder and straw shredding and mulching machines.
 - Up to 30% of average retail price subsidy payment for each purchased unit.

CA adoption rate from 2008 to 2020

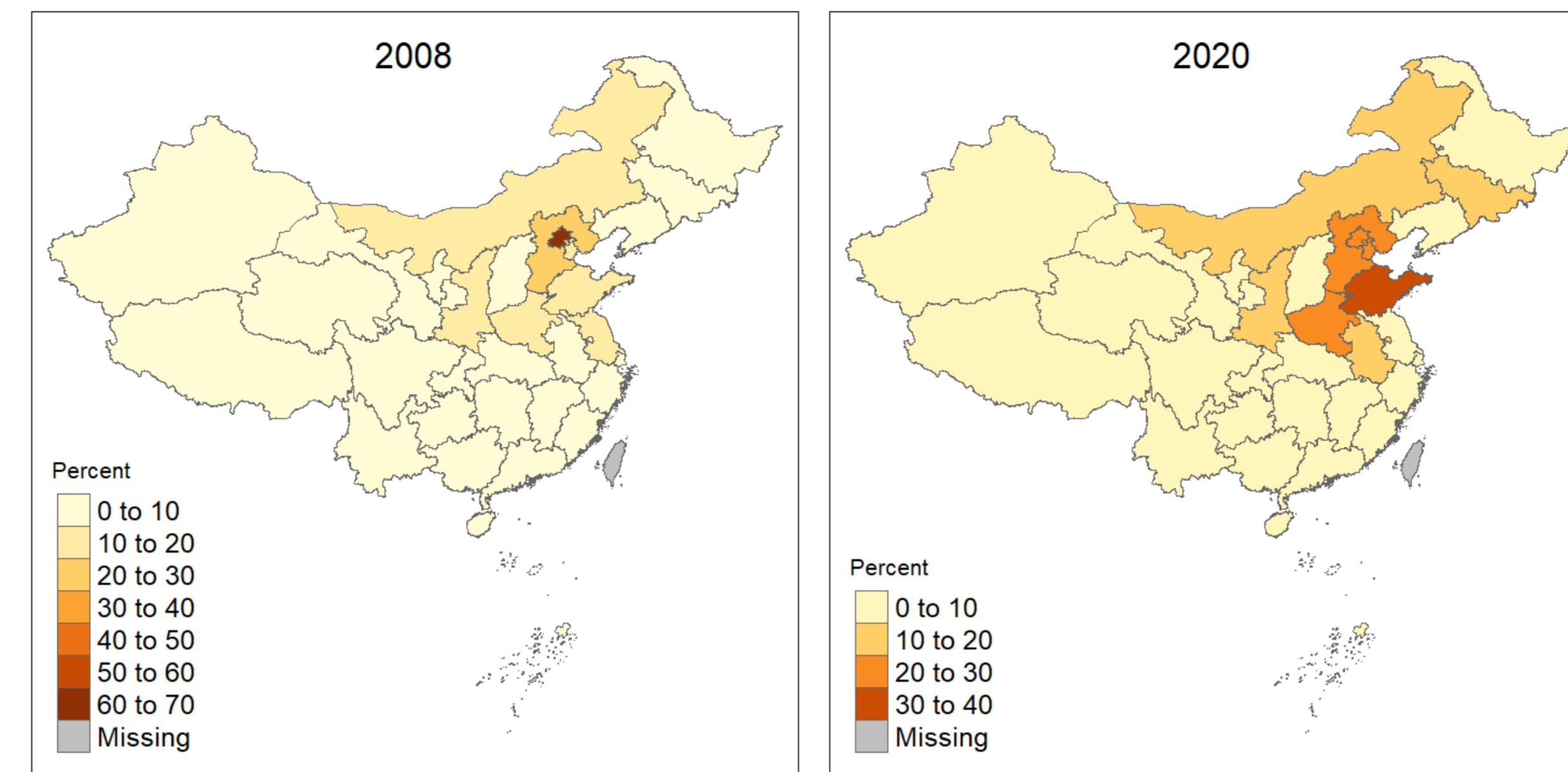


Figure 1. Percent of crop sown area under no till

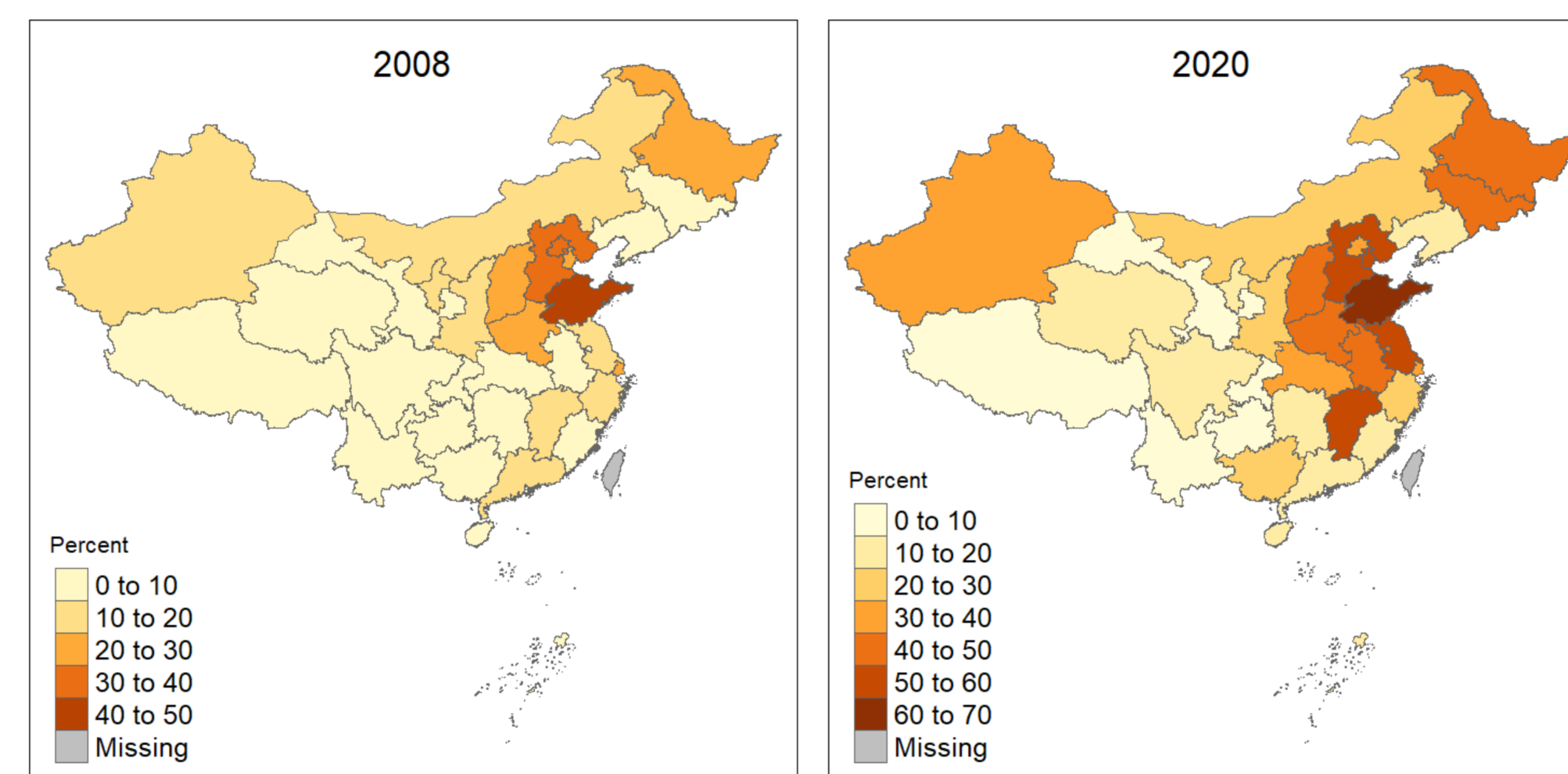


Figure 2. Percent of crop sown area under straw mulching

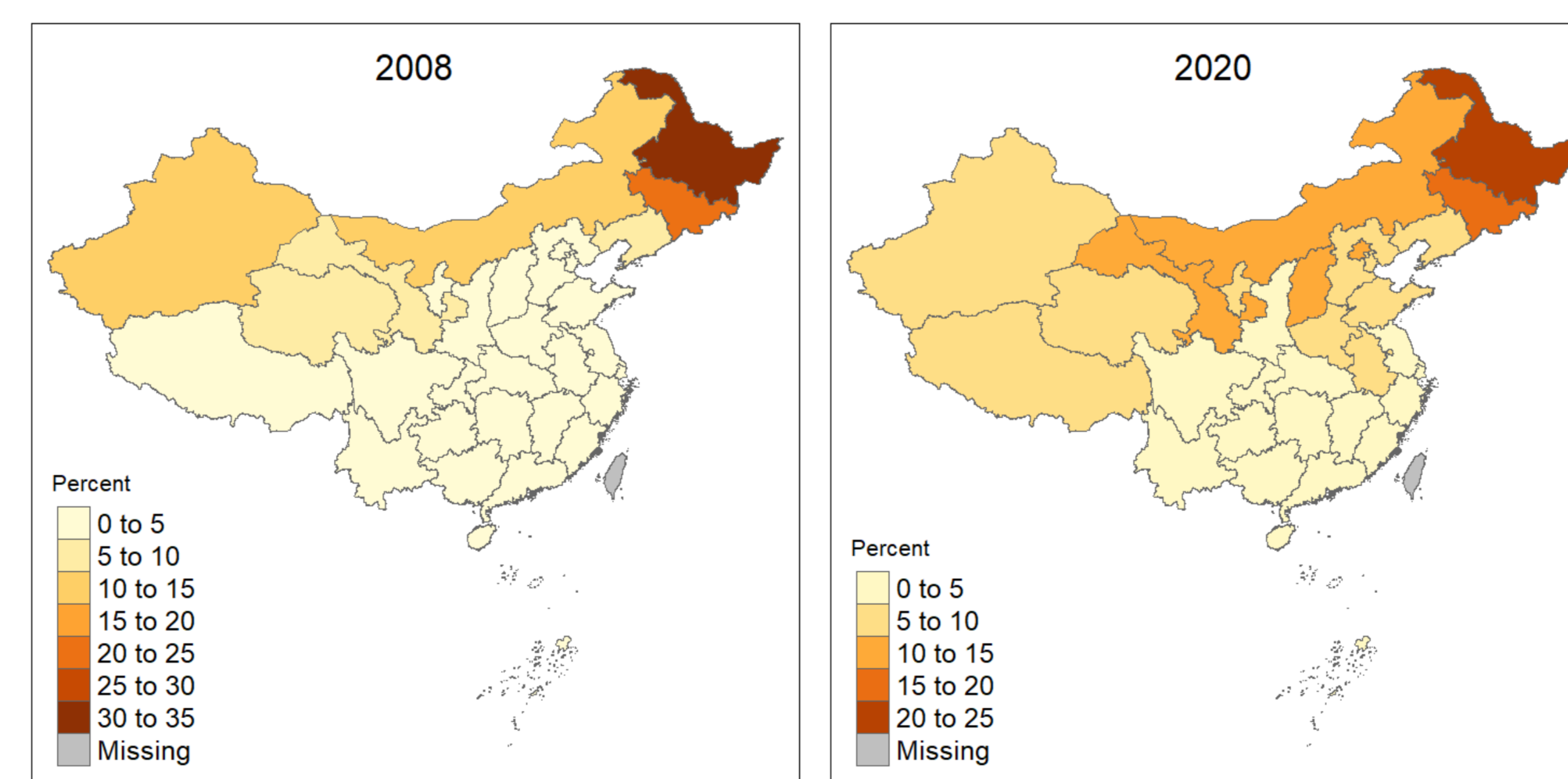
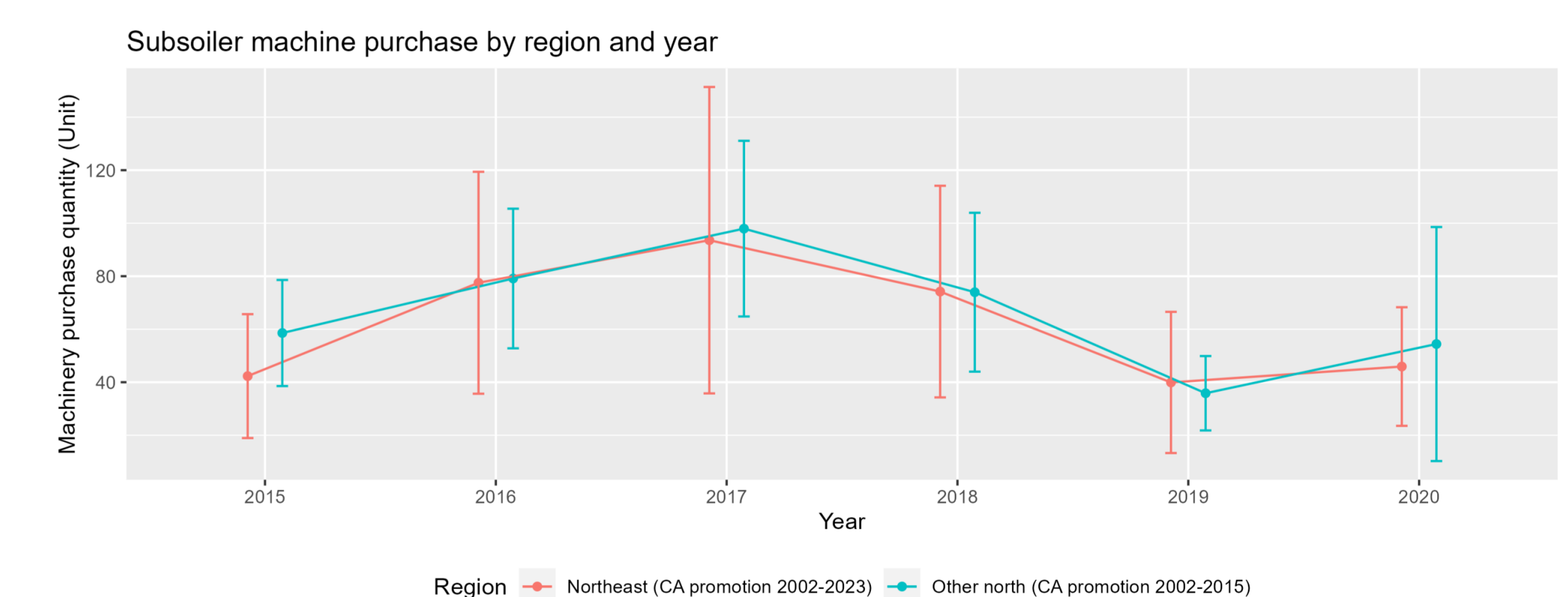
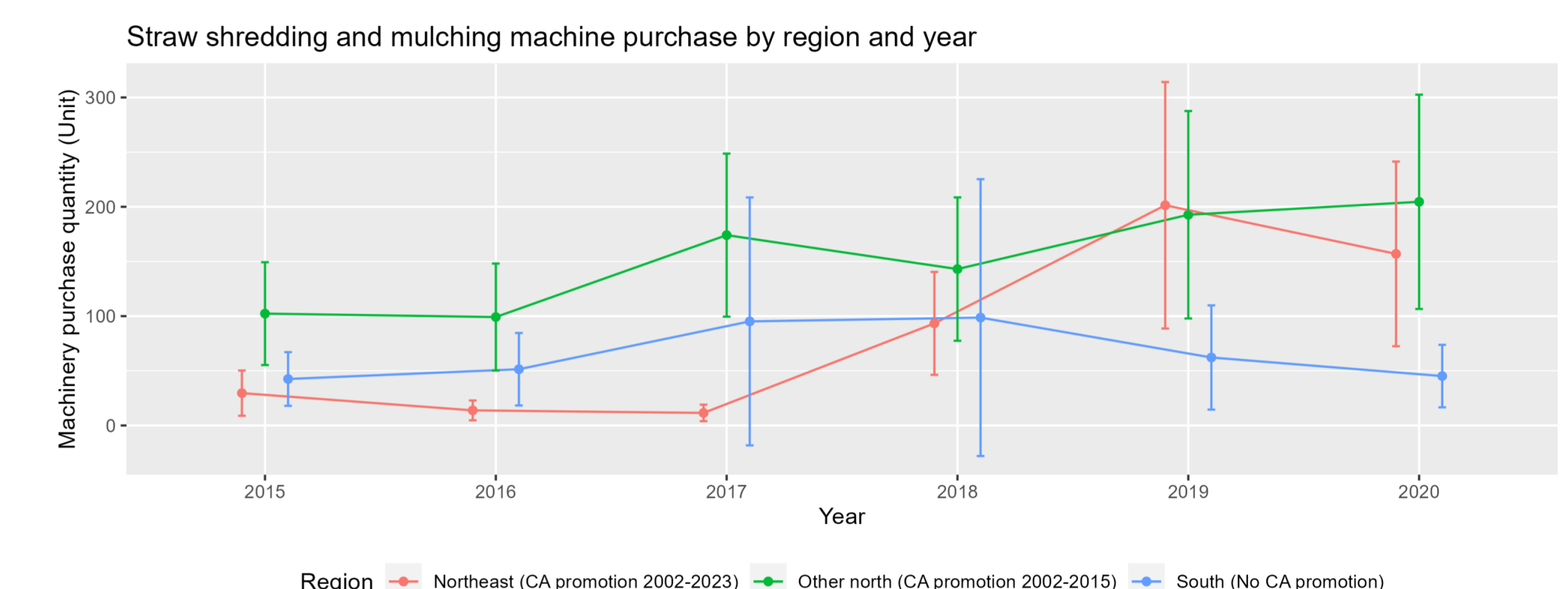
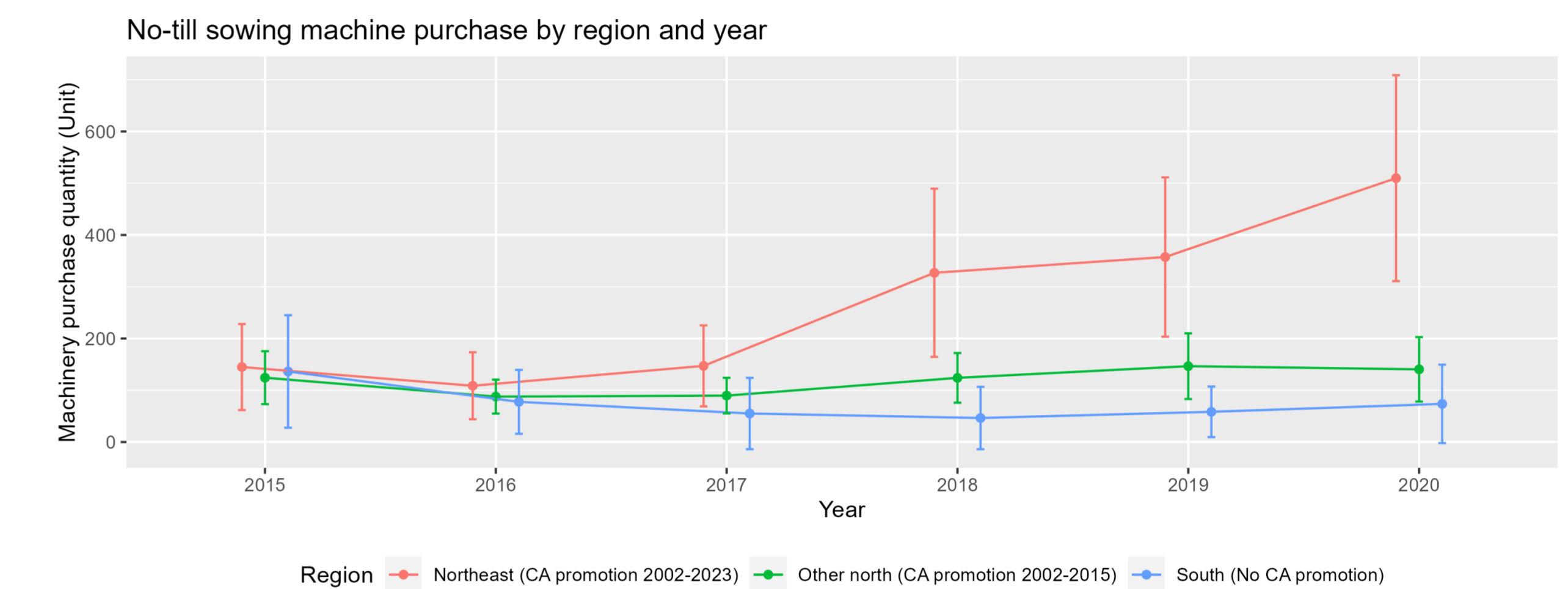


Figure 3. Percent of crop sown area under subsoiling

The CA operation acreage data is from the *China Agricultural Machinery Industry Yearbook 2021*. The crop sown area data is from the National Bureau of Statistics.

Using the machinery purchase data to measure prefecture city level CA adoption



Summary

- No-till, crop residue management and deep soil loosening are the major forms of conservation agriculture in China.
- Both no-till and crop residue management increased significantly in northeast provinces under government promotion since 2017.
- Crop residue management is most widely adopted and has the highest adoption rate.
- Subsoiling is mainly adopted in northern China.