

Comparing the cost-efficiency of farm- vs. regional-scale climate change mitigation policies in agriculture

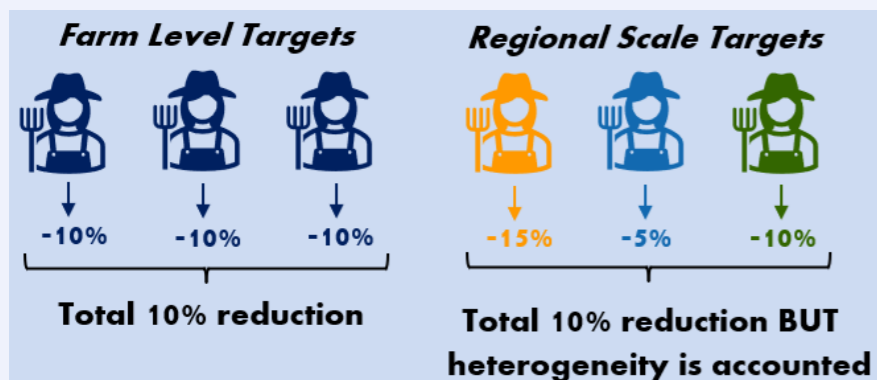
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1 Motivation & Method

- Reducing GHG emissions in agriculture is crucial ¹. **Current policies are ineffective** and do not consider the heterogeneity in abatement costs among farms²
- Marginal Abatement Cost Curves** assess the cost-efficiency of mitigation measures but **fail to capture the farm heterogeneity**³
- The **cost-efficiency** of policies can be **improved** by considering **targets at the regional level** instead of at the individual farm level

→ *By how much can cost-efficiency be increased with regional targets?*

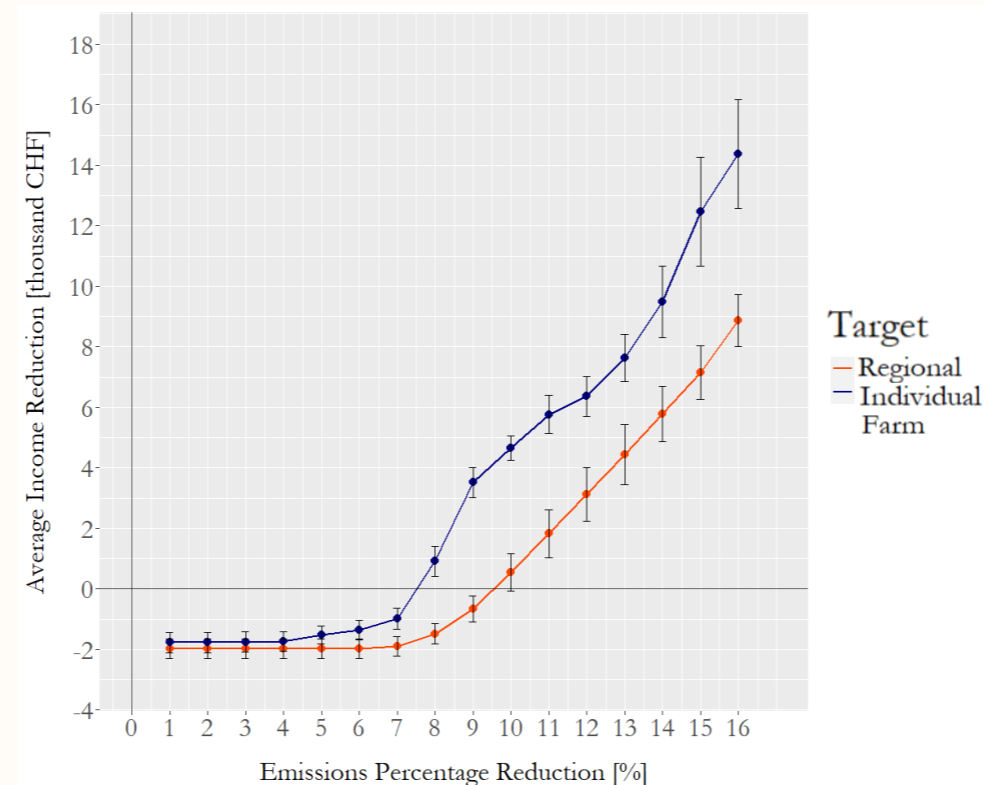


- Farm-level bioeconomic model **FarmDyn** to quantify the income and emissions reduction under **four abatement measures** that do not reduce food production for 65 Swiss Dairy farms ^{4,5}

2 Results

- The **regional target is more cost-efficient** than the individual farm
- 10% GHG reduction → regional target is **88% more cost-efficient**
- Only 16% of the emissions are abated without reducing food production

Average Income Reduction at different Emission Percentage Reductions



References:

1 Rosenzweig, C., et al., 2020. Climate change responses benefit from a global food system approach. *Nature Food*, 1(2), 94–97.
 2 Havlik, P., et al., 2014. Climate change mitigation through livestock system transitions. *Proceedings of the National Academy of Sciences*, 111(10), 3709–3714.
 3 Mosnier, C., et al., 2019. Greenhouse gas abatement strategies and costs in French dairy production. *Journal of Cleaner Production*, 236, 117589.
 4 Kreft, C. 2021. The role of non-cognitive skills in farmers' adoption of climate change mitigation measures. *Ecological Economics*, 11.
 5 Kreft, C. S., et al., 2021. Social network data of Swiss farmers related to agricultural climate change mitigation. *Data in Brief*, 35, 106898.

3 Conclusion

- Regional targets increase the cost-efficiency of CC mitigation policies** because they **consider the heterogeneity** among farms & measures



- Considering **production levels constant is not enough** to meet climate targets

4 Contribution to Sustainable Food Systems

By increasing the cost-efficiency of climate change mitigation policies in agriculture, we contribute to achieving the following UN SDGs:



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