



Causality Analysis in the Water-Energy-Food (WEF) Nexus in the Canadian Prairies

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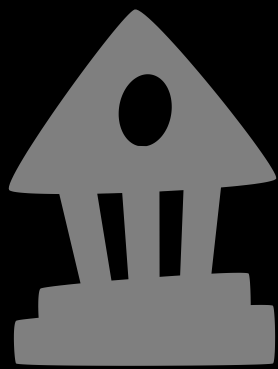
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Problem?



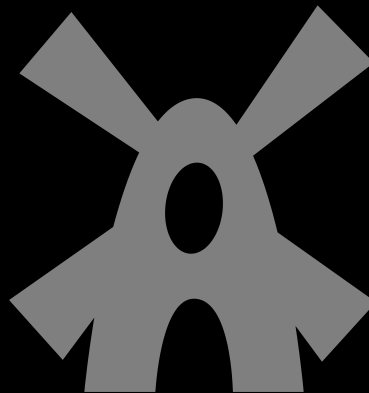
Water
Department

no more water
available for irrigation



Agriculture
Department

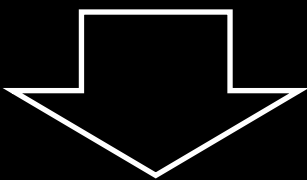
plans to double food
production



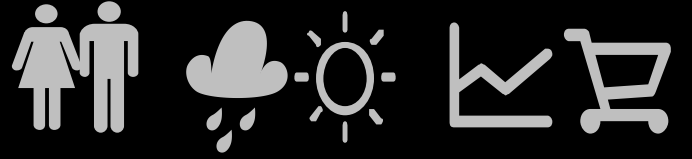
Energy
Department

develop new biofuel
plantations

Necessity of joining up policies



Nexus Thinking approach



How can Nexus Thinking help?



2030:

>30%
Water

>40%
Energy

>50%
Food

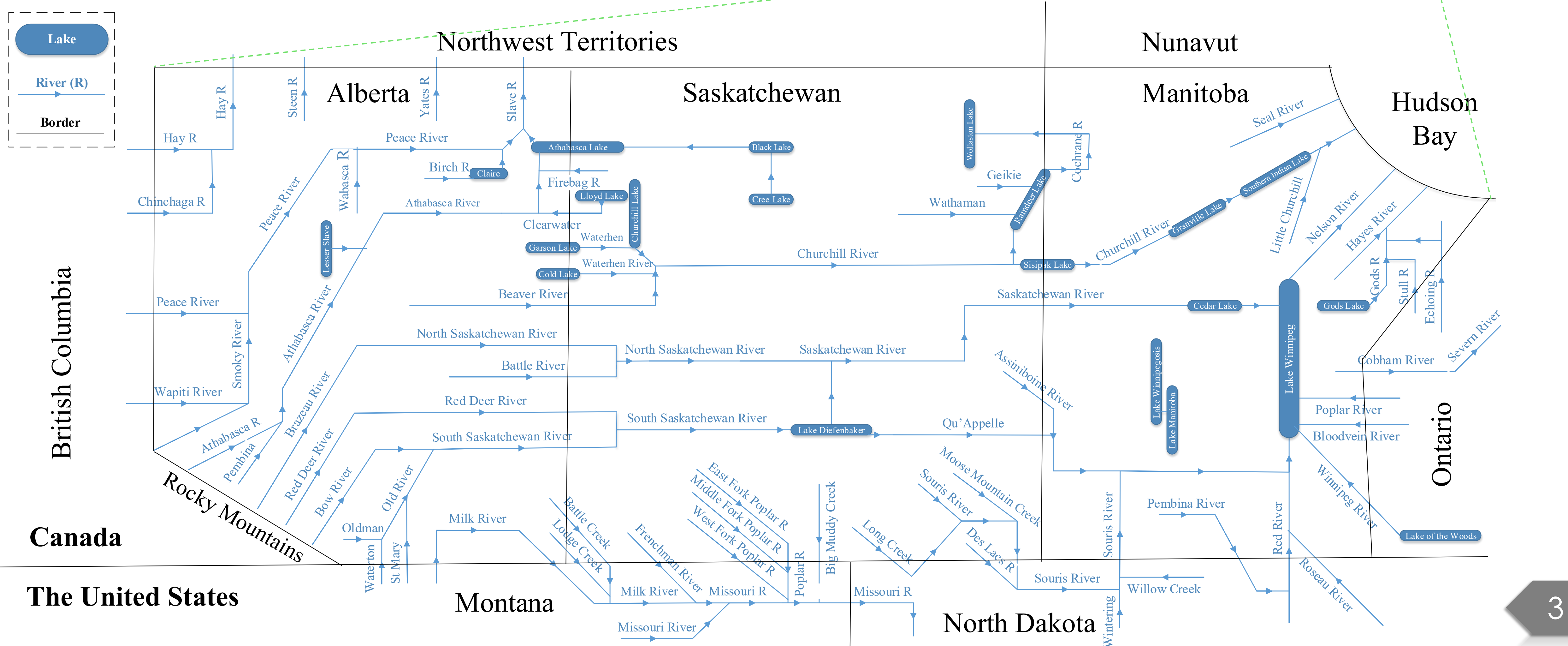
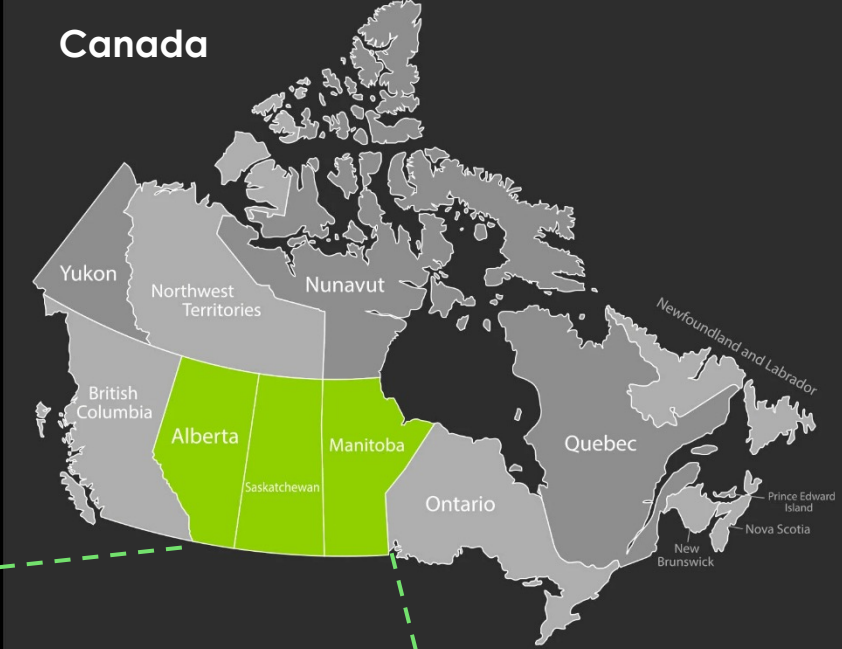


- increasing efficiency,
- reducing trade-offs,
- building synergies,
- improving governance across sectors

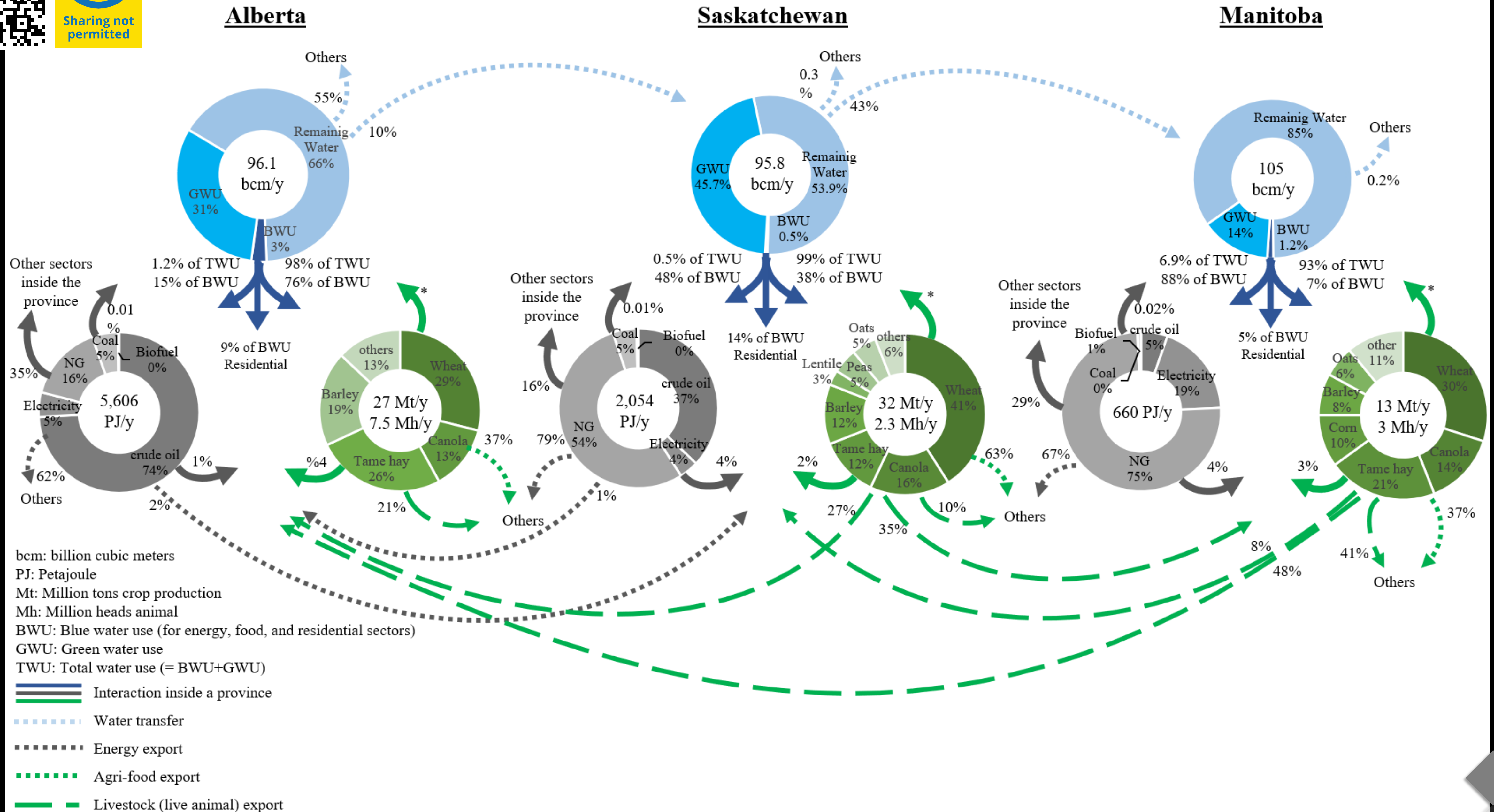




Case study: The Canadian Prairie Provinces



Identification of WEF Nexus Interactions



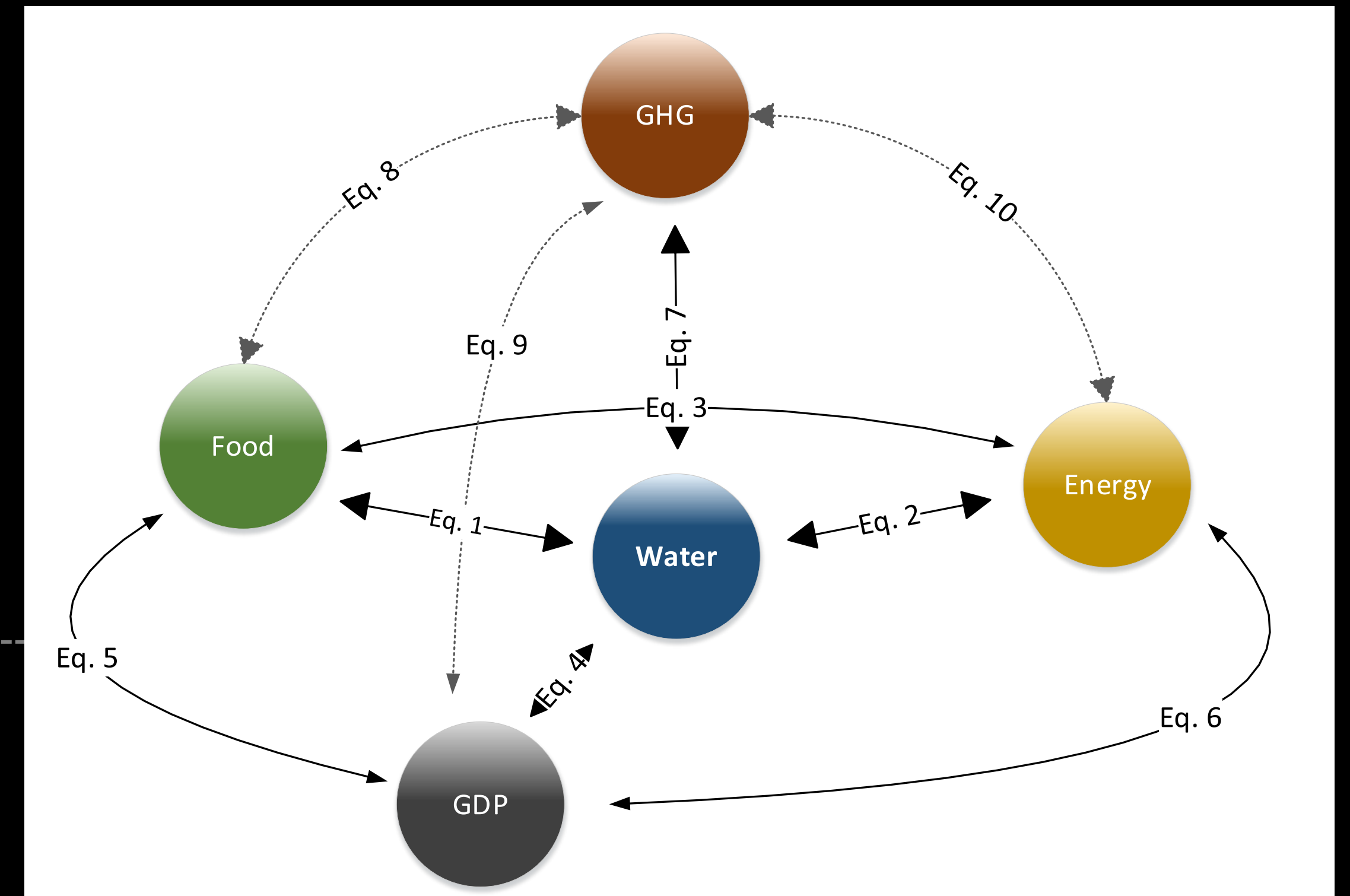


Quantifying and measuring WEF interrelationships

Correlation analysis

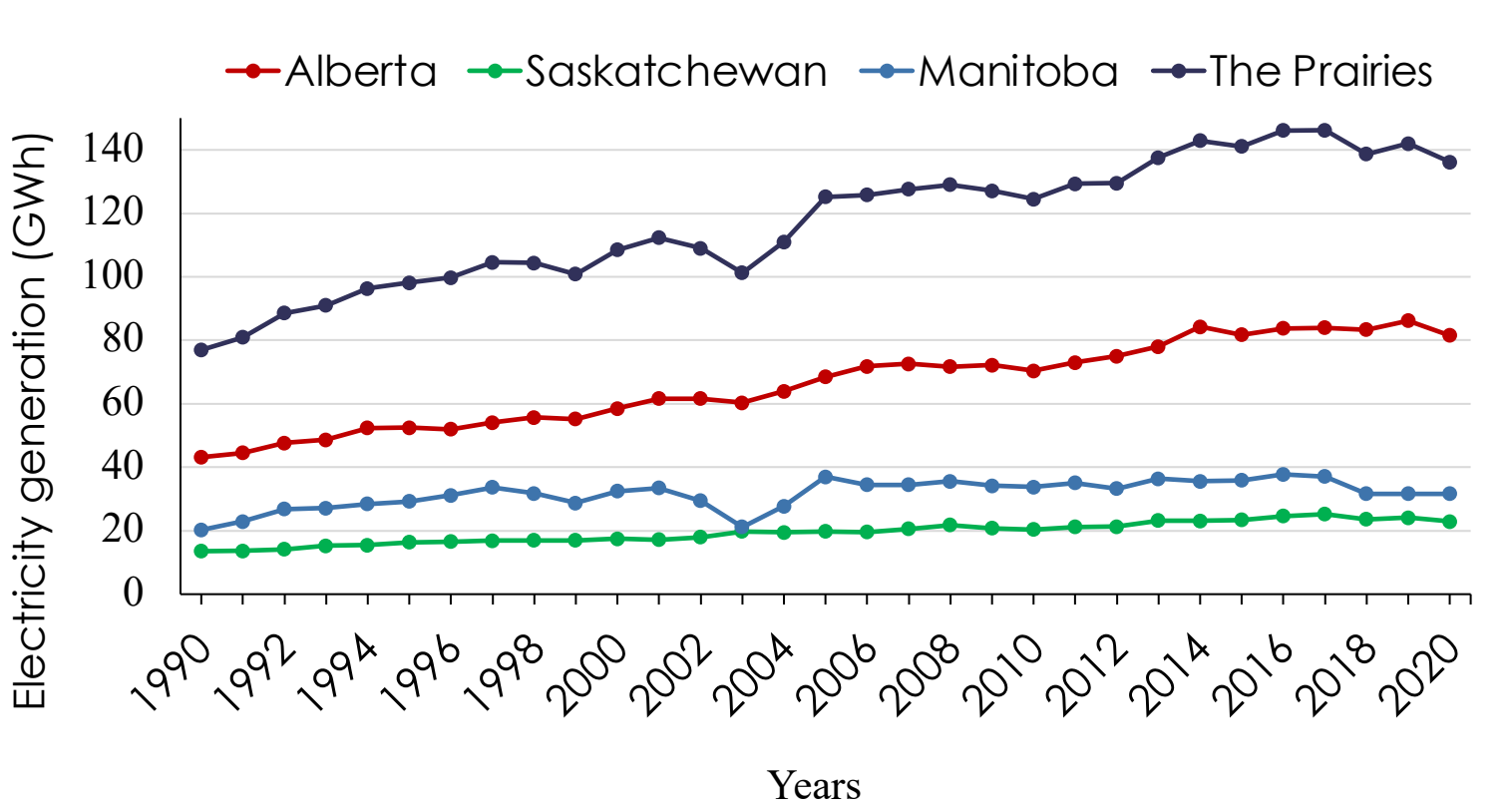
$$Y = a X^b + c$$

**a, b, and c were chosen to deliver
the highest R² (best-fit regression)**



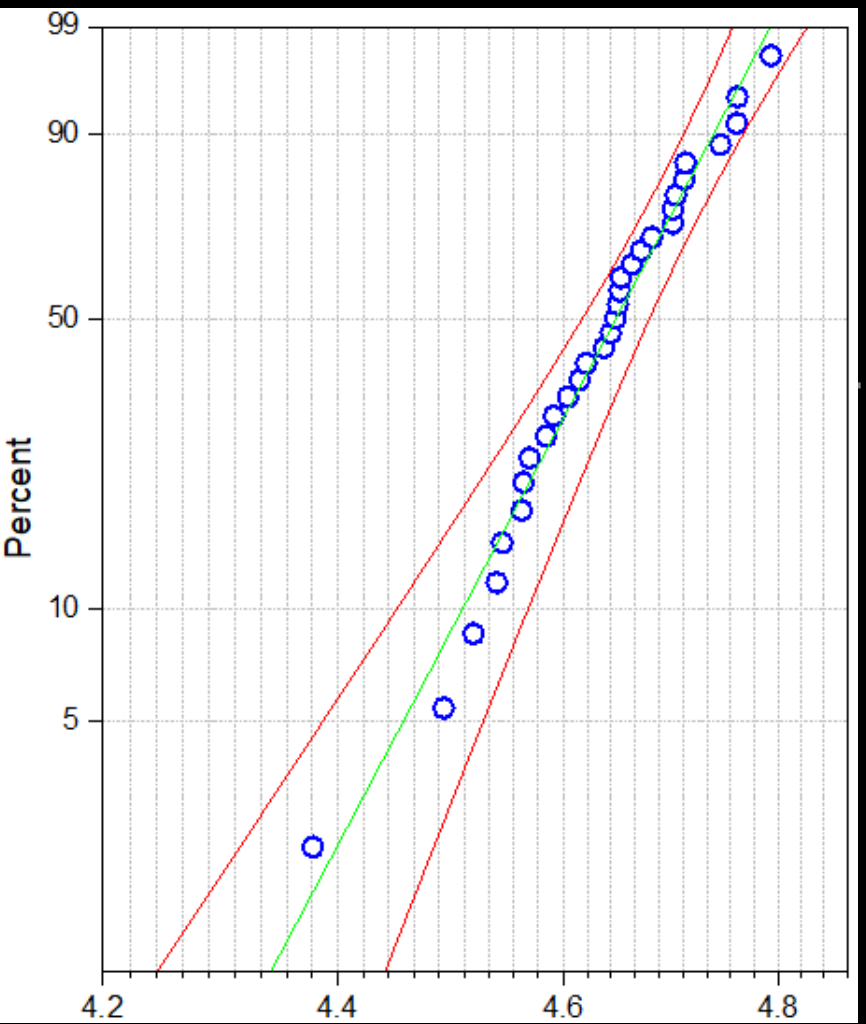


Causality analysis

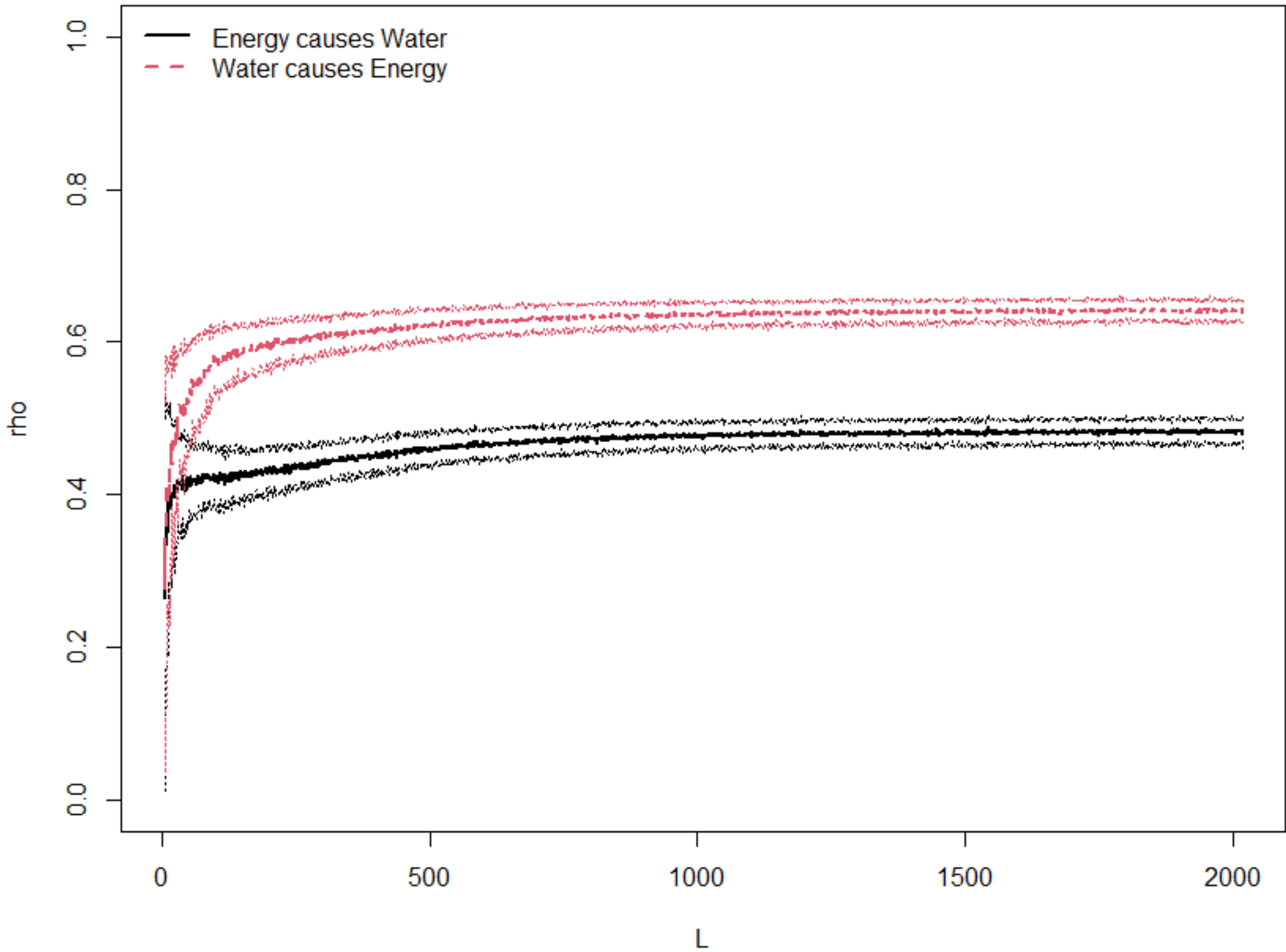


Historical Data

i

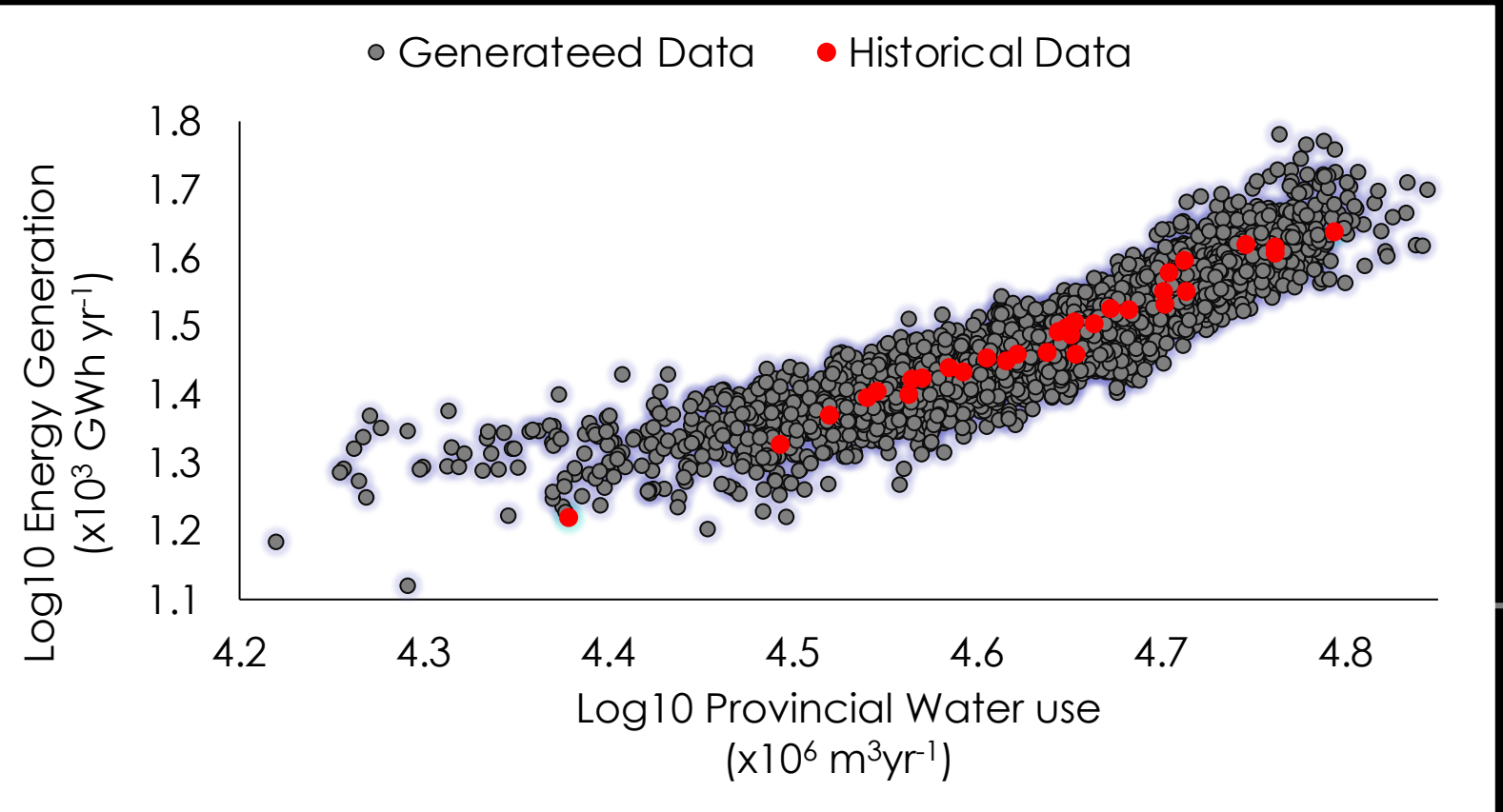


ii



mCCM

iv



Data generation

iii



mCCM results

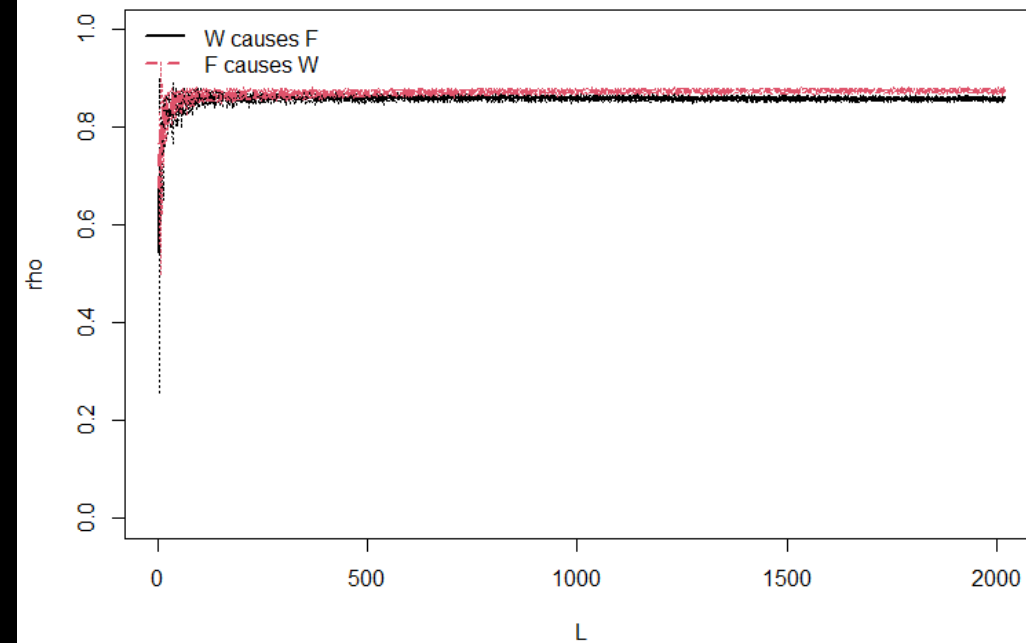
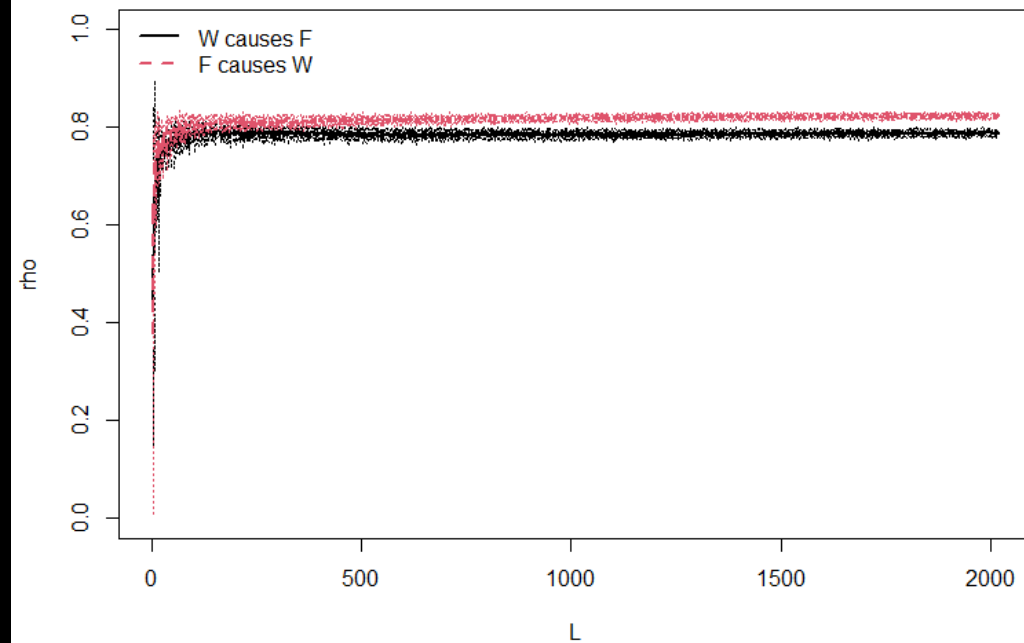
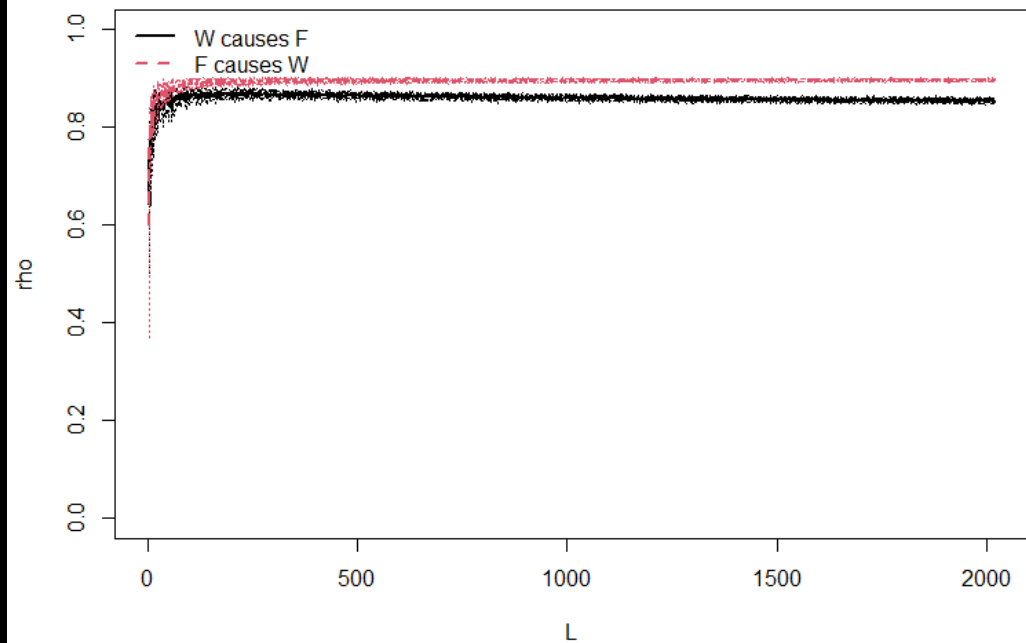
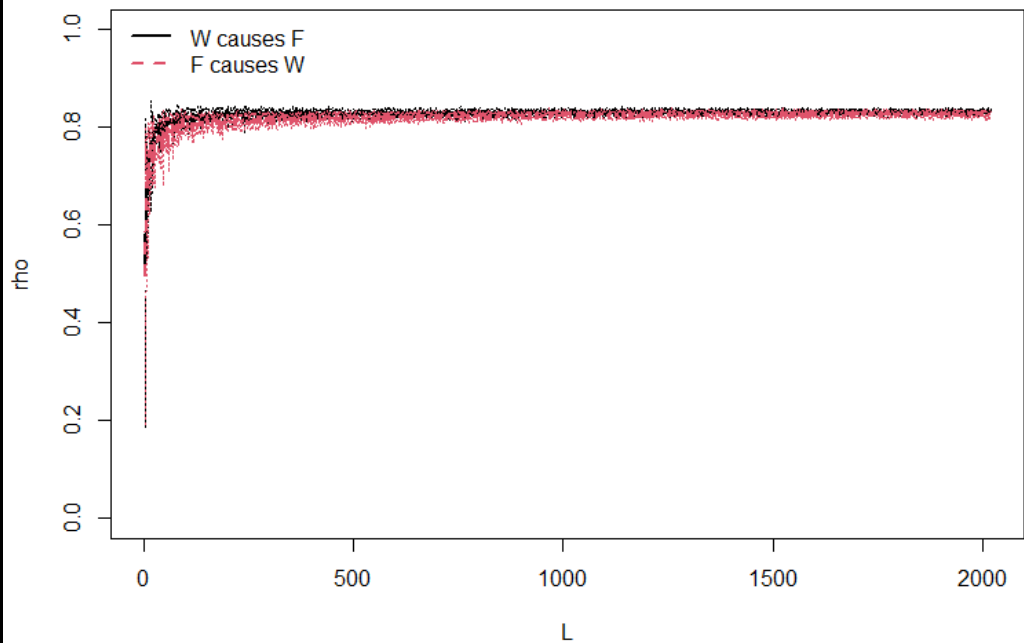
Alberta

Saskatchewan

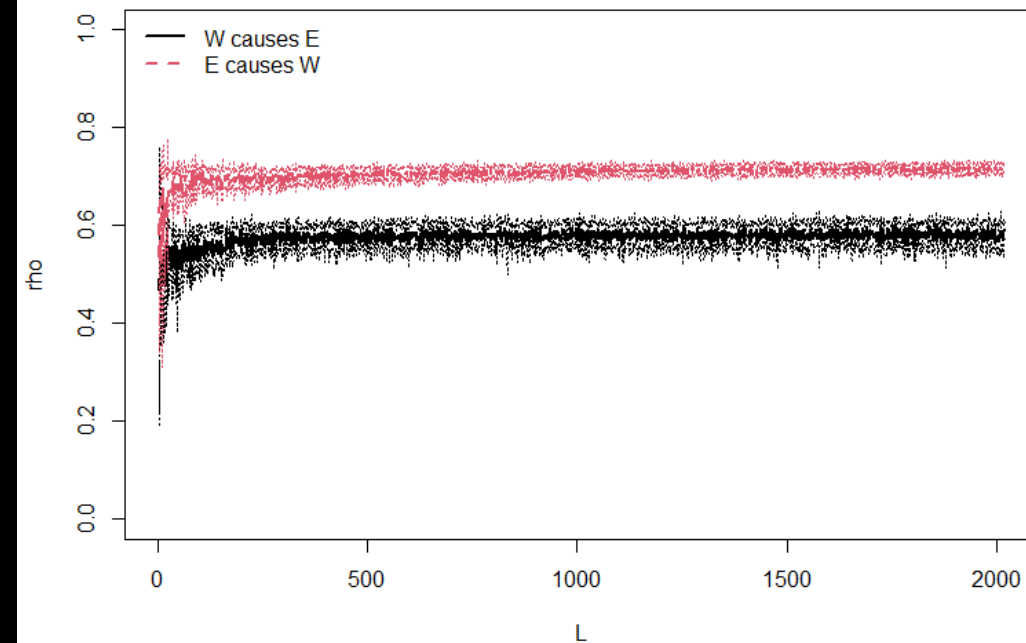
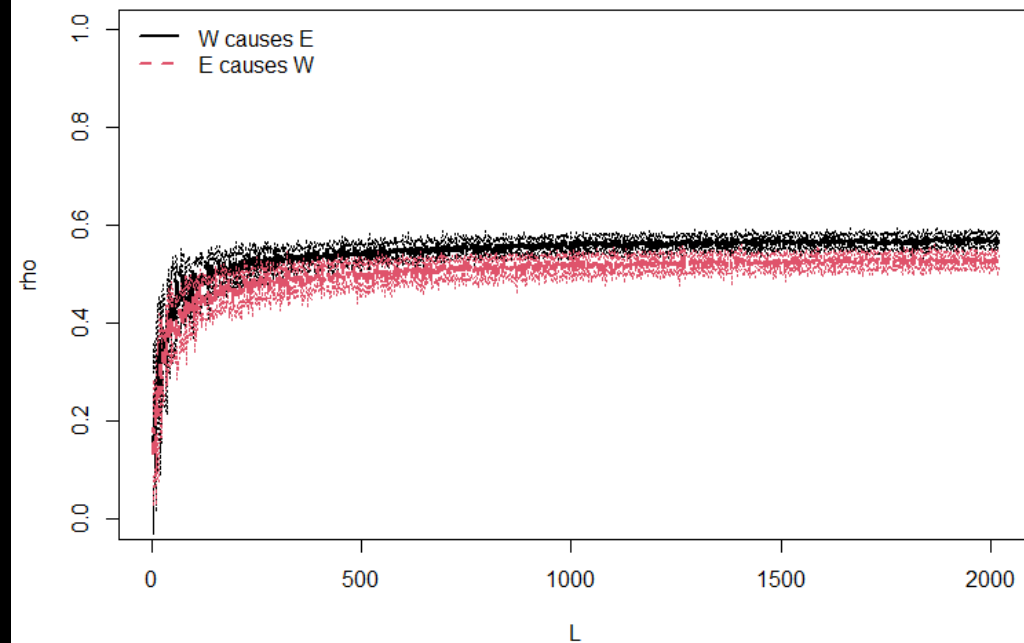
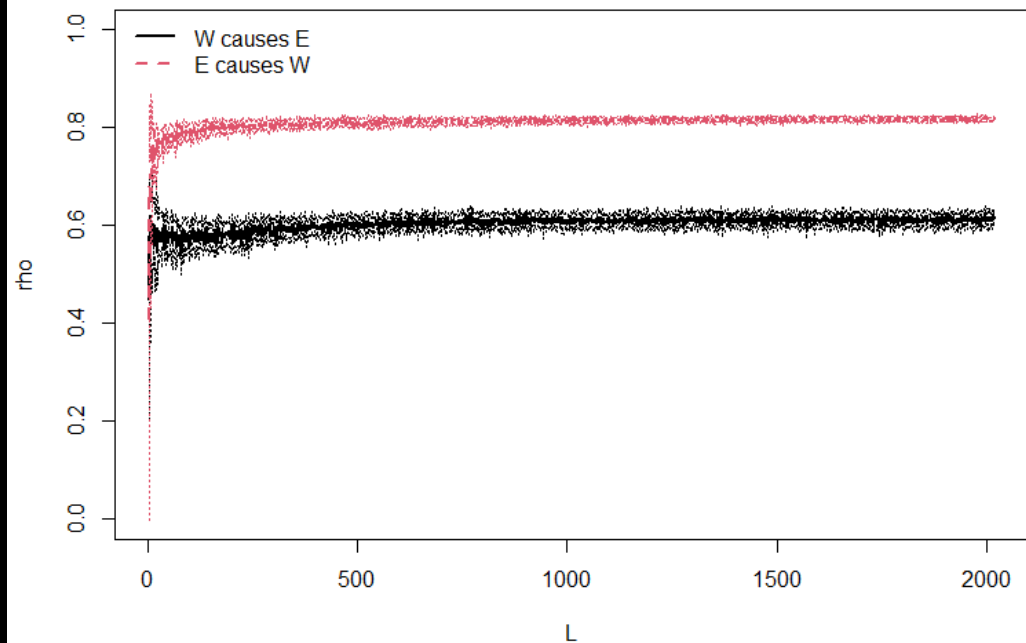
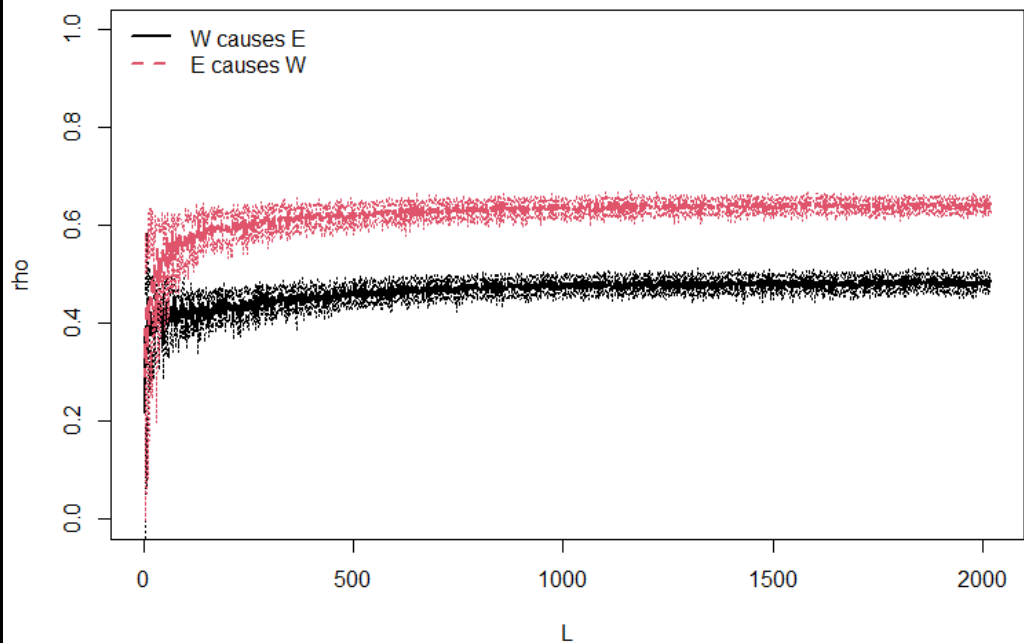
Manitoba

The Prairies

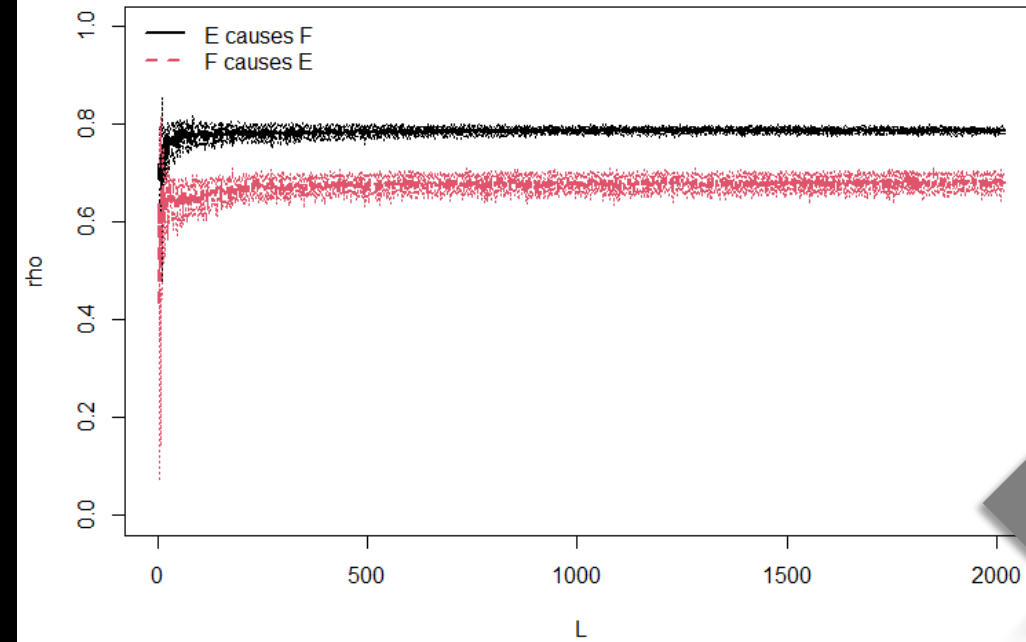
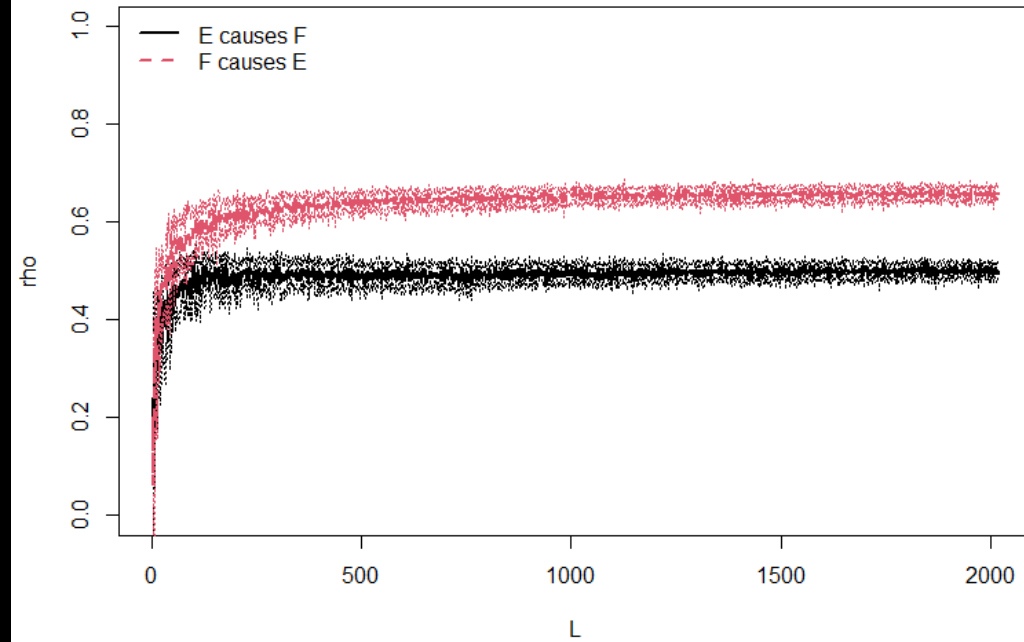
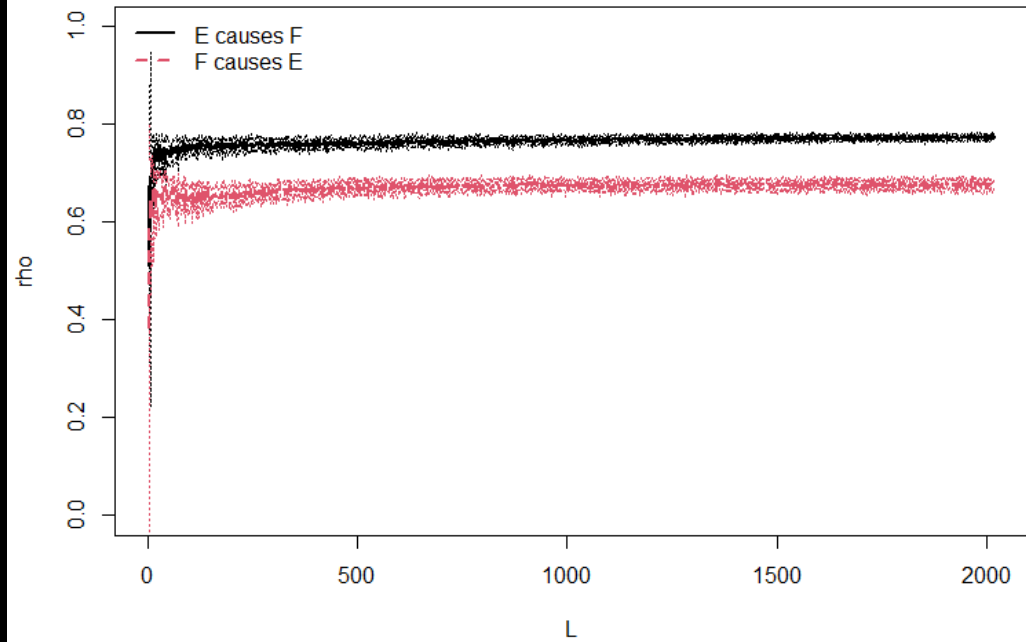
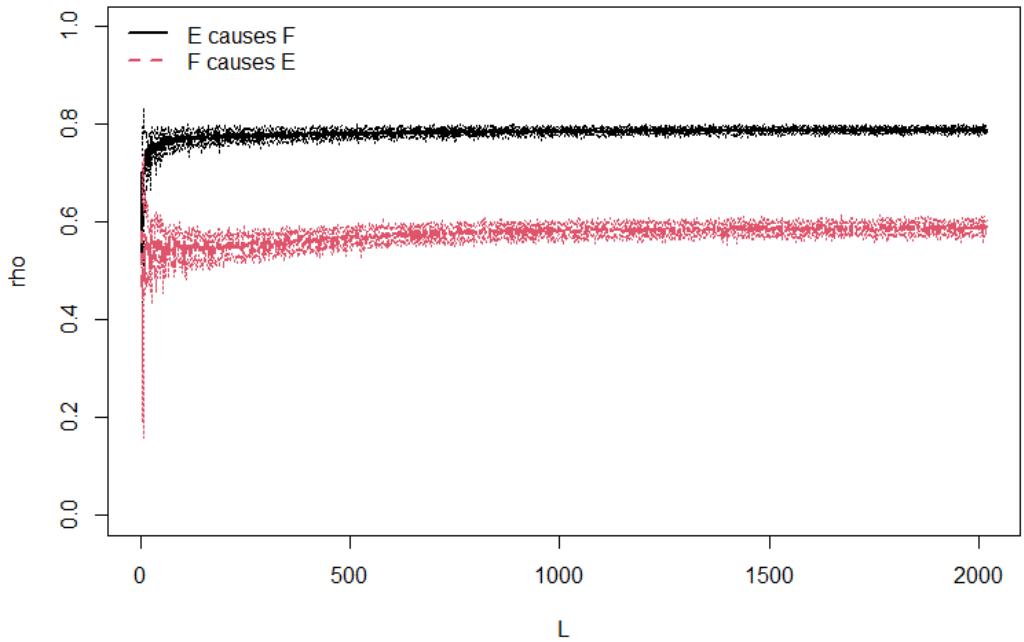
W-F



W-E



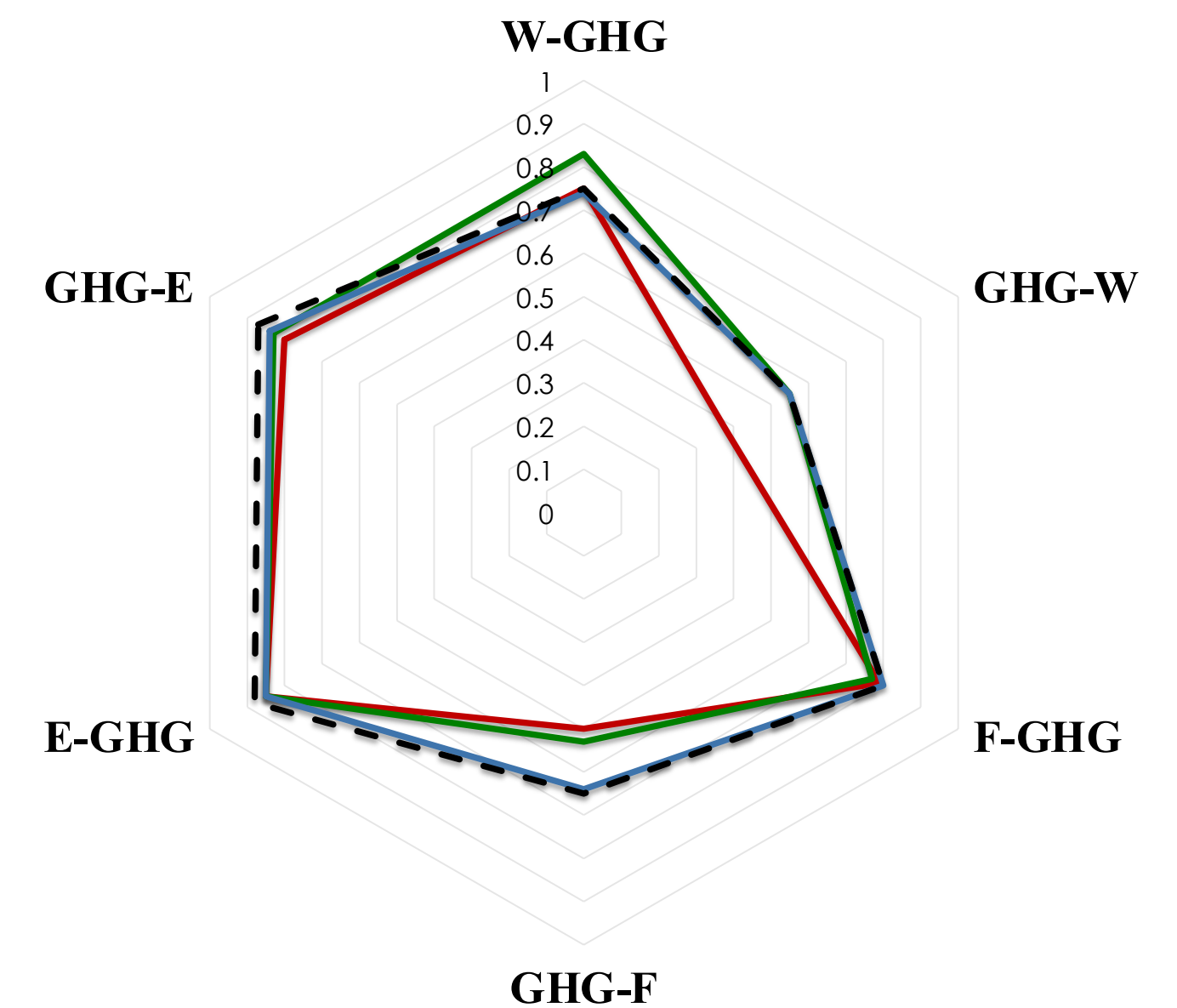
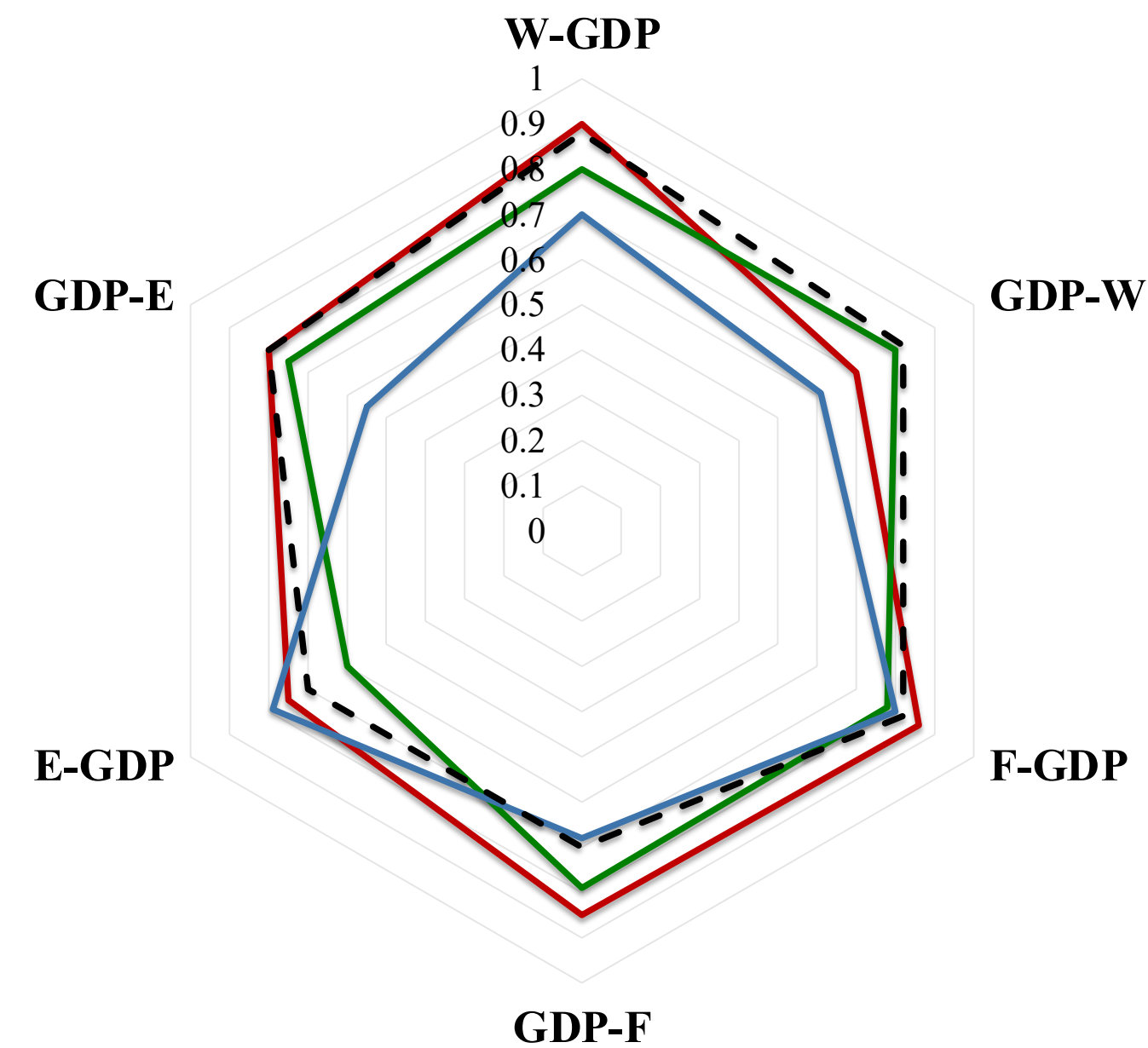
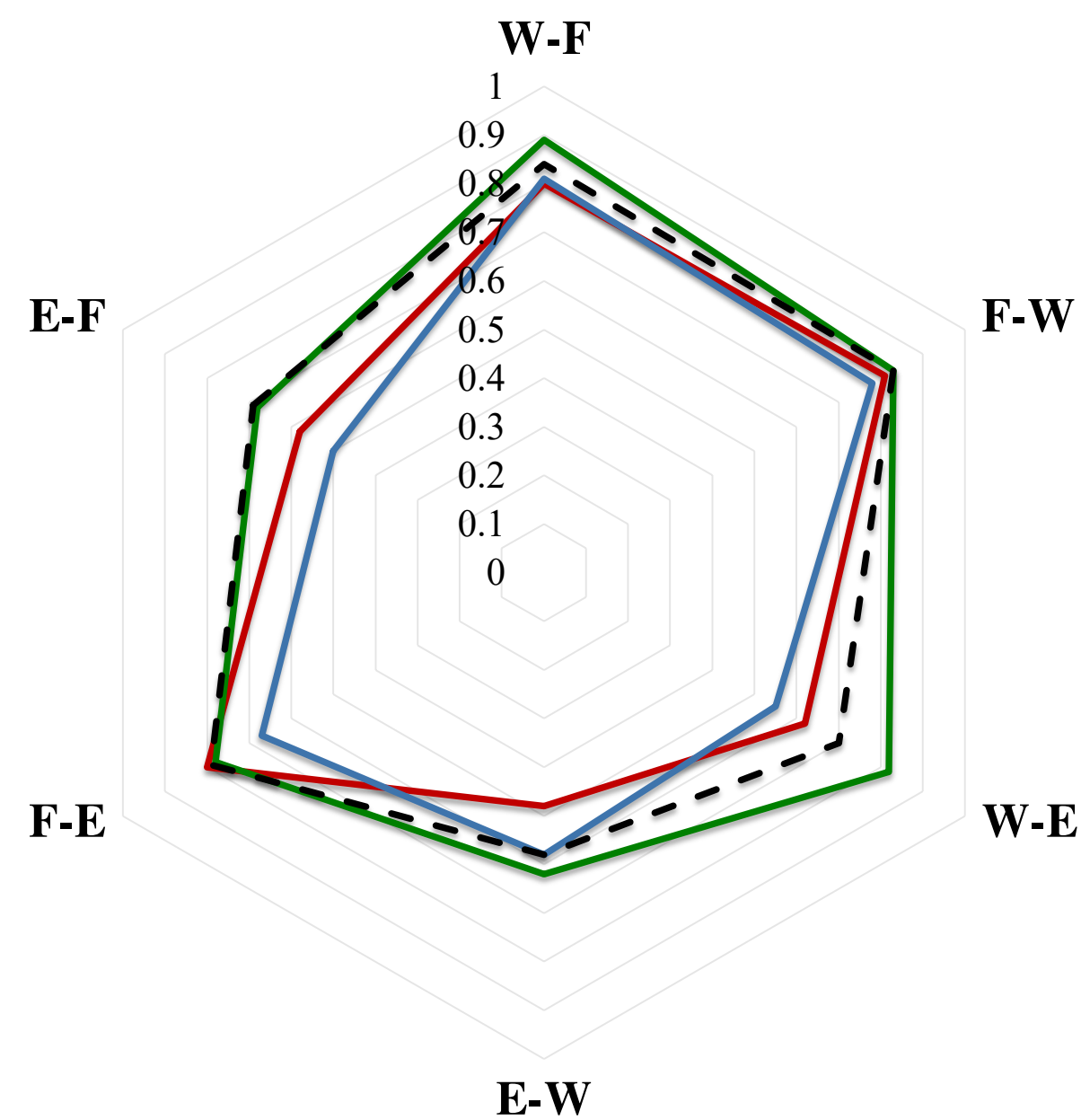
E-F





Comparing the results of mCCM among WEF sectors, between WEF-GDP, and between WEF-GHG

Relative causal strength (rho) of interrelationships



— Alberta — Saskatchewan — Manitoba - - The Prairies

Thanks for the sponsors!



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Thanks for your attention!

