

# **Global sharing of exotic species: the relative importance of trade and climate**

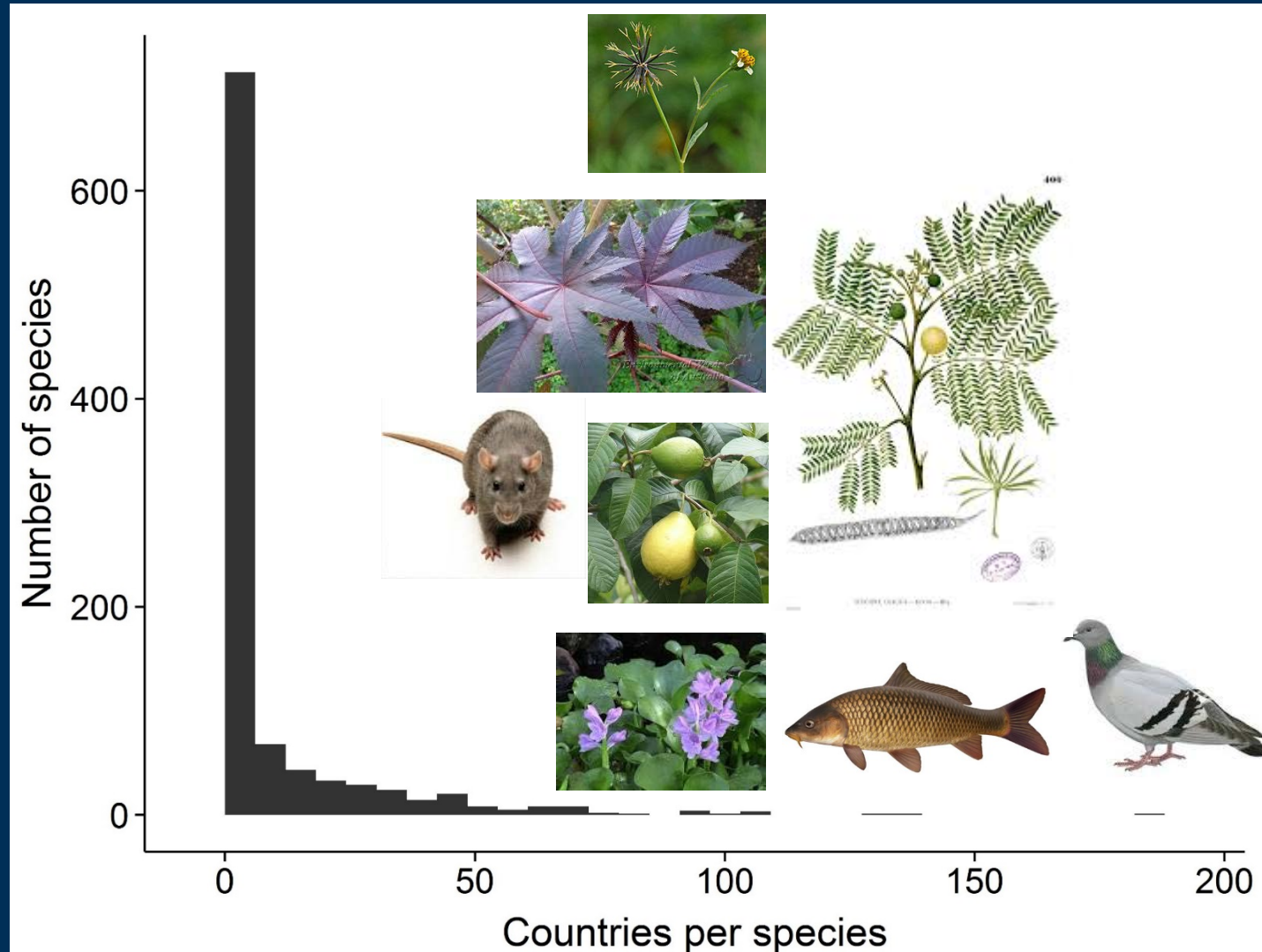
**Helen Sofaer and Catherine Jarnevich  
U.S. Geological Survey,  
Fort Collins Science Center**

# Understanding drivers of invasion risk

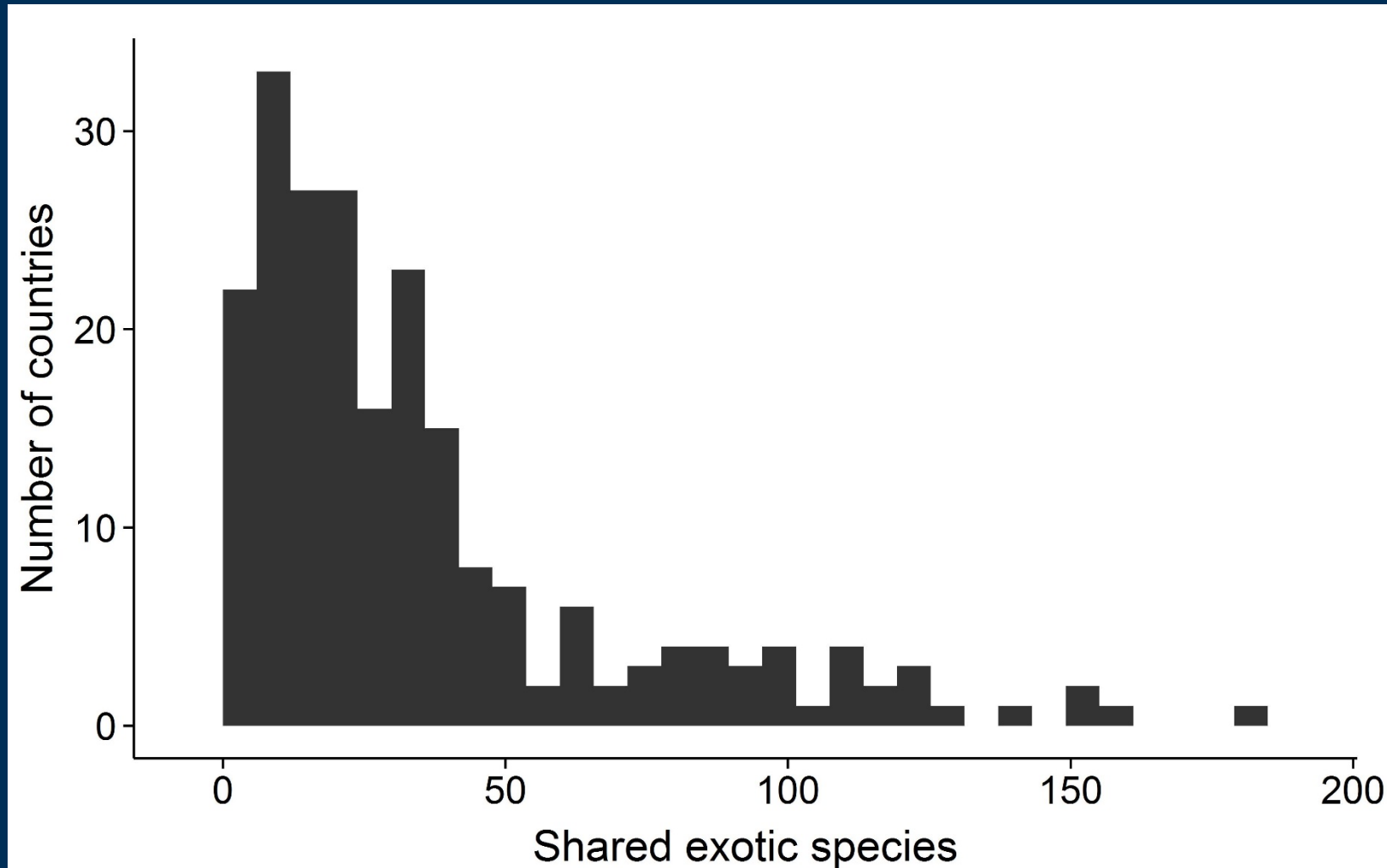
- Attributes of species
- Attributes of source and recipient communities
- Linkages between communities



# Global distributions of exotic species



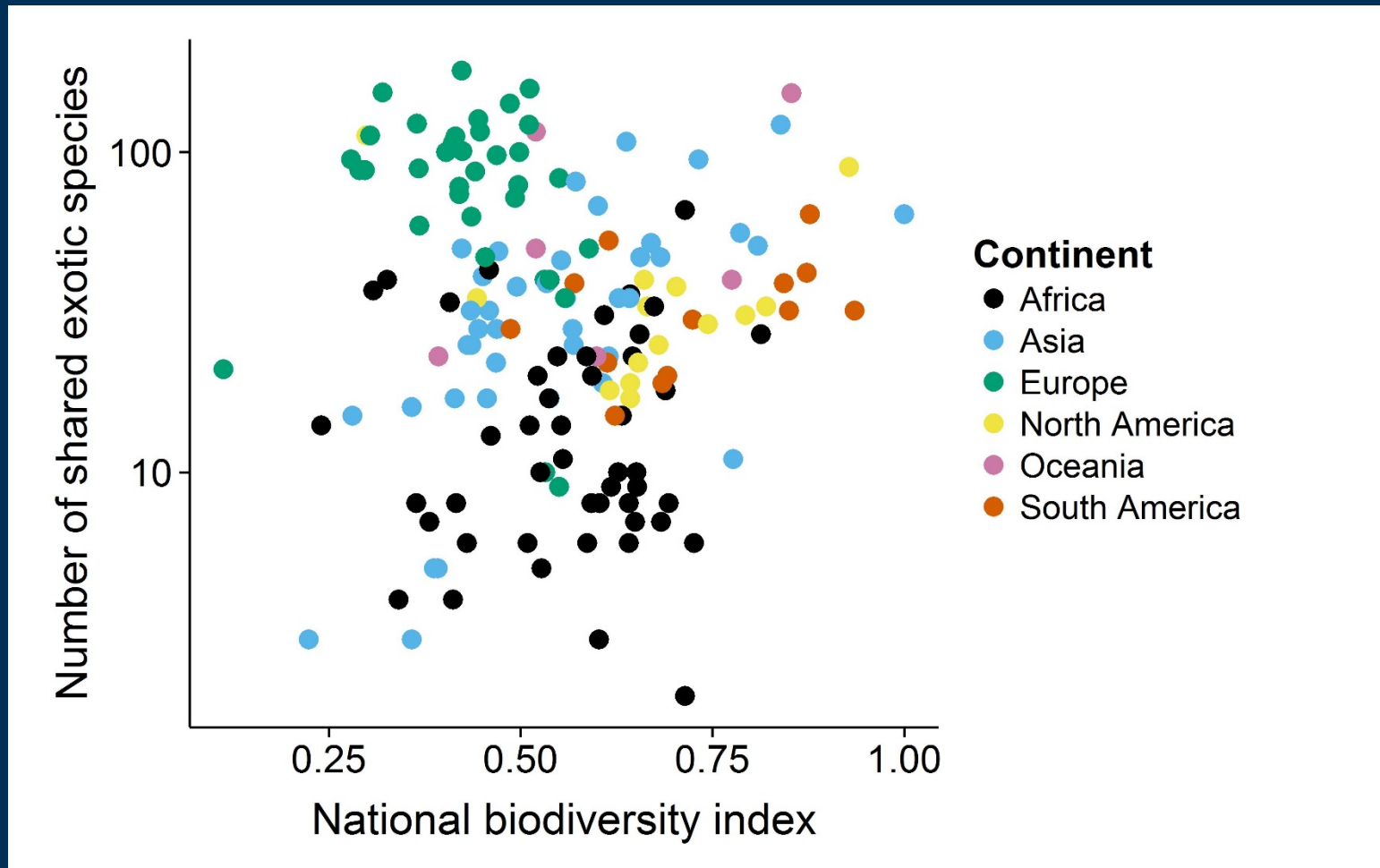
# How many exotic species are shared between the US and other countries worldwide?



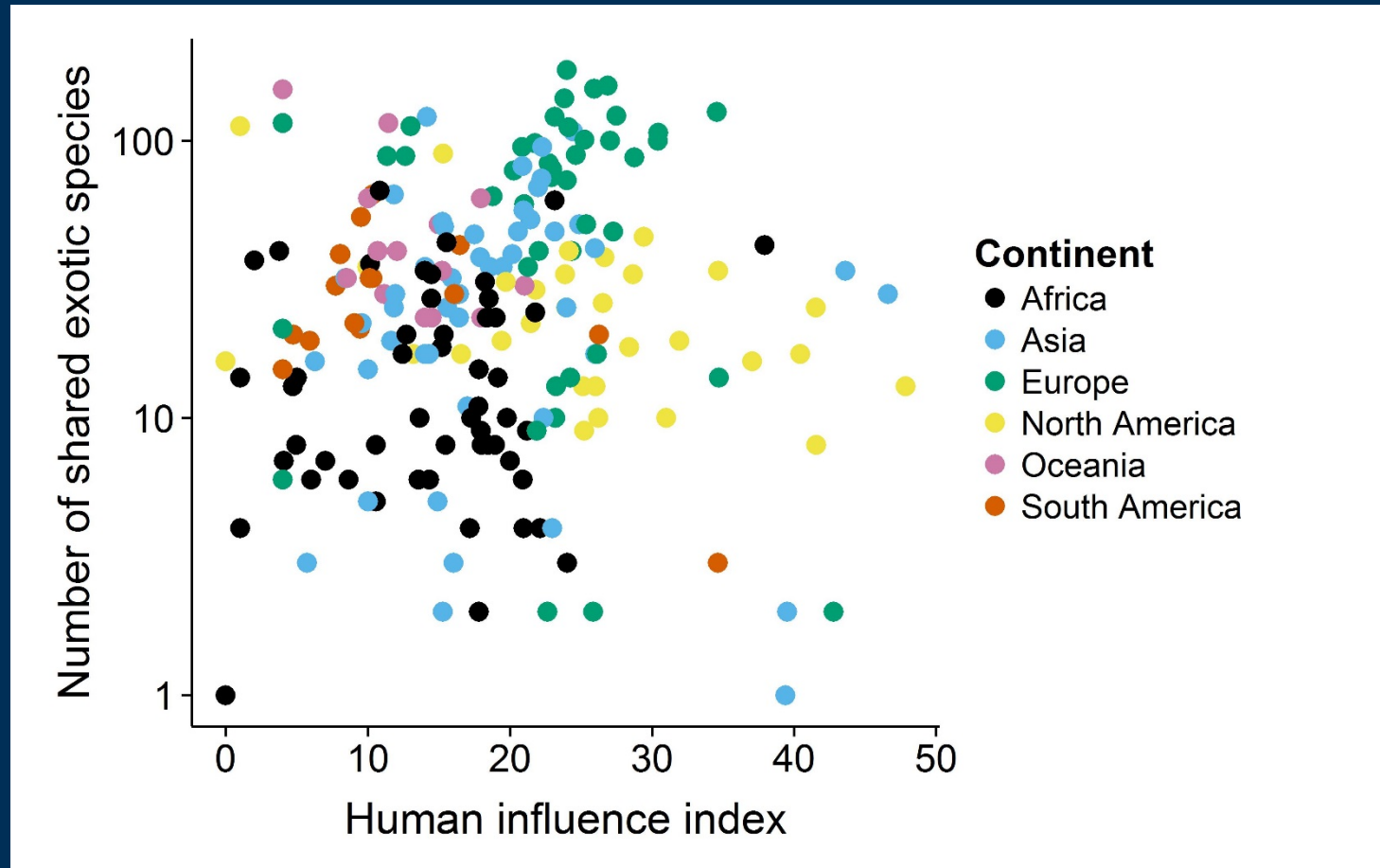
# Processes affecting exotic distributions

- Diversity
- Disturbance
- Area
- Climate
- Dispersal potential:
  - Distance
  - Trade

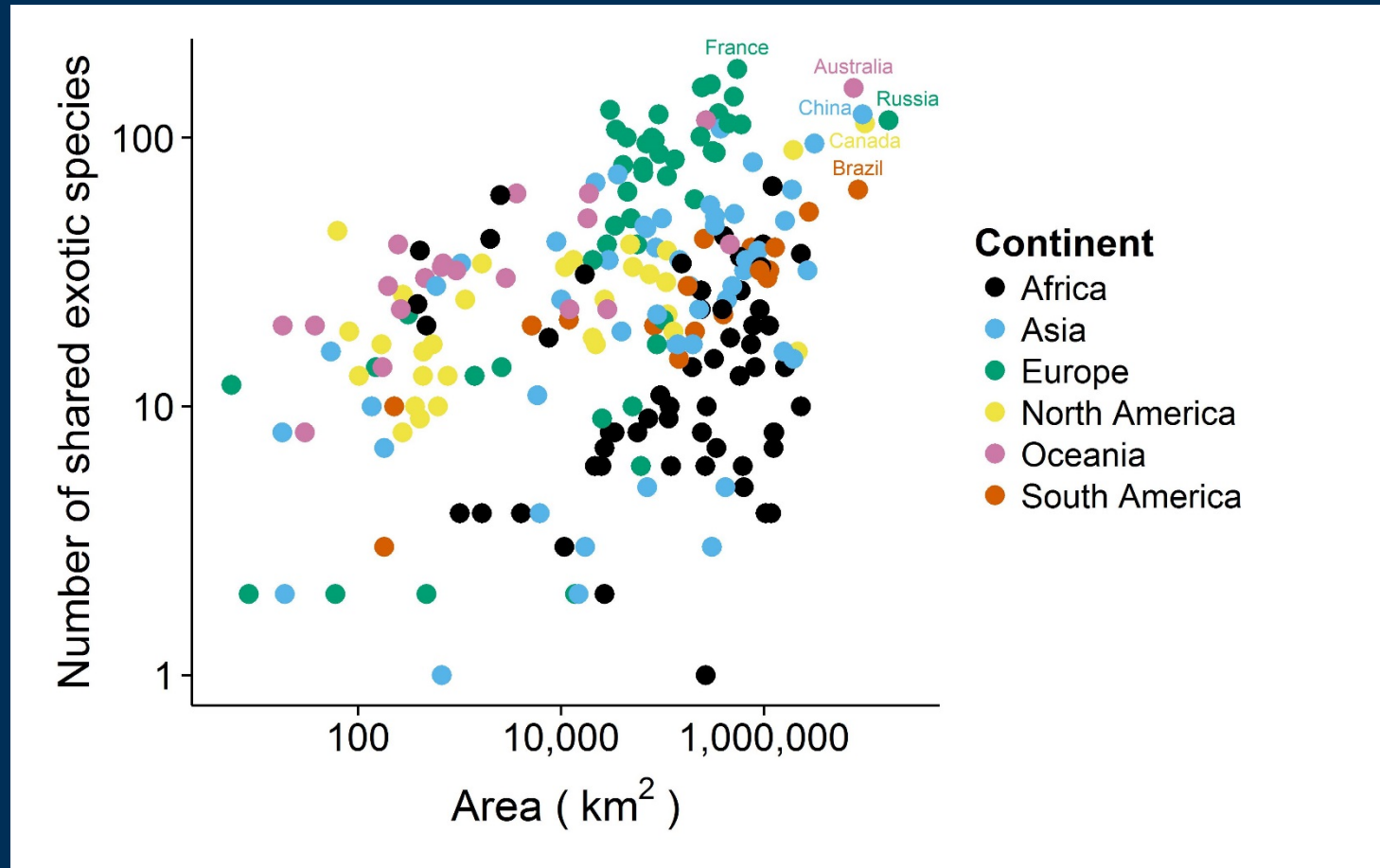
# Biological diversity



# Human disturbance

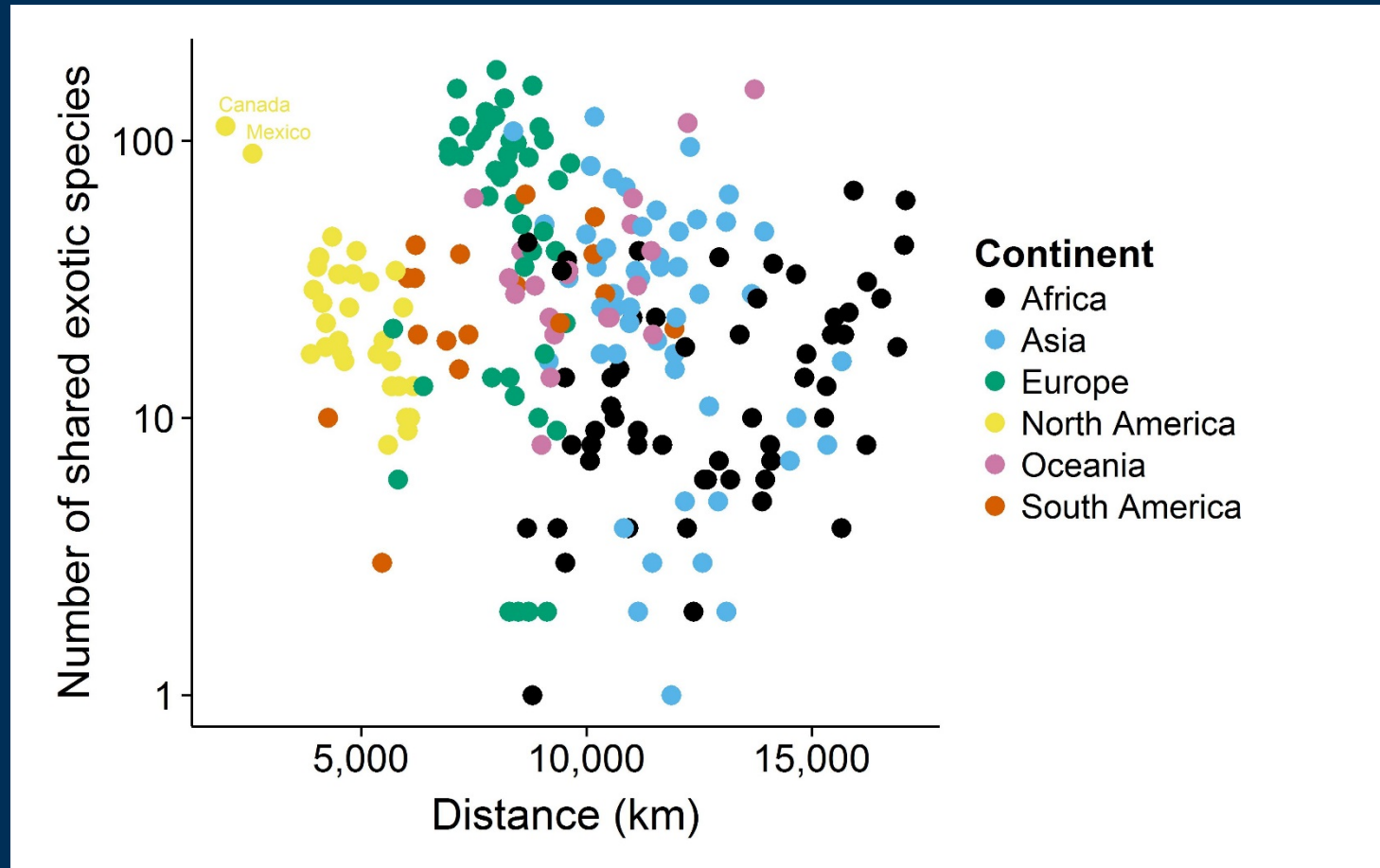


# Area

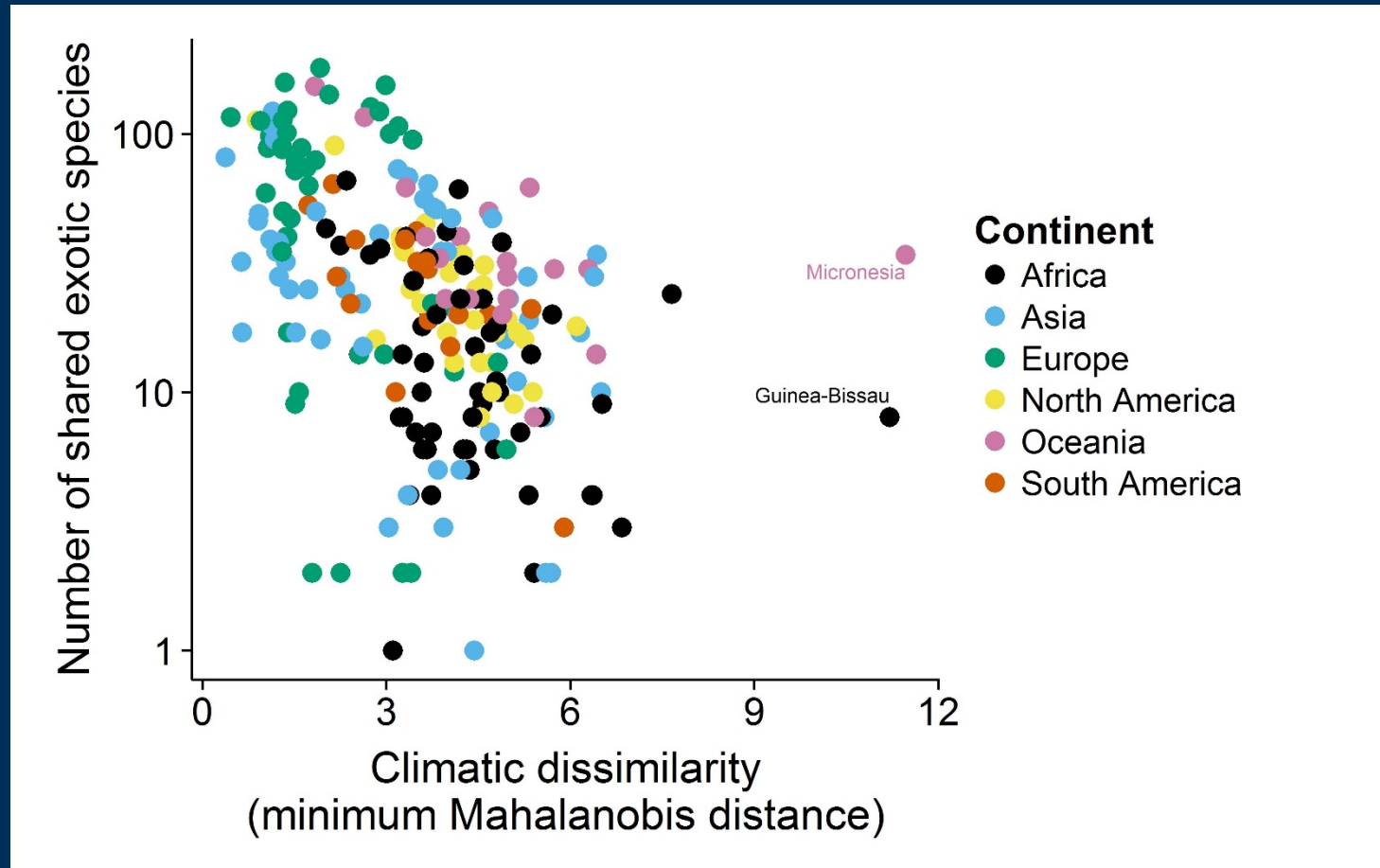




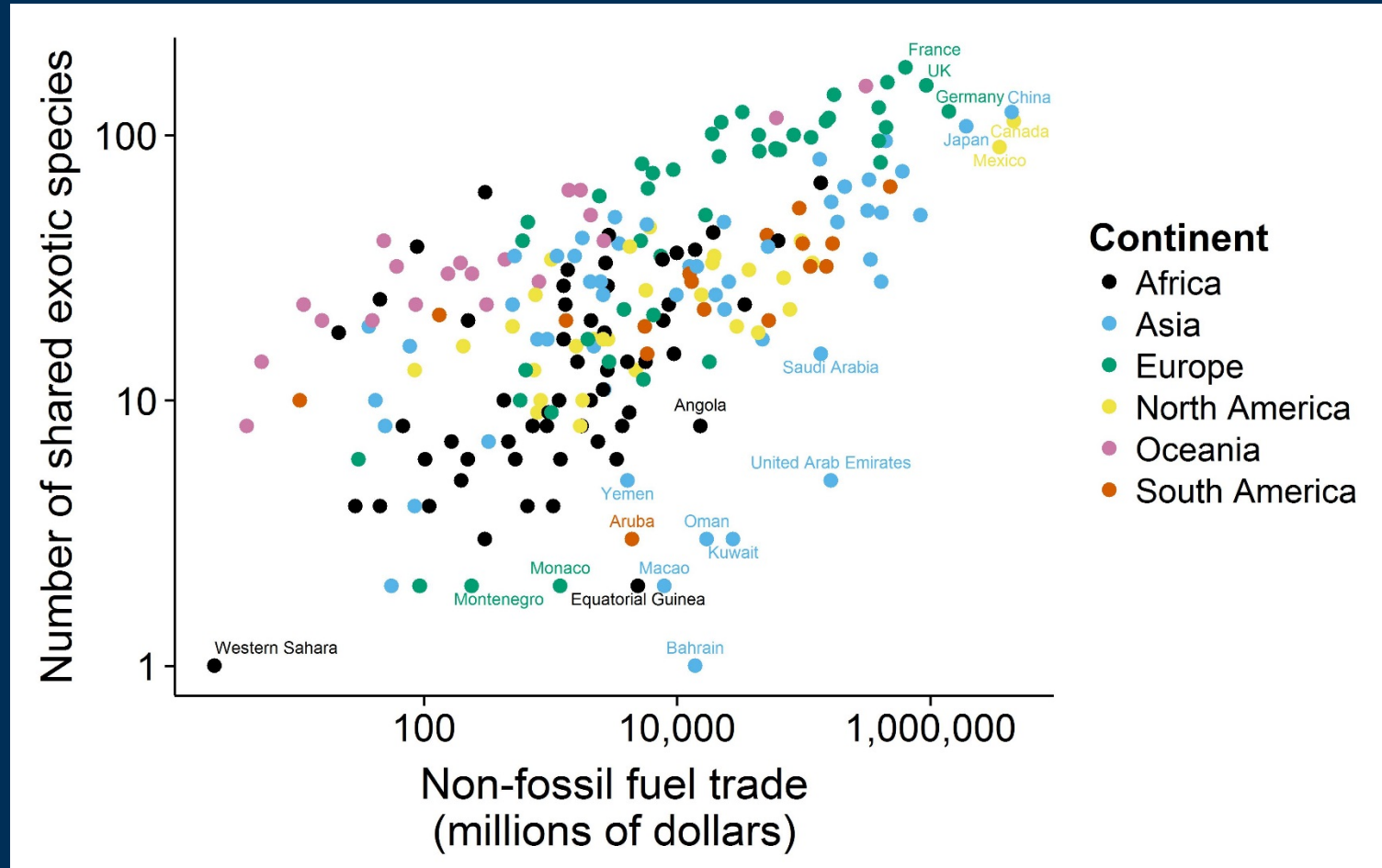
# Geographic distance



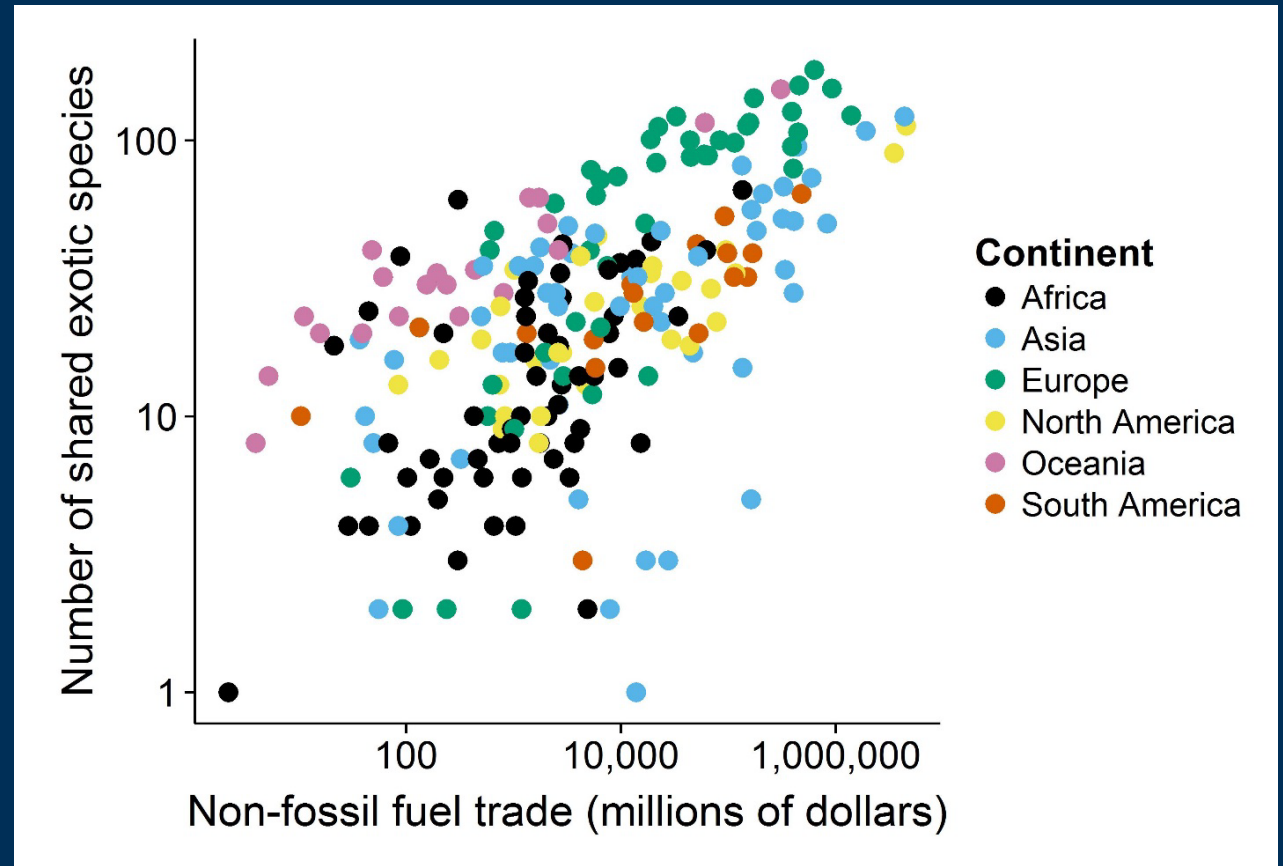
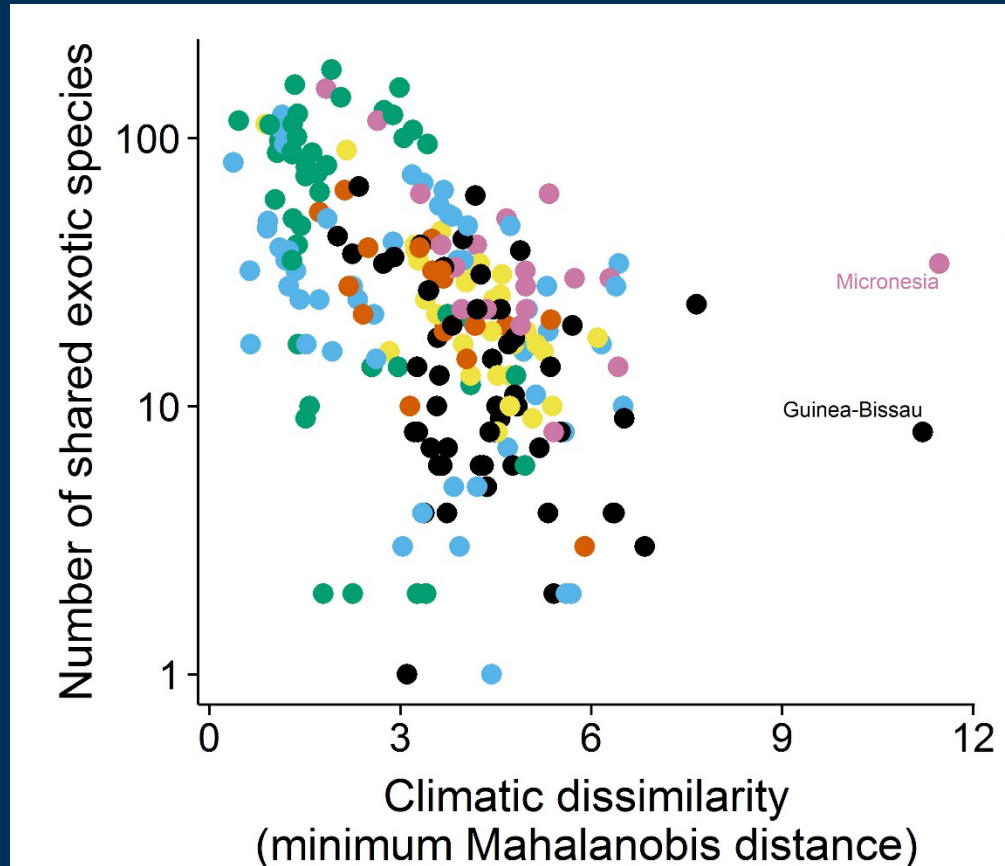
# Climate



# Trade



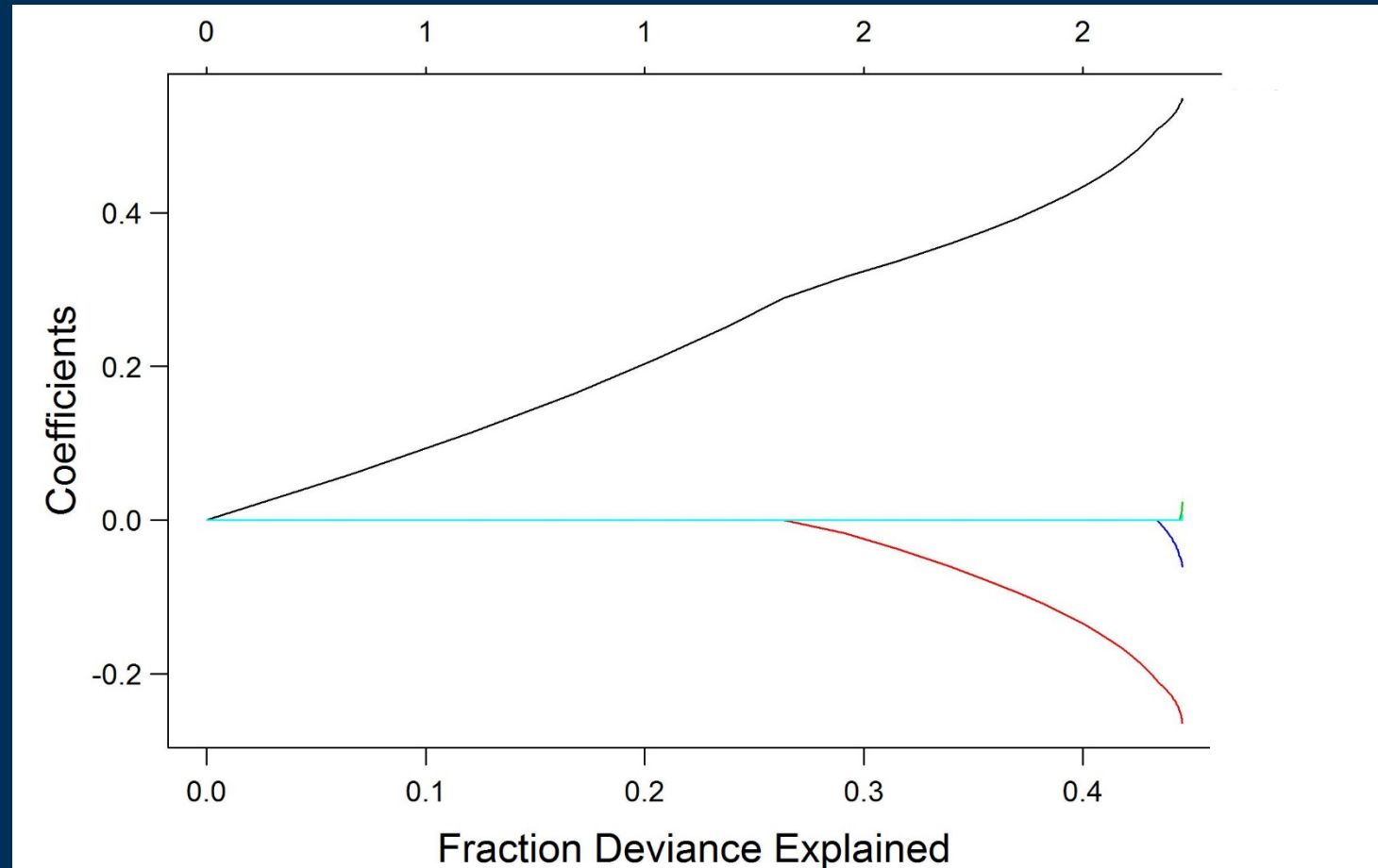
# Relative importance of trade and climate



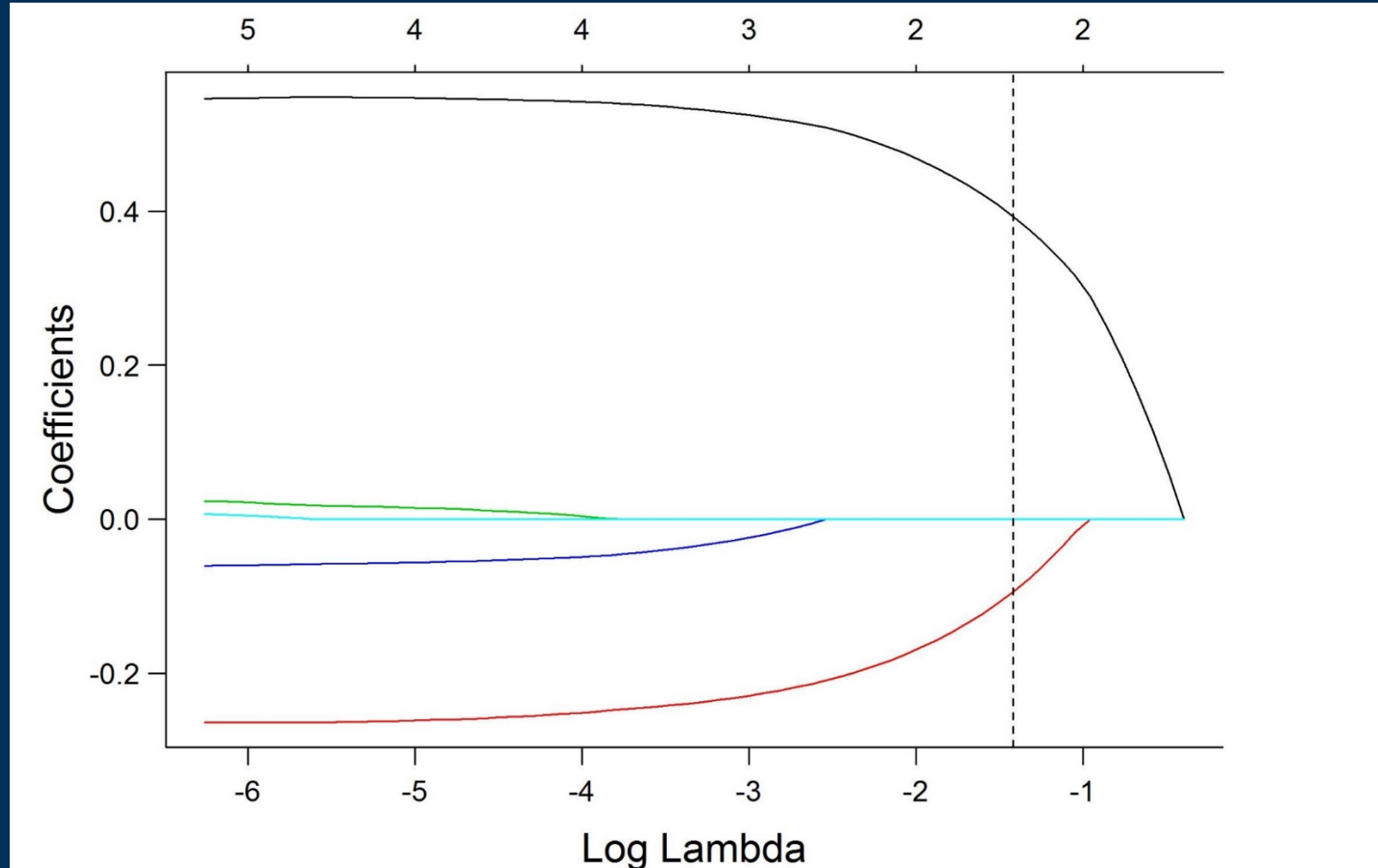
# Statistical methods:

- 1. Evaluated and dropped National Biodiversity Index**
  - Missing values for island and small nations
  - No evidence for an effect
- 2. Estimated relative importance all other variables**
  - Lasso regression
- 3. Evaluated role of different types of trade**

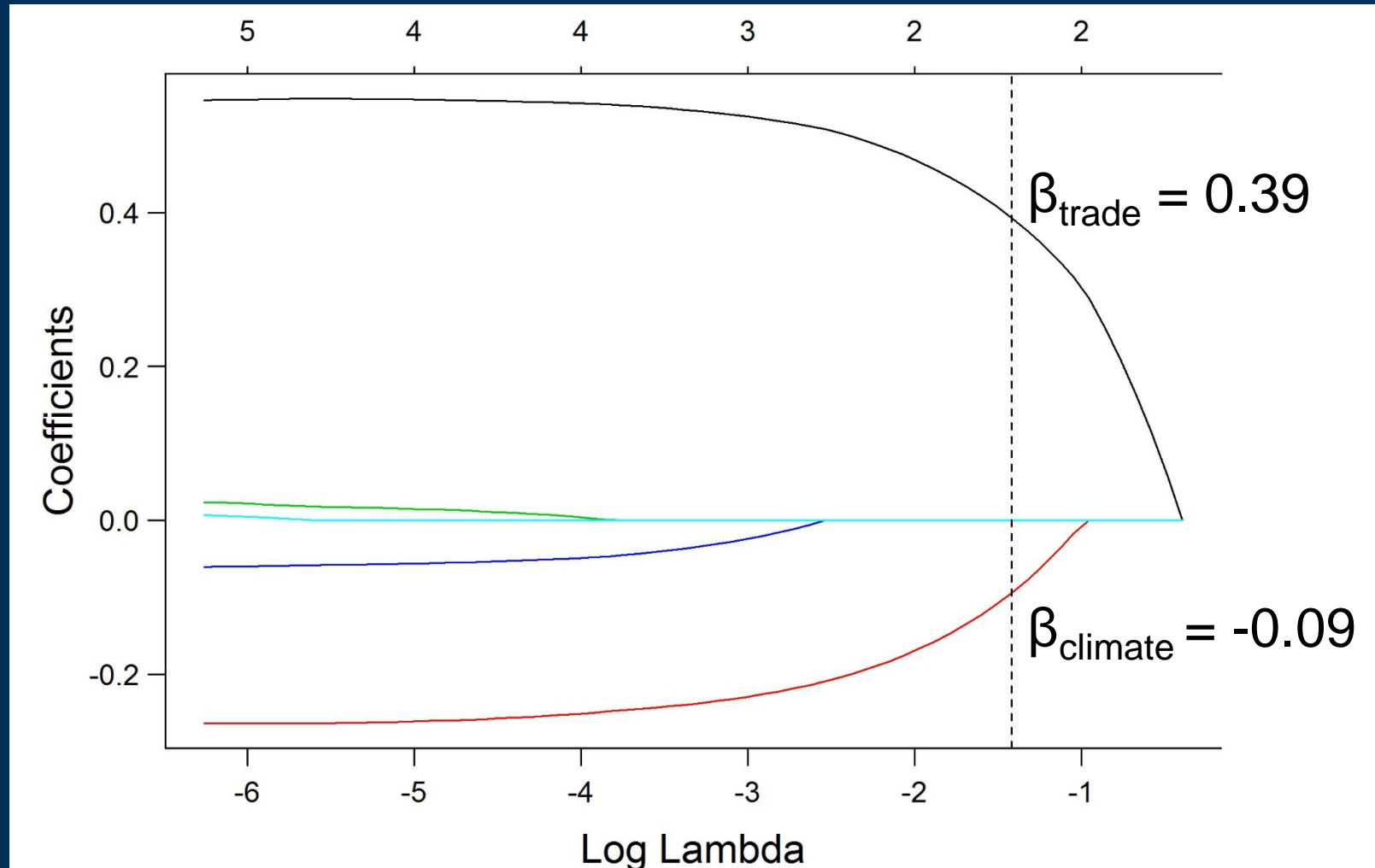
# Lasso Regression



# Lasso Regression



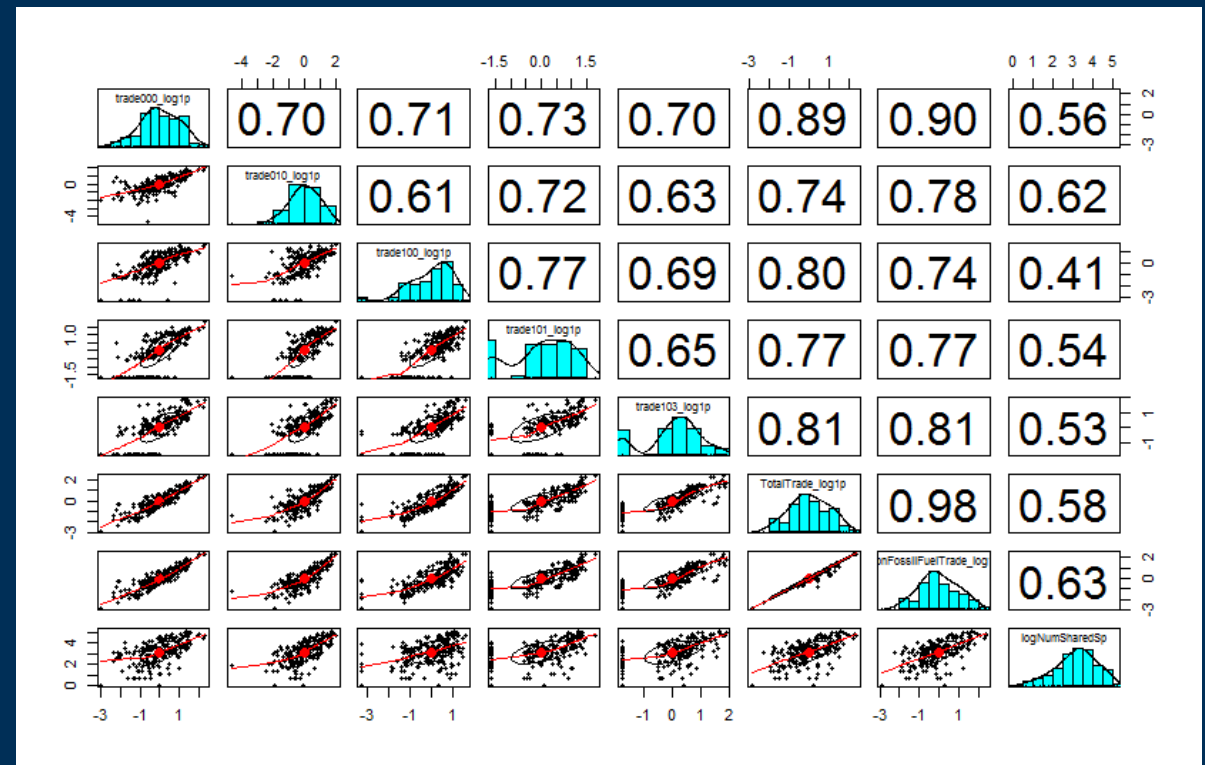
# Trade is four times as important as climate



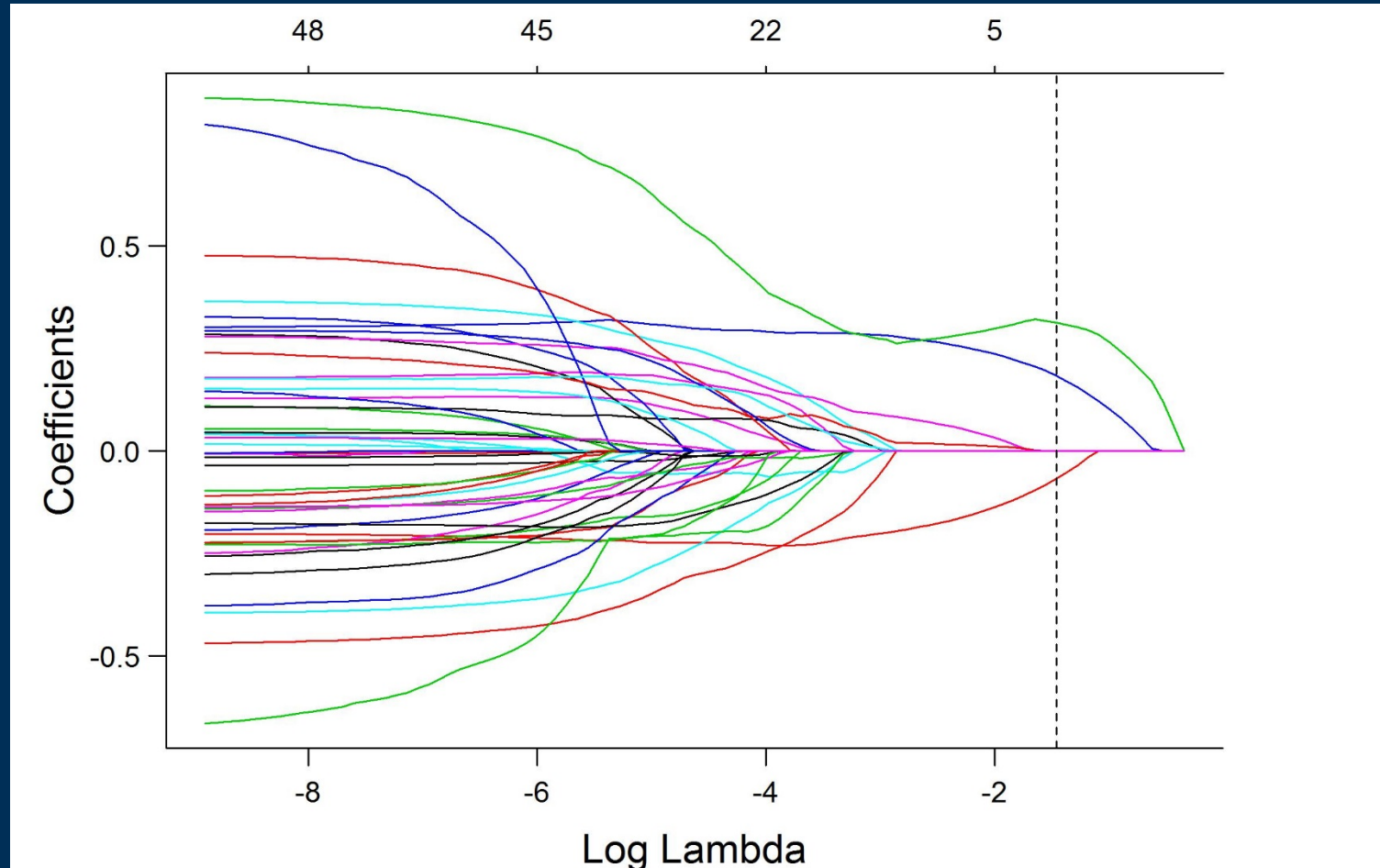


# Role of different types of trade

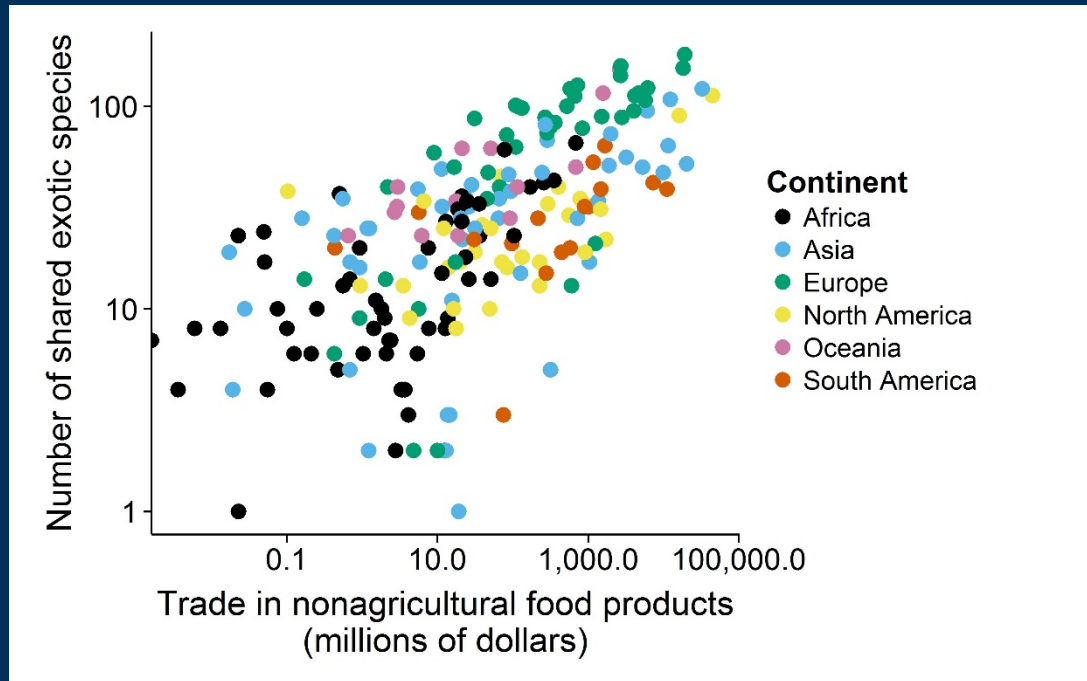
- 43 categories based on US Census 3-digit end-use codes
- Certain types of trade should constitute higher risk:
  - Nursery plants
  - Lumber
  - Agricultural products



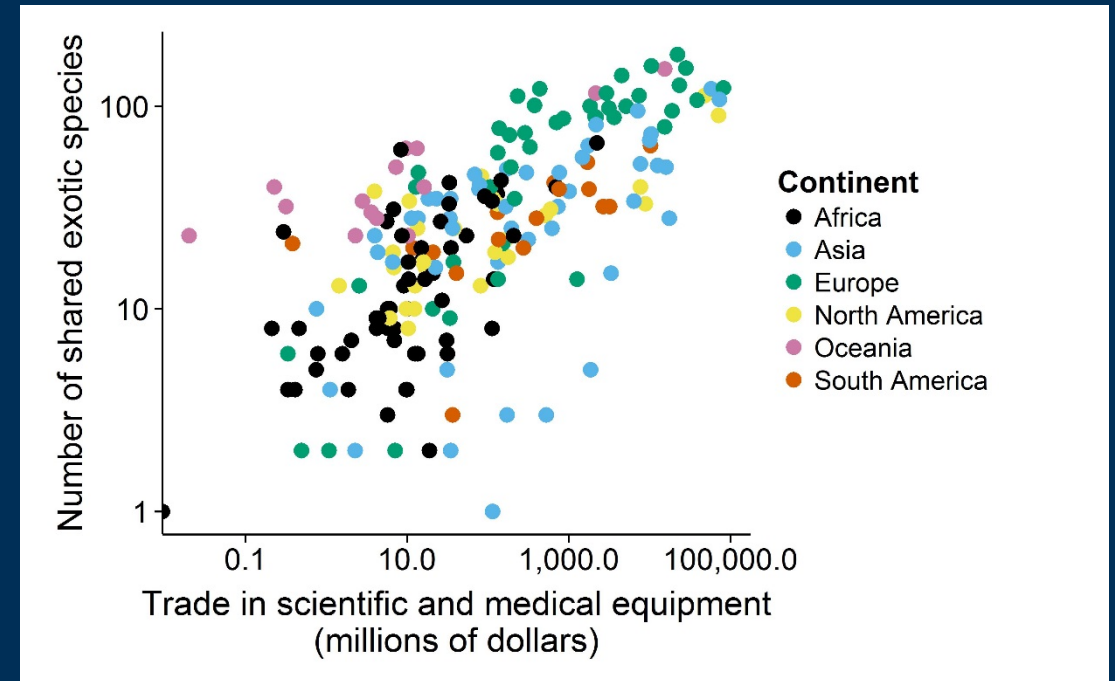
# Variable selection using lasso



# A priori categories were not selected

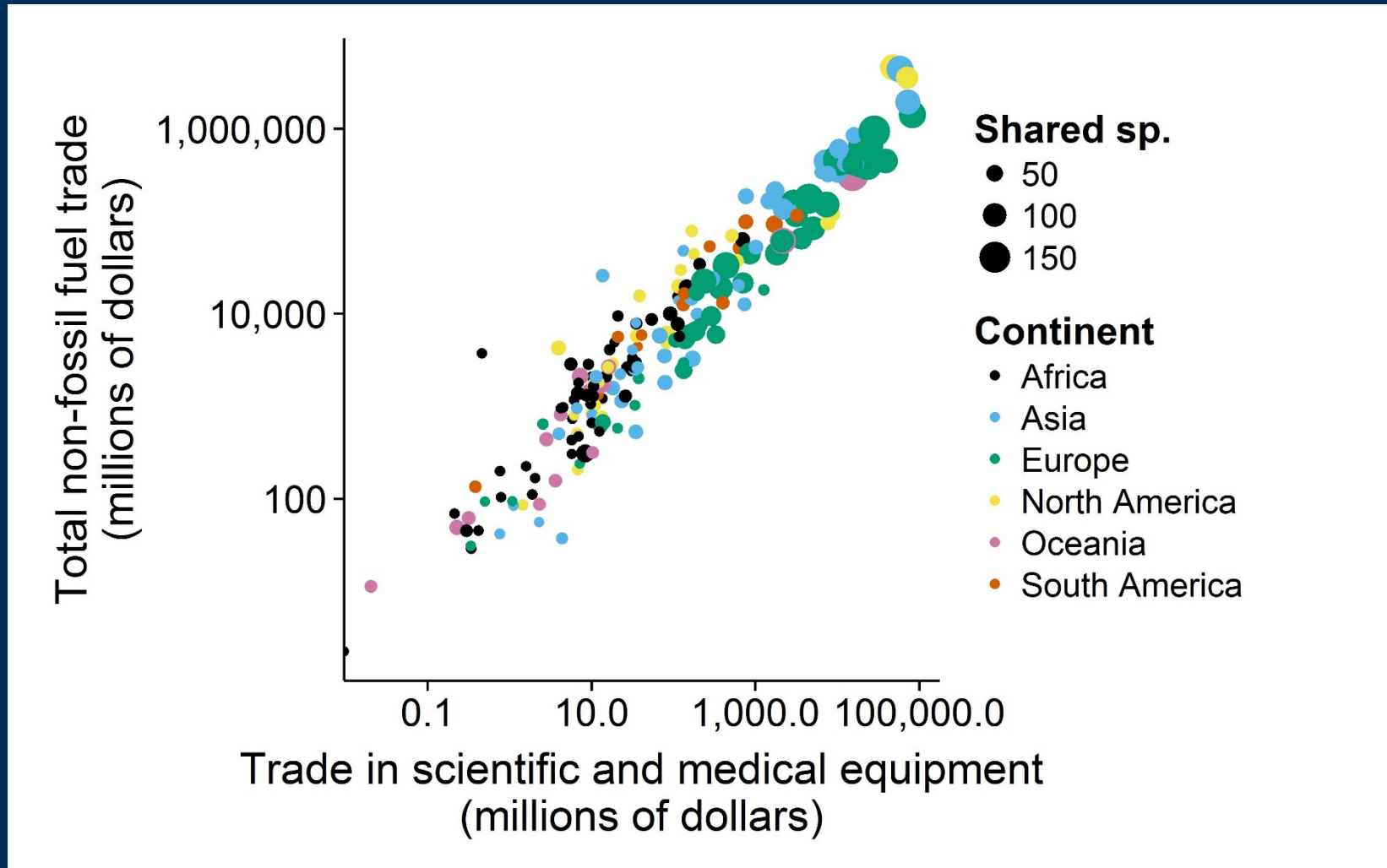


$$\beta = 0.18$$



$$\beta = 0.31$$

# Correlation between measures of trade



# Conclusions and next steps

- History of economic and social connections is most important predictor of number of shared exotic species
- Climatic similarity also plays a role
  - Less support for effects of diversity, disturbance, area, distance
- Ongoing work:
  - Numbers of species shared between US states
  - Elastic-net regression

# Acknowledgements

- Mendenhall Postdoctoral Fellowship
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