

MOTIVATION AND OBJECTIVES

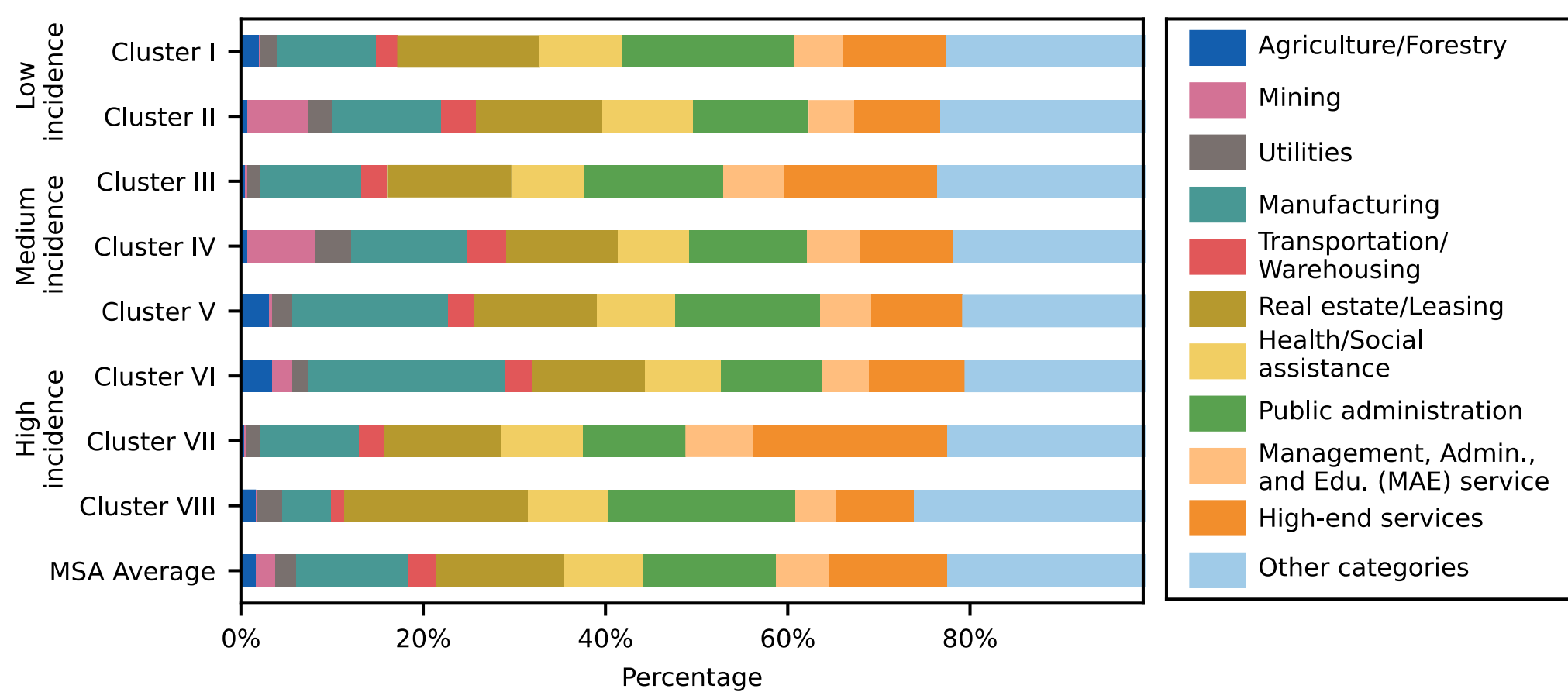
- ❖ To estimate electricity consumption at metropolitan level during COVID-19
- ❖ To investigate economic structure of metropolitans in US
- ❖ To demonstrate the connection between economic structure and economic structure during COVID-19

FINDINGS

- ❖ There is an evident pattern shift of total electricity consumption
- ❖ The reduction in total electricity consumption is related to the shares of certain industries in an MSA

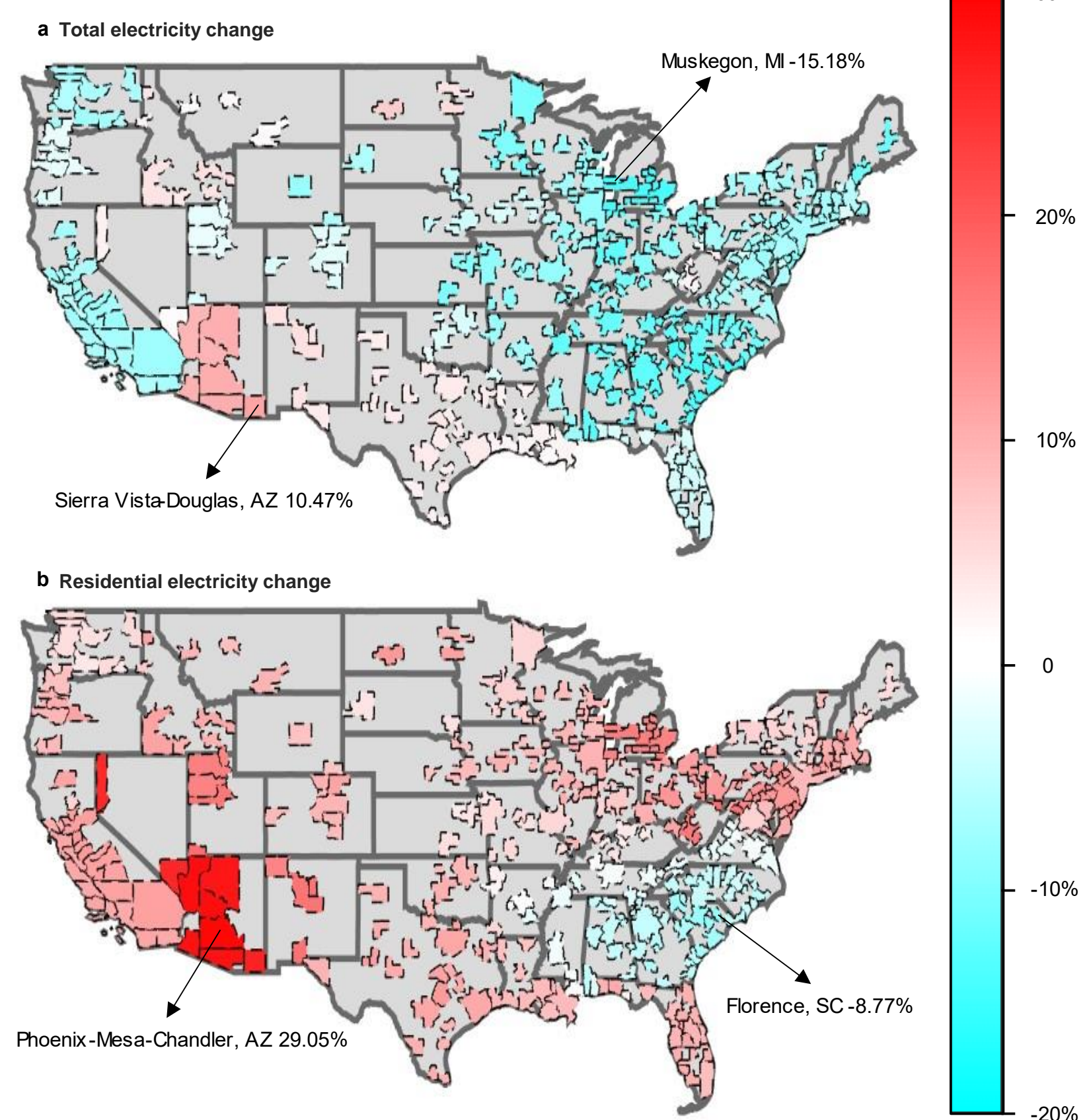
RESULTS

Cluster centers of MSA economic structure

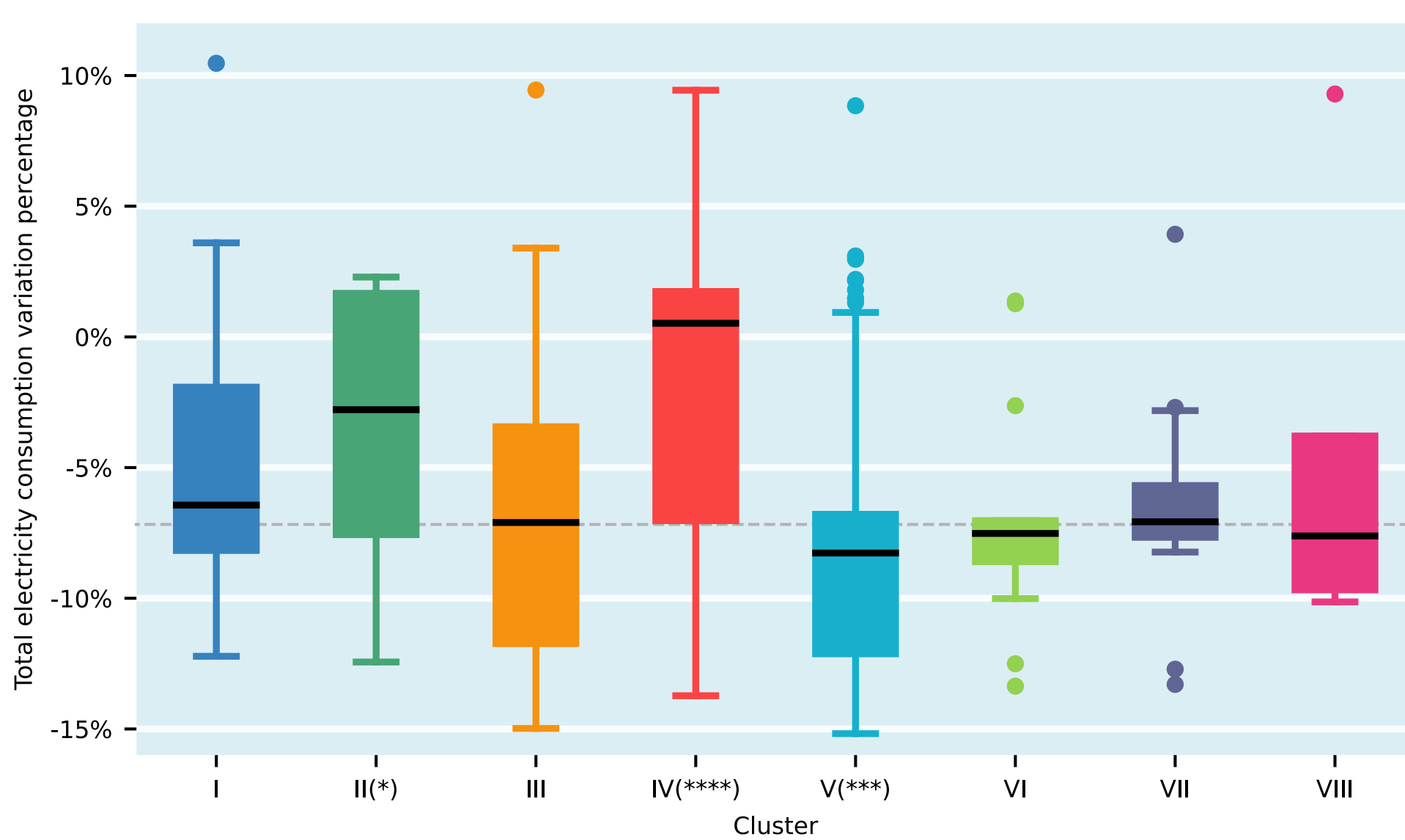


- ❖ In terms of agriculture/forestry, Cluster V and VI have a higher percentage when compared to the MSA average level. Furthermore, one can also observe that the share of manufacturing of these two clusters is larger than the average level.
- ❖ Regarding the mining industry, Cluster II and IV have a higher proportion than the MSA average level. Similarly, the transportation/warehousing of these two clusters is also above the average level.
- ❖ As for real estate/leasing, Cluster I and VIII have a higher share than the MSA average. Also, their percentage of public administration is greater than the MSA average.
- ❖ Another noteworthy point is that Cluster III and VII have a higher percentage of high-end services and MAE services.

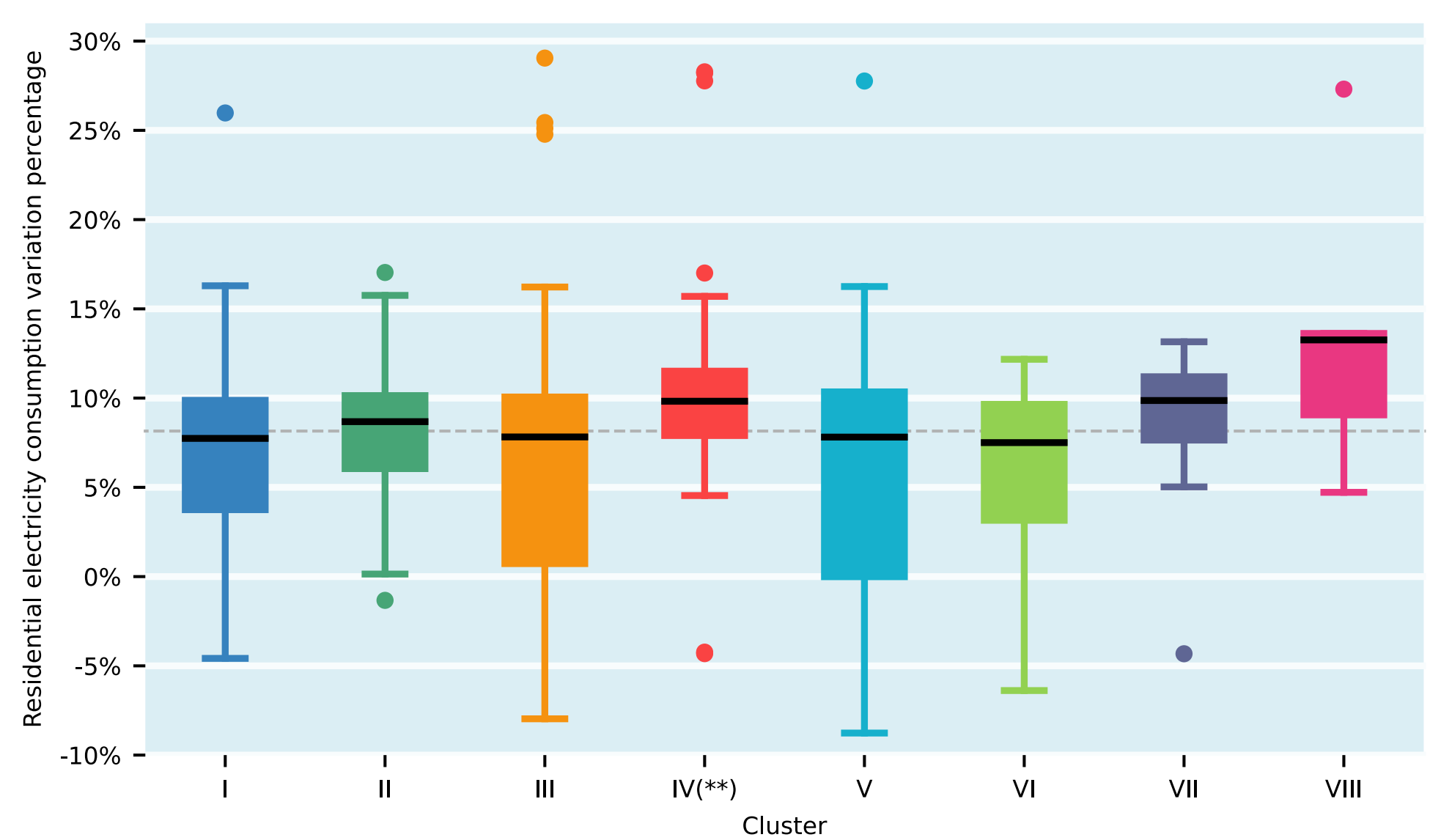
Spatial heterogeneity in EC change on metropolitan level after COVID-19



Electricity consumption variation among different clusters



Total electricity consumption variation



Residential electricity consumption variation

The connections between **total electricity** consumption reduction and economic structures can be presented:

- ❖ The total electricity consumption change indicates that Clusters II and IV have significantly **higher reduction** than the average. Both of them have a sizable **mining industry** (about 7%).
- ❖ Both Clusters V and VI have a significantly higher proportion of **agriculture/forestry and manufacturing** than average. The total electricity consumption of both clusters seem to have **greater declines** than the average level of total electricity consumption.
- ❖ Total electricity consumption of Cluster VI has **less** reduction than Cluster V, which can be possibly ascribed to higher **mining** industry share in Cluster VI than in Cluster V because mining industry electricity consumption is less affected during the pandemic, as discussed previously.
- ❖ Clusters III and VII have a concentration on **intelligence-intensive services** and the **management, administrative, and educational** services. However, the total electricity consumption of Clusters III-VII **does not** demonstrate statistically significant differences versus the total electricity consumption of other MSAs.
- ❖ Both Cluster I and VIII feature a disproportionately **high** share of the **real estate/leasing** and **public administration** industries, where the total electricity consumption reduction for the combination of Cluster I and VIII is statically **less** than in other clusters.

Total electricity consumption variation during the initial months of COVID-19 is shown to be mainly related to economic structure, whereas residential electricity consumption is shown to have increased regardless of economic structure and COVID-19 incidence level.