Organ procurement organization performance and net import of deceased donor livers

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Disclosures

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I have no financial relationships to disclose within the past 12 months relevant to my presentation. The ACCME defines 'relevant' financial relationships as financial relationships in any amount occurring within the past 12 months that create a conflict of interest.

My presentation does not include discussion of off-label or investigational use. I do not intend to reference unlabeled/unapproved uses of drugs or products in my presentation.

OPO performance and allocation

- OPOs vary in the populations that they serve and in their conversion of eligible deaths to liver donations

- Standard metrics of OPO performance provided by the SRTR are **liver donor conversion ratio** and **observed : expected (O:E) liver yield**.

- Concerns have been raised about whether allocation transfers livers from better-performing OPOs to poorer-performing OPOs

Research questions

- Are livers primarily exported from better-performing OPOs and imported to poorer-performing OPOs?

- Can we find associations between liver import and eligible deaths in an OPO, or between liver import and incident listings in an OPO?

  - Livers procured in one OPO and transplanted in a different OPO are said to have been **imported** into the latter OPO and **exported** from the former

Allocation scenarios tested

- Pre-share 35 (2010 data)
- Post-share 35 (June 18, 2013 – April 4, 2014)
- Redistricting: 4 optimized districts
- Redistricting: 8 optimized districts

Redistricting proposals

- According to criteria outlined by the OPTN's liver committee, we designed optimized redistricted maps to minimize the disparity in MELD at transplant under certain constraints
  - 8 districts, 4 districts
- We evaluated the impact of these redistricted maps on net import of livers per OPO, using the Liver Simulated Allocation Model to simulate allocation from 2006-2011

Redistricted maps

8 districts
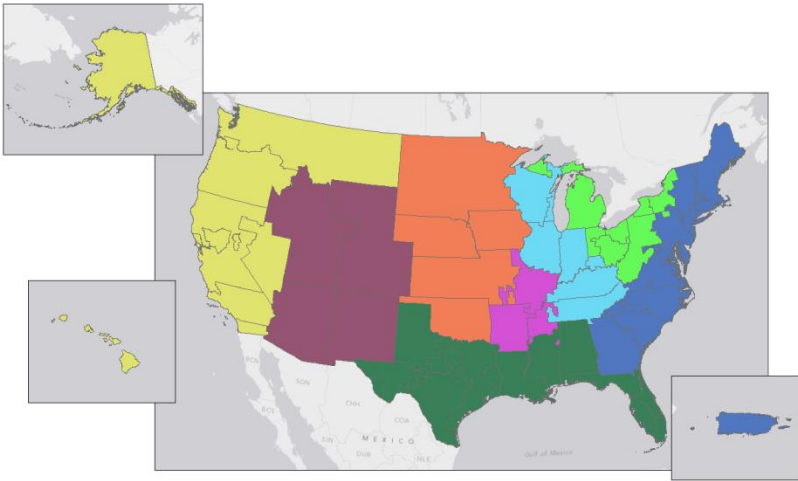
4 districts
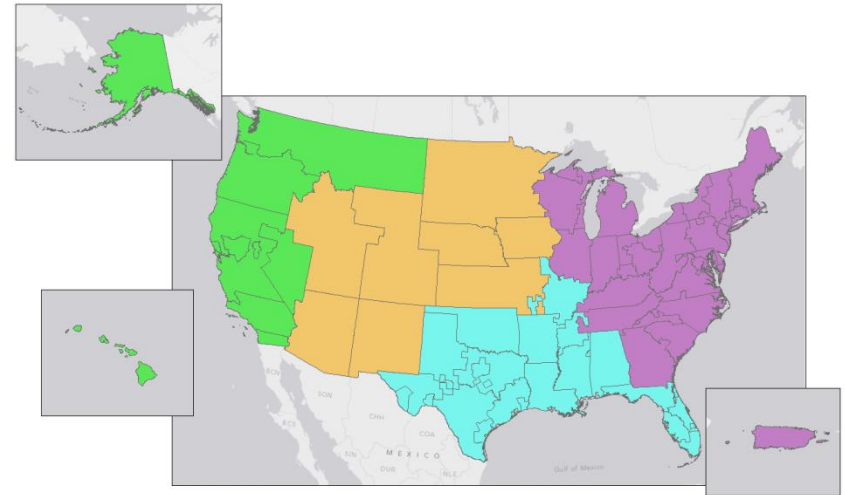
Outcome: Net import

- OPOs that do not serve a liver transplant center are excluded from this analysis
- Net import of livers from adult donors per OPO is defined as

$$\frac{\text{livers imported} - \text{livers exported}}{\text{livers recovered}}$$

Possibly explanatory variables

- Measures of OPO performance
  - Observed:Expected (O:E) Liver Yield
  - Liver Donor Conversion Ratio
- Measures of disparity in donor and candidate counts per OPO
  - Eligible deaths
  - Incident listings

Liver Donor Conversion Ratio

- Liver donor conversion ratio is the proportion of liver donations that are recovered from all eligible deaths within an OPO's service area.

- An eligible death is one that meets certain criteria for age, neurologic death, and other exclusions of infection or malignancy

- We use liver donor conversion ratio as reported by SRTR for 2010-2011.

Observed : Expected Liver Yield

- The observed liver yield is the actual number of liver donations from eligible deaths reported to SRTR for an OPO within a given time frame.

- The expected liver yield is a predicted number of liver donations from eligible deaths and is based on an adjusted linear regression model.

- O:E Liver Yield is the ratio of the observed and expected liver yields.

- We use O:E liver yield as reported for 2010-2011.

O:E eligible deaths

- We calculated an observed: expected ratio of eligible deaths for each OPO

$$\frac{OPO\ eligible\ deaths}{US\ eligible\ deaths} \Big/ \frac{pop.\ of\ OPO}{US\ pop.}$$

O:E incident listings

- Incident adult liver listings at MELD > 15

- We calculated an observed: expected ratio of incident listings, for each OPO

$$\frac{OPO\ incident\ listings}{US\ incident\ listings} \bigg/ \frac{pop.\ of\ OPO}{US\ pop.}$$

Methods

- We calculated a linear least squares fit between the possibly explanatory variables and the net import of livers to transplant centers in each OPO

- We weighted the linear fits by the number of livers transplanted in each OPO.

- We calculated the significance level of association in each case.

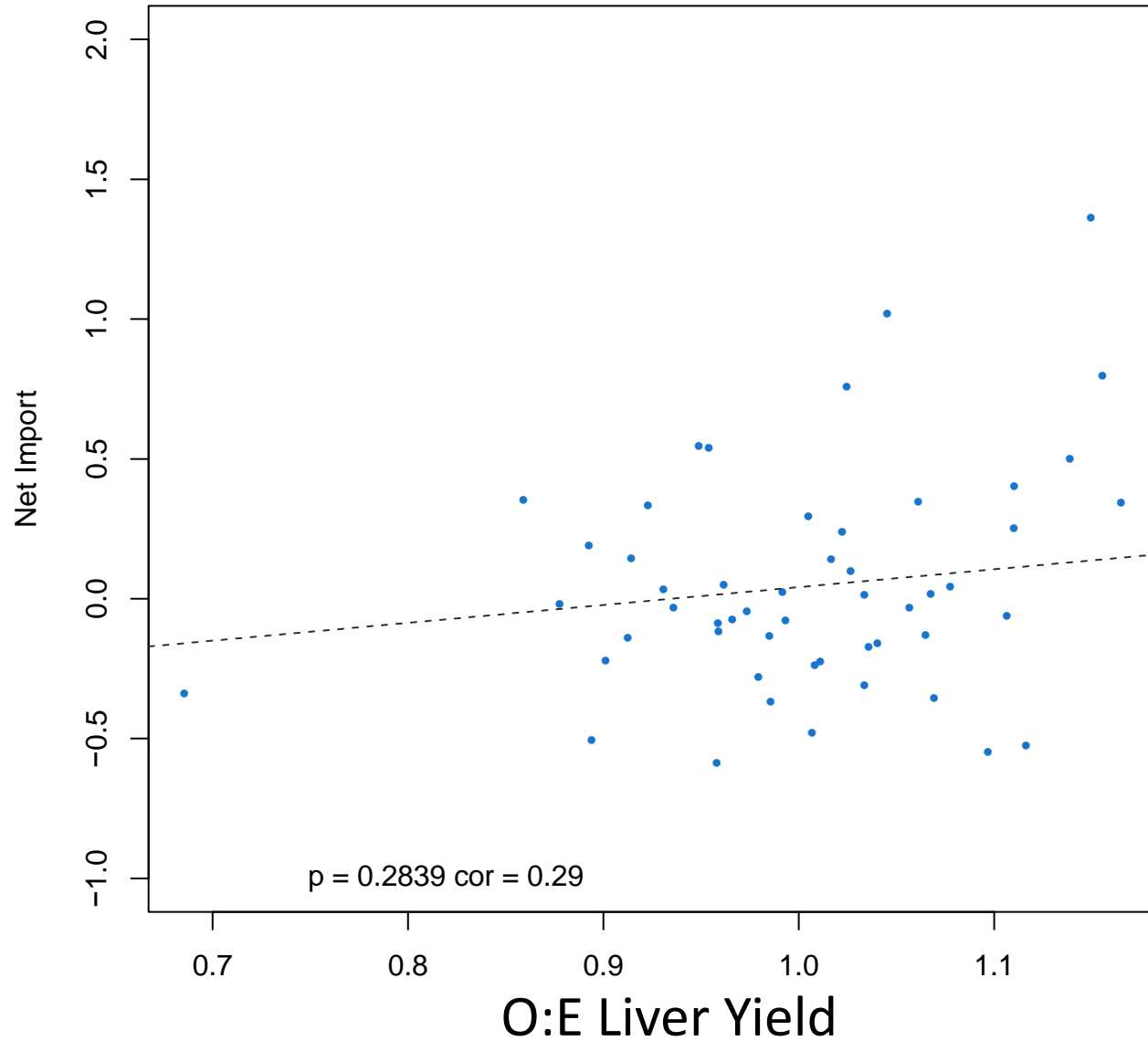# Net import versus O:E liver yield

Pre- share 35 (p=0.09, r=0.25)   Post- share 35 (p=0.28, r=0.29)
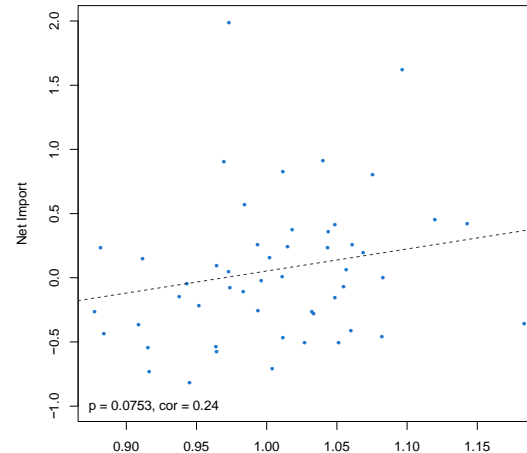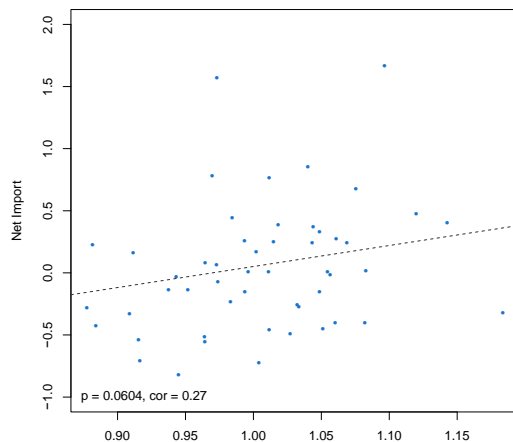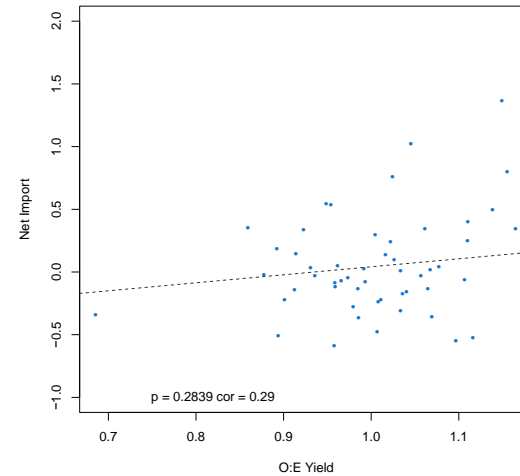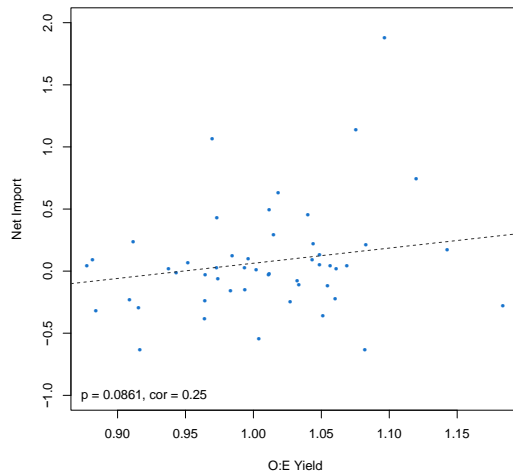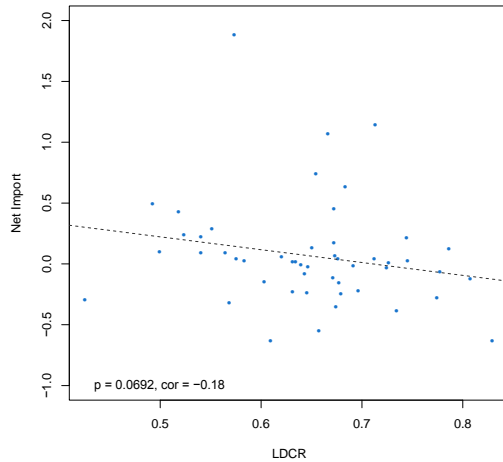

8 districts (p=0.06, r=0.27)   4 districts (p=0.08, r=0.24)
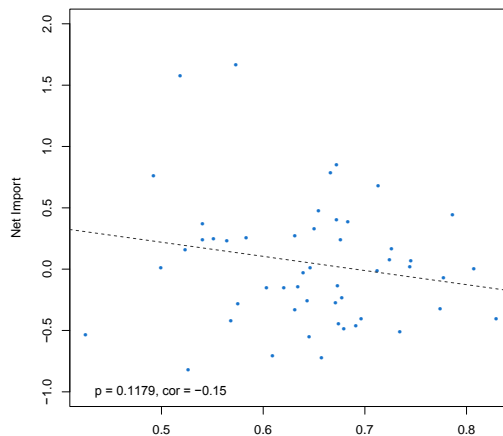
Post- share 35: net import vs O:E liver yield

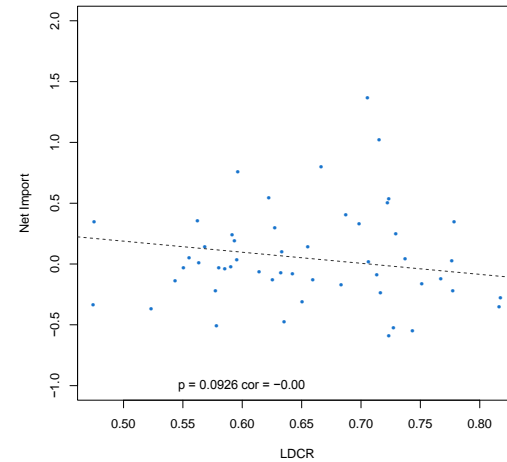# Net import vs. liver donor conversion ratio
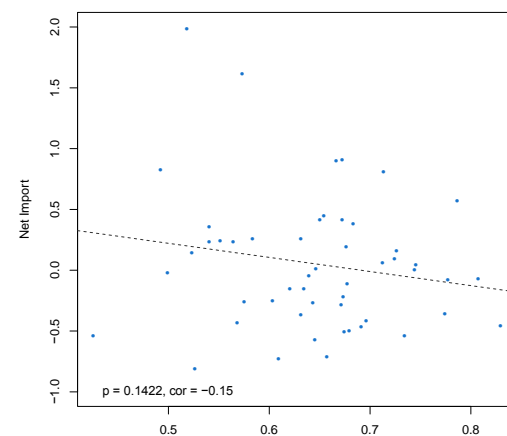
Pre- share 35 (p=0.07, r=-0.18)   Post- share 35 (p=0.09, r=0)
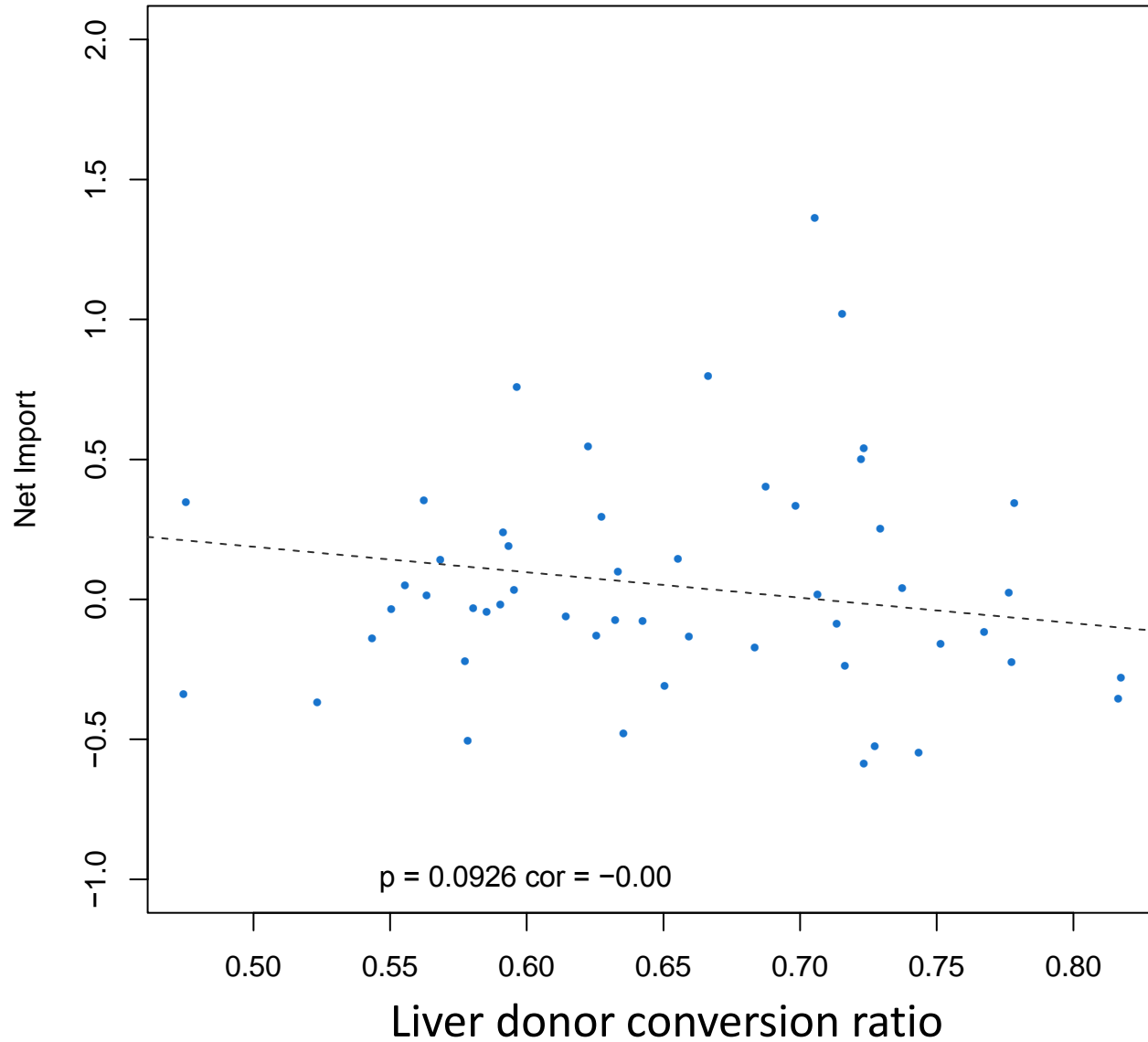

8 districts (p=0.12, r=-0.15)   4 districts (p=0.14, r=-0.15)

Post- share 35: net import vs. conversion ratio

Net Import

p = 0.0926 cor = −0.00

Liver donor conversion ratio

Net import and OPO performance

- We find no evidence of any relationship between net import and O:E liver yield, and no evidence of any relationship between net import and liver donor conversion ratio
- Both at present and under redistricting proposals, livers would not flow from better-performing OPOs to poorer-performing OPOs

Net import versus eligible deaths

Pre- share 35 (p=0.06, r=-0.17)   Post- share 35 (p=0.18, r=-0.11)
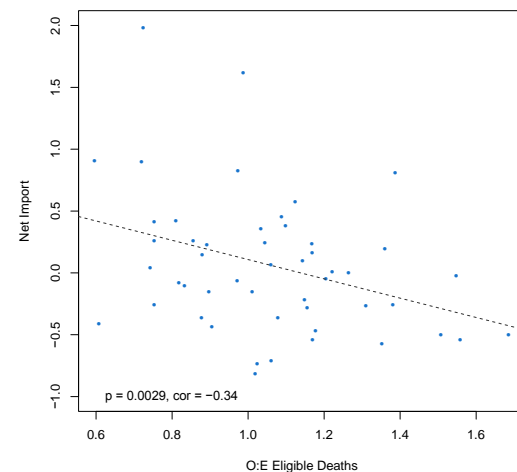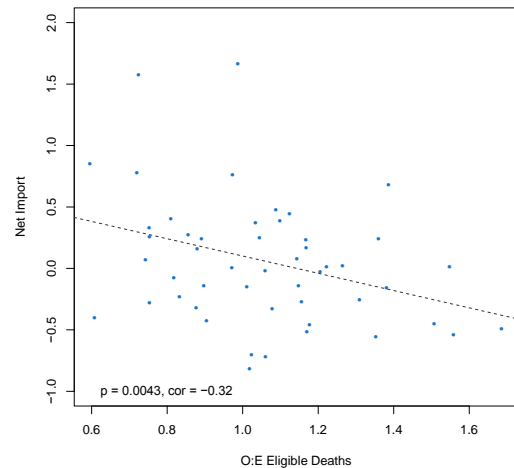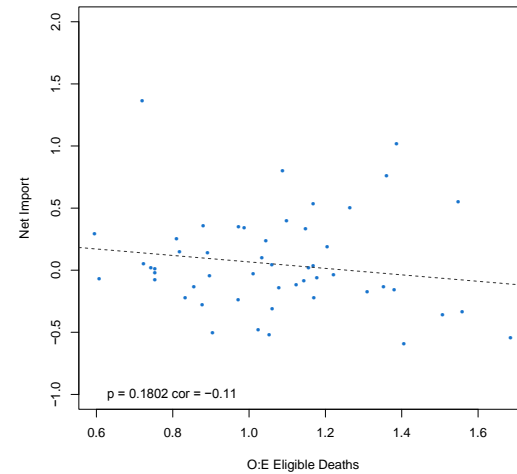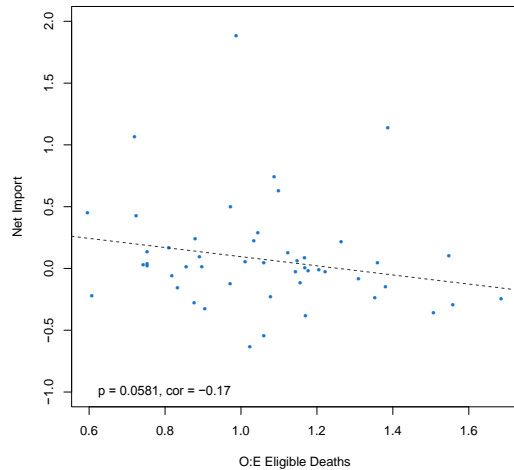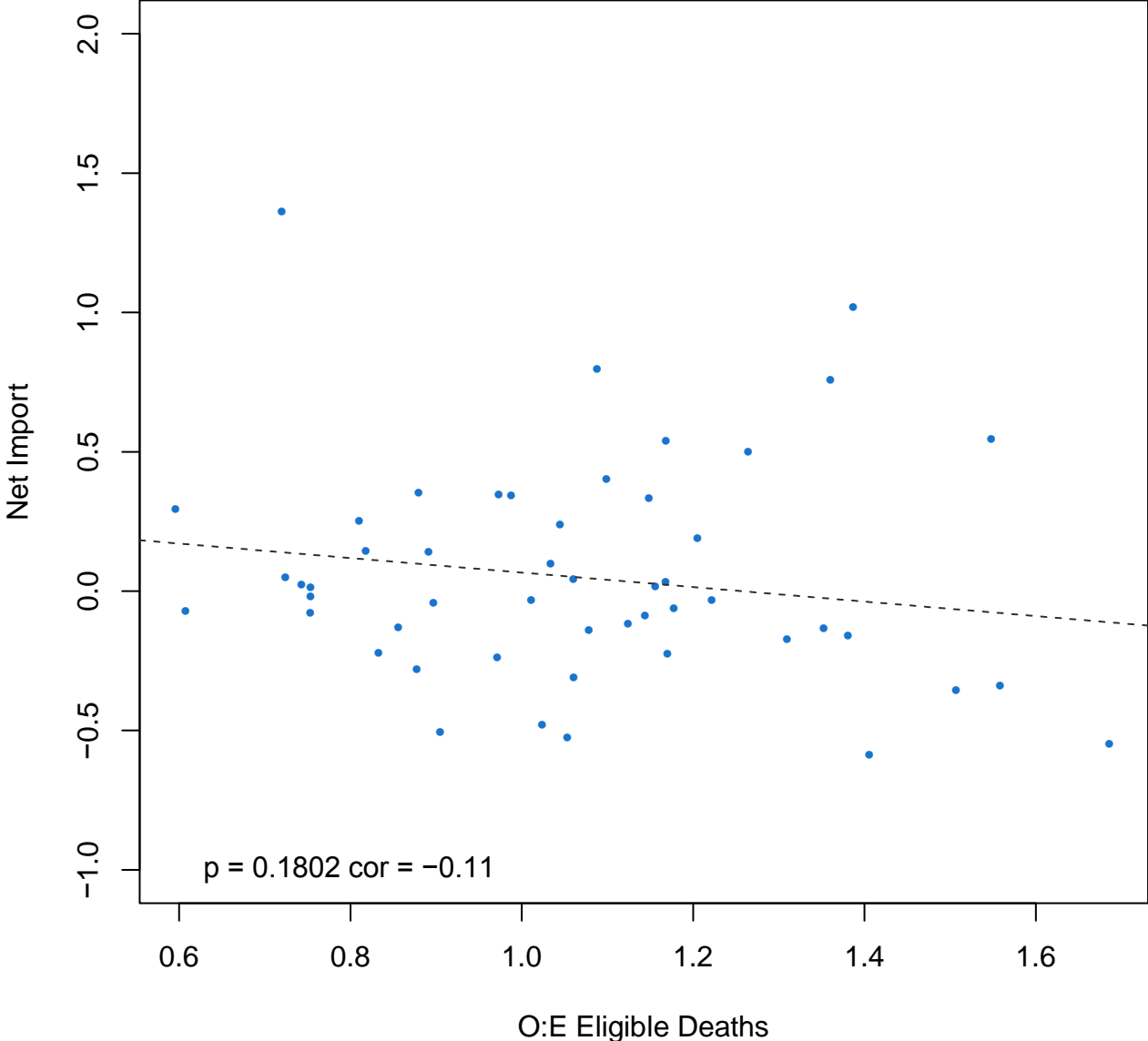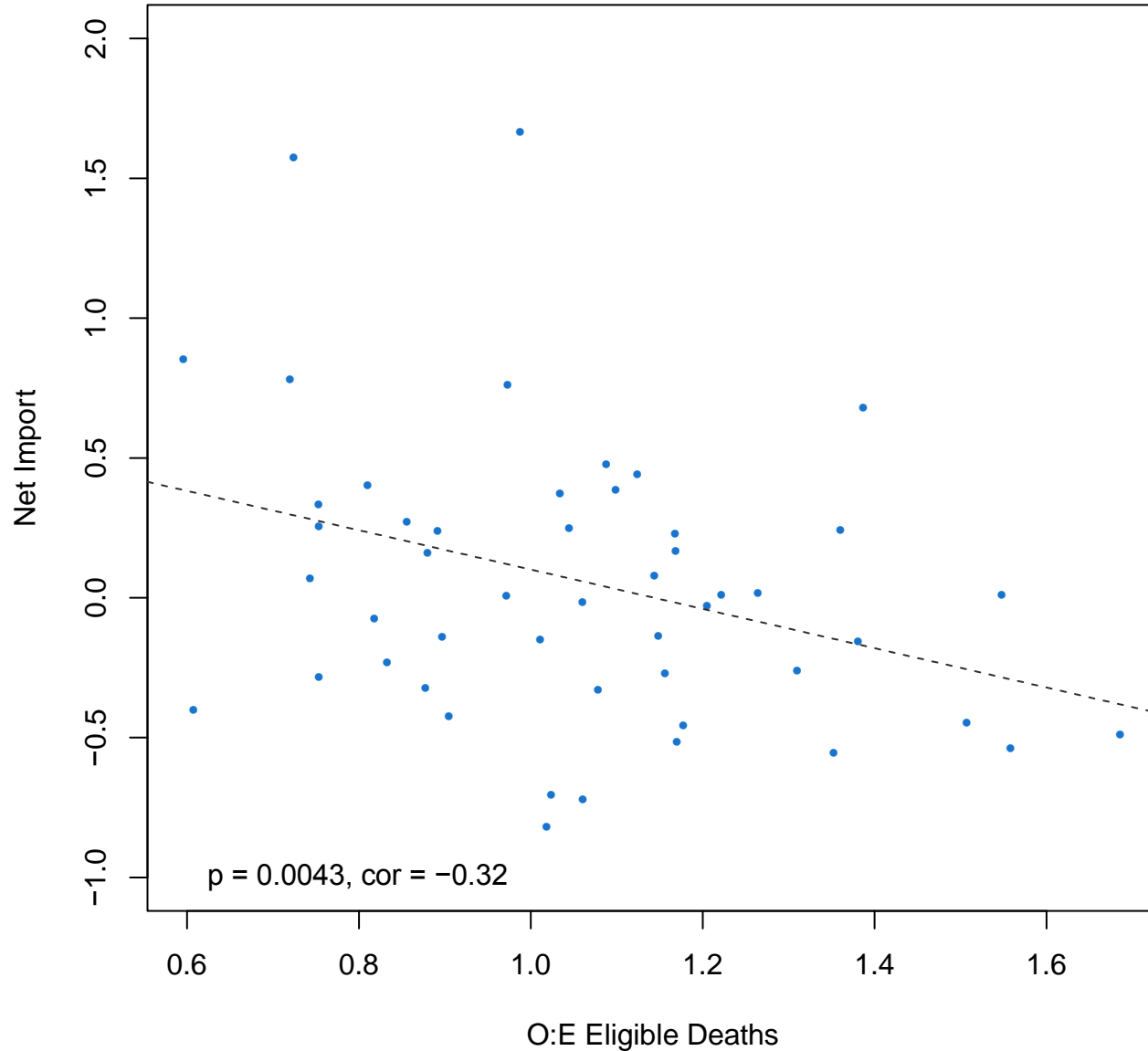

8 districts (p=0.004, r=-0.32)   4 districts (p=0.003, r=-0.34)

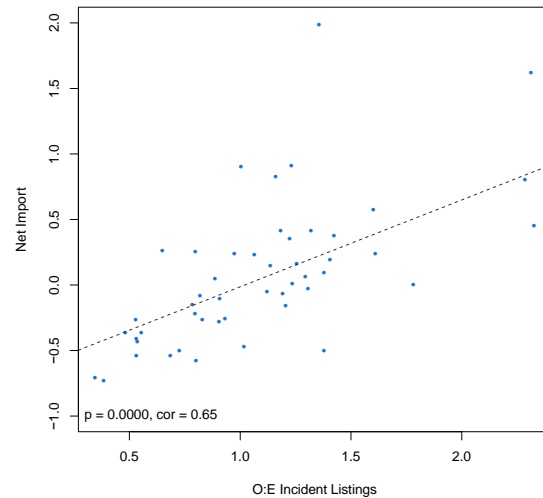# Share 35, net import vs eligible deaths

8 districts, net import vs eligible deaths

Net import versus incident listings

Pre- share 35 (p<0.001, r=0.75)   Post- share 35 (p<0.001, r=0.72)
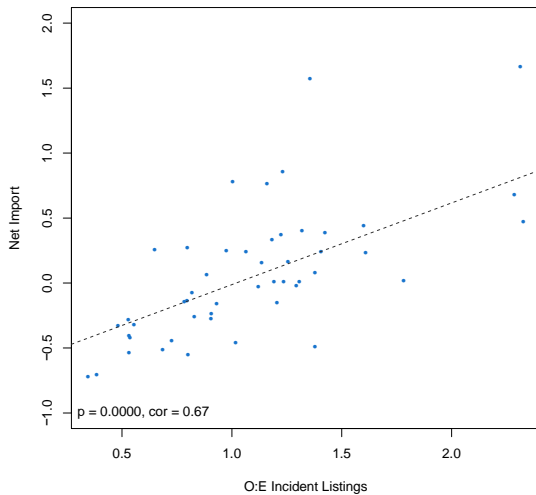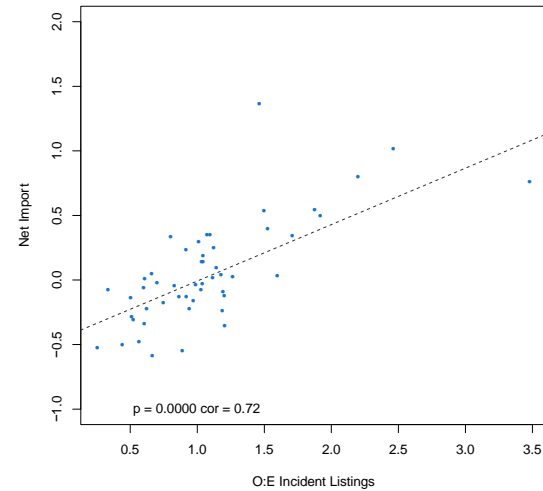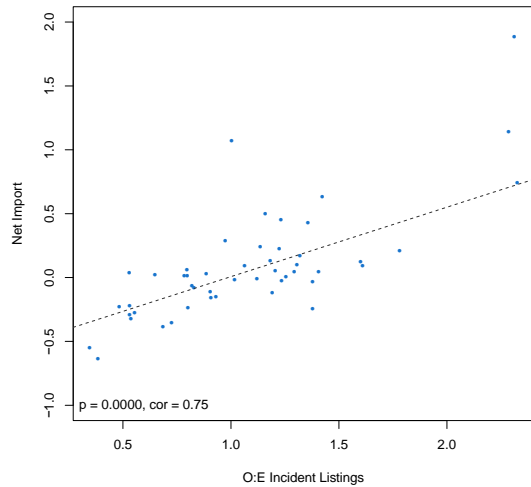
8 districts (p<0.001, r=0.67)   4 districts (p<0.001, r=0.65)

Share 35, net import vs incident listings
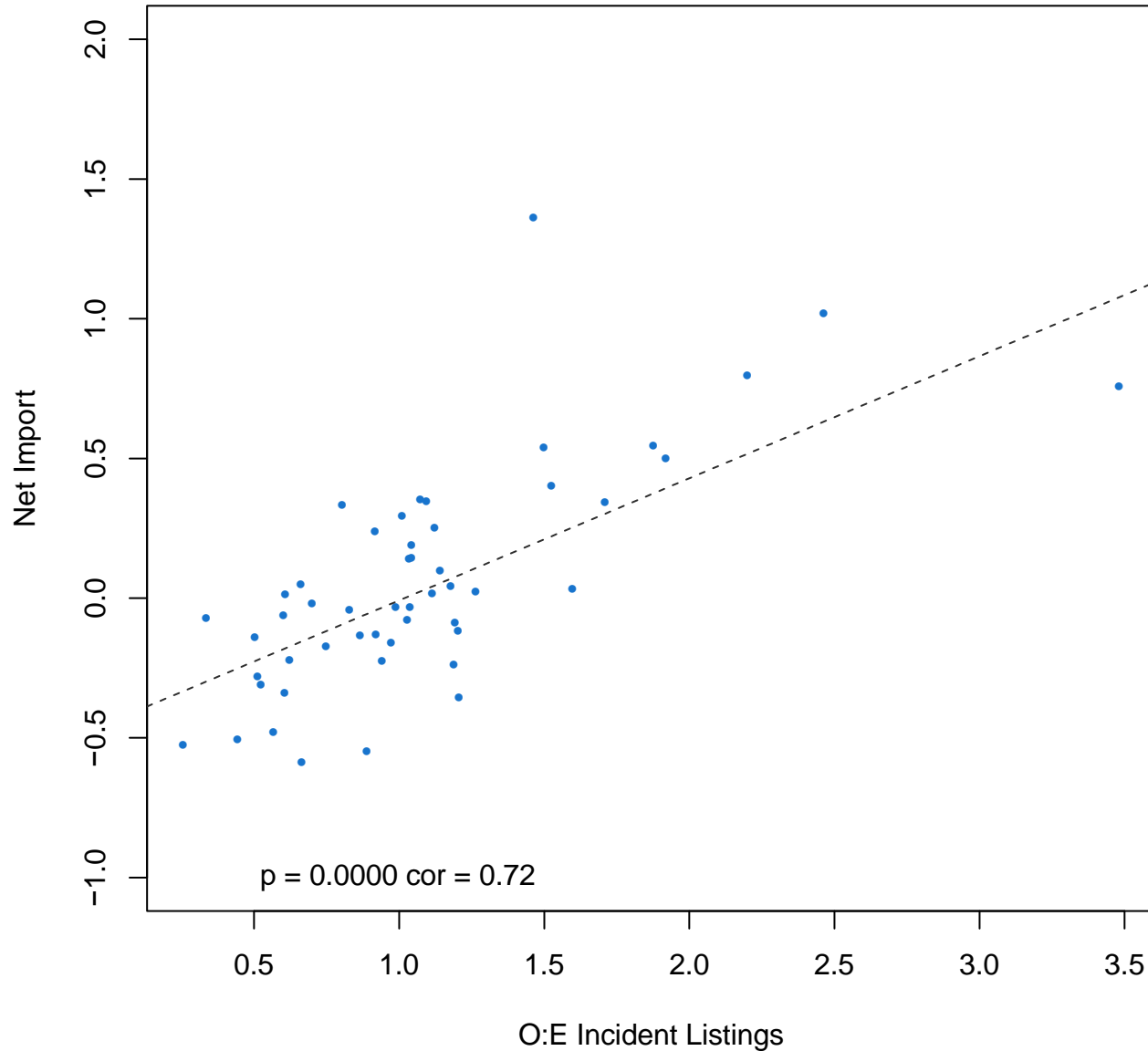
Net import vs O:E deaths and listings

- For all allocation scenarios, organs flow from OPOs with fewer incident listings toward OPOs with more listings than expected.

- Under 8 district and 4 district redistricting, organs would flow from OPOs with more eligible deaths to those with fewer eligible deaths than expected.

- Pre- and post- share 35, there is no evidence of a relationship between eligible deaths and net import.

Conclusions

- We find no evidence of a relationship between net import of livers and the standard metrics of OPO performance, either pre- or post-share 35.

- Under redistricting proposals considered here, we find no evidence that organs flow from better-performing OPOs to poorer-performing OPOs

- Higher liver import is related to higher incidence of listing and (under redistricting) lower rates of eligible death

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