

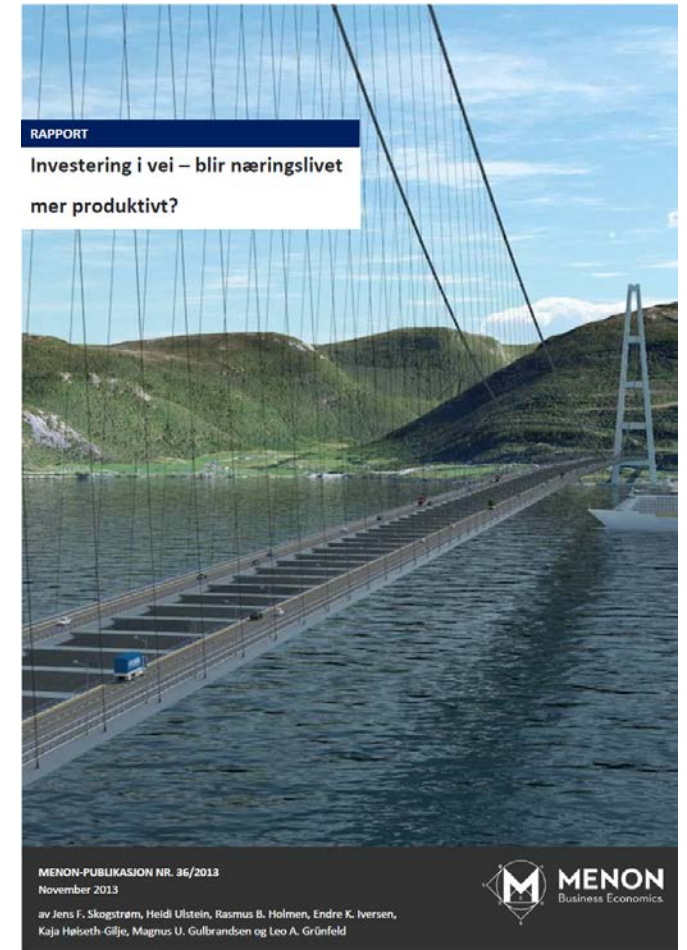
# Macro effects of a ferry free E39

Jens Fredrik B. Skogstrøm



# Our first report: Measuring the effects of road building on productivity

- Earlier studies lack a design addressed at uncovering causal mechanisms
- We identify causal effects of large-scale road projects on productivity in the local economy
- Aim: To submit to a peer reviewed journal in 2016
- Download the report on [www.menon.no](http://www.menon.no)



# Our second report: Estimating the effects of ferry free E39 on GDP



- We estimate the productivity effects of a ferry free E39 from Kristiansand to Trondheim
- Estimate the impact on national and regional GDP in our regional general equilibrium model NOREG
  - Taking into account crowding out from road investments
  - And productivity effects from agglomeration
- Download the report on [www.menon.no](http://www.menon.no)

# First, what do we mean by productivity?

- A simple way of thinking about it: The ratio of output to input
- Different ways of measuring productivity. For example:
  - Labor productivity: Output per hour worked or value added per employee
  - Total factor productivity (growth):  
The growth that cannot be accounted for by growth in inputs

Why do we expect roads to improve productivity?

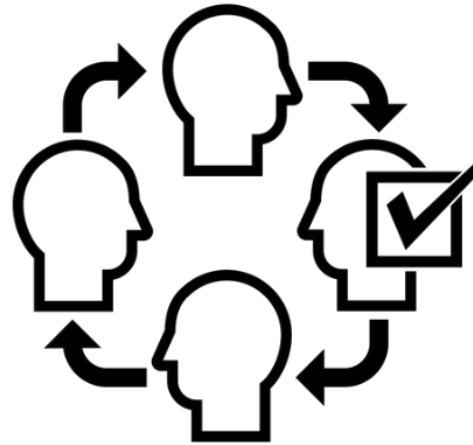
Economies of agglomeration

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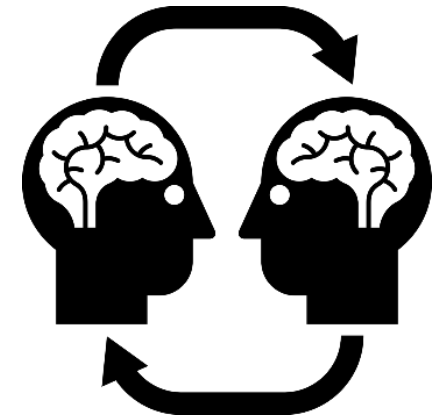
Benefits of locating close to other firms



Sharing



Matching



Learning

(Duranton & Puga, 2004)

This is theory



Can we observe these effects?



From Victor D. Norman, «Ferjefri E39 – Mye mer enn tidsbesparelse», 22.10.12

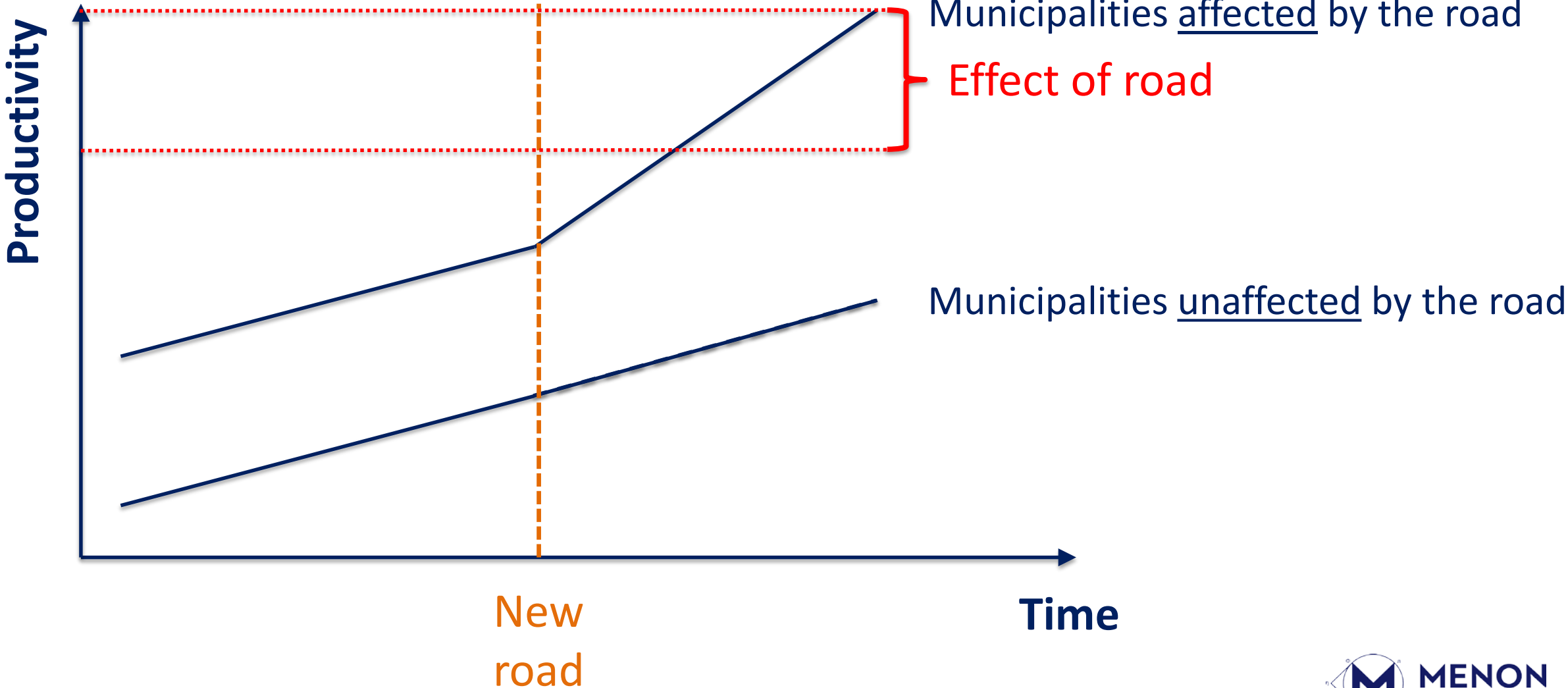
# Do roads cause productivity growth?



# Or, does productivity growth «cause» roads?



# Differences-in-differences on road projects



# What do we find?

- Eiksundsambandet (Sunnmøre region)
  - Replacing ferries by tunnels and bridges
  - Travel time savings of 21 minutes between Hareid and Volda
  - **Increased productivity by 10%** (point estimate, value added per employee)



Photo: Statens vegvesen

# What do we find?

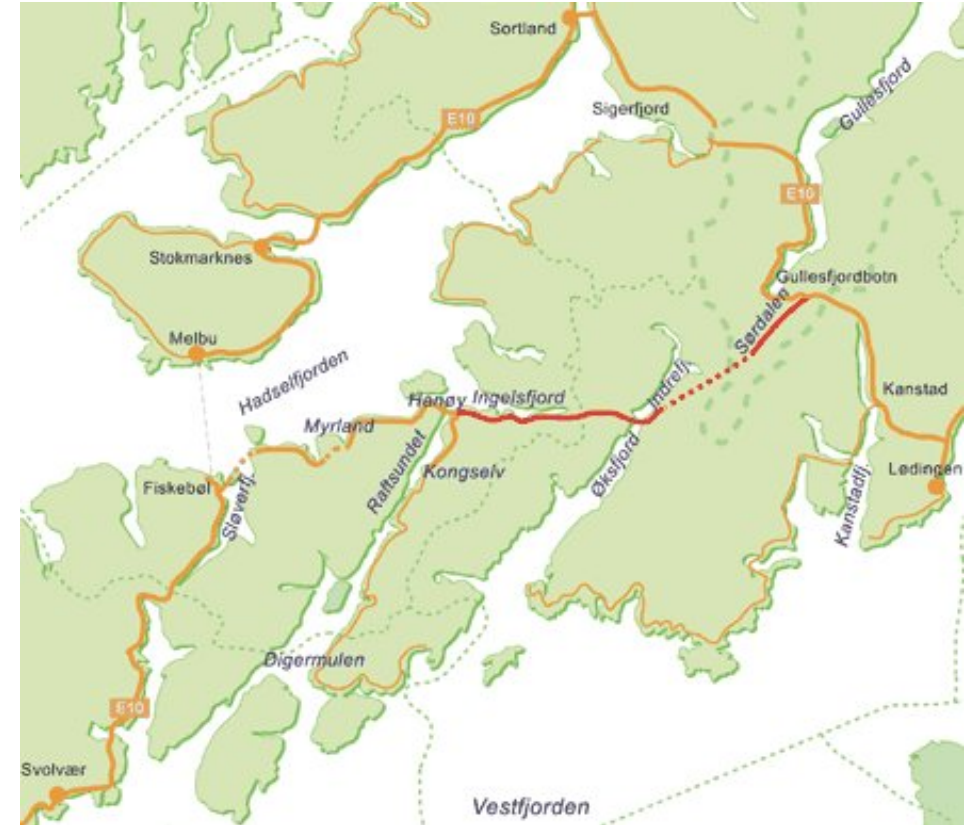
- E18 Grimstad – Kristiansand
  - Replacing old road by four lane highway
  - **Increased productivity by 10.9%** (point estimate, value added per employee)



Photo: Statens vegvesen

# What do we find?

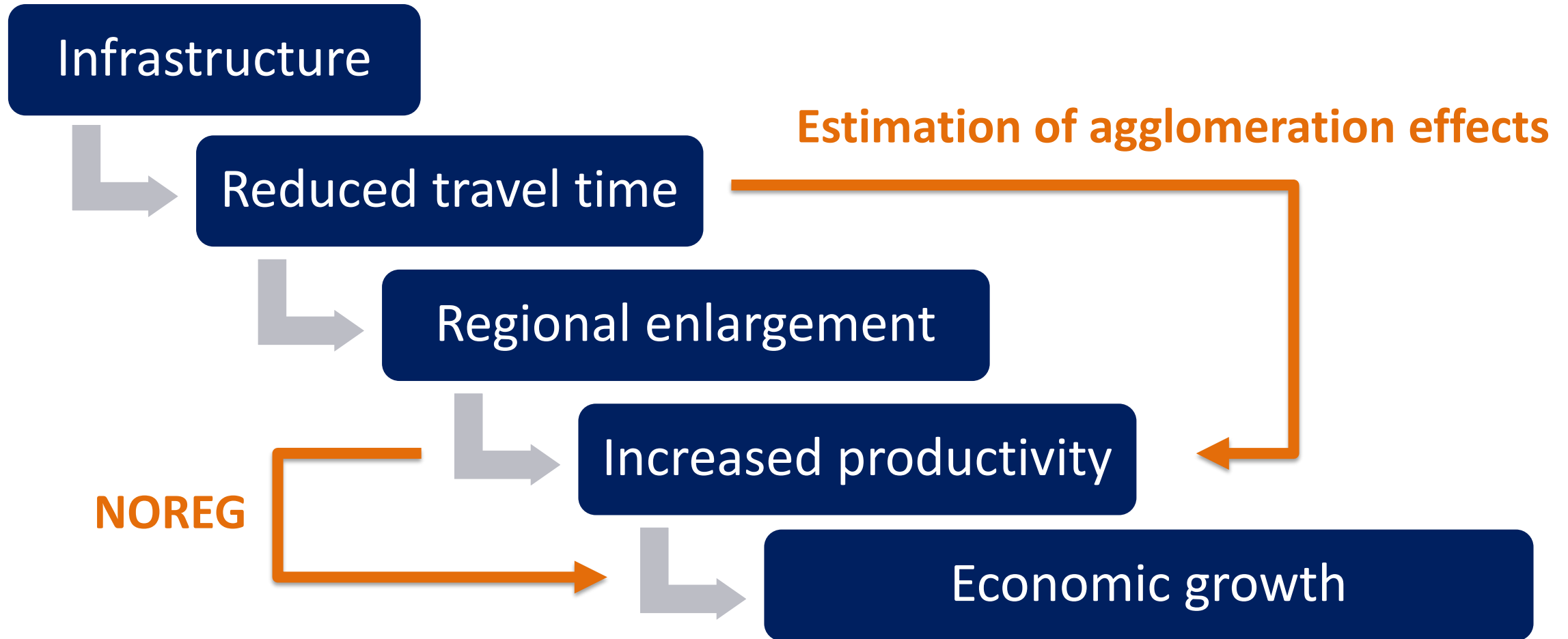
- **No effect for LOFAST (Nordland)**
- The effects of reduced travelling time is probably
  - Decreasing with distance
  - Increasing with initial labor market size
  - Other factors?





Our second report, the effects on the Norwegian economy

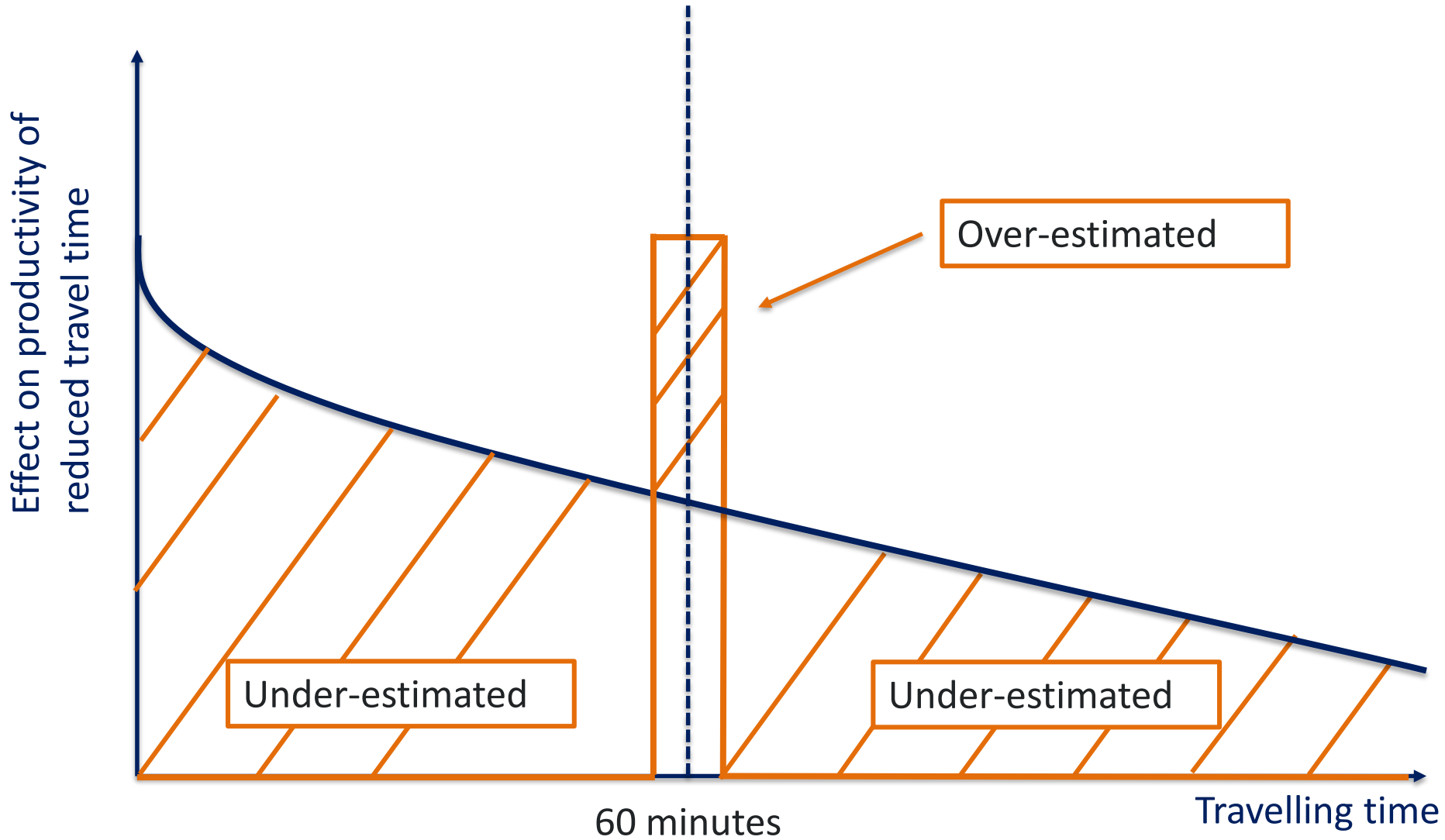
# From roads to economic growth



## Estimation of agglomeration effects

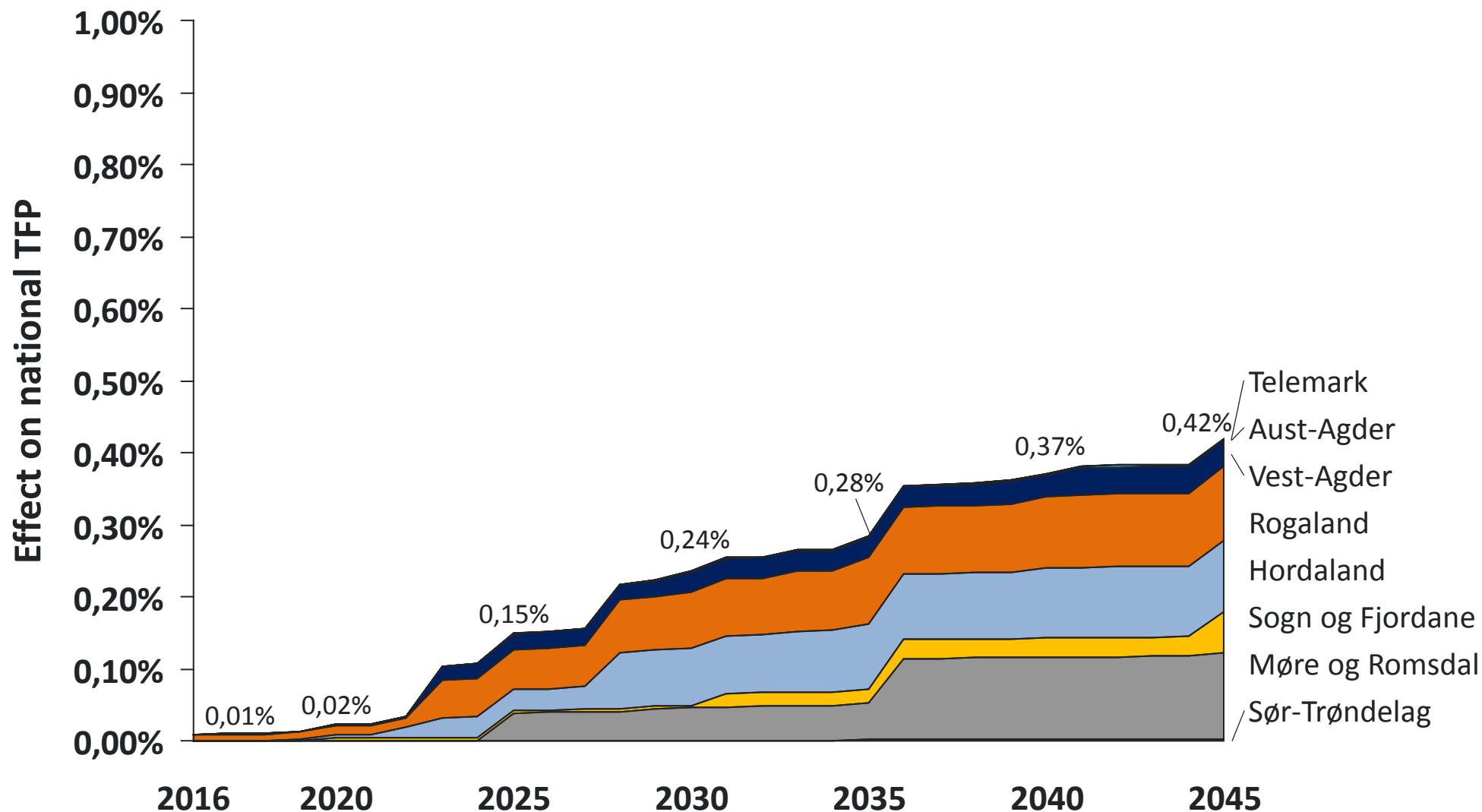
- How does a reduction in travel time lead to an increase in the size of the functional labor markets?
  - Measured through potential interactions (Heggedal, Moen and Riis, 2014)
  - Modified to account for a large number of municipalities (and not two regions as in the original report)
  - Elasticities between 0.04 and 0.09 (lower and upper bound)
    - A 100% increase in labor market size yields between 4% and 9% increase in productivity

# Estimation of agglomeration effects

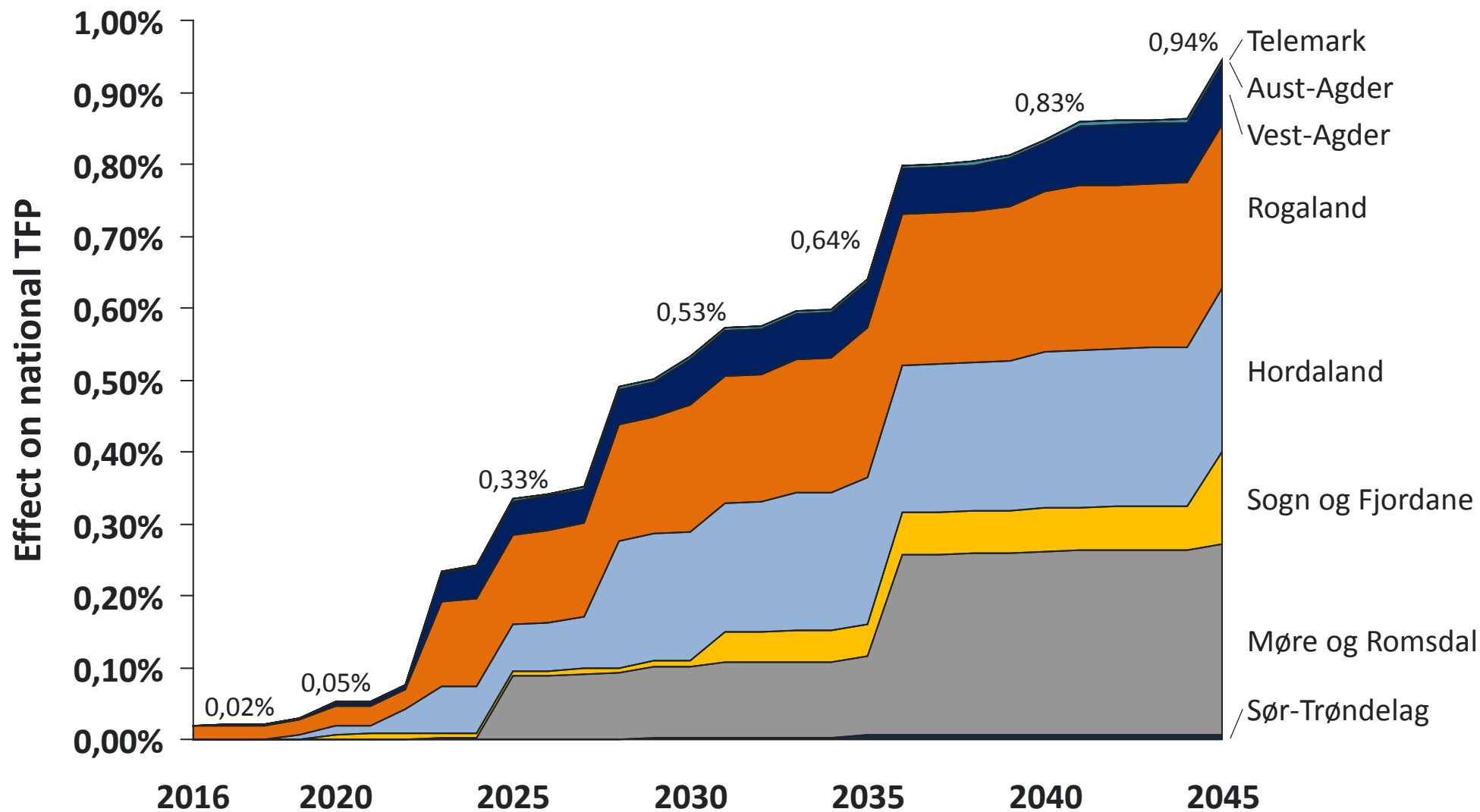


# Estimated productivity effects

# Contribution to national TFP by county and year (lower bound)



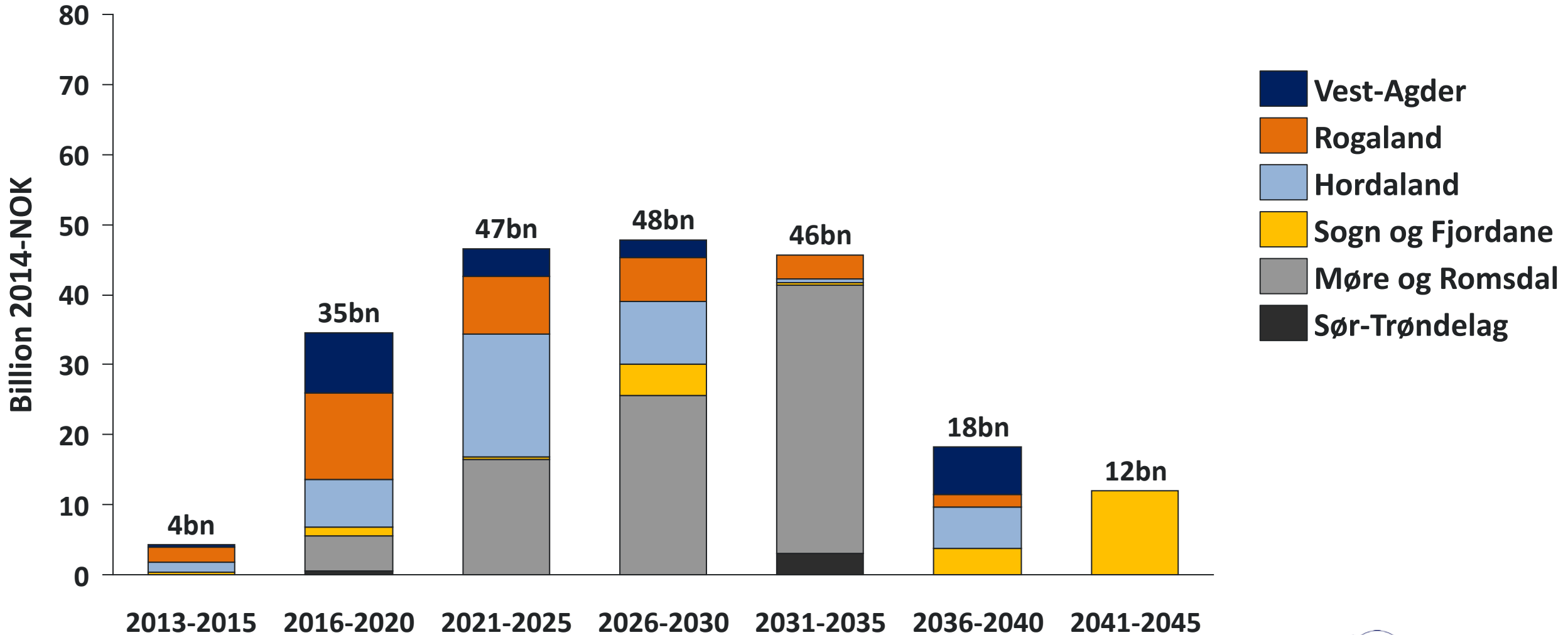
# Contribution to national TFP by county and year (upper bound)



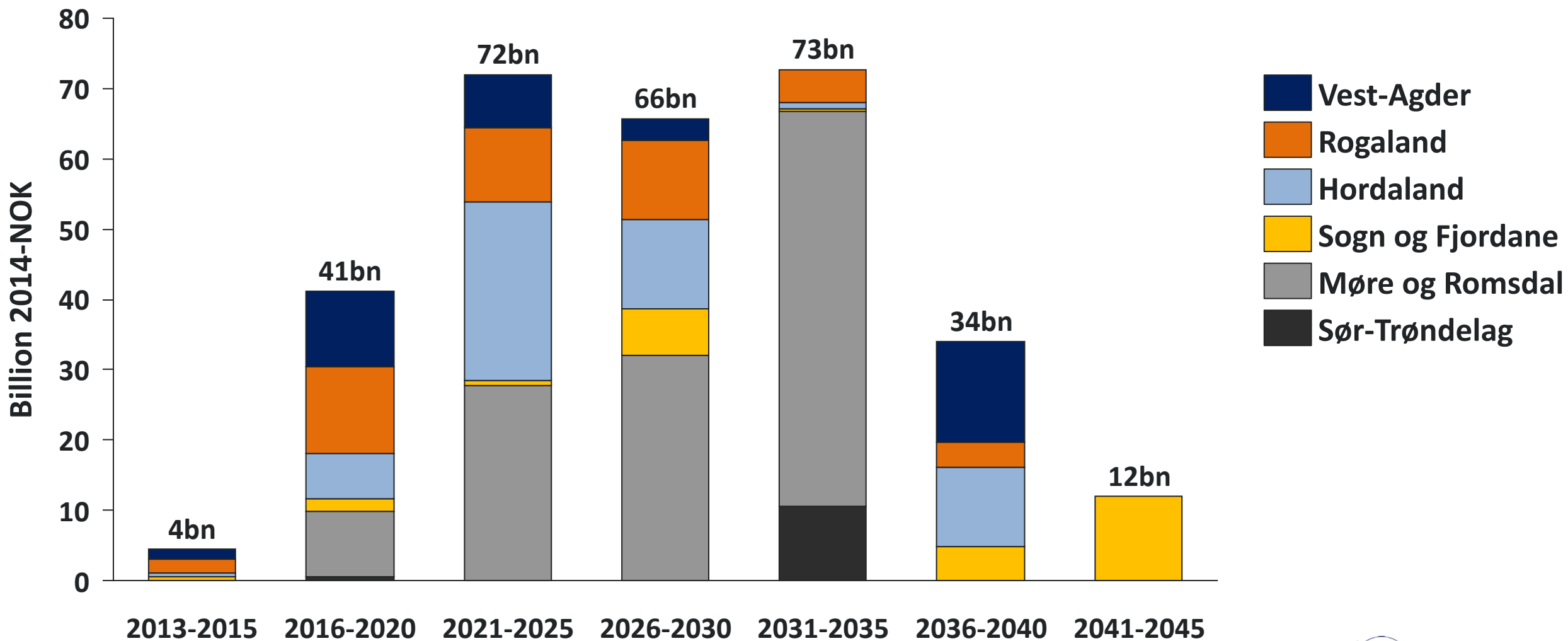
# Investments



# Investments, low cost alternative

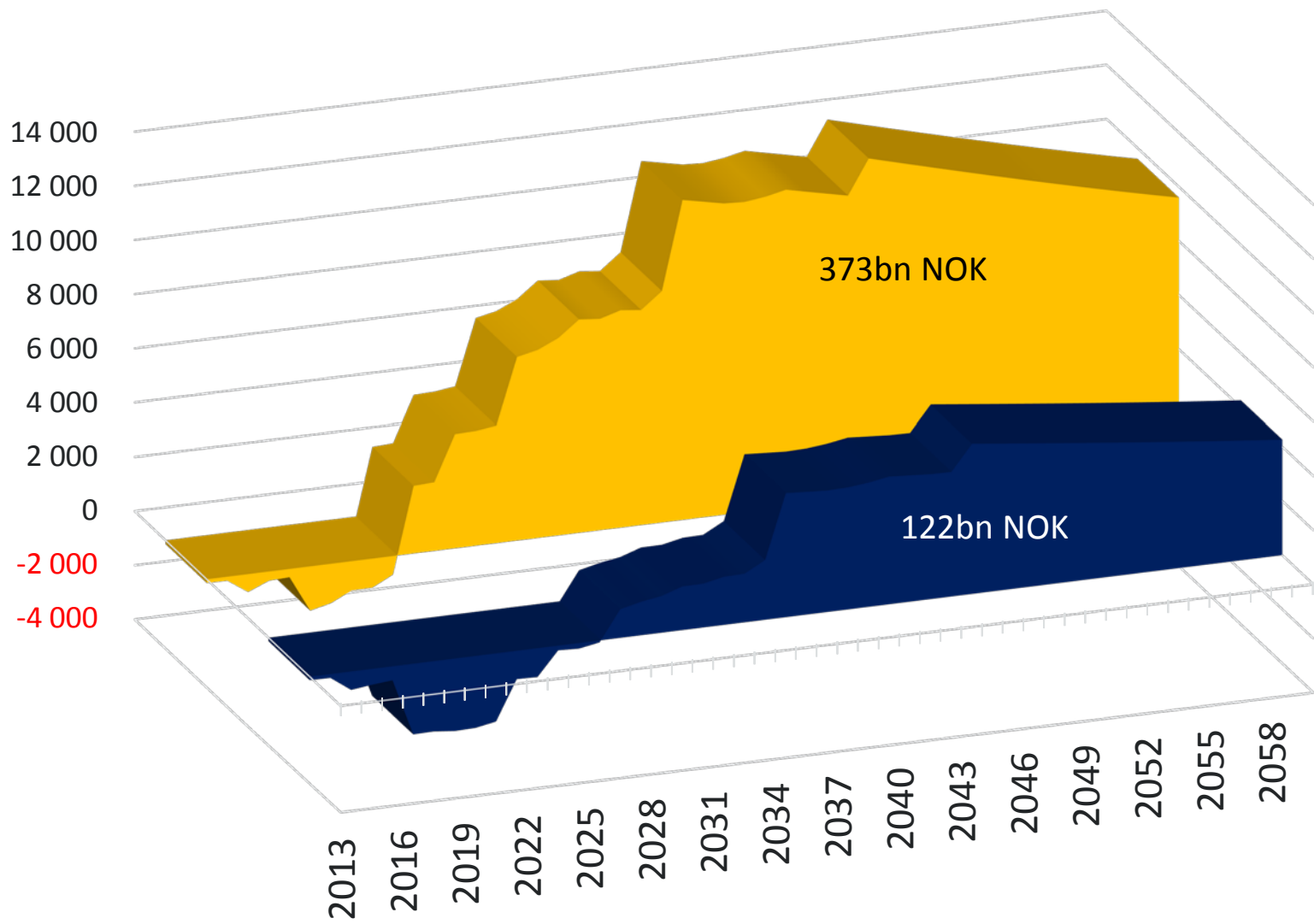


## Investments, high cost alternative



What is the effect on GDP?

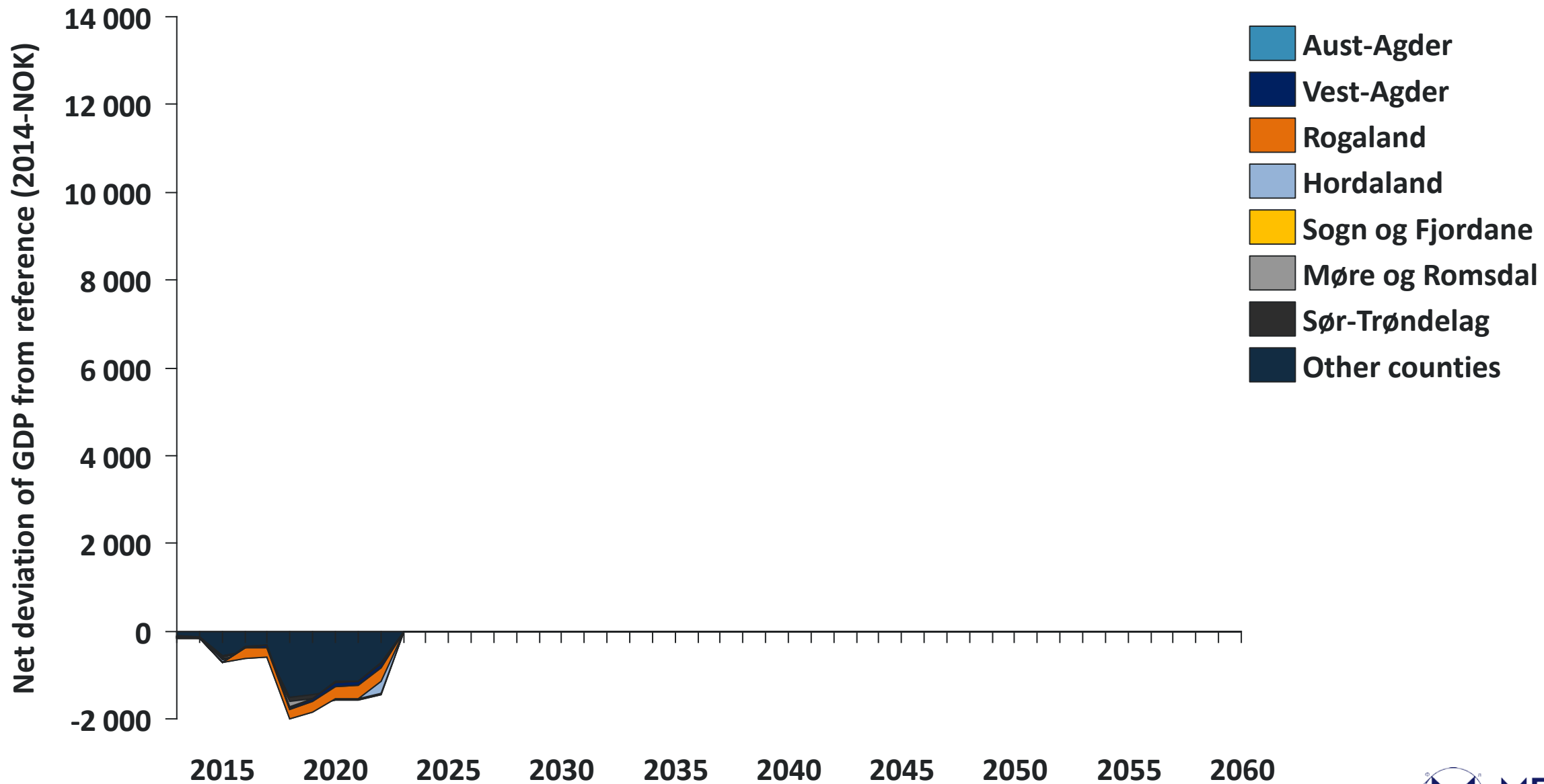
# Total effect on GDP of a ferry free E39\*



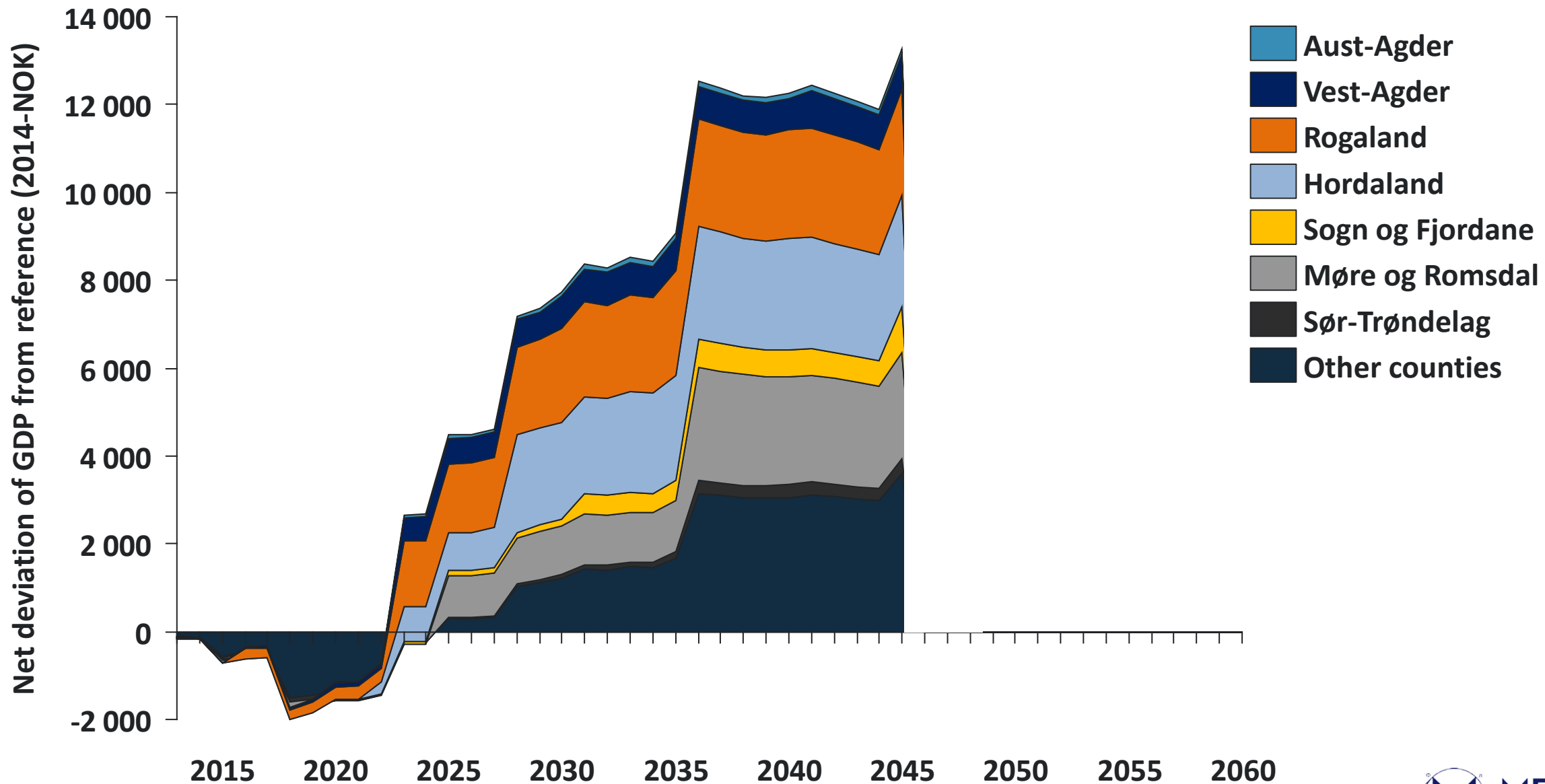
- High elasticity, low cost
- Low elasticity, high cost

\*2014-NOK discounted to 2015

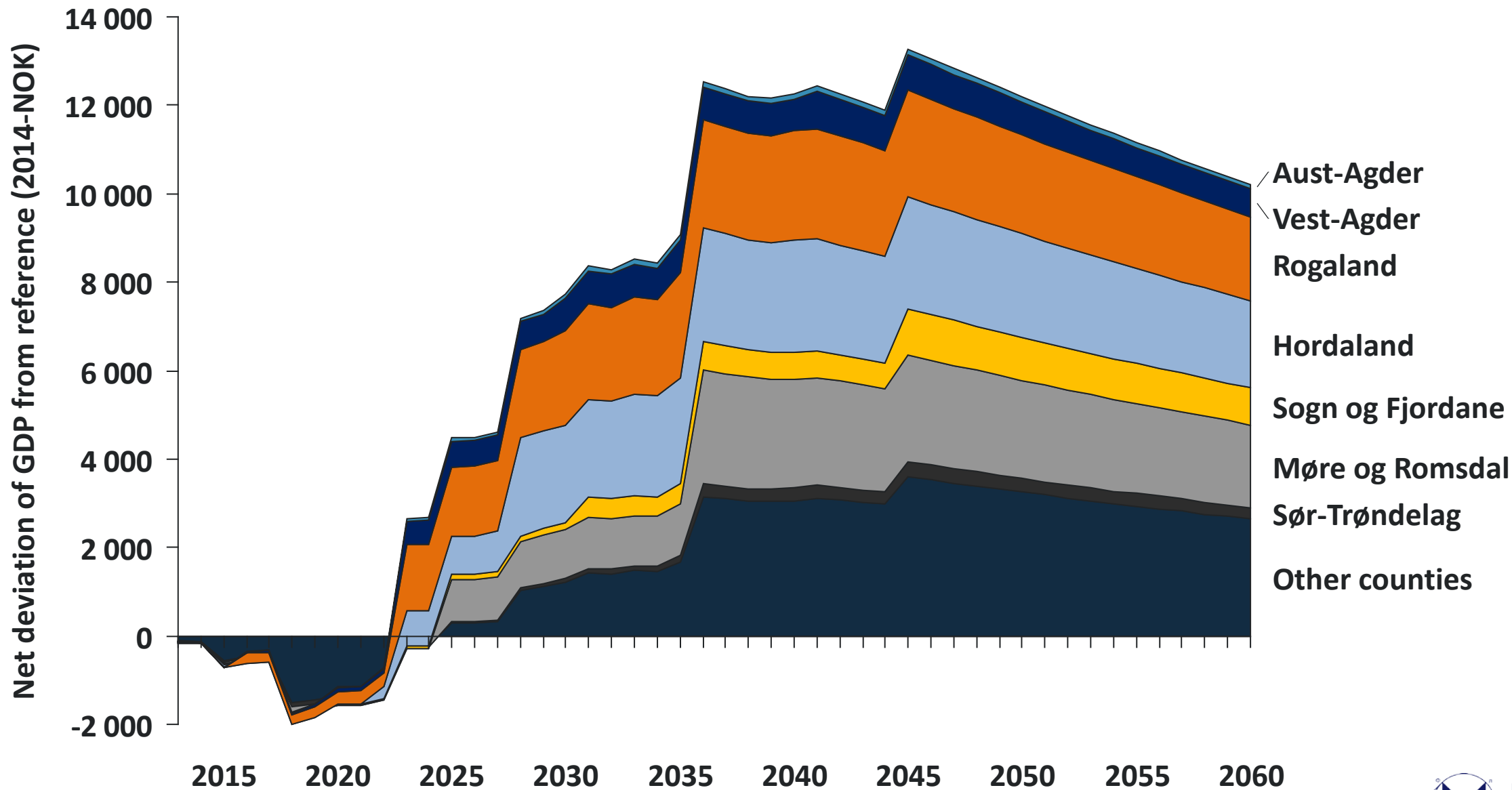
# Total effect of a ferry free E39 on GDP over time and county



# Total effect of a ferry free E39 on GDP over time and county



# Total effect of a ferry free E39 on GDP over time and county



## Summary

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- Our results are consistent with a causal link between roads and productivity
- A ferry free E39 in our regional general equilibrium model:
  - Productivity benefits outweighs distortions from the investments
  - Largest GDP effects in Rogaland, Hordaland and Møre og Romsdal
  - The whole country benefits