

# What are Quantitative Skills?

**Royal  
Geographical  
Society**  
with IBG

Advancing geography  
and geographical learning

**Richard Harris**

School of Geographical Sciences  
University of Bristol  
[rich.harris@bris.ac.uk](mailto:rich.harris@bris.ac.uk)



U466a  
Background image: ©stillfx  
© artwork: Mark Bolitho | Origami photography Pearson Education Ltd/Naki Kouyioumtzis ©Sozaijiten





GCSE and A level Geography 2016

# What are quantitative skills?

edexcel 

**Royal  
Geographical  
Society**  
with IBG

Advancing geography  
and geographical learning

- They are fundamental part of what it means to do geography and be a geographer





GCSE and A level Geography 2016

# What are quantitative skills?

edexcel 

**Royal  
Geographical  
Society**  
with IBG

Advancing geography  
and geographical learning

- They help us to explore and to explain geographical outcomes and processes





GCSE and A level Geography 2016

# What are quantitative skills not?

edexcel 

**Royal  
Geographical  
Society**  
with IBG

Advancing geography  
and geographical learning

- Limited to physical geography and primary data collection in the field





GCSE and A level Geography 2016

# What are quantitative skills not?

edexcel 

**Royal  
Geographical  
Society**  
with IBG

Advancing geography  
and geographical learning

- A pseudonym for statistical tests from the last century of uncertain relevance to non-random 'samples' of data 😊



$$\chi^2 = 13.9 \text{ (p} = 0.016\text{)}$$

|                                 | # English LAs | % LAs | # greater share<br>Leave | Expected<br>number |
|---------------------------------|---------------|-------|--------------------------|--------------------|
| Urban, major<br>conurbation     | 75            | 23.0  | 33                       | 56.8               |
| Urban, minor<br>conurbation     | 9             | 2.76  | 7                        | 6.82               |
| Urban with<br>city/town         | 97            | 29.8  | 78                       | 73.5               |
| Urban with<br>significant rural | 54            | 16.6  | 46                       | 40.9               |
| Largely rural                   | 41            | 12.6  | 36                       | 31.1               |
| Mainly rural                    | 50            | 15.3  | 47                       | 37.9               |
|                                 | 326           | 100   | 247                      | 247                |



$$\chi^2 = 13.9 \text{ (p} = 0.016\text{)}$$

|                                   | # English LAs | % LAs | # greater share<br>Leave | Expected<br>number |
|-----------------------------------|---------------|-------|--------------------------|--------------------|
| Urban, major<br>conurbation       | 75            | 23.0  | 33                       | 56.8               |
| Urban, minor<br>conurbation       | 9             | 2.76  | 7                        | 6.82               |
| Urban, city<br>conurbation        |               |       |                          |                    |
| Urban, significant<br>conurbation |               |       |                          |                    |
| Largely rural                     | 41            | 12.6  | 36                       | 31.1               |
| Mainly rural                      | 50            | 15.3  | 47                       | 37.9               |
|                                   | 326           | 100   | 247                      | 247                |

**“Chi-square is something taught to geographers at school and misunderstood thereafter!” (Crawley, 2007)**



## Percentages are easier

|                              | # English LAs |  | # greater share<br>Leave | % of group |
|------------------------------|---------------|--|--------------------------|------------|
| Urban, major conurbation     | 75            |  | 33                       | 44.0       |
| Urban, minor conurbation     | 9             |  | 7                        | 77.8       |
| Urban with city/town         | 97            |  | 78                       | 80.4       |
| Urban with significant rural | 54            |  | 46                       | 85.2       |
| Mainly rural                 | 41            |  | 36                       | 87.8       |
| Largely rural                | 50            |  | 47                       | 94.0       |
|                              | 326           |  | 247                      |            |



# What are quantitative skills?

## Europe referendum 1975 v 2016

1975

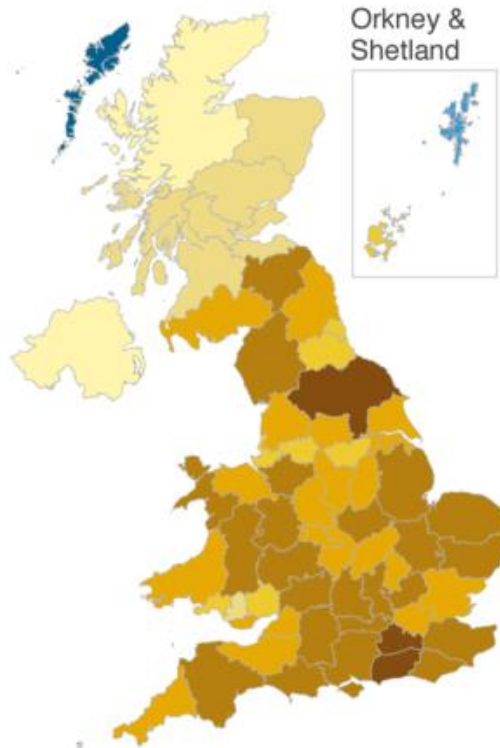
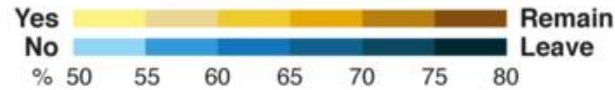
Question asked: "Do you think the UK should stay in the European Community (Common Market)?"

2016

Question asked: "Should the UK remain a member of the European Union or leave the European Union?"

edexcel

Winning side in area and vote share



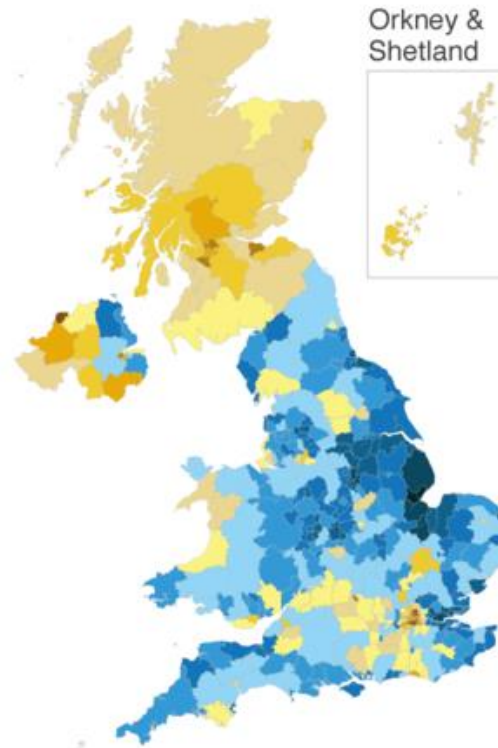
Results

Yes  
67.2 %



No  
32.8 %

Turnout: 64%



Results

Leave  
51.9 %



Remain  
48.1 %

Turnout: 72%

<http://www.bbc.co.uk/news/uk-politics-36616028>



# What are quantitative skills?

Europe referendum 1975 v 2016

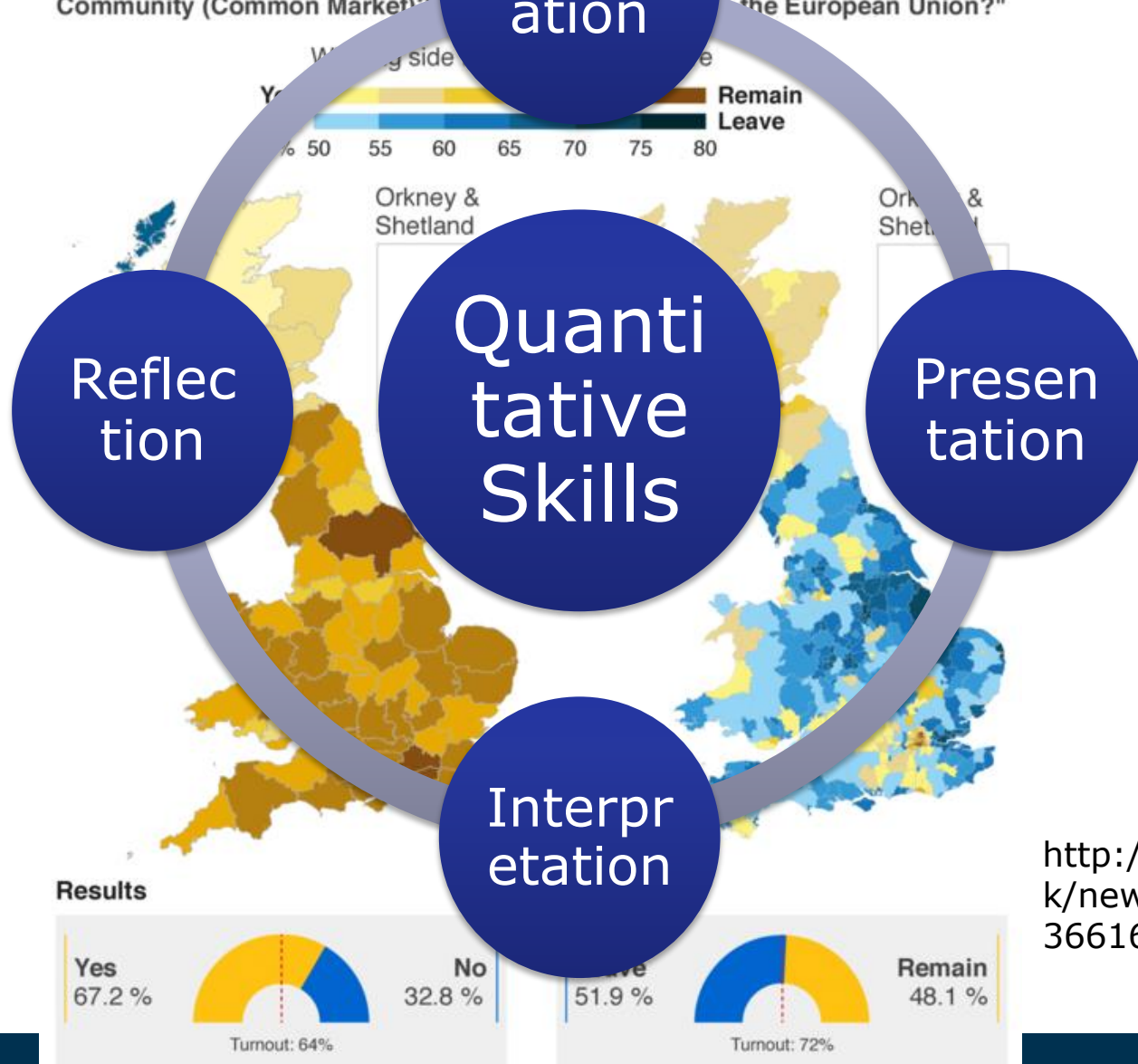
1975

Question asked: "Do you think the United Kingdom should stay in the European Community (Common Market)?"

Calculation

Question asked: "Should the UK remain a member of the European Community (the European Union)?"

edexcel



Results

Yes  
67.2%



Turnout: 64%

No  
32.8%

Remain  
48.1%



Turnout: 72%

Leave  
51.9%

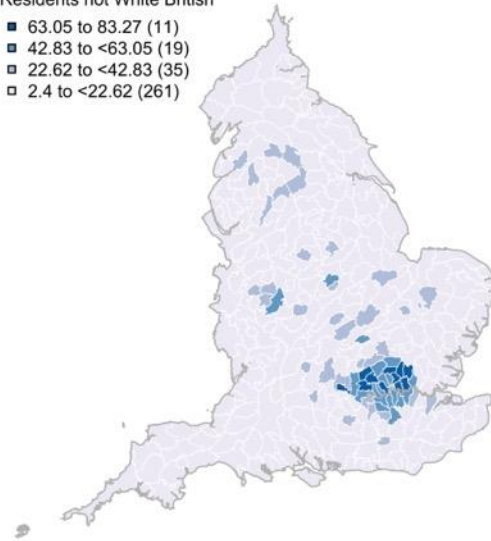
<http://www.bbc.co.uk/news/uk-politics-36616028>



(a) Equal interval classification

% Residents not White British

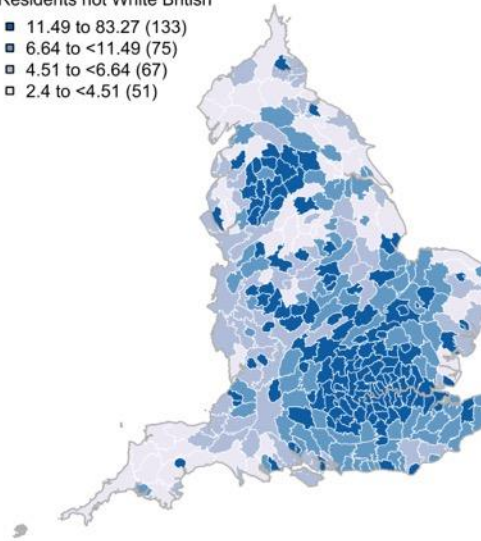
- 63.05 to 83.27 (11)
- 42.83 to <63.05 (19)
- 22.62 to <42.83 (35)
- 2.4 to <22.62 (261)



(b) Equal area classification

% Residents not White British

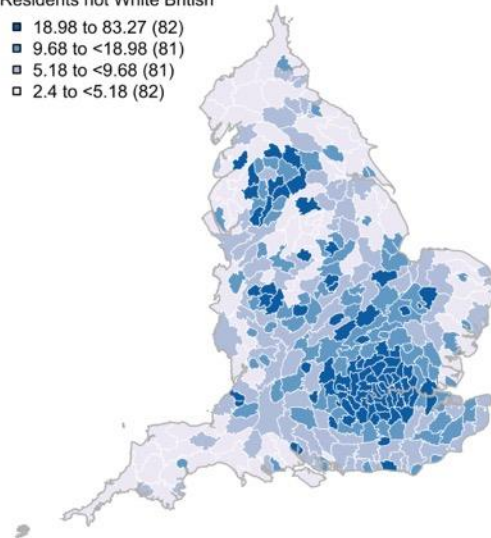
- 11.49 to 83.27 (133)
- 6.64 to <11.49 (75)
- 4.51 to <6.64 (67)
- 2.4 to <4.51 (51)



(c) Quantile classification

% Residents not White British

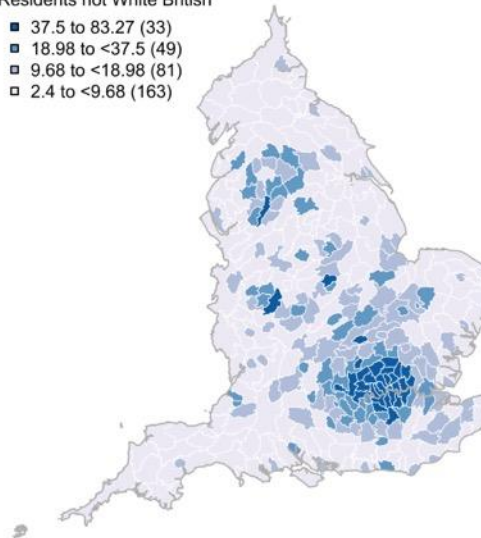
- 18.98 to 83.27 (82)
- 9.68 to <18.98 (81)
- 5.18 to <9.68 (81)
- 2.4 to <5.18 (82)



(d) Manual classification

% Residents not White British

- 37.5 to 83.27 (33)
- 18.98 to <37.5 (49)
- 9.68 to <18.98 (81)
- 2.4 to <9.68 (163)



# Which of these maps is correct?



# Demystifying!

<http://www.independent.co.uk/news/business/analysis-and-features/does-the-treasurys-brex-it-equation-stand-up-to-scrutiny-a6989356.html>

$$(A.1) \quad \ln(T_{ijt}) = \alpha_{ij} + \gamma_t + \alpha_1 \ln(Y_{it} * Y_{jt}) + \alpha_2 \ln(POP_{it} * POP_{jt}) + \alpha_3 \ln(DIST_{ij}) + \alpha_4 COMLANG_{ij} + \alpha_5 COLONY_{ij} + \alpha_6 BORDER_{ij} + \varepsilon_{ijt} \\ = \alpha_{ij} + \gamma_t + \alpha X_{ijt} + \varepsilon_{ijt}$$

$$(A.2) \quad \ln(T_{ijt}) = \alpha_{ij} + \gamma_t + \alpha_1 \ln(Y_{it} * Y_{jt}) + \alpha_2 \ln(POP_{it} * POP_{jt}) + \varepsilon_{ijt} \\ = \alpha_{ij} + \gamma_t + \alpha X_{ijt} + \varepsilon_{ijt}$$

$$(A.3) \quad \ln(T_{ijt}) = \alpha_{ij} + \alpha X_{ijt} + \beta_1 EU2_{ijt} + \beta_2 EU1_{ijt} + \beta_3 EEA_{ijt} + \beta_4 FTA_{ijt} + \varepsilon_{ijt}$$

$$(A.4) \quad x_{ij} = \frac{y_i y_j}{y^w} \left( \frac{t_{ij}}{p_i p_j} \right)^{1-\sigma}$$

$$\ln(T_{ijt}) = \alpha X_{ijt} + \beta_1 NTB_{ijt} + \beta_2 Tariff_{ijt} + \varepsilon_{ijt}$$

$$(A.5) \quad \ln(IFDI_{ijt}) = \alpha_{ij} + \alpha_1 \ln(Y_{it}) + \alpha_2 \ln(Y_{jt}) + \alpha_3 \ln(DIST_{ij}) + \alpha_4 POP_{it} + \alpha_5 POP_{jt} + \alpha_6 COMLANG_{ij} + \alpha_7 COLONY_{ij} + \alpha_8 BORDER_{ij} + \alpha_9 EMU2_{ijt} + \alpha_{10} EMU1_{ijt} + \varepsilon_{ijt} \\ = \alpha_{ij} + \alpha X_{ijt} + \varepsilon_{ijt}$$

$$(A.6) \quad \ln(IFDI_{ijt}) = \alpha_{ij} + \alpha_1 \ln(Y_{jt}) + \alpha_2 \ln(Y_{it}) + \alpha_3 POP_{it} + \alpha_4 POP_{jt} + \alpha_5 EMU2_{ijt} + \alpha_6 EMU1_{ijt} + \varepsilon_{ijt} \\ = \alpha_{ij} + \alpha X_{ijt} + \varepsilon_{ijt}$$

$$(A.7) \quad \ln(IFDI_{ijt}) = \alpha_{ij} + \alpha X_{ijt} + \beta_1 EU2_{ijt} + \beta_2 EUM_{ijt} + \beta_3 FTA_t + \varepsilon_{ijt}$$





GCSE and A level Geography 2016

edexcel 

**Royal  
Geographical  
Society**

with IBG

Advancing geography  
and geographical learning







- And it's easier than it's often portrayed
- 'Cheap geography', see

<http://www.rgs.org/NR/rdonlyres/9A5CB6C8-CDE5-47AA-9577-0C7FA7765987/0/WhytheFutureofGeographyisCheap.pdf>





GCSE and A level Geography 2016

# What are quantitative skills?

edexcel 

**Royal  
Geographical  
Society**  
with IBG

Advancing geography  
and geographical learning

- Telling stories with data...





GCSE and A level Geography 2016

# What are quantitative skills?

edexcel 

**Royal  
Geographical  
Society**  
with IBG

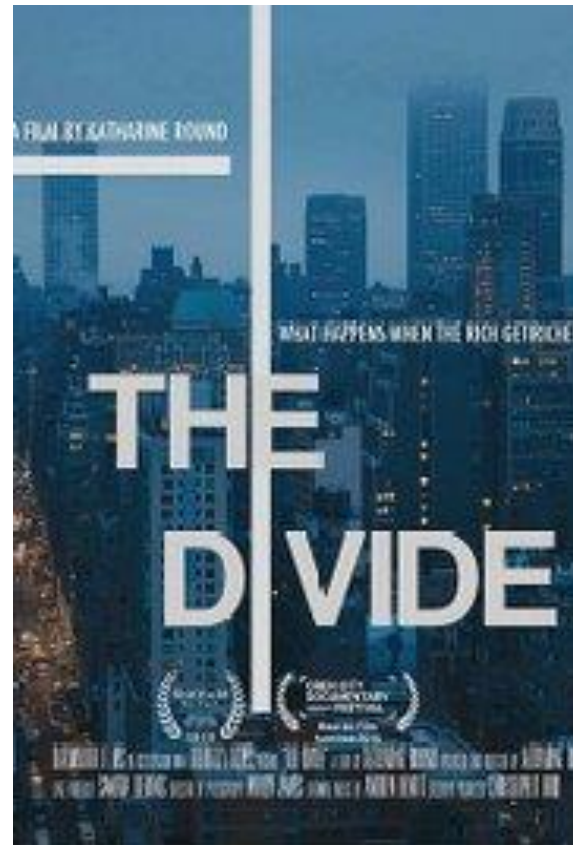
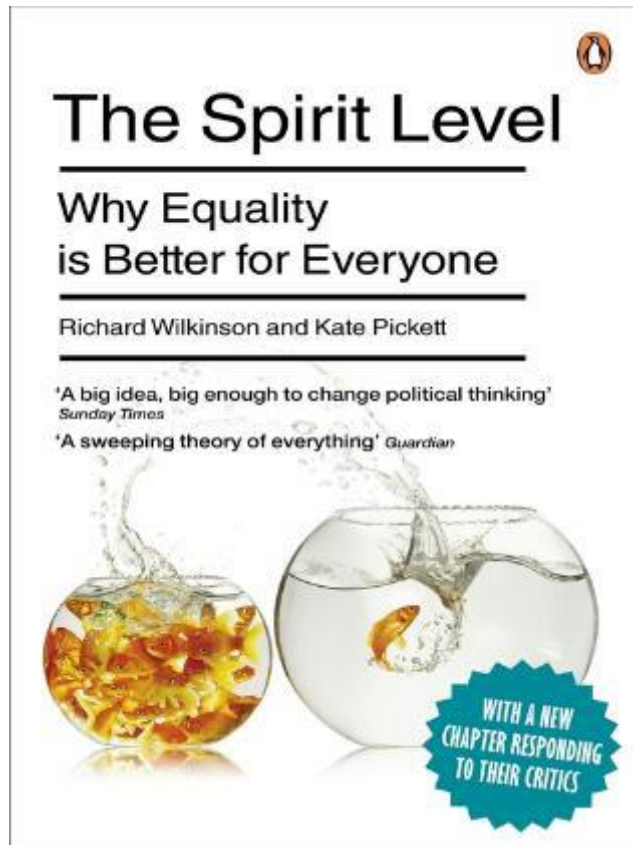
Advancing geography  
and geographical learning

- But some stories are better told than others





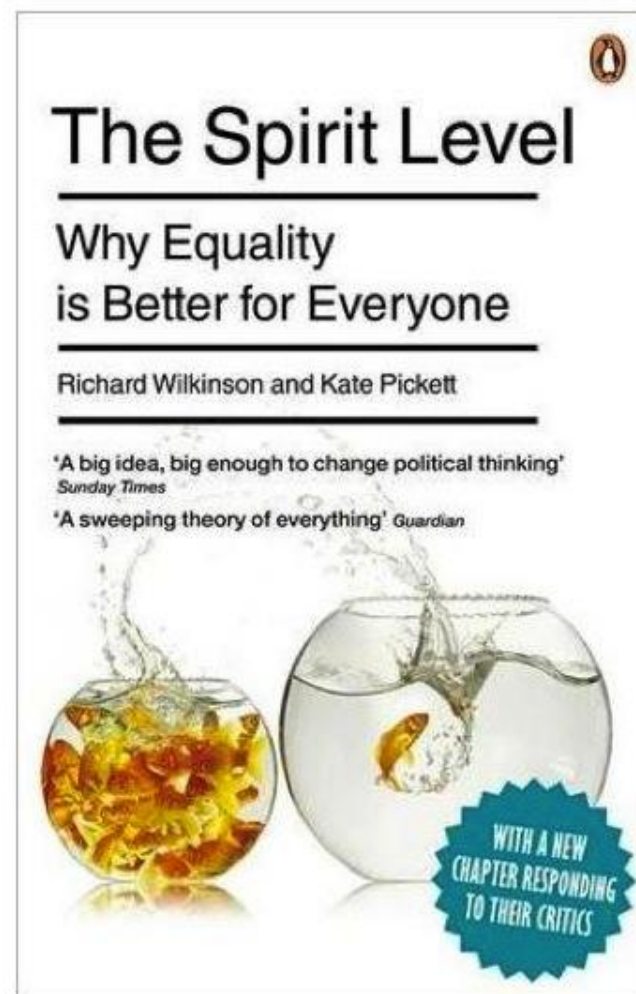
# For example





# Introduction

- This PowerPoint file contains 35 of the more important graphs shown on The Equality Trust website at [www.equalitytrust.org.uk](http://www.equalitytrust.org.uk)
- The graphs are also published in the book by Richard Wilkinson and Kate Pickett, *The Spirit Level: Why Equality is Better for Everyone* (Penguin, 2010).
- We hope you will use them in talks, lectures or discussion groups to help increase people's understanding of the effects of inequality.
- These slides are provided on condition that you acknowledge their source.
- We strongly recommend that you use them in conjunction with the book, which explains the relationships shown in the graphs.





# Donations

The Equality Trust is working hard to build a better society, by gaining a wider public understanding of the damaging effects of large inequalities of income and wealth. Together we can build support for policies to reduce them.

As these slides represent many years of work and thought, we would be very grateful for donations to help The Equality Trust continue its work.

As an independent, not-for-profit organisation, our work depends on generous donations from individuals and trusts which share our vision.

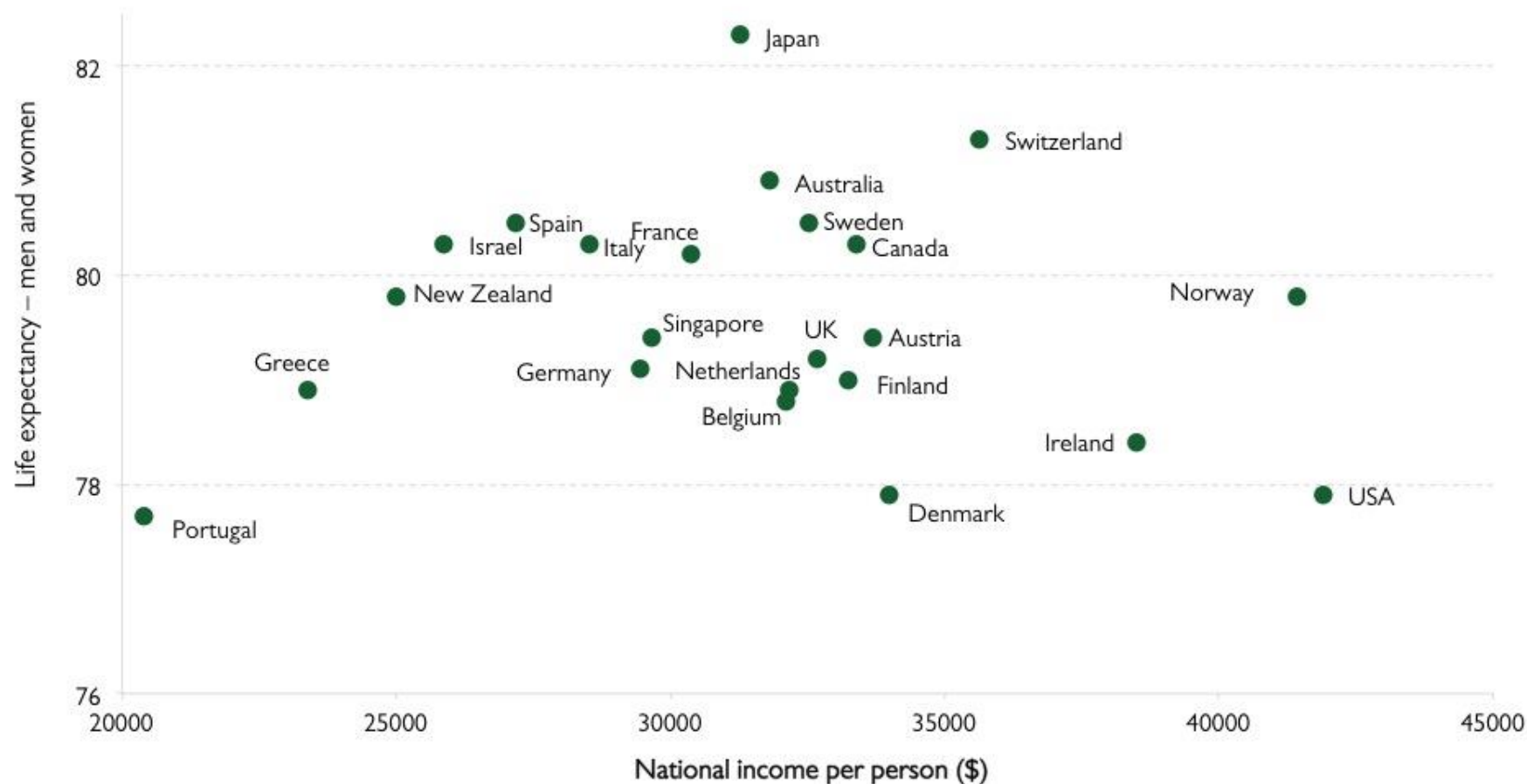
You can donate in two ways:

- Use PayPal to donate online at [www.equalitytrust.org.uk](http://www.equalitytrust.org.uk)
- Send a cheque payable to **The Equality Trust, 32-36 Loman Street, London SE1 0EH, UK**



# Health is related to income differences *within* rich societies but not to those *between* them

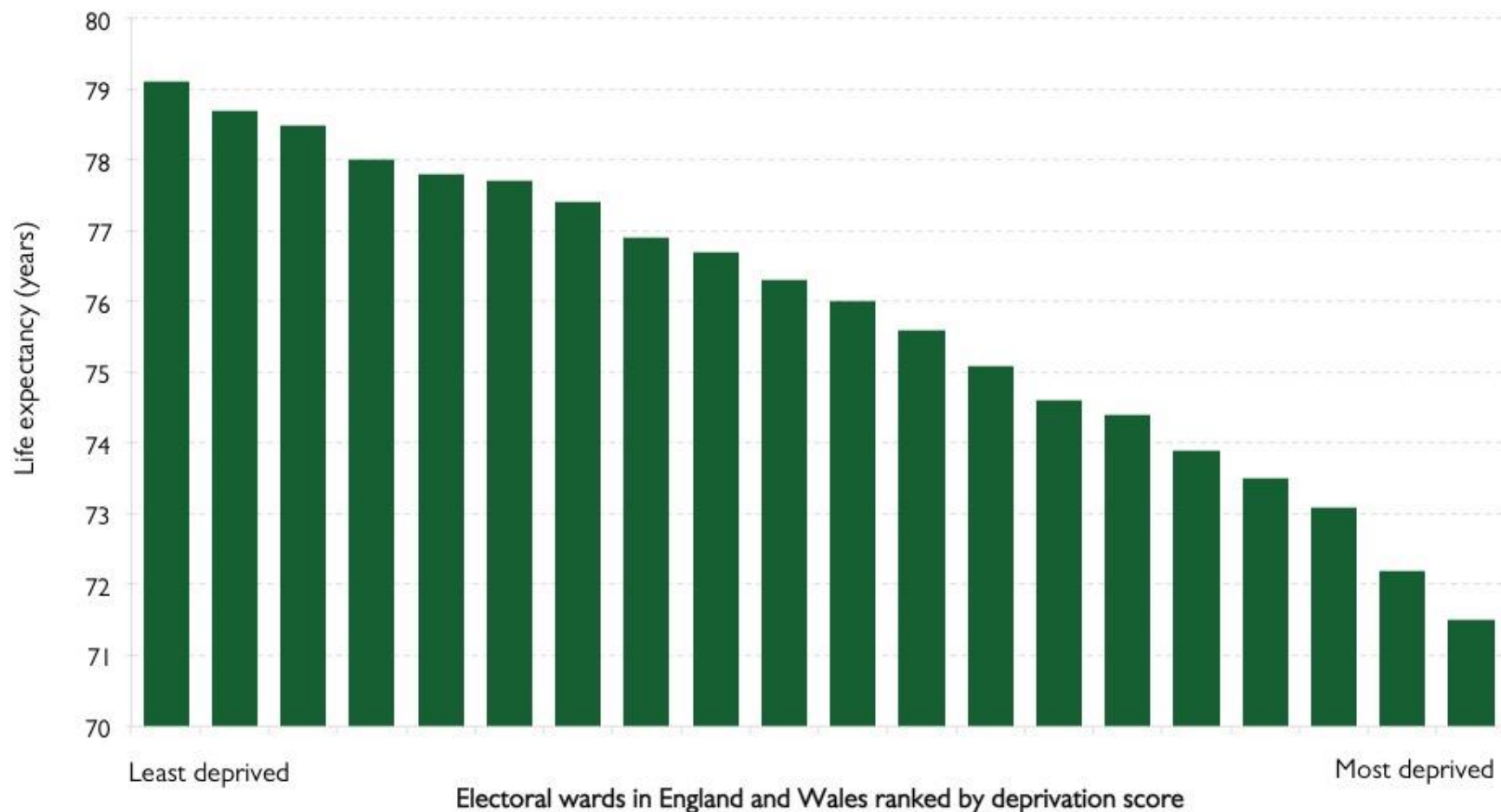
Between (rich) societies





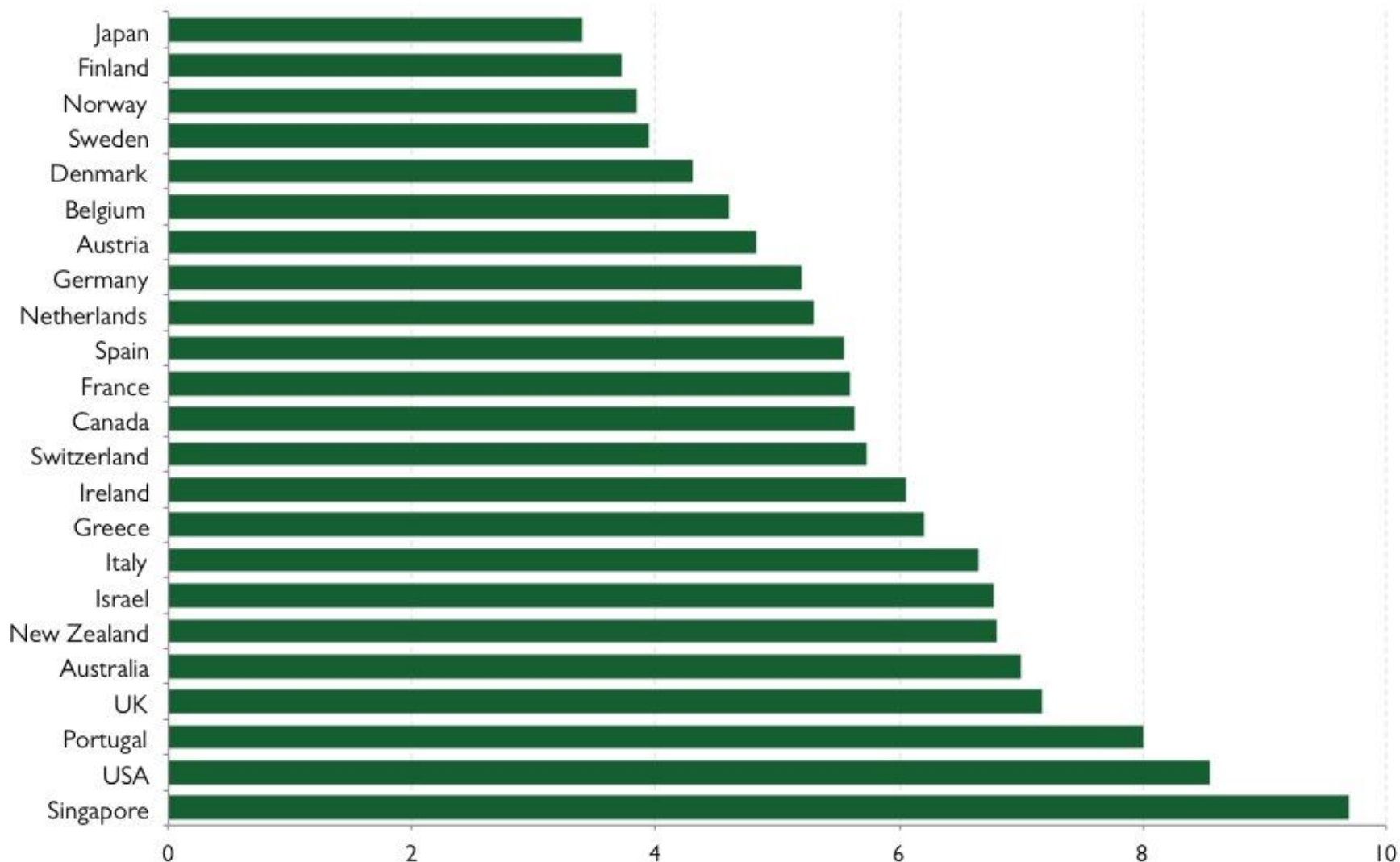
# Health is related to income differences *within* rich societies but not to those *between* them

Within societies



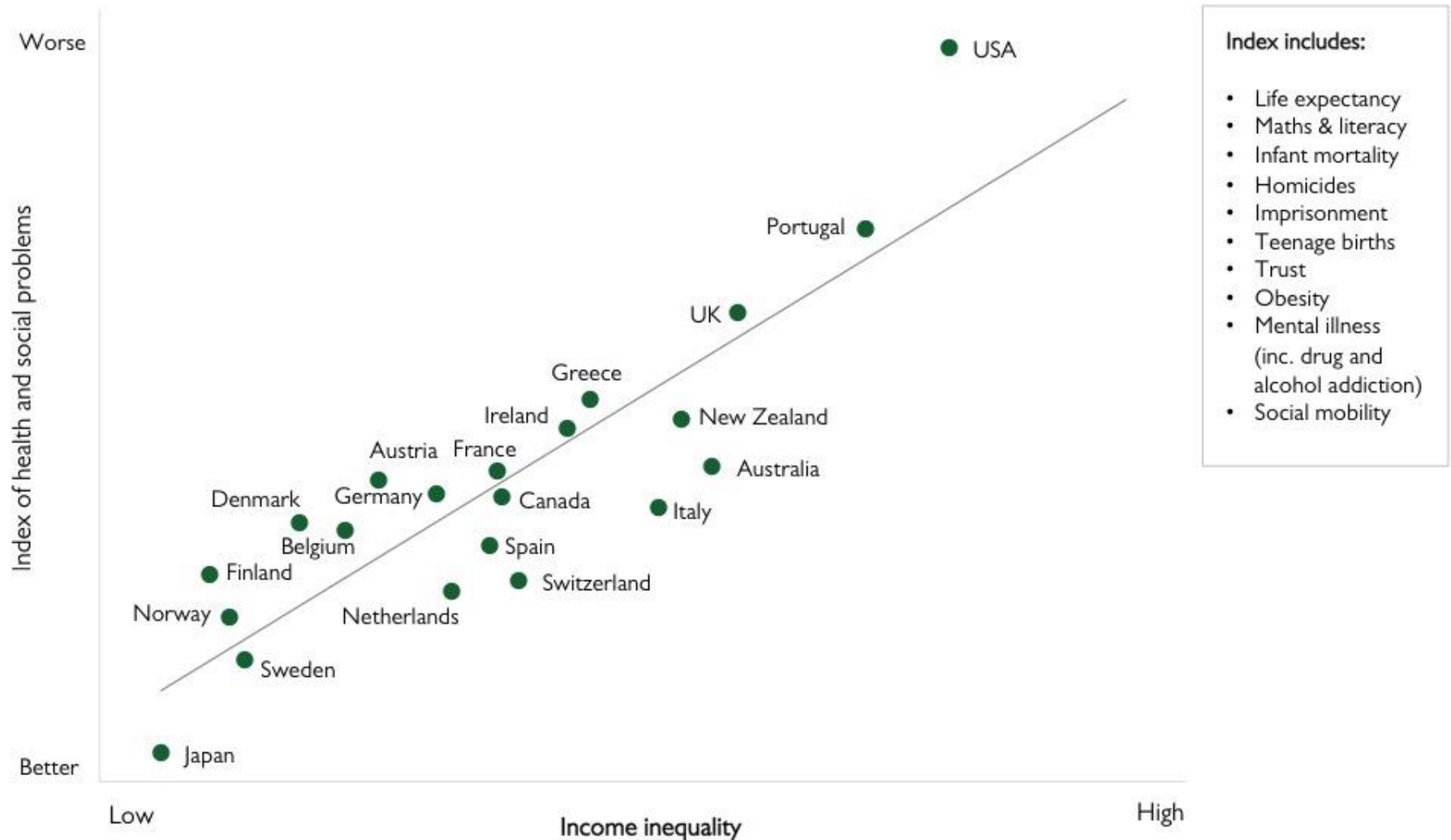


# How much richer are the richest 20% than the poorest 20%?



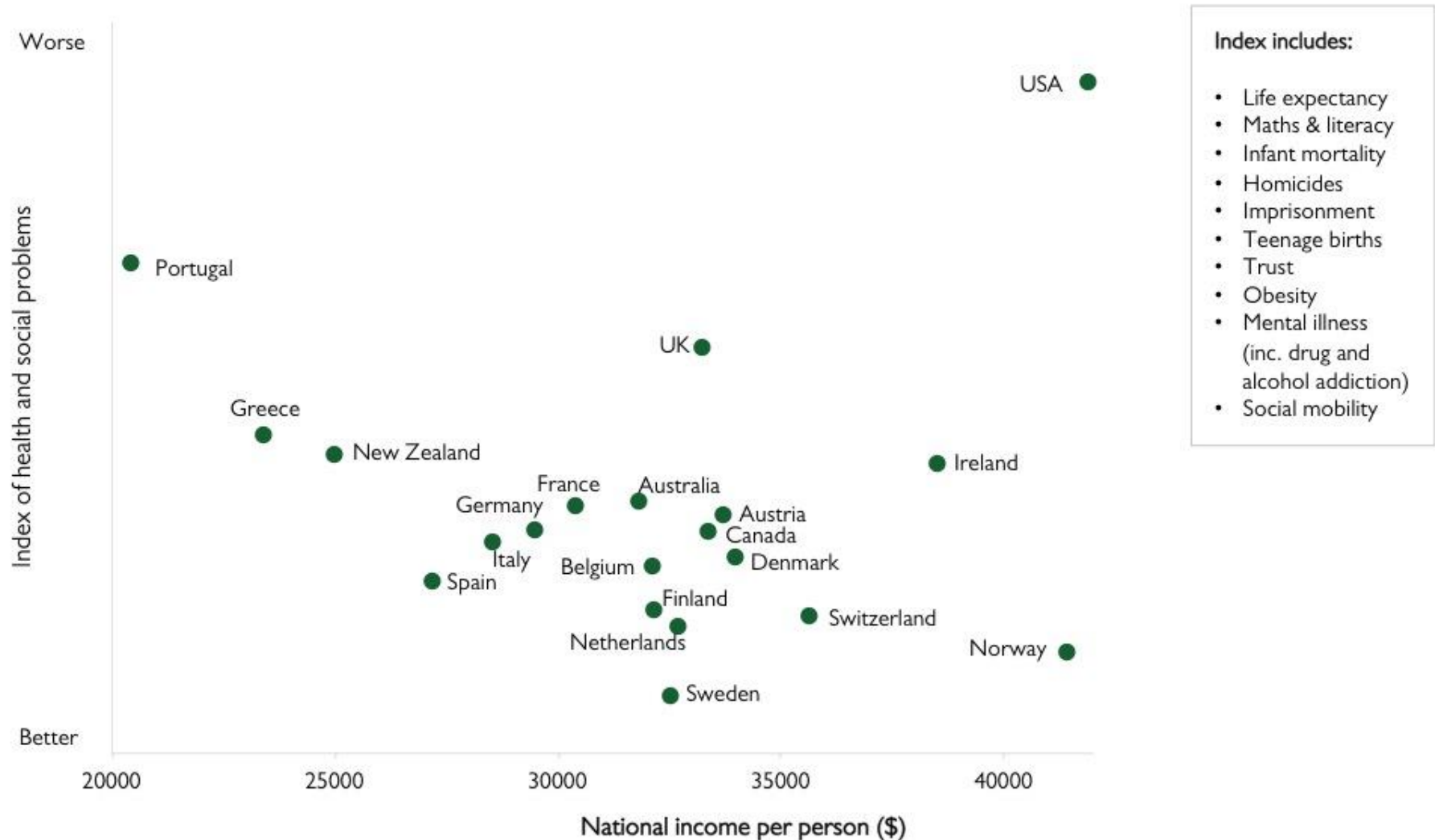


# Health and social problems are worse in more unequal countries



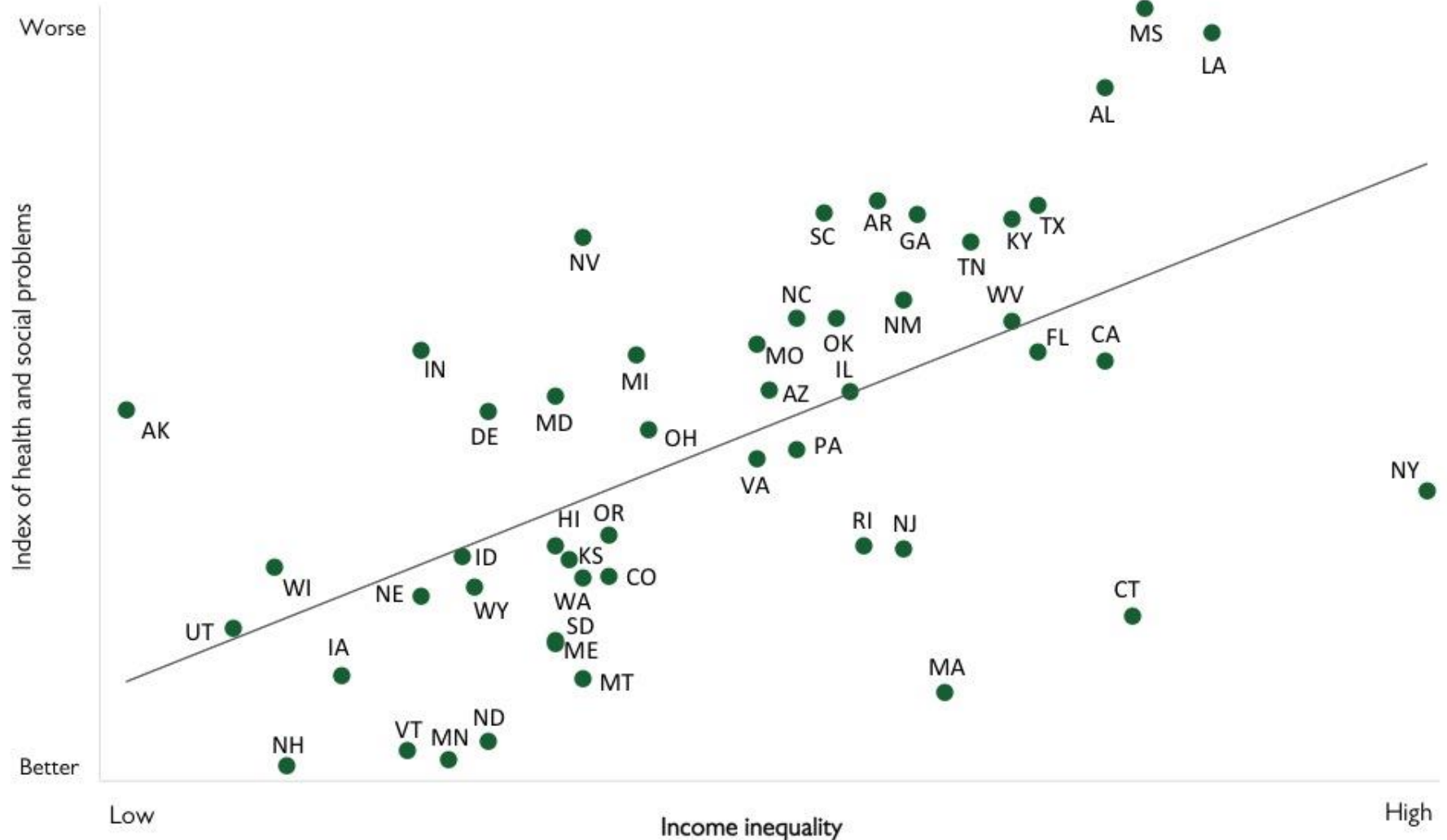


# Health and social problems are not related to average income in rich countries



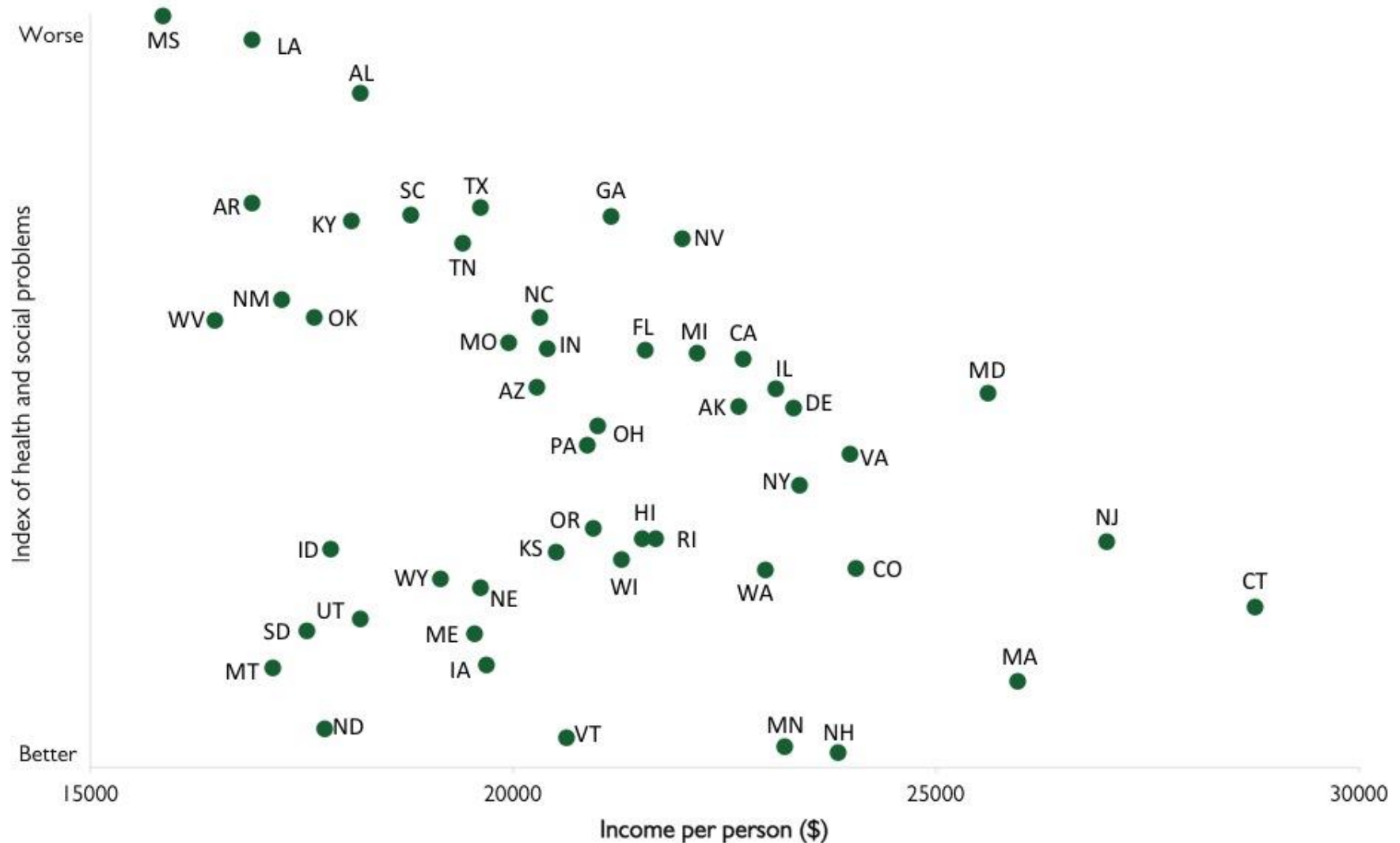


# Health and social problems are worse in more unequal US states



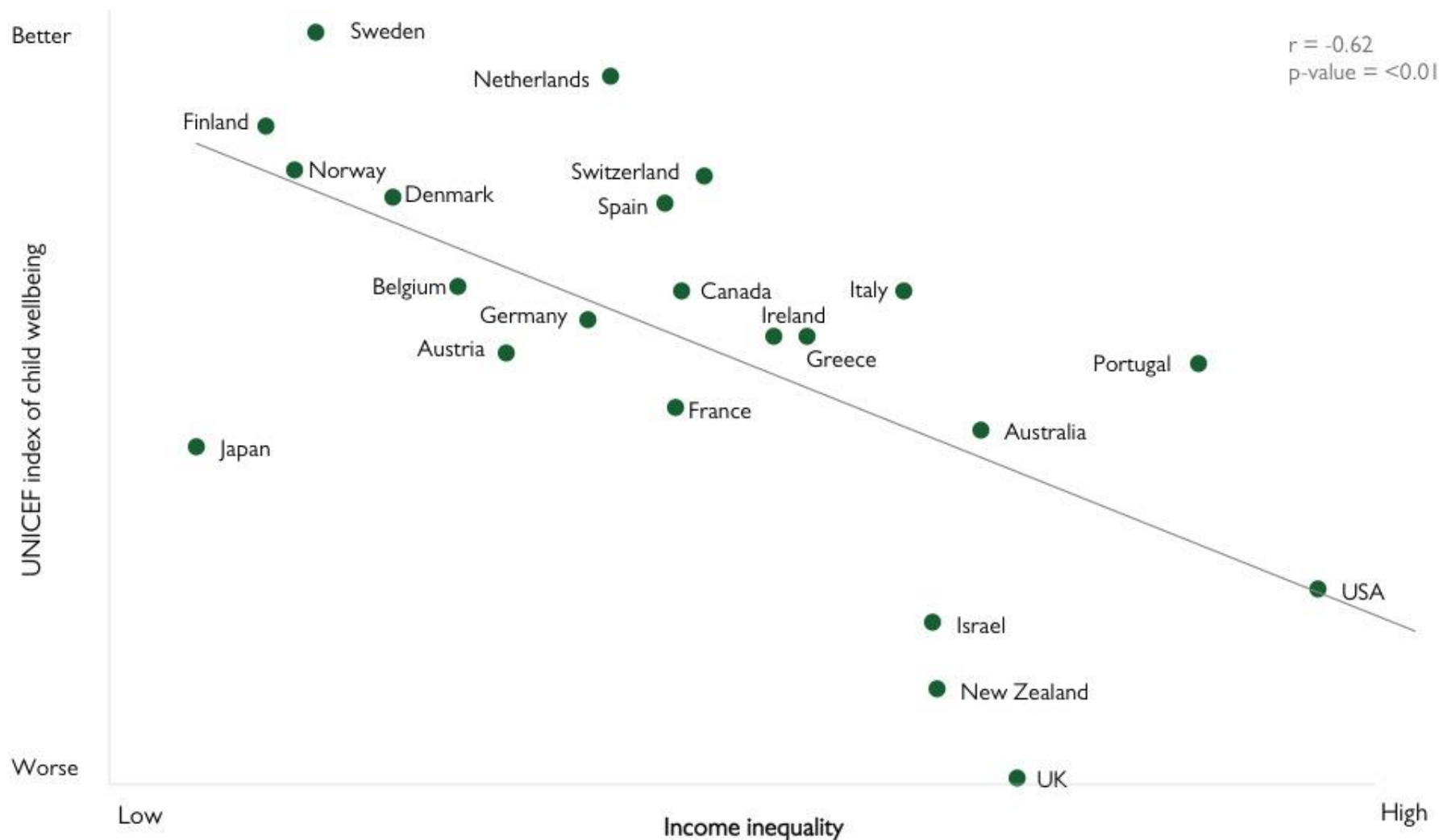


# Health and social problems are only weakly related to average income in US states



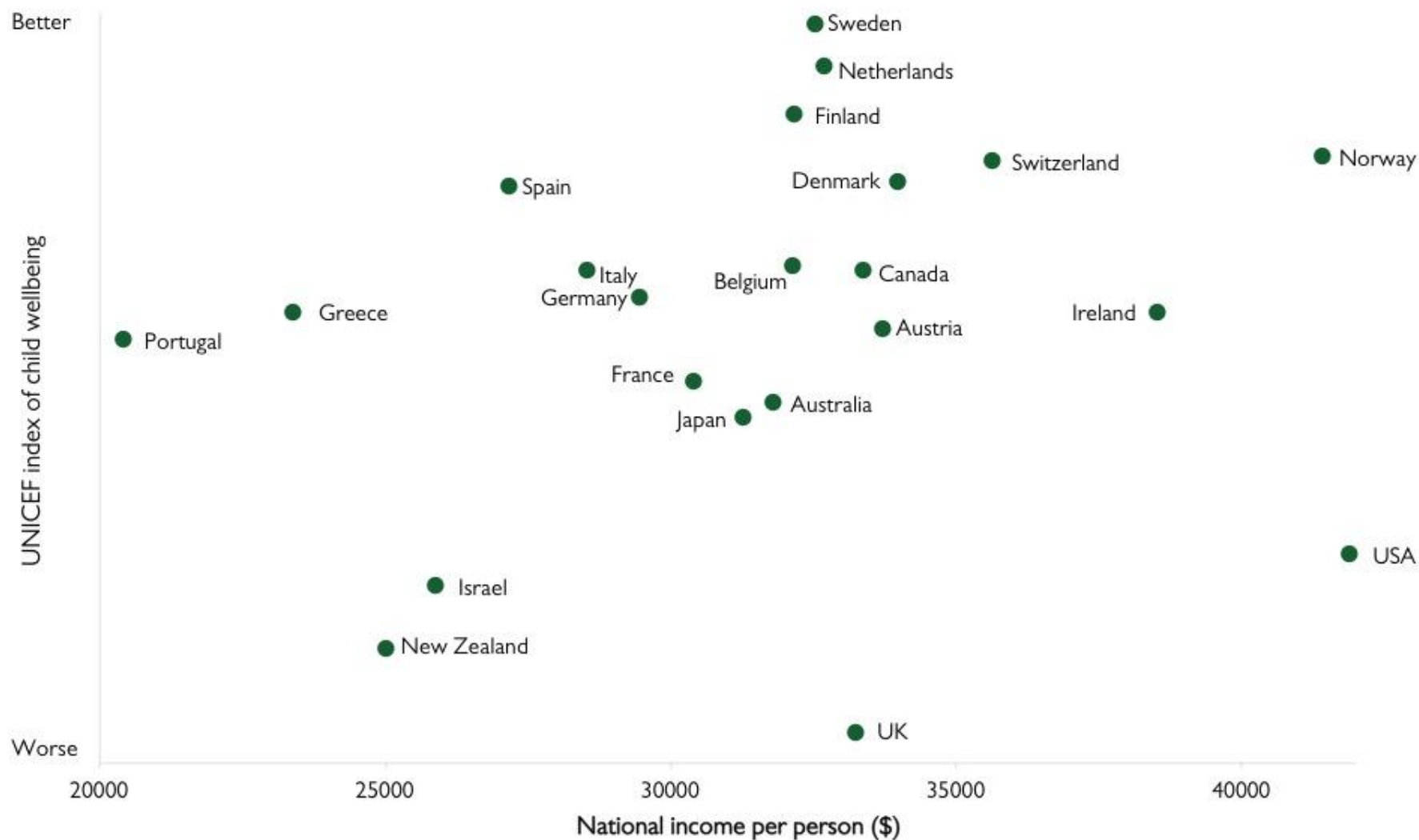


# Child wellbeing is better in more equal rich countries



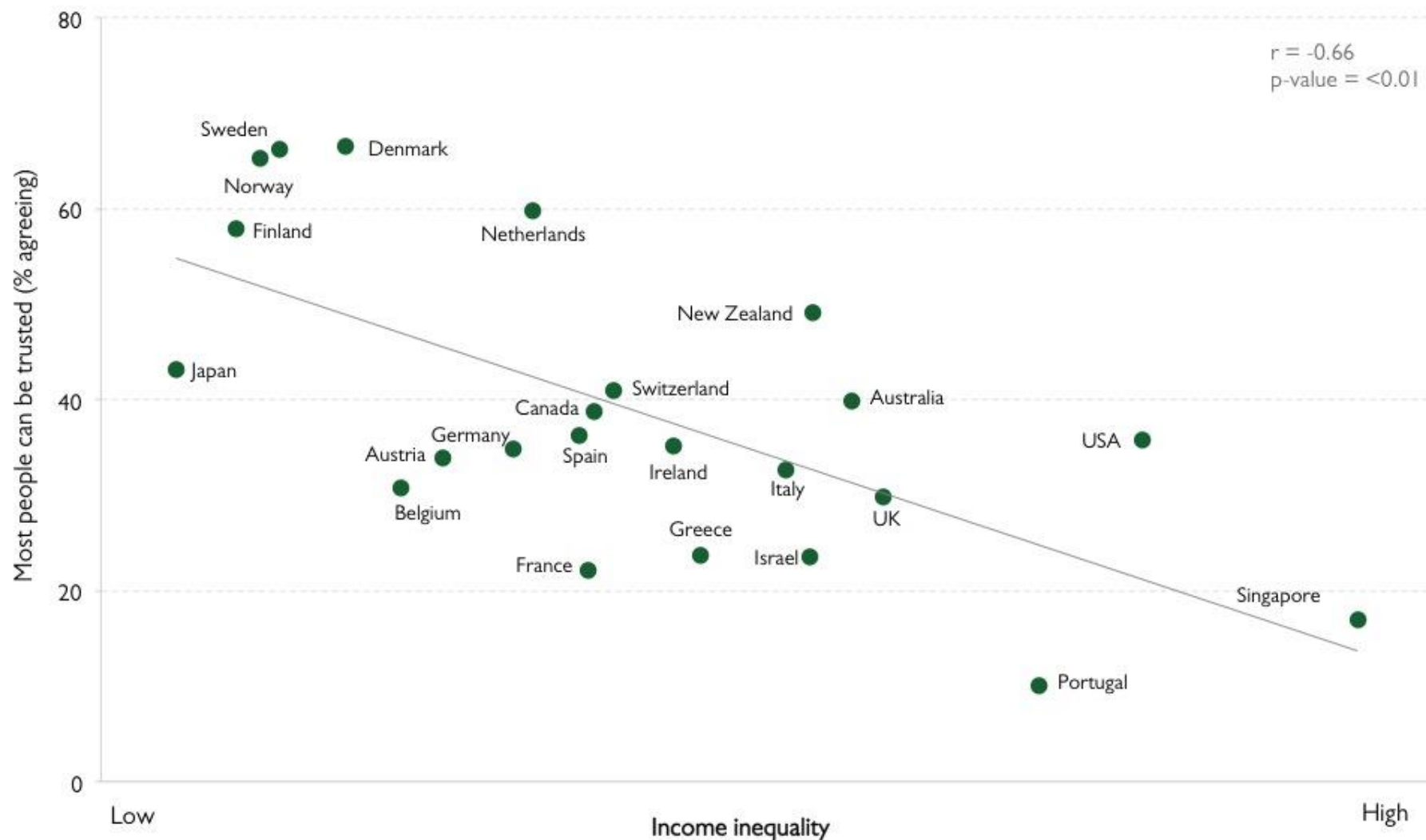


# Child wellbeing is unrelated to average incomes in rich countries



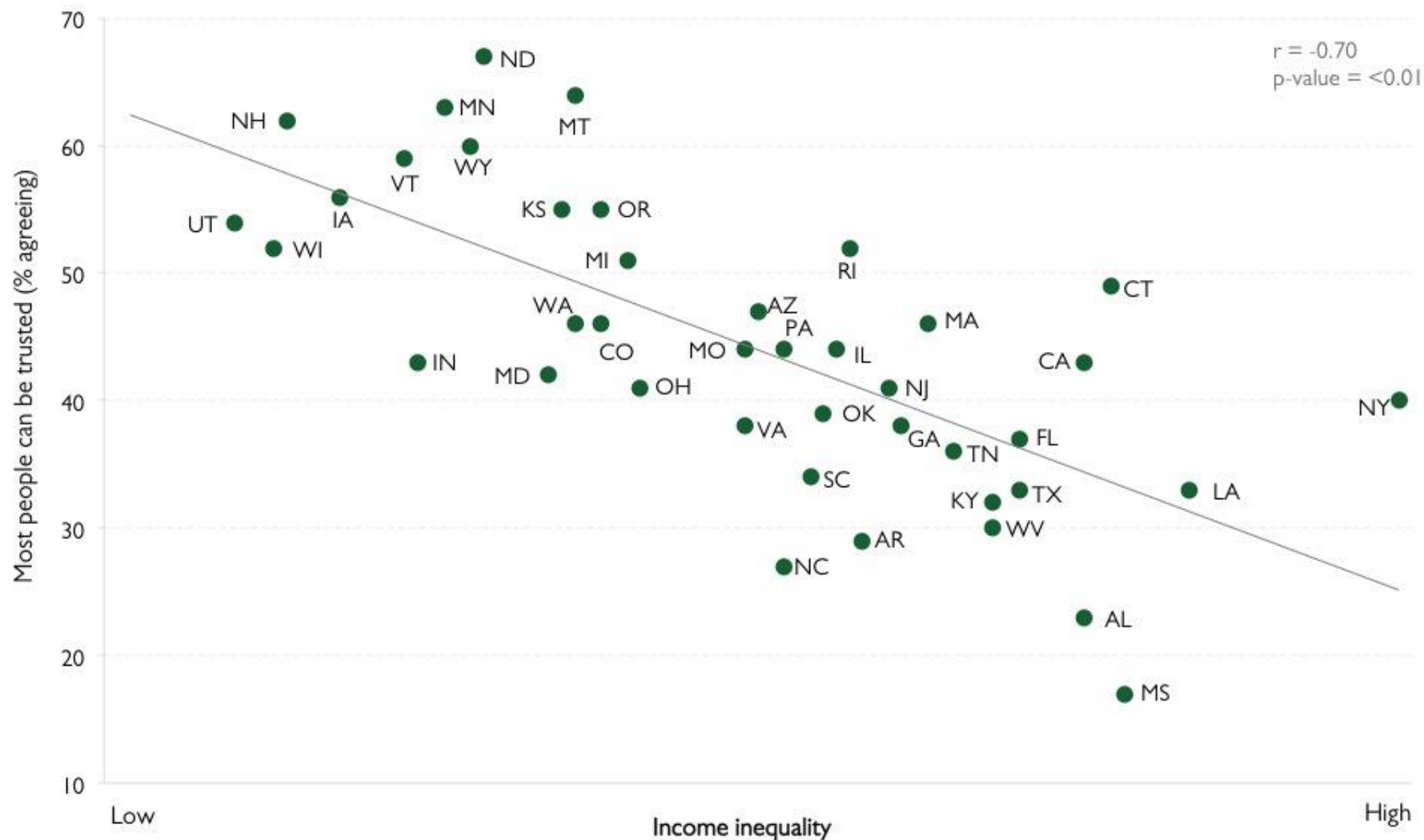


# Levels of trust are higher in more equal rich countries



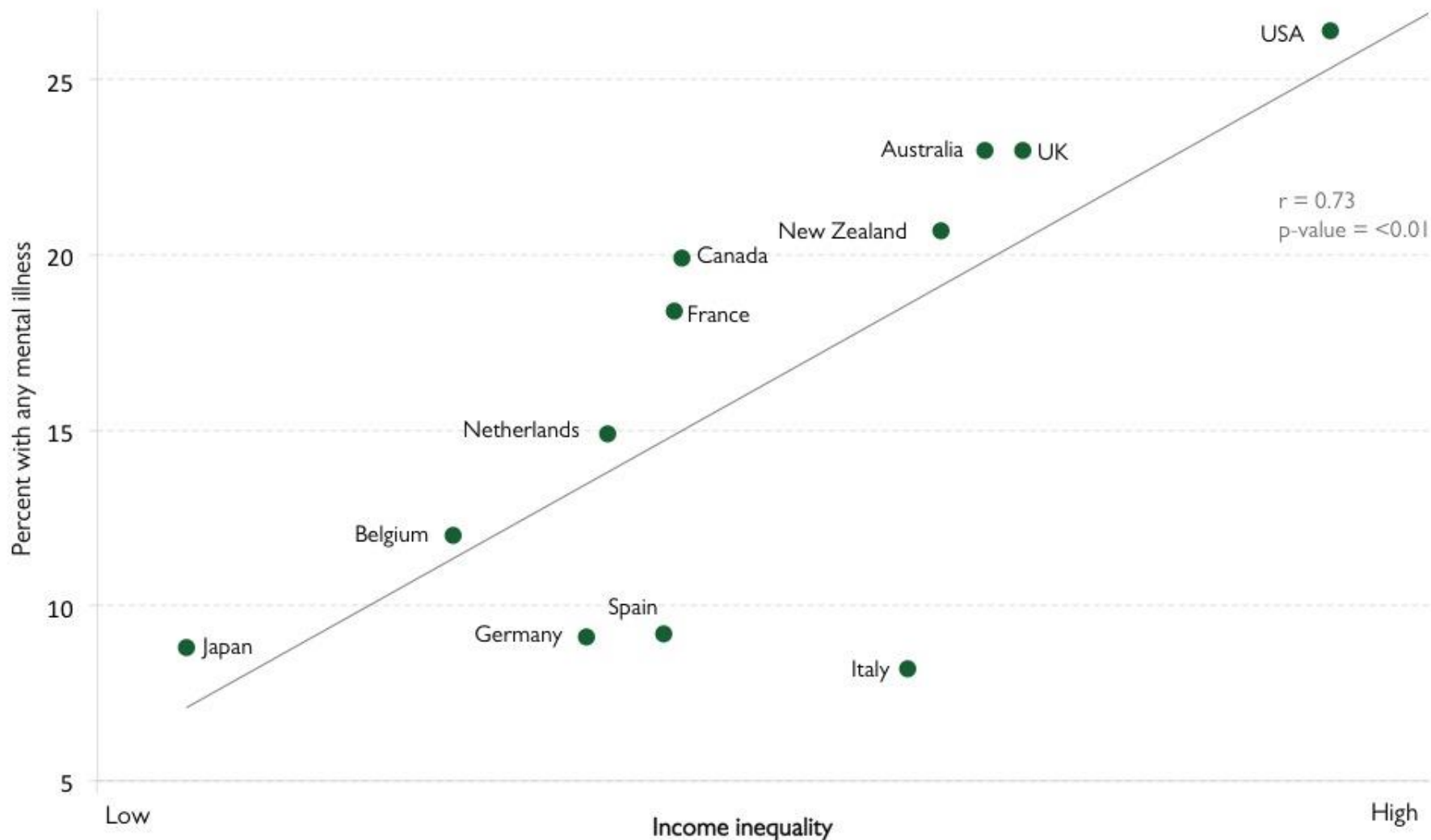


# Levels of trust are higher in more equal US states



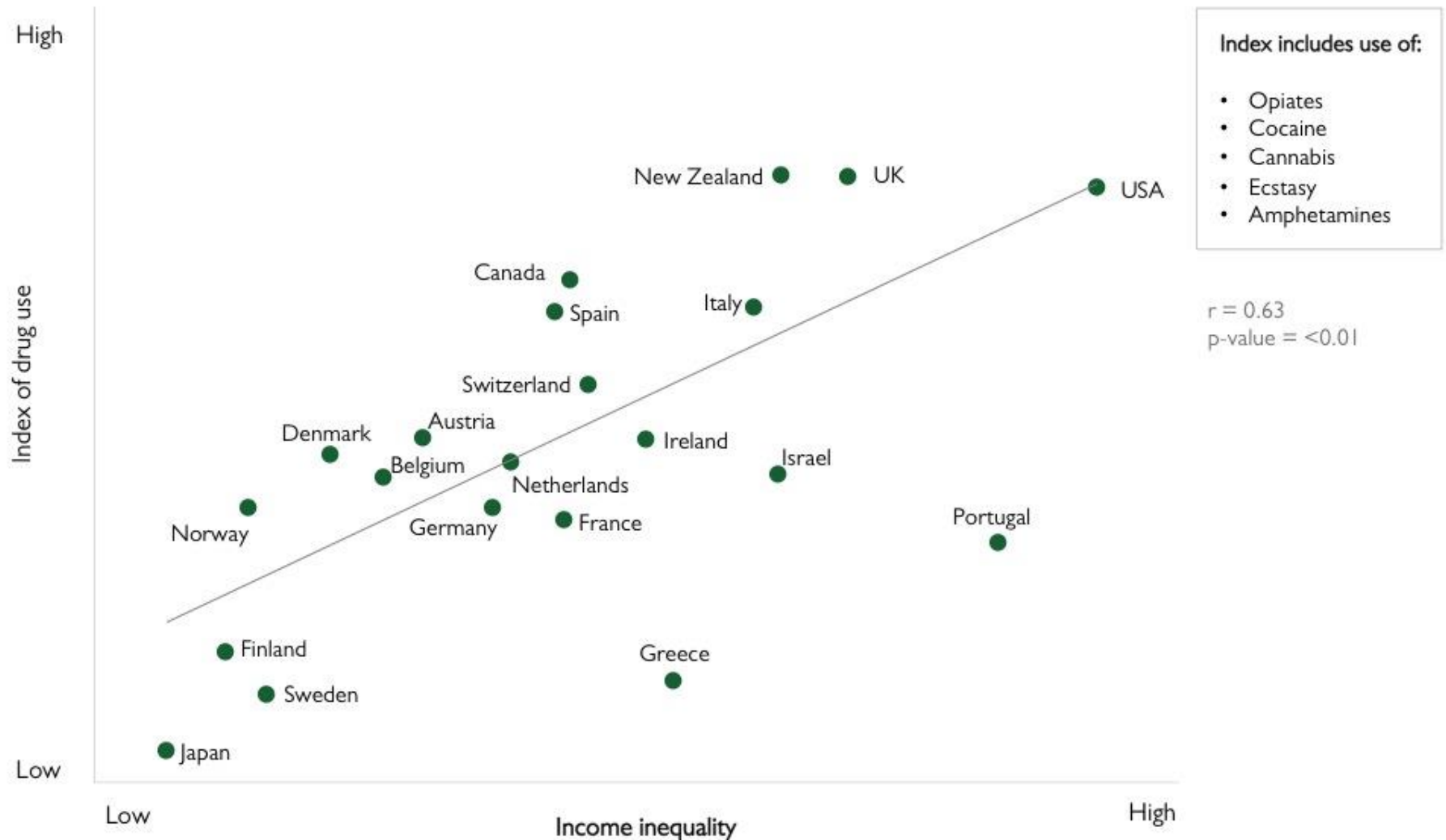


# The prevalence of mental illness is higher in more unequal rich countries



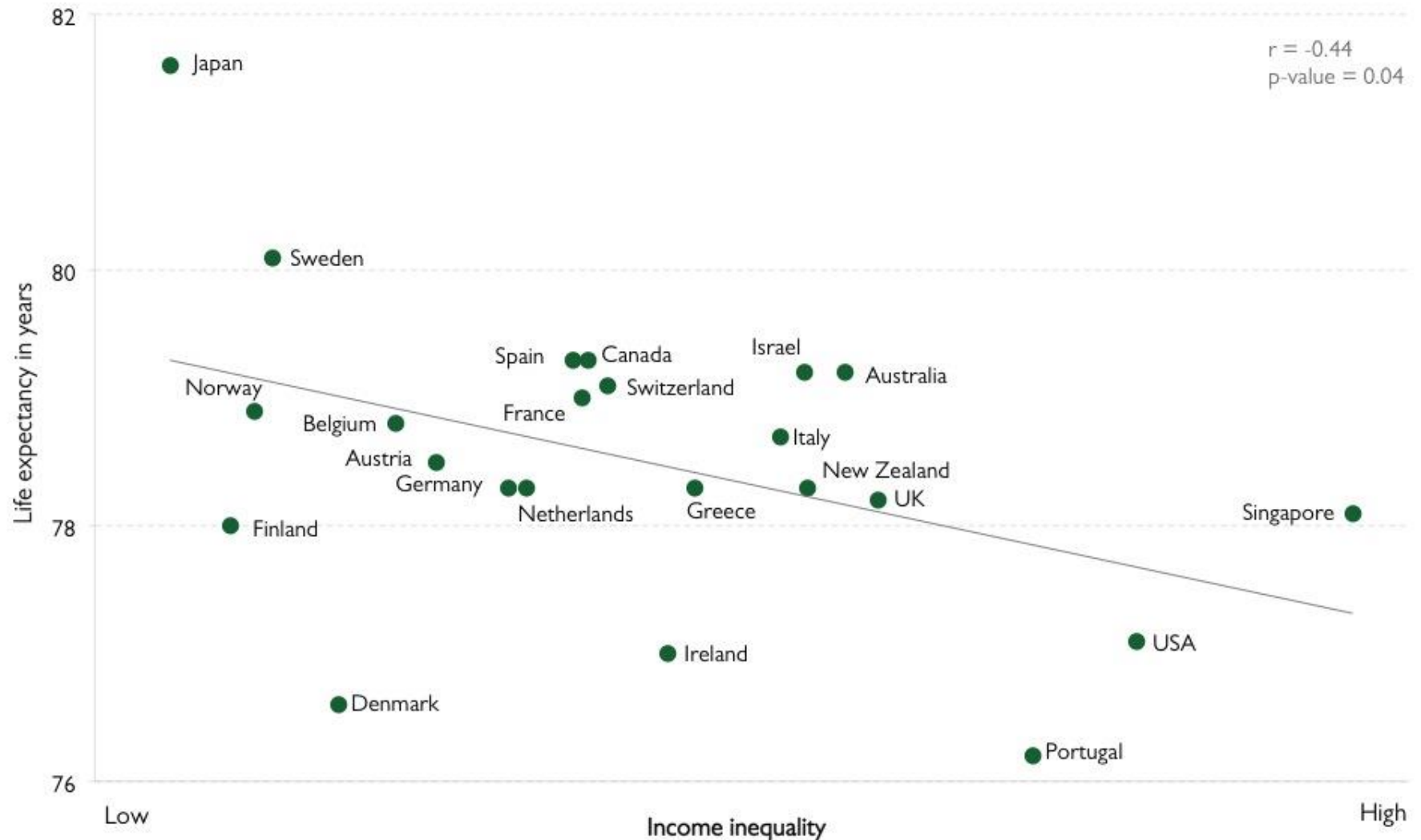


# Drug use is more common in more unequal countries



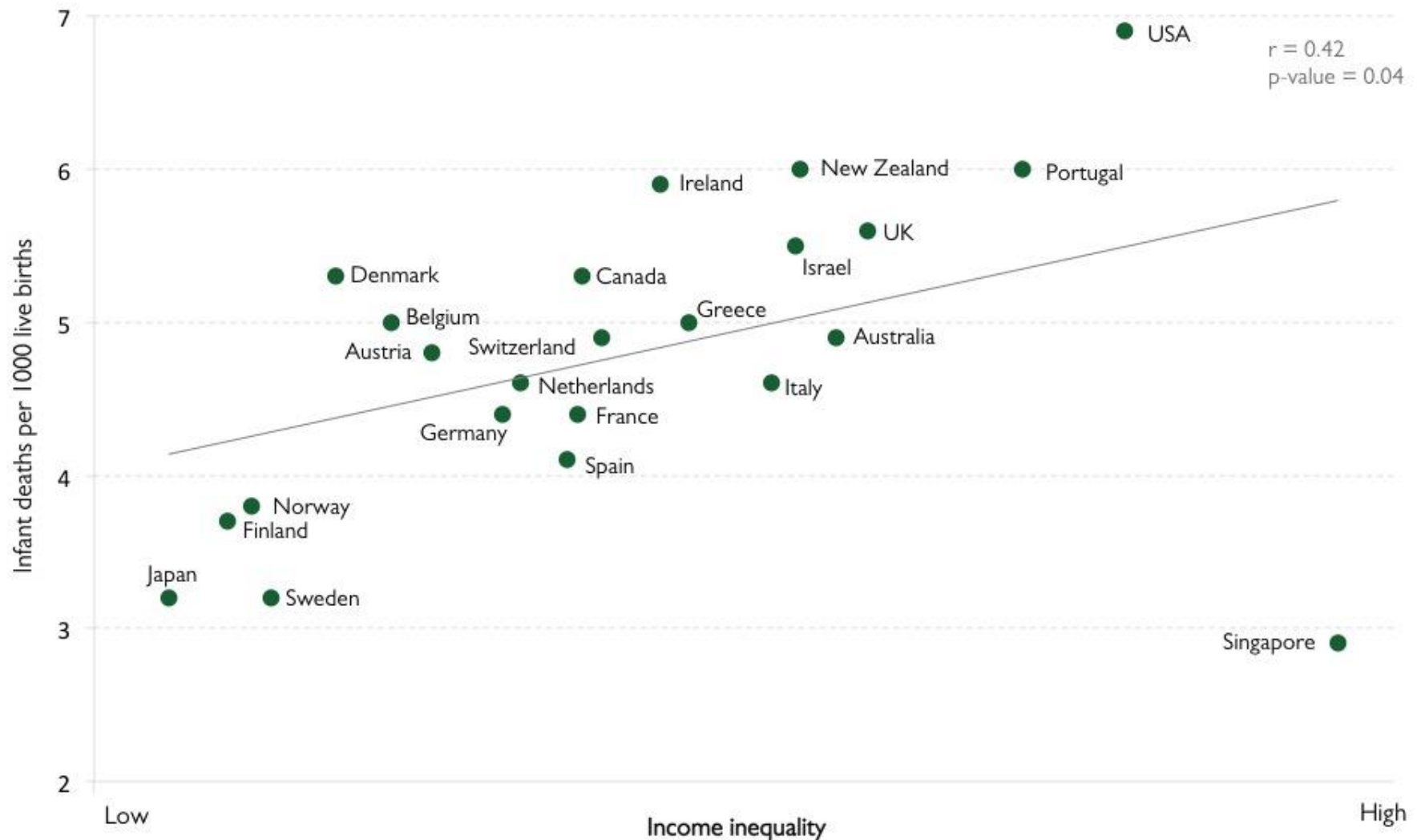


# Life expectancy is longer in more equal rich countries



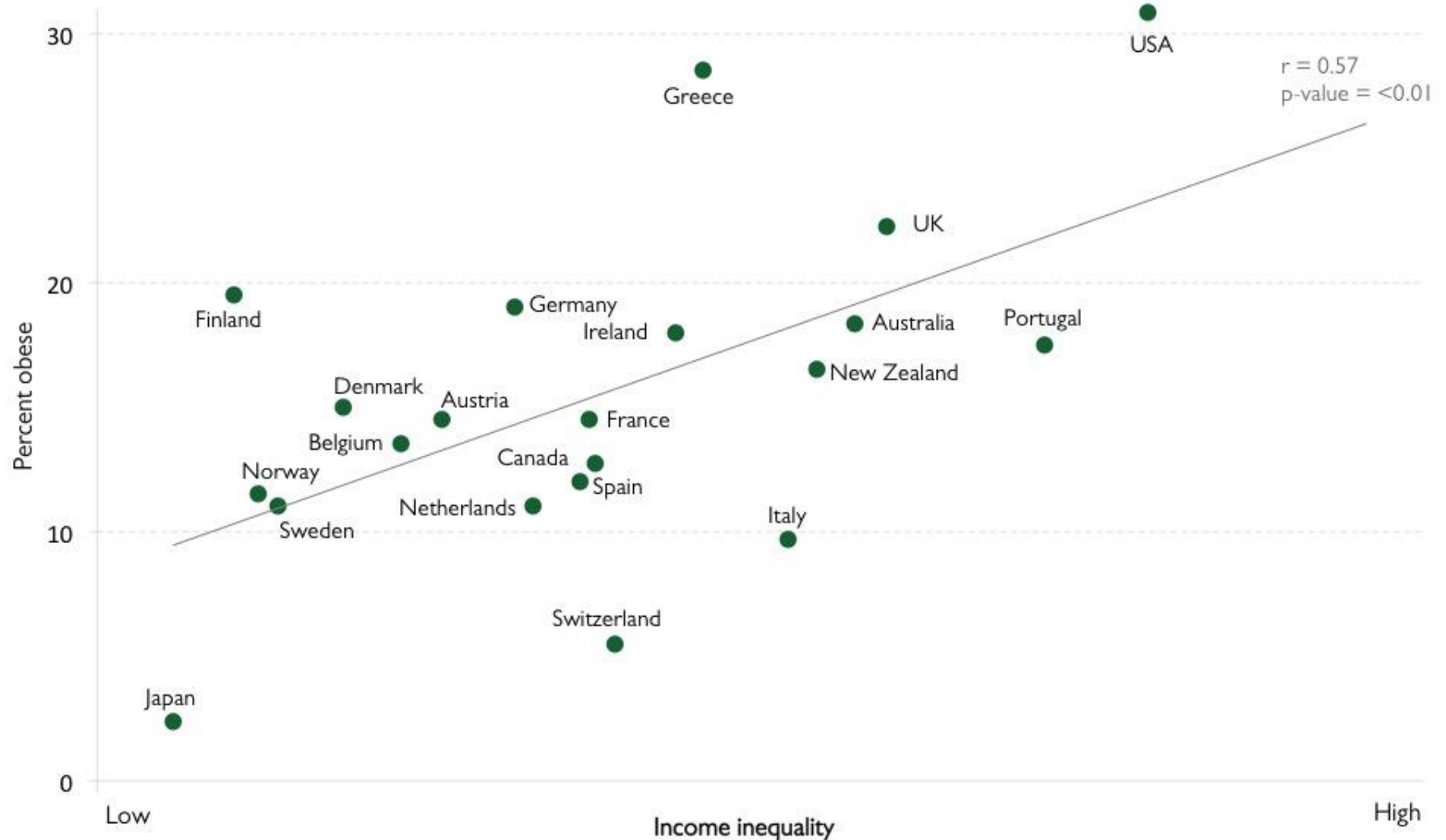


# Infant mortality rates are higher in more unequal countries



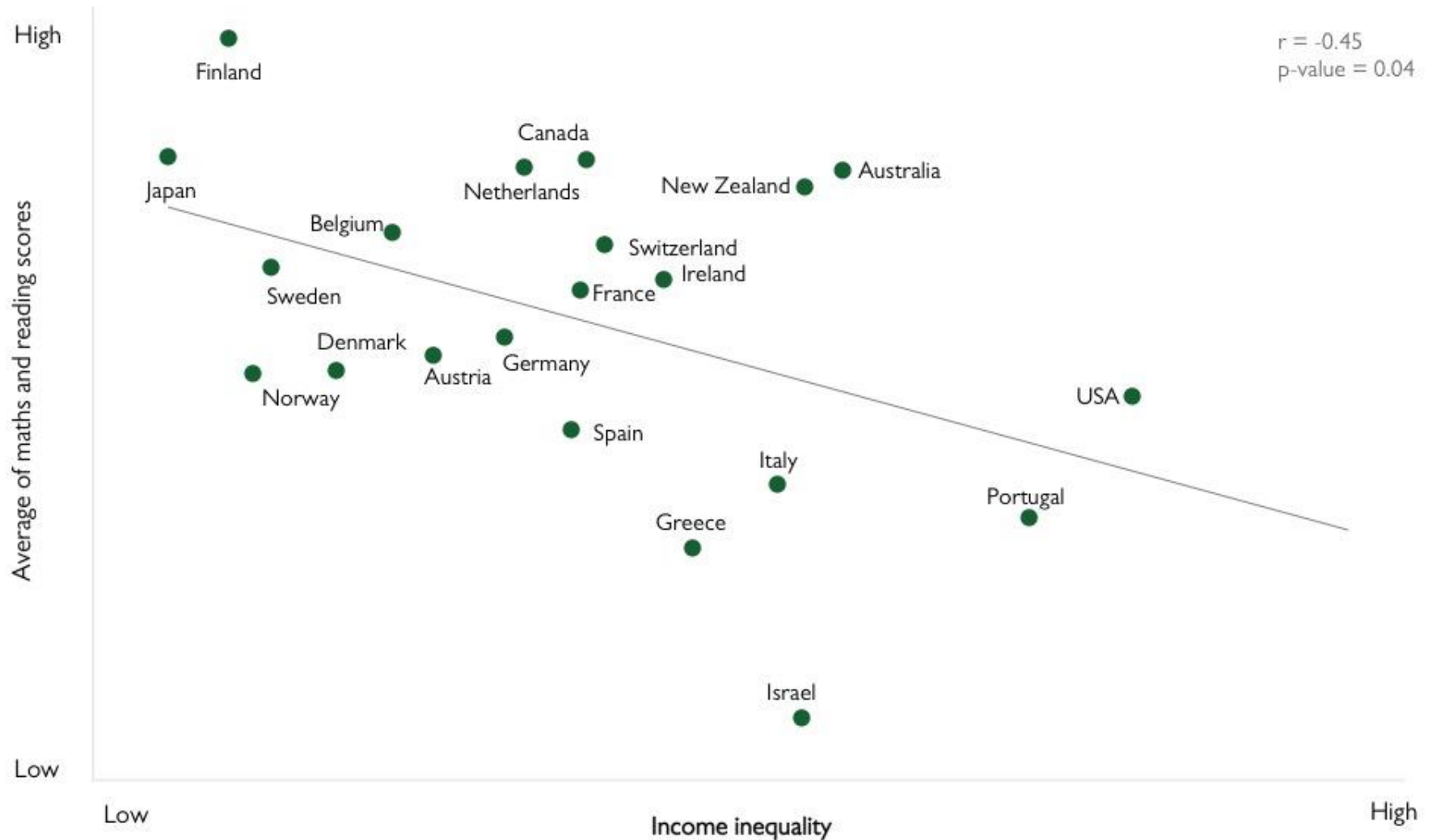


# More adults are obese in more unequal rich countries



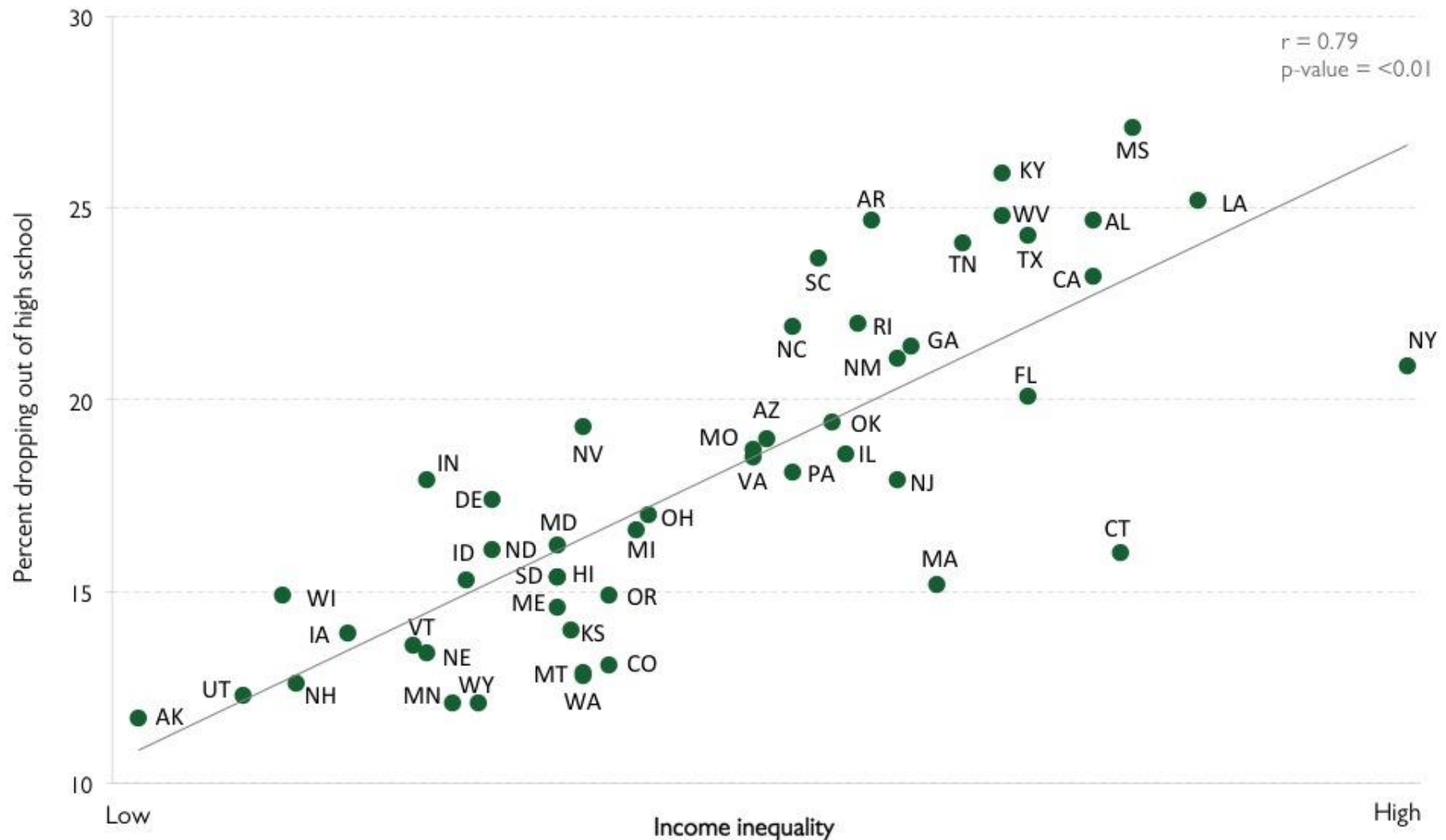


# Educational scores are higher in more equal rich countries



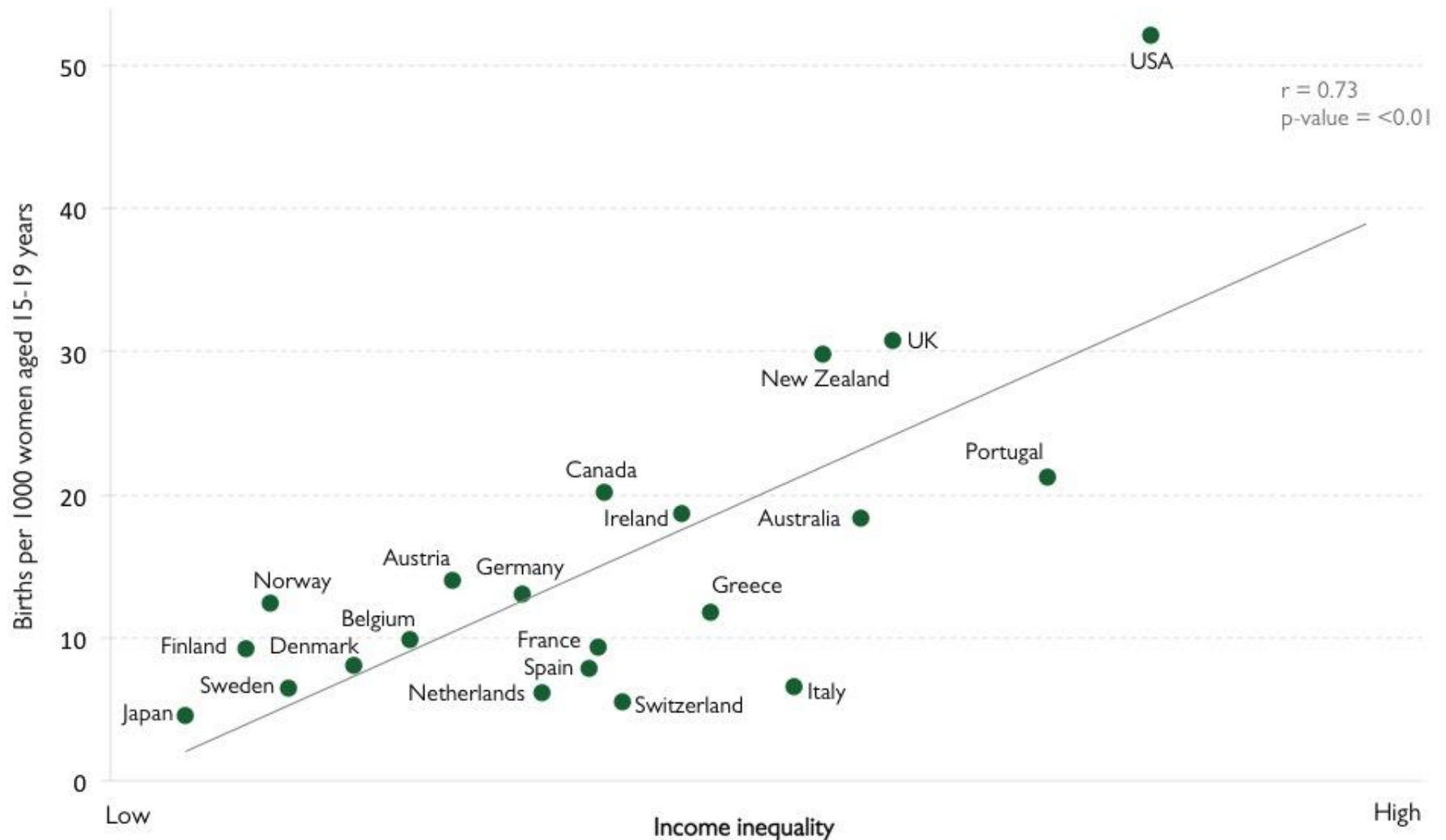


# More children drop out of high school in more unequal US states



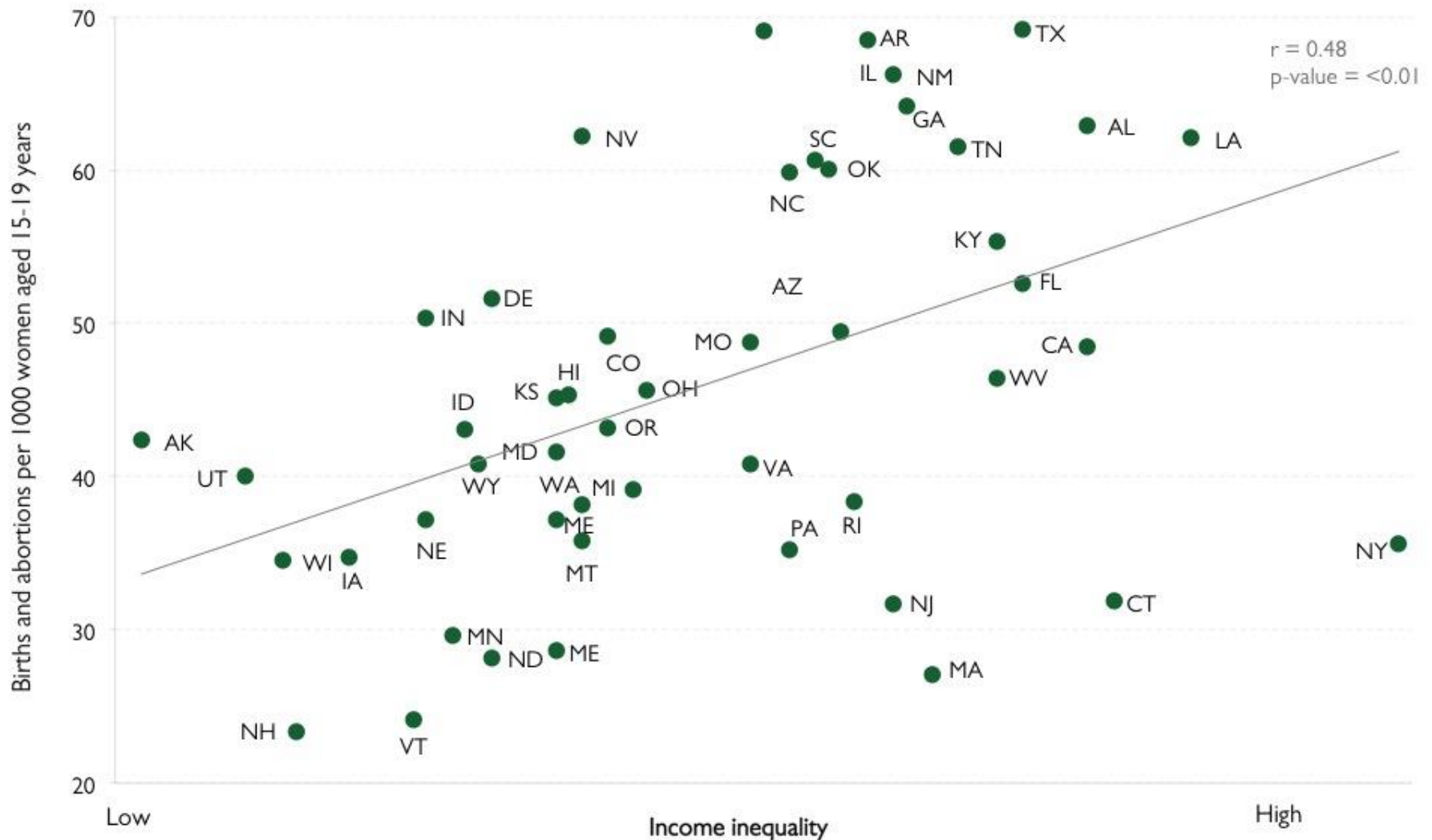


# Teenage birth rates are higher in more unequal rich countries



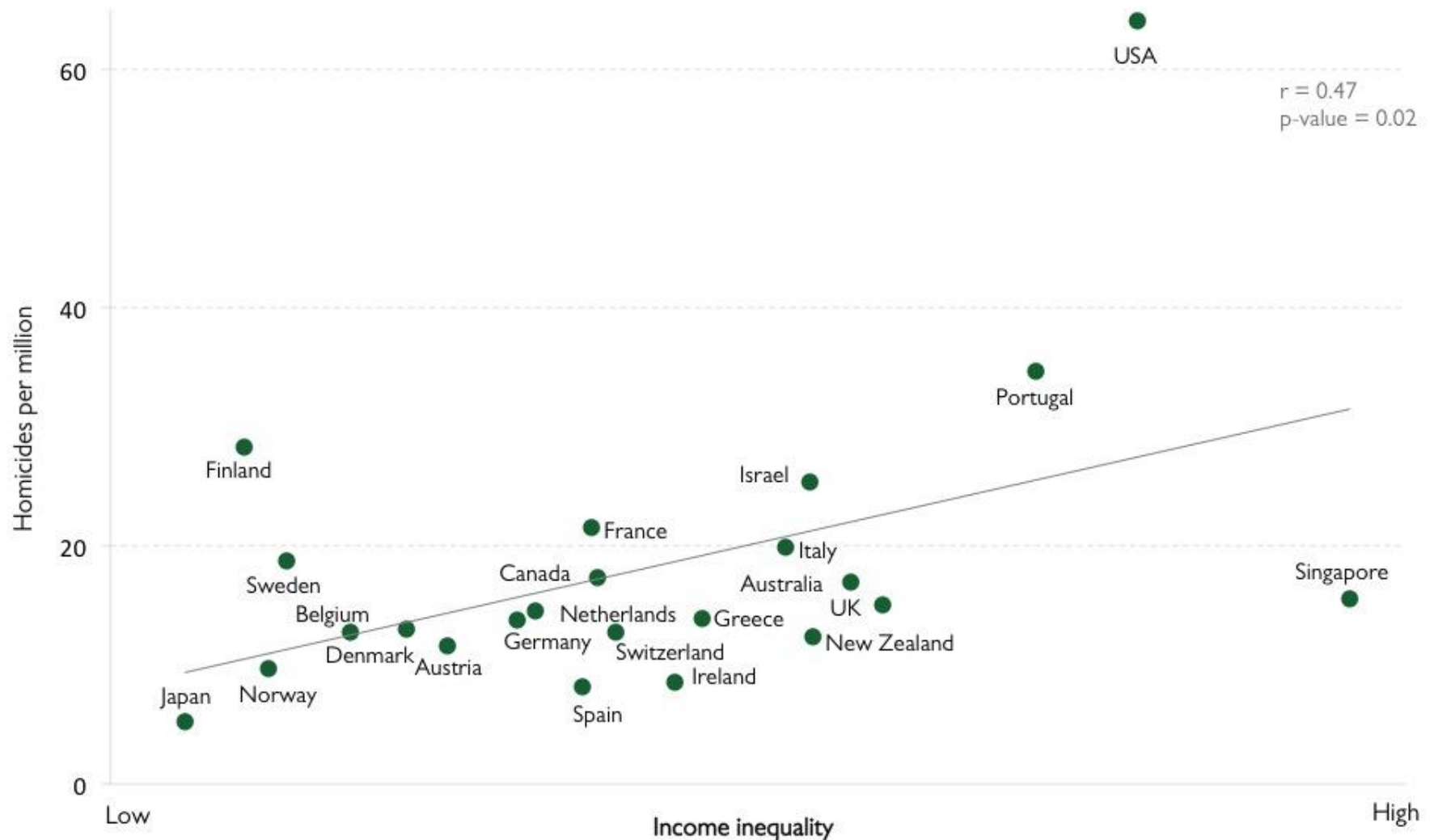


# Teen pregnancy rates are higher in more unequal US states



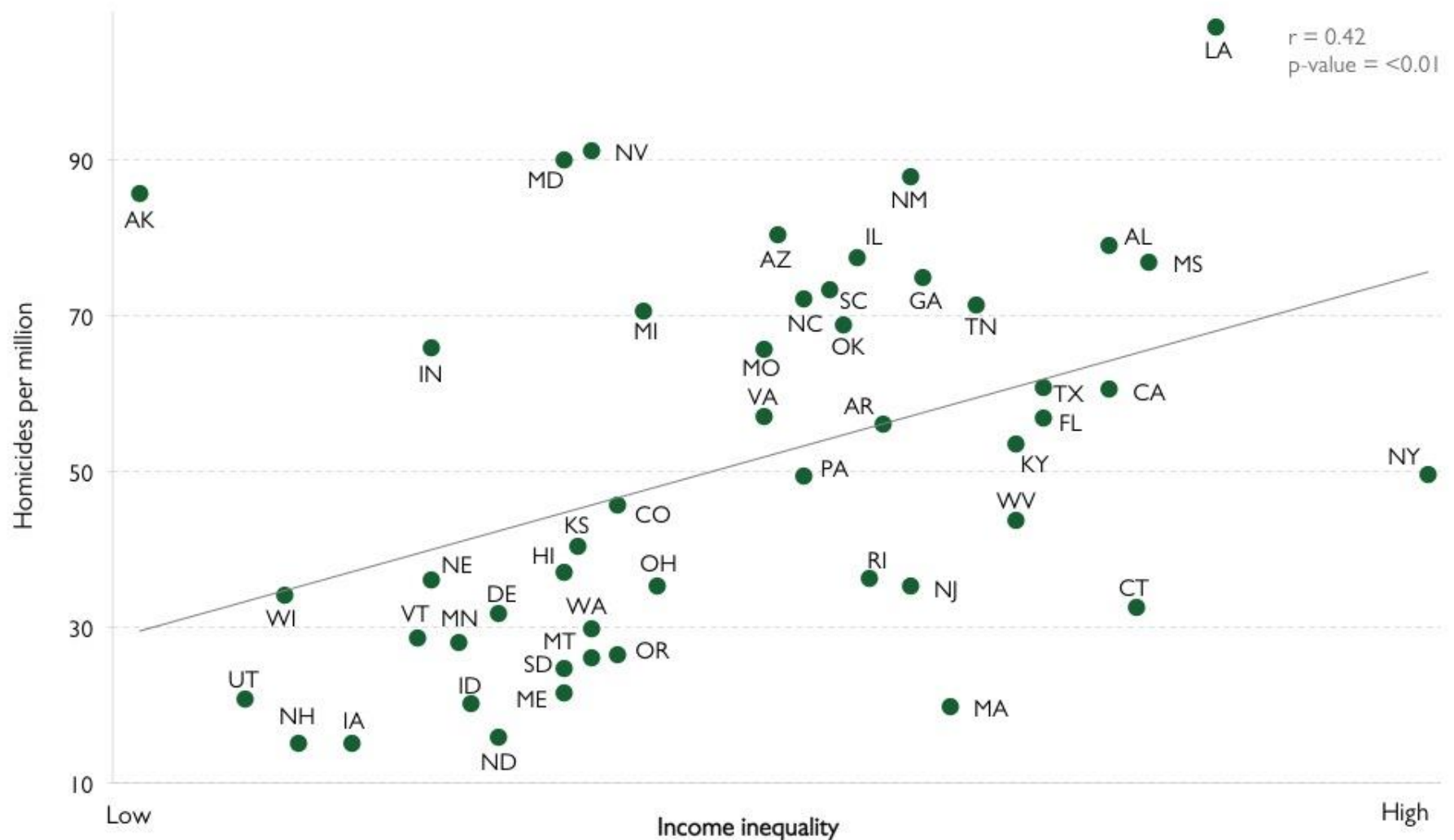


# Homicide rates are higher in more unequal rich countries



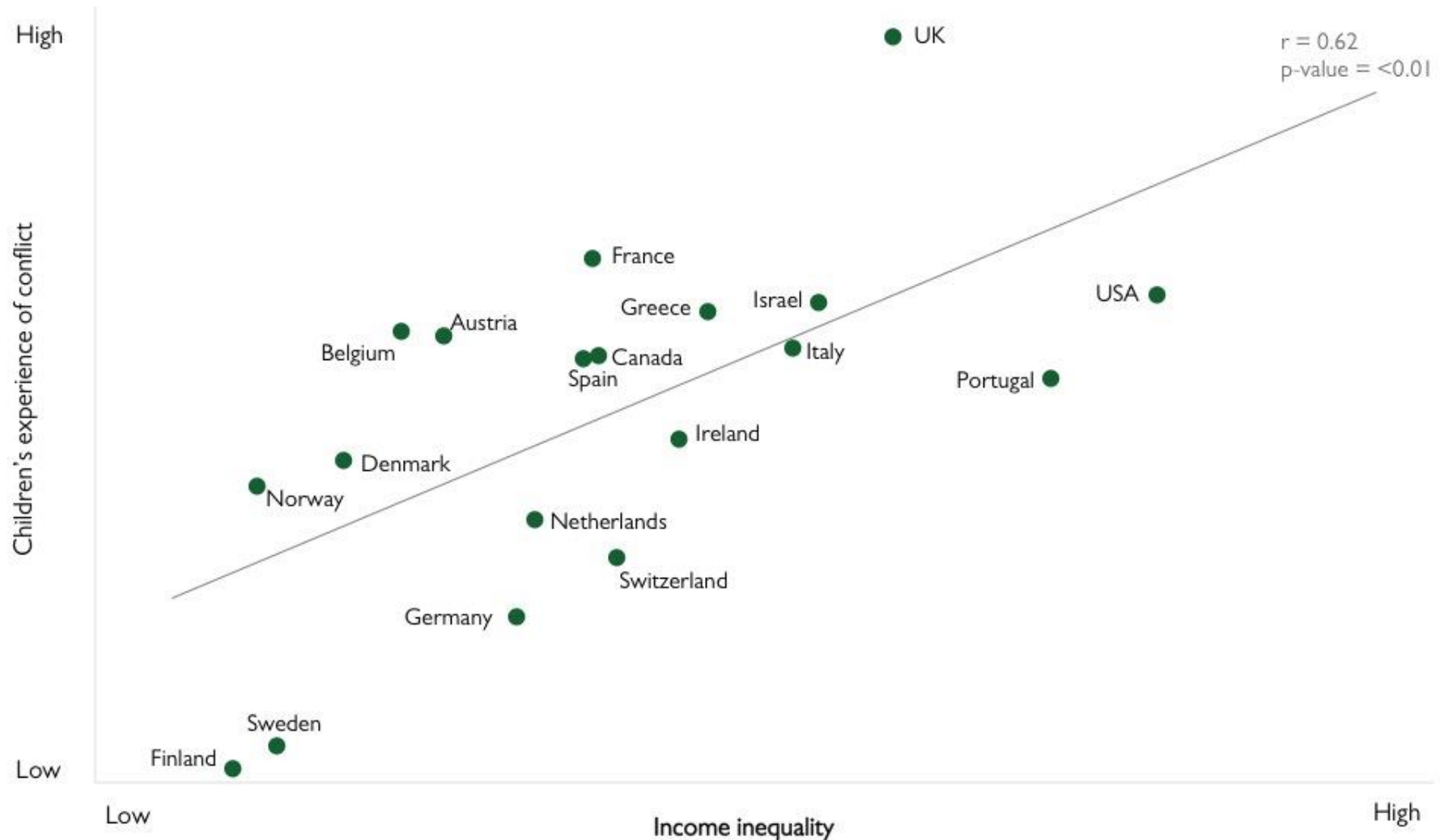


# Homicide rates are higher in more unequal US states



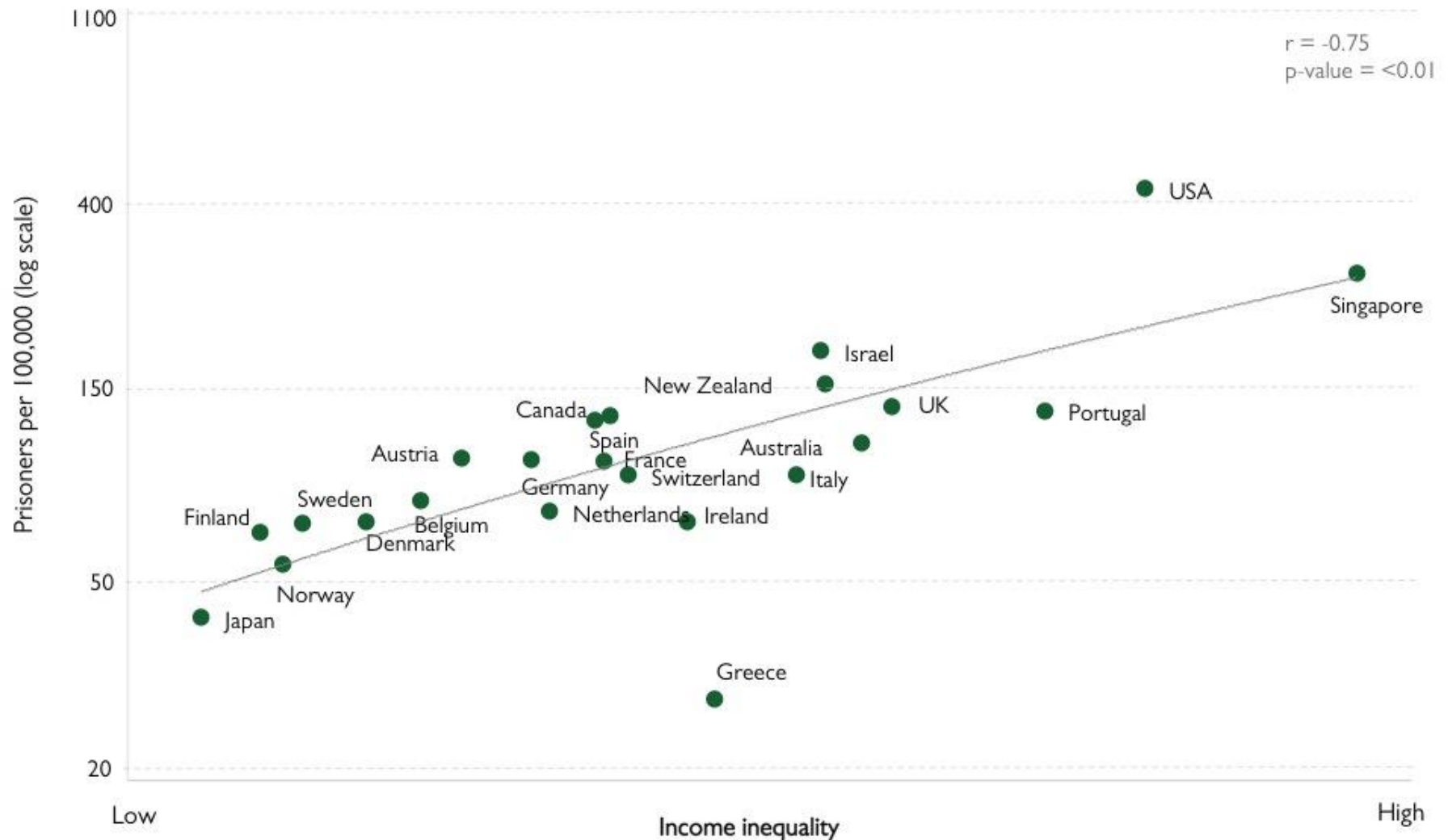


# Children experience more conflict in more unequal societies



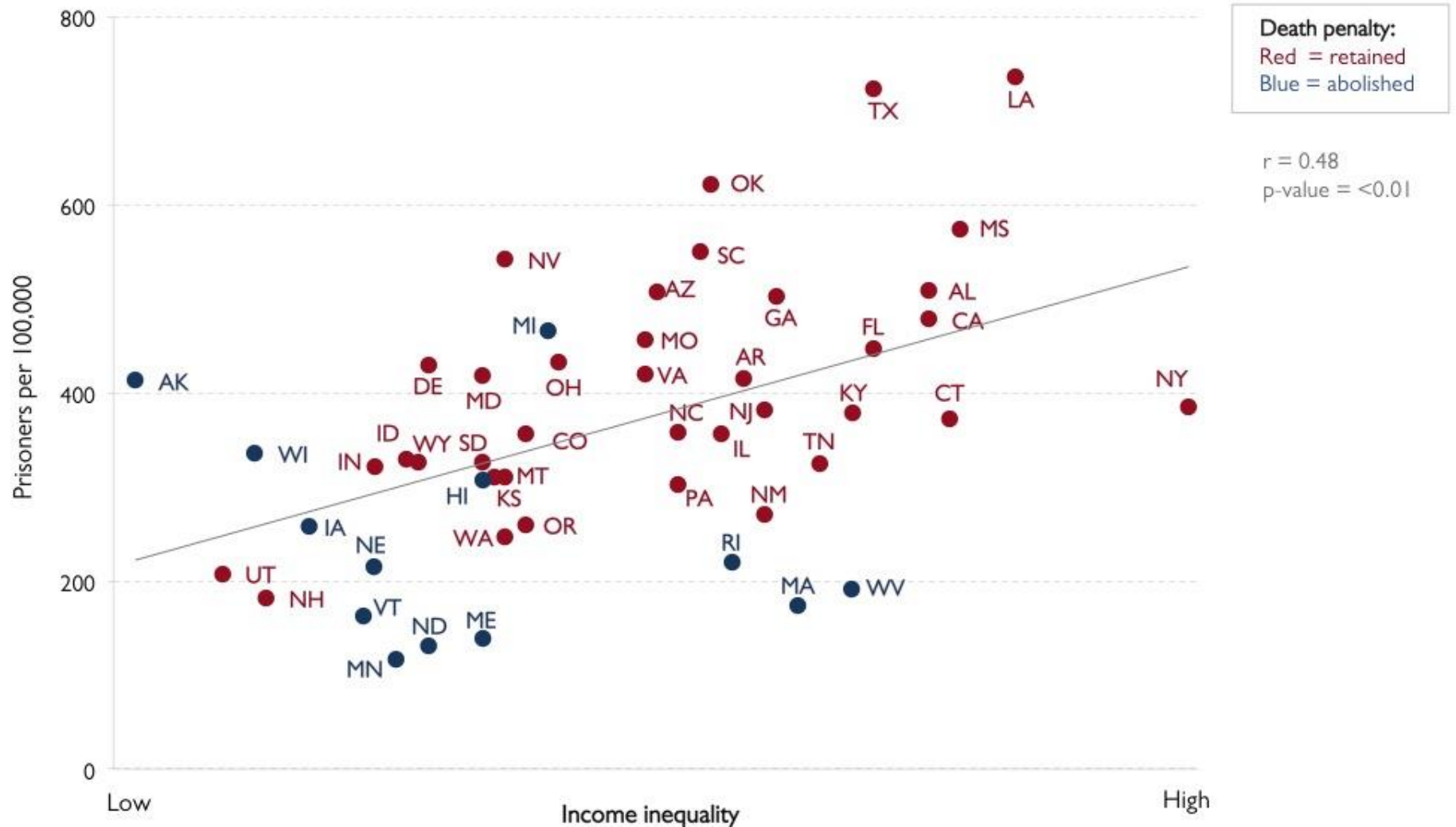


# Rates of imprisonment are higher in more unequal countries



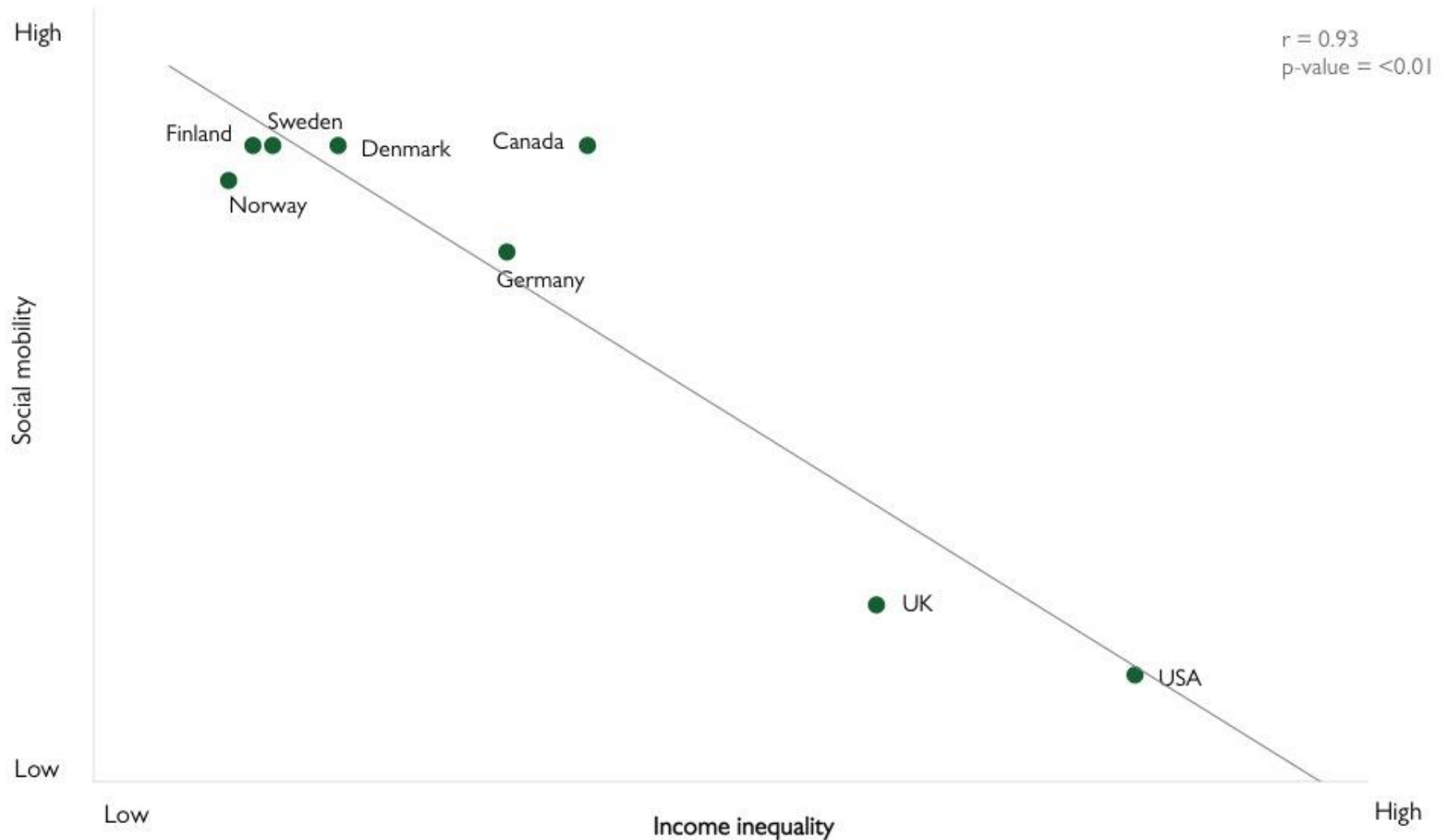


# Rates of imprisonment are higher in more unequal US states



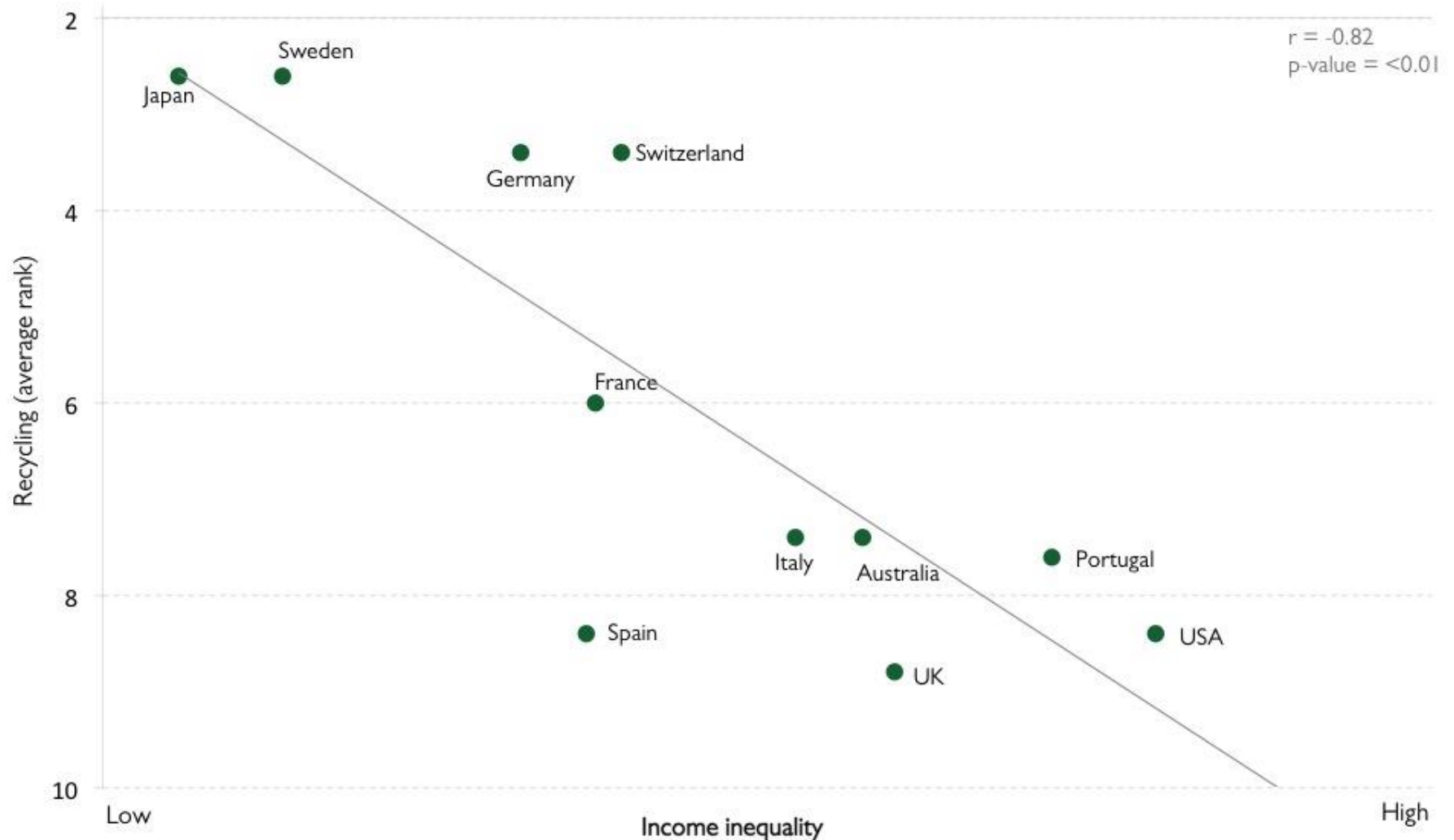


# Social mobility is lower in more unequal countries





# More equal countries rank better (1 is best) on recycling



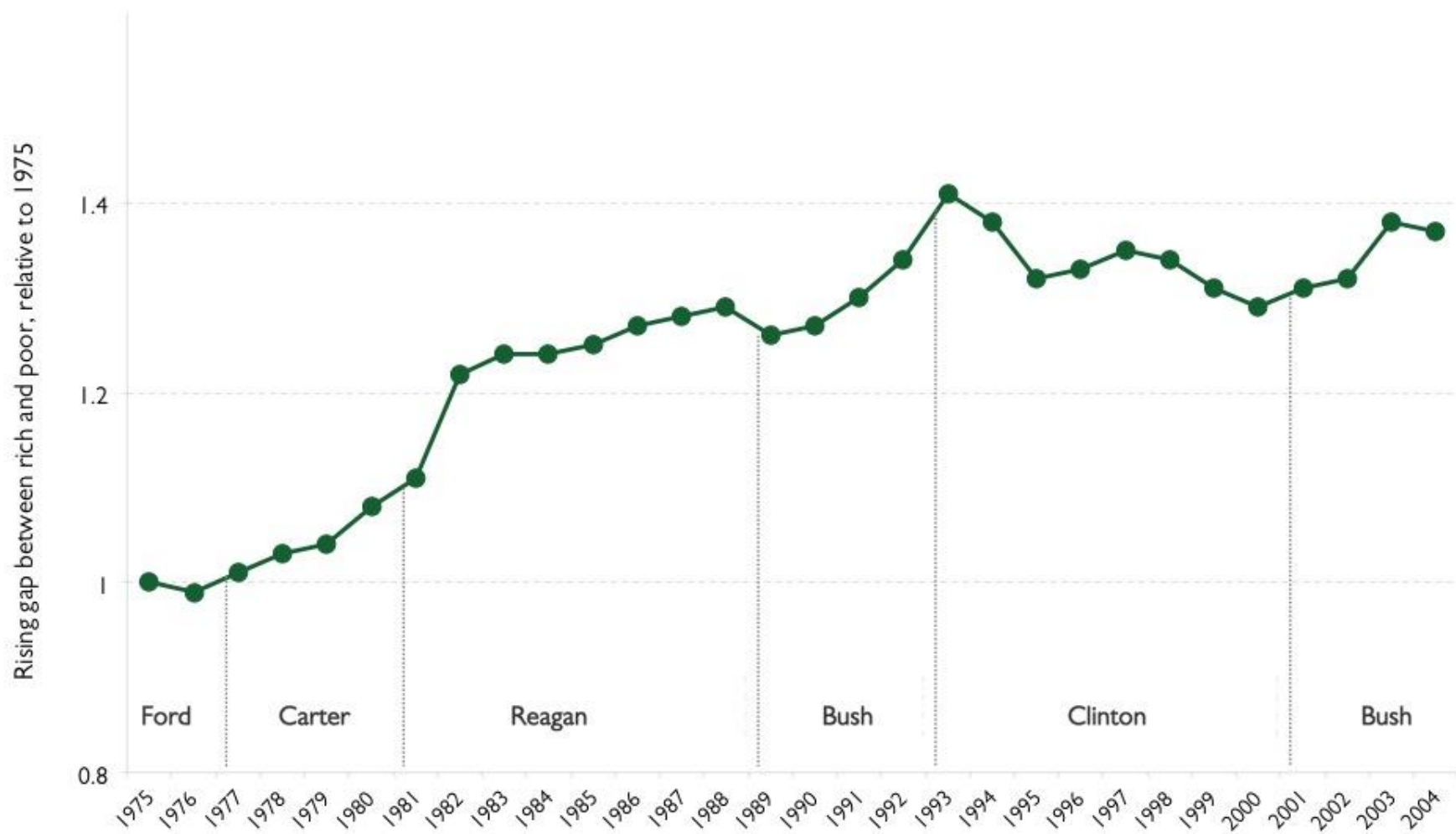


# Trends in UK income inequality 1979 – 2005/06





# Trends in US income inequality 1975 – 2005





 THE EQUALITY TRUST

[www.equalitytrust.org.uk](http://www.equalitytrust.org.uk)





GCSE and A level Geography 2016

# Resources for telling stories with data

edexcel 

**Royal  
Geographical  
Society**

with IBG

Advancing geography  
and geographical learning

- Data Skills in Geography
  - <http://www.rgs.org/OurWork/Schools/Data+skills+in+geography/Data+skills+in+geography.htm>





GCSE and A level Geography 2016

# Some additional resources

edexcel 

**Royal  
Geographical  
Society**

with IBG

Advancing geography  
and geographical learning

- Geographers Count: A Report on Quantitative Methods in Geography,  
<http://www.tandfonline.com/doi/full/10.11120/elss.2014.00035>
- The Use and Abuse of Statistics  
(from Quantitative Geography: the basics),  
<https://www.dropbox.com/s/tzc4b252pbtz2ck/chapter2-2.pdf?dl=0>
- Videos and case studies of quantitative geography skills used in the workplace,  
<https://quantile.info/careers/>





edexcel 

**Royal  
Geographical  
Society**

with IBG

Advancing geography  
and geographical learning



University of  
**BRISTOL**