Degrees of Difference: The Impact of Socio-Economic Background on Early Career Earnings Returns to Higher Education in the UK

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[1] This is based on joint work with Chris Belfield, Jack Britton, Lorraine Dearden, Luke Sibieta, Laura van der Erve, Franz Buscha, Anna Vignoles, Ian Walker, and Yu Zhu

Motivation

- Social mobility in the UK is low by international standards (OECD, 2018)
  - ▸ 5 generations
- Higher education system seen as a gateway for improving social mobility: 2016/2017 Higher Education Initial Participation Rate for English domiciled students age 17-20 = 43%, HEIPR60 = 54% ⇒ large proportion of people go to HE at some point
- But is the gateway working? UK does (slightly) better in education mobility than income mobility (Blanden, 2013) – so the (higher) education-to-earnings link may be the issue?
  - If returns to HE differ according to socio-economic background and/or prior attainment, there are implications both for social mobility and the widening participation agenda

Motivation

⇒ Understanding the returns to HE and what shapes them is important. . .

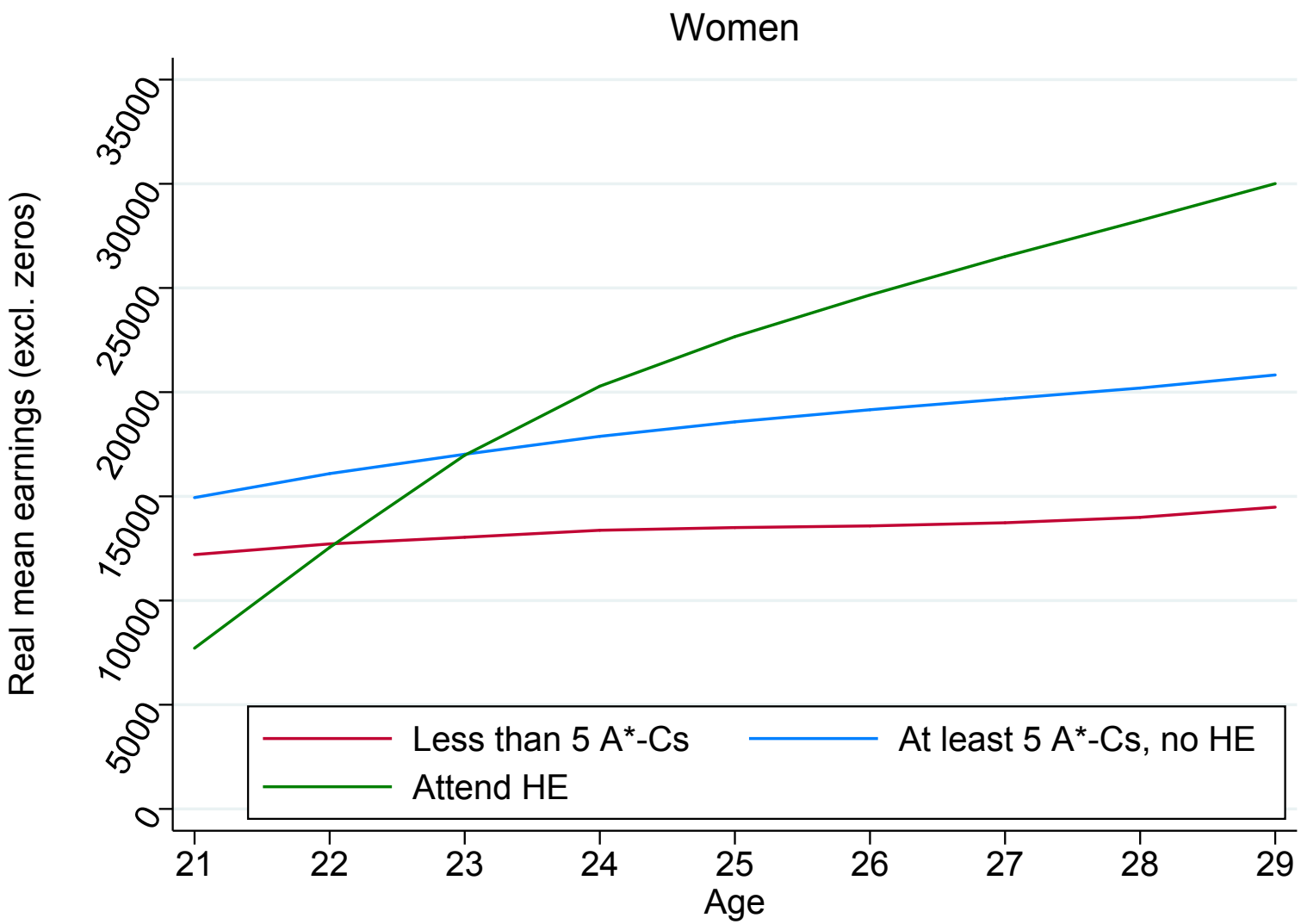
. . . for students:

- deciding (a) whether or not to go to university?
  - average graduate premium large but how much variation around the mean?
- and if so, (b) where to go and what to study?
  - lots of info in league tables, but earnings measures crude

. . . for policymakers:

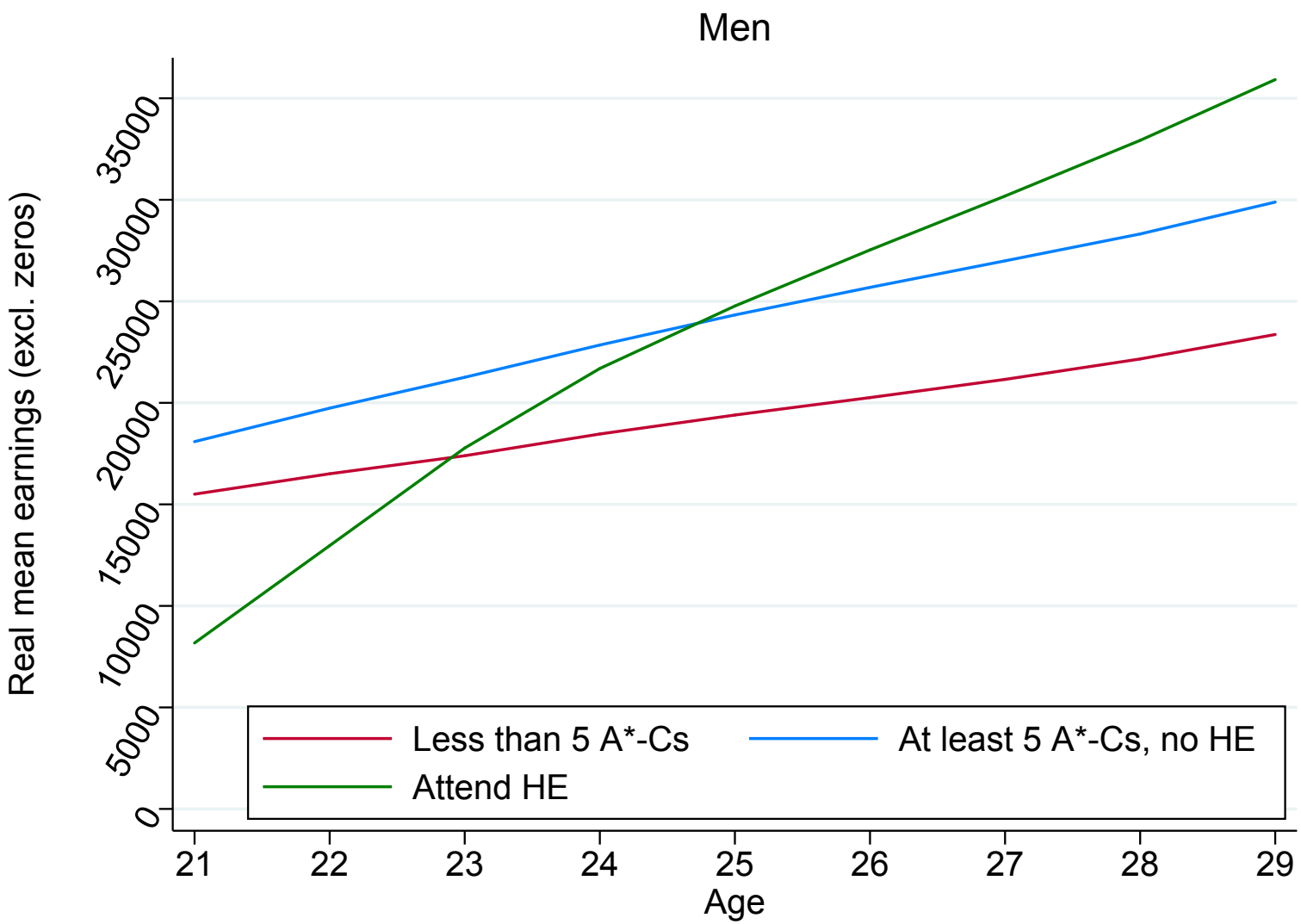
- considering the future of post-18 education (Augar)
  - are too many people now going to university? Could some people be making better choices?
  - understanding the university production function – are high 'value added' courses associated with certain teaching practices?
  - promoting widening participation – poor information has potential to harm students, particularly those from lower SES and non-traditional HE backgrounds

Average earnings by education level, women



Note: GCSE cohorts 2002-2007. Earnings are in 2018 prices and are capped at the 1st and 99th percentiles to avoid sensitivity to outliers. Self employment income is excluded.

Average earnings by education level, men



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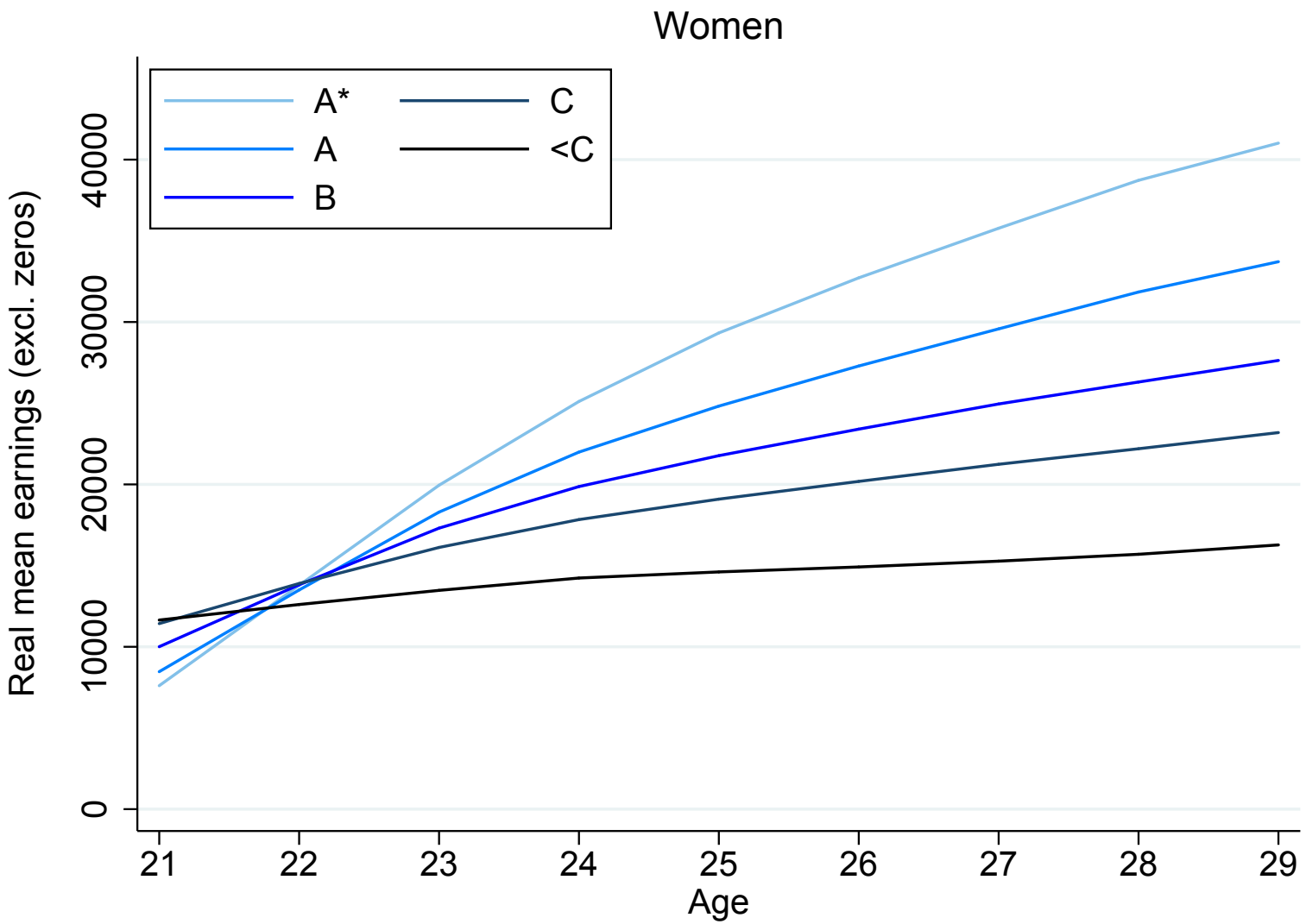
Estimating returns

- Estimating the 'return' to HE is complicated – fundamental problem of causal inference $\Rightarrow$ need to construct a valid counterfactual...
- Those who go to university typically have higher prior attainment and come from better-off families. For example, they are...
  - ...three times more likely to have achieved an A or A* in GCSE maths
  - ...twice as likely to have gone to an independent secondary school

Average earnings by maths GCSE result, women



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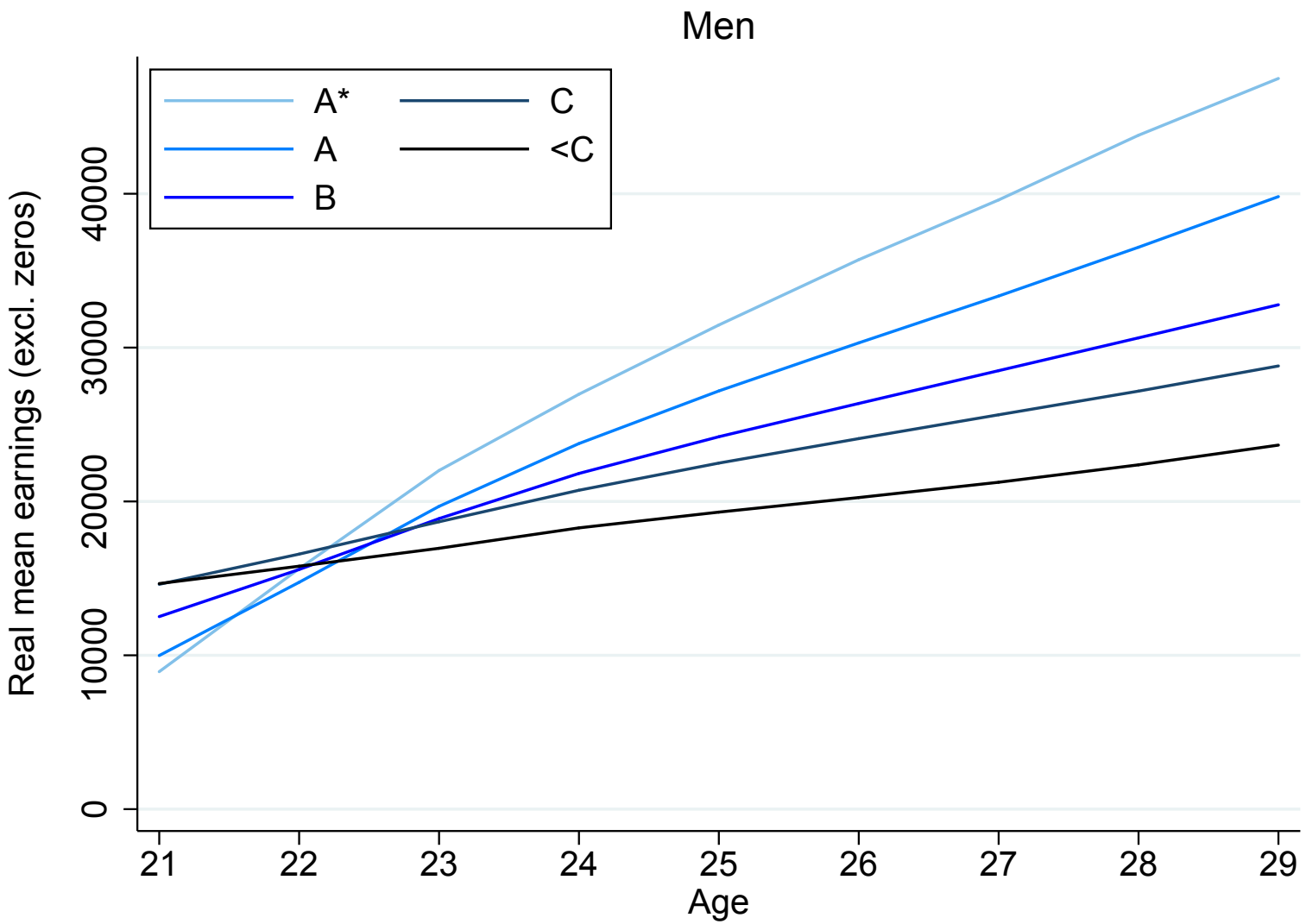

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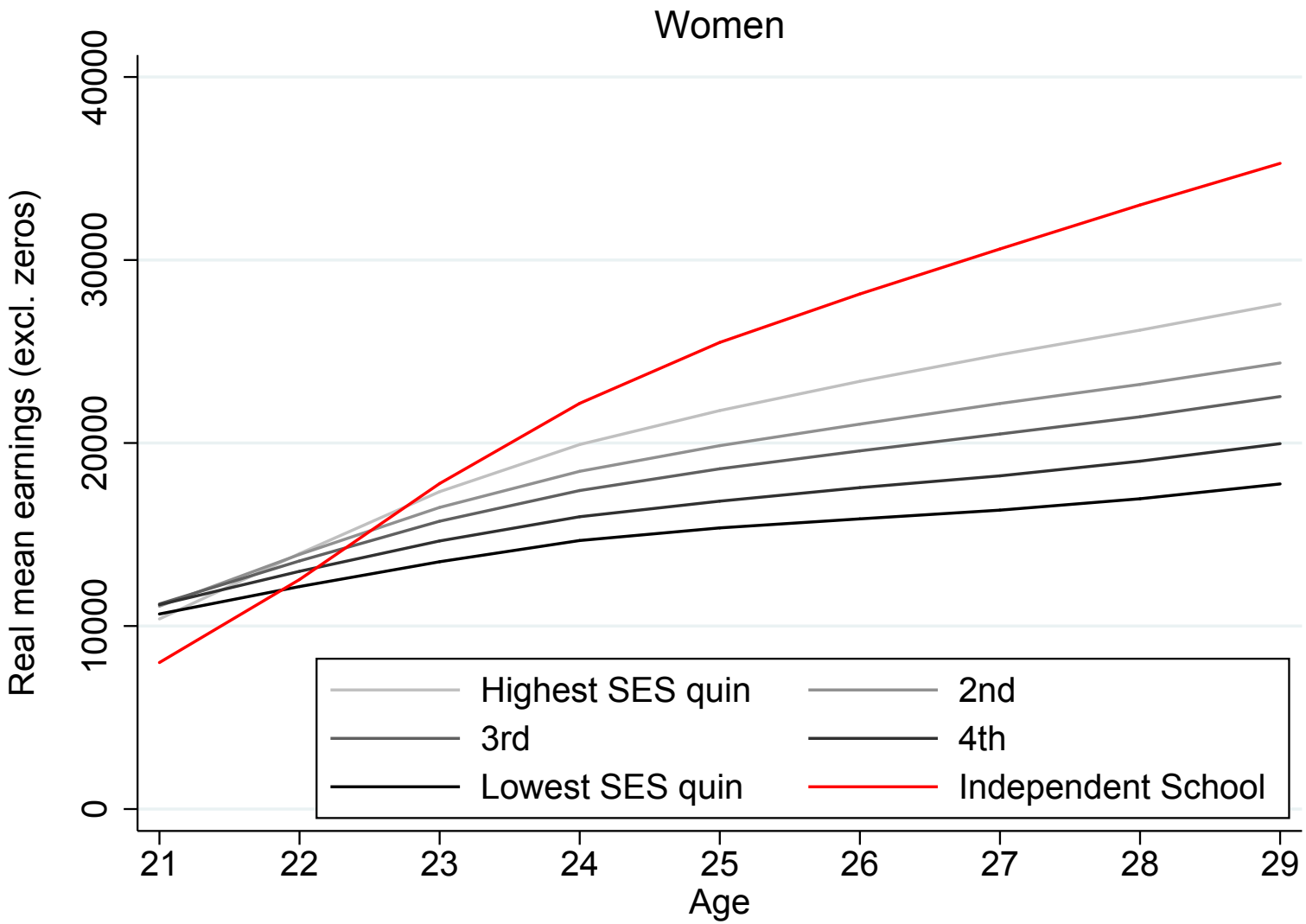
Average earnings by socio-economic status, women



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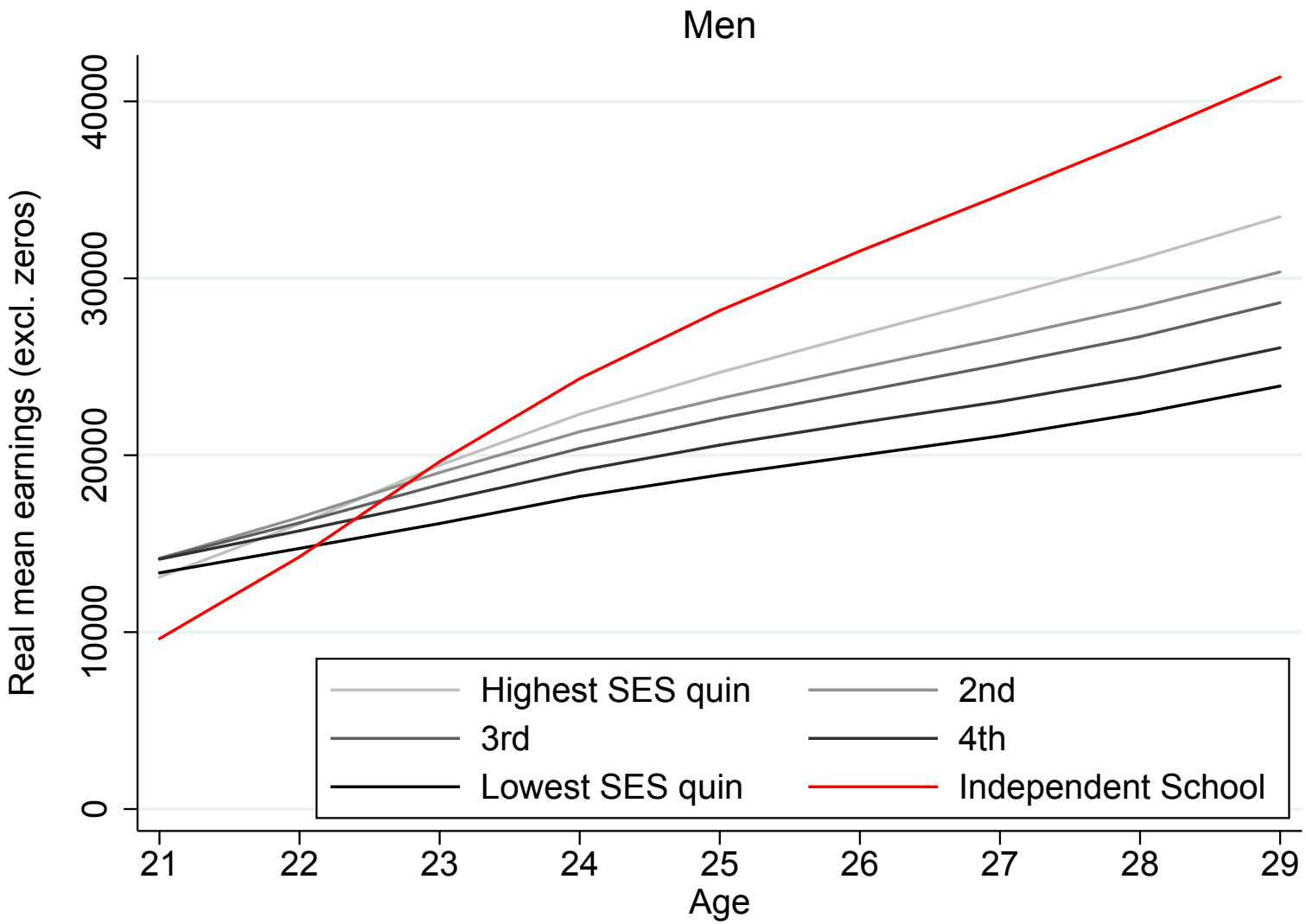

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Estimating returns

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- Those who go to university typically have higher prior attainment and come from better-off families. For example, they are...
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  ⇒ **we would expect them to have higher earnings on average even if they did not go to university**
- We need to take account of these differences in background and individual characteristics to estimate the "causal" effect of HE on earnings
- Requires data on earnings, HE subject/institution/cohort and also data on prior attainment, family background, school type etc

Data

- We use Longitudinal Educational Outcomes (LEO) data, new linked administrative data from DfE
  - Links **school** (NPD), **university** (HESA) and **tax** (HMRC) and **benefit records** (DWP)
  - Population of English students born 1986 onwards
  - Earnings from 2005/06-2015/16 (self-employment from 2012/13)
- For students born in 1986 who went to school in England, we know:
  - family background characteristics
  - performance in school
  - exact institution and subject of HE degrees
  - earnings at all ages up to age 29
- This is includes all state and independent school pupils

Methodology

- Returns are estimated (*separately by gender*) as follows:

$$ln(y_{it}) = \alpha_1 + X_i'\gamma_1 + HE_i\beta_1 + \epsilon_{1it} \quad (1)$$

$$ln(y_{it}) = \alpha_2 + X_i'\gamma_2 + Subj_i'\beta_2 + \epsilon_{2it} \quad (2)$$

$$ln(y_{it}) = \alpha_3 + X_i'\gamma_3 + HEI_i'\beta_3 + \epsilon_{3it} \quad (3)$$

$$ln(y_{it}) = \alpha_4 + X_i'\gamma_4 + Course_i'\beta_4 + \epsilon_{4it} \quad (4)$$

- y_{it} is real earnings at age 29 (though in practice we use more data)
- X_i a set of individual controls that include:
  - Region
  - Socio-economic status
  - Ethnicity
  - School type
  - Prior attainment (and KS5 subject choices)
- Focus on people who graduated from 2007 onwards; include all starters

Methodology

In the report we...

- ...estimate the causal impact of attending HE on gross annual earnings at age 29 for students studying full-time, who started HE age 18-21, and are subsequently observed in sustained employment
- ...estimate returns after accounting for differences in background characteristics and prior attainment, re-weight to make treatment/control as similar as possible
- ...show the overall impact, returns to specific subjects, HEIs and courses before looking at heterogeneity in returns by SES and prior attainment
- Caveats:
  - Choice of subject and institution inherently non-random
  - Returns reflect skill demand as well as return to HE
  - Fairly early point in career – lifetime earnings difference much higher
  - Historical time-frame – early to mid-2000s
  - Treatment on the treated
  - Non-pecuniary benefits

Overall returns to HE at age 29

	(1) Raw earnings	(2) Add age	(3) Add background	(4) Add prior attainment	(5) Add IPWRA
Men	**0.19*** **	0.25***	0.22***	0.04***	**0.06*** **
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
No. of observations	*2,183,120*	*2,183,120*	*2,183,120*	*2,183,120*	*2,183,120*
No. of individuals	*629,138*	*629,138*	*629,138*	*629,138*	*629,138*
Women	**0.44*** **	0.50***	0.46***	0.23***	**0.23*** **
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
No. of observations	*2,619,982*	*2,619,982*	*2,619,982*	*2,619,982*	*2,619,982*
No. of individuals	*731,200*	*731,200*	*731,200*	*731,200*	*731,200*
Cohort/Age start controls	No	Yes	Yes	Yes	Yes
Background charcteristics	No	No	Yes	Yes	Yes
Prior attainment	No	No	No	Yes	Yes
IPWRA weight	No	No	No	No	Yes

Note: Table reports derived estimates of the overall impact of HE on annual earnings at age 29 based on the 2002-2007 GCSE cohorts, conditional on at least five A*-C GCSEs and on being in sustained employment. Table sequentially adds age, background and prior attainment controls, and finally IPWRA weights. Estimates are in log points, which can be converted into percentage points using the transformation $100 * (e^x - 1)$, where x is the log points estimate.

Impacts of characteristics

	Male	Female
Independent school	0.001	0.004**
	(0.002)	(0.002)
4th quintile SES	-0.023***	-0.031***
	(0.001)	(0.001)
3rd quintile SES	-0.042***	-0.054***
	(0.001)	(0.001)
2nd quintile SES	-0.059***	-0.080***
	(0.002)	(0.001)
1st quintile SES	-0.068***	-0.093***
	(0.002)	(0.002)
EAL	-0.019***	-0.022***
	(0.003)	(0.002)
FSM	-0.040***	-0.043***
	(0.002)	(0.002)
SEN nonstatement	-0.082***	-0.065***
	(0.003)	(0.003)
Asian Bangladeshi	-0.003	-0.034***
	(0.007)	(0.006)
Asian Chinese	-0.048***	0.028***
	(0.007)	(0.007)
Asian Indian	0.05***	0.068***
	(0.004)	(0.003)
Asian Pakistani	-0.067***	-0.068***
	(0.005)	(0.004)
Black African	-0.080***	-0.062***
	(0.006)	(0.004)
Black Other	-0.082***	-0.078***
	(0.009)	(0.008)
Other Ethnicity	-0.022***	-0.01***
	(0.002)	(0.002)

- Clear impacts of SES, other characteristics and ethnicity - even taking into account prior attainment, prior subject choices, home region, age started and cohort
- To some extent due to choice of subject and institution

Overall returns to HE at age 29 by SES background

	Ind. School	High SES	4th quintile	3rd quintile	2nd quintile	Low SES
Men	17%	7%	4%	6%	4%	9%
Women	25%	23%	27%	23%	26%	23%

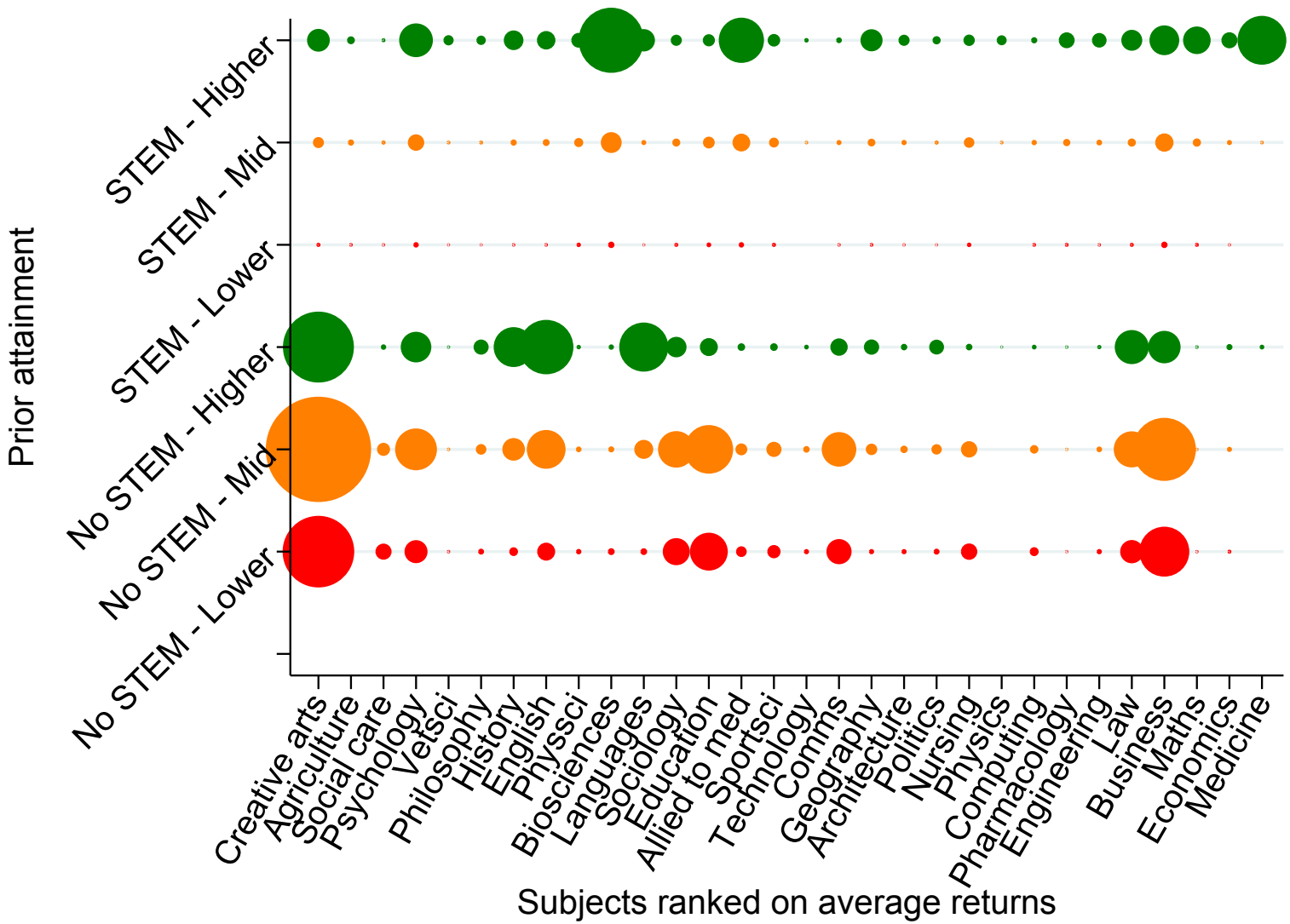
Note: Table reports derived estimates of the overall impact of HE on annual earnings at age 29 based on the 2002-2007 GCSE cohorts, conditional on at least five A*-C GCSEs and on being in sustained employment. Estimates are run separately by subgroup. SES quintile is based on the whole NPD sample, by cohort.

Overall returns to HE at age 29 by prior attainment

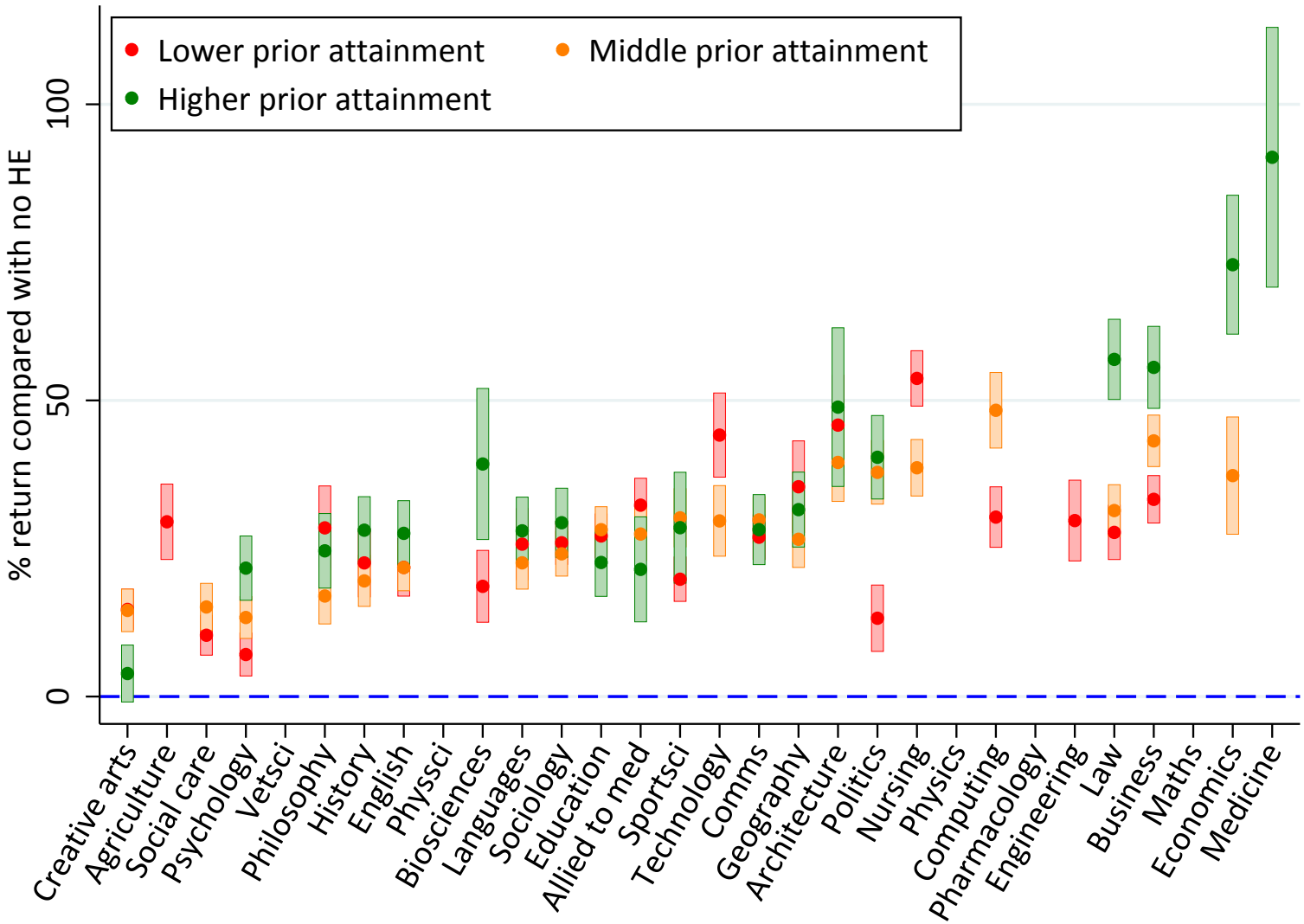
	Men			Women		
	Lower	Middle	Higher	Lower	Middle	Higher
No STEM A-level	4%	8%	20%	23%	25%	31%
With STEM A-level	11%	9%	5%	22%	16%	23%

Note: Table reports derived estimates of the overall impact of HE on annual earnings at age 29 based on the 2002-2007 GCSE cohorts, conditional on at least five A*-C GCSEs and on being in sustained employment. Estimates are run separately by subgroup. 'Lower', 'Middle' and 'Higher' prior attainment correspond respectively to the bottom, middle and top tercile of KS4 points in the sample of those with at least five A*-C GCSEs.

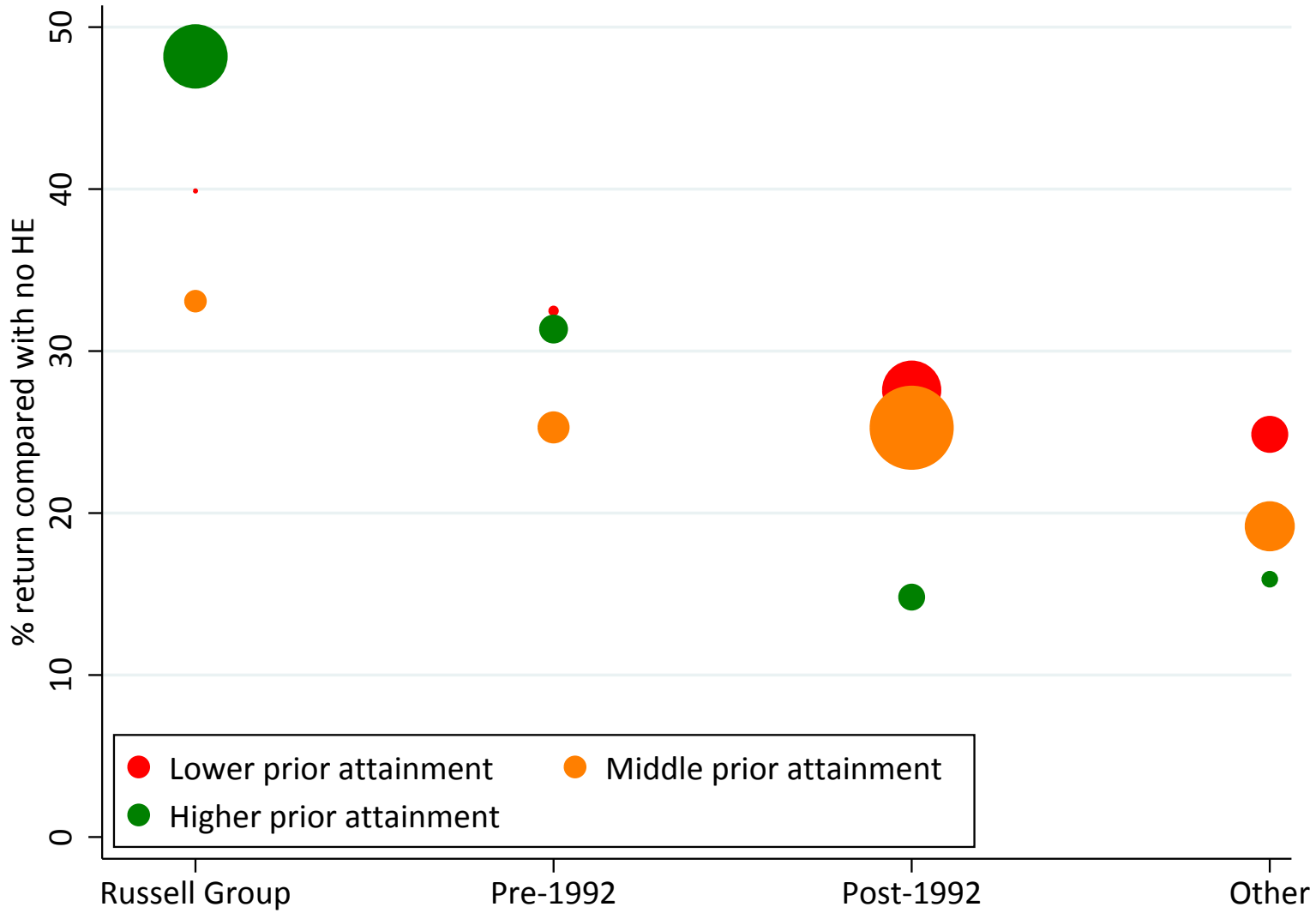
Subject choices by prior attainment – female students



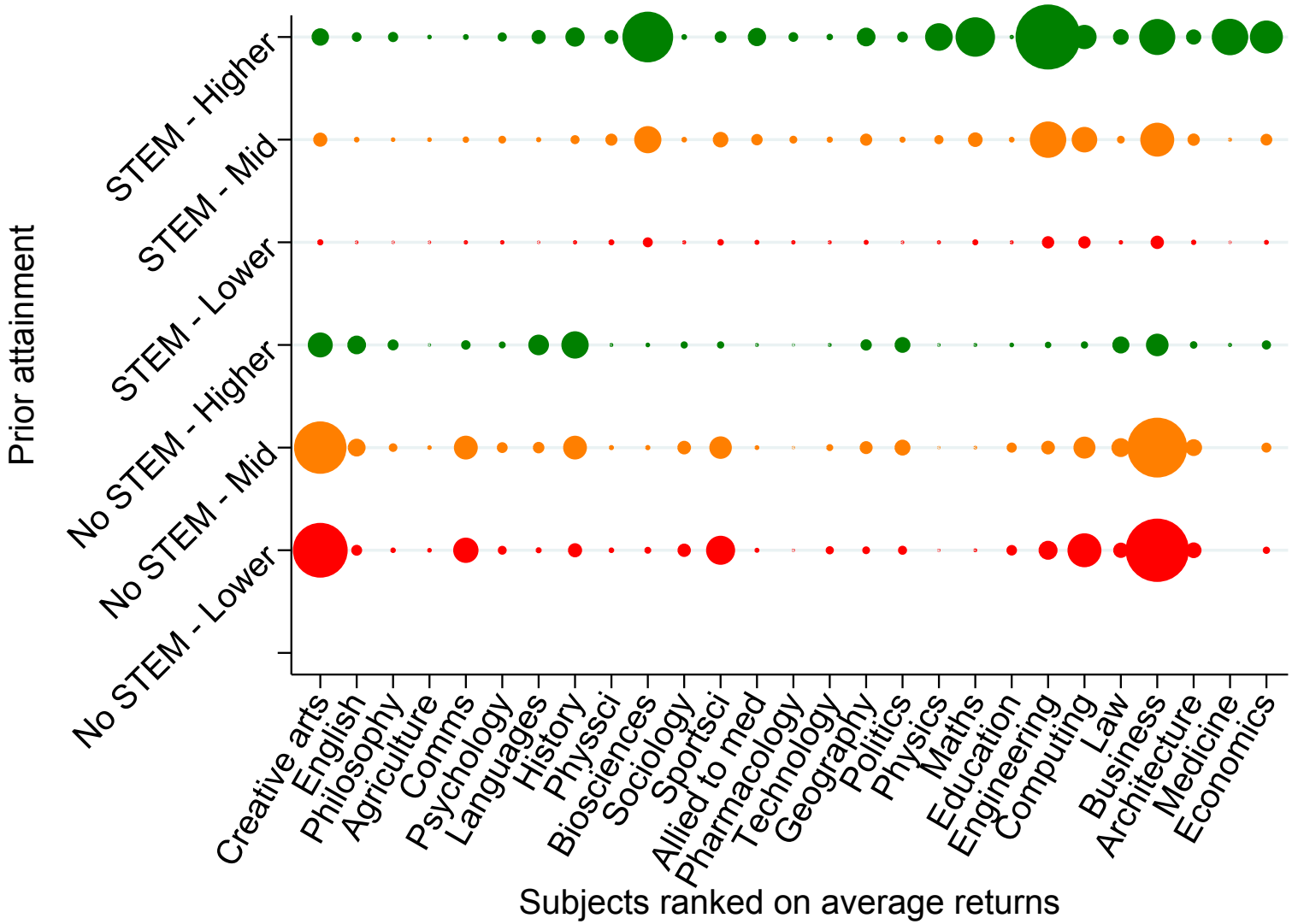
Subject returns to HE at age 29 by prior attainment – female students without STEM A-level



HEI type returns to HE at age 29 by prior attainment – female students without STEM A-level



Subject choices by prior attainment – male students



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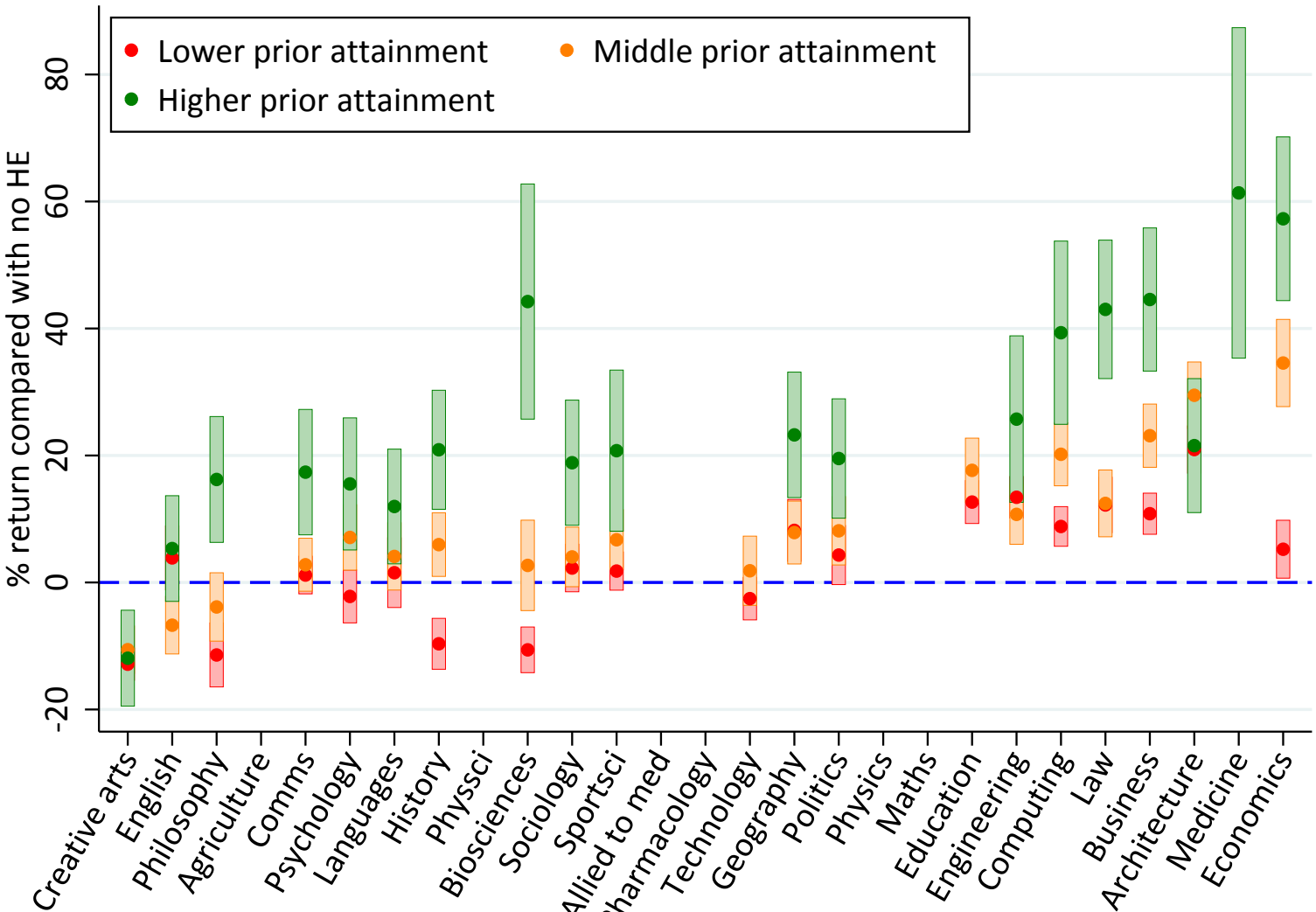

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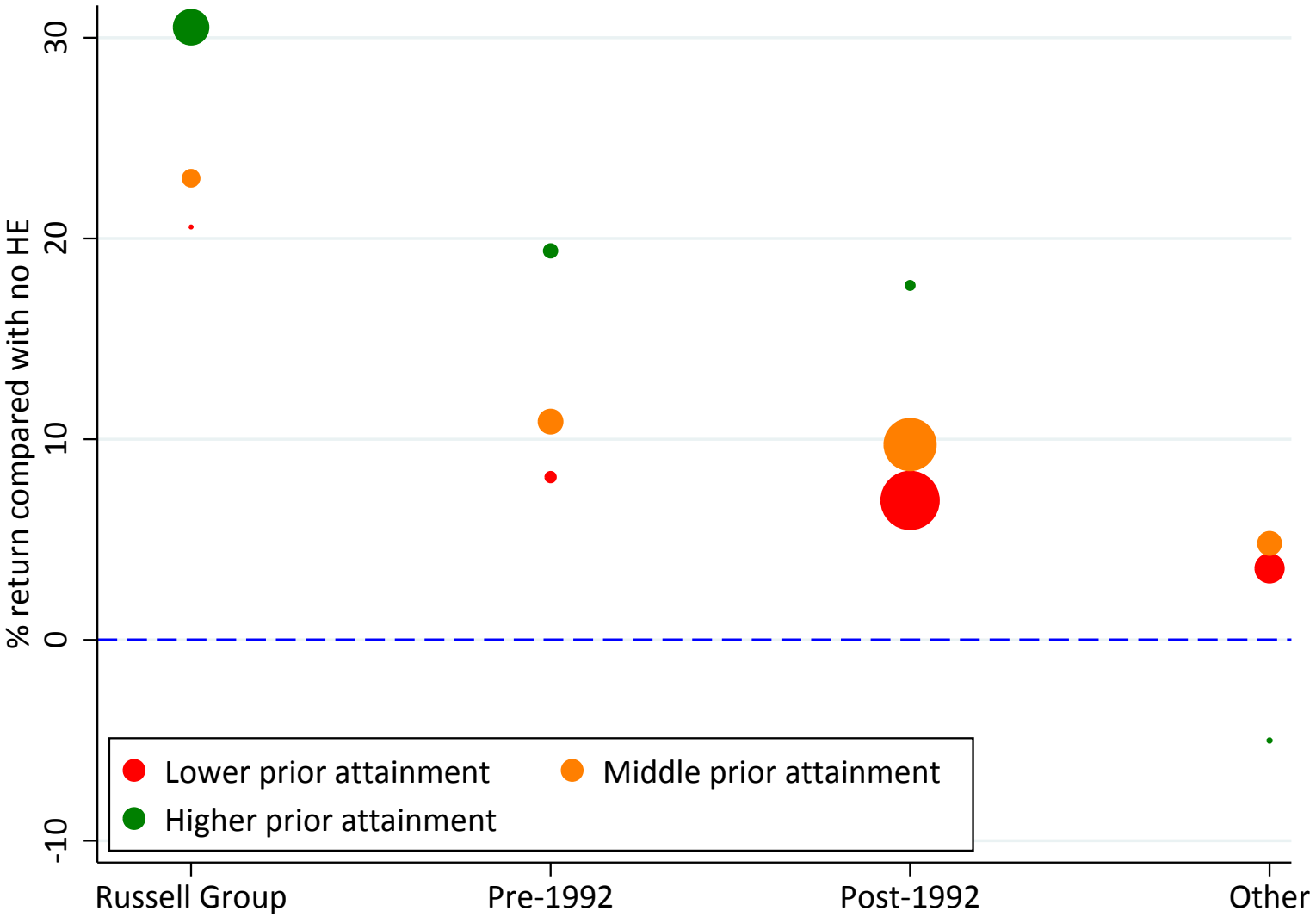


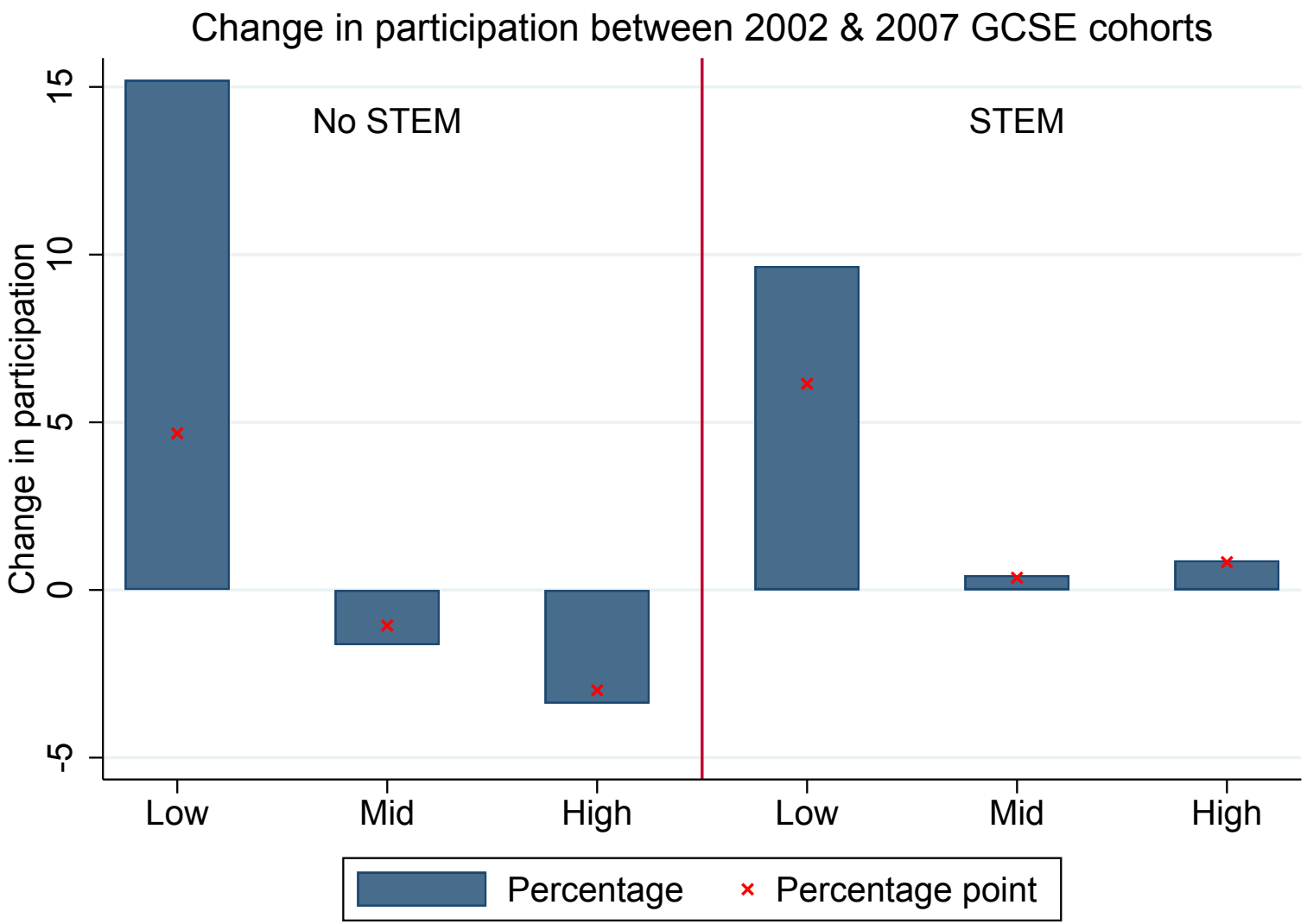
Implications for widening participation and social mobility

- 5 A*-C division stark – average earnings difference for getting 5 A*-C GCSEs compared to not is similar to average earnings difference for HE compared to 5 A*-C without HE from mid-20s onwards
- Positive: overall returns for different SES groups similar – on average HE translates into same proportionate increase in earnings
- Negative: level effect for lower SES groups – even after rich controls
- Negative: for men in particular, returns graded by prior attainment – HE experience translates into different levels of earnings, it is not just subject/HEI driving differences

Implications for widening participation and social mobility

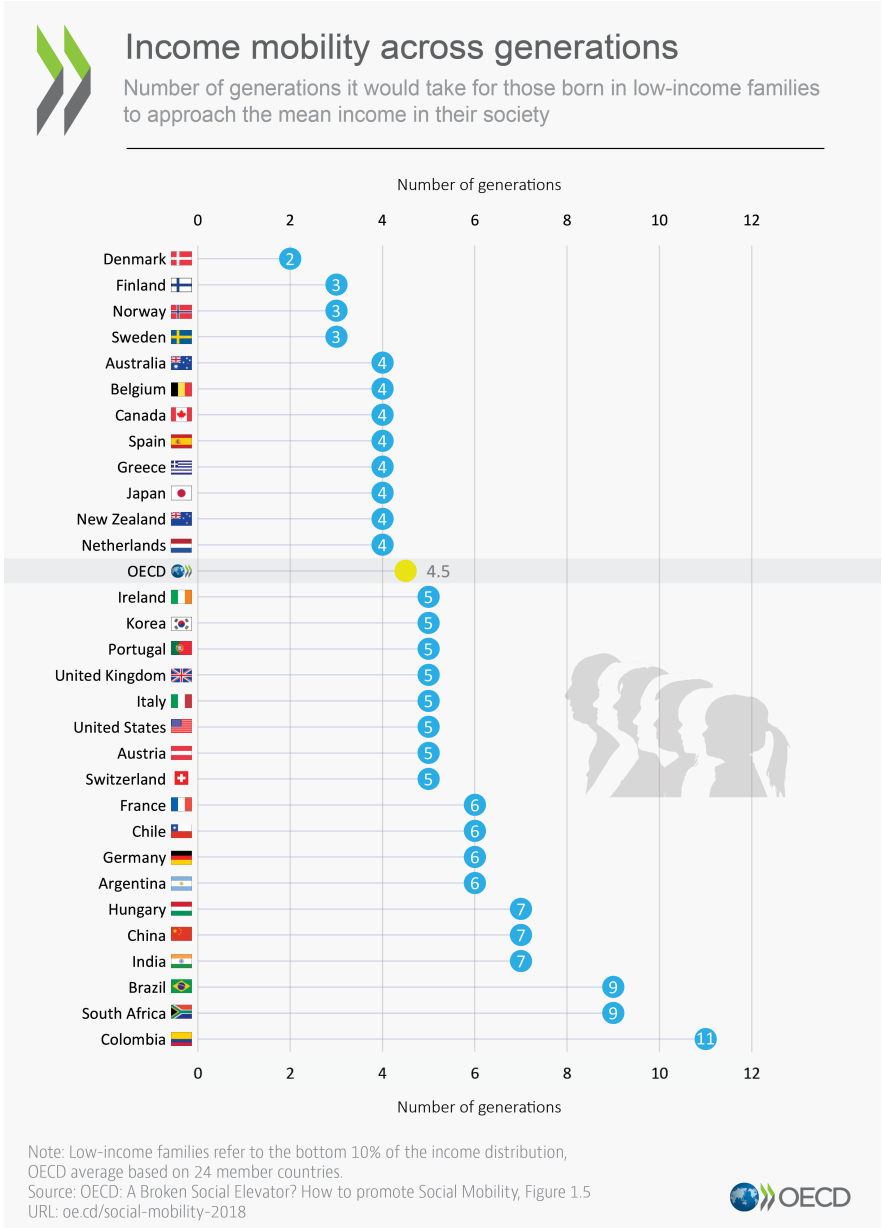
- Low returns for low prior attainment without a STEM A-level particularly important with regard to HE expansion:

Change in participation. . .



Implications for widening participation and social mobility

- Low returns for low prior attainment without a STEM A-level particularly important with regard to HE expansion:
  - Across all other prior attainment groups, nearly two-thirds of students already attend HE, in low prior attainment group it is only one-third. 70% of students with 5 A*-C grades who did not attend HE are in the low prior attainment/no STEM group
  - To extent that HE expansion is from this group, returns likely to be low
- But WP and HE expansion are not the same thing...


Income mobility across generations
Number of generations it would take for those born in low-income families to approach the mean income in their society
Number of generations
0 2 4 6 8 10 12
Denmark 2
Finland 3
Norway 3
Sweden 3
Australia 4
Belgium 4
Canada 4
Spain 4
Greece 4
Japan 4
New Zealand 4
Netherlands 4
OECD 4.5
Ireland 5
Korea 5
Portugal 5
United Kingdom 5
Italy 5
United States 5
Austria 5
Switzerland 5
France 6
Chile 6
Germany 6
Argentina 6
Hungary 7
China 7
India 7
Brazil 9
South Africa 9
Colombia 11
0 2 4 6 8 10 12
Number of generations
Note: Low-income families refer to the bottom 10% of the income distribution, OECD average based on 24 member countries.
Source: OECD: A Broken Social Elevator? How to promote Social Mobility, Figure 1.5
URL: oe.cd/social-mobility-2018
OECD

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