The Effect of Mental Health on Employment: Accounting for Selection Bias

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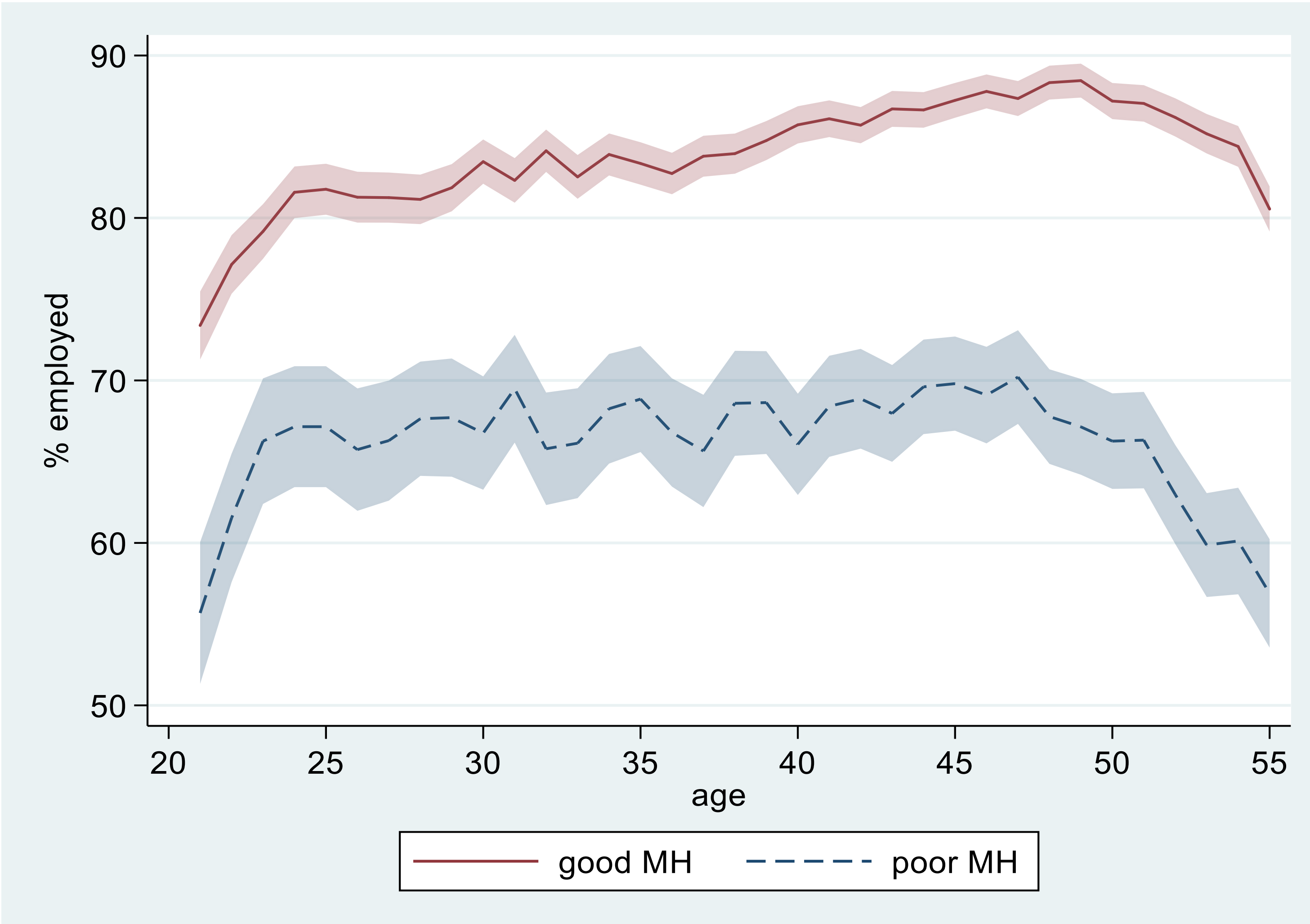
MH Employment Gap (UKHLS waves 1-8)



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Motivation

- The effect of an adverse health event on labour supply is theoretically ambiguous:
  - Can reduce time available for work because of increased time needed to maintain health and/or increased preference for leisure time
  - Can increase labour supply in order to cover the costs of health care (especially in privatised health care markets like the US where opportunity cost of non-work time is higher)
- No consensus regarding the size of the effect
  - Scarce evidence, especially in the UK

Policy makers need reliable quantitative estimates of the effect of MH on the probability of being in employment in order to estimate the real costs to the economy and to formulate appropriate policy tools to increase the employment rate of people with MH problems.

Motivation

- Sources of bias:
  - Reverse causality
  - Measurement error
  - ***Endogenous selection***

Instrumental Variable (IV) estimation for dealing with endogenous selection:

- eg: parental history of MH, childhood psychiatric disorders, religiosity, perceived social support, bereavement
- Instruments have little theoretical support
- No convincing empirical evidence on instrument validity
- Narrowly defined LATE estimates

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Motivation

- Longitudinal data with Fixed-Effects (FE)
  - Eliminates endogenous selection bias arising from time-invariant unobserved variables
  - But there could still be bias from time varying unobservables

- Oster (2019)
  - Method to estimate potential bias from time varying unobservables using selection information from time varying observables.
  - Enables estimation of an unbiased treatment effect in the presence of unobserved confounders

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Econometric model

$$(1)\ Y_{it} = \alpha + M_{it-1}\beta + Z_{it}\theta + d_t\gamma + \mu_i + \varepsilon_{it}$$

LPM for individual ***i*** at time ***t***

$$Y = \begin{cases} 1 & if\ (self)employed \\ 0 & if\ not\ employed \end{cases}$$

M is mental health

Z are individual, household, and area controls

μ are individual fixed-effects

d are wave dummies

Demean and estimate using OLS

$$(2)\ \underbrace{\ddot{Y}_{it}}_{(Y_{it} - \bar{Y}_i)} = \underbrace{\ddot{M}_{it-1}}_{(M_{it-1} - \bar{M}_i)}\beta + \underbrace{\ddot{Z}_{it}}_{(Z_{it} - \bar{Z}_i)}\theta + \underbrace{\ddot{d}_{it}}_{(d_{it} - \bar{d}_i)}\gamma + \underbrace{\tilde{\varepsilon}_{it}}_{(\varepsilon_{it} - \bar{\varepsilon}_i)}$$

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Data

- Understanding Society (UKHLS) waves 1-8 (2009/10 – 2016/17)
- 21-55 year olds (prime age workers)
- England and Wales
- 88,143 observations

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MH measures

- GHQ12D - Binary measure of Caseness based on the 0-12 scoring method of the 12-item General Health Questionnaire (=1 if score is 4 or higher, which identifies the possible presence of psychiatric morbidity).

- GHQ36 - Continuous measure based on the 0-36 Likert scale scoring method of the GHQ (higher values represent better health).

- MCS - Mental Component Summary, measured on a 0-100 continuous scale based on the SF-12 questionnaire where 0 denotes low functioning and 100 denotes high functioning.

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Controls

- Physical health - SF12 physical component score (PCS)
- Age
- Married (or living together)
- Education
- Children living in household
- Number of adults in household
- Other household income
- Unemployment rate and GVA in Local Authority District

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Oster (2019)

If selection on observables is proportional to selection on unobservables, omitted variable bias can be recovered from:

(i) Controlled regression: $\ddot{Y}_{it} = \ddot{M}_{it-1}\beta + \ddot{Z}_{it}\theta + \ddot{d}_{it}\gamma + \tilde{\varepsilon}_{it}$

(ii) Uncontrolled regression: $\ddot{Y}_{it} = \ddot{M}_{it-1}\beta + \ddot{d}_{it}\gamma + \dot{\varepsilon}_{it}$

(iii) Coefficient of proportionality $\boldsymbol{\delta}$ (defines how strong the effect of the unobservables on β is relative to the effect of the observables)

$\delta = 1$ effect of unobservables equal to effect of observables (same direction)

$\delta > 1$ effect of unobservables greater than effect of observables (same direction)

$0 < \delta < 1$ effect of unobservables less than effect of observables (same direction)

(iv) $\boldsymbol{R_{max}}$ (the R^2 from the full model with unobservables included)

- can be 1, but most likely < 1 (LPM, measurement error)

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Oster (2019)

Bias adjusted estimate of β: $\beta^* \approx \tilde{\beta} + \delta \frac{(\tilde{\beta}-\dot{\beta})(R_{max}-\tilde{R})}{(\tilde{R}-\dot{R})}$

$\tilde{\beta}$ and $\tilde{R}$ are the estimate of β and the R-squared from the controlled regression

$\dot{\beta}$ and $\dot{R}$ are the estimate of β is the R-squared from the uncontrolled regression

Size of the bias $(\beta^* - \tilde{\beta})$ depends not only on the effect of the observables on β (i.e. the difference between $\tilde{\beta}$ and $\dot{\beta}$), but also on how much of the variation in Y the observables explain (the difference between $\tilde{R}$ and $\dot{R}$) relative to how much of the variation we expect the unobservables to explain (the difference between R_{max} and $\tilde{R}$).

Possible to have large bias even when β is relatively stable (i.e. $\dot{\beta} - \tilde{\beta}$ is small) if $R_{max} - \tilde{R}$ is large compared to $\tilde{R} - \dot{R}$. Also possible to have little or no bias when β is not stable if $\frac{R_{max}-\tilde{R}}{\tilde{R}-\dot{R}}$ is very small.

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	GHQ12D=0			GHQ12D=1		
	obs	mean	(st. dev.)	obs	mean	(st. dev.)
Employed	70,554	0.86		17,589	0.69	
GHQ12D t-1	70,554	0.13		17,589	0.48	
GHQ36	70,554	26.90	(2.88)	17,589	15.59	(5.19)
GHQ36 t-1	70,554	25.78	(4.57)	17,589	20.17	(7.11)
MCS	70,554	51.23	(7.23)	17,589	36.13	(10.09)
MCS t-1	70,554	50.32	(8.51)	17,589	41.43	(11.48)
PCS	70,554	52.80	(8.09)	17,589	48.89	(13.20)
PCS t-1	70,554	52.98	(8.27)	17,589	49.08	(12.17)
ADL problems	70,522			17,566		
none		0.91			0.74	
1-2		0.07			0.15	
3-4		0.02			0.07	
5 or more		0.01			0.04	
Age	70,554	40.53	(9.12)	17,589	40.73	(9.31)
Married	70,554	0.74		17,589	0.65	
Education level	70,554			17,589		
No education		0.04			0.06	
O-level		0.29			0.32	
A-level		0.21			0.20	
Degree		0.46			0.42	
No child in HH	70,554	0.50		17,589	0.53	
Child 0-4 in HH	70,554	0.21		17,589	0.19	
Child 5-11 in HH	70,554	0.30		17,589	0.28	
Child 12-15 in HH	70,554	0.19		17,589	0.19	
Adults in HH	70,554	2.33	(0.97)	17,589	2.28	(1.05)
Other HH income	70,554	2616	(2374)	17,589	2441	(2139)
Unemployment rate	70,554	7.14	(2.90)	17,589	7.40	(2.95)
GVA	70,554	23070	(13858)	17,589	22908	(14554)

	(1) Pooled OLS (no controls)		(2) Pooled OLS (w/ controls)		(3) Demeaned OLS (no controls)		(4) Demeaned OLS (w/ controls)	
GHQ12D t-1	-0.1557	***	-0.0973	***	-0.0141	***	-0.0141	***
	(0.0052)		(0.0042)		(0.0027)		(0.0027)	
PCS t-1			0.0095	***			0.0008	***
			(0.0002)				(0.0002)	
R-squared	0.0288		0.2325		0.8029		0.8065	
GHQ36 t-1	0.0143	***	0.0091	***	0.0017	***	0.0017	***
	(0.0004)		(0.0003)		(0.0002)		(0.0002)	
	[0.0807]		[0.0515]		[0.0097]		[0.0098]	
PCS t-1			0.0091	***			0.0008	***
			(0.0002)				(0.0002)	
R-squared	0.0474		0.2398		0.8030		0.8066	
MCS t-1	0.0084	***	0.0068	***	0.0009	***	0.0012	***
	(0.0002)		(0.0002)		(0.0001)		(0.0002)	
	[0.0823]		[0.0670]		[0.0088]		[0.0119]	
PCS t-1			0.0102	***			0.0012	***
			(0.0002)				(0.0002)	
R-squared	0.0490		0.2525		0.8030		0.8067	

* $p<0.10$ ** $p<0.05$ *** $p<0.01$. Standard errors in parentheses (clustered at individual level). Standardized MH coefficients in brackets. All models include wave dummies. Sample size: 88,143.

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	$\delta = 0$	$\delta = 1$ (β^*)	
	$(\tilde{\beta})$	$R_{max} = 1.3\tilde{R}$	$R_{max} = 2.2\tilde{R}$
GHQ12D t-1	-0.0141	-0.0141	-0.0141
	(0.0027)	[0.0030]	[0.0030]
GHQ36 t-1	0.0017	0.0017	0.0017
	(0.0002)	[0.0003]	[0.0003]
MCS t-1	0.0012	0.0014	**0.0018**
	(0.0002)	[0.0002]	[0.0002]

Bootstrapped standard errors in square brackets (1000 reps). Clustered standard errors in parentheses. Bounds in bold are outside the 95% CI of the coefficient in the controlled regression.

- No evidence of selection bias once fixed-effects are taken into account

- Selection into mental health is almost entirely based on time-invariant characteristics

Heterogeneous Effects

- No significant difference between men and women across all three MH measures
- $|\beta_{degree}| < |\beta_{no\ degree}|$ for the GHQ caseness dummy and for the continuous GHQ scale
- $|\beta_{above\ poverty}| < |\beta_{below\ poverty}|$ only for the GHQ caseness dummy

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Policy Implications

- Relevant parameters for policymakers who wish to understand how deteriorations or improvements in health may affect employment levels in the population.

- Effects are small, but remember that we are estimating the effect of *changes* in MH! And our MH measures are not diagnosed conditions. Our results suggest the bulk of the MH employment gap is not due to the causal effect of MH on employment, and that policy targeted at improving MH will not have a large impact on reducing the MH employment gap.

- Does not mean there is no role for policy! Policies aimed at supporting people with MH problems gain or stay in employment may be more effective (e.g. initiatives that reduce stigma attached to mental illness, or programs that allow for special conditions for employees with MH issues).

- No significant gender differences in the effect of MH, but there is a significant difference in MH and employment levels between men and women, which should be addressed through policy.

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Concluding remarks

- Transitioning into poor MH leads to a reduction of 1.4 percentage points in the probability of being employed; one standard deviation change in the continuous measures of MH causes a 1.0-1.2 pp change
- Selection into MH is almost entirely based on time-invariant characteristics
- FE estimates of the effect of MH on employment are unbiased (no evidence of upward bias as may be expected from the intuition that changing circumstances that favour work also favour MH)
- Our effects are considerably smaller than estimates from other countries using IV methods (we focus on the effect of changes in MH!)
- Higher education moderates the effect of MH disorders on employment, while relative poverty exacerbates it

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