Persistent Poverty and Cognitive Development: Modelling, Methods and Evidence

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Outline

- Motivation
- Data
  - Measuring child poverty
  - Measures of cognitive development
- Linking child poverty and cognitive development
  - Method 1: Regression-based; SURE (Seemingly Unrelated Regression Equations)
  - Method 2: SEM (Structural Equation Modelling)
- Results
- Conclusions

Motivation

Early years matter for cognitive development and

Field

Feinstein (2003), Gregg & Macmillan (2009), Goodman & Gregg (2010), Blanden & Machin (2010) etc

vs critical periods)?

How much poverty matters (episodic vs persistent)?

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complementarity

Data

UK Millennium Cohort Study (MCS)

- 19,000 children born in the UK in 2000-01
- Four waves currently available:

Wave:	MCS1	MCS2	MCS3	MCS4	[MCS5]
Child age:	*9 months*	*3 years*	*5 years*	*7 years*	*[11 years]*

- Face-to-face interviews
- Range of household, socio-economic and demographic information about the child and their family, including parenting activities, cognitive assessment etc

Child poverty - incidence

Poverty incidence: $P_t = 1$ *if* $y_t < z_t$

with $z_t = 0.6$ median equivalised UK hh income

	MCS1 2001-2	MCS2 2004-5	MCS3 2006	MCS4 2008
Age of the child	*9 months*	*3 years*	*5 years*	*7 years*
Poverty rate	20.2%	21.2%	21.5%	18.7%

Persistent poverty

Number of poverty states (*PS*) at wave *T* is 2^T

Time horizon *T* = 2		Time horizon *T* = 3		Time horizon *T* = 4	
PS	*%*	*PS*	*%*	*PS*	*%*
00	72.1	**000**	67.0	**0000**	64.1
01	7.7	001	5.1	0001	2.9
10	6.7	010	4.1	0010	3.5
11	13.5	100	4.4	0100	3.4
		101	2.3		
		011	3.6		
		110	2.9		
		111	10.5		
				1110	2.4
				1111	8.2

Cognitive development

Age-appropriate standardised tests:

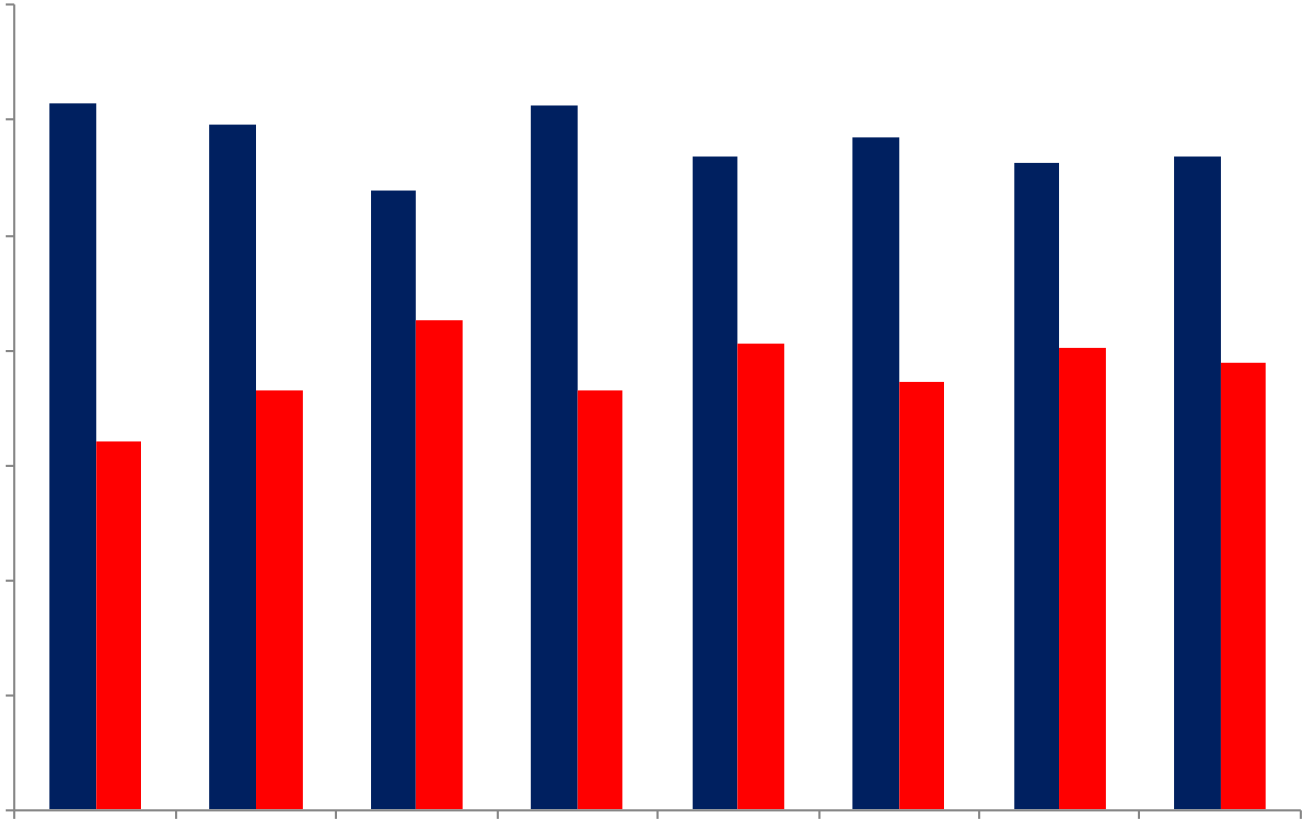
MCS2: BAS Naming Vocabulary test (BAS-NV)
Bracken School Readiness Assessment (BSRA)

MCS3: BAS Naming Vocabulary test (BAS-NV)
BAS Picture Similarity test (BAS-PS)
BAS Pattern Construction test (BAS-PC)

MCS4: BAS Pattern Construction test (BAS-PC)
BAS Word Reading test (BAS-WR)
Progress in Maths (PiM)

Compute percentile rankings for each test

Child poverty and cognitive development



Method 1: Reduced-form regression

SURE model: $Y \quad X \quad I$

Y = vector of test scores/rankings

X = matrix of the (wave-specific) characteristics including poverty

I = matrix of parental investments and parenting styles

Method 1: Reduced-form regression

One weakness with SURE (and other reduced-form regression-based approaches) is impact of measurement error in cognitive ability (and in parental investment):

- we observe test scores which are correlated with the latent cognitive ability but measure it with error
- leads to problems econometrically and in interpretation (Cunha and Heckman, 2008)

Also cannot take account of prior cognitive development and/or parental investment no dynamics

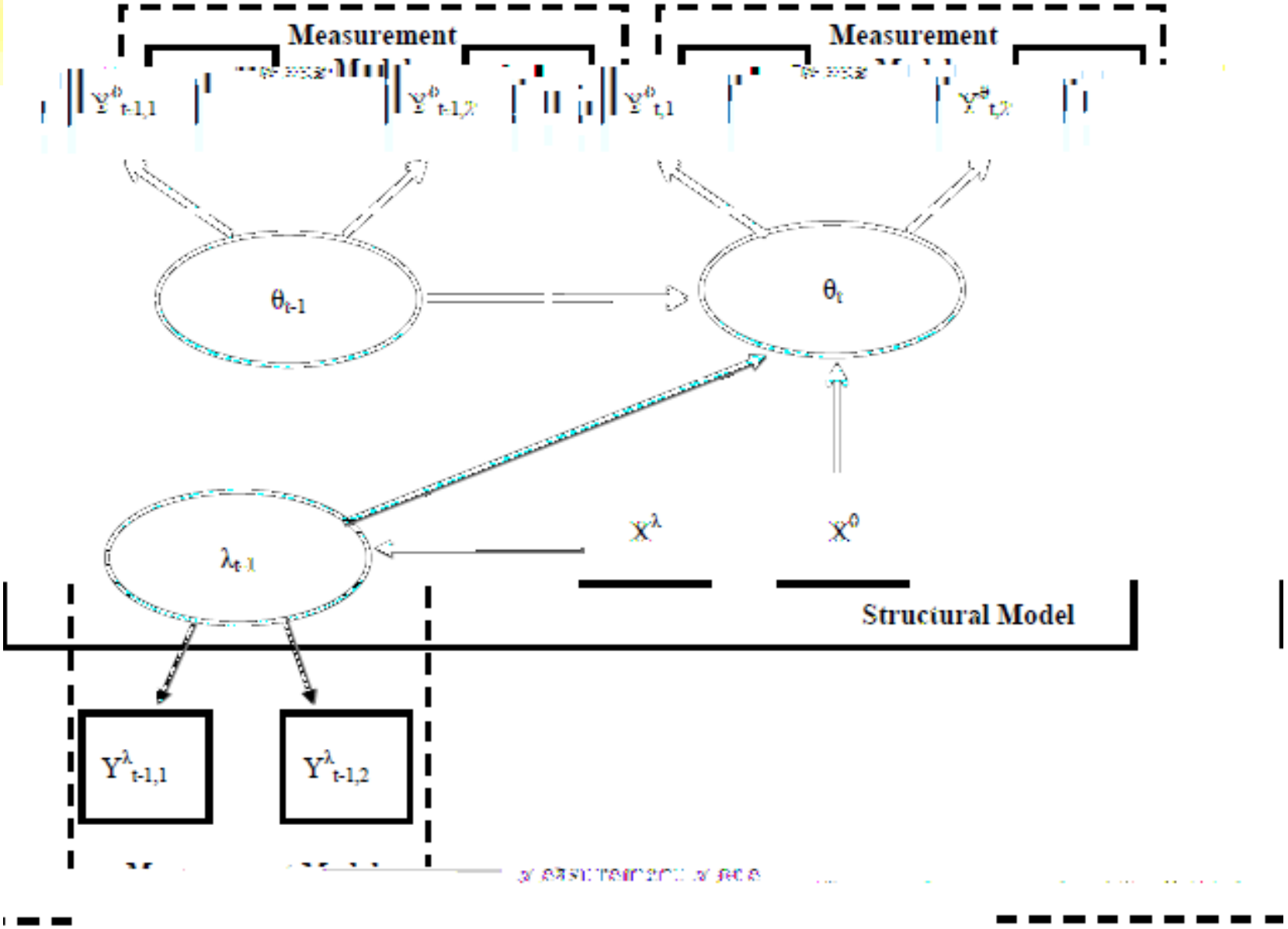
- age-specific tests cannot be compared: $Y = f(Y_{-1})$ is not allowed

Method 2: Structural Equation Modelling

= latent cognitive skill at time *t*

= latent parental investment at time *t*

= matrix of the (wave-


Measurement
Measurement
$Y^{\phi}_{t-1,1}$
$Y^{\phi}_{t-1,2}$
$Y^{\phi}_{t,1}$
$Y^{\phi}_{t,2}$
θ_{t-1}
θ_t
λ_{t-1}
X^{λ}
X^{ϕ}
Structural Model
$Y^{\lambda}_{t-1,1}$
$Y^{\lambda}_{t-1,2}$

Other advantages of SEM:

1. It allows us to introduce dynamics in the model

   while the past latent cognitive ability can reasonably be assumed to influence current latent cognitive ability, the same cannot be said about the test scores

2. It also allows us to capture both the direct and the indirect effect of poverty on cognitive development

   Direct effects are simply how poverty affects cognitive development

   Indirect effects capture how poverty affects lagged cognitive development, parental investment and parenting style, which in turn impact upon current cognitive development

3. It allows us to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Results SURE

The magnitudes of these effects are large

Even after controlling for the background characteristics, parental investment, and parenting style:

- a child age 3 who has been in poverty since birth can be expected to be 11 percentile ranks lower on BAS-NV than a child who has experienced no episodes of poverty
- a child age 7 who has been in poverty since birth can be expected to be 15 percentile ranks lower in BAS-WR than a child who has experienced no episodes of poverty

Results SEM

Poverty dummies are not that significant after wave 2

i.e. *direct* effects of poverty on cognitive development are mainly

Conclusions

Children born into poverty have significantly lower test scores at age 3, 5 and 7

Implications

Emphasis needs to be on early years intervention (birth to age 3) in preventing poverty

development is so strong

sufficient for good cognitive development since impact of parental investment significantly reduced if in poverty