

Human capital, gender and capabilities

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Human Capital: Definition and Measurement

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Goals of the paper

- Focus on children cognitive capability following Sen and Nussbaum's Capability Approach.
- Exploring the capabilities 'Senses imagination and Thought' (ISTAT AVQ 2008) and 'Scientific cognitive' (PISA 2006)
- Structural Equation model to estimate capabilities

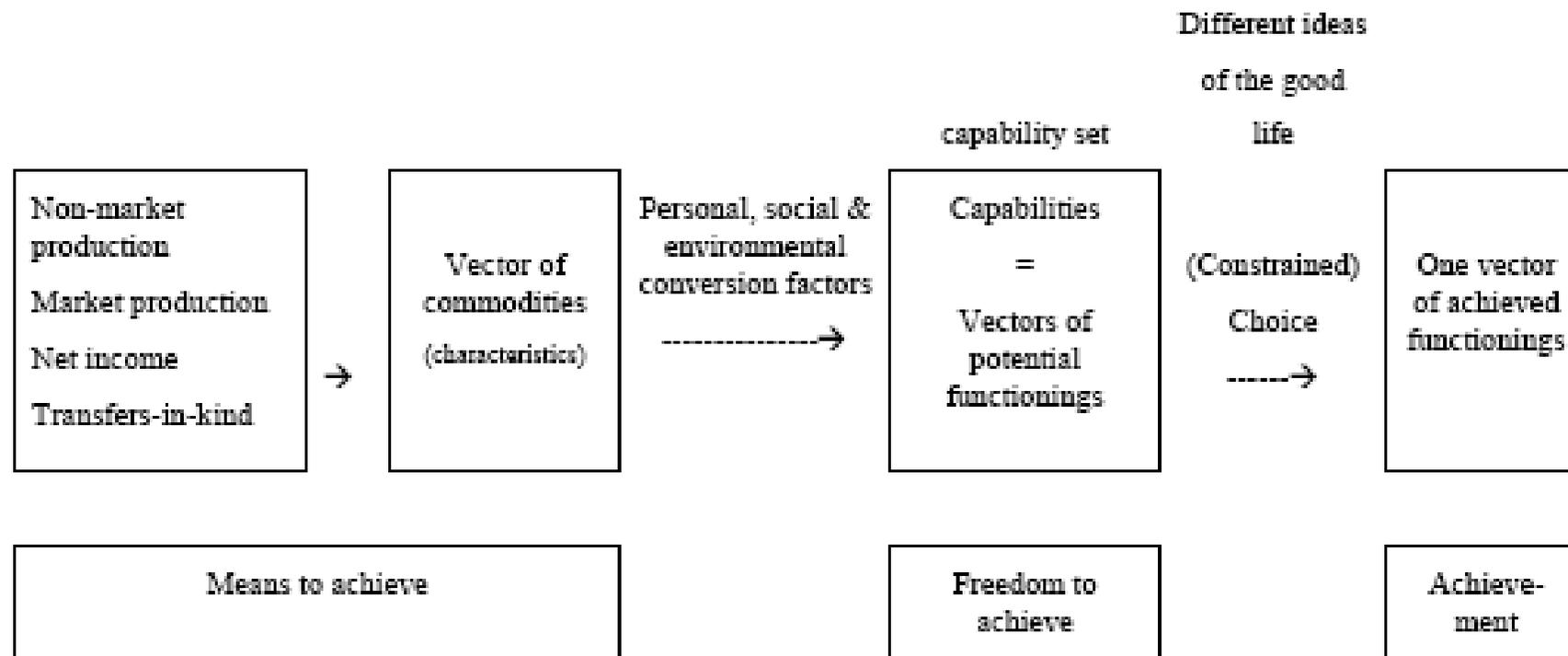
Senses Imagination and thought

“Being able to use the senses, to imagine, think, and reason and do these things in a “truly human” way informed and cultivated by an adequate education, including by no means limited to, literacy and basic material skills.”

Martha Nussbaum (2003) ‘Capabilities as fundamental entitlements: Sen and social justice’, *Feminist Economics*, vol.9 (2-3): 33-59.

Senses Imagination and thought

- This is a basic capability for the development of children
- Among OECD countries Italy is at the second lowest place in the ranking for children's educational well being (defined over school achievement at age 15, beyond basic skills, transition to employment, Unicef, 2007, pg 18)
- Institutional conversion factors can affect its development
- Regional variability
- Gender differences



Robeyns, I. (2003) 'The capability approach: an interdisciplinary introduction'
University of Amsterdam.

How to measure the development of capabilities

- Alkire S., Comim F., Qizilibash M, (eds), (2008) *The capability approach: concepts, applications and measurement*, Cambridge University Press.
- Anand, P., Hunter, G., Carter, I., Dowding, K., Guala, F. and Van Hees, M. (2005) "Measuring Human Capabilities", *Open discussion papers in economics*, 53.
- Chiappero Martinetti, E. (2008) 'Complexity and vagueness in the capability approach: strengths or weaknesses?' in Alkire S., Comim F., Qizilibash M, (eds), (2008) *The capability approach: concepts, applications and measurement*, Cambridge University Press.
- Di Tommaso, M.L. (2007) 'Children's capabilities: a structural equation models for India', *Journal of Socioeconomics*, vol 36: 436-50.
- Krishnakumar, J. and Ballon, P. (2008). Estimating basic capabilities: a structural equation approach. *World Development*, vol. 36, No. 6, 992-1010.
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Why **Structural Equation Models** for operationalising the capability approach?

- Capabilities as **latent variables** of which it is possible to identify some indicators.
- To study the relation between functionings and capabilities.
- To identify factors that can help in designing policies.

What is a structural equation model (SEM)

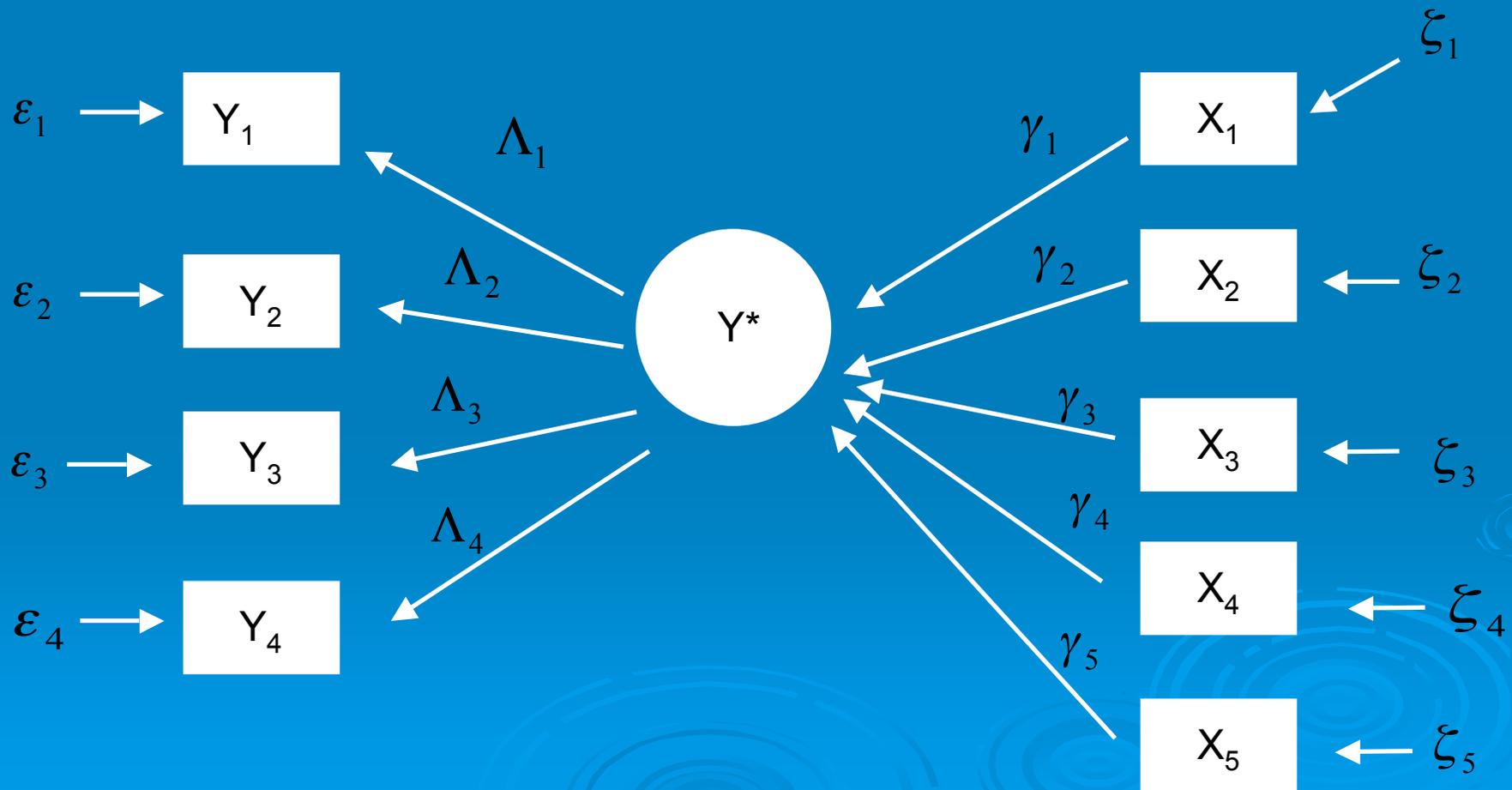
- The model consists of a system of structural equations.
- The equations contain random variables and structural parameters.
- The links between variables are summarized in the structural parameters.

What is a structural equation model (SEM)

The model consists of two parts:

- **Latent variable model:** it includes the structural equations that summarize the relationships between latent variables.
- **Measurement model:** it includes the structural equations that represents the link between the latent and the observed indicators.

MIMIC (Multiple Indicators Multiple Causes)



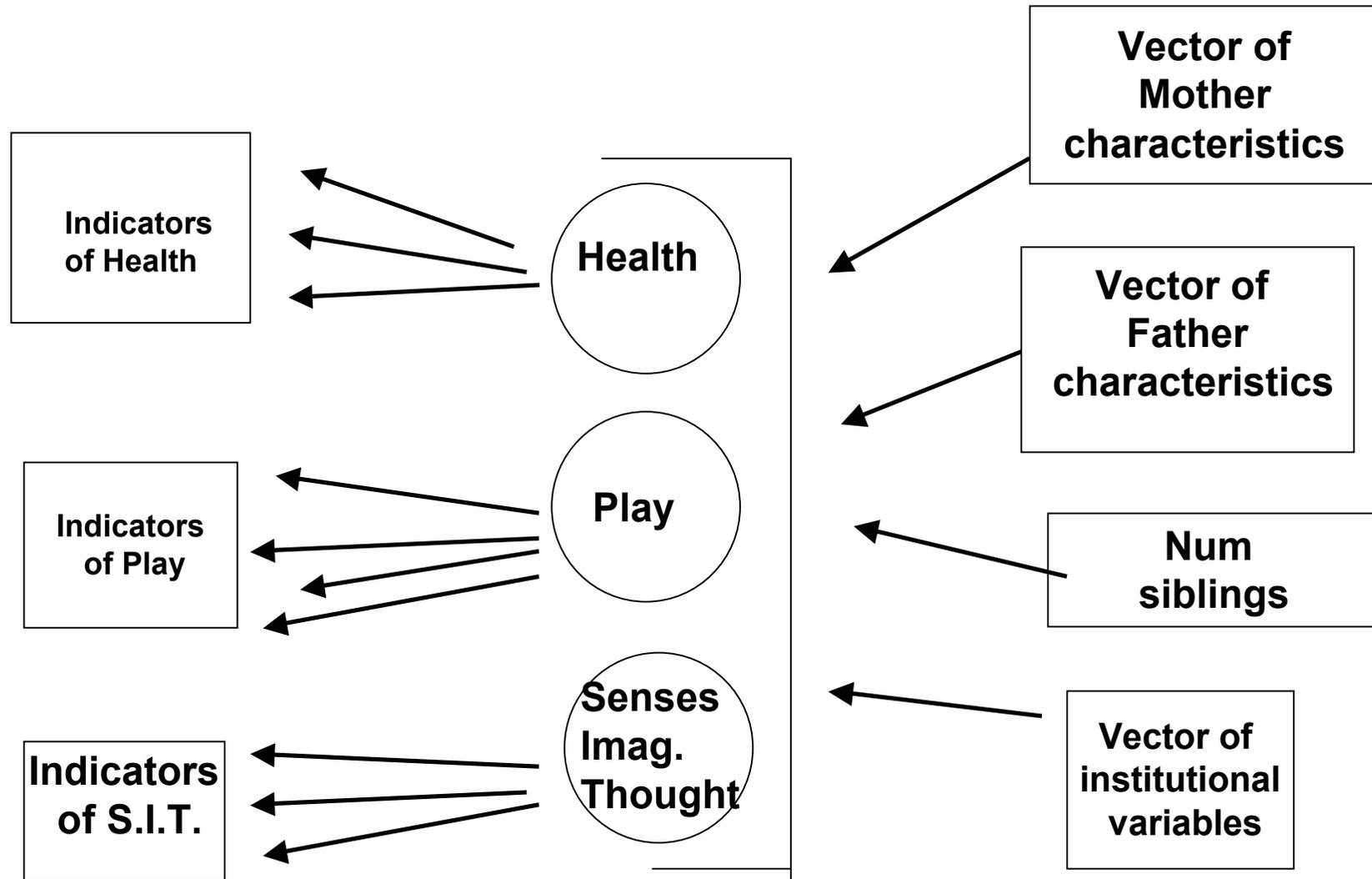
Two different applications

- A wider focus on sense imagination and thought and its interaction with other capabilities
- A finer focus on scientific cognitive capability

A wider model

- We have estimated a more complex model for 3 capabilities using the ISTAT Multipurpose Survey on Daily Life 2008.
- The Istat Multipurpose Survey provides information on: the household's sociodemographic structure, indicators on health, education, leisure time, playing activities and interaction with relatives and friends of children aged less than 18.

Structural Equation Model



Choosing the indicators of the capability senses imagination and thought

- attitude towards education
- participation to artistic activities
- participation to other activities.

Pros and cons of using Istat AVQ 2008

- The advantage of the Istat AVQ is the presence of many indicators about children activities besides school
- with reference to a wider age group
- The disadvantage consists of the lack of a measure of school performance. The only available indicator of school performance is attitude towards education as reported by parents.

The sample

We have restricted the analysis to:

primary school aged children given the different level of development of the capabilities over children life cycle

Households with both parents living together (the sample of lone parents households is too small and cannot be aggregated to two parents households)

The sample is made of **1703** children aged 6-10 (856 girls and 847 boys) living in HH where both parents are present

Descriptive statistics on the functionings

	Girls	Boys
Senses, Imagination, Thought		
Artistic activities	15.2%	11.6%
Other activities	10.9%	9.9%
Attitudes toward education:		
Indolent, no effort	1.8%	2.7%
Studies only some topics he/she likes	7.6%	11.2%
Enough effort to pass the mark	9.0%	13.5%
Results more than mark, but can do more	25.8%	63.4%
High effort and excellent results	55.7%	36.6%
Our elaboration on ISTAT AVQ08 data		

Factor loadings estimates

	Girls	Boys
Senses. imagination and thought		
Attitude towards education	0.24***	0.278***
Dummy artistic activities=1; 0 otherwise	0.467***	0.464***
Dummy other activities=1; 0 otherwise	0.411***	0.373***
*Significant at 10% level. ** Significant at 5% level.		
*** Significant at the 1% level.		
Completely standardized solution		
(significance level according to the non std solution)		

Correlations amongst latent variables

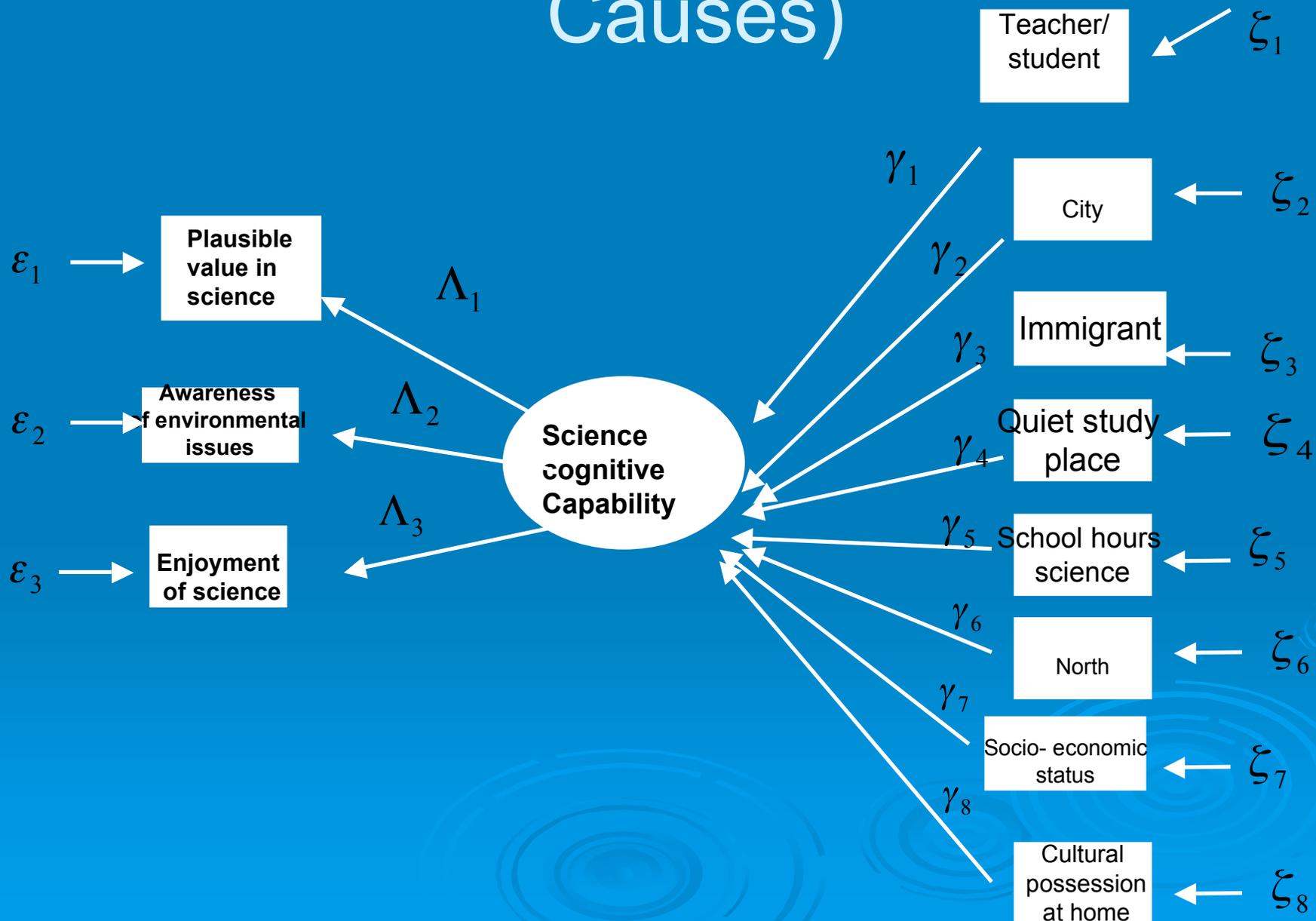
Correlations	Girls	Boys
Play - Health	0.10*	-0.21
Play - Senses	0.53***	0.73***
Health - Senses	0.00	0.03***
R-squared	Girls	Boys
Health	0.022	0.031
Senses, imagination, thought	0.143	0.118
Leisure activities, play	0.458	0.485
RMSEA	0.0319	0.0332

A finer focus on scientific
cognitive capability

Data set

- PISA 2006: particular focus on science.
- It allows a better specification of the science cognitive capability
- We include in the definition of the science cognitive capability not only the plausible values for science tests but also awareness for environmental issues and enjoyment of science.

MIMIC (Multiple Indicators Multiple Causes)



Descriptive statistics by gender on scientific cognitive capabilities indicators

Variables	Boys	Girls
Awareness of environmental issues	0,28	0,10
Enjoyment of science	0,10	0,02
Plausible values science	494,79	488,45
obs.	8687	8644

Factor loadings

Factor loadings	M	F
awareness of environmental issues	0,454	0,502
enjoyment of science	0,280	0,283
plausible values science	0,906	0,868

Effects of conversion factors

Variables	Boys	Girls
teacher-student ratio	0,01	0,01
city	-0,04	-0,04
immigrant	-0,21	-0,20
quiet study place	0,08	0,06
hours at school in science	0,09	0,07
North	0,33	0,36
Liceum	0,51	0,41
Technical School	0,25	0,18
Secondary School	-0,10	-0,21
Professional School	-0,03	-0,13
talking about environment at home	0,04	0,06
cultural possessions at home	0,04	0,06
socio ec.status	0,07	0,05
obs	8687	8644

Towards a more comprehensive understanding of the cognitive capability

- More data on:
 - Children performances at school
 - Extracurricula activities at school
 - Sport activities
 - Artistic activities
 - Other activities
- Collected on a wider sample regarding age or longitudinally
- With a finer definition of household characteristics including income and retrospective information on parents' employment conditions

Towards a more comprehensive understanding of the cognitive capability

- Estimating a model that disaggregates conversion factors according to their impact on the capability and/or its development into functionings
- And extending the analysis of the interactions amongst capabilities