Centre for the Evaluation
of Development Policies
at The Institute for Fiscal Studies

Early Childhood Development

Public Economics Lecture

Institute for Fiscal Studies

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Outline

1. Why are economists interested in Early Childhood Development?
2. Background to ECD
3. ECD in developing countries
4. ECD Policies
5. ECD Research
   - Internal and external validity
6. Case study: An ECD Intervention in Colombia
   - Impacts
   - Mechanisms

Why are economists interested in ECD?

1. Early years are important.
2. Early years are malleable.
3. Targeted and well-designed interventions can be effective.

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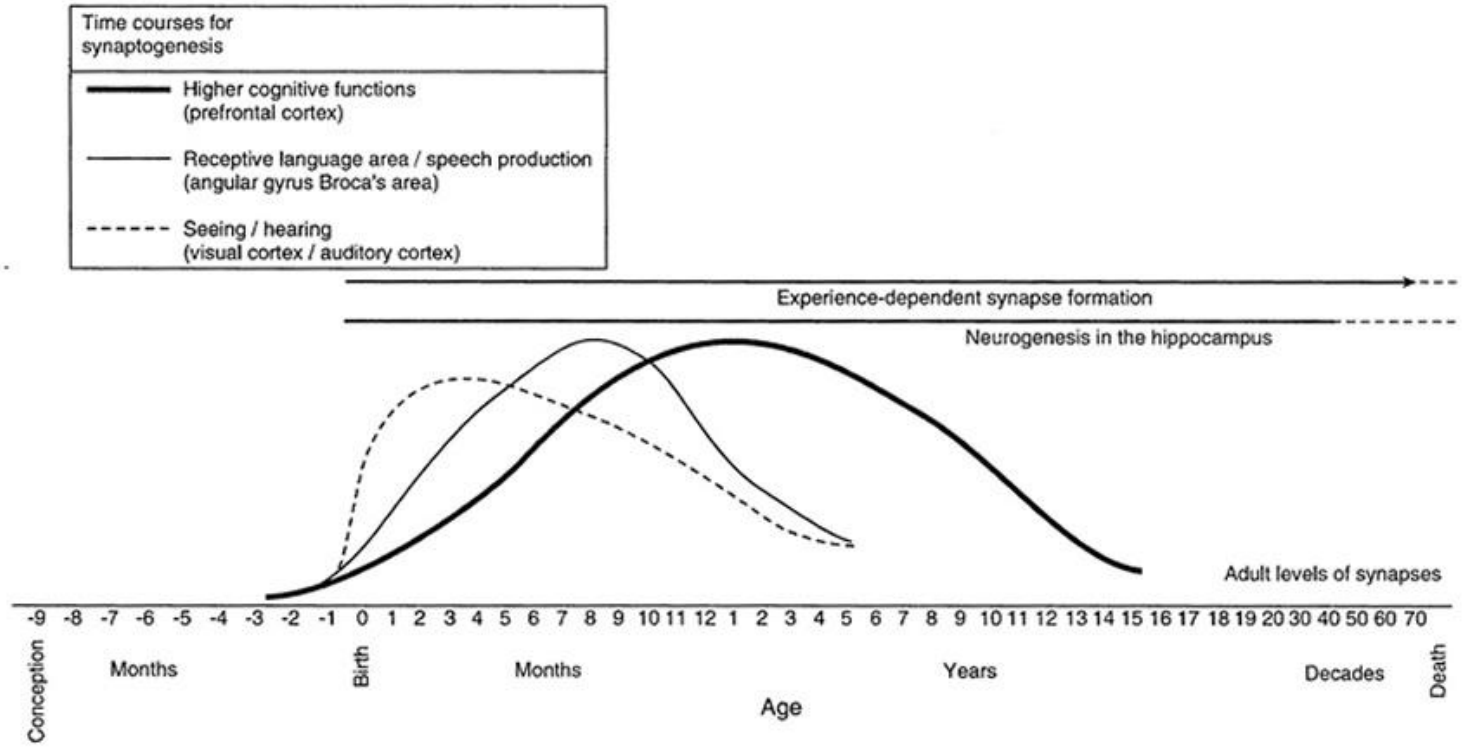
1. Early years are important.



Why are economists interested in ECD?

1. Early years are important.
   - During the earliest years of life development occurs faster than at any subsequent life stage.
   - What happens here lays the foundations for productivity and wellbeing in the rest of life.
   - Gaps and inequalities that open up between young children persist and are often exacerbated as they grow older. For example, evidence from the USA shows most of the gaps in cognitive abilities at age 18 (which help explain adult achievement) are already present at age five (Heckman 2008).
   - Such gaps often occur along familiar lines of income and wealth, a cycle that perpetuates inequality and the intergenerational transmission of poverty.

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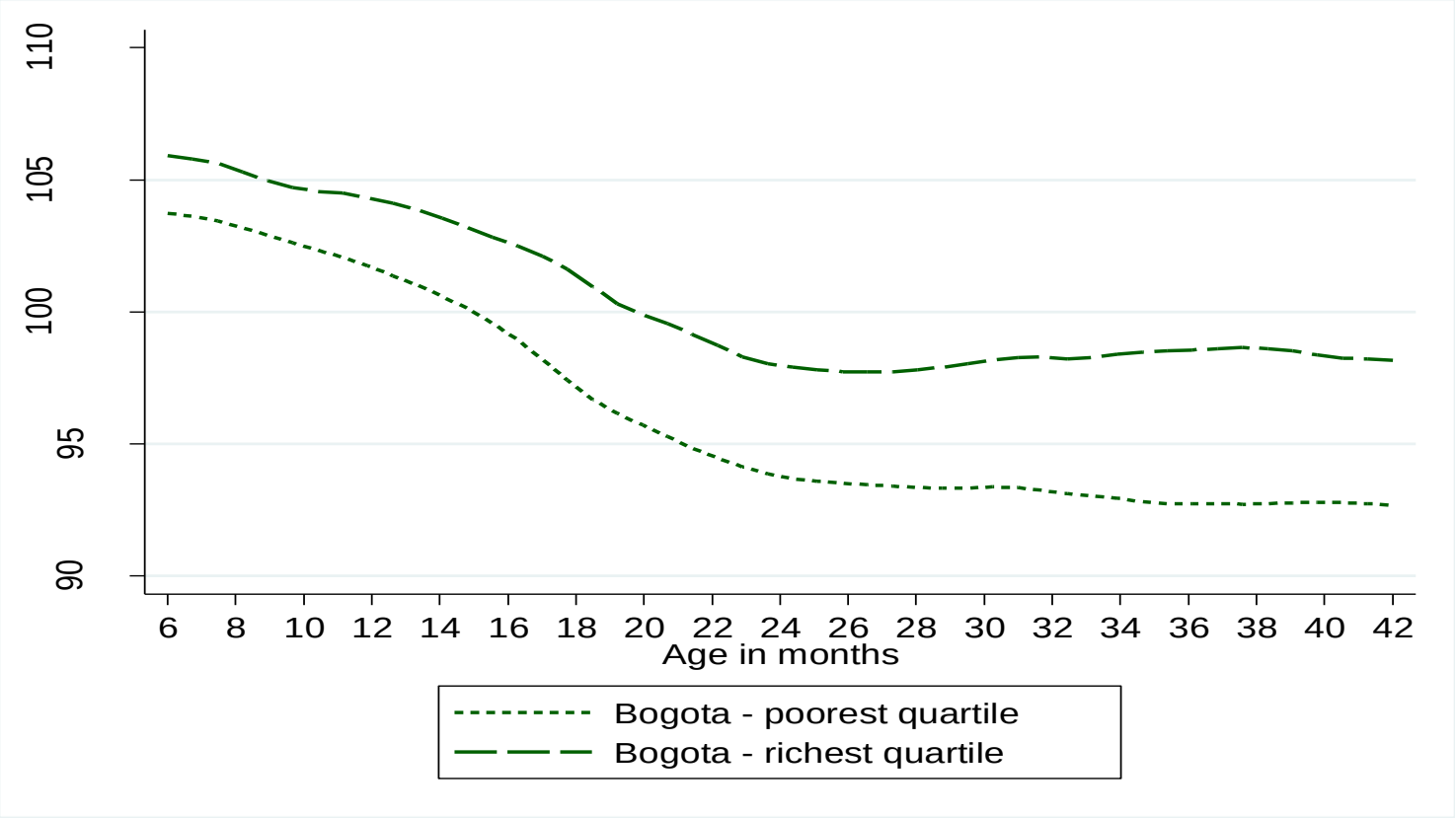

Why are economists interested in ECD?

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2. Early years are malleable.

Why are economists interested in ECD?

1. Early years are important.
2. Early years are malleable.
   - The paths of children's development and the gaps that open up between children are not pre-determined
   - They are instead heavily affected by environment and so can be significantly altered by policy or behaviour change
   - Effects of these policies or behaviour changes could last a lifetime

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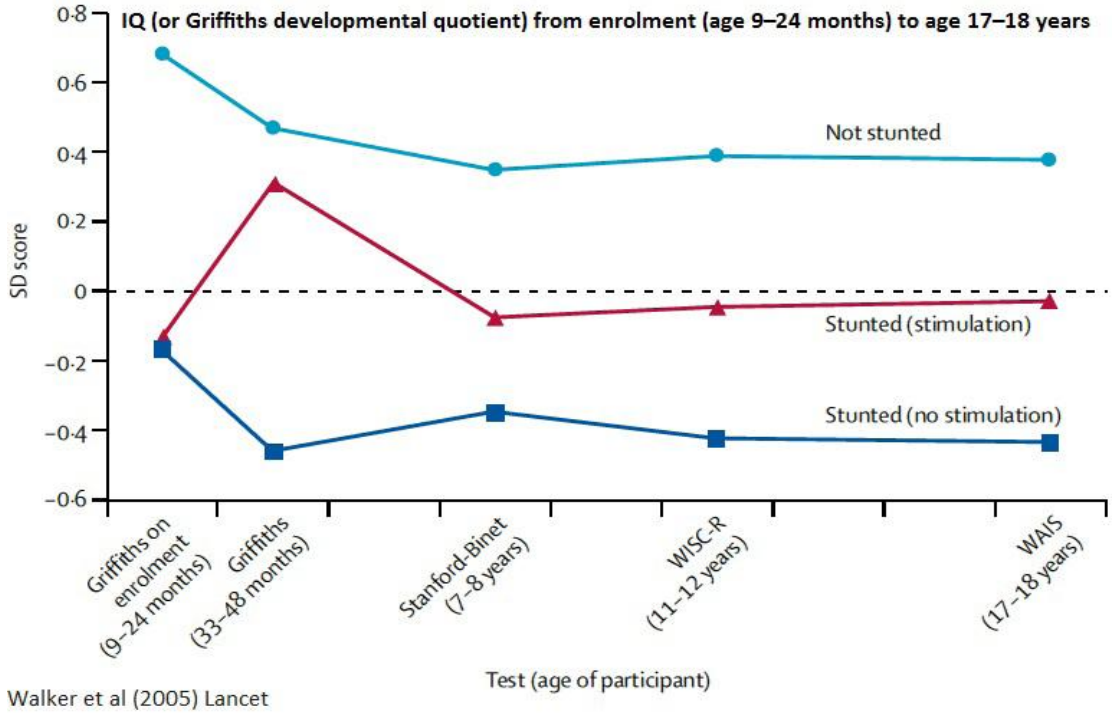

Walker et al (2005) Lancet

EDePo @ IFS
Evaluation of Development Policies at the Institute for Fiscal Studies

Why are economists interested in ECD?

1. Early years are important.
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3. Targeted and well-designed interventions can be very effective.
   - Intervening during the earliest years of life, particularly for very disadvantaged children, can have very positive effects which are sustained into adulthood.
   - It in seems intervening early for children with disadvantaged backgrounds may be significantly more effective at improving adult outcomes than intervening later (e.g. through remedial education).
   - The rate of return (inc. employment earnings, tax and welfare, crime…) on human capital investment early in life may be higher than investing an capital at any subsequent stage.

Why are economists interested in ECD?

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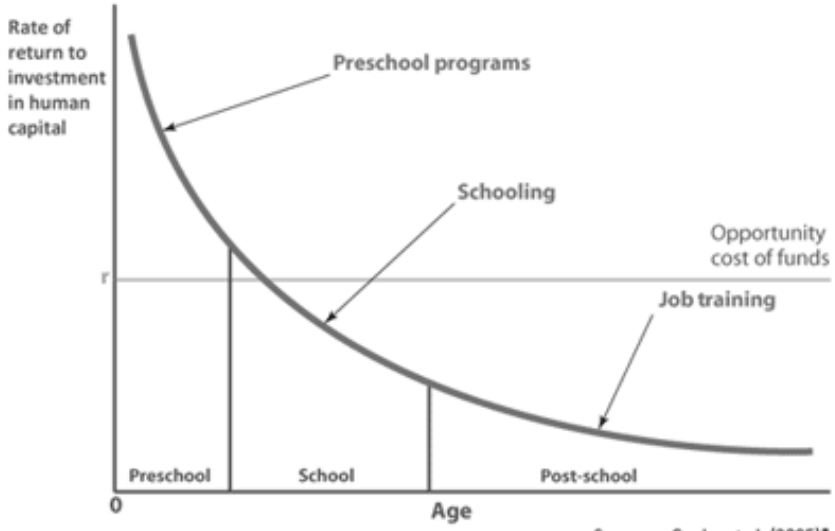
2. Early years are malleable.
3. Targeted and well-designed interventions can be very effective.

Rates of return to human capital investment initially setting investment to be equal across all ages



Source: : Cunha et al. (2005)*

Background to ECD: What exactly are we talking about?

- Key areas of development:
  - Cognition
  - Language
  - Socio-emotional
  - Motor
  - Health

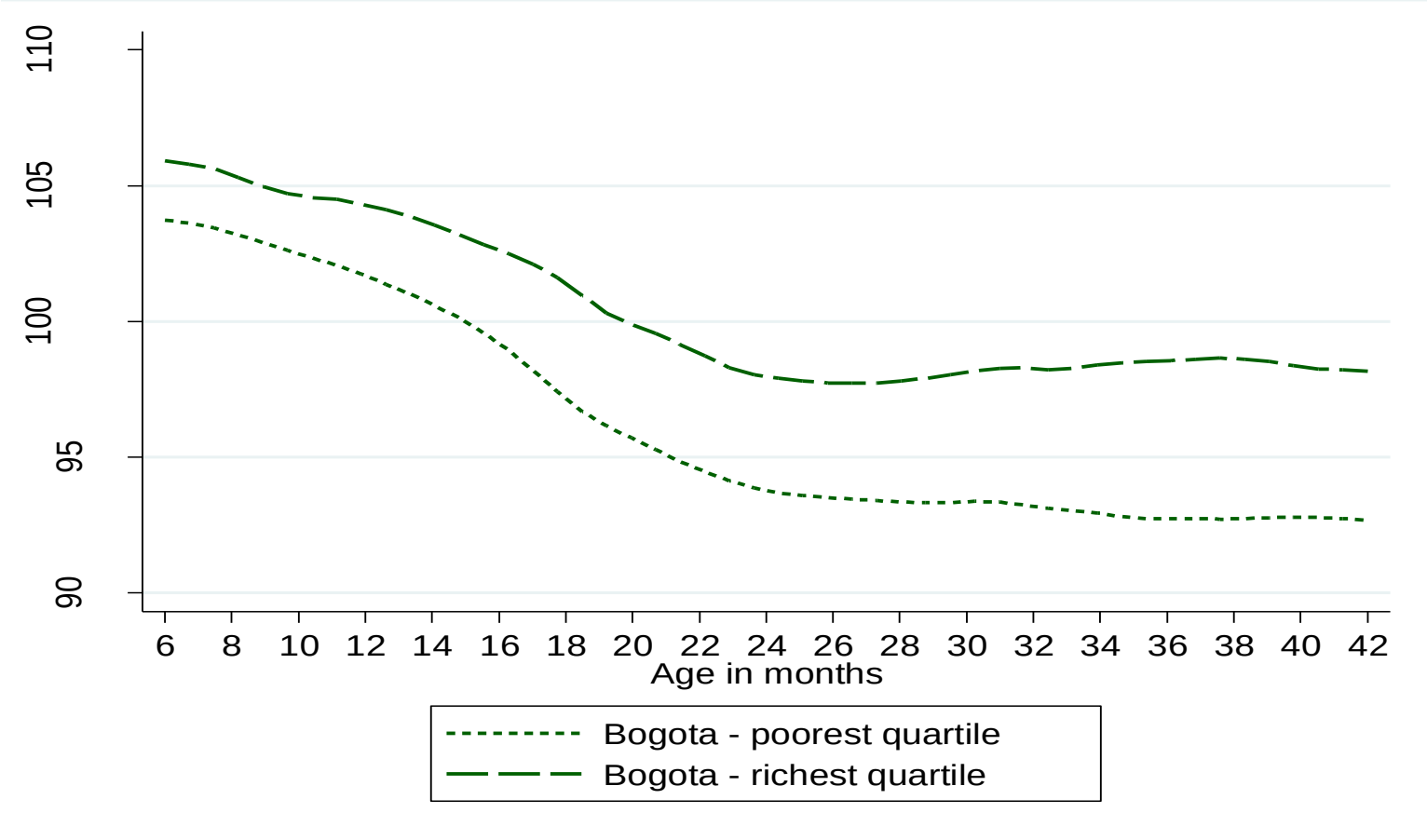
- Skills and abilities in these different domains and gained over different time periods reinforce one another through:
  - Self productivity
  - Dynamic complementarities
  - Skill multipliers

Background to ECD: Determinants

We've talked about 'investments' in early childhood – what do we mean?

- Stimulating environment (psychosocial stimulation):
  - Creative and stimulating play
  - Quantity and quality (symbols, rituals, conversational fluency) of words and verbal interactions
  - Role play
  - Play materials
  - Loving relationships
- Healthy environments and lifestyle:
  - Nutrition
  - Physical activity
  - Immunisations
  - Pathogens

ECD in Developing countries



ECD in Developing countries

- High absolute poverty rates -> parents struggle to provide nutritious food, play and learning materials
- Infrastructure is poor -> designing and implementing policies is difficult in terms of staffing, transport, getting materials
- Low education levels -> lack of knowledge about children's developmental needs
- Infectious disease
- (Power dynamics within households -> mothers often have little direct agency over decisions relating to their children)

ECD Policies: Aims

- Effective
- Sustainable
- Scalable:
  - Affordable for whoever would pay for scale-up
  - Makes use of existing institutional infrastructure
  - Makes use of local resources (human and otherwise)
  - Embraces local cultural context

ECD Policies: Design

1. What to target?
2. What to provide?
3. Who to deliver?
4. How to deliver?

ECD Policies: Design

1. What to target?
   - Nutrition? Immunisation? Stimulation?
   - Most Early Childhood policy (e.g. Nutrition education programmes) has focused on health outcomes (growth, immunity). These can be very effective and can also have impacts on broader areas of development.
   - Increasing emphasis on programmes that aim to increase psychosocial stimulation in a child's environment and are aimed largely at increasing cognitive, language and socio-emotional development.
   - Packages of different services can reinforce one another

ECD Policies: Design

1. What to target?
2. What to provide?
   - Cash? Goods? Services? Information? Motivation? High expectations?
   - Depends on what is causing children to not reach their developmental potential. This is difficult to know a priori.
   - Pure story of lack of resources suggests providing cash -> goods or services directly might be most useful. Which one is best might depend on other assumptions/ constraints.
   - Poverty often goes hand in hand with low levels of education and knowledge about children's developmental needs, lack of information sources about this and low expectations -> providing information, motivation and high expectations might be more useful than resources.

ECD Policies: Design

1. What to target?
2. What to provide?
3. Who to deliver?
   - Professionals? Paraprofessionals?
   - Availability of human resources
   - Effectiveness implications
   - Cost implications

ECD Policies: Design

1. What to target?
2. What to provide?
3. Who to deliver?
4. How to deliver?
   - Individual home visits? Groups?
   - Positives of individual visits – strong relationships, undivided attention, targeted at developmental level of child
   - Positives of groups – lower cost, helps build social support networks for mothers, more comfortable environment to raise problems

ECD Research: Aims

Overall aim: generate knowledge and understanding on improving developmental outcomes of children in various locations and contexts

1. Questions of internal validity
2. Questions of external validity

ECD Research: Aims

Overall aim: generate knowledge and understanding on improving developmental outcomes of children in various locations and contexts

1. Questions of internal validity
   - Does a particular programme improve outcomes in a particular place?
   - By how much?
   - Are impacts heterogeneous between groups?
   - Are there any unintended consequences (negative or positive)?
   - Are there any spillover effects?

ECD Research: Aims

Overall aim: generate knowledge and understanding on improving developmental outcomes of children in various locations and contexts

1. Questions of internal validity
2. Questions of external validity
   - Why/ how does it improve outcomes?
   - Will a similar programme improve outcomes elsewhere?
   - What would happen if we altered the programme slightly?

Case study: An ECD Intervention in Colombia

- Design, implement and evaluate an intervention in Colombia, in collaboration with a Government Agency, including:
  1. Psycho-social stimulation via home visits
  2. Micronutrient supplementation

- Two new elements:
  1. **Intervention**: exploit the existence of a large conditional cash transfee and use local resources (local women) for implementation

     → cost-effectiveness & scalability
  2. **Research Design:** collect detailed data to

     → identify mechanisms: model the behavioural impact of the intervention

     → estimate a human capital production function

Case study: An ECD Intervention in Colombia Context

- 96 small towns in 3 regions of Colombia
- Participants from the bottom quintile of the income distribution
- Relatively low starting point in terms of developmental outcomes (especially cognitive and language development), compared internationally.
- Mothers had, on average, 7.7 years of education. Big variation.
- Anaemia and other conditions caused by micronutrient deficiencies are fairly prevalent amongst young children
- Parenting norms, play culture…

Case study: An ECD Intervention in Colombia Using institutional infrastructure and local resources

- Since 2002, Colombia has had in place a Conditional Cash Transfer program, *Familias en Acción*, which is now the largest welfare program in the country.

- Beneficiary women elect a representative: *Madre Líder*

- *Madre Líderes* are distinguishable for their leadership skills and community networking abilities.

- We draw on these human resources available in the communities:

  → train and hire "*Madre Líderes*" to deliver the psycho-social stimulation curriculum through home visits

Case study: An ECD Intervention in Colombia
Using institutional infrastructure and local resources

- **Key Element for Scalability & Sustainability:**
  1. Low(er) intervention costs
  2. Community mobilization and information spread: local women may become agents of change within their communities
  3. Communities may take ownership of the intervention
  4. Scheme easily replicable in other less developed contexts

- **Challenges to Sustain Quality:**
  1. Identify suitable women
  2. Adjust intervention to ability of home visitor and to delivery at scale
  3. Adequate training, continuous mentoring and supervision

Case study: An ECD Intervention in Colombia
Intervention design

1. **Weekly Home Visits:**
   - lasting for 1 hour
   - delivered by specially trained "*Madre Líderes*"
   - based on the original Jamaican curriculum, adapted to the Colombian context and the intervention reality

2. **Micronutrient supplementation:**
   - Tasteless sprinkles, which are a mix of vitamins, iron and zinc

- The interventions lasted for **18 months**, starting in Feb-May 2010

Case study: An ECD Intervention in Colombia Psychosocial stimulation curriculum

- Promote cognitive and language development
- Mother focused: support the mother to promote her child's development
- Teach through play:
  - rich in play materials
  - incorporate concepts/skills to be taught in daily routines
- Organised by weeks to match the developmental level of the child to the extent possible
- Keep costs down: use home-made toys, rotating toys

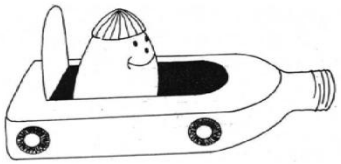
Programa de Desarrollo Infantil Temprano para Beneficiarios de Familias en Acción

Actividades	MES: 32
• Canción • Muñeca con carro • L6: "La camisa sucia" • Juego 7 – seguir las instrucciones III	SEMANA: 1

Canción Cante al niño una canción que usted escoja

Muñeco de trapo con gorro y carro

Objetivo: Que el niño disfrute de jugar con el juguete y aprenda los conceptos "parar" y "andar", "rápido" y "despacio", "cerca" y "lejos".



Instrucciones: Deje que el niño juegue con el muñeco y el carro. Haga que el niño siga instrucciones como: "Para el carro cuando llegues a la puerta", "anda otra vez", "maneja rápido, ahora despacio".

L6: "La camisa sucia"

Objetivo: Que el niño sea capaz de hablar acerca de las imágenes.

Instrucciones: Mire el libro con el niño y describa todo lo que el niño de las imágenes está haciendo (Por ejemplo "El niño se ensució su camisa" "El niño está abrazando a su mamá porque ella le lavó la camisa"). Enfóquese en nombrar la acción (por ejemplo vistiéndose, bañándose, comiendo, yendo a la cama). Luego pídale al niño que cuente qué está pasando en la historia (por ejemplo, que el niño está jugando en el charco o que la madre está lavando la camisa que el niño ensució). Pídale al niño que señale algunas ilustraciones como por ejemplo diciéndole "Dime ¿dónde está la camisa del niño? ¿dime cuál es el balde?".

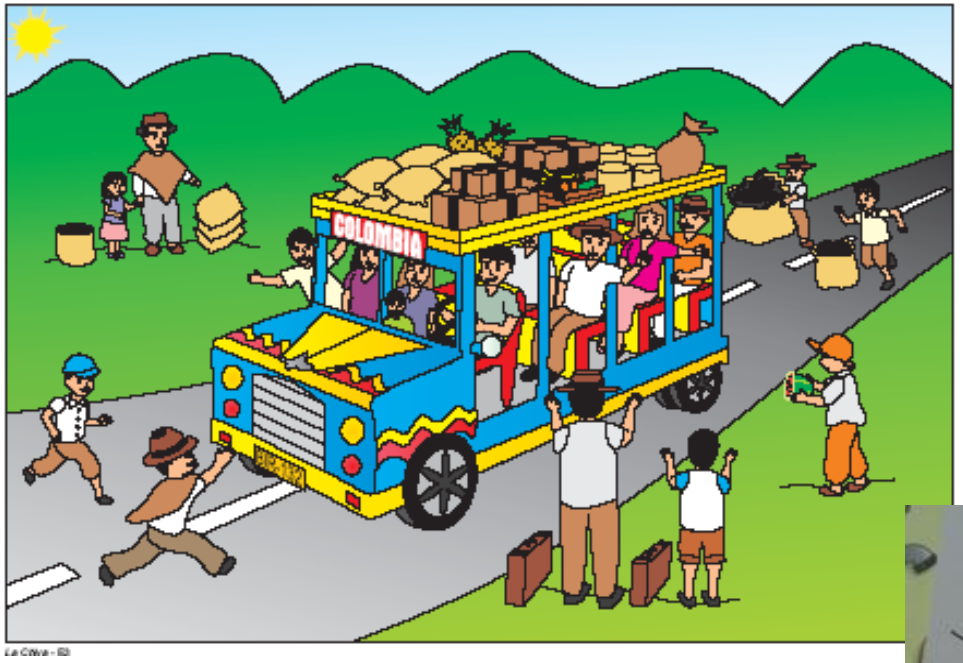
Haga que el niño represente lo que el niño de las imágenes está haciendo. Empiece a hacer preguntas sencillas al niño que le permitan hablar un poco más sobre la historia por ejemplo "¿por qué la mamá está lavando la camisa?". A medida que se avanza en el libro, tenga presente las situaciones en que se puedan utilizar las palabras de los diferentes grupos de conceptos del nivel 1 (húmedo, seco, grande, pequeño, encima, debajo, al lado, etc.).

Juego de instrucciones III

Usando una cuerda dígale al niño que ponga su pie DEBAJO de la cuerda y ENCIMA de ella. Con la misma cuerda, dígale al niño que SALTE sobre ella, que se DEVUELVA, que CORRA alrededor de ella.

TRAINING HOME VISITORS

Conversation Scenes & Books




SUPER
TEAM


Cirfrut

Case study: An ECD Intervention in Colombia
Evaluation design

- 96 communities (*municipios*) of 5,000 – 50,000 inhabitants each (semi-urban) in 3 regions
- **Randomly Assigned** to 4 groups:

Stimulation	**Micronutrient Suppl.**
Stimulation + Micronutrient Suppl.	**Control**

Case study: An ECD Intervention in Colombia Evaluation design

- Outcome variables:
  - Measures of cognitive, language, socio-emotional and motor development
  - Measures of health (inc growth, anaemia status)

- Intermediate variables/ mechanisms:
  - Time use
  - Quantity and quality of play materials
  - Quantity and variety of play activities

Case study: An ECD Intervention in Colombia Impacts

	COGNITION (Bayley)	RECEPTIVE LANGUAGE (Bayley)	EXPRESSIVE LANGUAGE (Bayley)	NUMBER WORDS (MacArthur)	DIFFICULT CHILD (Bates)
Stimulation	0.251**	0.188**	0.0592	3.830+	-0.541+
	(0.073)	(0.080)	(0.073)	(2.008)	(0.288)
Stim + Micronutr	0.205**	0.163*	0.0826	4.238*	-0.161
	(0.070)	(0.073)	(0.083)	(2.116)	(0.251)
Micronutrients	0.0467	0.0393	0.0836	3.634+	-0.0597
	(0.059)	(0.084)	(0.087)	(1.911)	(0.262)
N	1,267	1,267	1,267	1,325	1,325

+significant at 10%, *significant at 5%, **significant at 1%

- Impacts of combined interventions ("stim+micronutrients") not significantly different from "stimulation" intervention alone.
- No impact of micronutrient supplementation on cognition, language, difficult child

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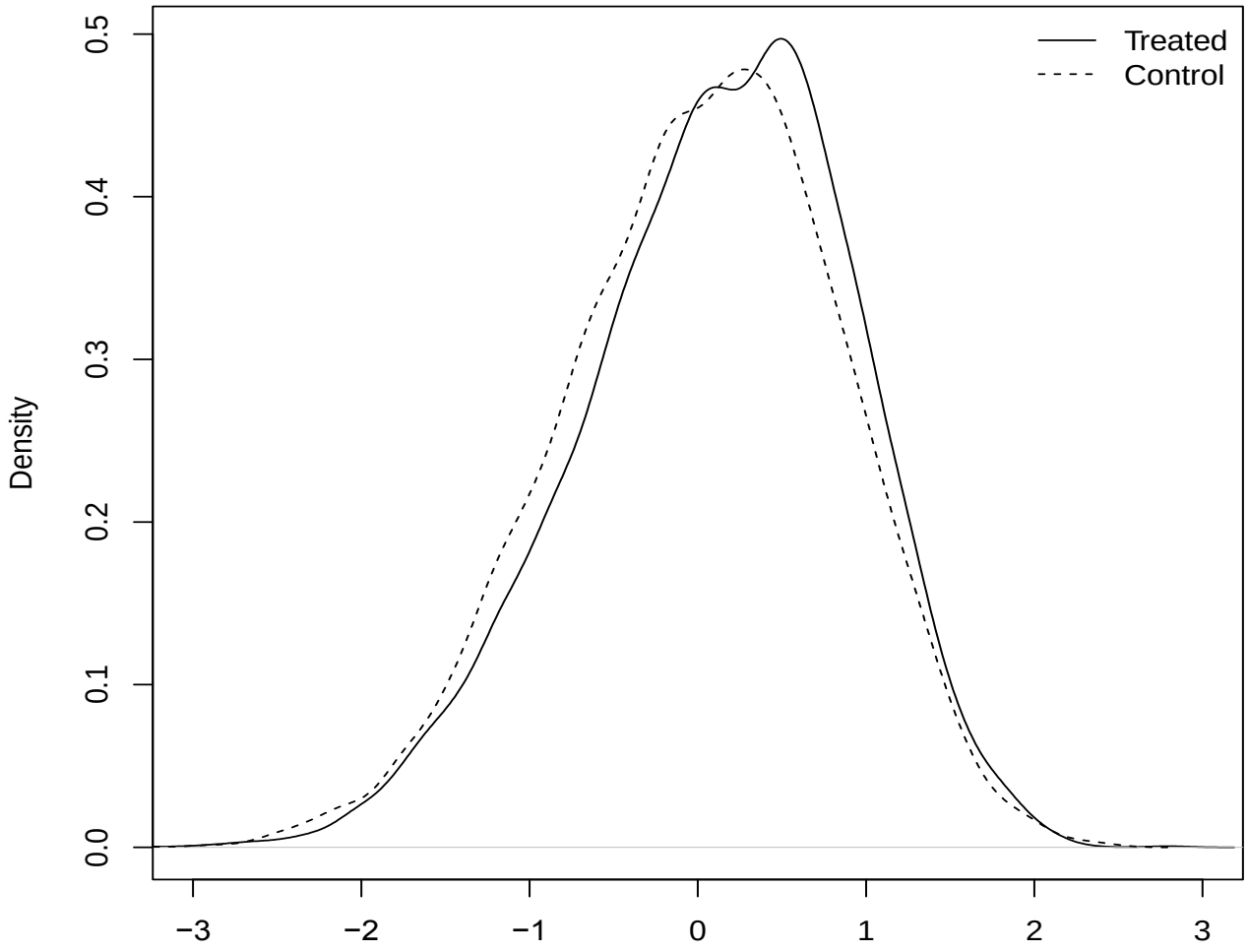
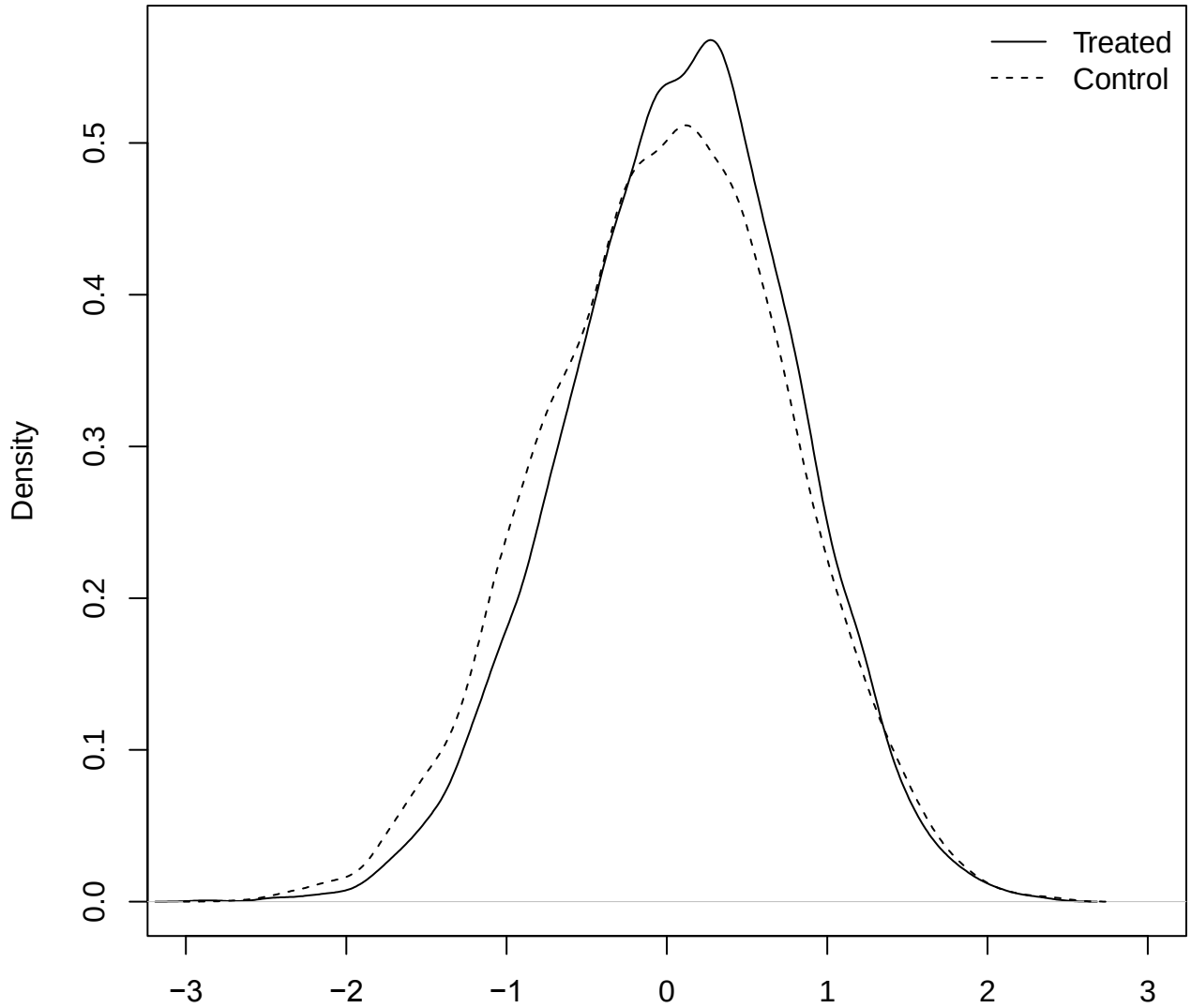
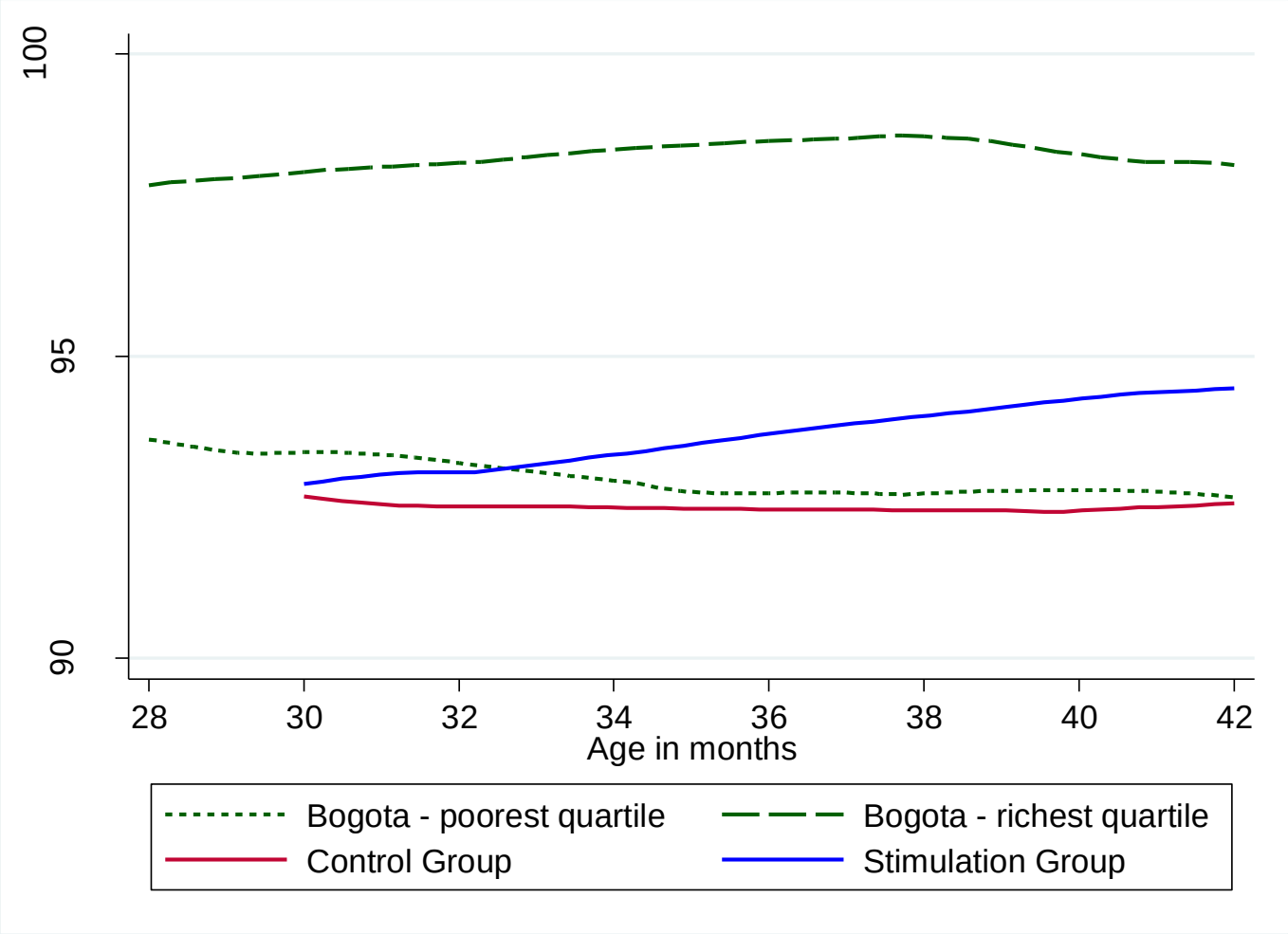
Case study: An ECD Intervention in Colombia Impacts – cognitive development



Case study: An ECD Intervention in Colombia
Impacts – non- cognitive development



Case study: An ECD Intervention in Colombia
Impacts – comparison with Bogota data



Case study: An ECD Intervention in Colombia Costs and sustainability

- Cost of the intervention is $491 USD per child per year

Budget Item	USD child/year	%
Supervisors	**265.2**	**54%**
Materials Stimulation	13.1	2.6%
Wages Home Visitors & Training	186.1	37.8%
Micronutrients	15.4	3.1%
Wages MLs Micronutrients & Training	11.3	2.3%
	491.11	

- At scale, supervision costs could be reduced substantially if supervisors were selected from neighbouring towns.
- Colombian government ECD Strategy (0 a 5iempre) ~ $1,300 USD per child per year budgeted

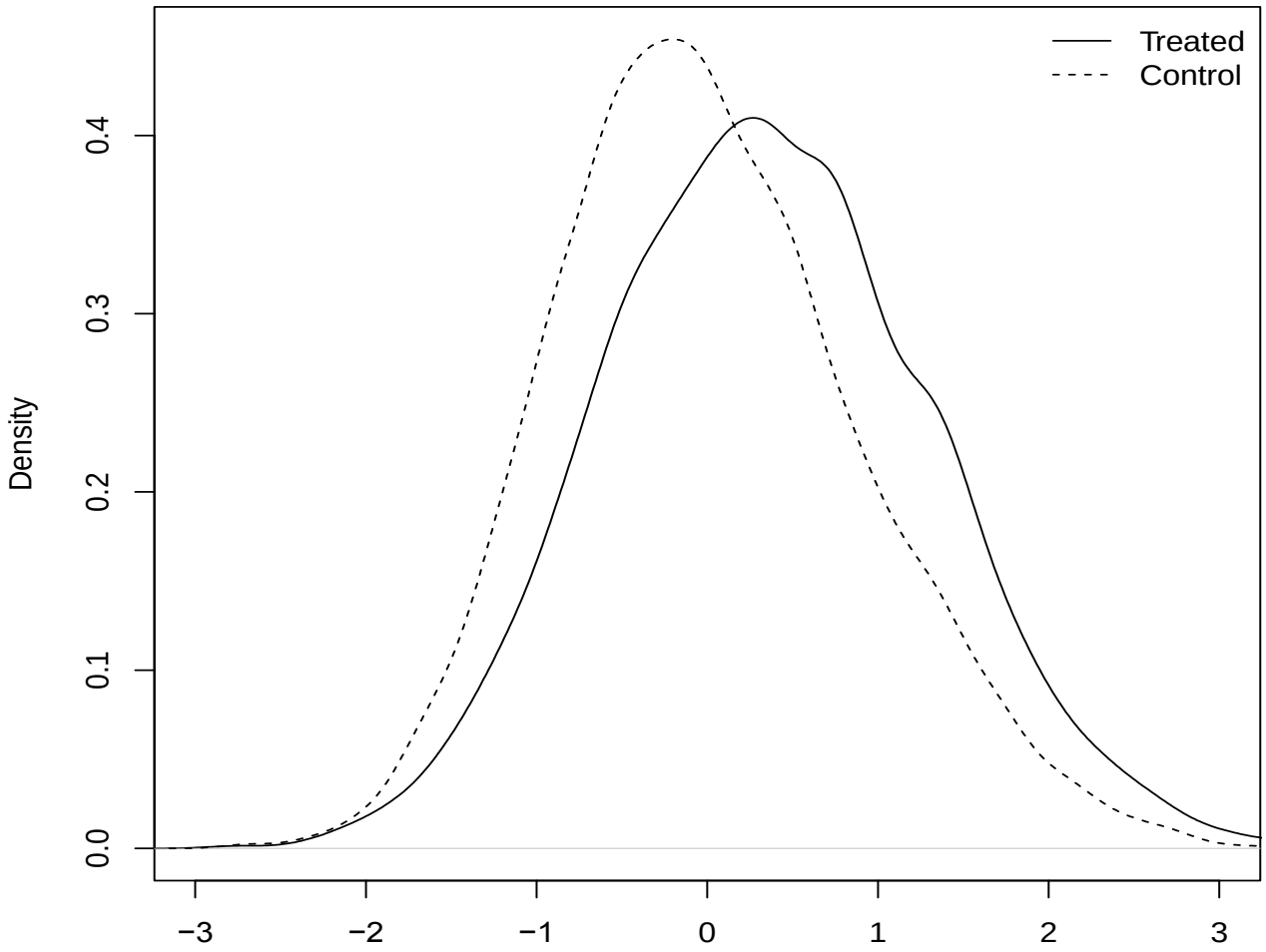
Case study: An ECD Intervention in Colombia Mechanisms – parental resources

	Home Made Toys	Bought Toys	Play Materials	Play Activities (previous 3 days)	Books for Adults
Stimulation	0.914**	0.284*	0.556**	0.564**	0.0188
	(0.180)	(0.134)	(0.128)	(0.152)	(0.081)
Stim + Micronutr	0.719**	0.167	0.452**	0.731**	0.140
	(0.189)	(0.133)	(0.137)	(0.153)	(0.087)
Micronutrients	0.0886	0.337*	0.213	0.217	0.104
	(0.187)	(0.151)	(0.167)	(0.153)	(0.087)

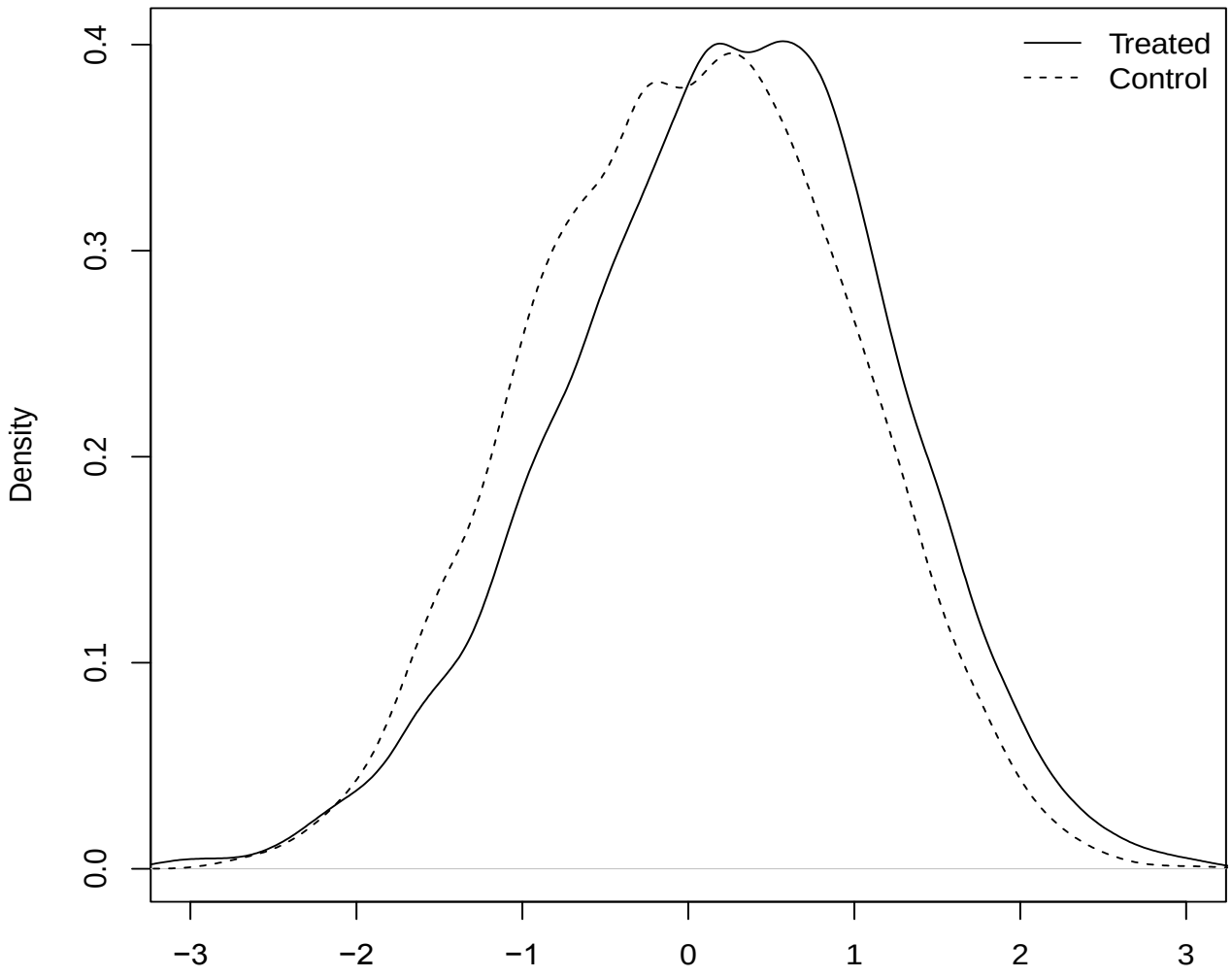
n =1329; *significant at 5%; **significant at 1%

- Suggestive evidence of "crowding-in" of resources

Case study: An ECD Intervention in Colombia
Mechanisms – time investment



Case study: An ECD Intervention in Colombia
Mechanisms – material investment



Case study: An ECD Intervention in Colombia Glimpse of modelling framework and results

- Model a human captial production function:

$$\mathbf{H_{t+1}}=g(\mathbf{H_t},\mathbf{X_t},\mathbf{Z_t},e_{t+1})$$

- H_t is Human Capital (including cognition, socio-emotional development and health)
- Z_t are background variables (including information on parents)
- X_t are Investments in human capital (including materials M and time T).
- e_t+1 are shocks.

Case study: An ECD Intervention in Colombia Glimpse of modelling framework and results

- Problem: endogeneity of investments:
  - Correlated with unobservables in the error term
  - Responses by parents to past realisations
- Possible instrument/ control function variable: Local prices
  - Prices don't enter the production function directly
  - Only affect human capital through effect on investment

- Problem: don't observe many variables directly
- One solution: latent factor approach – use multiple measurements to identify distribution of unobservable latent factors

Estimates of the CES production function for cognitive skill

	Without control function	*With control function*
Baseline cognitive skills	0.707*	0.646*
	[0.664,0.778]	[0.606,0.761]
Baseline non-cognitive skills	0.028	0.045
	[-0.056,0.138]	[-0.042,0.153]
Mother's cognitive skills	0.103*	-0.123
	[0.038,0.182]	[-0.174,0.126]
Mother's non-cognitive skills	0.119*	0.055
	[0.026,0.184]	[-0.018,0.152]
Material investments	0.056*	0.277*
	[0.02,0.084]	[0.005,0.315]
Time investments	-0.021	0.065
	[-0.056,0.012]	[-0.09,0.178]
Number of children in household	0.007	0.034
	[-0.012,0.022]	[-0.003,0.042]
Control function for material investments	-	-0.24
		[-0.295,0.049]
Control function for time investment	-	-0.097
		[-0.229,0.07]
Complementarity parameter	0.027	0.094
	[-0.156,0.263]	[-0.053,0.243]
Elasticity of substitution	1.027*	1.104*
	[0.865,1.356]	[0.949,1.321]
Productivity parameter (A)	0.996*	0.986*
	[0.986,1.008]	[0.978,1.004]
Productivity parameter interacted with treatment	0.064*	-0.022
	[0.006,0.128]	[-0.055,0.102]

Note: 90% confidence intervals in brackets based on 200 bootstraps. * significant at the 10% level

Estimates of the CES production function for non-cognitive skill

	Without control function	*With control function*
Baseline cognitive skills	0.156*	0.148*
	[0.102,0.277]	[0.03,0.291]
Baseline non-cognitive skills	0.611*	0.536*
	[0.424,0.705]	[0.371,0.678]
Mother's cognitive skills	-0.047	0.012
	[-0.09,0.034]	[-0.27,0.21]
Mother's non-cognitive skills	0.134*	0.034
	[0.02,0.27]	[-0.072,0.184]
Material investments	0.073*	-0.319
	[0.035,0.105]	[-0.418,0.09]
Time investments	0.048*	0.578*
	[0.014,0.085]	[0.198,0.724]
Number of children in household	0.025	0.012
	[-0.008,0.077]	[-0.014,0.087]
Control function for material investments	-	0.41
		[-0.008,0.509]
Control function for time investment	-	-0.564
		[-0.738,-0.16]
Complementarity parameter	-0.107	0.013
	[-0.29,0.15]	[-0.072,0.056]
Elasticity of substitution	0.904*	1.013*
	[0.775,1.176]	[0.933,1.059]
Productivity parameter	1.005*	1.000*
	[0.989,1.023]	[0.99,1.009]
Productivity parameter interacted with treatment	-0.009	-0.09
	[-0.04,0.027]	[-0.176,0.023]

Note: 90% confidence intervals in brackets based on 200 bootstraps. * significant at the 10% level

Case study: An ECD Intervention in Colombia Glimpse of modelling framework and results

- We find that most of the impact is explained by an increase in parental investment:
  - Material investments seems to be most relevant for cognitive development
  - Time investments seem to be most relevant for non-cognitive development

- No evidence of improved efficiency.

Case study: An ECD Intervention in Colombia Conclusions and Implications

- The psychosocial stimulation intervention led to a substantial improvement in child development outcomes which came about through increased parental investments.

- This raises the question:
  - Why do parents change investment behaviour with the intervention?
  - No permanent resources were given.
  - Maybe the intervention changes perceptions about the usefulness of investments. (i.e. perceptions about the production function)

Thank you