Child Development and Parental Behaviour: Measuring and Understanding what Happens in Families

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Outline

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- Early years development is important:
  - It has important long run consequences;
  - It is malleable, and therefore salient for policy interventions
- Considerable research work and policy effort has been devoted to this:
  - Heckman's work;
  - *Reach Up and Learn*;
  - Many others....

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- More realistic and richer models of individual behaviour can be identified with richer and better measures.

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- Measurement and connected issues are relevant for the themes I will discuss.

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- Use these measures to identify and characterize parental behaviour and child development.

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- In the case of Child Development:
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- Measurement error is pervasive.
- The perfect data does not exist.

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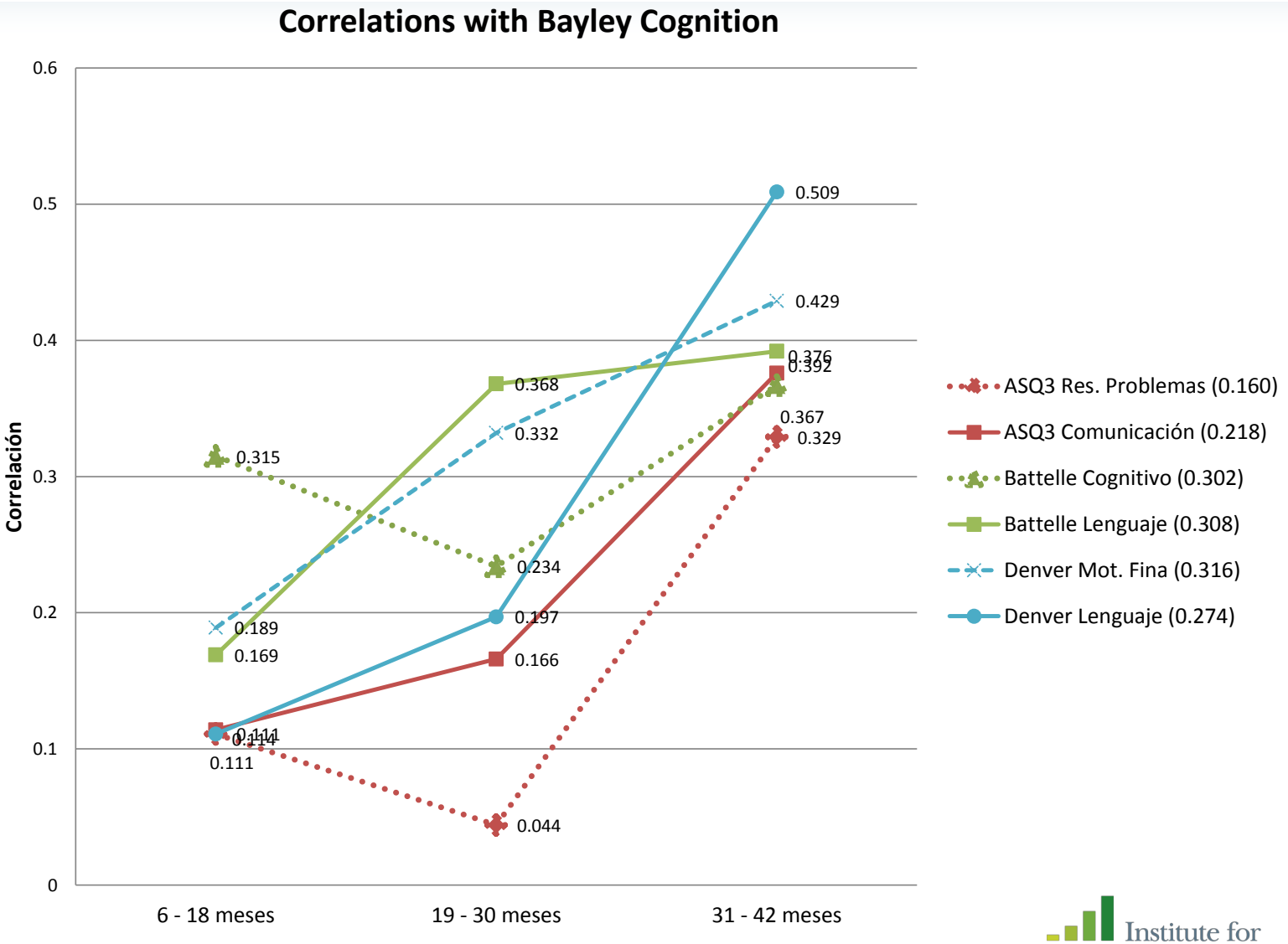
- Unfortunately alternative 'cheap' measures can be very noisy.

How good are cheap measures?

Results from Araujo, Attanasio, and Rubio-Codina (2016)



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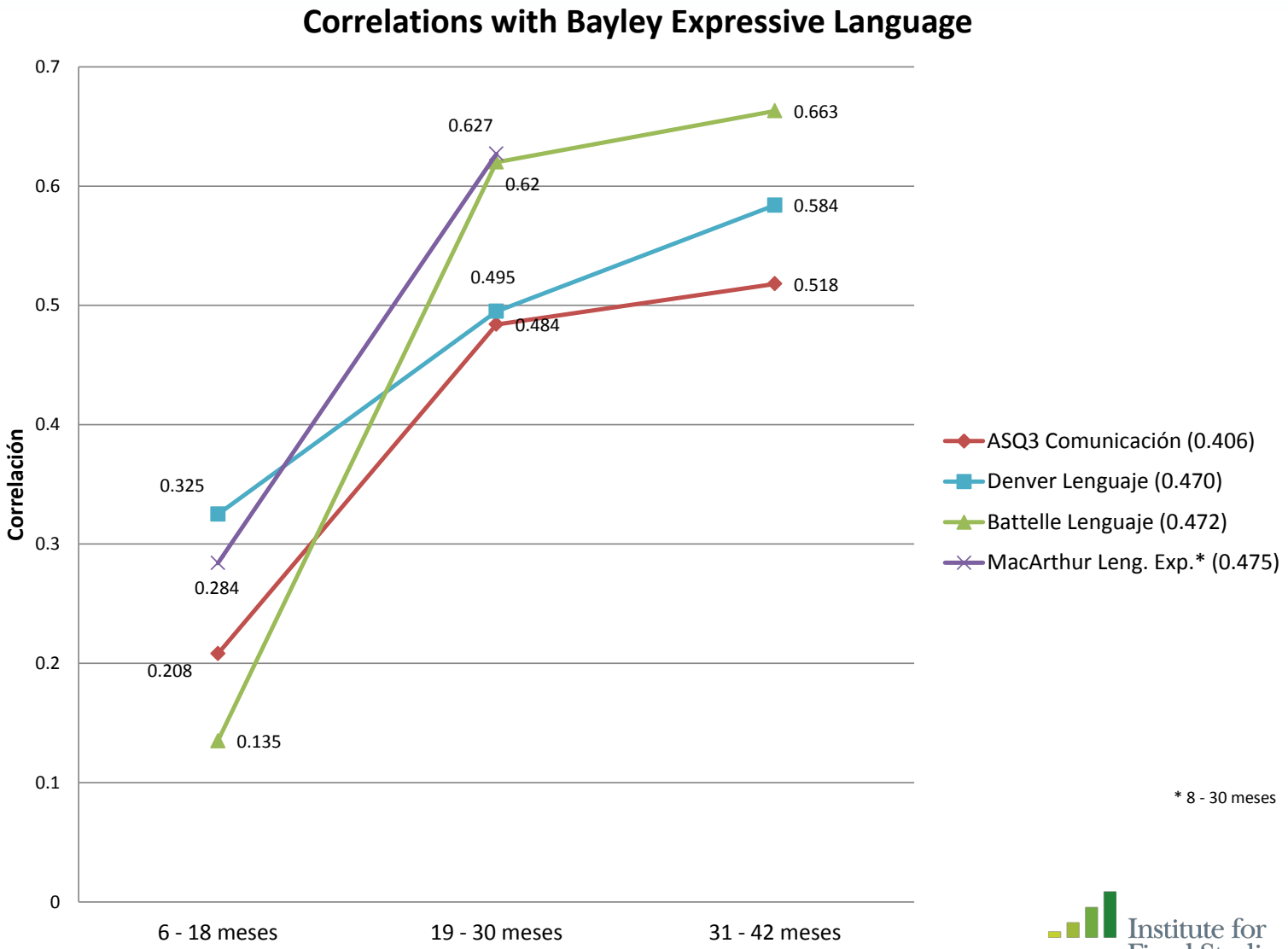

Institute for Fiscal Studies

Interpreting existing measures

- A useful measurement model: (see Cunha et al (2010)):

$$m_{i,t}^{jk} = \alpha^{j,k} + \beta^{j,k}\theta_{i,t}^{j} + \epsilon_{i,t}^{jk}$$

where
- $\theta_{i,t}^{j}$ is factor j for individual i at time t
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  - Measurement errors are additive ;
  - Measurement errors are independent across measures;
  - There are at least 2 measures;
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- We can then estimate the parameters of this model and use the avaliable measures to get an estimate of the factors.

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  - Bayleys Scales of Infant Development;
  - Woodcock Johnson measures;
- These scales are typically estimated on obsolete samples and/or are over-simplified.

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- These scales are typically estimated on obsolete samples and/or are over-simplified.
- It is useful to write down the model, especially when running surveys:
  - One can design survey methods to ensure that crucial assumptions hold in the data;

Existing measures: scaling and achoring

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- One can choose relatively few items characterised by 'high' β's and different and diverse α's.

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- Often the right strategy depends on the question one is asking.
  - Attanasio, Blundell, Conti and Mason (2019) try to compare the distribution of child development at 11 in two British cohorts.
  - Attanasio, Bernal, Giannola and Nores (2019) look at child development from age 6 to 72 months.

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- One of the objectives is scalability of the new measures.
- I will discuss four types of measures:
  - Novel indicators of child development;
  - Barganing power within the marriage;
  - Parental beliefs about the process of child development;
  - Paretal tastes and preferences.

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  - Cognition;
  - Language;
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- We use different approaches to measure:
  - Testing the child;
  - Maternal report;
  - Filming.

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- In a second step, we collect the reduced set of items as a template for a new test and validate them in a different sample.

An example on language development

- The MacArthur Language Inventory test (MLI) is a widely used instrument to measure the development of language skills among very young children.
- It is based on maternal reports:
  - Mothers are asked whether their child understands (or says, depending on the age) certain words;
  - There are about 100 words.
- It is a very good test:
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  - There are about 100 words.
- It is a very good test:
  - language is very salient for development and mothers are aware of it.
- The standard alghoritm to score it sums the words.
- There is no good reason to use that alghoritm.

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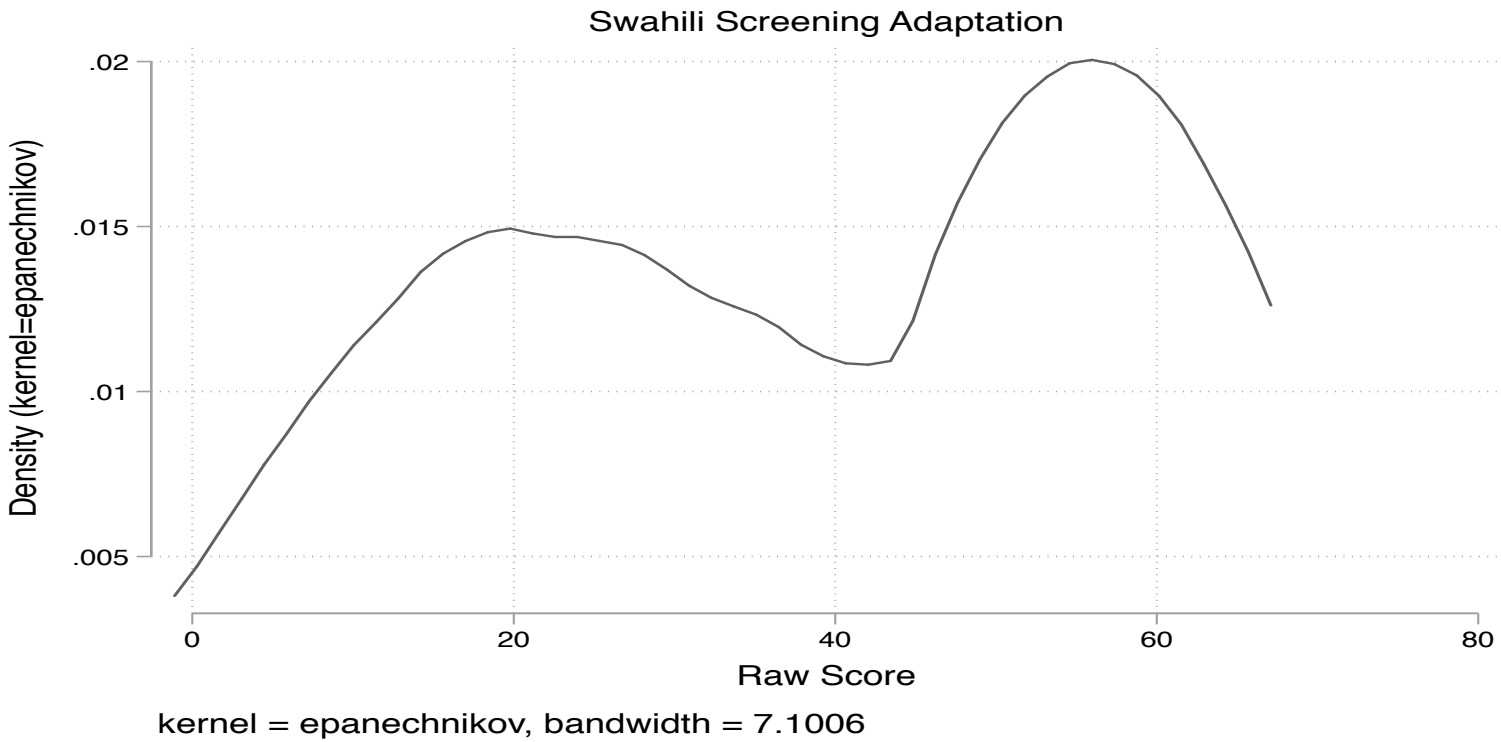

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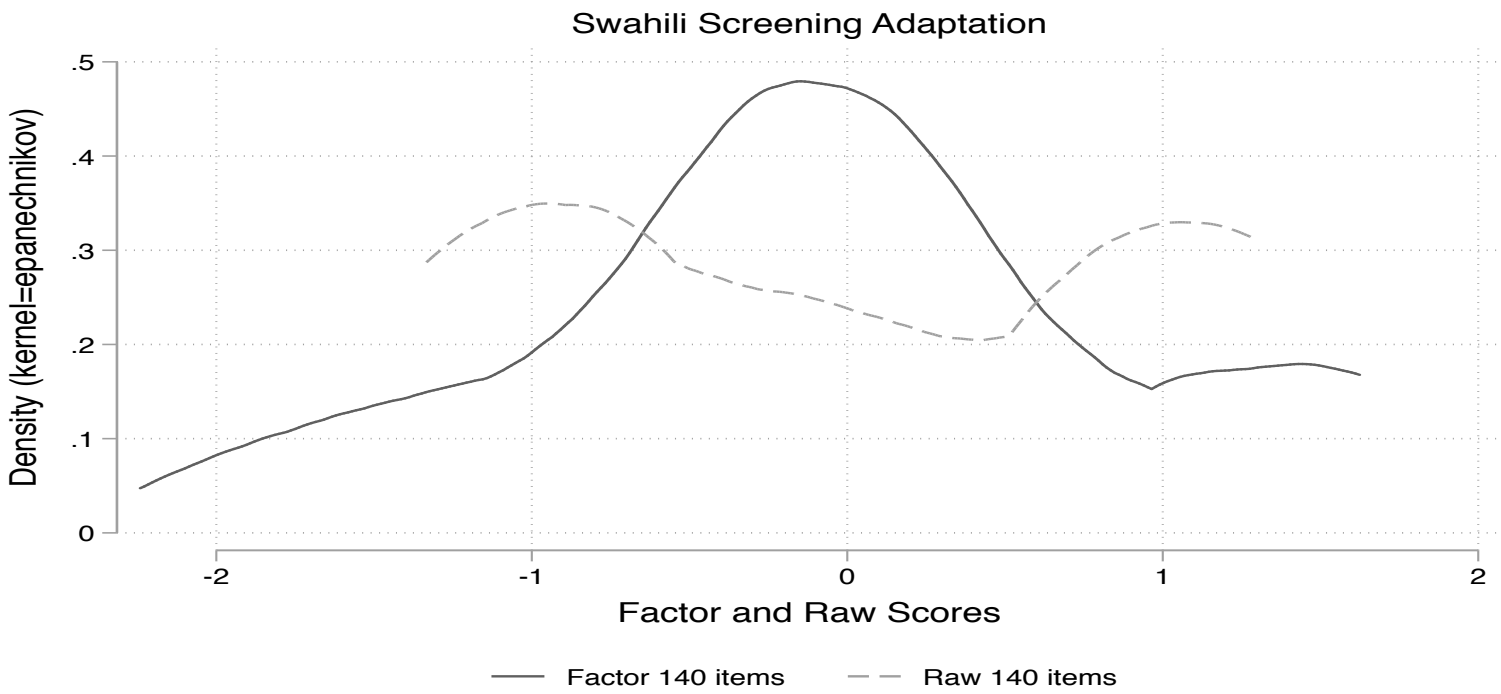
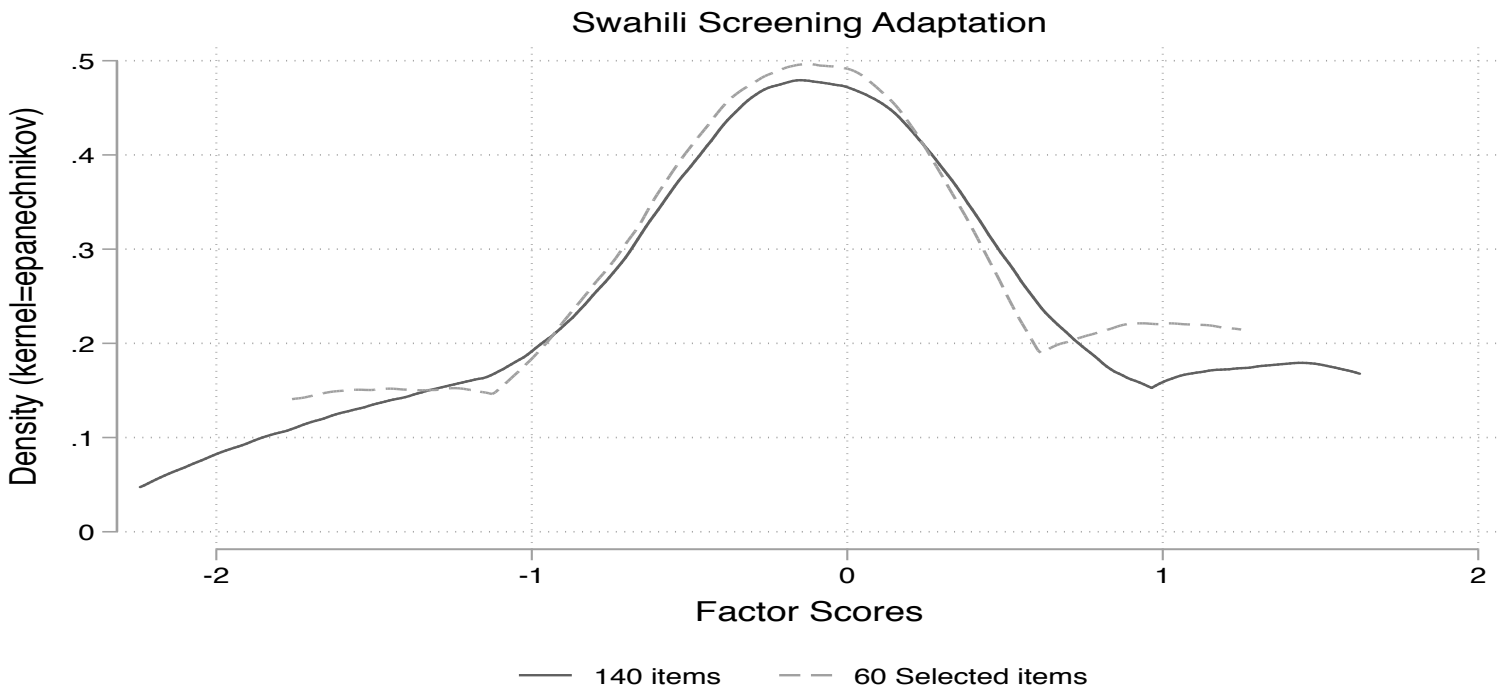


Note: Correlation is equal to 0.93.

An example on language development

- The next step is to select the most informative items (high loading factors β's)



Note: Correlation is equal to 0.95.

Constructing a new test of cognitive development

- The next step was to analyse a variety of items from different stadard tests;
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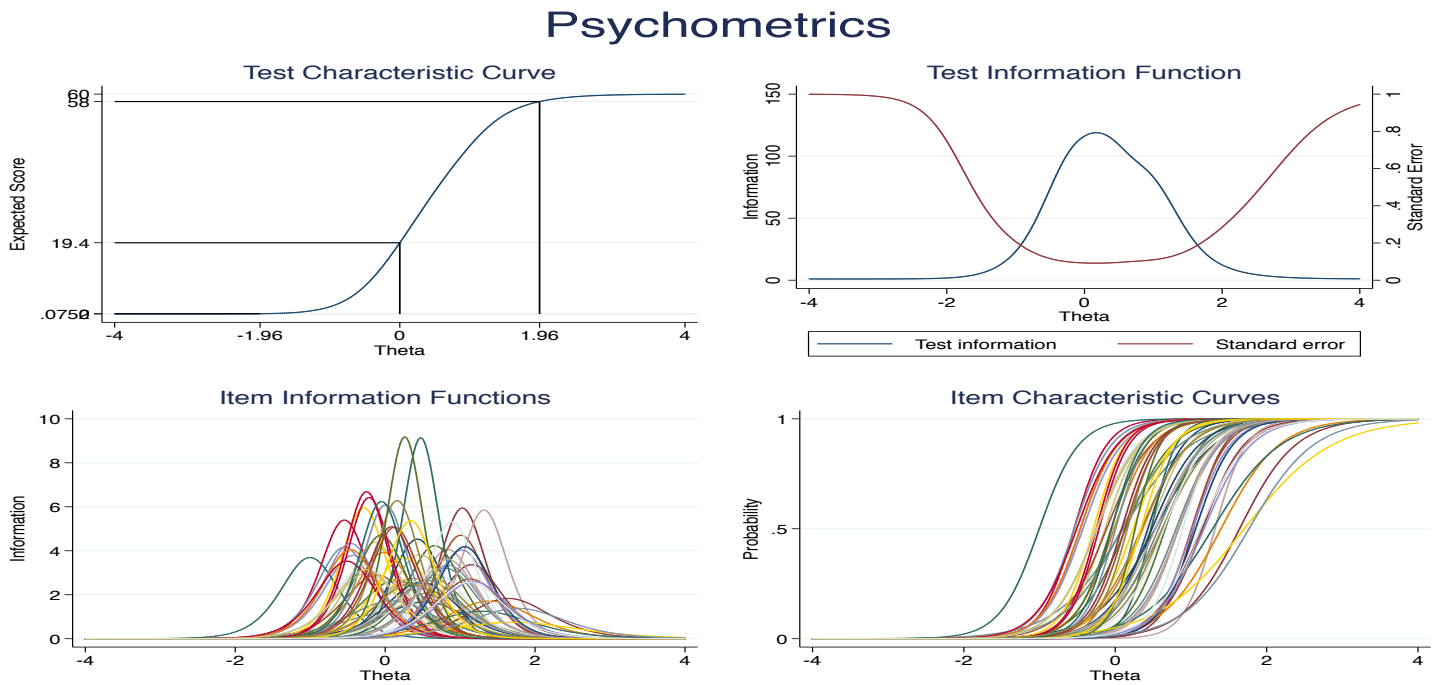
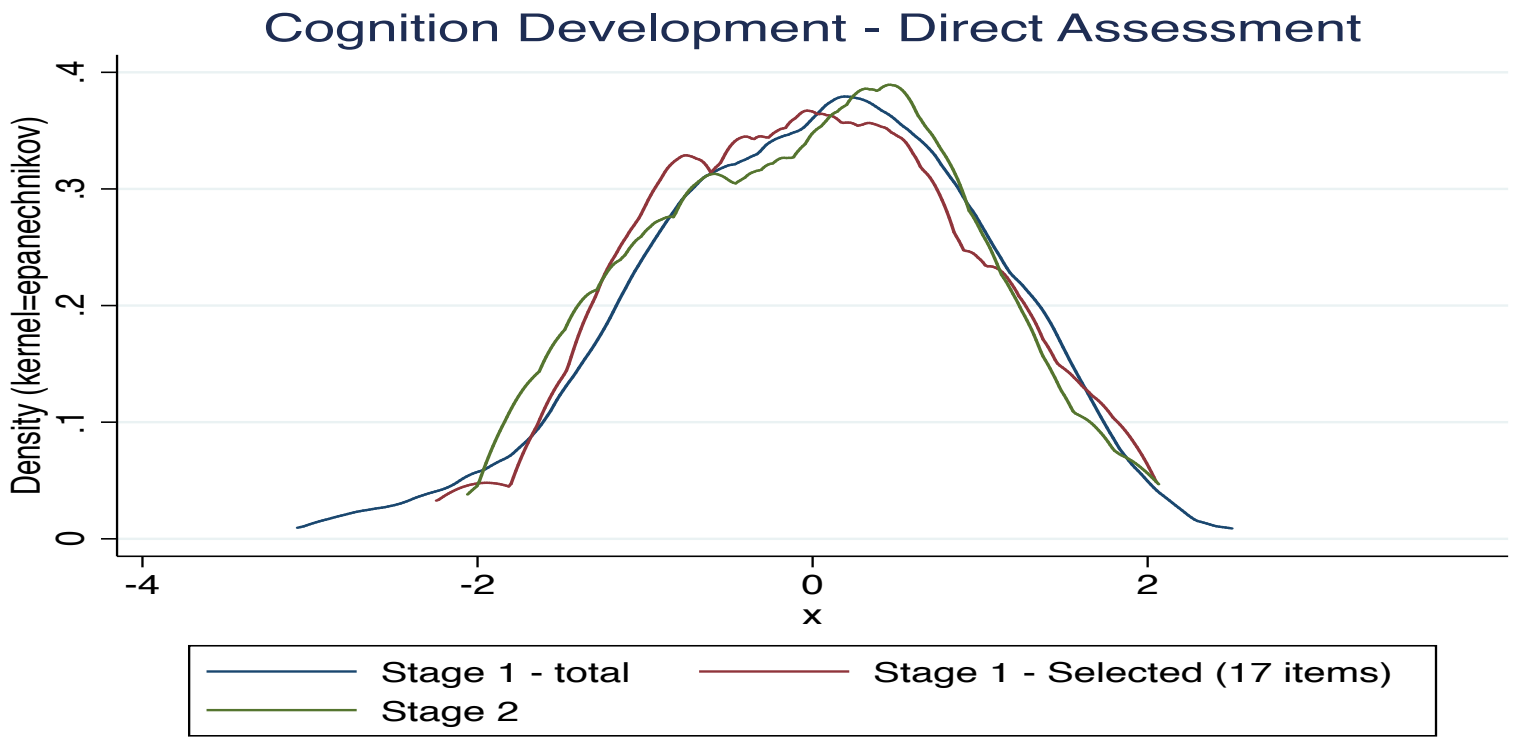


(a) IRT - Psychometrics

Constructing a new test of cognitive development

- We plot the density of factors estimates based on:
  1. Complete cognition Bayley (70 out of 91 items);
  2. Selected items (17 items);
  3. Selected items in a new sample.

Stage 1 and Stage 2 Factor Comparison



- Correlation in baseline sample between extended and reduced measure = 0.975.

Constructing a new test of cognitive development

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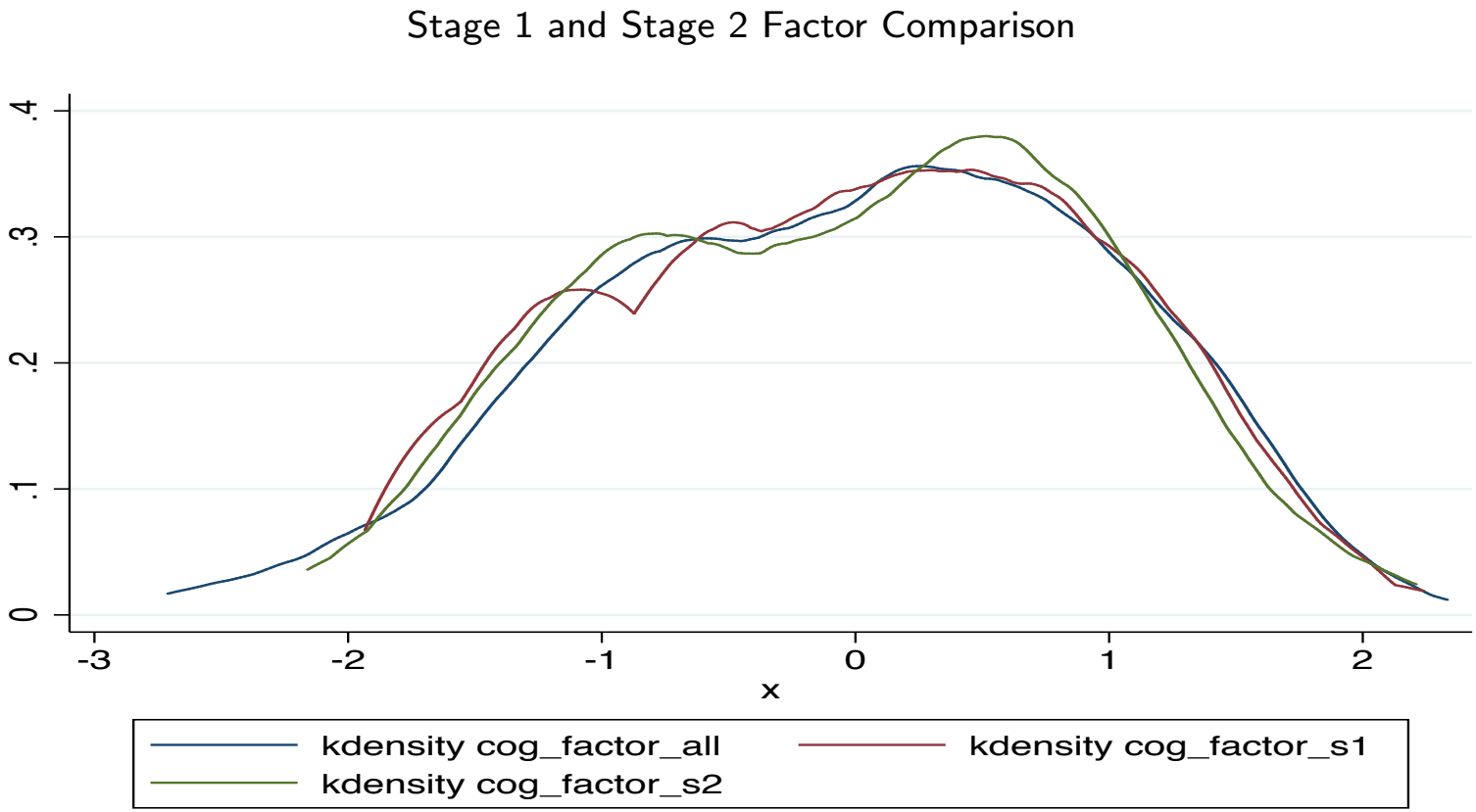

- Correlation in baseline sample between extended and reduced measure = 0.961.

Outline

Measuring new concepts

- In a number of important economic models the possibility of measuring new factors can allow the estimation of models subject to less stringent assumptions.
- Examples:
  - Barganing power within couples;
  - Beliefs;
  - Tastes:
    - Altruism;
    - Discount factors;
    - Risk aversion
    - Taste for redistribution;
- Subjective expectations: means
- Subjective expectations: variances and risk
- Information and its quality.

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  - An additional hypothetitcal question with larger stakes.

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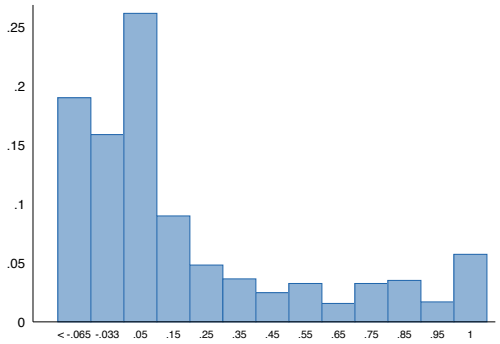
- Considerable variability, linked to several observables;

Figure 2: Willingness to pay



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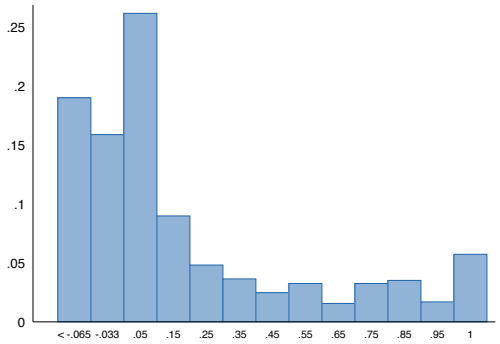

- The intervention shifted considerably the willingness to pay.

Table 8: ITT estimates of the effect of targeting payments on willingness to pay

Dep.var.:	**Willingness to pay**					
	Include all observations			Exclude always husband and always herself		
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS
Payment to mother	-0.057**	-0.053**	-0.053**	-0.058***	-0.055***	-0.055***
	(0.025)	(0.024)	(0.024)	(0.021)	(0.019)	(0.020)
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity controls	No	Yes	Yes	No	Yes	Yes
Stake controls	No	No	Yes	No	No	Yes
R^2	0.055	0.074	0.074	0.060	0.082	0.083
Observations	768	768	768	576	576	576

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- In our Tz sample we repeated the game;
- We now ask a sample of husband and a sample of wifes.

Pilot - Preliminary Results: average willingness to pay (out of 6 600 TZS)

Mean women	Mean men	p-value of difference
2720	660	< 0.0001

Outline

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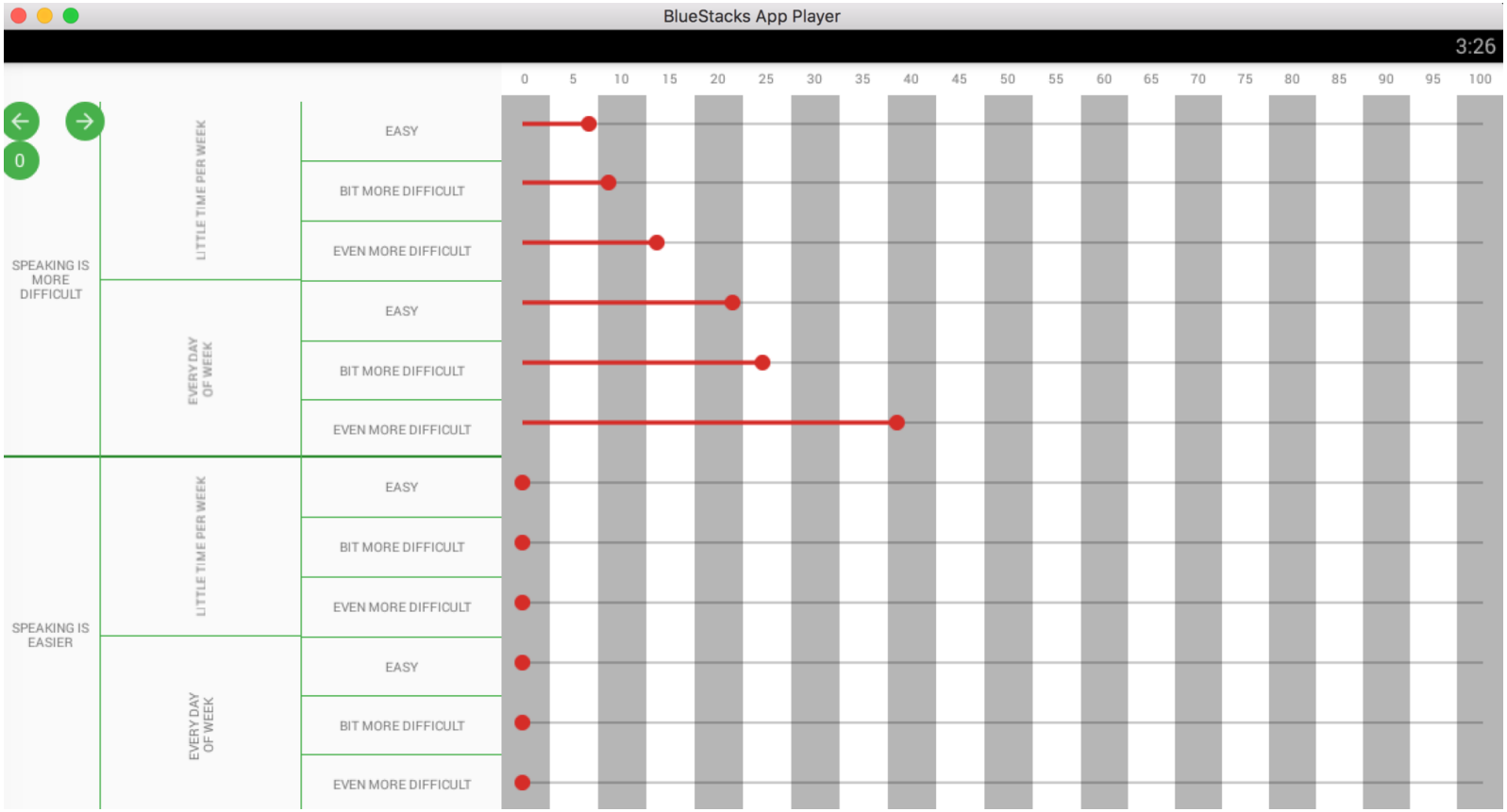
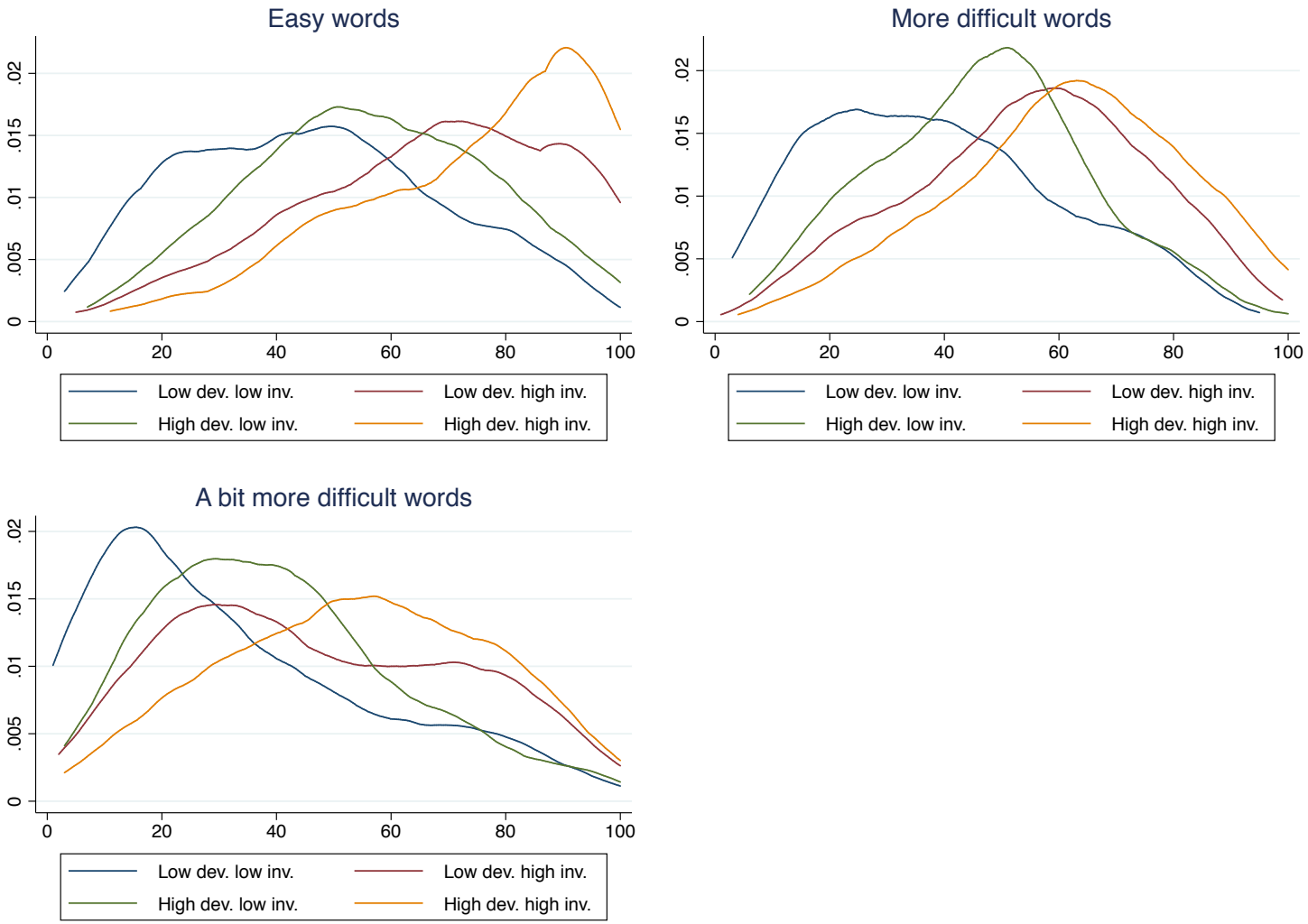
- The implicit assumption is that mothers use the same mapping between latent factors and observable markers.
  - For child development we use language
  - For parental investment we use items from the FCI.
- This approach allows us to:
  - Estimate rates of return to investment
  - Estimate 'subjective production functions' and compare them to actual production functions.

Figure: Beliefs on Language



Pilot - Preliminary Results: Beliefs on Language

Figure: Beliefs on Language



Beliefs on Language: Returns of Investment

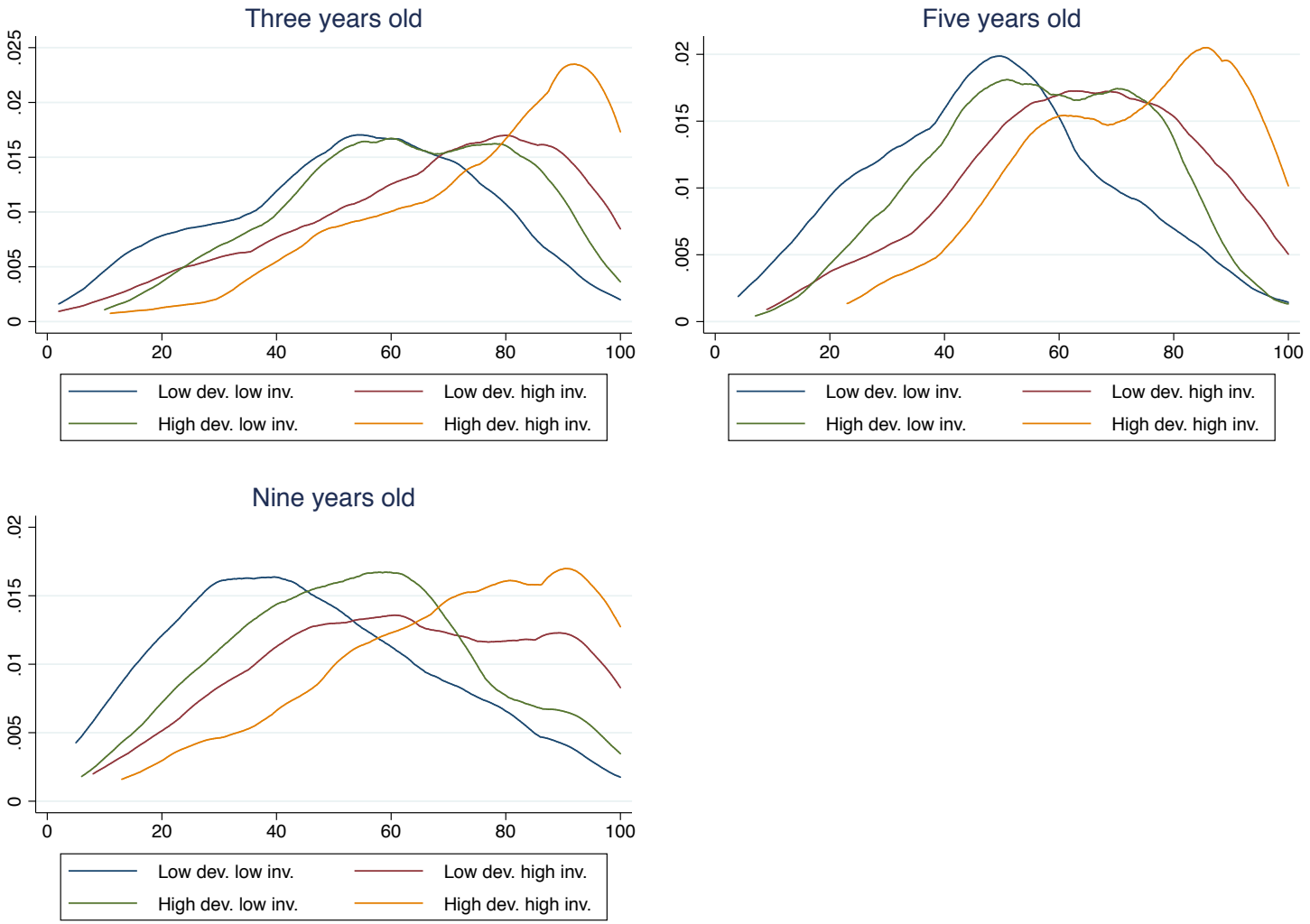
Table: Beliefs on Language: Returns of Investment

	Mothers	Fathers	p-value of diff
Low Initial Condition (easy words)	0.449	0.325	0.013
	(0.028)	(0.041)	
High Initial Condition (easy and difficult words)	0.313	0.303	0.808
	(0.024)	(0.035)	
Number of observations	246	126	

Notes: The table shows the means for the returns of investment. The p-values for the test of difference between the mother and father subsamples are presented in the last column. Standard errors in parentheses.

Beliefs on Socio-emotional

Figure: Beliefs on Socio-emotional



Beliefs on Socio-emotional: Returns of Investment

Table: Beliefs on Socio-emotional: Returns of Investment

	Mothers	Fathers	Diff. means
Low Initial Condition (behave very badly)	0.344	0.188	0.000
	(0.023)	(0.035)	
High Initial Condition (behave very well)	0.282	0.227	0.112
	(0.019)	(0.032)	
Number of observations	246	126	

Notes: The table shows the means for the returns of investment. The p-values for the test of difference between the mother and father subsamples are presented in the last column. Standard errors in parentheses.

Beliefs: the next steps.

- We have now collected data on beliefs in a longitudinal survey in India.
- We change slightly the formulation of the questions to introduce uncertainty about the process.
- This can allow us to study the evolution of beliefs.
- We can also better relate beliefs to other variables, both individual and environmental.

Outline

Measuring tastes with hypothetical scenarios

- We use a hypothetical allocation game to elicit data on parents preferences for household allocations
  - Juster and Shay, 1964;
  - Kahneman, Knetsch, and Thaler, 1986;
  - Ringdal and Sjursen, 2017;
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  - The participants first allocate the endowment across different consumption categories such as food, clothing, education, health, luxury goods and transportation.
  - Within each consumption category, the participant makes an allocation between the family members.
  - We randomize whether we interview the father, the mother or both.

Allocation module

"We would now like to understand how you would prefer to spend 300,000 X, if we were to give this money to you. Use these 60 beans that each represents 5,000 TSH, and cardboard card with 3 different expenditure options (for mother, for father, for your child); for each question distribute the beans according to your preferences. Imagine that your child is 5 years old for this exercise.

How much would you spend on .. (item) for .. (person)?"

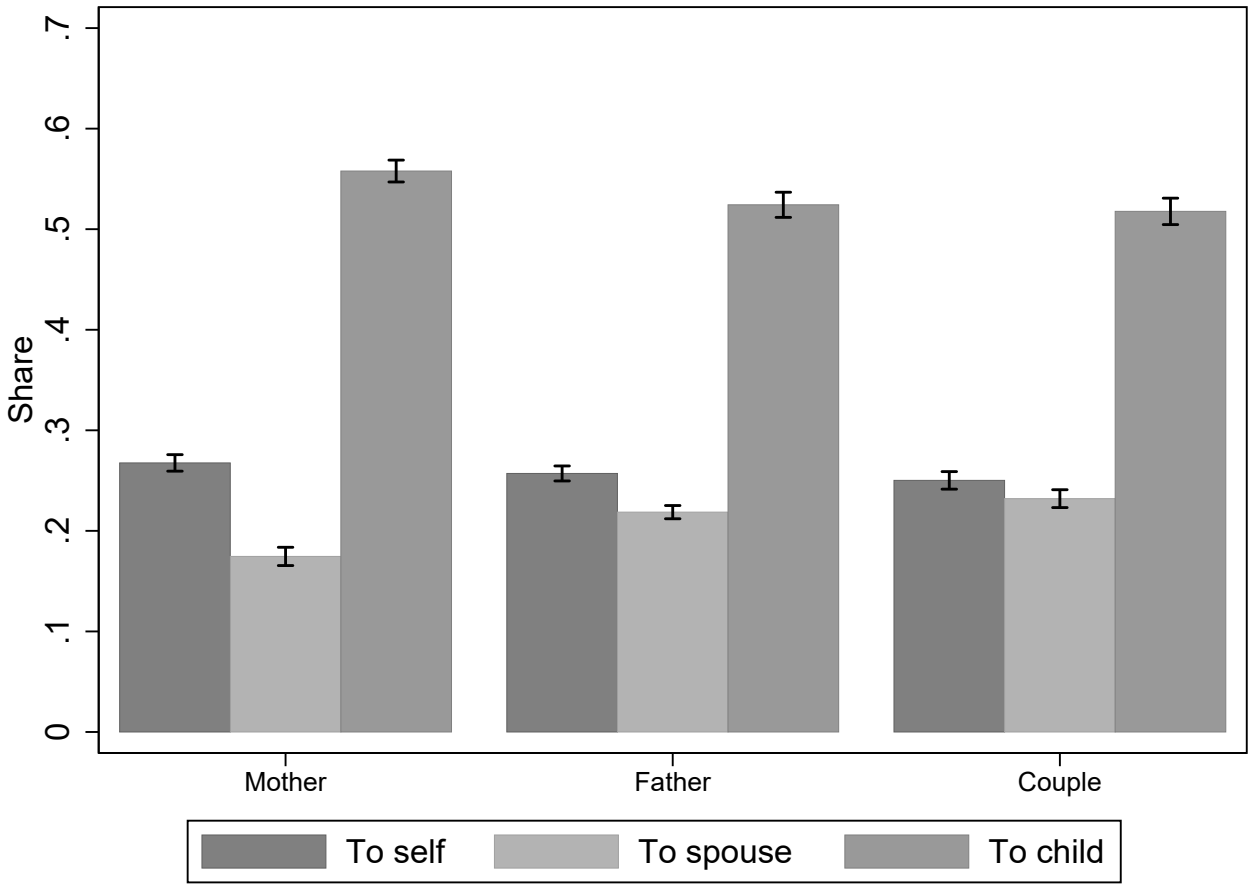
FOR THE COUPLE: "Please discuss the options between you in the same way you make expenditure decisions in the household."

Spending categories

- How much would you spend on **Clothing**?
- How much would you spend on **Food**?
- How much would you spend on **School expenditures**?
- How much would you spend on **Learning materials such as books, notebooks, pens & pencils**?
- How much would you spend on **Health expenditures**?
- How much would you spend on **Transportation**?

Expenditure allocations

Figure: Average share of expenditure allocated to household members



Note: This figure shows the average share of expenditure to household members for the different subsamples. The range plots show the one-standard errors around the shares.

	Wife	Husband	p-value for difference
Clothing			
Mean	6.628	5.559	0.005
Median	6.000	5.000	0.015
Standard deviation	2.710	3.627	
Food			
Mean	6.062	5.338	0.076
Median	5.000	5.000	1.000
Standard deviation	3.637	3.135	
School expenditure			
Mean	7.434	7.529	0.886
Median	6.000	6.000	1.000
Standard deviation	4.255	6.681	
Learning materials			
Mean	5.503	5.213	0.441
Median	5.000	5.000	1.000
Standard deviation	2.970	3.328	
Health expenditures			
Mean	5.159	5.213	0.866
Median	5.000	5.000	1.000
Standard deviation	2.491	2.937	
Transportation			
Mean	2.683	2.603	0.769
Median	2.000	3.000	0.001
Standard deviation	2.198	2.355	
Number of observations	145	136	

Outline

Validation

- These measures are difficult to implement.
- Different types of validation are essential:
  - Predictive power but not only;
  - What are we measuring?
  - Variability and co-variability.
  - Comparison with actual choices in different samples.

Are these data useful?

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- We need to put all these measures together and model individual behaviour to answer question 2.

Outline

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Conclusions

- I have provided some examples that should be salient for these arguments.
- Many more could be provided:
  - measuring networks and connections;
  - measuring allocation across different children;
  - measuring the quality of information;
  - measuring different inputs in production processes and their role.