The Role of Cognitive Ability on Children's Time Allocation

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Introduction

- Motivation: Wellbeing implications of **children's time allocation**
  - Educational activities→ cognitive skills (Fiorini & Keane, 2014).
  - Leisure time→ psychological wellbeing and social behaviour (Herting & Kostenius, 2012; Whitebread, Basilio, Kuvalja & Verma, 2012)

- Intrahousehold decision-making process: *Implicit* investment decisions on children through **time allocation**.
  - *Time spent at school → Investment*
  - *Time spent at work → Consumption*

- Does children's **ability** play a role in parents' investment strategy?
  - Compensation vs. reinforcement

Objective

- Use panel data from the MxFLS to study the relationship between children's cognitive **ability** and their time allocation among three activities: **work, school** and **housework**.

- Possible assumptions

  - Alternative 1 (Pooled OLS): Parents decide on children's time allocation based on the children's ability with respect to all children of similar age.

  - Alternative 2 (Fixed effects): Parents decide on their children's time allocation based on the children's relative level of ability with respect to siblings living in the same household.

Parental Allocation of Children's Time: School vs. Work

- Parental decision-making involves a cost-benefit analysis (Webbink, Smiths & de Jong, 2012).

- Decision: Sending a child to school

  - BENEFIT: Present value of future income→ Potential wage , based on the child's characteristics at the individual and household level:
    - Current level of education (Orazem & Gunnarsson, 2003)
    - Gender (Ilahi, 2001; Bonke, 2010)
    - Age (Guarcello, et al 2010)
    - Birth order (Edmonds, 2005).
    - Gender composition of the hosuehold (Raley & Bianchi, 2006).
    - Income→ Productivity of school (Orazem & Gunnarsson, 2003)

  - COST: Costs of schooling, both direct and indirect.

Methodological Approaches to the Study of Children's Time Allocation

DECISION: Work vs. School

Using cross sectional data

- Single equation analysis (Kamga, 2010).
- Heckman two-step sample selection model (Ahmed, 2011).
- Multivariate Tobit models (Koissy-Kpein, 2013).
- Multinomial Logit equations (Burki & Fasih, 1998)
- Combination of Probit and Tobit models (Rosati and Rossi, 2001).

- Limitations:
  - Tackling endogeneity coming from unobservable fixed factors becomes challenging.
  - Study of intrahousehold variations is limited
  - Results are highly sensitive to the methodology used (Portner, 2016).

The Role of Children's Ability on Parental Choices

- Most of the literature focus on the **effect of ability on human capital investments ($).**

- Parents make different human capital investments depending on their children's ability → *REINFORCEMENT* or *COMPENSATION*? (Becker &Tomes, 1976).

  - If the COST of the investment is negatively correlated with the child's endowment, LESS able children will receive a SMALLER investment.

  - Problem: Role of parental preferences? Parental aversion to inequality in their children's future earnings can reverse the predictions of the model (Behrman, Pollack & Taubman, 1982)

Empirical Evidence

- **United States** (NLSY): Positive relationship between cognitive ability and parental investment (Frijters et al, 2013).
- **Burkina Faso**: Children with higher ability test scores are more likely to be enrolled in school, controlling for reverse causality and household FE (Akresh et al, 2012).
- **Ethiopia**: Parents follow a compensation approach regarding their children's health endowments, but a reinforcement strategy regarding educational investments (Ayalew, 2012).
- **Mexico**: Ability reinforcement patterns in terms of schooling expenditures, especially for boys (Majid, 2012).

In most cases investments are measured in terms of schooling expenditures or indexes measuring the effort parents make in providing children with cognitive stimulation, mainly measured by physical resources.

However, this approach does not explore more basic dimensions of parental investment, that would apply to very poor households (e.g., the decision to send a child to school)

Empirical Evidence

- The specific relationship between children's cognitive **ability** and parental choices regarding their **time allocation** has not been studied in depth.

- The closest attempt has been Sequeira (2013), where the author uses data from the project 'Young Lives' to study this association for the Peruvian case.

  - Results show a negative relationship between ability and child labour, though its statistical significance quickly disappears when poverty is added as a control.

  - However this study works with cross-sectional variations and does not explore the possibility that parents may decide on a particular child based not only on the child's ability but also the one of the rest of the siblings.

  - Moreover, it does not consider the presence of reverse causality.

Data

- **Mexican Family Life Survey (MxFLS)**

  - The design of the survey was undertaken by the National Institute of Statistics and Geography (INEGI), and consists of a probabilistic, stratified, multi-staged, independent sample, which is representative of the Mexican population at the urban, rural and regional level.

  - Publicly available dataset that contains a broad variety of socioeconomic and demographic information for a large sample of Mexican households

  - Information is collected in three rounds: 2002, 2005 and 2009.

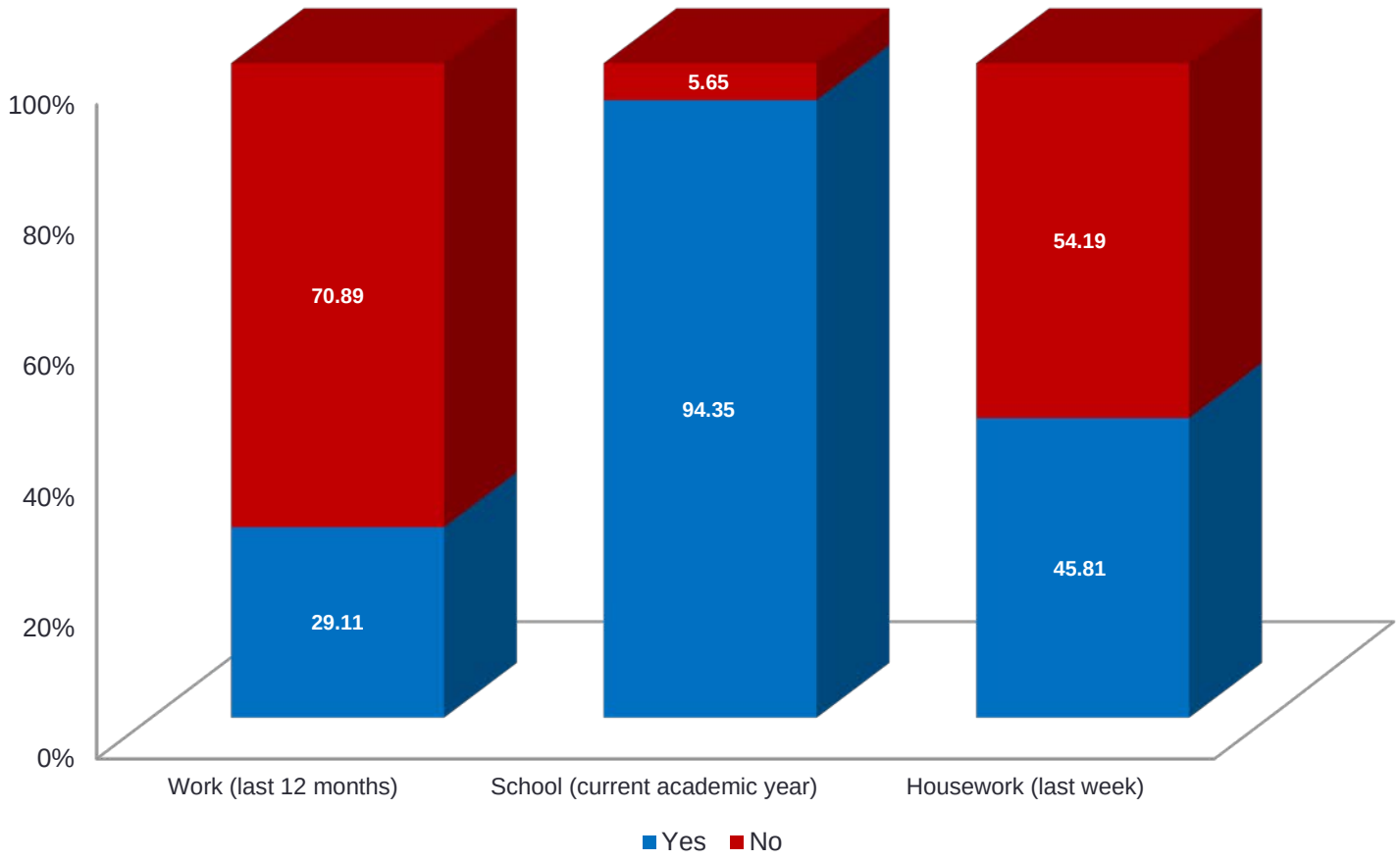
Data

- **Time allocation:**
  - Children's (<15 years) participation in paid work, school enrolment and participation in housework
  - Number of hours children spent at paid work, school and housework.

- **Ability**
  - Raven test consisting of 18 progressive matrices, the scores being measured in a scale from 0 to 100 and then standardised by age.

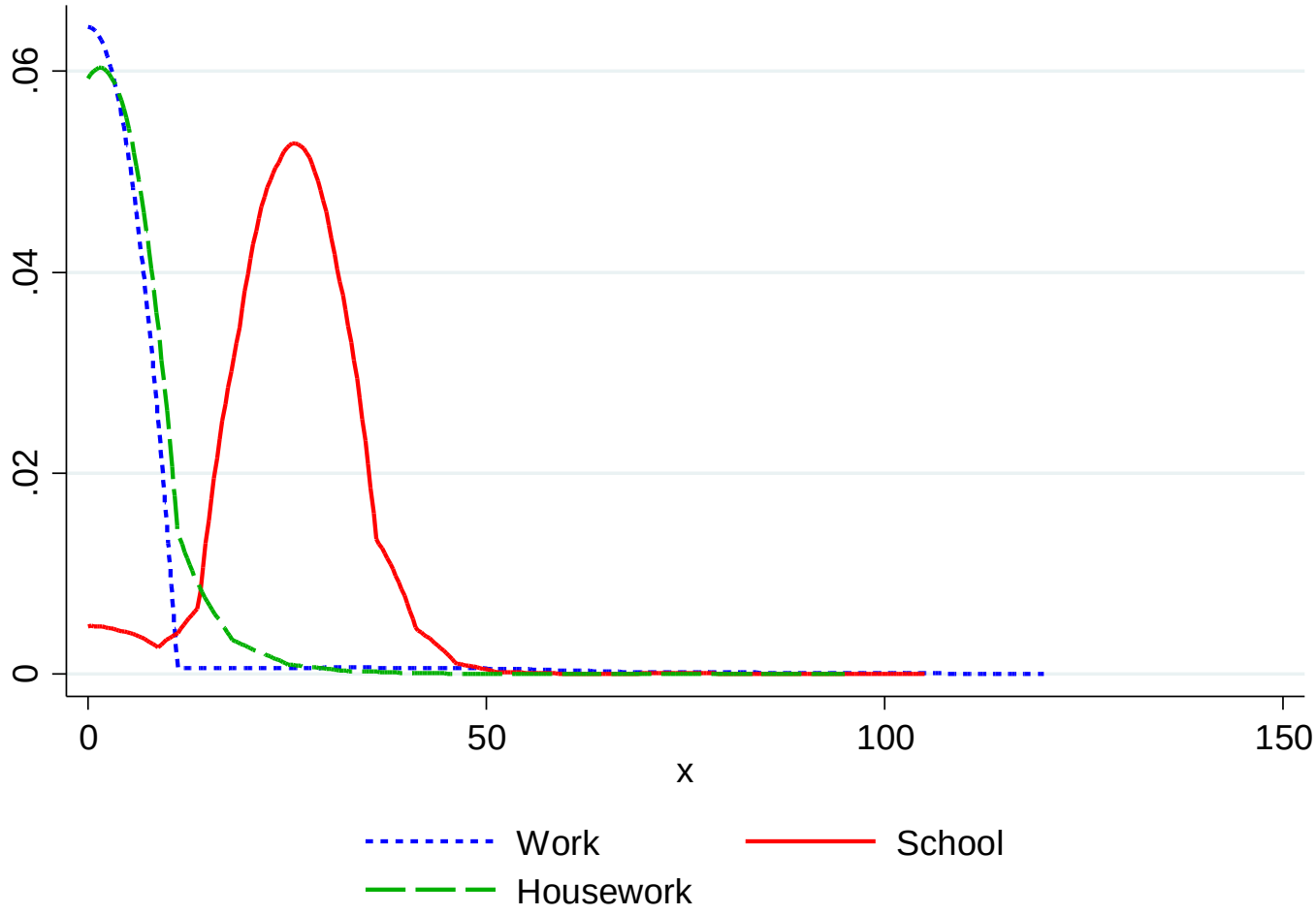
$$z = \frac{IQ_i - \overline{IQ}}{\sigma_{IQ}}$$

Children's participation (%)



Mexican Family Life Survey (2002, 2005-2006, 2009-2012).

Number of hours allocated to each activity, per week.



Mexican Family Life Survey (2002, 2005-2006, 2009-2012).

Methodology

- Participation → Logit model:

$$\log\left(\frac{P(Y_K = 1|X)}{1 - P(Y_K = 1|X)}\right) = X'\beta$$

- Number of Hours→ Tobit model:

$$Y_K = \begin{cases} Y_K^* & if \;\; Y_K^* > 0 \\ 0 & if \;\; Y_K^* \leq 0 \end{cases}$$

$$Y_K^* = \; X'\beta + u$$

Results (I): Pooled OLS

Table 1. Pooled OLS analysis for children's participation and number of hours spent on each activity; using logit and tobit regressions, respectively.

			Controls				
				(I)	(II)	(III)	(IV)
			None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score	-0.088*	-0.171	-0.164	-0.140	-0.145
		IQ z-score*Male(=1)		0.172	0.184	0.090	0.086
		Pseudo R-squared	0.001	0.095	0.112	0.107	0.129
		Wald Chi-Square	3.661	129.812	154.998	75.037	99.279
		N. of cases	16540	5795	5794	2308	2308
	School	IQ z-score	0.325***	0.286**	0.245*	0.316	0.411
		IQ z-score*Male(=1)		0.133	0.140	0.163	0.239
		Pseudo R-squared	0.012	0.177	0.194	0.375	0.419
		Wald Chi-Square	57.125	257.891	272.488	158.155	183.169
		N. of cases	16433	5764	5763	2286	2286
	Housework	IQ z-score	-0.007	-0.084**	-0.095**	-0.088	-0.079
		IQ z-score*Male(=1)		0.105*	0.108*	0.052	0.034
		Pseudo R-squared	0.000	0.106	0.108	0.104	0.121
		Wald Chi-Square	0.178	704.290	709.586	273.233	292.462
		N. of cases	16511	5794	5793	2308	2308
Number of Hours	Work	IQ z-score	-2.645	-4.725	-4.774	-3.052	-3.070
		IQ z-score*Male(=1)		4.296	4.984	1.828	1.233
		Pseudo R-squared	0.000	0.048	0.058	0.048	0.059
		F statistic	1.920	.	.	4.272	3.913
		N. of cases	16471	5777	5776	2300	2300
	School	IQ z-score	0.684***	0.554***	0.522***	0.476**	0.434**
		IQ z-score*Male(=1)		-0.088	-0.087	0.111	0.123
		Pseudo R-squared	0.001	0.029	0.029	0.039	0.042
		F statistic	86.988	27.531	23.047	11.117	8.268
		N. of cases	13580	4811	4811	1921	1921
	Housework	IQ z-score	-0.155*	-0.324*	-0.355**	-0.277	-0.215
		IQ z-score*Male(=1)		0.294	0.292	0.323	0.293
		Pseudo R-squared	0.000	0.045	0.046	0.038	0.074
		F statistic	2.842	.	.	13.125	.
		N. of cases	14145	4877	4876	2004	2004

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

Results (II): Intrahousehold Analysis (HFE)

Table 2. Intrahousehold analysis for children's participation and number of hours spent on each activity; using logit and least squares fixed effects regressions, respectively.

			Controls				
				(I)	(II)	(III)	(IV)
			None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score	0.070	0.145	0.145	.	.
		IQ z-score'*Male(=1)		0.441	0.441	.	.
		Pseudo R-squared	0.001	0.722	0.722	.	.
		Wald Chi-Square	0.307	87.398	87.398	.	.
		N. of cases	496	170	170	.	.
		N. of groups	191	66	66	.	.
	School	IQ z-score	-0.073	-1.102	-1.102	.	.
		IQ z-score'*Male(=1)		2.687**	2.687**	.	.
		Pseudo R-squared	0.000	0.405	0.405	.	.
		Wald Chi-Square	0.058	359.342	359.342	.	.
		N. of cases	842	215	215	.	.
		N. of groups	304	82	82	.	.
	Housework	IQ z-score	-0.011	0.168	0.168	.	.
		IQ z-score'*Male(=1)		-0.096	-0.096	.	.
		Pseudo R-squared	0.000	0.403	0.403	.	.
		Wald Chi-Square	0.058	335.927	335.927	.	.
		N. of cases	3475	1162	1162	.	.
		N. of groups	1352	469	469	.	.
Number of Hours	Work	IQ z-score	0.024	0.274	0.274	0.366	0.366
		IQ z-score'*Male(=1)		-0.167	-0.167	-0.347	-0.347
		R-squared	0.000	0.040	0.040	0.051	0.051
		F statistic	0.042	3.079	3.079	.	.
		N. of cases	16471	5777	5776	2300	2300
		N. of groups	11941	4218	4217	1571	1571
	School	IQ z-score	0.042	-0.129	-0.129	0.247	0.247
		IQ z-score'*Male(=1)		0.208	0.208	-0.117	-0.117
		R-squared	0.000	0.288	0.288	0.390	0.390
		F statistic	0.056	18.864	18.864	10.376	10.376
		N. of cases	13580	4811	4811	1921	1921
		N. of groups	10321	3731	3731	1424	1424
	Housework	IQ z-score	-0.042	-0.010	-0.010	0.105	0.105
		IQ z-score'*Male(=1)		0.233	0.233	0.367	0.367
		R-squared	0.000	0.163	0.163	0.177	0.177
		F statistic	0.215	22.852	22.852	.	.
		N. of cases	14145	4877	4876	2004	2004
		N. of groups	9595	3308	3307	1272	1272

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects. The fixed effects estimation controls for each household at each particular year, allowing a direct sibling-level comparison at each point of time.

The Issue of Reverse Causality

- **Children's ability** is not completely determined by genetic factors and **can be affected by environmental influences** and activities they're involved in (Makharia, et al 2016; Sharkey & Elwert, 2011; Broberg et al, 1997).

Time allocation → Cognitive ability

(Biased estimators)

- Solutions?
  1. Use the **lag of the z-score** as explanatory variable
  2. Use **Instrumental variables** → *Height for age z-score*
     - Evidence of strong positive relationship between height and cognitive ability (Spears, 2012; Humphreys, Davey & Park, 1985), at least 35% of the correlation between these variables coming from *pleitropy*- same gene causing two or more effects (Sundet et al, 2005).

Results (III): Lagged IQ-for-age z-score

Table 3. Using the lagged IQ-for-age z-score as explanatory variable on children's participation and number of hours spent on each activity; logit and tobit regressions, respectively.

			Controls				
				(I)	(II)	(III)	(IV)
			None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	Lag of IQ z-score	-0.093**	0.017	0.037	0.110	0.145
		Lag of IQ z-score*Male(=1)		-0.096	-0.06	-0.382	0.449
		Pseudo R-squared	0.001	0.068	0.078	0.138	0.178
		Wald Chi-Square	4.105	41.480	43.292	40.961	44.650
		N. of cases	7933	1864	1864	508	508
		Wooldrige's Serial Correlation F test in the original model	10710.628	0.170	0.465	.	.
	School	Lag of IQ z-score	0.452***	0.353	0.328	0.283	.
		Lag of IQ z-score*Male(=1)		1.905***	1.942***	3.947**	.
		Pseudo R-squared	0.024	0.237	0.248	0.648	.
		Wald Chi-Square	59.551	50.354	72.802	57.344	.
		N. of cases	7869	1846	1279	338	.
		Wooldrige's Serial Correlation F test in the original model	322.301	165.266	95.512	.	.
	Housework	Lag of IQ z-score	-0.052**	-0.034	-0.049	0.032	0.077
		Lag of IQ z-score*Male(=1)		0.081	0.079	0.03	-0.067
		Pseudo R-squared	0.000	0.095	0.101	0.088	0.148
		Wald Chi-Square	4.868	211.459	225.056	51.371	87.044
		N. of cases	7867	1864	1864	512	512
		Wooldrige's Serial Correlation F test in the original model	1.706	0.711	0.660	.	.
Number of Hours	Work	Lag of IQ z-score	-3.194	4.511	5.062	9.361	10.301
		Lag of IQ z-score*Male(=1)		-4.65	-3.172	-14.377	-12.756
		Pseudo R-squared	0.000	0.029	0.034	0.068	0.080
		F statistic	2.124	3.194	2.825	.	.
		N. of cases	7830	1854	1854	514	514
		Wooldrige's Serial Correlation F test in the original model	182.068	0.612	0.484	.	.
	School	Lag of IQ z-score	0.888***	0.179	0.166	-0.023	0.002
		Lag of IQ z-score*Male(=1)		0.363	0.343	1.214**	1.243**
		Pseudo R-squared	0.002	0.003	0.003	0.010	0.017
		F statistic	82.638	2.668	2.269	1.734	2.084
		N. of cases	7794	1844	1844	509	509
		Wooldrige's Serial Correlation F test in the original model	113.757	140.471	121.318	.	.
	Housework	Lag of IQ z-score	-0.413***	-0.036	-0.084	0.175	-0.233***
		Lag of IQ z-score*Male(=1)		-0.261	-0.255	0.175	-0.03
		Pseudo R-squared	0.000	0.035	0.039	0.035	0.132
		F statistic	7.419	13.304	12.297	.	.
		N. of cases	5681	1380	1380	330	330
		Wooldrige's Serial Correlation F test in the original model	11.520	66.808	58.788	.	.

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

Results (IV): Instrumental Variables (Participation)

Table 4a. Instrumental variable analysis for children's participation on each activity; using IV probit.

				Controls				
					(I)	(II)	(III)	(IV)
				None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score		-0.128	0.465	0.650	1.261***	1.289***
		IQ z-score*Male(=1)			-0.625	-0.669	-0.721*	-0.825**
		Wald Chi-Square		0.813	165.700	220.656	989.051	1099.618
		N. of cases		13163	5080	5080	2033	2033
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.028	0.033
			Height z-score*Male		0.027	0.026	0.019	0.022
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.008***	-0.014***	-0.007
			Height z-score*Male		0.094***	0.094***	0.088***	0.088***
		Wald Test of Exogeneity		0.37	1.66	2.6	68.27	73.75
	School	IQ z-score		0.880***	1.096***	1.004**	-1.135***	-0.797
		IQ z-score*Male(=1)			-0.411	-0.279	0.684	0.689
		Wald Chi-Square		287.765	288.446	229.764	456.982	262.932
		N. of cases		13139	5076	5076	2022	2022
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.031	0.036
			Height z-score*Male		0.027	0.025	0.014	0.018
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.008***	-0.014***	-0.007
			Height z-score*Male		0.094***	0.093***	0.088***	0.088***
		Wald Test of Exogeneity		47.72	18.10	8.30	44.42	2.02
	Housework	IQ z-score		0.141*	0.717***	0.764***	1.112***	1.116***
		IQ z-score*Male(=1)			-0.429	-0.425	-0.475	-0.518
		Wald Chi-Square		3.297	907.526	999.701	947.583	975.810
		N. of cases		13148	5080	5080	2033	2033
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.028	0.033
			Height z-score*Male		0.027	0.026	0.019	0.022
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.008***	-0.014***	-0.007
			Height z-score*Male		0.094***	0.094***	0.088***	0.088***
		Wald Test of Exogeneity		3.37	12.18	11.59	20.56	21.25

Results (IV): Instrumental Variables (Number of hours)

Table 4b. Instrumental variable analysis for number of hours spent on each activity; using IV tobit regressions.

Number of hours	Work	IQ z-score		-12.361	33.336	47.366	251.033	255.828
		IQ z-score*Male(=1)			-57.416	-61.519	-174.223	-191.251
		Wald Chi-Square		0.882	488.377	110.044	41.878	57.396
		N. of cases		13114	5064	5064	2025	2025
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.027	0.033
			Height z-score*Male		0.026	0.025	0.016	0.019
		Instruments for IQ z-score*Male	Height z-score		0.026	0.025	0.016	0.019
			Height z-score*Male		0.093***	0.092***	0.085***	0.085***
		Wald Test of Exogeneity		0.56	1.53	1.65	43.67	51.46
	School	IQ z-score		2.071***	3.242**	3.341*	4.453	4.663
		IQ z-score*Male(=1)			-0.867	-0.868	-2.946	-2.497
		Wald Chi-Square		23.284	129.965	132.098	69.721	80.349
		N. of cases		11898	4630	4630	1848	1848
		Instruments for IQ z-score	Height z-score	0.122***	0.064***	0.052***	0.018	0.026
			Height z-score*Male		0.026	0.025	0.033	0.038
		Instruments for IQ z-score*Male	Height z-score		-0.004**	-0.009***	-0.016***	-0.008
			Height z-score*Male		0.096***	0.095***	0.094***	0.095***
		Wald Test of Exogeneity		12.71	9.38	7.19	0.96	2.79
	Housework	IQ z-score		-1.188*	3.079	3.287	11.932	11.516
		IQ z-score*Male(=1)			-1.867	-1.722	-5.115	-6.023
		Wald Chi-Square		3.026	477.036	478.804	94.732	106.115
		N. of cases		11131	4233	4233	1746	1746
		Instruments for IQ z-score	Height z-score	0.113***	0.058***	0.049***	0.027	0.034
			Height z-score*Male		0.032	0.028	0.019	0.023
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.007***	-0.017***	-0.010
			Height z-score*Male		0.096***	0.094***	0.088***	0.088***
		Wald Test of Exogeneity		2.29	2.58	2.32	7.39	8.13

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

Results (V): Instrumental Variables + HFE (Participation)

Table 5a. Instrumental variable analysis with household fixed effects for children's participation on each activity (intrahousehold variation at any fixed point in time)

				Controls				
					(I)	(II)	(III)	(IV)
				None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score		0.104	-0.031	-0.031	-0.442	-0.442
		IQ z-score*Male(=1)			-0.035	-0.035	0.059	0.059
		F statistic		0.259	3.260	3.260	0.735	0.735
		N. of cases		5777	2208	2208	1007	1007
		Instruments for	Height z-score	0.019	-0.049	-0.049	-0.028	-0.028
		IQ z-score	Height z-score*Male		0.020	0.020	0.033	0.033
		Instruments for	Height z-score		-0.031	-0.031	-0.021	-0.021
		IQ z-score*Male	Height z-score*Male		0.078**	0.078**	0.085*	0.085*
	School	IQ z-score		-0.022	-0.015	-0.015	-0.102	-0.102
		IQ z-score*Male(=1)			0.020	0.020	0.060	0.060
		F statistic		0.014	1.318	1.318	0.492	0.492
		N. of cases		5772	2205	2205	1006	1006
		Instruments for	Height z-score	0.019	-0.047	-0.047	-0.028	-0.028
		IQ z-score	Height z-score*Male		0.017	0.017	0.035	0.035
		Instruments for	Height z-score		-0.029	-0.029	-0.020	-0.020
		IQ z-score*Male	Height z-score*Male		0.076**	0.076**	0.087*	0.087*
	Housework	IQ z-score		0.600	-0.356	-0.356	-1.273	-1.273
		IQ z-score*Male(=1)			-0.285	-0.285	0.303	0.303
		F statistic		0.765	10.244	10.244	7.739	7.739
		N. of cases		5775	2208	2208	1007	1007
		Instruments for	Height z-score	0.019	-0.049	-0.049	-0.028	-0.028
		IQ z-score	Height z-score*Male		0.020	0.020	0.033	0.033
		Instruments for	Height z-score		-0.031	-0.031	-0.021	-0.021
		IQ z-score*Male	Height z-score*Male		0.078**	0.078**	0.085*	0.085*

Results (V): Instrumental Variables + HFE (Number of Hours)

Table 5b. Instrumental variable analysis with household fixed effects for number of hours spent on each activity (intrahousehold variation at any fixed point in time)

Number of hours	Work	IQ z-score		-4.110	3.989	3.989	-10.108	-10.108
		IQ z-score*Male(=1)			0.210	0.210	-2.091	-2.091
		F statistic		0.261	1.998	1.998	0.575	0.575
		N. of cases		5745	2190	2190	1000	1000
		Instruments for IQ z-score	Height z-score	0.019	-0.046	-0.046	-0.022	-0.022
			Height z-score*Male		0.013	0.013	0.020	0.020
		Instruments for IQ z-score*Male	Height z-score		-0.032	-0.032	-0.023	-0.023
			Height z-score*Male		0.076**	0.076**	0.080*	0.080*
	School	IQ z-score		-9.586	3.017	3.017	0.562	0.562
		IQ z-score*Male(=1)			-0.750	-0.750	-0.328	-0.328
		F statistic		0.348	4.838	4.838	2.981	2.981
		N. of cases		4868	1822	1822	832	832
		Instruments for IQ z-score	Height z-score	0.013	-0.057	-0.057	-0.021	-0.021
			Height z-score*Male		0.041	0.041	0.051	0.051
		Instruments for IQ z-score*Male	Height z-score		-0.037	-0.037	-0.022	-0.022
			Height z-score*Male		0.116***	0.116***	0.125**	0.125**
	Housework	IQ z-score		2.268	-3.103	-3.103	-3.135	-3.135
		IQ z-score*Male(=1)			-0.171	-0.171	3.616	3.616
		F statistic		0.204	12.975	12.975	14.155	14.155
		N. of cases		5771	2206	2206	1005	1005
		Instruments for IQ z-score	Height z-score	0.019	-0.049	-0.049	-0.029	-0.029
			Height z-score*Male		0.020	0.020	0.032	0.032
		Instruments for IQ z-score*Male	Height z-score		-0.031	-0.031	-0.022	-0.022
			Height z-score*Male		0.077**	0.077**	0.084*	0.084*

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

Conclusions

- **Cognitive ability** does not seem to have a significant effect on children's participation or time allocated to work**,** but it does have a strong effect on **school enrolment**, **number of hours spent at school** and **participation in housework.**
- However, these **results regarding school and housework differ slightly across specifications.**
  - Pooled OLS vs HFE : Gender effect on school enrolment.
- Strong evidence of reverse causality between **ability** and **school outcomes.**
  - Once this source of endogeneity is removed, the relationship becomes stronger in size and significance.
- Once we take IV+HFE, we found no significant relationship between cognitive ability and time allocation, however this result should be interpreted with caution (low explanatory power of instruments).