

Web Appendix to “Gender differences in educational outcomes
and the effect of family background:
A comparative perspective from East Asia[†]”

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Table A1. Gender gap in top 10% by income class

(1) Math test scores

Math	China		Japan		US	
	Boy	Girl	Boy	Girl	Boy	Girl
Age 10-12						
Income Class						
1st Q	0.124	0.093	0.137	0.152	0.047 >>>	0.021
2nd Q	0.169	0.152	0.223	0.229	0.096 >>>	0.057
3rd Q	0.161	0.168	0.318	0.303	0.157 >>>	0.093
4th Q	0.242	0.239	0.339	0.323	0.268 >>>	0.172
Total	0.171	0.158	0.258	0.248	0.130 >>>	0.077
N	831	772	473	452	5,256	5,188
Age 13-15						
Income Class						
1st Q	0.080	0.090	0.093	0.077	0.043 >>>	0.017
2nd Q	0.127	0.130	0.164	0.164	0.107 >	0.080
3rd Q	0.138	0.176	0.171	0.168	0.145	0.146
4th Q	0.204	0.194	0.227	0.233	0.214 >	0.175
Total	0.134	0.143	0.167	0.165	0.120 >>>	0.093
N	796	818	622	588	4,166	4,147

(2) Language test score

Language	China		Japan		US	
	Boy	Girl	Boy	Girl	Boy	Girl
Age 10-12						
Income Class						
1st Q	0.053	0.044	0.137	0.144	0.028	0.029
2nd Q	0.079	0.113	0.175	0.174	0.075	0.081
3rd Q	0.081	0.139	0.136 <	0.246	0.126	0.137
4th Q	0.185	0.226	0.190	0.281	0.216	0.230
Total	0.095	0.124	0.159	0.208	0.102	0.108
N	831	772	473	452	5,256	5,188
Age 13-15						
Income Class						
1st Q	0.133	0.126	0.119	0.091	0.031	0.028
2nd Q	0.144	0.199	0.071	0.100	0.079	0.098
3rd Q	0.133 <	0.216	0.082	0.077	0.120 <	0.157
4th Q	0.160 <<	0.281	0.141	0.194	0.185 <<	0.235
Total	0.142 <<	0.199	0.106	0.121	0.097 <<	0.117
N	796	818	622	588	4,166	4,147

Note: >, >>, and >>> indicate that boy's proportion of top 10% was higher than the girl's proportion of top 10% at 0.05, 0.01, 0.001 levels, respectively. Further, <, <<, and <<< indicate the reverse order at each significance level.

Table A2. Gender gap in bottom 10% by income class

(1) Math test scores

Math	China		Japan		US	
	Boy	Girl	Boy	Girl	Boy	Girl
Age 10-12						
Income Class						
1st Q	0.147	0.161	0.214	0.184	0.180 <<	0.228
2nd Q	0.107	0.147	0.117	0.064	0.097	0.107
3rd Q	0.081	0.106	0.098	0.066	0.030	0.038
4th Q	0.084	0.058	0.074	0.021	0.018	0.020
Total	0.107	0.122	0.125	0.088	0.086 <<<	0.106
N	831	772	473	452	5,256	5,188
Age 13-15						
Income Class						
1st Q	0.207	0.238	0.199	0.217	0.207	0.214
2nd Q	0.119	0.134	0.121	0.127	0.086	0.072
3rd Q	0.100	0.108	0.110 >>	0.019	0.037	0.025
4th Q	0.062	0.094	0.065	0.028	0.017	0.016
Total	0.123	0.148	0.121	0.090	0.095	0.092
N	796	818	622	588	4,166	4,147

(2) Language test scores

Language	China		Japan		US	
	Boy	Girl	Boy	Girl	Boy	Girl
Age 10-12						
Income Class						
1st Q	0.200	0.151	0.145	0.208	0.231 >	0.193
2nd Q	0.124	0.127	0.068	0.055	0.124 >>>	0.063
3rd Q	0.081	0.067	0.144 >	0.049	0.042 >>>	0.020
4th Q	0.079	0.052	0.099	0.031	0.020	0.010
Total	0.125	0.102	0.116	0.091	0.111 >>>	0.079
N	831	772	473	452	5,256	5,188
Age 13-15						
Income Class						
1st Q	0.191 >	0.121	0.146	0.147	0.260 >>>	0.178
2nd Q	0.165 >>	0.082	0.136	0.082	0.100 >>>	0.048
3rd Q	0.138 >>>	0.039	0.185 >>>	0.019	0.057 >>>	0.016
4th Q	0.062	0.081	0.097 >	0.033	0.017	0.014
Total	0.143 >>>	0.082	0.138 >>>	0.066	0.117 >>>	0.072
N	796	818	622	588	4,166	4,147

Note: >, >>, and >>> indicate that boy's proportion of bottom 10% was higher than the girl's proportion of bottom 10% at 0.05, 0.01, 0.001 levels, respectively. Further, <, <<, and <<< indicate the reverse order at each significance level.

Table A3. Descriptive statistics

	China			Japan			US		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Girl	3129	0.50	0.50	2059	0.48	0.50	18245	0.50	0.50
Math test score	3129	-0.01	1.00	2059	0.02	0.99	18245	0.03	0.99
Language test score	3129	-0.01	1.00	2059	0.01	0.99	18245	0.03	0.99
Math top 10%	3129	0.15	0.36	2059	0.21	0.41	18245	0.11	0.31
Math bottom 10%	3129	0.12	0.33	2059	0.10	0.30	18245	0.09	0.29
Language top 10%	3129	0.14	0.35	2059	0.14	0.35	18245	0.11	0.31
Language bottom 10%	3129	0.11	0.32	2059	0.10	0.30	18245	0.09	0.29
Log household income	3129	9.96	0.90	2059	6.50	0.46	18245	10.83	0.85
Parental education									
Father high school or above	3129	0.16	0.37	-	-	-	-	-	-
Mother high school or above	3129	0.12	0.32	-	-	-	-	-	-
Father some college or above	-	-	-	2059	0.53	0.50	18245	0.52	0.50
Mother some college or above	-	-	-	2059	0.50	0.50	18245	0.65	0.48
Ethnicity	3129	0.89	0.31	-	-	-	-	-	-
Father's ethnicity	-	-	-	-	-	-	18245	0.63	0.48
Mother's ethnicity	-	-	-	-	-	-	18245	0.54	0.50
Marital status: Single	-	-	-	-	-	-	18245	0.21	0.41
Participation in extra curriculum class									
Study	2112	0.25	0.43	1183	0.48	0.50	7981	0.25	0.43
Art	1872	0.02	0.15	1183	0.20	0.40	7936	0.30	0.46
Sports	-	-	-	1183	0.15	0.35	7945	0.62	0.48
Preference for study subjects									
Math	-	-	-	1195	0.37	0.48	7938	0.55	0.50
Language	-	-	-	1195	0.30	0.46	7923	0.47	0.50

Table A4. Regression Results for Math test score

(1) Math test score: China

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girl (dummy)	-0.0076 (0.0268)	0.0083 (0.0259)	0.4732 (0.3182)	0.0049 (0.0294)	0.0369 (0.0602)	0.0208 (0.0347)	0.0221 (0.0391)
Log household income		0.0523*** (0.0183)	0.0747*** (0.0264)	0.0520*** (0.0184)	0.0523*** (0.0184)	0.0482*** (0.0184)	0.0257 (0.0210)
Father: High school or above		0.1727*** (0.0359)	0.1729*** (0.0358)	0.1858*** (0.0492)	0.1727*** (0.0359)	0.1537*** (0.0365)	0.1289*** (0.0396)
Mother: High school or above		0.1605*** (0.0405)	0.1634*** (0.0405)	0.1255** (0.0545)	0.1597*** (0.0406)	0.1313*** (0.0415)	0.1322*** (0.0440)
Sibling		-0.0694*** (0.0201)	-0.0694*** (0.0201)	-0.0689*** (0.0202)	-0.0591** (0.0279)	-0.0624*** (0.0206)	-0.0591** (0.0244)
Household income X Girl			-0.0467 (0.0317)				
Father: High school or above X Girl				-0.0275 (0.0723)			
Mother: High school or above X Girl				0.0669 (0.0767)			
Sibling X Girl					-0.0170 (0.0331)		
Urban						0.1153*** (0.0382)	
Urban X Girl						-0.0327 (0.0505)	
Father: Regular worker							0.1517*** (0.0495)
Mother: Regular worker							0.1158** (0.0564)
Father: Regular worker X Girl							0.0125 (0.0712)
Mother: Regular worker X Girl							-0.0316 (0.0753)
Age	yes	yes	yes	yes	yes	yes	yes
Region	no	yes	yes	yes	yes	yes	yes
Ethnicity	no	yes	yes	yes	yes	yes	yes
Constant	-0.9074*** (0.0305)	-1.5029*** (0.2091)	-1.7176*** (0.2783)	-1.4944*** (0.2094)	-1.5194*** (0.2134)	-1.5413*** (0.2088)	-1.1892*** (0.2401)
Observations	3129	3129	3129	3129	3129	3129	1996
Adjusted R-squared	0.4199	0.4931	0.4933	0.4928	0.4929	0.4945	0.5081

Note: ***, ** and * are indicating that they are significant at the level of 1%, 5% and 10% respectively.

(2) Math test score: Japan

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girl (dummy)	0.0562 (0.0458)	0.0449 (0.0427)	-1.2578** (0.6255)	0.0793 (0.0699)	-0.0152 (0.0772)	0.0562 (0.0515)	-0.0501 (0.1006)
Log household income		0.3261*** (0.0567)	0.2384*** (0.0755)	0.3254*** (0.0566)	0.3297*** (0.0569)	0.3250*** (0.0566)	0.3775*** (0.0617)
Father: Some college or above		0.2217*** (0.0540)	0.2219*** (0.0539)	0.2633*** (0.0784)	0.2224*** (0.0540)	0.2207*** (0.0539)	0.2089*** (0.0547)
Mother: Some college or above		0.1954*** (0.0525)	0.1897*** (0.0527)	0.1852** (0.0773)	0.1959*** (0.0526)	0.2002*** (0.0528)	0.1975*** (0.0529)
Sibling		-0.1178*** (0.0306)	-0.1125*** (0.0307)	-0.1189*** (0.0308)	-0.1421*** (0.0458)	-0.1177*** (0.0304)	-0.1247*** (0.0309)
Household income X Girl			0.2004** (0.0949)				
Father: Some college or above X Girl				-0.0846 (0.0969)			
Mother: Some college or above X Girl				0.0206 (0.0979)			
Sibling X Girl					0.0506 (0.0584)		
Urban						-0.0527 (0.0712)	
Urban X Girl						-0.0283 (0.0913)	
Father: Regular worker							-0.0389 (0.0863)
Mother: Regular worker							-0.2297** (0.0934)
Father: Regular worker X Girl							0.0976 (0.1077)
Mother: Regular worker X Girl							0.1655 (0.1118)
Grade	yes	yes	yes	yes	yes	yes	yes
Region	no	yes	yes	yes	yes	yes	yes
Constant	-0.7121*** (0.0435)	-2.9296*** (0.3866)	-2.3523*** (0.5093)	-2.9381*** (0.3861)	-2.9247*** (0.3879)	-2.9043*** (0.3874)	-3.1982*** (0.4028)
Observations	2059	2059	2059	2059	2059	2059	2020
Adjusted R-squared	0.2514	0.3268	0.3287	0.3266	0.3269	0.3271	0.3314

Note: ***, ** and * are indicating that they are significant at the level of 1%, 5% and 10% respectively.

(3) Math test score: US

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girl (dummy)	-0.1536*** (0.0173)	-0.1432*** (0.0153)	-0.1798 (0.1955)	-0.1383*** (0.0298)	-0.1160*** (0.0251)	-0.1505*** (0.0312)	-0.1957*** (0.0361)
Log household income		0.2847*** (0.0117)	0.2830*** (0.0149)	0.2848*** (0.0117)	0.2846*** (0.0117)	0.2800*** (0.0122)	0.2882*** (0.0124)
Father: Some college or above		0.2176*** (0.0197)	0.2176*** (0.0197)	0.2351*** (0.0257)	0.2177*** (0.0197)	0.2042*** (0.0202)	0.2153*** (0.0202)
Mother: Some college or above		0.2118*** (0.0187)	0.2118*** (0.0187)	0.2016*** (0.0257)	0.2116*** (0.0187)	0.2050*** (0.0190)	0.2113*** (0.0195)
Sibling		-0.0251*** (0.0067)	-0.0251*** (0.0067)	-0.0250*** (0.0067)	-0.0158* (0.0094)	-0.0253*** (0.0067)	-0.0253*** (0.0069)
Household income X Girl			0.0034 (0.0177)				
Father: Some college or above X Girl				-0.0349 (0.0322)			
Mother: Some college or above X Girl				0.0203 (0.0354)			
Sibling X Girl					-0.0178 (0.0131)		
Urban						0.0917*** (0.0254)	
Urban X Girl						0.0117 (0.0357)	
Father: Regular worker							-0.0382 (0.0314)
Mother: Regular worker							-0.0649*** (0.0207)
Father: Regular worker X Girl							0.0445 (0.0353)
Mother: Regular worker X Girl							0.0189 (0.0289)
Age	yes	yes	yes	yes	yes	yes	yes
Region	no	yes	yes	yes	yes	yes	yes
Ethnicity	no	yes	yes	yes	yes	yes	yes
Marital status: Single	no	yes	yes	yes	yes	yes	yes
Constant	-0.5368*** (0.1016)	-3.9900*** (0.1561)	-3.9717*** (0.1873)	-3.9935*** (0.1570)	-4.0030*** (0.1564)	-4.0350*** (0.1603)	-3.9387*** (0.1614)
Observations	18245	18245	18245	18245	18245	17037	16572
Adjusted R-squared	0.1578	0.3341	0.3340	0.3341	0.3342	0.3367	0.3454

Note: ***, ** and * are indicating that they are significant at the level of 1%, 5% and 10% respectively.

Table A5. Regression Results for Language test score

(1) Language test score: China

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girl (dummy)	0.1766*** (0.0320)	0.1922*** (0.0302)	0.4531 (0.3438)	0.2036*** (0.0344)	0.0698 (0.0675)	0.2203*** (0.0399)	0.2199*** (0.0435)
Log household income		0.0569*** (0.0198)	0.0695** (0.0276)	0.0575*** (0.0198)	0.0569*** (0.0198)	0.0513*** (0.0197)	0.0382 (0.0239)
Father: High school or above		0.2463*** (0.0440)	0.2464*** (0.0440)	0.2345*** (0.0584)	0.2465*** (0.0440)	0.2198*** (0.0441)	0.2190*** (0.0467)
Mother: High school or above		0.2132*** (0.0507)	0.2148*** (0.0507)	0.2828*** (0.0673)	0.2164*** (0.0507)	0.1728*** (0.0514)	0.1988*** (0.0539)
Sibling		-0.0813*** (0.0218)	-0.0813*** (0.0218)	-0.0824*** (0.0218)	-0.1256*** (0.0325)	-0.0718*** (0.0222)	-0.0719*** (0.0257)
Household income X Girl			-0.0262 (0.0342)				
Father: High school or above X Girl				0.0256 (0.0803)			
Mother: High school or above X Girl				-0.1314 (0.0947)			
Sibling X Girl					0.0727* (0.0376)		
Urban						0.1754*** (0.0467)	
Urban X Girl						-0.0735 (0.0588)	
Father: Regular worker							0.0827 (0.0614)
Mother: Regular worker							0.0697 (0.0713)
Father: Regular worker X Girl							0.0107 (0.0856)
Mother: Regular worker X Girl							-0.0064 (0.0951)
Age	yes	yes	yes	yes	yes	yes	yes
Region	no	yes	yes	yes	yes	yes	yes
Ethnicity	no	yes	yes	yes	yes	yes	yes
Constant	-0.8383*** (0.0455)	-1.4772*** (0.2718)	-1.5977*** (0.3318)	-1.4913*** (0.2710)	-1.4063*** (0.2714)	-1.5355*** (0.2675)	-1.1659*** (0.3000)
Observations	3129	3129	3129	3129	3129	3129	1996
Adjusted R-squared	0.2062	0.3379	0.3378	0.3378	0.3386	0.3411	0.3288

Note: ***, ** and * are indicating that they are significant at the level of 1%, 5% and 10% respectively.

(2) Language test score: Japan

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girl (dummy)	0.2128*** (0.0477)	0.1963*** (0.0461)	-2.0525*** (0.6323)	0.1710** (0.0738)	0.2230*** (0.0815)	0.2062*** (0.0555)	0.0531 (0.1011)
Log household income		0.1785*** (0.0603)	0.0270 (0.0738)	0.1794*** (0.0605)	0.1769*** (0.0602)	0.1780*** (0.0604)	0.2856*** (0.0688)
Father: Some college or above		0.1808*** (0.0556)	0.1811*** (0.0553)	0.1432* (0.0797)	0.1805*** (0.0556)	0.1806*** (0.0556)	0.1666*** (0.0559)
Mother: Some college or above		0.2012*** (0.0555)	0.1913*** (0.0556)	0.2160*** (0.0795)	0.2009*** (0.0555)	0.2021*** (0.0557)	0.2043*** (0.0557)
Sibling		-0.1856*** (0.0348)	-0.1765*** (0.0345)	-0.1847*** (0.0350)	-0.1748*** (0.0467)	-0.1854*** (0.0349)	-0.1858*** (0.0347)
Household income X Girl			0.3460*** (0.0965)				
Father: Some college or above X Girl				0.0764 (0.0989)			
Mother: Some college or above X Girl				-0.0301 (0.0990)			
Sibling X Girl					-0.0225 (0.0594)		
Urban						0.0164 (0.0780)	
Urban X Girl						-0.0293 (0.0982)	
Father: Regular worker							-0.1181 (0.0780)
Mother: Regular worker							-0.2806** (0.1130)
Father: Regular worker X Girl							0.1798* (0.1083)
Mother: Regular worker X Girl							0.0884 (0.1232)
Grade	yes	yes	yes	yes	yes	yes	yes
Region	no	yes	yes	yes	yes	yes	yes
Constant	-0.6806*** (0.0508)	-1.6263*** (0.3964)	-0.6297 (0.4893)	-1.6240*** (0.4013)	-1.6285*** (0.3964)	-1.6292*** (0.3989)	-2.1978*** (0.4412)
Observations	2059	2059	2059	2059	2059	2059	2020
Adjusted R-squared	0.1839	0.2429	0.2489	0.2425	0.2426	0.2422	0.2530

Note: ***, ** and * are indicating that they are significant at the level of 1%, 5% and 10% respectively.

(3) Language test score: US

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girl (dummy)	0.1456*** (0.0172)	0.1566*** (0.0146)	0.5107*** (0.1860)	0.1880*** (0.0281)	0.1809*** (0.0244)	0.1828*** (0.0304)	0.1303*** (0.0339)
Log household income		0.2984*** (0.0113)	0.3149*** (0.0145)	0.2987*** (0.0113)	0.2983*** (0.0113)	0.2972*** (0.0118)	0.2976*** (0.0119)
Father: Some college or above		0.2482*** (0.0189)	0.2482*** (0.0189)	0.2824*** (0.0255)	0.2483*** (0.0189)	0.2342*** (0.0194)	0.2469*** (0.0193)
Mother: Some college or above		0.2195*** (0.0181)	0.2192*** (0.0180)	0.2160*** (0.0258)	0.2193*** (0.0181)	0.2125*** (0.0184)	0.2182*** (0.0186)
Sibling		-0.0603*** (0.0067)	-0.0604*** (0.0067)	-0.0603*** (0.0067)	-0.0520*** (0.0095)	-0.0597*** (0.0067)	-0.0595*** (0.0068)
Household income X Girl			-0.0327* (0.0169)				
Father: Some college or above X Girl				-0.0686** (0.0311)			
Mother: Some college or above X Girl				0.0063 (0.0340)			
Sibling X Girl					-0.0159 (0.0129)		
Urban						0.0884*** (0.0261)	
Urban X Girl						-0.0271 (0.0345)	
Father: Regular worker							-0.0280 (0.0302)
Mother: Regular worker							-0.0693*** (0.0206)
Father: Regular worker X Girl							-0.0022 (0.0332)
Mother: Regular worker X Girl							0.0324 (0.0276)
Age	yes	yes	yes	yes	yes	yes	yes
Region	no	yes	yes	yes	yes	yes	yes
Ethnicity	no	yes	yes	yes	yes	yes	yes
Marital status: Single	no	yes	yes	yes	yes	yes	yes
Constant	-0.5656*** (0.0893)	-4.1618*** (0.1446)	-4.3392*** (0.1758)	-4.1787*** (0.1453)	-4.1733*** (0.1448)	-4.2376*** (0.1491)	-4.0749*** (0.1489)
Observations	18245	18245	18245	18245	18245	17037	16572
Adjusted R-squared	0.1506	0.3652	0.3654	0.3655	0.3653	0.3684	0.3787

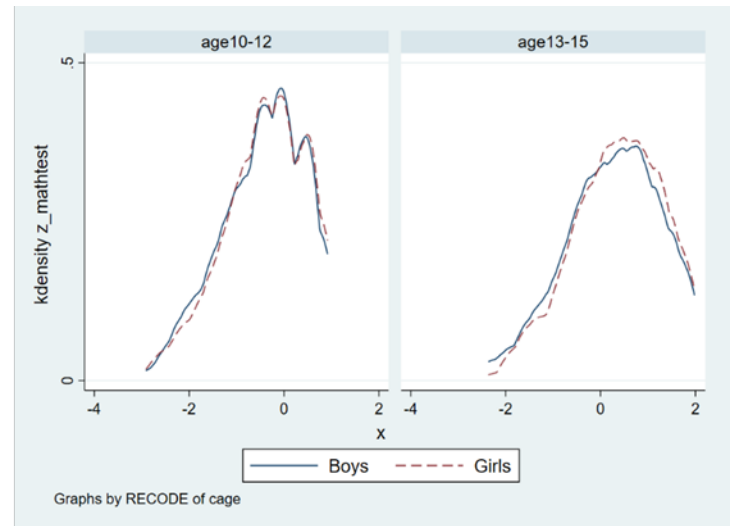
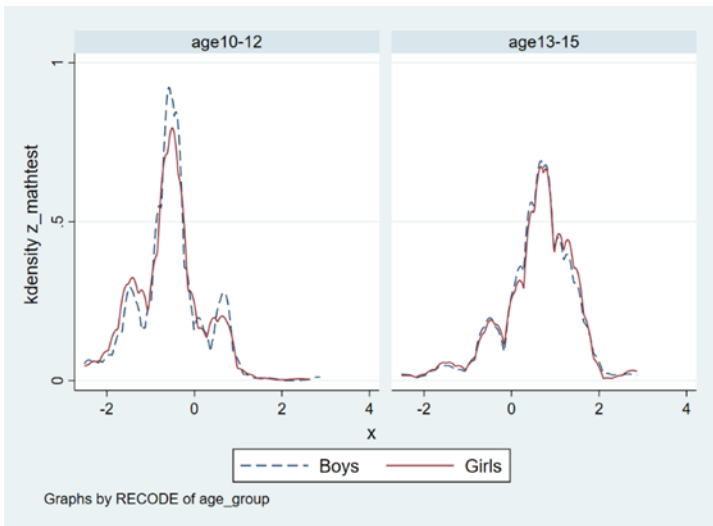
Note: ***, ** and * are indicating that they are significant at the level of 1%, 5% and 10% respectively.

Figure A1. Kernel density distribution over standardized IRT scores by age and gender.

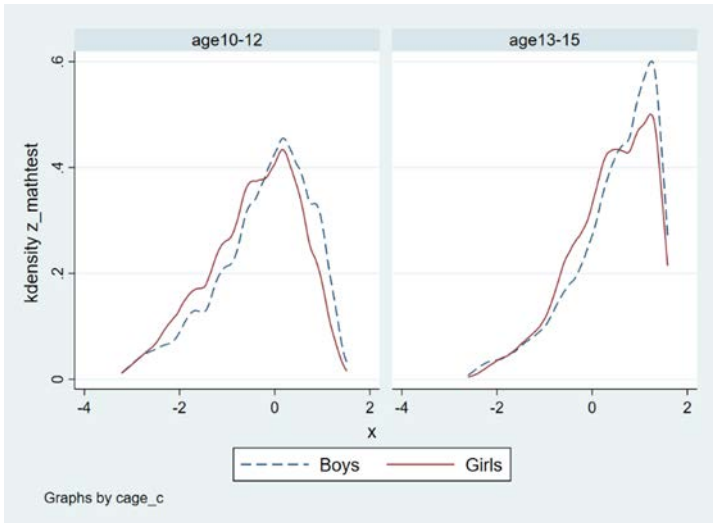
(1) Math

(a) China

(b) Japan

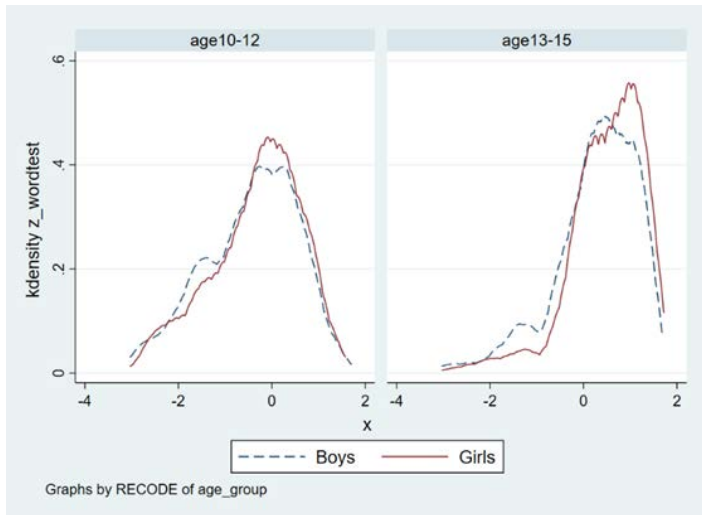


(c) US

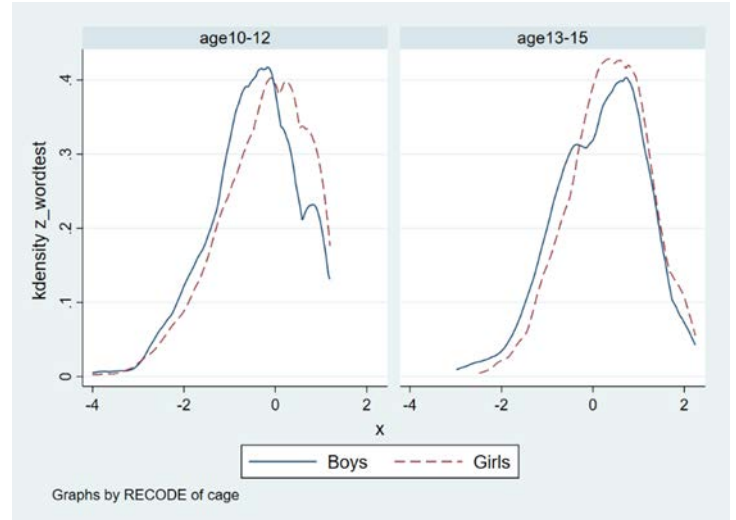


(2) Word

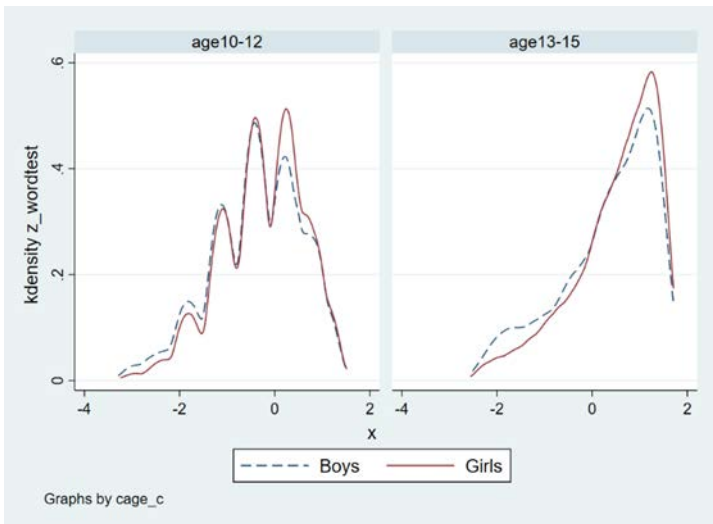
(a) China



(b) Japan



(c) US



Note: For both math and word test score, 6 ages are summarized into 2 age categories: age 10-12 (higher elementary school) and age 13-15 (junior high school). In China and US case, the test scores are standardized to the deviation value (mean is 1 and standard deviation is 0) by age. In Japan case, the test scores are IRT scaling. The kernel density function was calculated using the pooled standardized IRT scores by school stage.