

```
1 * time of day and test performance
2 * Last edited: 20160113 by hhs@sfi.dk
3 *****
4 clear all
5 set max_memory 2g, perm
6
7 * Set directory
8 cd "D:\Data\workdata\704335\Timeofday"
9
10 global tf "D:\Data\workdata\704335\Timeofday\tempfiles"
11 global df "D:\Data\workdata\704335\Timeofday\download"
12 global rf "D:\Data\workdata\704335\stataraw_new"
13
14 adopath + "D:\Data\workdata\704335\Timeofday\adofiles"
15
16 * Controls
17 global covariates "birthweight edu inc incrank immigr_nonwestern female spring "
18 global missings "missing_birthweight missing_edu missing_inc missing_incrank
19 missing_immigr_nonwestern missing_female missing_spring"
20 global controls1 "i.sub i.grade i.dow i.testyear"
21 global controls2 "$covariates $missings $controls1"
```

```

1
2 /*****
3 * Create data for time of day project
4 * Last edited: 20160113 by hhs@sfi.dk
5 *****/
6
7 * Load preamble
8 do "D:\Data\workdata\704335\Timeofday\dofiles\preamble.do"
9 * Set memory
10 set max_memory 12g, perm
11
12 /*****
13 * Outline:
14 * 1: Create covariate data
15 * 2: Create test data
16 * 3: Merge 1 and 2
17 *****/
18
19
20
21
22 /*****
23 * 1 Create covariate data
24 *****/
25 * Load "Grund" data for 1995 to 2012 and make sure everything is in the right format.
26 forval i=1995/2012{
27     use "$rf\GRUND`i'.dta", clear
28     * foed_dag changes name after 2006. Correct this
29     if `i'>2006{
30         rename FOED_DAG foed_dag
31     }
32     * Keep what we need
33     keep pnr familie_id koen kom IE_TYPE OPR_LAND hfaudd SAMLINK_NY foed_dag
34     * Education level within the family
35     rename hfaudd audd
36     tostring audd, replace
37     merge m:1 audd using "$tf\audd.dta"
38     drop if _merge==2
39     drop _merge
40     bys familie_id: egen educ=max(pria)
41     gen edu=educ/12
42
43     * Household income
44     * Adjust to 2010 level
45     gen gross_inc=SAMLINK_NY
46     replace gross_inc=gross_inc*(122.4/89.2) if `i'==1995
47     replace gross_inc=gross_inc*(122.4/91.1) if `i'==1996
48     replace gross_inc=gross_inc*(122.4/93.1) if `i'==1997
49     replace gross_inc=gross_inc*(122.4/94.8) if `i'==1998
50     replace gross_inc=gross_inc*(122.4/97.2) if `i'==1999
51     replace gross_inc=gross_inc*(122.4/100.0) if `i'==2000
52     replace gross_inc=gross_inc*(122.4/102.4) if `i'==2001
53     replace gross_inc=gross_inc*(122.4/104.8) if `i'==2002
54     replace gross_inc=gross_inc*(122.4/107.0) if `i'==2003
55     replace gross_inc=gross_inc*(122.4/108.3) if `i'==2004
56     replace gross_inc=gross_inc*(122.4/110.2) if `i'==2005
57     replace gross_inc=gross_inc*(122.4/112.3) if `i'==2006
58     replace gross_inc=gross_inc*(122.4/114.2) if `i'==2007
59     replace gross_inc=gross_inc*(122.4/118.1) if `i'==2008
60     replace gross_inc=gross_inc*(122.4/119.7) if `i'==2009
61     replace gross_inc=gross_inc*(122.4/122.4) if `i'==2010
62     replace gross_inc=gross_inc*(122.4/125.8) if `i'==2011
63     replace gross_inc=gross_inc*(122.4/128.8) if `i'==2012
64     * Total income on household level
65     bys familie_id: egen inc=sum(gross_inc)
66     * Family members
67     bys familie_id: gen count=_n
68     bys familie_id: egen members=max(count)
69     * Adjusted household income
70     replace inc=inc/(members^0.5)
71     replace inc=inc/1000
72     * Household income rank
73     gen incl=inc if count==1
74     egen income=xtile(incl),nq(100)
75     bys familie_id: egen incrank=min(income)

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76
77     * Country formats
78     rename OPR_LAND land
79     merge m:1 land using "$tf\ieland.dta"
80     drop if _merge==2
81     gen western=VEST_EJ==1|VEST_EJ==2
82     gen immigr_nonwestern=(IE_TYPE==2|IE_TYPE==3)&western==0
83     * Gender
84     gen female=koen-1
85     * Spring child
86     gen spring=month(foed_dag)<7
87     * Variable labels
88     label var spring "Spring child"
89     label var inc "Household income, 1,000 DKK"
90     label var immigr_nonwestern "Nonwestern immigrant/desc."
91     label var female "Female"
92     label var incrank "Household inc. percentile"
93     label var edu "Parents' years of schooling"
94     * Keep what we need
95     keep kom pnr western immigr_nonwestern female incrank edu inc spring
96
97     gen y=`i'
98     compress
99     save "$tf\GRUND`i'.dta", replace
100 }
101
102 *Append to one dataset
103 clear
104 use "$tf\GRUND1995.dta", clear
105 forval i=1996/2012{
106     append using "$tf\GRUND`i'.dta",
107     }
108
109 save "$tf\covariates.dta",replace
110
111
112 /*****
113 * 2 Create test data
114 *****/
115 * Load
116 use "$rf\DNT2010_2014_HHS_SFI.dta", clear
117 * grade
118 rename klassesettrin grade
119 * subject
120 gen subject=substr(fag,1,5)
121 * test time
122 gen testyear=substr(testtid,1,4)
123 gen testmonth=substr(testtid,6,2)
124 gen testday=substr(testtid,9,2)
125 gen testhour=substr(testtid,12,2)
126 gen testmin=substr(testtid,15,2)
127 destring testyear testmonth testday testhour testmin ,replace
128 drop testtid
129 gen date=mdy(testmonth,testday,testyear)
130 * create one uncertainty measure (simple average of the the three)
131 gen uncert=(sem_p1+sem_p2+sem_p3)/3
132 * create one testscore per test
133 gen testscore=(theta_p1+theta_p2+theta_p3)/3
134 bys testyear grade subject: egen sdscoreraw=sd(testscore)
135 bys testyear grade subject: egen mscoreraw=mean(testscore)
136 gen testscore_std=(testscore-mscoreraw)/sdscoreraw
137 * Percentile scores
138 bys testyear grade sub: egen percentile=xtile(testscore), nq(100)
139 label var percentile "Percentile score"
140
141 * create variables and labels
142 * Test hour indicators
143 tab testhour, gen(th)
144 label var th1 "8AM"
145 label var th2 "9AM"
146 label var th3 "10AM"
147 label var th4 "11AM"
148 label var th5 "12Noon"
149 label var th6 "1PM"
150 label var th7 "2PM"

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151 label var testhour "Hour of the day"
152 * Break variables
153 gen break=th1==1|th3==1|th5==1|th7==1
154 gen nobreak=th2==1|th4==1|th6==1
155 label var break "After a break"
156 label var nobreak "Not after a break"
157 * Subject value labels and indicators
158 gen sub=1 if subject=="Dansk"
159 replace sub=2 if subject=="Biolo"
160 replace sub=3 if subject=="Engel"
161 replace sub=4 if subject=="Fysik"
162 replace sub=5 if subject=="Geogr"
163 replace sub=6 if subject=="Matem"
164 label define subl 1 "Danish" 2 "Biology" 3 "English" 4 "Physics" 5 "Geography" 6 "Math"
165 label values sub subl
166 * Day of the week
167 gen dow=dow(date)
168 * Various labels
169 label var uncert "Uncertainty"
170 label var testscore "Testscore (1-100)"
171 label var testscore_std "Standardized testscore"
172 label var grade "Grade"
173 label var dow "Day of the week"
174 label var sub "Subject"
175 * keep, compress and save
176 keep pnr break nobreak testmin uncert instnr percentile date testyear grade sub testyear
testscore testscore_std grade th1-th7 testhour dow
177 compress
178 save "$tf\testscoredata.dta",replace
179
180
181
182 /*****
183 * 3 Merge test score data and covariate data
184 *****/
185 use "$tf\testscoredata.dta",clear
186 * merge to birthweight data
187 merge m:1 pnr using "$rf\NYLFOED2010.dta"
188 rename V_VAGT V_VAGT1
189 drop if _merge==2
190 drop _merge
191 merge m:1 pnr using "$rf\MFR2010.dta"
192 drop if _merge==2
193 drop _merge
194 gen birthweight=V_VAGT
195 replace birthweight=V_VAGT1 if V_VAGT==.
196 drop V_GA_DAGE V_APGAR fodtdato V_VAGT1 V_VAGT
197 * merge to covariate panel using the year before the test
198 gen y=year(date)-1
199 merge m:1 pnr y using "$tf\covariates.dta",
200 drop if _merge==2
201 drop _merge
202 * Indicator for break break data
203 gen breakdata=0
204 gen deviates=.
205 destring instnr,replace
206 foreach l in xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx ... xxxxxx {
207 qui: replace breakdata=1 if instnr==`l'
208 qui: replace deviates=0 if instnr==`l'
209 }
210 foreach l in xxxxxx xxxxxx... xxxxxx {
211 qui: replace deviates=1 if instnr==`l'
212 }
213 * Missing variable indicators
214 foreach l in $covariates {
215 gen missing_`l'=0
216 replace missing_`l'=1 if `l'==.
217 replace `l'=0 if missing_`l'==1
218 }
219 label var missing_birthweight "Missing birthweight data"
220 label var missing_edu "Missing education data"
221 label var missing_immig "Missing origin data"
222 label var missing_female "Missing gender data"
223 label var missing_spring "Missing date of birth"
224 label var missing_inc "Missing income data"

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225 label var missing_incrank "Missing income data"
226 * School day (approximated)
227 gen schoolday=date-mdy(8,1,year(date)-1)
228 * adjust for weekends
229 replace schoolday=schoolday-floor(schoolday/7)*2
230 label var schoolday "School day"
231
232 * PNR as numeric
233 egen id=group(pnr)
234
235 compress
236
237 * Sample selection
238 preserve
239 gen day=testhour+testmin/60
240 keep if testyear==2014
241 drop if day>14
242 hist day, xtitle(Time of the Day) title(Distribution of test times in 2014)
243 graph export "$df\fig2014_testtimedist.pdf",replace
244 tw (lpolyci testscore_std day,bwidth(0.2)), xline(9.5) xline(11.5)
245 graph export "$df\fig2014_testtimeperf.pdf",replace
246 restore
247 drop if testyear==2014
248 qui: sum testscore
249 local nu=r(N)
250 drop if grade==.
251 * tests in nonscheduled grades
252 drop if grade==0
253 drop if grade==1
254 drop if grade==5
255 drop if grade>8
256 drop if grade<8 & sub==2
257 drop if grade==2 & sub==6
258 drop if grade==4 & sub==6
259 drop if grade==7 & sub==6
260 drop if grade==8 & sub==6
261 drop if grade==3 & sub==1
262 drop if grade==7 & sub==1
263 drop if grade!=7 & sub==3
264 drop if grade!=8 & sub==4
265 drop if grade!=8 & sub==5
266 drop if testhour==14
267 sum testscore,d
268 local r1=`nu'-r(N)
269 di "Sampleselection: Deleted `r1' out of `nu' observations"
270 * Keep what we need
271 keep id percentile instnr uncert schoolday break nobreak date testhour testscore
testscore_std th1-th7 testyear sub breakdata deviates grade dow $covariates $missings
272 * final labels
273 label var breakdata "School included in break survey"
274 label var deviates "School deviates from normal schedule when testing"
275 label var birthweight "Child birth weight"
276 label var date "Test date"
277
278 save "$tf\analysisdata.dta",replace
279 keep if runiform()<.01
280 save "$tf\analysisdatapct.dta",replace
281

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1 /*****
2 * Analyses for test time project, main document
3 * Last edited: 20160113 by hhs@sfi.dk
4 *****/
5
6 * Load preamble
7 do "D:\Data\workdata\704335\Timeofday\dofiles\preamble.do"
8 * Set memory
9 set max_memory 4g, perm
10
11 /*****
12 * Outline:
13 * 1 Main figure hourly bars
14 * 2 The effect of breaks
15 * 3 figure break bars and quantile regs
16 *****/
17
18 /*****
19     1 Main figure hourly bars
20 *****/
21 * Load data
22 use "$tf\analysisdata\sample'.dta",clear
23 * set fixed effect level
24 xtset instnr
25 * singletons in instnr?
26 bys instnr: gen count=_n
27 bys instnr: egen instcount=max(count)
28 * estimate with basic vars
29 eststo: qui: xtreg testscore_std th2-th6 $controls2 if instcount>1, cluster(instnr) fe
30 * create dataset to save estimates
31 clear
32 set obs 5
33 gen th=_n+1
34 * save estimates for testhour==9
35 gen u= _b[th2]+invttail(e(df_r),0.025)*_se[th2]
36 gen l= _b[th2]-invttail(e(df_r),0.025)*_se[th2]
37 gen beta=_b[th2]
38 * save estimates for testhour>9
39 forval i=2/5{
40     local j=`i'+1
41     replace beta= _b[th`j']-_b[th`i'] if th==`j'
42     test th`j'-th`i'=0
43     replace u= _b[th`j']-_b[th`i']+invttail(e(df_r),0.025)*((_b[th`j']-_b[th`i'])/(r(F)^.5))
44     if th==`j'
45     replace l= _b[th`j']-_b[th`i']-invttail(e(df_r),0.025)*((_b[th`j']-_b[th`i'])/(r(F)^.5))
46     if th==`j'
47 }
48 * Adjust testhour such that 9 starts at 9 (and is not centered at 9)
49 gen testhour=th+7
50 replace testhour=9.375 if testhour==9
51 replace testhour=10.375 if testhour==10
52 replace testhour=11.375 if testhour==11
53 replace testhour=12.375 if testhour==12
54 replace testhour=13.375 if testhour==13
55 replace testhour=14.375 if testhour==14
56 * make tw plot
57 twoway (bar beta testhour, fcolor(orange_red) lwidth(medthick) lcolor(orange_red)
58 barwidth(.75)) ///
59         (rcap u l testhour, fcolor(black) lcolor(gs3) lwidth(medium)) ///
60         ,ylabel(#7 , nogrid noticks) graphregion(fcolor(white) lcolor(white)) ///
61         xlabel(,noticks) plotregion(fcolor(white) lcolor(black)) ///
62         yline(0,lcolor(black) ) title(" ") ///
63         ytitle("Change in test score (SD)") ///
64         legend(off) xtitle("Test starting time") ///
65         xlabel(8 "8:00" 9 "9:00" 10 "10:00" 11 "11:00" 12 "Noon" 13 "13:00")
66 graph export "$df\main_graph_testhour.png",replace width(4000)
67
68 /*****
69     2 The effect of breaks
70 *****/
71 use "$tf\analysisdata\sample'.dta",clear
72 * set fixed effect level
73 xtset instnr

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73 * regress
74 set matsize 5000
75 preserve
76 * create dataset to save estimates
77 clear
78 set obs 7
79 gen id=_n
80 gen breakbeta=.
81 gen breakl=.
82 gen breaku=.
83 gen thbeta=.
84 gen thl=.
85 gen thu=.
86 save "$tf\estimates.dta",replace
87 restore
88 eststo clear
89 * program to run regressions
90
91 cap program drop myreg
92 program myreg
93     syntax, id(string) [condition(string)]
94     eststo: qui: xtreg testscore_std testhour break $controls2 `condition', cluster(
instnr) fe nonest
95     estadd scalar DF= e(df_m)
96     estadd scalar groups= e(N_g)
97     estadd scalar sgroup= e(g_min)
98     estadd scalar lgroup= e(g_max)
99     estadd scalar ar2=e(r2_a)
100     preserve
101     use "$tf\estimates.dta",clear
102     replace breakbeta=_b[break] if id==`id'
103     replace breakl=_b[break]-invttail(e(df_r),0.025)*_se[break] if id==`id'
104     replace breaku=_b[break]+invttail(e(df_r),0.025)*_se[break] if id==`id'
105     replace thbeta=_b[testhour] if id==`id'
106     replace thl=_b[testhour]-invttail(e(df_r),0.025)*_se[testhour] if id==`id'
107     replace thu=_b[testhour]+invttail(e(df_r),0.025)*_se[testhour] if id==`id'
108     save "$tf\estimates.dta",replace
109 end
110 * main
111 * singletons in instnr?
112 bys instnr: gen count=_n
113 bys instnr: egen instcount=max(count)
114 myreg, id(1) condition(if instcount>1)
115 myreg, id(2) condition(if sub==6 & instcount>1)
116 myreg, id(3) condition(if sub==1 & instcount>1)
117 myreg, id(4) condition(if grade<5 & instcount>1)
118 myreg, id(5) condition(if grade>5 & instcount>1)
119 myreg, id(6) condition(if breakdata==1 & instcount>1)
120 xtset id
121 drop count
122 bys id: gen count=_n
123 bys id: egen obs=max(count)
124 drop if obs==1
125 myreg, id(7)
126
127 * graph
128 use "$tf\estimates.dta",clear
129 gen expand=2
130 expand expand
131 bys id: gen show=_n
132 replace id=id-0.2 if show==1
133 replace id=id+0.2 if show==2
134 tw (bar breakbeta id if show==2, barwidth(0.4) fcolor(blue) lcolor(blue)) (rcap breaku
breakl id if show==2, lcolor(black) ) ///
135     (bar thbeta id if show==1, barwidth(0.4) fcolor(red) lcolor(red)) (rcap thu thl id
if show==1, lcolor(black)), ///
136     xlabel(1 "Main" 2 "Math" 3 "Reading" 4 "Young" 5 "Old" 6 "Breakdata" 7 "Ind. FE",
noticks) ///
137     yline(0,lcolor(black)) ylabel(-0.02(0.01)0.05, nogrid noticks) graphregion(fcolor(
white) lcolor(white)) ///
138     plotregion(fcolor(white) lcolor(black)) legend(order(3 "Hourly effect" 1 "Effect of
a break") region(lcolor(white))) xtitle("") ytitle("Effect size (SD)")
139     graph export "$df\main_breakdata.png",replace width(4000)
140 esttab using "$df\appendix_reg_hetero_table.csv", stats(groups sgroup lgroup DF ar2 aic N
, fmt(%11.3f) b(%5.3f) ///

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141         keep(break testhour) nolines nonotes se nonumbers fragment ///
142         subs("[lem]" " ") label replace
143
144
145 /*****
146     3 figure break bars and quantile regs
147 *****/
148 * Load data
149
150 use "$tf\analysisdata`sample'.dta",clear
151 * set fixed effect level
152 xtset instnr
153 * singletons in instnr
154 bys instnr: gen count=_n
155 bys instnr: egen instcount=max(count)
156 drop if instcount==1
157 * regress
158 set matsize 5000
159 qui: xtreg testscore_std testhour break $controls2, cluster(instnr) fe
160 * create dataset to save estimates
161 preserve
162 clear
163 set obs 9
164 gen id=_n
165 gen u= .
166 gen l= .
167 gen betamean=_b[break]
168 gen betameanth=_b[testhour]
169 gen beta=.
170 gen uth=.
171 gen lth=.
172 gen betath=.
173 save "$tf\estimatesq.dta",replace
174 restore
175 * quantile reg
176 qui: xtreg testscore_std break $controls2,
177 predict fe, u
178 gen y=testscore_std-fe
179 qui:tab grade,gen(grade)
180 qui:tab sub,gen(sub)
181 qui:tab testyear,gen(testyear)
182 qui:tab dow,gen(dow)
183
184 forval i=1/9{
185     local l=`i'*10
186     qreg2 y break testhour gradel-grade6 subl-sub6 testyear1-testyear4 dowl-dow5 $covariates
187     $missings, quantile(`l') c(instnr)
188     preserve
189     use "$tf\estimatesq.dta",clear
190     replace u= _b[break]+invttail(e(df_r),0.025)*_se[break] if id==`i'
191     replace l= _b[break]-invttail(e(df_r),0.025)*_se[break] if id==`i'
192     replace beta=_b[break] if id==`i'
193     replace uth= _b[testhour]+invttail(e(df_r),0.025)*_se[testhour] if id==`i'
194     replace lth= _b[testhour]-invttail(e(df_r),0.025)*_se[testhour] if id==`i'
195     replace betath=_b[testhour] if id==`i'
196     save "$tf\estimatesq.dta",replace
197     restore
198 }
199
200 * MAKE GRAPH
201 use "$tf\estimatesq.dta",clear
202 replace id=id*10
203 tw (line beta id, lcolor(blue)) ///
204     (line betath id, lcolor(red)) ///
205     (line u id, lcolor(blue) lpattern(dash) ) ///
206     (line l id, lcolor(blue) lpattern(dash) ) ///
207     (line uth id, lcolor(red) lpattern(dash) ) ///
208     (line lth id, lcolor(red) lpattern(dash) ) ///
209     , xtitle(Testscore percentile) ytitle("Effect size (SD)") ///
210     legend(order ( 1 "Effect of a break" 2 "Hourly effect") ///
211     region(lcolor (white))) yline(0,lcolor(black)) ///
212     xlabel(0(10)100) ylabel(-0.03(0.01)0.05,nogrid noticks) graphregion(fcolor(white)
213     lcolor(white)) ///
214     xlabel(,noticks) plotregion(fcolor(white) lcolor(black))

```



```
214 graph export "$df/main_breakdata_quantiles.png", replace width(4000)  
215
```

```

1  /*****
2  * Analyses for test time project, appendix
3  * Last edited: 20160113 by hhs@sfi.dk
4  *****/
5
6  * Load preamble
7  do "D:\Data\workdata\704335\Timeofday\dofiles\preamble.do"
8  * Set memory
9  set max_memory 4g, perm
10
11 /*****
12 * Outline:
13 * 1 Descriptives
14 * 2 Main regression table
15 * 3 Distributions
16 * 4 Compare precision
17 * 5 Main regression table with percentiles
18 * 6 Effect size
19 *****/
20
21
22
23
24 /*****
25 1 Descriptives
26 *****/
27 use "$tf\analysisdata\sample'.dta",clear
28
29 * My little program to create covariate means
30 cap program drop mytab
31 program mytab
32 syntax varlist [using/]
33 preserve
34     * close handle if open
35     cap file close mytab
36     * open handle
37     file open mytab using "`using'",write replace
38     * temporary variables
39     tempvar s1 s2 s3 s4 s5 s6 s7 s8
40     forval i=1/8{
41         qui: gen `s`i'=.
42     }
43     * Replace missing obs with missing, if relevant
44     cap replace `l'=. if missing_`l'==1
45
46     foreach l of local varlist{
47
48         * Save mean values
49         qui: sum `l'
50         qui: replace `s1'=r(mean)
51         qui: sum `l' if testhour==8
52         qui: replace `s2'=r(mean)
53         qui: sum `l' if testhour==9
54         qui: replace `s3'=r(mean)
55         qui: sum `l' if testhour==10
56         qui: replace `s4'=r(mean)
57         qui: sum `l' if testhour==11
58         qui: replace `s5'=r(mean)
59         qui: sum `l' if testhour==12
60         qui: replace `s6'=r(mean)
61         qui: sum `l' if testhour==13
62         qui: replace `s7'=r(mean)
63
64         local label: variable lab `l'
65         file write mytab "`label':" _tab _tab _tab %8.3f (`s1') ";" %8.3f (`s2') ";" %
66         8.3f (`s3') ";" ///
67                                     %8.3f (`s4') ";" %8.3f (`s5') ";" %8.3f (`s6') ";" %8.3f (`s7')
68         _n
69     }
70     * Number of Observations
71     forval i=1/1{
72         qui: sum testscore_std
73         qui: replace `s1'=r(N)
74         qui: sum testscore_std if testhour==8
75         qui: replace `s2'=r(N)

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74     qui: sum testscore_std if testhour==9
75     qui: replace `s3'=r(N)
76     qui: sum testscore_std if testhour==10
77     qui: replace `s4'=r(N)
78     qui: sum testscore_std if testhour==11
79     qui: replace `s5'=r(N)
80     qui: sum testscore_std if testhour==12
81     qui: replace `s6'=r(N)
82     qui: sum testscore_std if testhour==13
83     qui: replace `s7'=r(N)
84 }
85     file write mytab "Observations:" _tab _tab _tab %12.0fc (`s1') ";" %12.0fc (`s2'
) ";" %12.0fc (`s3') ";" ///
86     %12.0fc (`s4') ";" %12.0fc (`s5') ";" %12.0fc (`s6') ";" %
12.0fc (`s7') ";" %12.0fc (`s8') _n
87     file close mytab
88     restore
89 end
90
91
92 * Main table of descriptives
93 mytab uncert schoolday $covariates $missings using "$df\appendix_descriptives.txt"
94 keep if breakdata==1
95 * Table of descriptives selected schools
96 mytab uncert schoolday $covariates $missings using
"$df\appendix_descriptives_surveyed.txt"
97
98 /*****
99     2 Main regression table
100 *****/
101 * Load data
102 use "$tf\analysisdata\sample'.dta",clear
103 * set fixed effect level
104 xtset instnr
105 * singletons in instnr
106 bys instnr: gen count=_n
107 bys instnr: egen instcount=max(count)
108 * Now create table with six edumns
109 eststo clear
110 * Test hour effect, no controls
111 eststo: qui: reg testscore_std testhour, cluster(instnr)
112 estadd scalar Fval=r(F)
113 estadd scalar Pval=r(p)
114 estadd scalar DF= e(df_m)
115 estadd scalar groups= e(N_g)
116 estadd scalar sgroup= e(g_min)
117 estadd scalar lgroup= e(g_max)
118 estadd scalar ar2=e(r2_a)
119 * Hourly effect, no controls
120 eststo: qui: reg testscore_std th2-th6, cluster(instnr)
121 qui: test th2=th3=th4=th5=th6=0
122 estadd scalar Fval=r(F)
123 estadd scalar Pval=r(p)
124 estadd scalar DF= e(df_m)
125 estadd scalar groups= e(N_g)
126 estadd scalar sgroup= e(g_min)
127 estadd scalar lgroup= e(g_max)
128 estadd scalar ar2=e(r2_a)
129 * Hourly effect, basic controls
130 eststo: qui: xtreg testscore_std th2-th6 $controls1 if instcount>1, cluster(instnr) fe
131 qui: test th2=th3=th4=th5=th6=0
132 estadd scalar Fval=r(F)
133 estadd scalar Pval=r(p)
134 estadd scalar DF= e(df_m)
135 estadd scalar groups= e(N_g)
136 estadd scalar sgroup= e(g_min)
137 estadd scalar lgroup= e(g_max)
138 estadd scalar ar2=e(r2_a)
139 * Hourly effect, extended controls
140 eststo: qui: xtreg testscore_std th2-th6 $controls2 if instcount>1, cluster(instnr) fe
141 qui: test th2=th3=th4=th5=th6=0
142 estadd scalar Fval=r(F)
143 estadd scalar Pval=r(p)
144 estadd scalar DF= e(df_m)
145 estadd scalar groups= e(N_g)

```

```

146 estadd scalar sgroup= e(g_min)
147 estadd scalar lgroup= e(g_max)
148 estadd scalar ar2=e(r2_a)
149 * Break effect, no controls
150 eststo: qui: reg testscore_std testhour break, cluster(instrnr)
151 estadd scalar DF= e(df_m)
152 estadd scalar groups= e(N_g)
153 estadd scalar sgroup= e(g_min)
154 estadd scalar lgroup= e(g_max)
155 estadd scalar ar2=e(r2_a)
156 * Break effect, basic controls
157 eststo: qui: xtreg testscore_std testhour break $controls1 if instcount>1, cluster(instrnr)
    fe
158 estadd scalar DF= e(df_m)
159 estadd scalar groups= e(N_g)
160 estadd scalar sgroup= e(g_min)
161 estadd scalar lgroup= e(g_max)
162 estadd scalar ar2=e(r2_a)
163 * Break effect, extended controls
164 eststo: qui: xtreg testscore_std testhour break $controls2 if instcount>1, cluster(instrnr)
    fe
165 estadd scalar DF= e(df_m)
166 estadd scalar groups= e(N_g)
167 estadd scalar sgroup= e(g_min)
168 estadd scalar lgroup= e(g_max)
169 estadd scalar ar2=e(r2_a)
170 esttab using "$df\appendix_reg_table.csv", stats( groups sgroup lgroup Fval Pval DF ar2
aic N, fmt(%11.3f)) b(%5.3f) ///
171     keep(break testhour th2 th3 th4 th5 th6) nolines nonotes se nonumbers fragment ///
172     subs("[lem]" " ") label replace
173
174
175
176 /*****
177 3 Distribution
178 *****/
179 * Load data
180 use "$tf\analysisdata`sample'.dta",clear
181 * make density plots
182 twoway (kdensity testscore_std if testhour==8,lcolor(gs11) bwidth(0.25) kernel(triangle
)) ///
183 (kdensity testscore_std if testhour==9,lcolor(gs9) bwidth(0.25) kernel(triangle
)) ///
184 (kdensity testscore_std if testhour==10,lcolor(gs7) bwidth(0.25) kernel(triangle
)) ///
185 (kdensity testscore_std if testhour==11,lcolor(gs5) bwidth(0.25) kernel(triangle
)) ///
186 (kdensity testscore_std if testhour==12,lcolor(gs3) bwidth(0.25) kernel(triangle
)) ///
187 (kdensity testscore_std if testhour==13,lcolor(gs1) bwidth(0.25) kernel(triangle
)) ///
188 ,legend(order(1 "8AM" 2 "9AM" 3 "10AM" 4 "11AM" 5 "Noon" 6 "1PM") rows(2) ) ///
189 graphregion(fcolor(white) lcolor(white)) plotregion(fcolor(white) lcolor(black))
///
190 ylabel(,noticks) xlabel(,noticks) ytitle("Density") xtitle("Standardized test
score")
191     graph export "$df\appendix_test_distribution.png",replace width(4000)
192
193 use "$tf\analysisdata`sample'.dta",clear
194 * set fixed effect level
195 xtset instrnr
196 * singletons in instrnr
197 bys instrnr: gen count=_n
198 bys instrnr: egen instcount=max(count)
199 qui: xtreg testscore_std testhour break $controls2 if instcount>1, cluster(instrnr) fe
200
201 predict res, u
202 twoway (kdensity res if testhour==8,lcolor(gs11) bwidth(0.25) kernel(triangle)) ///
203     ,legend(off) ///
204     graphregion(fcolor(white) lcolor(white)) plotregion(fcolor(white) lcolor(black))
///
205 ylabel(,noticks) xlabel(,noticks) ytitle("Density") xtitle("Residuals")
206     graph export "$df\appendix_residual_distribution.png",replace width(4000)
207 /*****
208 4 Compare precision across samples

```

```

208 *****/
209 * Create empty dataset to save estimates
210 clear
211 set obs 4
212 gen id=_n
213 gen depvar="edu"
214 replace depvar="birthweight" if id==2
215 replace depvar="inc" if id==3
216 replace depvar="testscore_std" if id==4
217 gen expand=5
218 expand expand
219 drop expand
220 bys id: gen th=_n+1
221 gen expand=10
222 expand expand
223 drop expand
224 bys th depvar: gen sample=_n
225 gen samplesize=.
226 gen tstat=.
227 save "$tf\estimates.dta",replace
228 * Load data
229 use "$tf\analysisdata\sample'.dta",clear
230 xtset instnr
231 * singletons in instnr
232 bys instnr: gen count=_n
233 bys instnr: egen instcount=max(count)
234 drop if instcount==1
235 * run regressions
236 gen missing_testscore_std=testscore_std==.
237 foreach l in edu inc birthweight testscore_std {
238 forval a=1(1)10{
239     local i=`a'/10
240     di "`i'"
241     preserve
242     keep if runiform()<`i'
243     qui: sum testscore_std
244     local N=r(N)
245     qui: xtreg `l' th2-th6 $controls1 if missing_`l'!=1, cluster(instnr) fe
246     restore
247     preserve
248     use "$tf\estimates.dta",clear
249     replace samplesize=`N' if depvar=="`l'" & sample=="`a'"
250     forval j=2/6{
251     replace tstat=_b[th`j']/_se[th`j'] if depvar=="`l'" & sample=="`a'" & th=="`j'"
252     }
253     save "$tf\estimates.dta",replace
254     restore
255 }
256 }
257
258 use "$tf\estimates.dta",clear
259 * make graph
260 replace tstat=abs(tstat)
261
262
263 tw (scatter tstat samplesize if th==2 & depvar=="testscore_std" ,msymbol(o) mcolor(green
)) ///
264 (scatter tstat samplesize if th==3 & depvar=="testscore_std",msymbol(d) mcolor(green
)) ///
265 (scatter tstat samplesize if th==4 & depvar=="testscore_std", msymbol(s) mcolor(
green)) ///
266 (scatter tstat samplesize if th==5 & depvar=="testscore_std",msymbol(x) mcolor(green
)) ///
267 (scatter tstat samplesize if th==6 & depvar=="testscore_std",msymbol(t) mcolor(green
)) ///
268 (scatter tstat samplesize if th==2 & depvar=="edu",msymbol(o) mcolor(gs1)) ///
269 (scatter tstat samplesize if th==3 & depvar=="edu",msymbol(d) mcolor(gs1)) ///
270 (scatter tstat samplesize if th==4 & depvar=="edu", msymbol(s) mcolor(gs1)) ///
271 (scatter tstat samplesize if th==5 & depvar=="edu",msymbol(x) mcolor(gs1)) ///
272 (scatter tstat samplesize if th==6 & depvar=="edu",msymbol(t) mcolor(gs1)) ///
273 (scatter tstat samplesize if th==2 & depvar=="inc",msymbol(o) mcolor(gs7)) ///
274 (scatter tstat samplesize if th==3 & depvar=="inc",msymbol(d) mcolor(gs7)) ///
275 (scatter tstat samplesize if th==4 & depvar=="inc", msymbol(s) mcolor(gs7)) ///
276 (scatter tstat samplesize if th==5 & depvar=="inc",msymbol(x) mcolor(gs7)) ///
277 (scatter tstat samplesize if th==6 & depvar=="inc",msymbol(t) mcolor(gs7)) ///

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278     (scatter tstat samplesize if th==2 & depvar=="b",msymbol(o) mcolor(gs12)) ///
279     (scatter tstat samplesize if th==3 & depvar=="b",msymbol(d) mcolor(gs12)) ///
280     (scatter tstat samplesize if th==4 & depvar=="b", msymbol(s) mcolor(gs12)) ///
281     (scatter tstat samplesize if th==5 & depvar=="b",msymbol(x) mcolor(gs12)) ///
282     (scatter tstat samplesize if th==6 & depvar=="b",msymbol(t) mcolor(gs12)) ///
283     (scatter tstat samplesize if th==22 & depvar=="b",msymbol(t) mcolor(white)) ///
284     ,legend(order(2 "Testscore" 7 "Parental Education" 12 "Parental income" 17 "Birth
weight" 21 " " 6 "9AM" 7 "10AM" 8 "11AM" 9 "Noon" 10 "1PM") rows(2) region(lcolor(white)))
    ///
285     ylabel(#7 ,nogrid noticks) graphregion(fcolor(white) lcolor(white)) ///
286     xlabel(,noticks) plotregion(fcolor(white) lcolor(black)) ///
287     ylabel("T-value (numerical)") xtitle(Sample size)
288
289
290
291     graph export "$df\appendix_graph_testhour_tstats_sample.png",replace width(4000)
292
293     /*****
294     5 Main regression table, with percentiles
295     *****/
296
297     * Load data
298     use "$tf\analysisdata`sample'.dta",clear
299     * set fixed effect level
300     xtset instnr
301     * singletons in instnr
302     bys instnr: gen count=_n
303     bys instnr: egen instcount=max(count)
304     eststo clear
305     * Test hour effect, no controls
306     eststo: qui: reg percentile testhour, cluster(instnr)
307     estadd scalar Fval=r(F)
308     estadd scalar Pval=r(p)
309     estadd scalar DF= e(df_m)
310     estadd scalar groups= e(N_g)
311     estadd scalar sgroup= e(g_min)
312     estadd scalar lgroup= e(g_max)
313     estadd scalar ar2=e(r2_a)
314     * Hourly effect, no controls
315     eststo: qui: reg percentile th2-th6, cluster(instnr)
316     qui: test th2=th3=th4=th5=th6=0
317     estadd scalar Fval=r(F)
318     estadd scalar Pval=r(p)
319     estadd scalar DF= e(df_m)
320     estadd scalar groups= e(N_g)
321     estadd scalar sgroup= e(g_min)
322     estadd scalar lgroup= e(g_max)
323     estadd scalar ar2=e(r2_a)
324     * Hourly effect, basic controls
325     eststo: qui: xtreg percentile th2-th6 $controls1 if instcount>1, cluster(instnr) fe
326     qui: test th2=th3=th4=th5=th6=0
327     estadd scalar Fval=r(F)
328     estadd scalar Pval=r(p)
329     estadd scalar DF= e(df_m)
330     estadd scalar groups= e(N_g)
331     estadd scalar sgroup= e(g_min)
332     estadd scalar lgroup= e(g_max)
333     estadd scalar ar2=e(r2_a)
334     * Hourly effect, extended controls
335     eststo: qui: xtreg percentile th2-th6 $controls2 if instcount>1, cluster(instnr) fe
336     qui: test th2=th3=th4=th5=th6=0
337     estadd scalar Fval=r(F)
338     estadd scalar Pval=r(p)
339     estadd scalar DF= e(df_m)
340     estadd scalar groups= e(N_g)
341     estadd scalar sgroup= e(g_min)
342     estadd scalar lgroup= e(g_max)
343     estadd scalar ar2=e(r2_a)
344     * Break effect, no controls
345     eststo: qui: reg percentile testhour break, cluster(instnr)
346     estadd scalar DF= e(df_m)
347     estadd scalar groups= e(N_g)
348     estadd scalar sgroup= e(g_min)
349     estadd scalar lgroup= e(g_max)
350     estadd scalar ar2=e(r2_a)

```

```

351 * Break effect, basic controls
352 eststo: qui: xtreg percentile testhour break $controls1 if instcount>1, cluster(instrn) fe
353 estadd scalar DF= e(df_m)
354 estadd scalar groups= e(N_g)
355 estadd scalar sgroup= e(g_min)
356 estadd scalar lgroup= e(g_max)
357 estadd scalar ar2=e(r2_a)
358 * Break effect, extended controls
359 eststo: qui: xtreg percentile testhour break $controls2 if instcount>1, cluster(instrn) fe
360 estadd scalar DF= e(df_m)
361 estadd scalar groups= e(N_g)
362 estadd scalar sgroup= e(g_min)
363 estadd scalar lgroup= e(g_max)
364 estadd scalar ar2=e(r2_a)
365 esttab using "$df\appendix_reg_table_percentiles.csv", stats( groups sgroup lgroup Fval
Pval DF ar2 aic N, fmt(%11.3f)) b(%5.3f) ///
366 keep(break testhour th2 th3 th4 th5 th6) nolines nonotes se nonumbers fragment
///
367 subs("[lem]" " ") label replace
368
369
370 /*****
371 6 Unconditional correlations for covariates and testscore
372 *****/
373 * Load data
374 use "$tf\analysisdata`sample'.dta",clear
375
376 * regress
377 sum inc,d
378 replace inc=. if inc>r(p99)
379 replace inc=. if inc<r(p1)
380 sum birthweight,d
381 replace birthweight=. if birthweight>r(p99)
382 replace birthweight=. if birthweight<r(p1)
383 eststo clear
384 set matsize 5000
385 eststo: qui: reg testscore_std inc if missing_incrank!=1, cluster(instrn)
386 estadd scalar ar2=e(r2_a)
387 eststo: qui: reg testscore_std birthweight if missing_bir!=1, cluster(instrn)
388 estadd scalar ar2=e(r2_a)
389 eststo: qui: reg testscore_std edu if missing_edu!=1, cluster(instrn)
390 estadd scalar ar2=e(r2_a)
391 eststo: qui: reg testscore_std schoold , cluster(instrn)
392 estadd scalar ar2=e(r2_a)
393 esttab using "$df\appendix_main_effectsizes.csv", stats( ar2 aic N, fmt(%11.3f)) b(%6.4f
) ///
394 keep( inc birthweight edu schoolday) nolines nonotes se nonumbers fragment ///
395 subs("[lem]" " ") label replace
396
397

```