



Using 'intsvy' to analyze international assessment data

Professional Development and Training Course:
Analyzing International Large-Scale Assessment Data with R

Dr. Daniel Caro & Dr. Christian Bokhove

AERA 2014
Philadelphia, April 2, 2014

'intsvy': International Assessment Data Manager

Package 'intsvy' provides tools for importing, merging, and analysing data from international assessment studies (TIMSS, PIRLS, and PISA)

Install package

```
> install.packages("intsvy")
```

Load package

```
> library(intsvy)
```

Get help for 'intsvy'

```
> help(package="intsvy")
```

'intsvy': Print variable labels

```
# Print TIMSS Grade 8 data labels
```

```
> ?timssg8.var.label
```

```
> timssg8.var.label(folder = filepath)
```

```
> timssg8.var.label(folder = "/home/eldani/Work/international  
LSA/TIMSS/TIMSS 11/Grade 8/Data")
```

```
# Selecting output location and name
```

```
> timssg8.var.label(folder = filepath, name="TIMSSG8 variable  
labels", output = filepath)
```

'intsvy': Print variable labels

```
# Print PISA 2012 labels
```

```
> pisa.var.label(folder= # PISA data filepath #,  
school.file="INT_SCQ12_DEC03.sav",  
student.file="INT_STU12_DEC03.sav")
```

```
> pisa.var.label(folder = filepath,  
school.file="INT_SCQ12_DEC03.sav",  
student.file="INT_STU12_DEC03.sav", name="PISA 2012 labels",  
output = # enter output filepath #)
```

'intsvy': Import selected data

```
# Select and merge functions
```

```
> ?timssg8.select.merge
```

```
> ?pisa.select.merge
```

```
# TIMSS Grade 8: Import selected data
```

```
> timss8g <- timssg8.select.merge(folder=filepath,  
countries=c("AUS", "BHR", "ARM", "CHL"), student  
=c("BSDGEDUP", "ITSEX", "BSDAGE", "BSBGSLM", "BSDGSLM"),  
school=c("BCBGDAS", "BCDG03"))
```

```
# Examine data
```

```
> class(timss8g); dim(timss8g); head(timss8g)
```

'intsvy': Import selected data

```
# PISA 2012: Import selected data
```

```
> pisa <- pisa.select.merge(folder = filepath,  
school.file="INT_SCQ12_DEC03.sav",  
student.file="INT_STU12_DEC03.sav",  
student= c("ST01Q01", "IMMIG", "ESCS", "hisced", "PARED",  
"ST04Q01", "ST61Q04", "ST62Q01", "ST08Q01", "ST09Q01",  
"ST115Q01", "ST87Q07", "BELONG", "ATSCHL"),  
school = c("STRATIO", "SCHAUTON", "CLSIZE", "TCSHORT",  
"SCMATBUI", "SC20Q01", "SC21Q05"))
```

'intsvy': Average achievement by country

```
# PISA 2012 - Math achievement
```

```
> ?pisa.mean.pv
```

```
# Calculate mean reading achievement by country
```

```
> pisa.mean.pv(pvlabel = "MATH", by = "IDCNTRYL", data = pisa)
```

	IDCNTRYL	Freq	Mean	Std.err.
1	China, Hong Kong	4670	561.24	3.22
2	Peru	6035	368.10	3.69
3	Poland	4607	517.50	3.62
4	Sweden	4736	478.26	2.26
5	United States of America	4978	481.37	3.60

```
# Compare with international report (Table I.2.3a, p. 305)
```

'intsvy': Average achievement by country

Table I.2.3a, PISA 2012 International Report, Volume I, p. 305

	All students				Gender differences				
	Mean score		Standard deviation		Boys		Girls		Difference (B - G)
	Mean	S.E.	S.D.	S.E.	Mean score	S.E.	Mean score	S.E.	Score dif.
OECD	Australia	504 (1.6)	96 (1.2)	510 (2.4)	498 (2.0)	12 (3.1)			
	Austria	506 (2.7)	92 (1.7)	517 (3.9)	494 (3.3)	22 (4.9)			
	Belgium	515 (2.1)	102 (1.4)	518 (2.8)	512 (2.6)	6 (3.4)			
	Canada	518 (1.8)	89 (0.8)	523 (2.1)	513 (2.1)	10 (2.0)			
	Chile	423 (3.1)	81 (1.5)	436 (3.8)	411 (3.1)	25 (3.6)			
	Czech Republic	499 (2.9)	95 (1.6)	505 (3.7)	493 (3.6)	12 (4.6)			
	Denmark	500 (2.3)	82 (1.3)	507 (2.9)	493 (2.3)	14 (2.3)			
	Estonia	521 (2.0)	81 (1.2)	523 (2.6)	518 (2.2)	5 (2.6)			
	Finland	519 (1.9)	85 (1.2)	517 (2.6)	520 (2.2)	-3 (2.9)			
	France	495 (2.5)	97 (1.7)	499 (3.4)	491 (2.5)	9 (3.4)			
	Germany	514 (2.9)	96 (1.6)	520 (3.0)	507 (3.4)	14 (2.8)			
	Greece	453 (2.5)	88 (1.3)	457 (3.3)	449 (2.6)	8 (3.2)			
	Hungary	477 (3.2)	94 (2.4)	482 (3.7)	473 (3.6)	9 (3.7)			
	Iceland	493 (1.7)	92 (1.3)	490 (2.3)	496 (2.3)	-6 (3.0)			
	Ireland	501 (2.2)	85 (1.3)	509 (3.3)	494 (2.6)	15 (3.8)			
	Israel	466 (4.7)	105 (1.8)	472 (7.8)	461 (3.5)	12 (7.6)			
	Italy	485 (2.0)	93 (1.1)	494 (2.4)	476 (2.2)	18 (2.5)			
	Japan	536 (3.6)	94 (2.2)	545 (4.6)	527 (3.6)	18 (4.3)			
	Korea	554 (4.6)	99 (2.1)	562 (5.8)	544 (5.1)	18 (6.2)			
	Luxembourg	490 (1.1)	95 (0.9)	502 (1.5)	477 (1.4)	25 (2.0)			
	Mexico	413 (1.4)	74 (0.7)	420 (1.6)	406 (1.4)	14 (1.2)			
	Netherlands	523 (3.5)	92 (2.1)	528 (3.6)	518 (3.9)	10 (2.8)			
	New Zealand	500 (2.2)	100 (1.2)	507 (3.2)	492 (2.9)	15 (4.3)			
	Norway	489 (2.7)	90 (1.3)	490 (2.8)	488 (3.4)	2 (3.0)			
	Poland	518 (3.6)	90 (1.9)	520 (4.3)	516 (3.8)	4 (3.4)			
	Portugal	487 (3.8)	94 (1.4)	493 (4.1)	481 (3.9)	11 (2.5)			
	Slovak Republic	482 (3.4)	101 (2.5)	486 (4.1)	477 (4.1)	9 (4.5)			
	Slovenia	501 (1.2)	92 (1.0)	503 (2.0)	499 (2.0)	3 (3.1)			
	Spain	484 (1.9)	88 (0.7)	492 (2.4)	476 (2.0)	16 (2.2)			
	Sweden	478 (2.3)	92 (1.3)	477 (3.0)	480 (2.4)	-3 (3.0)			
	Switzerland	531 (3.0)	94 (1.5)	537 (3.5)	524 (3.1)	13 (2.7)			
	Turkey	448 (4.8)	91 (3.1)	452 (5.1)	444 (5.7)	8 (4.7)			
United Kingdom	494 (3.3)	95 (1.7)	500 (4.2)	488 (3.8)	12 (4.7)				
United States	481 (3.6)	90 (1.3)	484 (3.8)	479 (3.9)	5 (2.8)				
OECD total	487 (1.1)	98 (0.5)	493 (1.3)	481 (1.2)	12 (1.1)				
OECD average	494 (0.5)	92 (0.3)	499 (0.6)	489 (0.5)	11 (0.6)				

'intsvy': Average achievement by country

```
# Export results into spreadsheet
```

```
> pisa.mean.pv(pvlabel = "MATH", by = "IDCNTRYL", data = pisa,  
export=TRUE, name= "PISA mean", folder= "filepath")
```

```
# TIMSS Grade 8 - Math achievement
```

```
> ?timss.mean.pv
```

```
> timss.mean.pv(pvlabel="BSMMAT", by= "IDCNTRYL", data=timss8g)
```

	IDCNTRYL	Freq	Mean	s.e.	SD	s.e
1	Armenia	5846	466.59	2.73	90.68	1.73
2	Australia	7556	504.80	5.09	85.42	3.36
3	Bahrain	4640	409.22	1.96	99.57	1.72
4	Chile	5835	416.27	2.59	79.65	1.85

'intsvy': Average achievement by country

Exhibit 2.5 TIMSS 2011 User Guide, p. 15

Average for BSMMAT0 by IDCNTRY

COUNTRY ID	N of Cases	Sum of TOTWGT	Percent	Percent (s.e.)	BSMMAT0 (Mean)	BSMMAT0 (s.e.)	Std.Dev	Std.Dev. (s.e.)
Australia	7556	251985	1.18	.02	504.80	5.09	85.42	3.36
Bahrain	4640	12625	.06	.00	409.22	1.96	99.57	1.72
Armenia	5846	36181	.17	.00	466.59	2.73	90.68	1.73
Chile	5835	251180	1.18	.03	416.27	2.59	79.65	1.85

Calculate average by gender

```
> timss.mean.pv(pvlabel="BSMMAT", by= c("IDCNTRYL", "ITSEX"),  
data=timss8g)
```

'intsvy': Average by country and gender

Exhibit 2.8 TIMSS 2011 User Guide, p. 18

Average for BSMMAT0 by IDCNTY ITSEX

COUNTRY ID	*SEX OF STUDENTS*	N of Cases	Sum of TOTWGT	Percent	Percent (s.e.)	BSMMAT0 (Mean)	BSMMAT0 (s.e.)	Std.Dev	Std.Dev. (s.e.)
Australia	GIRL	3747	125555	49.83	1.61	500.41	4.72	82.72	3.59
	BOY	3809	126429	50.17	1.61	509.16	7.26	87.80	4.82
Bahrain	GIRL	2288	6276	49.72	.85	430.78	2.51	87.23	1.93
	BOY	2352	6348	50.28	.85	387.89	3.07	106.20	2.26
Armenia	GIRL	2894	17702	48.93	.78	471.52	3.07	87.13	1.81
	BOY	2952	18479	51.07	.78	461.86	3.21	93.72	2.24
Chile	GIRL	3133	133160	53.01	1.46	409.46	3.23	79.97	2.39
	BOY	2702	118020	46.99	1.46	423.94	3.05	78.59	2.03

'intsvy': Average by country and gender

PISA: calculate mean by gender

```
> pisa.mean.pv(pvlabel = "MATH", by = c("IDCNTRYL",  
"ST04Q01"), data = pisa)
```

	IDCNTRYL	ST04Q01	Freq	Mean	Std.err.
1	China, Hong Kong	Female	2161	552.96	3.94
2	China, Hong Kong	Male	2509	568.38	4.55
3	Peru	Female	3118	358.92	4.75
4	Peru	Male	2917	377.82	3.65
5	Poland	Female	2388	515.53	3.76
6	Poland	Male	2219	519.56	4.25
7	Sweden	Female	2378	479.63	2.41
8	Sweden	Male	2358	476.92	2.97
9	United States of America	Female	2453	479.00	3.91
10	United States of America	Male	2525	483.65	3.81

'intsvy': Testing mean differences

TIMSS Grade 8 - Statistical significance of math gender gap

```
> timss.reg.pv(pvlabel="BSMMAT", by=c("IDCNTRYL"), x=c("ITSEX"), data=timss8g)
```

Exhibit 2.11, TIMSS 2011 User Guide , p.21

Regression Coefficients				
IDCNTRY	Variable	Regression Coefficient	Regression Coefficient (s.e.)	Regression Coefficient (t-value)
Armenia	(CONSTANT)	471.52	3.07	153.75
	REGSEX	-9.66	3.10	-3.12
Australia	(CONSTANT)	500.41	4.72	105.93
	REGSEX	8.75	6.90	1.27
Bahrain	(CONSTANT)	430.78	2.51	171.50
	REGSEX	-42.89	3.99	-10.74
Chile	(CONSTANT)	409.46	3.23	126.86
	REGSEX	14.48	3.63	3.99

PISA 2009 - Statistical significance of reading gender gap

```
> pisa.reg.pv(pvlabel="MATH", x="ST04Q01", by = "IDCNTRYL", data=pisa)
```

'intsvy': Frequency tables

TIMSS Grade 8: Percentage of students who like learning math

```
> timss.table(variable="BSDGSLM", by="IDCNTRYL", data=timss8g)
```

Exhibit 2.19, TIMSS 2011 User Guide, p. 29

Average for BSMMAT0 by IDCNTRY BSDGSLM

COUNTRY ID	*STUDENTS LIKE LEARNING MATHEMATICS/IDX*	N of Cases	Sum of TOTWGT	Percent	Percent (s.e.)
Australia	LIKE LEARNING MATHEMATICS	1068	38977	15.67	.94
	SOMEWHAT LIKE LEARNING MATHEMATICS	2985	99021	39.81	.87
	DO NOT LIKE LEARNING MATHEMATICS	3336	110764	44.53	1.41
Bahrain	LIKE LEARNING MATHEMATICS	1072	2959	23.75	.64
	SOMEWHAT LIKE LEARNING MATHEMATICS	1756	4780	38.37	.86
	DO NOT LIKE LEARNING MATHEMATICS	1753	4719	37.88	.84
Armenia	LIKE LEARNING MATHEMATICS	2421	14925	42.92	.97
	SOMEWHAT LIKE LEARNING MATHEMATICS	2181	13729	39.48	.76
	DO NOT LIKE LEARNING MATHEMATICS	1024	6121	17.60	.97
Chile	LIKE LEARNING MATHEMATICS	1289	54770	22.06	.86
	SOMEWHAT LIKE LEARNING MATHEMATICS	2291	99860	40.21	.89
	DO NOT LIKE LEARNING MATHEMATICS	2192	93691	37.73	.97

'intsvy': Frequency tables

TIMSS Grade 8: Percentage of students who attended schools with a given SES

```
> timss.table(variable="BCDG03", by="IDCNTRYL", data=timss8g)
```

Exhibit 2.25, TIMSS 2011 User Guide, p. 36

COUNTRY ID	*SCHOOL COMPOSITION BY STUDENT BACKGD*	N of Cases	Sum of TOTWGT	Percent	Percent (s.e.)
Australia	MORE AFFLUENT	2118	71105	32.49	3.36
	NEITHER MORE AFFLUENT NOR MORE DISADVANTAGED	2535	84358	38.54	3.74
	MORE DISADVANTAGED	1800	63400	28.97	3.11
Bahrain	MORE AFFLUENT	1954	5157	45.30	.32
	NEITHER MORE AFFLUENT NOR MORE DISADVANTAGED	1143	3173	27.87	.23
	MORE DISADVANTAGED	1051	3055	26.83	.34
Armenia	MORE AFFLUENT	2085	12047	34.78	3.70
	NEITHER MORE AFFLUENT NOR MORE DISADVANTAGED	1329	8398	24.25	3.59
	MORE DISADVANTAGED	2158	14191	40.97	3.68
Chile	MORE AFFLUENT	811	22830	12.16	2.32
	NEITHER MORE AFFLUENT NOR MORE DISADVANTAGED	1391	59452	31.66	4.07
	MORE DISADVANTAGED	2119	105493	56.18	3.86

'intsvy': Frequency tables

PISA: Percentage of students by Grade

> pisa.table(variable="ST01Q01", by="IDCNTRYL", data=pisa)

Table A2.4a, International Report 2012, Volume 1, p.274

		All students											
		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade and above	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	0.0	(0.0)	0.1	(0.0)	10.8	(0.5)	70.0	(0.6)	19.1	(0.4)	0.0	(0.0)
	Austria	0.3	(0.1)	5.4	(0.7)	43.3	(0.9)	51.0	(1.0)	0.1	(0.0)	0.0	c
	Belgium	0.9	(0.1)	6.4	(0.5)	30.9	(0.6)	60.8	(0.6)	1.0	(0.1)	0.0	(0.0)
	Canada	0.1	(0.0)	1.1	(0.1)	13.2	(0.6)	84.6	(0.6)	1.0	(0.1)	0.1	(0.0)
	Chile	1.4	(0.3)	4.1	(0.6)	21.7	(0.8)	66.1	(1.2)	6.7	(0.3)	0.0	c
	Czech Republic	0.4	(0.1)	4.5	(0.4)	51.1	(1.2)	44.1	(1.3)	0.0	c	0.0	c
	Denmark	0.1	(0.0)	18.2	(0.8)	80.6	(0.8)	1.0	(0.2)	0.0	c	0.0	c
	Estonia	0.6	(0.2)	22.1	(0.7)	75.4	(0.7)	1.9	(0.3)	0.0	c	0.0	c
	Finland	0.7	(0.2)	14.2	(0.4)	85.0	(0.4)	0.0	c	0.1	(0.1)	0.0	c
	France	0.0	(0.0)	1.9	(0.3)	27.9	(0.7)	66.6	(0.7)	3.5	(0.3)	0.1	(0.1)
	Germany	0.6	(0.1)	10.0	(0.6)	51.9	(0.8)	36.7	(0.9)	0.8	(0.4)	0.0	c
	Greece	0.3	(0.1)	1.2	(0.3)	4.0	(0.7)	94.5	(1.0)	0.0	c	0.0	c
	Hungary	2.8	(0.5)	8.7	(0.9)	67.8	(0.9)	20.6	(0.6)	0.0	c	0.0	c
	Iceland	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c
	Ireland	0.0	(0.0)	1.9	(0.2)	60.5	(0.8)	24.3	(1.2)	13.3	(1.0)	0.0	c
	Israel	0.0	(0.0)	0.3	(0.1)	17.1	(0.9)	81.7	(0.9)	0.8	(0.3)	0.0	c
	Italy	0.4	(0.1)	1.7	(0.2)	16.8	(0.6)	78.5	(0.7)	2.6	(0.2)	0.0	(0.0)
	Japan	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c
	Korea	0.0	c	0.0	c	5.9	(0.8)	93.8	(0.8)	0.2	(0.1)	0.0	c
	Luxembourg	0.7	(0.1)	10.2	(0.2)	50.7	(0.1)	38.0	(0.1)	0.5	(0.1)	0.0	c
	Mexico	1.1	(0.1)	5.2	(0.3)	30.8	(1.0)	60.8	(1.1)	2.1	(0.3)	0.1	(0.0)
	Netherlands	0.0	c	3.6	(0.4)	46.7	(1.0)	49.2	(1.1)	0.5	(0.1)	0.0	c
	New Zealand	0.0	c	0.0	c	0.1	(0.1)	6.2	(0.4)	88.3	(0.5)	5.4	(0.4)
	Norway	0.0	c	0.0	c	0.4	(0.1)	99.4	(0.1)	0.2	(0.0)	0.0	c
	Poland	0.5	(0.1)	4.1	(0.4)	94.9	(0.4)	0.5	(0.2)	0.0	c	0.0	c
	Portugal	2.4	(0.3)	8.2	(0.7)	28.6	(1.6)	60.5	(2.1)	0.3	(0.1)	0.0	c
	Slovak Republic	1.7	(0.3)	4.5	(0.5)	39.5	(1.5)	52.7	(1.4)	1.6	(0.5)	0.0	c
	Slovenia	0.0	c	0.3	(0.2)	5.1	(0.8)	90.7	(0.8)	3.9	(0.2)	0.0	c
Spain	0.1	(0.0)	9.8	(0.5)	24.1	(0.4)	66.0	(0.6)	0.0	(0.0)	0.0	c	
Sweden	0.0	(0.0)	3.7	(0.3)	94.0	(0.6)	2.2	(0.5)	0.0	c	0.0	c	
Switzerland	0.6	(0.1)	12.9	(0.8)	60.6	(1.0)	25.6	(1.0)	0.2	(0.1)	0.0	c	
Turkey	0.5	(0.2)	2.2	(0.3)	27.6	(1.2)	65.5	(1.2)	4.0	(0.3)	0.3	(0.1)	
United Kingdom	0.0	c	0.0	c	0.0	(0.0)	1.3	(0.3)	95.0	(0.3)	3.6	(0.1)	
United States	0.0	c	0.3	(0.1)	11.7	(1.1)	71.2	(1.1)	16.6	(0.8)	0.2	(0.1)	
OECD average	0.5	(0.0)	4.9	(0.1)	34.7	(0.1)	51.9	(0.2)	7.7	(0.1)	0.3	(0.0)	

'intsvy': Calculate mean for single variable

PISA: Average socioeconomic status (SES) index

```
> pisa.mean(variable="ESCS", by="IDCNTRYL", data=pisa)
```

Table II.2.3, International Report 2012, p. 183

	IDCNTRYL	Freq	Mean	Std.err.
1	China, Hong Kong	4547	-0.79	0.05
2	Peru	6005	-1.23	0.05
3	Poland	4560	-0.21	0.03
4	Sweden	4616	0.28	0.02
5	United States of America	4915	0.17	0.04

	Mean index	S.E.
Australia	0.25	(0.01)
Austria	0.08	(0.02)
Belgium	0.15	(0.02)
Canada	0.41	(0.02)
Chile	-0.58	(0.04)
Czech Republic	-0.07	(0.02)
Denmark	0.43	(0.02)
Estonia	0.11	(0.01)
Finland	0.36	(0.02)
France	-0.04	(0.02)
Germany	0.19	(0.02)
Greece	-0.06	(0.03)
Hungary	-0.25	(0.03)
Iceland	0.78	(0.01)
Ireland	0.13	(0.02)
Israel	0.17	(0.03)
Italy	-0.05	(0.01)
Japan	-0.07	(0.02)
Korea	0.01	(0.03)
Luxembourg	0.07	(0.01)
Mexico	-1.11	(0.02)
Netherlands	0.23	(0.02)
New Zealand	0.04	(0.02)
Norway	0.46	(0.02)
Poland	-0.21	(0.03)
Portugal	-0.48	(0.05)
Slovak Republic	-0.18	(0.03)
Slovenia	0.07	(0.01)
Spain	-0.19	(0.03)
Sweden	0.28	(0.02)
Switzerland	0.17	(0.02)
Turkey	-1.46	(0.04)
United Kingdom	0.27	(0.02)
United States	0.17	(0.04)
OECD average	0.00	(0.00)

'intsvy': Calculate mean for single variable

TIMSS: Average index of students like learning mathematics

```
> timss.mean(variable='BSBGSLM', by='IDCOUNTRYL', data=timss8g)
```

Exhibit 2.17 User Guide TIMSS 2011, p. 27

Average for BSBGSLM by (IDCOUNTRY)

COUNTRY ID	N of Cases	Sum of TOTWGT	Percent	Percent (s.e.)	BSBGSLM (Mean)	BSBGSLM (s.e.)	Std.Dev.	Std.Dev. (s.e.)	Percent Missing
Australia	7389	248762	45.70	.74	9.32	.06	1.91	.03	1.28
Bahrain	4581	12458	2.29	.03	9.77	.03	2.05	.02	1.32
Armenia	5626	34775	6.39	.14	10.87	.05	1.92	.02	3.89
Chile	5772	248321	45.62	.77	9.76	.04	1.96	.03	1.14

Thank you!

daniel.caro@education.ox.ac.uk

C.Bokhove@soton.ac.uk