

```

GET
FILE='C:\Documents and Settings\kfn0002\Desktop\hsb.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
COMMENT: Run the linear model (OLS; Ordinary Least Squares).
REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT mathach
/METHOD=ENTER ses .

```

## Regression

[DataSet1] C:\Documents and Settings\kfn0002\Desktop\hsb.sav

### Variables Entered/Removed<sup>b</sup>

Model	Variables Entered	Variables Removed	Method
1	ses <sup>a</sup>	.	Enter

- a. All requested variables entered.
- b. Dependent Variable: mathach

### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.361 <sup>a</sup>	.130	.130	*****

- a. Predictors: (Constant), ses

### ANOVA<sup>b</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44233.156	1	44233.156	1074.695	.000 <sup>a</sup>
	Residual	295643.78	7183	41.159		
	Total	339876.93	7184			

- a. Predictors: (Constant), ses
- b. Dependent Variable: mathach

### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.747	.076		168.424	.000
	ses	3.184	.097	.361	32.783	.000

- a. Dependent Variable: mathach

COMMENT: Run the Null Multilevel Model - Null Model.

```

MIXED
mathach
/CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.00000000001) HCONVERGE
(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE)

```

```

/FIXED = | SSTYPE(3)
/METHOD = REML
/PRINT = SOLUTION TESTCOV
/RANDOM INTERCEPT | SUBJECT(school) COVTYPE(VC) .

```

## Mixed Model Analysis

[DataSet1] C:\Documents and Settings\kfn0002\Desktop\hsb.sav

### Model Dimension<sup>b</sup>

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1	Variance Components	1	school
Random Effects	Intercept <sup>a</sup>	1		1	
Residual				1	
Total		2		3	

- a. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using SPSS 11 syntax, please consult the current syntax reference guide for more information.
- b. Dependent Variable: mathach.

### Information Criteria<sup>a</sup>

-2 Restricted Log Likelihood	47116.79
Akaike's Information Criterion (AIC)	47120.79
Hurvich and Tsai's Criterion (AICC)	47120.80
Bozdogan's Criterion (CAIC)	47136.55
Schwarz's Bayesian Criterion (BIC)	47134.55

The information criteria are displayed in smaller-is-better forms.

- a. Dependent Variable: mathach.

## Fixed Effects

### Type III Tests of Fixed Effects<sup>a</sup>

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	156.647	2673.663	.000

- a. Dependent Variable: mathach.

### Estimates of Fixed Effects<sup>a</sup>

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	12.636974	.244394	156.647	51.707	.000	12.154242	13.119706

- a. Dependent Variable: mathach.

## Covariance Parameters

Estimates of Covariance Parameters<sup>a</sup>

Parameter	Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Residual	39.148322	.660645	59.258	.000	37.874662	40.464813
Intercept [subject Variance	8.614025	1.078804	7.985	.000	6.739122	11.010548

a. Dependent Variable: mathach.

COMMENT: Run the Model with Fixed Effect for Slopes - Model One.

MIXED

```

mathach WITH cses
/CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE
(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE)
/FIXED = cses | SSTYPE(3)
/METHOD = REML
/PRINT = SOLUTION TESTCOV
/RANDOM INTERCEPT | SUBJECT(school) COVTYPE(VC) .

```

## Mixed Model Analysis

[DataSet1] C:\Documents and Settings\kfn0002\Desktop\hsb.sav

Model Dimension<sup>b</sup>

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1	Variance Components	1	school
	cses	1		1	
Random Effects	Intercept <sup>a</sup>	1		1	
Residual				1	
Total		3		4	

a. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using SPSS 11 syntax, please consult the current syntax reference guide for more information.

b. Dependent Variable: mathach.

Information Criteria<sup>a</sup>

-2 Restricted Log Likelihood	46724.00
Akaike's Information Criterion (AIC)	46728.00
Hurvich and Tsai's Criterion (AICC)	46728.00
Bozdogan's Criterion (CAIC)	46743.76
Schwarz's Bayesian Criterion (BIC)	46741.76

The information criteria are displayed in smaller-is-better forms.

a. Dependent Variable: mathach.

## Fixed Effects

### Type III Tests of Fixed Effects<sup>a</sup>

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	156.743	2676.773	.000
cses	1	7022.024	406.682	.000

a. Dependent Variable: mathach.

### Estimates of Fixed Effects<sup>a</sup>

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	12.649286	.244490	156.743	51.738	.000	12.166367	13.132206
cses	2.191168	.108655	7022.024	20.166	.000	1.978172	2.404164

a. Dependent Variable: mathach.

## Covariance Parameters

### Estimates of Covariance Parameters<sup>a</sup>

Parameter	Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Residual	37.010411	.624608	59.254	.000	35.806227	38.255093
Intercept [subject Variance]	8.672392	1.079425	8.034	.000	6.795049	11.068410

a. Dependent Variable: mathach.

COMMENT: Add a Random Component to the Slopes - Model Two.

MIXED

```

mathach WITH cses
/CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE
(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE)
/FIXED = cses | SSTYPE(3)
/METHOD = REML
/PRINT = SOLUTION TESTCOV
/RANDOM INTERCEPT cses | SUBJECT(school) COVTYPE(VC) .

```

## Mixed Model Analysis

[DataSet1] C:\Documents and Settings\kfn0002\Desktop\hsb.sav

### Model Dimension<sup>b</sup>

	Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects Intercept	1		1	
Fixed Effects cses	1		1	
Random Effects Intercept + cses <sup>a</sup>	2	Variance Components	2	school
Residual			1	
Total	4		5	

a. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using SPSS 11 syntax, please consult the current syntax reference guide for more information.

b. Dependent Variable: mathach.

### Information Criteria<sup>a</sup>

-2 Restricted Log Likelihood	46714.25
Akaike's Information Criterion (AIC)	46720.25
Hurvich and Tsai's Criterion (AICC)	46720.25
Bozdogan's Criterion (CAIC)	46743.89
Schwarz's Bayesian Criterion (BIC)	46740.89

The information criteria are displayed in smaller-is-better forms.

a. Dependent Variable: mathach.

## Fixed Effects

### Type III Tests of Fixed Effects<sup>a</sup>

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	156.756	2676.383	.000
cses	1	155.255	292.242	.000

a. Dependent Variable: mathach.

### Estimates of Fixed Effects<sup>a</sup>

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	12.649144	.244505	156.756	51.734	.000	12.166196	13.132093
cses	2.192599	.128259	155.255	17.095	.000	1.939241	2.445956

a. Dependent Variable: mathach.

## Covariance Parameters

### Estimates of Covariance Parameters<sup>a</sup>

Parameter	Estimate	Std. Error	Wald Z	Sig.	
Residual	36.700216	.625743	58.651	.000	
Intercept [subject =	Variance	8.680962	1.079531	8.041	.000
cses [subject = school]	Variance	.693985	.280752	2.472	.013

### Estimates of Covariance Parameters<sup>a</sup>

Parameter	95% Confidence Interval		
	Lower Bound	Upper Bound	
Residual	35.494048	37.947372	
Intercept [subject =	Variance	6.803238	11.076946
cses [subject = school]	Variance	.314048	1.533574

a. Dependent Variable: mathach.

COMMENT: Add meanses as a predictor of both the intercept and the slope of ses - Model

Three.

MIXED

```

mathach WITH cses meanses
/CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE
(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE)
/FIXED = cses meanses cses*meanses | SSTYPE(3)
/METHOD = REML
/PRINT = SOLUTION TESTCOV
/RANDOM INTERCEPT cses | SUBJECT(school) COVTYPE(VC) .
  
```

## Mixed Model Analysis

[DataSet1] C:\Documents and Settings\kfn0002\Desktop\hsb.sav

### Model Dimension<sup>b</sup>

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1	Variance Components	1	school
	cses	1		1	
	meanses	1		1	
	cses * meanses	1		1	
Random Effects	Intercept + cses <sup>a</sup>	2		2	
Residual				1	
Total		6		7	

- a. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using SPSS 11 syntax, please consult the current syntax reference guide for more information.
- b. Dependent Variable: mathach.

### Information Criteria<sup>a</sup>

-2 Restricted Log Likelihood	46558.45
Akaike's Information Criterion (AIC)	46564.45
Hurvich and Tsai's Criterion (AICC)	46564.45
Bozdogan's Criterion (CAIC)	46588.09
Schwarz's Bayesian Criterion (BIC)	46585.09

The information criteria are displayed in smaller-is-better forms.

- a. Dependent Variable: mathach.

## Fixed Effects

### Type III Tests of Fixed Effects<sup>a</sup>

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	153.676	7185.218	.000
cses	1	154.282	293.440	.000
meanses	1	153.353	263.261	.000
cses * meanses	1	168.708	.803	.371

a. Dependent Variable: mathach.

### Estimates of Fixed Effects<sup>a</sup>

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	12.661059	.149365	153.676	84.766	.000	12.365985	12.956134
cses	2.197388	.128276	154.282	17.130	.000	1.943983	2.450792
meanses	5.868336	.361678	153.353	16.225	.000	5.153822	6.582850
cses * meanses	.286326	.319448	168.708	.896	.371	-.344306	.916957

a. Dependent Variable: mathach.

## Covariance Parameters

### Estimates of Covariance Parameters<sup>a</sup>

Parameter	Estimate	Std. Error	Wald Z	Sig.
Residual	36.711267	.625997	58.644	.000
Intercept [subject = Variance	2.699202	.405150	6.662	.000
cses [subject = school] Variance	.689872	.282242	2.444	.015

### Estimates of Covariance Parameters<sup>a</sup>

Parameter	95% Confidence Interval	
	Lower Bound	Upper Bound
Residual	35.504612	37.958932
Intercept [subject = Variance	2.011268	3.622436
cses [subject = school] Variance	.309402	1.538205

a. Dependent Variable: mathach.

COMMENT: Add sector as a predictor of both the intercept and the slope of ses - Model Four.

MIXED

```

mathach WITH cses meanses sector
/CRITERIA = CIN(95) MXITER(100) MXSTEP(5) SCORING(1) SINGULAR(0.000000000001) HCONVERGE
(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE)
/FIXED = cses meanses cses*meanses sector cses*sector | SSTYPE(3)
/METHOD = REML
/PRINT = SOLUTION TESTCOV
/RANDOM INTERCEPT cses | SUBJECT(school) COVTYPE(VC) .

```

## Mixed Model Analysis

[DataSet1] C:\Documents and Settings\kfn0002\Desktop\hsb.sav

### Model Dimension<sup>b</sup>

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1	Variance Components	1	school
	cses	1		1	
	meanses	1		1	
	cses * meanses	1		1	
	sector	1		1	
	cses * sector	1		1	
	Random Effects	Intercept + cses <sup>a</sup>		2	
Residual			1		
Total		8		9	

- a. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using SPSS 11 syntax, please consult the current syntax reference guide for more information.
- b. Dependent Variable: mathach.

### Information Criteria<sup>a</sup>

-2 Restricted Log Likelihood	46504.57
Akaike's Information Criterion (AIC)	46510.57
Hurvich and Tsai's Criterion (AICC)	46510.57
Bozdogan's Criterion (CAIC)	46534.20
Schwarz's Bayesian Criterion (BIC)	46531.20

- The information criteria are displayed in smaller-is-better forms.
- a. Dependent Variable: mathach.

## Fixed Effects

### Type III Tests of Fixed Effects<sup>a</sup>

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	160.020	3718.579	.000
cses	1	140.048	358.398	.000
meanses	1	151.075	209.658	.000
cses * meanses	1	161.374	11.985	.001
sector	1	149.703	15.742	.000
cses * sector	1	144.074	46.768	.000

- a. Dependent Variable: mathach.

**Estimates of Fixed Effects<sup>a</sup>**

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	12.113810	.198652	160.020	60.980	.000	11.721492	12.506127
cses	2.934473	.155006	140.048	18.931	.000	2.628020	3.240927
meanses	5.342966	.369000	151.075	14.480	.000	4.613900	6.072033
cses * meanses	1.034186	.298724	161.374	3.462	.001	.444273	1.624098
sector	1.214627	.306136	149.703	3.968	.000	.609721	1.819533
cses * sector	-1.638767	.239631	144.074	-6.839	.000	-2.112413	-1.165121

a. Dependent Variable: mathach.

## Covariance Parameters

**Estimates of Covariance Parameters<sup>a</sup>**

Parameter	Estimate	Std. Error	Wald Z	Sig.
Residual	36.723269	.626164	58.648	.000
Intercept [subject = Variance	2.376534	.371010	6.406	.000
cses [subject = school] Variance	.097827	.212883	.460	.646

**Estimates of Covariance Parameters<sup>a</sup>**

Parameter	95% Confidence Interval	
	Lower Bound	Upper Bound
Residual	35.516291	37.971264
Intercept [subject = Variance	1.750086	3.227220
cses [subject = school] Variance	.001375	6.962580

a. Dependent Variable: mathach.