

```

library(AER)
data(mroz, package='wooldridge')
oursample <- subset(mroz,!is.na(wage))
HR0 <- lm(hours~log(wage)+educ+age+kidslt6+nwifeinc, data=oursample)
Wage0 <- lm(log(wage)~hours+educ+exper+l(exper^2), data=oursample)

# 2SLS regressions
HR <- ivreg(hours~log(wage)+educ+age+kidslt6+nwifeinc
|educ+age+kidslt6+nwifeinc+exper+l(exper^2), data=oursample)
Wage <- ivreg(log(wage)~hours+educ+exper+l(exper^2)
|educ+age+kidslt6+nwifeinc+exper+l(exper^2), data=oursample)

library(systemfit)
# Define system of equations and instruments
eq.hrs <- hours ~ log(wage)+educ+age+kidslt6+nwifeinc
eq.wage <- log(wage)~ hours +educ+exper+l(exper^2)
eq.system<- list(eq.hrs, eq.wage)
instrum <- ~educ+age+kidslt6+nwifeinc+exper+l(exper^2)

# 2SLS of whole system (run Example-16-5-systemfit-prep.R first!)
SEM <- systemfit(eq.system,inst=instrum,data=oursample,method="2SLS")

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> library(AER)
> data(mroz, package='wooldridge')
> oursample <- subset(mroz,!is.na(wage))
> HR0 <- lm(hours~log(wage)+educ+age+kidslt6+nwifeinc, data=oursample)
> Wage0 <- lm(log(wage)~hours+educ+exper+l(exper^2), data=oursample)
> # 2SLS regressions
> HR <- ivreg(hours~log(wage)+educ+age+kidslt6+nwifeinc
+           |educ+age+kidslt6+nwifeinc+exper+l(exper^2), data=oursample)
> Wage <- ivreg(log(wage)~hours+educ+exper+l(exper^2)
+           |educ+age+kidslt6+nwifeinc+exper+l(exper^2), data=oursample)
> library(systemfit)
> # Define system of equations and instruments
> eq.hrs <- hours ~ log(wage)+educ+age+kidslt6+nwifeinc
> eq.wage <- log(wage)~ hours +educ+exper+l(exper^2)
> eq.system<- list(eq.hrs, eq.wage)
> instrum <- ~educ+age+kidslt6+nwifeinc+exper+l(exper^2)
> # 2SLS of whole system (run Example-16-5-systemfit-prep.R first!)
> SEM <- systemfit(eq.system,inst=instrum,data=oursample,method="2SLS")
> |

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```
library(stargazer)
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stargazer(HR0,Wage0,HR,Wage,type="text",keep.stat=c("n","rsq"))
```

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                        Dependent variable:
-----
             hours      log(wage)      hours      log(wage)
             OLS        OLS        instrumental  instrumental
             (1)        (2)        variable      variable
             (3)        (4)
-----
```

log(wage)	-2.047 (54.880)		1,639.556*** (470.576)	
hours		-0.0001 (0.00004)		0.0001 (0.0003)
educ	-6.622 (18.116)	0.106*** (0.014)	-183.751*** (59.100)	0.110*** (0.016)
age	0.562 (5.140)		-7.806 (9.378)	
kidslt6	-328.858*** (101.457)		-198.154 (182.929)	
nwifeinc	-5.918 (3.683)		-10.170 (6.615)	
exper		0.045*** (0.013)		0.035* (0.019)
I(exper2)		-0.001** (0.0004)		-0.001 (0.0005)
Constant	1,523.775*** (305.575)	-0.462** (0.204)	2,225.662*** (574.564)	-0.656* (0.338)
Observations	428	428	428	428
R2	0.036	0.160	-2.008	0.126

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Note:

*p<0.1; **p<0.05; ***p<0.01

summary(SEM)

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> summary(SEM)
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systemfit results
method: 2SLS
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	N	DF	SSR	detRCov	OLS-R2	McElroy-R2
system	856	845	773893309	155089	-2.00762	0.748802

	N	DF	SSR	MSE	RMSE	R2	Adj R2
eq1	428	422	7.73893e+08	1.83387e+06	1354.204541	-2.007617	-2.043253
eq2	428	423	1.95266e+02	4.61621e-01	0.679427	0.125654	0.117385

The covariance matrix of the residuals

	eq1	eq2
eq1	1833869.938	-831.542690
eq2	-831.543	0.461621

The correlations of the residuals

	eq1	eq2
eq1	1.000000	-0.903769
eq2	-0.903769	1.000000

2SLS estimates for 'eq1' (equation 1)

Model Formula: hours ~ log(wage) + educ + age + kidslt6 + nwifeinc

Instruments: ~educ + age + kidslt6 + nwifeinc + exper + I(exper^2)

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2225.66182	574.56412	3.87365	0.00012424 ***
log(wage)	1639.55561	470.57568	3.48415	0.00054535 ***
educ	-183.75128	59.09981	-3.10917	0.00200323 **
age	-7.80609	9.37801	-0.83238	0.40566404
kidslt6	-198.15429	182.92914	-1.08323	0.27932497
nwifeinc	-10.16959	6.61474	-1.53741	0.12494167

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1354.204541 on 422 degrees of freedom
 Number of observations: 428 Degrees of Freedom: 422
 SSR: 773893113.843842 MSE: 1833869.938019 Root MSE: 1354.204541
 Multiple R-Squared: -2.007617 Adjusted R-Squared: -2.043253

2SLS estimates for 'eq2' (equation 2)

Model Formula: log(wage) ~ hours + educ + exper + I(exper^2)

Instruments: ~educ + age + kidslt6 + nwifeinc + exper + I(exper^2)

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.655725440	0.337788292	-1.94123	0.052894 .
hours	0.000125900	0.000254611	0.49448	0.621223
educ	0.110330004	0.015524358	7.10690	5.0768e-12 ***
exper	0.034582356	0.019491555	1.77422	0.076746 .
I(exper^2)	-0.000705769	0.000454080	-1.55428	0.120865

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.679427 on 423 degrees of freedom
 Number of observations: 428 Degrees of Freedom: 423
 SSR: 195.26556 MSE: 0.461621 Root MSE: 0.679427
 Multiple R-Squared: 0.125654 Adjusted R-Squared: 0.117385