Homework: 2024/11/20

1-1. Reduced-form regressions

Reproduce Table 12.2

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[1] "Number of observations before filtering: 3613"
[1] "Number of observations after filtering: 3010"
```

Regression Results

	Dependent variable:					
	lwage76	ed76		experience	`experience2/100`	ed76
	(1)	(2)	(3)	(4)	(5)	(6)
experience	0.053***	-0.410***				-0.413***
	(0.007)	(0.034)				(0.034)
`experience2/100`	-0.219***	0.073				0.093
	(0.034)	(0.165)				(0.165)
black	-0.264***	-1.006***	-1.468***	1.468***	0.282***	-1.006***
	(0.018)	(0.090)	(0.115)	(0.115)	(0.024)	(0.090)
reg76r	-0.143***	-0.291***	-0.460***	0.460***	0.112***	-0.267***
	(0.016)	(0.079)	(0.102)	(0.102)	(0.022)	(0.079)
smsa76r	0.185***	0.404***	0.835***	-0.835***	-0.176***	0.400***
	(0.018)	(0.085)	(0.109)	(0.109)	(0.023)	(0.085)
nearc4	0.045***	0.337***	0.347***	-0.347***	-0.073***	
	(0.017)	(0.083)	(0.107)	(0.107)	(0.022)	
age76			1.061***	-0.061	-0.555***	
			(0.301)	(0.301)	(0.063)	
`age2/100`			-1.876***	1.876***	1.313***	
			(0.523)	(0.523)	(0.110)	
nearc4a						0.430***
						(0.087)
nearc4b						0.123
						(0.106)

1-2. IV & 2SLS wage regressions

Reproduce Table 12.1

Regression Results

	Dependent variable:				
	lwage76				
	OLS	instrumental variable			
	OLS	IV(a)	IV(b)	2SLS(a)	2SLS(b)
	(1)	(2)	(3)	(4)	(5)
ed76	0.074***	0.132***	0.133***	0.161***	0.160***
	(0.004)	(0.049)	(0.051)	(0.041)	(0.041)
experience	0.084***	0.107***	0.056**	0.119***	0.047*
	(0.007)	(0.021)	(0.026)	(0.018)	(0.025)
`experience2/100`	-0.224***	-0.228***	-0.080	-0.231***	-0.032
	(0.032)	(0.033)	(0.134)	(0.035)	(0.128)
black	-0.190***	-0.131**	-0.103	-0.102**	-0.064
	(0.018)	(0.053)	(0.077)	(0.045)	(0.063)
reg76r	-0.125***	-0.105***	-0.098***	-0.095***	-0.086***
	(0.015)	(0.023)	(0.029)	(0.022)	(0.026)
smsa76r	0.161***	0.131***	0.108**	0.116***	0.083**
	(0.016)	(0.030)	(0.050)	(0.027)	(0.041)

Sargan's over-identification test

```
Sargan Test Results:
2SLS(a) Model:
Sargan statistic: 0.821
p-value: 0.365

2SLS(b) Model:
Sargan statistic: 0.524
p-value: 0.469
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2.

Since $S \xrightarrow{d} z'(I_l - Q(Q'Q)^{-1}Q')z$, and $z \sim N(0, I_l)$

The degree of freedom depends on $\text{rank}(I_l - Q(Q'Q)^{-1}Q')$

$$\text{rank}(I_l - Q(Q'Q)^{-1}Q') = \text{trace}(I_l - Q(Q'Q)^{-1}Q')$$

$$= l - k$$

As we know that for any idempotent matrix A, we have $z'Az \longrightarrow \chi^2(\text{rank}(A))$

$\therefore$ Under H_0, we have $S \xrightarrow{d} \chi^2(l-k)$, Q.E.D.

3. Source Code

Source Code