

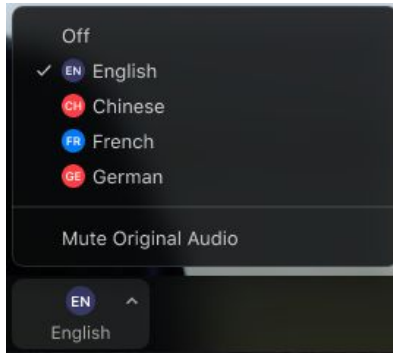
Webinar Series in Applied Quantitative Analysis - Updated

Date	Topic	
	<u>Session One</u>	
February 29	Potential Outcomes and Omitted Variable Bias I (Theory)	✓
March 7	Potential Outcomes and Omitted Variable Bias II (Application)	
	<u>Session Two</u>	
March 21	Difference-in-differences I (Theory)	✓
March 28	Difference-in-differences II (Application)	
	<u>Session Three</u>	
April 25	Power analysis, clustering and sample size calculations I (Theory)	✓
May 2	Power analysis, clustering and sample size calculations II (Application)	
	<u>Session Four</u>	
May 23	Propensity score matching (Theory)	✓
May 30	Propensity score matching (Application)	
	<u>Session Five</u>	
June 20	Fixed-effects I (Theory)	
June 27	Fixed-effects II (Application)	
	<u>Session Six</u>	
July 25	Instrumental variables I (Theory)	
August 1	Instrumental Variables II (Application)	
	<u>Session Seven</u>	
August 22	Lagged dependent variables and the Arellano-Bond Estimator I (Theory)	
August 29	Lagged dependent variables and the Arellano-Bond Estimator II (Application)	

Écoute de l'interprétation d'une langue

Windows | macOS

1. Dans les contrôles de votre réunion/webinaire, cliquez sur Interprétation .
2. Cliquez sur la langue que vous souhaitez entendre. (Nous aurons le français) Pas besoin de choisir l'anglais, c'est la langue de la salle Zoom principale



3. (Facultatif) Pour entendre uniquement la langue interprétée, cliquez sur Couper le son original.

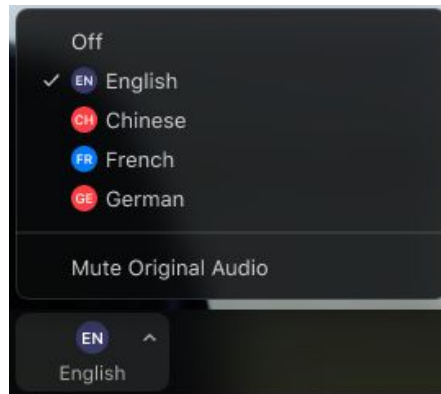
Remarques:

- Vous devez rejoindre l'audio de la réunion via l'audio/VoIP de votre ordinateur. Vous ne pouvez pas écouter l'interprétation linguistique si vous utilisez les fonctions audio de connexion ou d'appel téléphonique.
- En tant que participant rejoignant une chaîne linguistique, vous pouvez retransmettre sur le canal audio principal canal si vous réactivez votre audio et parlez.

Listening to language interpretation

Windows | macOS

1. In your meeting/webinar controls, click Interpretation .
2. Click the language that you would like to hear. (We will have French) No need to choose English, that is the language in the main Zoom room



3. (Optional) To hear the interpreted language only, click Mute Original Audio.

Notes:

- You must join the meeting audio through your computer audio/VoIP. You cannot listen to language interpretation if you use the dial-in or call me phone audio features.
- As a participant joining a language channel, you can broadcast back into the main audio channel if you unmute your audio and speak.

Fixed Effects

Professor Jeremy Moulton

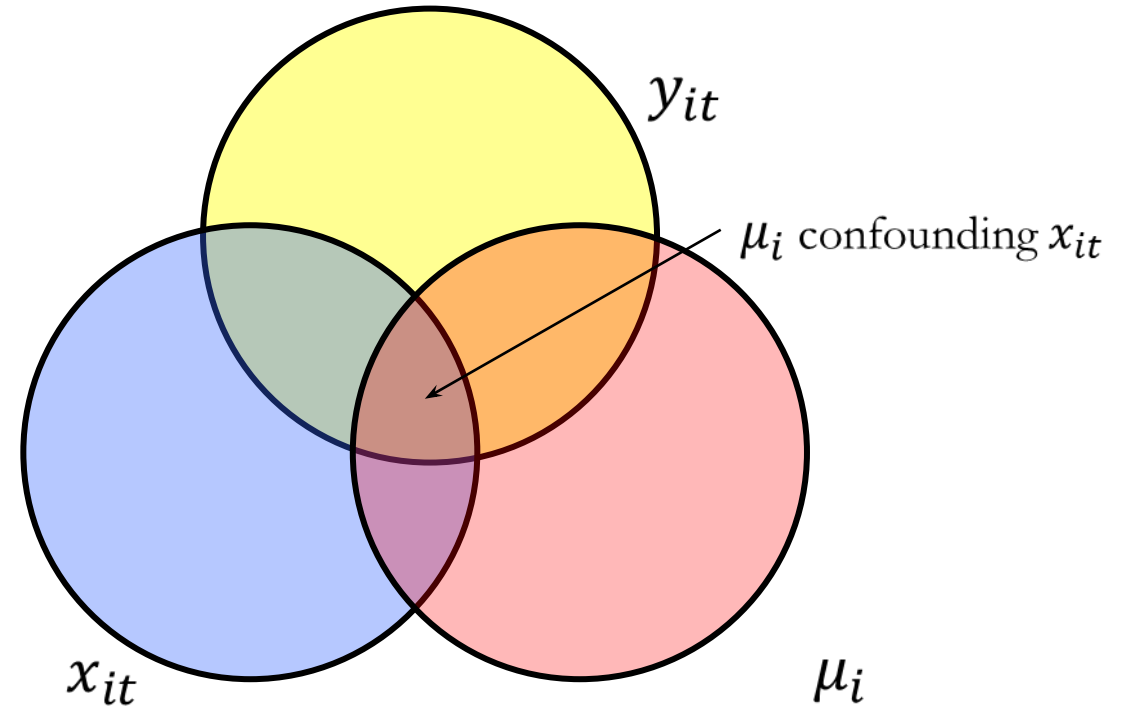
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The Set Up

- $y_{it} = \alpha + \beta x_{it} + \gamma z_{it} + \delta z_i + \varepsilon_{it}$
 - $\varepsilon_{it} = v_{it} + \mu_i$
- x_{it} = independent variable of interest
- z_{it} = time-varying controls
- z_i = time-invariant controls
- μ_i = time-invariant individual specific error
 - Example: innate ability or health endowment



First Difference (T = 2)

$$\begin{aligned} & \bullet \quad y_{i2} = \alpha + \beta x_{i2} + \gamma z_{i2} + \delta z_i + v_{i2} + \mu_i \\ & \quad - y_{i1} = \alpha + \beta x_{i1} + \gamma z_{i1} + \delta z_i + v_{i1} + \mu_i \\ \hline & \Delta y_{i2} = \beta \Delta x_{i2} + \gamma \Delta z_{i2} + \Delta v_{i2} \end{aligned}$$

Fixed Effects: De-Meaned version

id	time						
1	1	2	0	3	0.33	-1	-.33
1	2	2	0	3	0.33	-1	-.33
1	3	5	1	3	0.33	2	.67
2	1	2	0	3.33	0.67	-1.33	-.67
2	2	4	1	3.33	0.67	.67	.33
2	3	4	1	3.33	0.67	.67	.33
3	1	5	1	5	1	0	0
3	2	5	1	5	1	0	0
3	3	5	1	5	1	0	0

Ok, but how do I actually do it?

- **First Difference:**

- `reg D. (y x)`

- **Fixed Effects:**

- You could create a fixed effect for every individual:

- `tab id, gen(idFE)`
- `reg y x idFE*`

- You could include a temporarily created fixed effect for every individual:

- `reg y x i.id`

- You could use the xt version:

- `xtset id year`
- `xtreg y x, fe`

- Or other options:

- `areg y x, absorb(id)`
- `reghdfe y x, absorb(id)`

- *You need to install this ado file, but it is very helpful when using a large number of fixed effects*

How do I know if OLS or FE is better?

- We can test if the individual specific intercepts $\alpha_{-i} = 0$, meaning that they don't explain any of the variation in y_{it}
 - If $\alpha_{-i} = 0$, then Pooled OLS is probably the right model
 - If $\alpha_{-i} \neq 0$, then Fixed Effects might be the right model
 - We can conduct this test in Stata using an F-test of the individual fixed effect coefficients:
 - `reg y x i.id`
 - `testparm i*.id`
 - Or it is included at the bottom of the `xtreg y x, fe` regression output

Test difference in coefficients

- We can also test if the coefficients from OLS and Fixed Effects are different using a Hausman test.
 - If the same, then you want to use the efficient estimator (Pooled OLS)
 - If different, then you want to use the consistent estimator (Fixed Effects)
- Consistent Estimator (Fixed Effects)
 - Converges in probability to population parameter as N grows without bound
- Efficient Estimator (Pooled OLS)
 - Has a smaller variance
- $(\beta^{FE} - \beta^{OLS})[V(\beta^{FE}) - V(\beta^{OLS})]^{-1}(\beta^{FE} - \beta^{OLS})$
- `reg y x`
- `estimates store my_ols`
- `xtreg y x, fe`
- `estimates store my_fe`
- `hausman my_fe my_ols, sigmamore`
 - Be sure to put the consistent estimator before the efficient estimator. `sigmamore` specifies that the covariance matrices be based on the estimated disturbance variance from the efficient estimator. This forces the difference between the covariance matrices to be positive definite.

Smoking and Wealth

- $Wealth_{it} = \alpha + \beta Smoking_{it} + \gamma HealthStatus_{it} + \delta Education_i + v_{it} + \mu_i$

Figure 1. Health and Retirement Study: Steady-State Design and Data System

