GSERM - Oslo 2019
GLS-ARMA and Dynamics

January 7, 2019 (afternoon session)

For:

$$Y_{it} = \mathbf{X}_{it}\beta + u_{it}$$

i.i.d. u_{it}s require:

$$
\begin{aligned}
\mathbf{uu}' \equiv \mathbf{\Omega} &= \sigma^2 \mathbf{I} \\
&= \begin{pmatrix} \sigma^2 & 0 & \cdots & 0 \\ 0 & \sigma^2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \sigma^2 \end{pmatrix}
\end{aligned}
$$

That is, within units:

- $\text{Var}(u_{it}) = \text{Var}(u_{is}) \ \forall \ t \neq s$ (temporal homoscedasticity)
- $\text{Cov}(u_{it}, u_{is}) = 0 \ \forall \ t \neq s$ (no within-unit autocorrelation)

and between units:

- $\text{Var}(u_{it}) = \text{Var}(u_{jt}) \ \forall \ i \neq j$ (cross-unit homoscedasticity)
- $\text{Cov}(u_{it}, u_{jt}) = 0 \ \forall \ i \neq j$ (no between-unit / spatial correlation)

The Key: $\boldsymbol{\Omega}$

Estimator:

$$\hat{\beta}_{GLS} = (\mathbf{X}'\boldsymbol{\Omega}^{-1}\mathbf{X})^{-1}\mathbf{X}'\boldsymbol{\Omega}^{-1}\mathbf{Y}$$

with:

$$\widehat{V(\beta_{GLS})} = (\mathbf{X}'\boldsymbol{\Omega}^{-1}\mathbf{X})^{-1}$$

Two approaches:

- Use OLS $\hat{u}_{it}$s to get $\hat{\boldsymbol{\Omega}}$ ("feasible GLS")
- Use substantive knowledge about the data to structure $\boldsymbol{\Omega}$

Assume:

- $E(u_{it}^2) = E(u_{is}^2) \ \forall \ t \neq s$
- $E(u_{it}, u_{jt}) = \sigma_{ij} \ \forall \ i \neq j,$
- $E(u_{it}, u_{js}) = 0 \ \forall \ i \neq j, t \neq s$
- $E(u_{it}, u_{is}) = \rho$ or ρ_i

(B&K: "panel error assumptions").

Then

1. Use OLS to generate $\hat{u}$s $\rightarrow \hat{\rho} \ (\rightarrow \hat{\boldsymbol{\Omega}})$,
2. Use $\hat{\rho}$ for Prais-Winsten.

This method was widely used prior to B&K (1995)

$$\mathbf{\Omega} = \begin{pmatrix} \Sigma & 0 & \cdots & 0 \\ 0 & \Sigma & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \Sigma \end{pmatrix} = \Sigma \otimes \mathbf{I}_N$$

where

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \cdots & \sigma_{1N} \\ \sigma_{12} & \sigma_2^2 & \cdots & \sigma_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{1N} & \sigma_{2N} & \cdots & \sigma_N^2 \end{pmatrix}$$

Means:

- $\frac{N(N-1)}{2}$ distinct contemporaneous correlations,
- NT observations,
- $\rightarrow 2T/(N+1)$ observations per $\hat{\sigma}$

Panel-Corrected Standard Errors

Key to PCSEs:

$$\hat{\sigma}_{ij} = \frac{\sum_{t=1}^{T} \hat{u}_{it} \hat{u}_{jt}}{T}$$

Define:

$$\underset{T \times N}{\mathbf{U}} = \begin{pmatrix} \hat{u}_{11} & \hat{u}_{21} & \cdots & \hat{u}_{N1} \\ \hat{u}_{12} & \hat{u}_{22} & \cdots & \hat{u}_{N2} \\ \vdots & \vdots & \ddots & \vdots \\ \hat{u}_{1T} & \hat{u}_{2T} & \cdots & \hat{u}_{NT} \end{pmatrix}$$

$$\hat{\mathbf{\Sigma}} = \frac{(\mathbf{U'U})}{T}$$

$$\hat{\mathbf{\Omega}}_{PCSE} = \frac{(\mathbf{U'U})}{T} \otimes \mathbf{I}_T$$

Panel-Corrected Standard Errors

Correct formula:

$$\text{Cov}(\hat{\beta}_{PCSE}) = (\mathbf{X}'\mathbf{X})^{-1}[\mathbf{X}'\mathbf{\Omega}\mathbf{X}](\mathbf{X}'\mathbf{X})^{-1}$$

PCSEs:

- Do not fix unit-level heterogeneity (a la "fixed" / "random" effects)

- Do not deal with dynamics

- Depend critically on the "panel data assumptions" of Park / B&K

Panel Assumptions and Numbers of Parameters to be Estimated

Panel Assumptions	No AR(1)	Common $\hat{\rho}$	Separate $\hat{\rho}_i$s
$\sigma_i^2 = \sigma^2$, $Cov(\sigma_{it}, \sigma_{jt}) = 0$	$k+1$	$k+2$	$k+N+1$
$\sigma_i^2 \neq \sigma^2$, $Cov(\sigma_{it}, \sigma_{jt}) = 0$	$k+N$	$k+N+1$	$k+2N$
$\sigma_i^2 \neq \sigma^2$, $Cov(\sigma_{it}, \sigma_{jt}) \neq 0$	$\frac{N(N-1)}{2} + k + N$	$\frac{N(N-1)}{2} + k + N + 1$	$\frac{N(N-1)}{2} + k + 2N$

Example: Central Banks, Unions, Unemployment

- Hall and Franzese (1998 *IO*)

- 18 OECD countries, 1955-1990 ($N = 18$, $T = 36$, $NT = 648$)

- $Y =$ unemployment

- Covariates: GDP, openness, union density, left cabinets, central bank independence, coordinated wage bargaining, interaction

```
> summary(HF)
    country          year            ue             inf            cbi
 Min.   : 1.0    Min.   :1955    Min.   : 0.0    Min.   :-1.7    Min.   :0.12
 1st Qu.: 5.0    1st Qu.:1964    1st Qu.: 1.6    1st Qu.: 3.2    1st Qu.:0.41
 Median : 9.5    Median :1972    Median : 3.0    Median : 4.9    Median :0.47
 Mean   :10.3    Mean   :1972    Mean   : 4.0    Mean   : 6.0    Mean   :0.50
 3rd Qu.:15.0    3rd Qu.:1981    3rd Qu.: 5.7    3rd Qu.: 7.7    3rd Qu.:0.61
 Max.   :21.0    Max.   :1990    Max.   :17.5    Max.   :27.2    Max.   :0.93
    cwagebrg        GDP_PC          open            uden           lcab
 Min.   :0.00    Min.   :7.6    Min.   :0.07    Min.   :0.10    Min.   :0.00
 1st Qu.:0.25    1st Qu.:8.9    1st Qu.:0.31    1st Qu.:0.32    1st Qu.:0.00
 Median :0.50    Median :9.2    Median :0.43    Median :0.41    Median :0.07
 Mean   :0.49    Mean   :9.1    Mean   :0.46    Mean   :0.44    Mean   :0.31
 3rd Qu.:0.75    3rd Qu.:9.4    3rd Qu.:0.54    3rd Qu.:0.56    3rd Qu.:0.58
 Max.   :1.00    Max.   :9.8    Max.   :1.40    Max.   :0.85    Max.   :1.00
    wagexcbi        HasLCAB
 Min.   :0.00    Min.   :1
 1st Qu.:0.04    1st Qu.:1
 Median :0.21    Median :1
 Mean   :0.25    Mean   :1
 3rd Qu.:0.37    3rd Qu.:1
 Max.   :0.70    Max.   :1
```
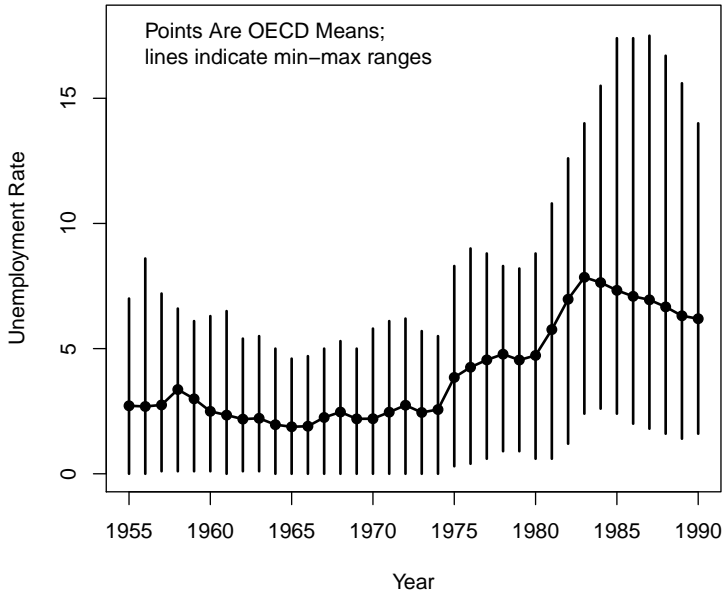
Unemployment in 18 Nations, 1955-1990

Points Are OECD Means;
lines indicate min−max ranges

```
> summary(HF.OLS)
Oneway (individual) effect Pooling Model

Balanced Panel: n=18, T=36, N=648

Residuals :
   Min. 1st Qu.  Median 3rd Qu.    Max.
 -5.120  -1.500  -0.241   1.230   9.290

Coefficients :
            Estimate Std. Error t-value   Pr(>|t|)
(Intercept)  -13.579      2.328   -5.83 0.0000000086 ***
GDP_PC         1.603      0.263    6.09 0.0000000020 ***
open           5.119      0.418   12.24      < 2e-16 ***
uden           0.709      0.808    0.88         0.38
lcab           0.236      0.293    0.81         0.42
cbi            5.169      1.097    4.71 0.0000030150 ***
cwagebrg      -1.292      0.792   -1.63         0.10
wagexcbi      -7.030      1.505   -4.67 0.0000036327 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

Total Sum of Squares:   6500
Residual Sum of Squares: 3730
R-Squared:      0.426
Adj. R-Squared: 0.421
F-statistic: 67.9634 on 7 and 640 DF, p-value: <2e-16
```

```
> HF.prais <- prais.winsten(ue~GDP_PC+open+uden+lcab+cbi+cwagebrg+wagexcbi,
                            data=HF,iter=100)
> HF.prais

Residuals:
   Min    1Q Median    3Q    Max
-8.456 -0.431 -0.144  0.314  4.615

Coefficients:
          Estimate Std. Error t value Pr(>|t|)
Intercept -15.2783    2.2128   -6.90  1.2e-11 ***
GDP_PC      2.3415    0.2515    9.31  < 2e-16 ***
open       -0.3491    0.7950   -0.44   0.6608
uden        5.5466    1.1492    4.83  1.7e-06 ***
lcab       -0.0593    0.1861   -0.32   0.7501
cbi        -3.4801    2.4753   -1.41   0.1602
cwagebrg  -10.5954    2.0019   -5.29  1.7e-07 ***
wagexcbi   10.6805    3.4942    3.06   0.0023 **
---
Signif. codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

Residual standard error: 0.95 on 640 degrees of freedom
Multiple R-squared:  0.279,Adjusted R-squared:  0.27
F-statistic:    31 on 8 and 640 DF,  p-value: <2e-16

  Rho Rho.t.statistic Iterations
 0.94             73         10
```

```
> HF.GLS <- gls(ue~GDPPC+open+uden+lcab+cbi+cwagebrg+wagexcbi,
                            HF,correlation=corAR1(form=~1|country))
> summary(HF.GLS)
Generalized least squares fit by REML
  Model: ue ~ GDPPC + open + uden + lcab + cbi + cwagebrg + wagexcbi
  Data: HF
   AIC  BIC logLik
  1484 1529  -732

Correlation Structure: AR(1)
 Formula: ~1 | country
 Parameter estimate(s):
 Phi
0.99

Coefficients:
            Value Std.Error t-value p-value
(Intercept)   43      7.3     5.8   0.000
GDPPC         -4      0.7    -5.5   0.000
open          -1      0.8    -1.8   0.072
uden           1      2.2     0.3   0.792
lcab           0      0.1    -0.7   0.473
cbi           -1      7.5    -0.2   0.848
cwagebrg      -5      6.4    -0.8   0.402
wagexcbi       3     11.7     0.3   0.770

 Correlation:
         (Intr) GDPPC open   uden   lcab   cbi    cwgbrg
GDPPC    -0.827
open      0.124 -0.207
uden     -0.145  0.017 -0.048
lcab      0.041 -0.054  0.005 -0.003
cbi      -0.421 -0.100  0.033  0.069  0.009
cwagebrg -0.371 -0.065  0.018 -0.084 -0.014  0.721
wagexcbi  0.334  0.082 -0.028  0.017  0.004 -0.813 -0.905

Standardized residuals:
  Min   Q1   Med   Q3   Max
-1.49 -0.64 -0.20  0.46  2.55
```

More GLS: Unit-Wise Heteroscedisticity

```
> HF.GLS2 <- gls(ue~GDPPC+open+uden+lcab+cbi+cwagebrg+wagexcbi,
+                HF,correlation=corAR1(form=~1|country),
+                weights = varIdent(form = ~1|country))
> summary(HF.GLS2)
Generalized least squares fit by REML
   AIC  BIC logLik
  1326 1446  -636

Correlation Structure: AR(1)
 Formula: ~1 | country
 Parameter estimate(s):
 Phi
0.98

Variance function:
 Structure: Different standard deviations per stratum
 Formula: ~1 | country
 Parameter estimates:
   1    2    3    4    5    6    7    8    9   10   11   13   14   15   18   19   20   21
1.00 0.19 0.75 0.54 0.60 1.00 0.95 0.32 0.88 0.89 0.78 1.09 0.92 0.57 0.33 0.38 0.86 0.60

Coefficients:
            Value Std.Error t-value p-value
(Intercept)  21.1       4.7     4.5  0.0000
GDPPC        -1.6       0.4    -4.3  0.0000
open         -2.2       0.6    -3.4  0.0008
uden          0.9       1.5     0.6  0.5415
lcab         -0.1       0.1    -1.2  0.2206
cbi          -1.9       7.3    -0.3  0.7984
cwagebrg     -6.3       4.7    -1.3  0.1794
wagexcbi      5.0       9.5     0.5  0.5996
.
.
.
```

```
> library(lmtest)
> coeftest(HF.OLS,vcov=vcovBK)

t test of coefficients:

            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -13.579      7.320   -1.86    0.064 .
GDP_PC         1.603      0.821    1.95    0.051 .
open           5.119      1.304    3.93 0.000096 ***
uden           0.709      2.518    0.28    0.778
lcab           0.236      0.668    0.35    0.724
cbi            5.169      3.439    1.50    0.133
cwagebrg      -1.292      2.478   -0.52    0.602
wagexcbi      -7.030      4.726   -1.49    0.137
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1
```

```
> HF.lm<-lm(ue~GDP_PC+open+uden+lcab+cbi+cwagebrg+wagexcbi,data=HF)
> HF.pcse<-pcse(HF.lm,groupN = HF$country, groupT = HF$year)
> summary(HF.pcse)

 Results:

            Estimate PCSE t value Pr(>|t|)
(Intercept)   -13.58 4.74   -2.87 4.3e-03
GDP_PC          1.60 0.53    3.01 2.7e-03
open            5.12 0.53    9.71 7.0e-21
uden            0.71 0.53    1.35 1.8e-01
lcab            0.24 0.27    0.88 3.8e-01
cbi             5.17 0.85    6.10 1.9e-09
cwagebrg       -1.29 0.77   -1.67 9.6e-02
wagexcbi       -7.03 1.05   -6.68 5.3e-11

 ---------------------------------------------

# Valid Obs = 648; # Missing Obs = 0; Degrees of Freedom = 640.
```

General advice...

$$Y_{it} = \phi Y_{it-1} + \mathbf{X}_{it}\boldsymbol{\beta}_{LDV} + \epsilon_{it}$$

If ϵ_{it} is perfect...

- $\hat{\beta}_{LDV}$ is biased (but consistent),
- $O(\text{bias}) = \frac{-1 + 3\beta_{LDV}}{T}$

If ϵ_{it} is autocorrelated...

- $\hat{\beta}_{LDV}$ is biased and <u>inconsistent</u>
- IV is one (bad) option...

Can rewrite:

$$
\begin{aligned}
Y_{it} &= \mathbf{X}_{it}\boldsymbol{\beta}_{AR} + u_{it} \\
u_{it} &= \phi u_{it-1} + \eta_{it}
\end{aligned}
$$

as

$$
\begin{aligned}
Y_{it} &= \mathbf{X}_{it}\boldsymbol{\beta}_{AR} + \phi u_{it-1} + \eta_{it} \\
&= \mathbf{X}_{it}\boldsymbol{\beta}_{AR} + \phi(Y_{it-1} - \mathbf{X}_{it-1}\boldsymbol{\beta}_{AR}) + \eta_{it} \\
&= \phi Y_{it-1} + \mathbf{X}_{it}\boldsymbol{\beta}_{AR} + \mathbf{X}_{it-1}\psi + \eta_{it}
\end{aligned}
$$

where $\psi = \phi\beta_{AR}$ and $\psi = 0$ (by assumption).

Lagged Ys and World Domination

In:

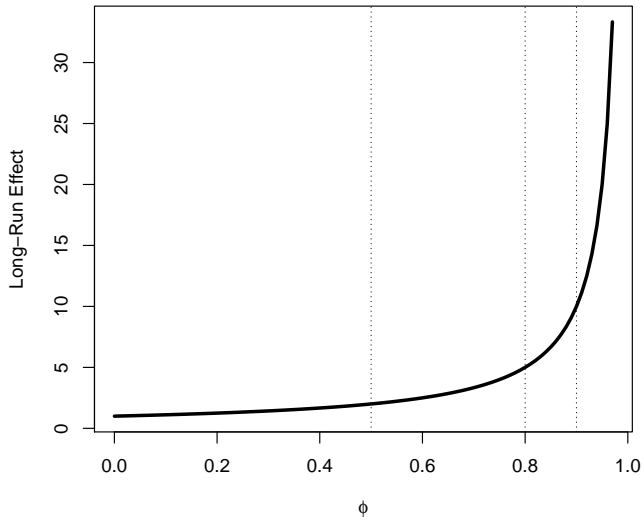$$Y_{it} = \phi Y_{it-1} + \mathbf{X}_{it}\boldsymbol{\beta}_{LDV} + \epsilon_{it}$$

Achen: Bias "deflates" $\hat{\boldsymbol{\beta}}$ relative to $\hat{\phi}$, "suppress" the effects of **X**...

Keele & Kelly (2006):

- Contingent on ϵs having autocorrelation
- Key: In LDV, *long-run impact of a unit change in X is*:

$$\hat{\beta}_{LR} = \frac{\hat{\beta}_{LDV}}{1 - \hat{\phi}}$$

Long-Run Impact for $\hat{\beta} = 1$

Consider:

$$Y_{it} = \phi Y_{it-1} + \mathbf{X}_{it}\boldsymbol{\beta} + \alpha_i + u_{it}.$$

If we omit the unit effects, we have:

$$Y_{it} = \phi Y_{it-1} + \mathbf{X}_{it}\boldsymbol{\beta} + u_{it}^*$$

with

$$u_{it}^* = \alpha_i + u_{it}$$

Lagging yields:

$$Y_{it-1} = \phi Y_{it-2} + \mathbf{X}_{it-1}\boldsymbol{\beta} + \alpha_i + u_{it-1}$$

which means

$$\text{Cov}(Y_{it-1}, u_{it}^*) \neq 0.$$

Bias in $\hat{\phi}$ is

- toward zero when $\phi > 0$,
- increasing in ϕ.

Including unit effects still yields bias in $\hat{\phi}$ of $O(\frac{1}{T})$, and bias in $\hat{\boldsymbol{\beta}}$.

Solutions:

- Difference/GMM estimation
- Bias correction approaches

First Difference Estimation

$$
\begin{aligned}
Y_{it} - Y_{it-1} &= \phi(Y_{it-1} - Y_{it-2}) + (\mathbf{X}_{it} - \mathbf{X}_{it-1})\boldsymbol{\beta} + (\alpha_i - \alpha_i) + (u_{it} - u_{it-1}) \\
\Delta Y_{it} &= \phi\Delta Y_{it-1} + \Delta\mathbf{X}_{it}\boldsymbol{\beta} + \Delta u_{it}
\end{aligned}
$$

Anderson/Hsiao: If $\nexists$ autocorrelation, then use ΔY_{it-2} or Y_{it-2} as instruments for ΔY_{it-1}...

- Consistent in theory,
- in practice, the former is preferred, and both have issues if ϕ is high;
- both are inefficient.

Arellano & Bond (also Wawro): Use *all* lags of Y_{it} and $\mathbf{X}_{it}$ from $t-2$ and before.

- "Good" estimates, better as $T \to \infty$,
- Easy to handle higher-order lags of Y,
- Easy software (plm in R , xtabond in Stata).
- Model *is* fixed effects...
- $\mathbf{Z}_i$ has $T - p - 1$ rows, $\sum_{i=p}^{T-2} i$ columns $\to$ difficulty of estimation declines in p, grows in T.

Kiviet (1995, 1999; Bun and Kiviet 2003; Bruno 2005a,b): Derive the bias in $\hat{\phi}$ and $\hat{\beta}$, then correct it...

- More accurate than the instrumental-variables/GMM estimators of A&H/A&B...
- ...especially when T is small; but not as T gets reasonably large ($T \approx 20$)

Stationarity: Quick Intro

Mean stationarity:

$$E(Y_t) = \mu \ \forall \ t$$

Variance stationarity:

$$\text{Var}(Y_t) = E[(Y_t - \mu)^2] \equiv \sigma_Y^2 \ \forall \ t$$

Covariance stationarity:

$$\text{Cov}(Y_t, Y_{t-s}) = E[(Y_t - \mu)(Y_{t-s} - \mu)] = \gamma_s \ \forall \ s$$

I(1) Series and Unit Roots

I(1) ("integrated") series:

$$Y_t = Y_{t-1} + u_t$$

vs. AR(1) series:

$$Y_t = \rho Y_{t-1} + u_t$$

or *trending* series:

$$Y_t = \beta t + u_t$$

Differencing:

$$
\begin{aligned}
\Delta Y_t \equiv Y_t - Y_{t-1} &= Y_t + u_t - Y_{t-1} \\
&= u_t
\end{aligned}
$$

and

$$
\begin{aligned}
\Delta Y_t \equiv Y_t - Y_{t-1} &= \beta t + u_t - (\beta(t-1) + u_{t-1}) \\
&= \beta t + u_t - \beta t + \beta - u_{t-1} \\
&= u_t - u_{t-1} + \beta
\end{aligned}
$$

More generally:

- $|\rho| > 1$
  - Series is nonstationary / *explosive*
  - Past shocks have a greater impact than current ones
  - Uncommon
- $|\rho| < 1$
  - *Stationary* series
  - Effects of shocks die out exponentially according to ρ
  - Is mean-reverting
- $|\rho| = 1$
  - Nonstationary series
  - Shocks persist at full force
  - Not mean-reverting; variance increases with t

Two steps:

- Estimate $Y_t = \rho Y_{t-1} + u_t$,
- test the hypothesis that $\hat{\rho} = 0$, *but*
- this requires that the us are uncorrelated.

But suppose:

$$\Delta Y_t = \sum_{i=1}^{p} d_i \Delta Y_{t-i} + u_t$$

which yields

$$Y_t = Y_{t-1} + \sum_{i=1}^{p} d_i \Delta Y_{t-i} + u_t.$$

D.F. tests will be incorrect.

Augmented Dickey-Fuller Tests:

- Estimate

$$\Delta Y_t = Y_{t-1} + \sum_{i=1}^{p} d_i \Delta Y_{t-i} + u_t$$

- Test $\hat{\rho} = 0$

Phillips-Perron Tests:

- Estimate:

$$\Delta Y_t = \alpha + \rho Y_{t-1} + u_t$$

- Calculate modified test statistics (Z_ρ and Z_t)
- Test $\hat{\rho} = 0$

Issues with Unit Roots in Panel Data

- Short series + Asymptotic tests $\rightarrow$ "borrow strength"

- Requires uniform unit roots across is

- Various alternatives:
    - Maddala and Wu (1999)
    - Hadri (2000)
    - Levin, Lin and Chu (2002)

- What to do?
    - Difference the data...
    - Error-correction models

Example: HIV/AIDS in Africa, 1997-2001

```
> summary(AIDS)
     ccode           year          lnAIDS         lnAIDSlag       warlag          popden
 Min.   :404    Min.   :1997    Min.   :-3.8    Min.   :-4    Min.   :0.00    Min.   :0.00
 1st Qu.:451    1st Qu.:1998    1st Qu.: 0.6    1st Qu.: 1    1st Qu.:0.00    1st Qu.:0.01
 Median :506    Median :1999    Median : 1.6    Median : 2    Median :0.00    Median :0.03
 Mean   :510    Mean   :1999    Mean   : 1.2    Mean   : 1    Mean   :0.14    Mean   :0.06
 3rd Qu.:560    3rd Qu.:2000    3rd Qu.: 2.4    3rd Qu.: 2    3rd Qu.:0.00    3rd Qu.:0.07
 Max.   :651    Max.   :2001    Max.   : 3.7    Max.   : 4    Max.   :1.00    Max.   :0.57
                                                NA's   :46
     refsin
 Min.   :  0
 1st Qu.:  1
 Median : 10
 Mean   : 56
 3rd Qu.: 46
 Max.   :543
```

HIV/AIDS in Africa, 1997-2001
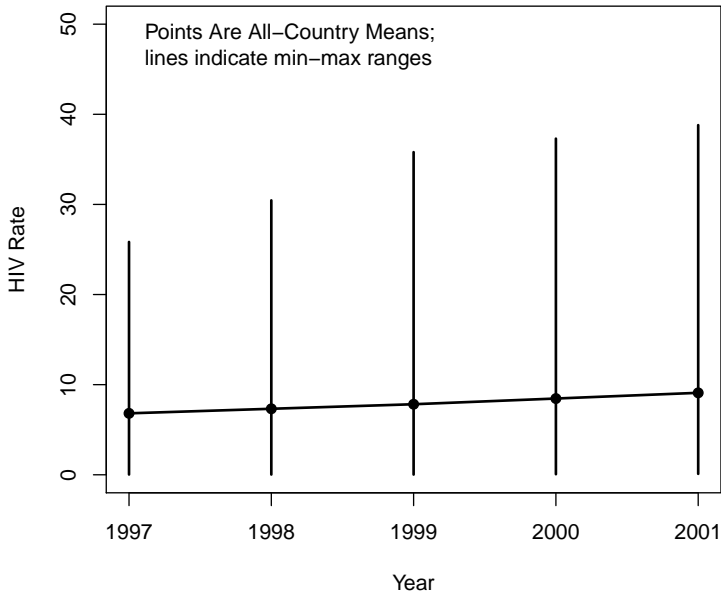
```
> lnAIDS<-cbind(AIDS$ccode,AIDS$year,AIDS$lnAIDS)
> purtest(lnAIDS,exo="trend",test=c("levinlin"))

Levin-Lin-Chu Unit-Root Test (ex. var.: Individual Intercepts and Trend)

data:  lnAIDS
z.x1 = 3e+12, p-value <2e-16
alternative hypothesis: stationarity

> purtest(lnAIDS,exo="trend",test=c("hadri"))

Hadri Test (ex. var.: Individual Intercepts and Trend)

data:  lnAIDS
z = 60, p-value <2e-16
alternative hypothesis: at least one series has a unit root

> purtest(lnAIDS,exo="trend",test=c("ips"))

Im-Pesaran-Shin Unit-Root Test (ex. var.: Individual Intercepts and Trend)

data:  lnAIDS
z = 4, p-value = 0.0002
alternative hypothesis: stationarity
```

Final Thoughts: Dynamic Panel Models

- *N* vs. *T*...

- Are dynamics nuisance or substance?

- What problem(s) do you *really* care about?