

# Advanced Quantitative Methods

## Homework 2: time-series & panel data

Johan A. Elkink  
jos.elkink@ucd.ie

Due March 26, 2018, 5pm

Please submit by email in PDF format. Add R code in a separate .R file, or SPSS code in a separate .sps file, or Stata code in a separate .do file, or the code for any other package you use separately. Alternatively, you can integrate R code and responses in R Markdown and submit both in PDF format (easiest is to use HTML format and then in the web browser save as PDF).

Please note the revised submission date.

Percentages with an asterisk indicate that positive rather than negative marking will be applied.

(5\*%) of the grade is used for an overall evaluation of the clarity and presentation of your code.

### Questions

1. Using the `usatime.dta` data (Table 1),<sup>1</sup> the model we will be looking at is:  $immig_t = \beta_0 + \beta_1 wages_t + \beta_2 gnppc_t + \beta_3 unemp_t + \varepsilon_t$ .
  - (a) (5%) Run the OLS regression and present coefficients, standard errors, and  $t$ -tests (e.g.  $p$ -values or stars) in publishable table format.
  - (b) (5%) Plot the dependent variable, all independent variables, and the residuals over time. In a few sentences about each, what do you observe?
  - (c) Run Durbin-Watson (4%), Breusch-Godfrey (4%) tests and the Gauss-Newton regression (4%) on the residuals. What do you conclude?
  - (d) (8%) Take first differences for all four variables and re-estimate (and present) the model. Repeat the tests on the new residuals. What do you conclude?
  - (e) (10%) Write a 300 word summary what you *substantively*, in layman terms, conclude about the relationship between immigration levels, wages, GNP per capita, and unemployment rates?

---

<sup>1</sup><http://www.joselkink.net/wp-content/uploads/2013/01/usatime.dta>; see also <http://www.joselkink.net/wp-content/uploads/2013/01/usatime.txt>.

year	Year
immig	Immigration
uspop	Population
money	Money stock
strikes	Strikes
coffee	Coffee consumption
suicide	Suicide rate (per 100,000)
emp	Employment (male)
unemp	Unemployment rate
gnp	Gross National Product
gnppc	Gross National Product per capita
cpi	Consumer Price Index
wages	Wages
copper	Price of copper (not US specific)
wheat	Price of wheat (not US specific)
chicken	Price of chicken (not US specific)
phone	Price of New York - San Francisco phone call
oil	Oil price (not US specific)

Table 1: Variables in `uswages.csv`, all annual data on the United States.

2. Using the same data, investigate the regression:  $\log(wages)_t = \beta_0 + \beta_1 \log(gnppc)_t + \beta_2 strikes_t + \varepsilon_t$ .
  - (a) (5%) Test for unit roots in *wages* and  $\log(wages)$ .
  - (b) (5%) Perform a unit root test on the residuals.
  - (c) (10%) Assuming the model is cointegrated, estimate the short-term and long-term elasticity between wages and GNP per capita.
  
3. This question will make use of the replication data of Neumayer (2003) (see Table 2 and Figure 1 for download instructions). The model we will look at is:  $homiciderate_{it} = \beta_0 + \beta_1 popdensity_{it} + \beta_2 \ln gdp_{it} + \beta_3 freedom_{it} + \beta_4 freedom_{it}^2 + \beta_5 femlabourpart_{it} + \beta_6 deathpen_{it} + \varepsilon_{it}$ . All the below models have to be presented in publishable table format - they can be combined in one or two tables, with columns per model.
  - (a) (5%) Estimate a pooled model with the above variables.
  - (b) (5%) Estimate a model with country fixed effects.
  - (c) (5%) Estimate a model with time fixed effects and panel-corrected standard errors.
  - (d) (5%) Estimate a model with time fixed and country random effects.
  - (e) (5%) Estimate a model with country random effects and a lagged dependent variable.
  - (f) (10%) What do you substantively conclude (300 words) about the explanation of homicide rates and the possibilities for policy intervention to reduce them?

country	Country identifier
year	Year identifier
homiciderate	Homicide rate (per 100,000 people)
popdensity	Population density (per sq. km)
lngdp	Log of GDP per capita
freedom	Freedom House democracy score
femlabourpart	Female labour force participation
deathpen	Death penalty (dummy)

Table 2: Variables in the homicide.dta data set

<https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/0IFFYZ>

**HARVARD** Dataverse We've changed hosting! Contact us if you see any issues. Q About User Guide Support Sign Up Log In

**Replication Data for: Good Policy can Lower Violent Crime: Evidence From Fixed Effects Estimation in a Cross-National Panel of Homicide Rates, 1980-97, Journal of Peace Research 40 (6), 2003, pp. 619-640**  
Version 1.0

Neumayer, Eric, 2017, "Replication Data for: Good Policy can Lower Violent Crime: Evidence From Fixed Effects Estimation in a Cross-National Panel of Homicide Rates, 1980-97, Journal of Peace Research 40 (6), 2003, pp. 619-640", doi:10.7910/DVN/0IFFYZ, Harvard Dataverse, V1, UNF:6:pSfikQY66lBtISze/OBXQ== Cite Dataset



**Description**  
This article provides empirical evidence that good political governance and good economic policies can lower homicide rates. Therefore, violent crime is not simply determined by modernization, population characteristics, and cultural factors. This result follows from rigorous econometric testing based on a cross-national panel of homicide data from up to 117 countries over the period 1980–97. Contrary to most existing studies, which have applied ordinary least squares on data drawn from one time period only, this analysis uses a fixed-effects estimator with fully robust standard errors. A fixed-effects estimator elegantly controls for time-invariant determinants, such as cultural factors, and allows the pooling of homicide data from otherwise incompatible sources. This is complemented by random-effects estimation in sensitivity analysis. The results suggest that economic growth, higher income levels, respect for human rights, and the abolition of the death penalty are all associated with lower homicide rates. The same is true for democracy at high levels of democracy. The transition from autocracy to democracy is likely to be accompanied by a rising homicide rate, however, until full democracy has been reached. Results also indicate that policies aimed at improving equity have no effect on violent crime. In particular, there is evidence that the positive effect of income inequality on homicide rates found in many studies might be spurious. The results reported here are strikingly similar to those found for the causes of civil war.

**Subject**  
Social Sciences

Files Metadata Terms Versions

Search this dataset... Find

**2 Files**

<input type="checkbox"/>		<b>JPR homicide.do</b> application/x-stata-syntax - 3.3 KB - Apr 19, 2017 - 2 Downloads MD5: ae6e3fe232f45f73348b873cd7722011	Download
<input type="checkbox"/>		<b>JPR homicide.tab</b> Tabular Data - 184.1 KB - Apr 19, 2017 - 4 Downloads 32 Variables, 1242 Observations - UNF:6:pSfikQY66lBtISze/OBXQ==	Download

Explore Download

- Original File Format (Stata Binary)
- Tab Delimited
- RData Format
- Variable Metadata

Figure 1: Download instructions for the Neumayer (2003) replication data. Download in Stata format and open this in R.

## Grade conversion scheme

Score	Grade		Score	Grade		Score	Grade		Score	Grade	
	UCD	TCD		UCD	TCD		UCD	TCD		UCD	TCD
97-100%	A+	A+	85-87%	B	B	74-76%	C-	C	54-64%	E+	D
94-96%	A	A	83-84%	B-	B	71-73%	D+	C	44-53%	E	D
91-93%	A-	A	80-82%	C+	C+	68-70%	D	C	33-43%	E-	D
88-90%	B+	B+	77-79%	C	C	65-67%	D-	C	0-32%	F	F

Neumayer, Eric. 2003. "Good policy can lower violent crime: Evidence from fixed effects estimation in a cross-national panel of homicide rates, 1980-1997." *Journal of Peace Research* 40(6):619-640.