

# 1 Introduction

Econometrics started with time series data

## 2 Overview

Core models to learn:

1) Autoregressive model (AR)  $\Rightarrow y_t = \alpha + \phi_1 y_{t-1} + \dots + \phi_p y_{t-p} + e_t$

2) Regression model  $\Rightarrow y_t = \alpha + \delta x_t + e_t$

3) Distributed Lag (DL) model

$\Rightarrow y_t = \alpha + \delta_0 x_t + \delta_1 x_{t-1} + \dots + \delta_q x_{t-q} + e_t$

4) Autoregressive-distributed Lag (ARDL) model

$\Rightarrow y_t = \alpha + \phi_1 y_{t-1} + \dots + \phi_p y_{t-p} + \delta_0 x_t + \delta_1 x_{t-1} + \dots + \delta_q x_{t-q} + e_t$

$p$  = # lags of dependent var  $y_t$

$q$  = # of lags of explanatory var  $x_t$

$e_t$  = mean-zero shock

!!! Core insights!

## 3 Standard Errors and t Statistics

Newey standard error appropriate for simple (non-dynamic) regressions and DL models

$\hookrightarrow$  distributed Lag  
 $\hookrightarrow$  to be used when serial correlation has not been modelled

## 4 Autoregressive models

## 5 Distributed Lag models

Estimate impact of one var on another

## 6 Autoregressive Distributed Lag models

## 7 Model selection

"Lag selection is inherently a bias-variance trade-off"

## 8 Spurious Regression

## 9 Structural Change

be wary of major shifts within data that throw off estimates

## 10 Forecasting