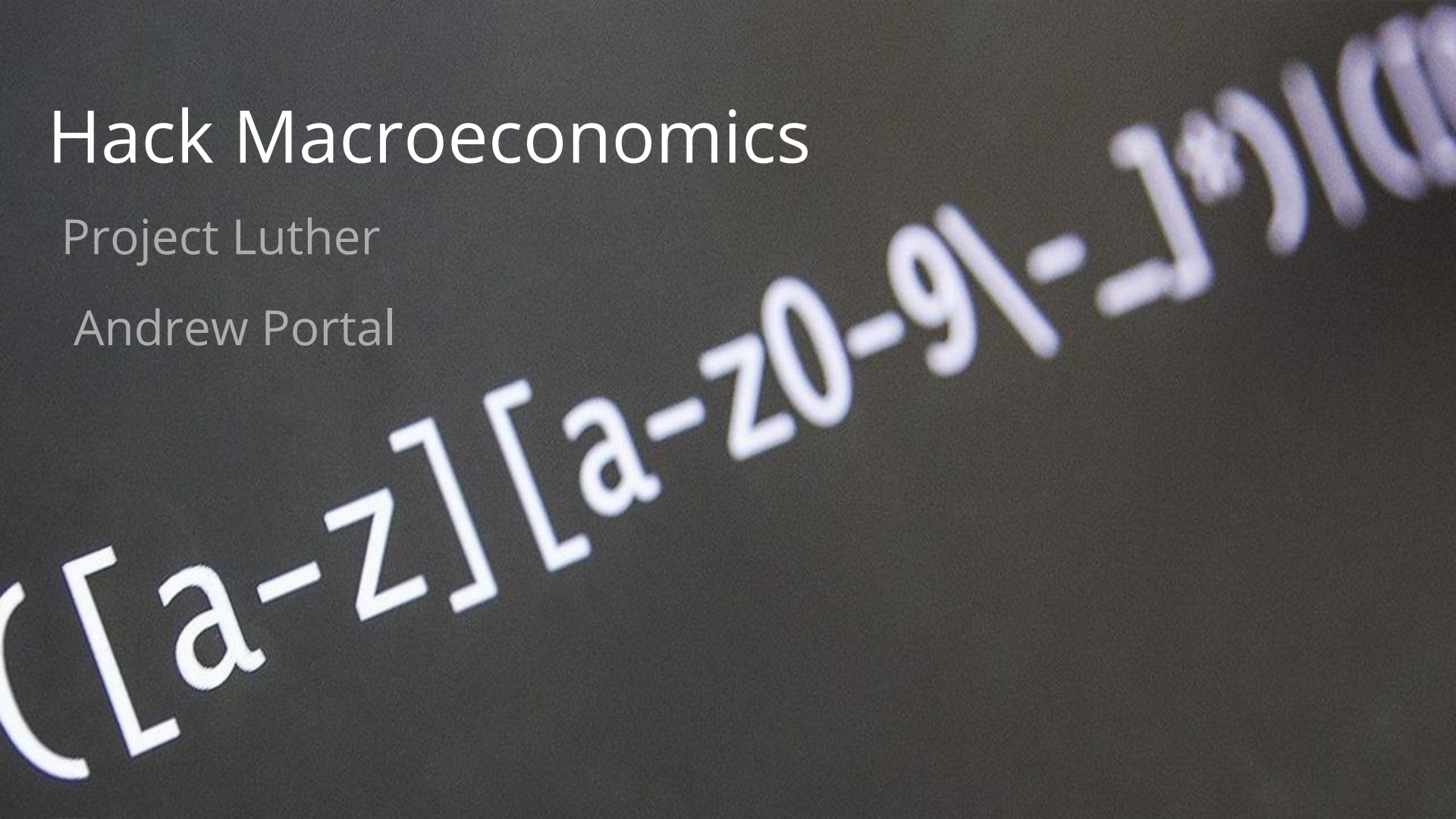


# Hack Macroeconomics

Project Luther

Andrew Portal



# The Cobb-Douglas Production Function

$$Y = AL^{\alpha}K^{\beta}$$

Goal: Find exponents ( represent returns to scale)

By the power of logarithms...

$$\text{Log}(Y) = \text{Log}(A) + \alpha \text{Log}(L) + \beta \text{Log}(K)$$

Expectation:  $\alpha + \beta \leq 1 \leftrightarrow$  No Free Lunches!

# Hack the CIA

...World FactBook



Many hours later..were in!

230 Countries; 200 Features , a lot of NaNs

$Y = \text{GDP in PPP}$ ,  $L = \text{Labor}$  &  $K = \dots \text{Not-Labor}$

$L(Y) = L(A) + \beta_1 L(\text{Labor}) + \beta_2 L(\text{Land}) + \backslash$

$\beta_3 L(\text{Rails}) + \beta_4 L(\text{Airports}) + \beta_5 L(\text{Debt})$



Prevalent Not-Labor features:  
.. still kinda labor

**GDP**

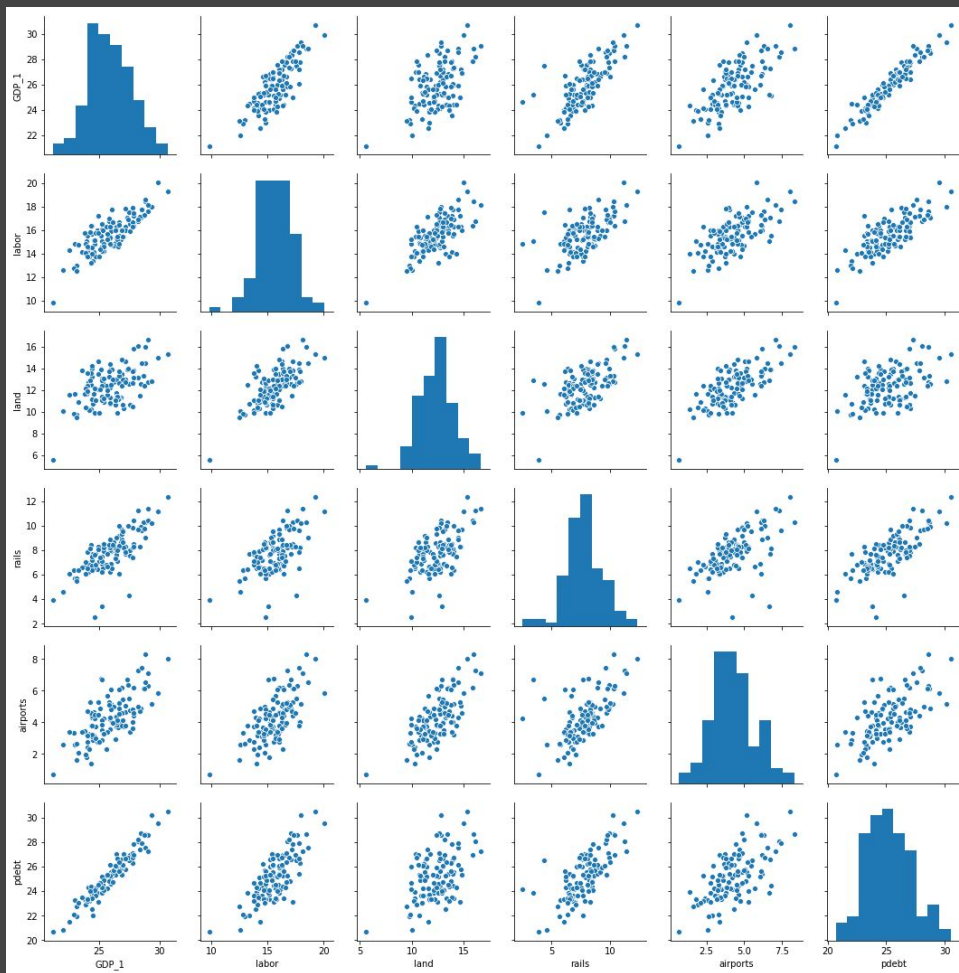
Labor

Land Area

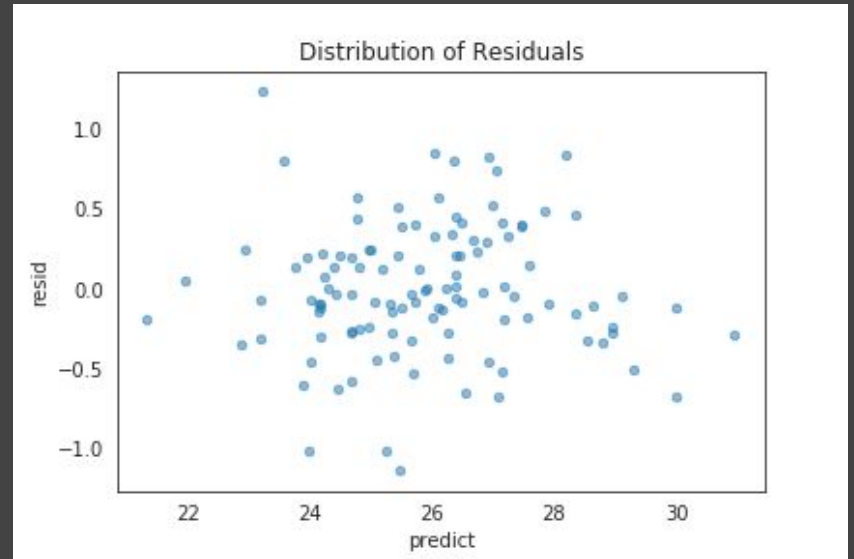
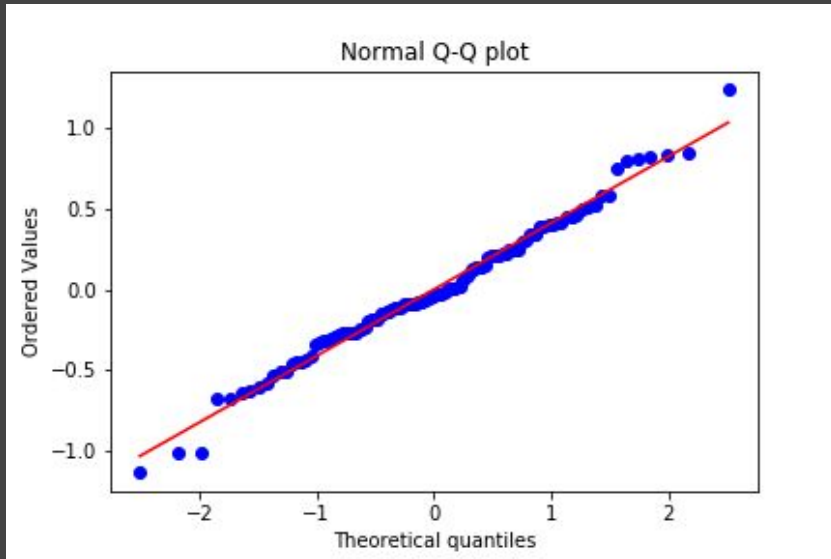
Railways

Airports

Public Debt



# Check Residuals



# Results

## OLS Regression Results

**Dep. Variable:** GDP\_1 **R-squared:** 0.947

**Model:** OLS **Adj. R-squared:** 0.945

	coef	std err	t	P> t	[0.025	0.975]
<b>const</b>	5.6441	0.753	7.494	0.000	4.151	7.137
<b>labor</b>	0.2031	0.055	3.715	0.000	0.095	0.311
<b>land</b>	-0.0934	0.045	-2.097	0.038	-0.182	-0.005
<b>rails</b>	0.0998	0.040	2.489	0.014	0.020	0.179
<b>airports</b>	0.1671	0.046	3.608	0.000	0.075	0.259
<b>pdebt</b>	0.6632	0.045	14.753	0.000	0.574	0.752

# Going Forward

Look into ways unbiased explanatory variables through shared relationship with population.

Gather information by random sampling of individual firm across time and countries

New data; new features: try regularization