

Dependencies

```
In [1]: using DataFrames
        using ExcelReaders
```

Data

```
In [2]: df_assignment = readxl(DataFrame, "./gw1_macro.xlsx", "Sheet1!A1:B101")
        df_data = readxl(DataFrame, "./pwt90.xlsx", "Data!A1:AU11831");
```

```
In [3]: head(df_assignment,2)
```

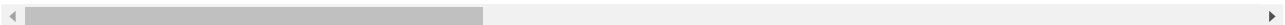
```
Out[3]:
```

	group	country
1	100.0	CHN
2	101.0	USA

```
In [4]: head(df_data,2)
```

```
Out[4]:
```

	countrycode	country	currency_unit	year	rgdpe	rgdpo	pop	emp	avh	hc	ccon	cda	cgdpe	cgdpo	ck	ctfp	cwtfp
1	ABW	Aruba	Aruban Guilder	1950.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	ABW	Aruba	Aruban Guilder	1951.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA



Code

```

In [5]: function GW1_respondes(group)

# Country selection
country = df_assignment[(df_assignment[:group].==group),:][2]
country_message = string("The second section of the answers will show the solutions for PRT

# Exercise 1
df_country = df_data[.](df_data[:countrycode] .== "PRT", df_data[:countrycode] .== country
data = df_country[.](df_country[:year] .== 2000, df_country[:year] .== 2014), [:countrycod

# Exercise 2
gdp = []
for i in 1:2 push!(gdp, ((data[i*2,4]/data[i*2-1,4])^(1/(data[i*2,3]-data[i*2-1,3]))-1)*100
ex2_results = ["" data[1,2] data[3,2]; "Growth Rate (%)" gdp[1] gdp[2]]

# Exercise 3
ex3_results = ["Country" "TFP2000" "TFP2014" "ΔTFP/TFP"]
for i in 1:2
    α = 1 - data[i*2-1,7]
    TFP2000 = data[i*2-1,4]/(data[i*2-1,6]^α * data[i*2-1,5]^(1-α))
    TFP2014 = data[i*2,4]/(data[i*2,6]^α * data[i*2,5]^(1-α))
    ex3_results = [ex3_results; data[i*2,2] TFP2000 TFP2014 (TFP2014-TFP2000)/TFP2000*100]
end

# Exercise 4
ex4_changes = ["Country" "ΔY/Y" "ΔTFP/TFP" "α*ΔK/K" "(1-α)*ΔL/L"]
ex4_contributions = ["Country" "%ΔTFP/TFP" "%α*ΔK/K" "%(1-α)*ΔL/L"]
for i in 1:2
    α = 1 - data[i*2-1,7]
    ΔY_Y = (data[i*2,4]-data[i*2-1,4])/data[i*2-1,4]
    ΔA_A = ex3_results[i+1,4]
    ΔK_K = (data[i*2,6]-data[i*2-1,6])/data[i*2-1,6]
    ΔL_L = (data[i*2,5]-data[i*2-1,5])/data[i*2-1,5]
    deltas = [ΔA_A α*ΔK_K (1-α)*ΔL_L]
    ex4_changes = [ex4_changes; data[i*2,2] ΔY_Y deltas]
    ex4_contributions = [ex4_contributions; data[i*2,2] deltas*(100/ΔY_Y)]
end
if ex4_contributions[2,2] == maximum(ex4_contributions[2,2:4])
    yn1 = "Yes, in $(ex4_contributions[2,1])." else yn1 = "No, in $(ex4_contributions[2,1]
if ex4_contributions[3,2] == maximum(ex4_contributions[3,2:4])
    yn2 = "Yes, in $(ex4_contributions[3,1])." else yn2 = "No, in $(ex4_contributions[3,1]

return data, ex2_results, ex3_results, ex4_changes, ex4_contributions, yn1, yn2, country_m
end;

```

Group Selection

Use the cell below to check the solutions of other groups:

```
In [6]: group_number = 125;
```

```
In [7]: GW1_respondes(group_number)[8]
```

```
Out[7]: "The second section of the answers will show the solutions for PRT and NLD."
```

Questions

1) Retrieving Data

Use the most recent version (9.0) of the Penn World Tables (at <https://www.rug.nl/ggdc/productivity/pwt/>) and retrieve the correct value to each component below to your designated country, as well as Portugal, for the years of 2000 and 2014.

- Output-side real GDP at chained PPPs (in mil. US\$2011) (rgdpo)
- Number of persons engaged (in millions) (emp)
- Capital stock at constant 2011 national prices (in mil. 2011US\$) (rkna)
- Share of labour compensation in GDP at current national prices (labsh)

Fill out the table below:

Answer of our group:

	Portugal		Thailand	
year	2010	2014	2010	2014
rgdpo	219630.03125	281354.90625	434126.28125	929554.5625
emp	5.0140275955200195	4.3413472175598145	31.74068260192871	38.893306732177734
rkna	1.30302975e6	1.7131235e6	2.38961475e6	3.62297275e6
labsh	0.6547812819480896	0.5807642936706543	0.38971802592277527	0.3928701877593994

Answer for the group chosen at the beginning:

In [8]: `GW1_respondes(group_number)[1]`

Out[8]:

	countrycode	country	year	rgdpo	emp	rkna	labsh
1	NLD	Netherlands	2000.0	596606.9375	8.19922924041748	2.6317835e6	0.6248472929000854
2	NLD	Netherlands	2014.0	812675.375	8.742557525634766	3.36735875e6	0.5955878496170044
3	PRT	Portugal	2000.0	219630.03125	5.0140275955200195	1.30302975e6	0.6547812819480896
4	PRT	Portugal	2014.0	281354.90625	4.3413472175598145	1.7131235e6	0.5807642936706543

2) Simple Math

Taking only these values from the above table, calculate Portugal's and your country's GDP growth rate. Fill out the below table:

Answer of our group:

$$g_{2000-2014} = \left(\frac{Y_{2014}}{Y_{2000}} \right)^{\frac{1}{2014-2000}} - 1$$

	Portugal	Thailand
GDP growth rate (%)	1.78483	5.588954

Answer for the group chosen at the beginning:

In [9]: `GW1_respondes(group_number)[2]`

Out[9]: 2x3 Array{Any,2}:
 "" "Netherlands" "Portugal"
 "Growth Rate (%)" 2.23222 1.78483

3) Cobb Douglas

Taking only the variables from the initial table, believing that the volume of a country's production is well approximated by a Cobb Douglas Production Function and **assuming that the share of labor income is constant and equal to that retrieved for the year 2000** calculate:

- The Total Factor Productivity level in the year 2000
- The Total Factor Productivity level in the year 2014
- The accumulated growth rate of TFP from 2000 to 2014

Answer of our group:

$$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha}$$

$$A = \frac{Y}{K^{\alpha} \cdot L^{1-\alpha}}$$

	Portugal		Thailand	
year	2010	2014	2010	2014
TFP	591.869	758.105	14.4488	22.1714
ΔTFP/TFP (%)		28.0865%		53.4483%

Answer for the group chosen at the beginning:

In [10]: `GW1_respondes(group_number)[3]`

Out[10]: 3x4 Array{Any,2}:
 "Country" "TFP2000" "TFP2014" "ΔTFP/TFP"
 "Netherlands" 625.382 746.116 19.3057
 "Portugal" 591.869 758.105 28.0865

4) Growth

Was the growth in TFP the responsible for the majority of the growth experienced by Portugal? [Yes / No]

Was the growth in TFP the responsible for the majority of the growth experienced by your assigned country? [Yes / No]

Answer of our group:

$$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha}$$

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \alpha \cdot \frac{\Delta K}{K} + (1 - \alpha) \cdot \frac{\Delta L}{L}$$

Country	$\Delta Y/Y$	$\Delta TFP/TFP$	$\alpha \Delta K/K$	$(1-\alpha) \Delta L/L$
Portugal	0.28104	0.280865	0.108648	-0.0878453
Thailand	1.14121	0.534483	0.314986	0.0878213

Country	% $\Delta TFP/TFP$	% $\alpha \Delta K/K$	% $(1-\alpha) \Delta L/L$
Portugal	99.9378	38.6594	-31.2572
Thailand	46.8349	27.6011	7.69547

Yes, in Portugal.

Yes, in Thailand.

Answer for the group chosen at the beginning:

```
In [11]: GW1_respondes(group_number)[4]
```

```
Out[11]: 3x5 Array{Any,2}:  
  "Country"      "ΔY/Y"      "ΔTFP/TFP"      "α*ΔK/K"      "(1-α)*ΔL/L"  
  "Netherlands"  0.362162  19.3057         0.104854      0.041406  
  "Portugal"     0.28104   28.0865         0.108648     -0.0878453
```

```
In [12]: GW1_respondes(group_number)[5]
```

```
Out[12]: 3x4 Array{Any,2}:  
  "Country"      "%ΔTFP/TFP"      "%α*ΔK/K"      "%(1-α)*ΔL/L"  
  "Netherlands"  5330.67          28.9522        11.433  
  "Portugal"     9993.78          38.6594        -31.2572
```

```
In [13]: GW1_respondes(group_number)[6]
```

```
Out[13]: "Yes, in Netherlands."
```

```
In [14]: GW1_respondes(group_number)[7]
```

```
Out[14]: "Yes, in Portugal."
```