

**In our first question we will create a linear model based on total population vs working population**

**2013: Total Labour Costs per Head ~ Business Births (divided with population of 2013)**

Call:

```
lm(formula = labourratio2013 ~ registratio2013, data = test)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-0.0047400	-0.0017672	0.0003785	0.0015150	0.0124289

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-0.009070	0.002657	-3.414	0.00186 **
registratio2013	4.226564	0.693581	6.094	1.07e-06 ***

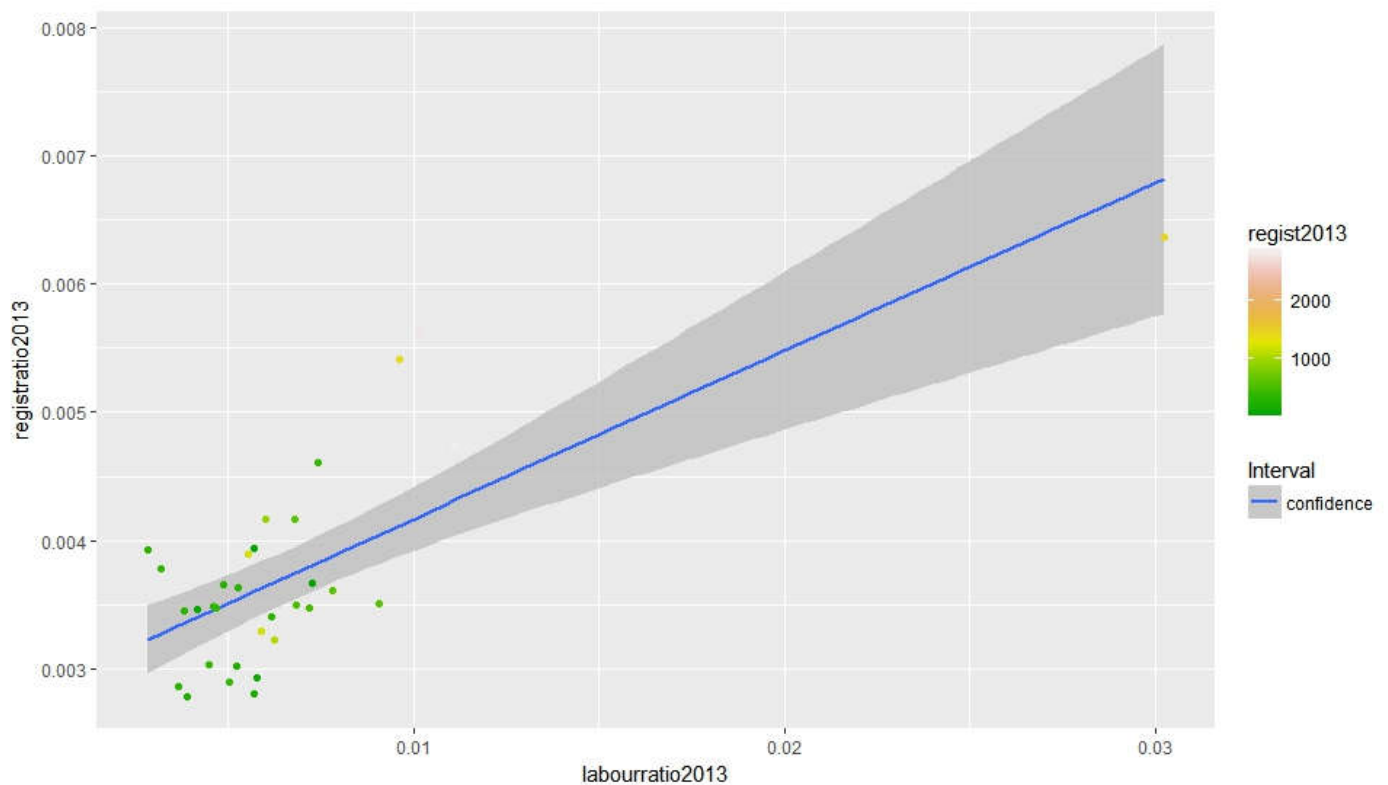
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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.00321 on 30 degrees of freedom

Multiple R-squared: 0.5531, Adjusted R-squared: 0.5382

F-statistic: 37.13 on 1 and 30 DF, p-value: 1.073e-06



**2013: Total Labour Costs per Head ~ Business Births (divided with working population of 2013)**

	2.5 %	97.5 %
(Intercept)	-0.02201594	-0.001789187
business_ratio	2.10129745	5.387089738

Call:

```
lm(formula = labour_ratio ~ business_ratio, data = test)
```

Residuals:

Min	1Q	Median	3Q	Max
-0.0081746	-0.0031636	0.0004713	0.0019418	0.0212375

Coefficients:

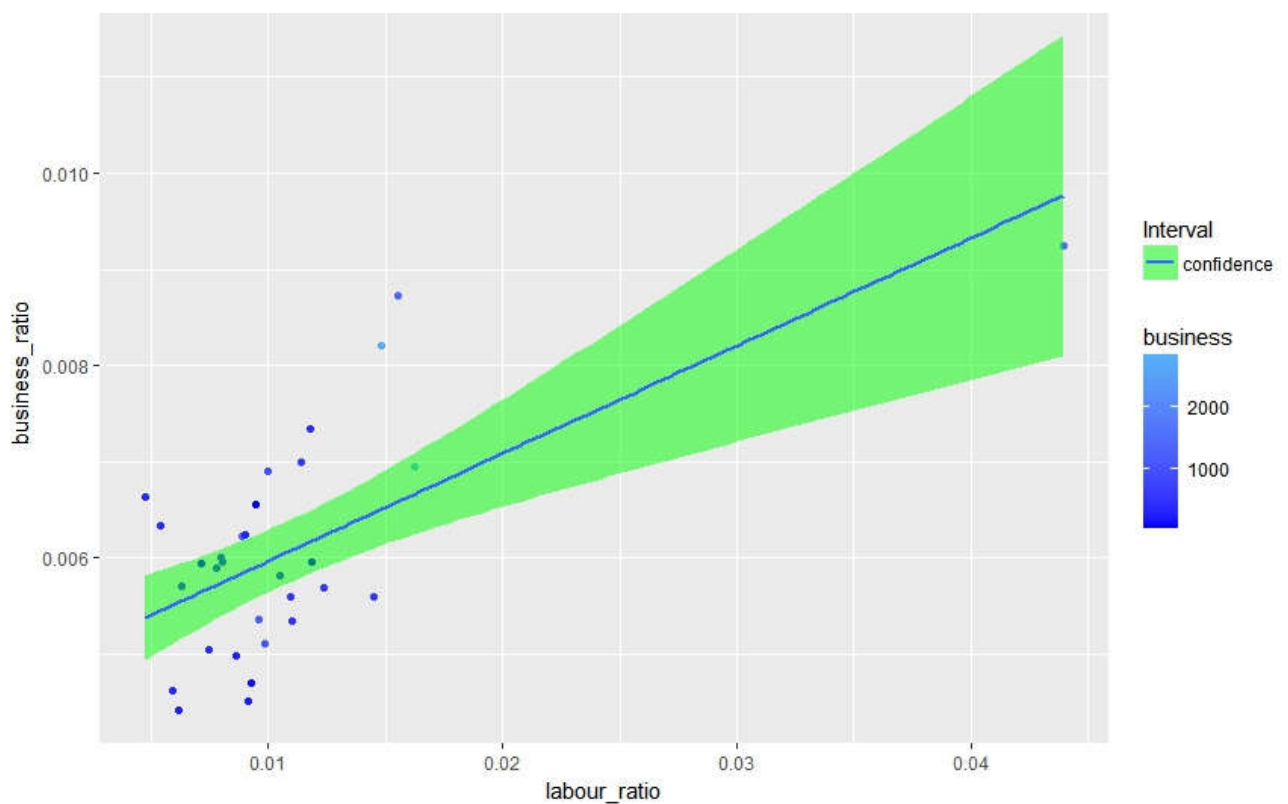
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-0.011903	0.004952	-2.404	0.0226 *
business_ratio	3.744194	0.804445	4.654	6.17e-05 ***

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.005191 on 30 degrees of freedom

Multiple R-squared: 0.4193, Adjusted R-squared: 0.4

F-statistic: 21.66 on 1 and 30 DF, p-value: 6.172e-05



Regarding also our labour costs per head ~ Unemployment ratio plot  
We realize that the confidence interval includes zero.

	2.5 %	97.5 %
(Intercept)	15180.2666	27055.8774
uemplo	-744.3225	807.6306

Call:  
lm(formula = labour ~ uemplo, data = test)

Residuals:

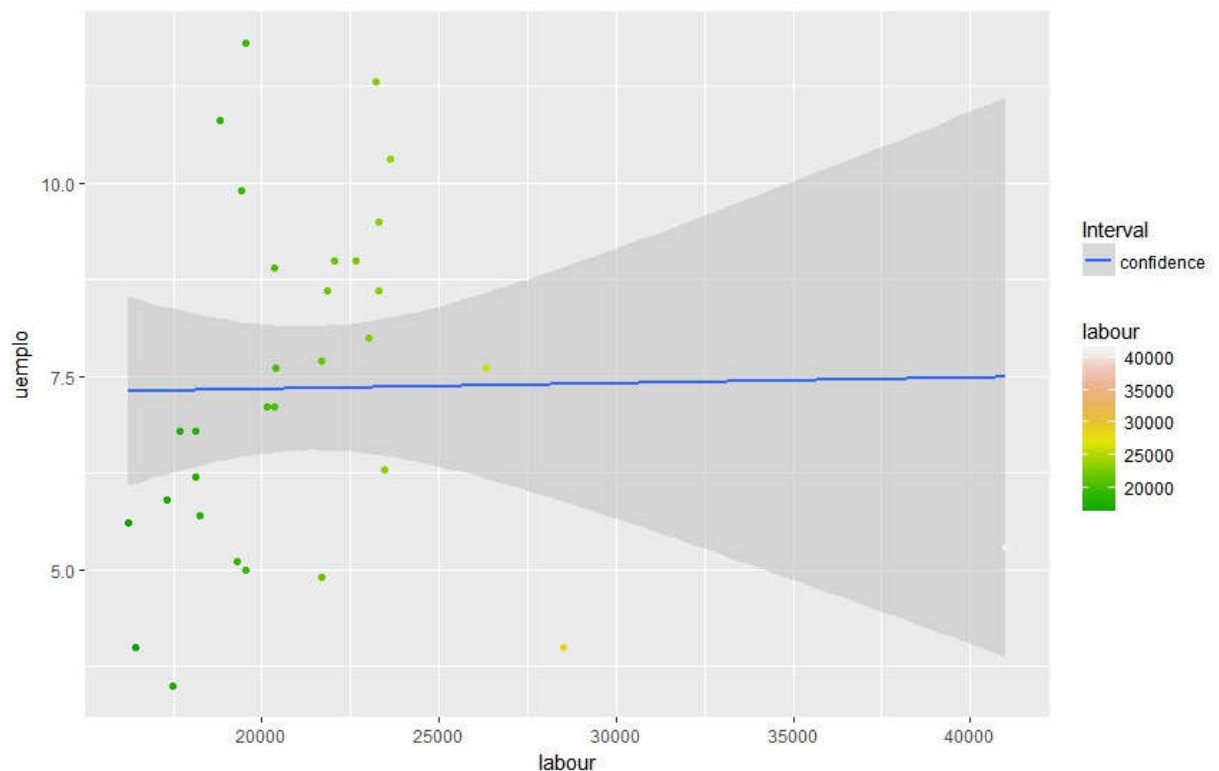
Min	1Q	Median	3Q	Max
-5056	-2744	-1036	1654	19727

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	21118.07	2907.45	7.263	4.36e-08 ***
uemplo	31.65	379.96	0.083	0.934

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4621 on 30 degrees of freedom  
Multiple R-squared: 0.0002313, Adjusted R-squared: -0.03309  
F-statistic: 0.00694 on 1 and 30 DF, p-value: 0.9342



In the next trials we will use a new scenario for analysis on Council Areas, Electoral Wards, Intermediate Zones (32, 353, 1235 observations, equivalent) .

This scenario might be used for prediction in the next assignment

Mean House sale price on 2012 ~ Number of dwellings per hectare (ratio) on 2012

Intermediate Zones (1235 observations)

	2.5 %	97.5 %
(Intercept)	149921.926	159475.1460
dwellings	-1219.044	-693.5639

Residuals:

Min	1Q	Median	3Q	Max
-110510	-44806	-12987	28473	312991

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	154698.5	2434.7	63.539	< 0.0000000000000002 ***
dwellings	-956.3	133.9	-7.141	0.000000000000158 ***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 61470 on 1233 degrees of freedom

Multiple R-squared: 0.03971, Adjusted R-squared: 0.03893

F-statistic: 50.99 on 1 and 1233 DF, p-value: 0.0000000000001582



### Electoral Wards (353 observations)

	2.5 %	97.5 %
(Intercept)	143985.136	156326.6927
dwellings	-1011.809	169.4032

Call:  
lm(formula = price ~ dwellings, data = electoral)

#### Residuals:

Min	1Q	Median	3Q	Max
-77446	-35918	-10950	25971	171338

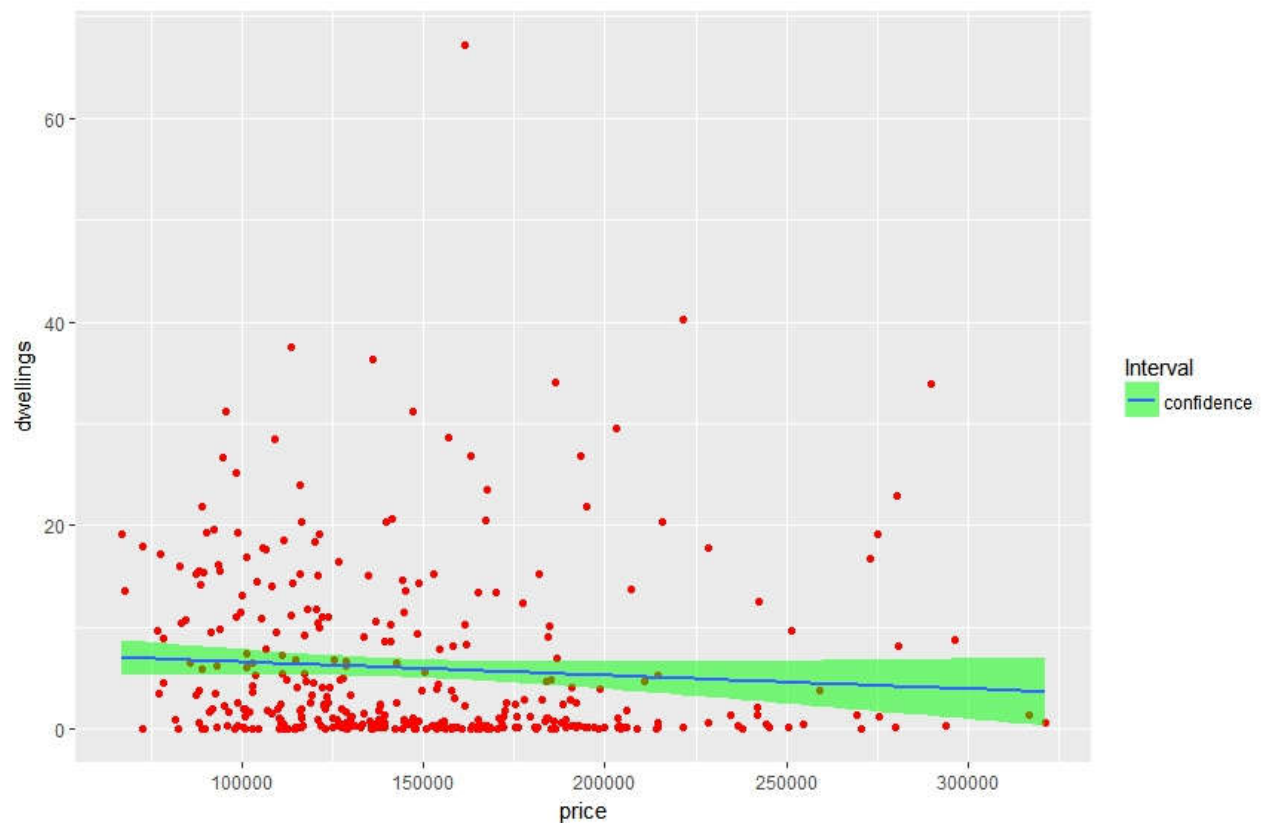
#### Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	150155.9	3137.6	47.858	<0.0000000000000002 ***
dwellings	-421.2	300.3	-1.403	0.162

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 48500 on 351 degrees of freedom  
Multiple R-squared: 0.005574, Adjusted R-squared: 0.002741  
F-statistic: 1.967 on 1 and 351 DF, p-value: 0.1616



### Council Areas (32 observations)

	2.5 %	97.5 %
(Intercept)	135668.573	165462.844
dwellings	-3303.661	3481.019

#### Residuals:

Min	1Q	Median	3Q	Max
-43551	-26797	-9686	23903	67818

#### Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	150565.71	7294.39	20.641	<0.0000000000000002 ***
dwellings	88.68	1661.06	0.053	0.958

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signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 35220 on 30 degrees of freedom

Multiple R-squared: 0.000095, Adjusted R-squared: -0.03324

F-statistic: 0.00285 on 1 and 30 DF, p-value: 0.9578

