

CH9_Q5

Fasih Atif

12/21/2020

The purpose of this task is to analyze the relationship between management quality score and size of firm as measured by number of employees. The country that will be the focus of our research is Canada.

The dataset looks like the following:

country	management	emp_firm
Canada	3.500000	600
Canada	2.611111	400
Canada	2.944444	575
Canada	3.666667	860
Canada	2.833333	170
Canada	3.888889	1800

Analysis

We will start by doing a simple linear regression between management quality score and firm size. The visualization of the regression is shown in **Figure 1** in appendix.

Interpretation:

Beta: Management quality score rises by 0.012 units as the number of employees in firm increase by 1.

Alpha: We would expect an average management quality score of 3.05 if number of employees in firm was zero which cant be possible hence its meaningless in this situation.

Confidence Interval Interpretation: We can be 95% confident that the average management quality score can be expected to be between 8.883e-05 and 0.00017.

Log Transformation

The scatterplot in the previous graph showed us how nonlinear and skewed the graph is. We will transform the variables and see if we can visualize the graph better.

Model 1: $\text{management} = \alpha + \beta \cdot \text{emp_firm}$ (**Figure 2**)

Model 2: $\text{management} = \alpha + \beta \cdot \ln_emp_firm$ (**Figure 3**)

The loess graphs show us that Model 2 does a comparatively better job at visualizing the data.

Regression Analysis to capture non linearities

We will try to capture the non linearity via different regression models such as Simple linear regression with log x (**Figure 4**), Quadratic (**Figure 5**) and Piecewise linear spline (**Figure 6**). The results of the

regressions are summarized in the table below:

	management - linear	management - linear	management - quadratic	management - PLS
(Intercept)	3.05*** (0.04)	2.27*** (0.15)	0.29 (0.84)	-1.21 (1.47)
emp_firm	0.00*** (0.00)			
ln_emp_firm		0.15*** (0.02)	0.81** (0.27)	
ln_emp_firm_sq			-0.05* (0.02)	
lspline(ln_emp_firm, cutoff)1				0.91** (0.32)
lspline(ln_emp_firm, cutoff)2				0.13*** (0.03)
R ²	0.05	0.07	0.08	0.08
Adj. R ²	0.05	0.07	0.08	0.08
Num. obs.	414	412	412	412
RMSE	0.61	0.60	0.60	0.60

*** p < 0.001; ** p < 0.01; * p < 0.05

Management Quality Score vs Employment

Based on our robustness checks that we carried out, we can reject the linear approximation that we carried out at the start. The simple linear regression with log x variable better approximates the non linearity in the data.

Appendix

Figure 1

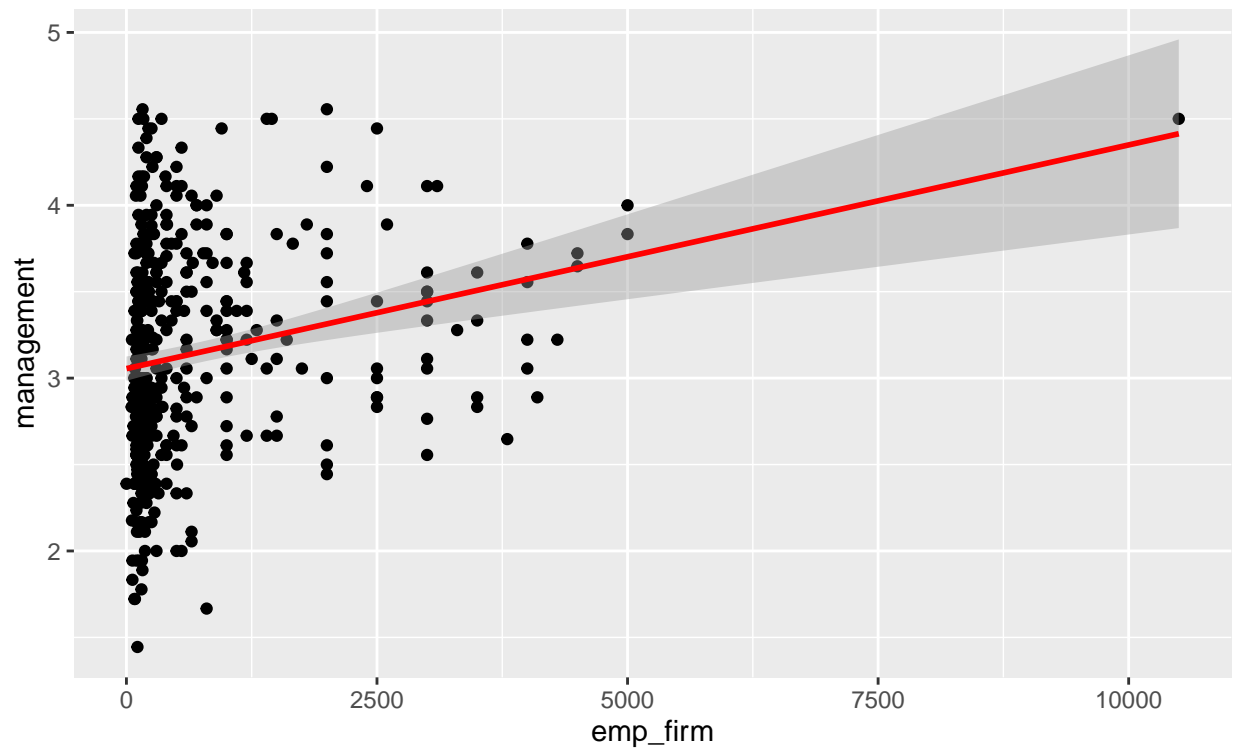


Figure 2

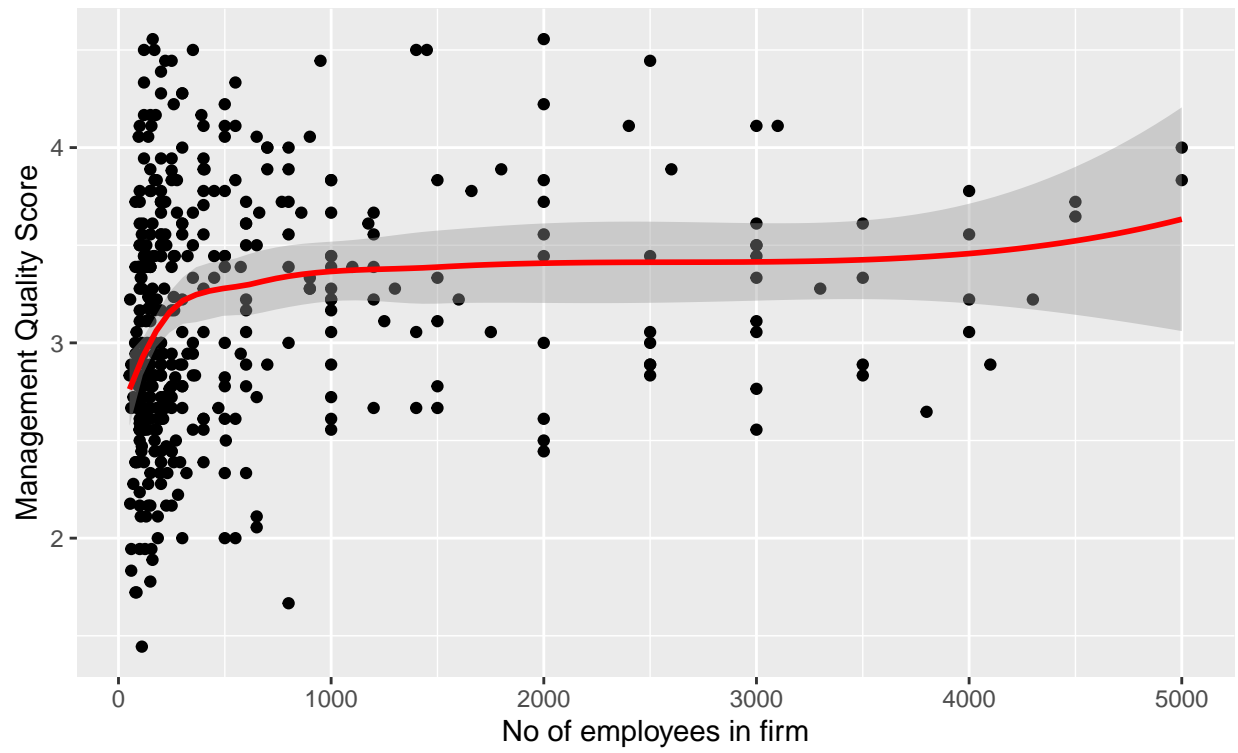


Figure 3

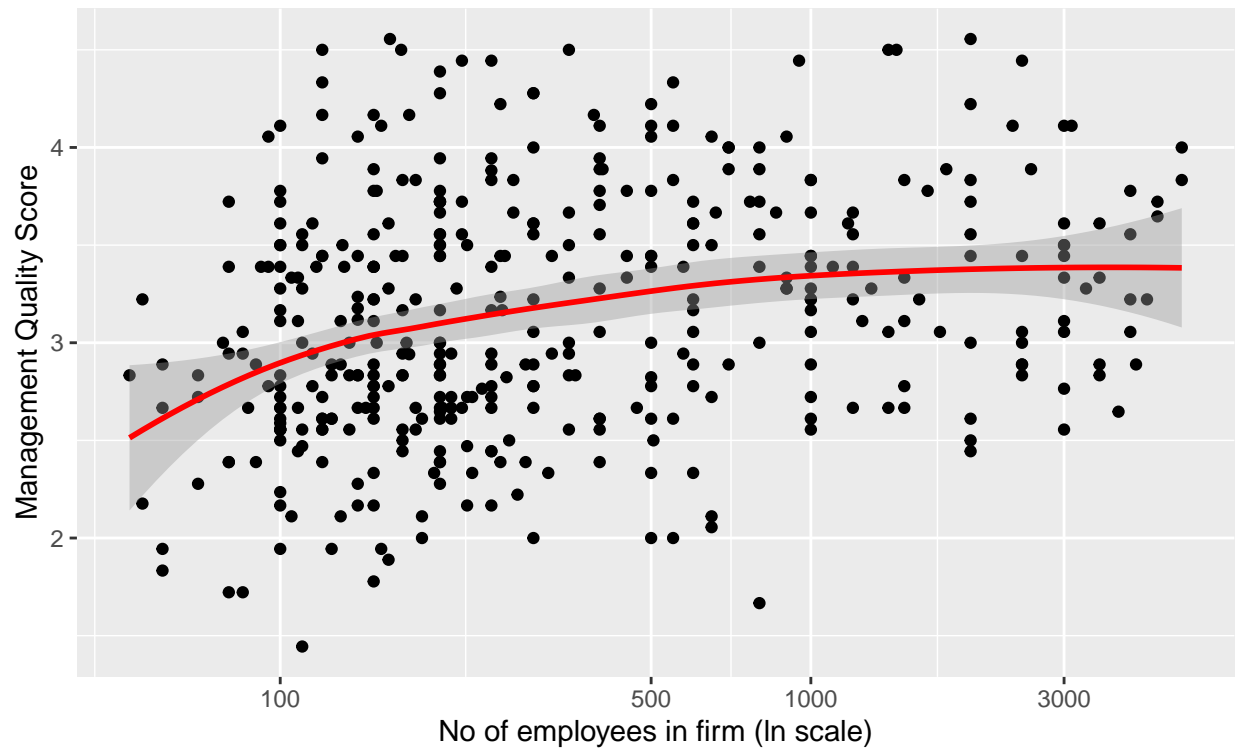


Figure 4

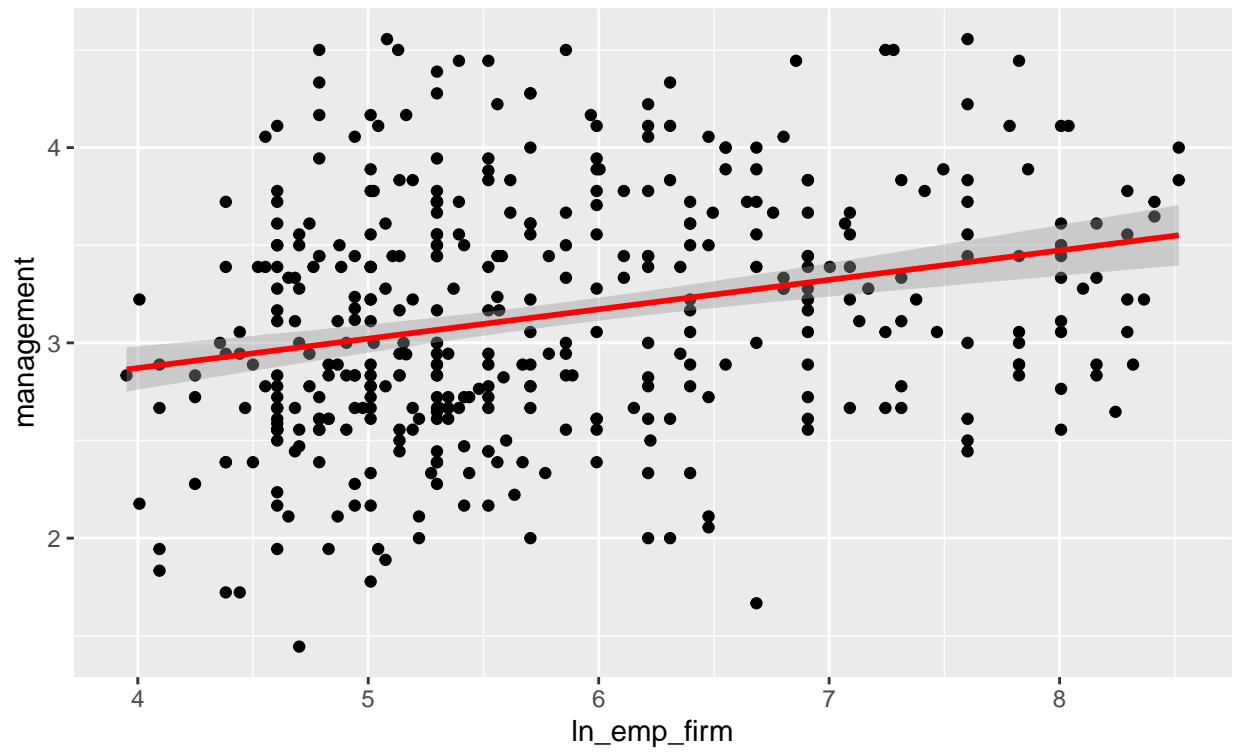


Figure 5

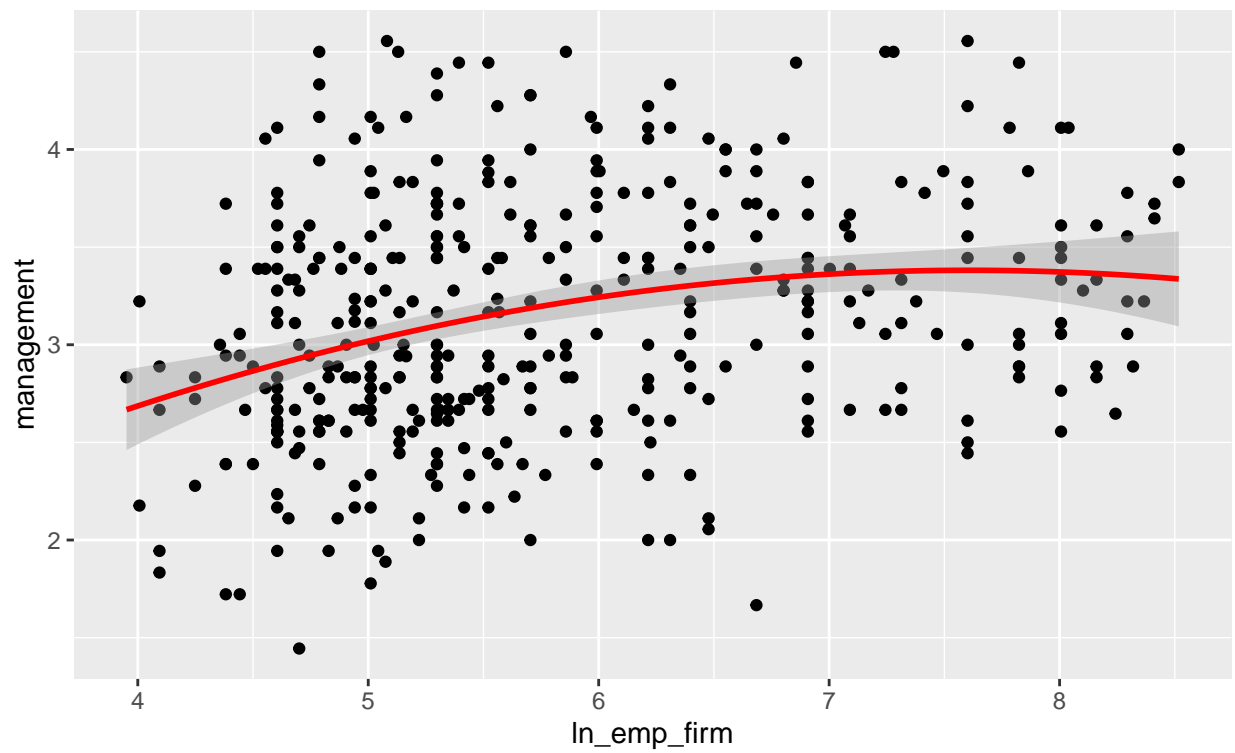


Figure 6

