ES50119- Financial Economics

Question 1

In the table below, descriptive statistics have been generated for the seven variables given in the data set: cost, w1 – the wage rate for labour, w2 – the interest rate for borrowed funds, w3 – the price of physical capital, y1 – consumer loans, y2 – non–consumer loans, consisting of industrial and commercial loans and real estate loans and y3 – securities, including non–loan financial assets. Within the table, the following statistics are reported for the variables mentioned above: number (n), mean, standard deviation (s.d), median, maximum (max), minimum (min), skewness and kurtosis and first quantile (1st Qu).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | n | mean | s.d | median | max | min | skewness | kurtosis | 1st Qu. |
| Cost | 1864 | 60337.1333671643 | 449671.91045121 | 5186.70772 | 12129396.01 | 183 | 18.247524544294 | 405.63777192331 | 2488 |
| w1 | 1864 | 14.5292386668847 | 7.39181776881712 | 13.902979455 | 61.01505248 | 3.705882353 | 0.724944120083378 | 0.977739672240377 | 8.556 |
| w2 | 1864 | 0.0112285863562232 | 0.0145424508605424 | 0.0073762475 | 0.294862036 | 4.47027E-05 | 7.60227886173083 | 110.353927148207 | 0.0031743 |
| w3 | 1864 | 0.0394556469141631 | 0.0224401766501043 | 0.0371678285 | 0.335618316 | 0.007643251 | 3.86645664473968 | 35.4967094613061 | 0.023356 |
| y1 | 1864 | 95652.1432107764 | 366692.664170711 | 13761.61477 | 6048775.913 | 80 | 9.39957697441973 | 112.160218982242 | 5668 |
| y2 | 1864 | 653931.0530919 | 4506701.65303655 | 55638.19117 | 87124479.8 | 3020 | 14.3062921177649 | 238.083396661143 | 25895 |
| y3 | 1864 | 516858.671716761 | 3267159.26621292 | 57675.5 | 62132000 | 2900.627976 | 14.4251104284749 | 239.721381606057 | 32007 |

**Table 1 -Descriptive Statistics**

According to table one, cost, w2, w3, y1, y2 and y3 are highly positively skewed to the right suggesting that the data is not normally distributed as the value is greater than (+) 1. However, the skewness for w1 is 0.7250 implying that it is moderately positively skewed to the right as it lies between 0 and (+) 1. Furthermore, the value for kurtosis for normally distributed usually lies around a figure of 3 **(Brooks, 2014).** There is high kurtosis for cost, w2, w3, y1, y2 and y3 as the value lies above 3, implying the data may have fat tails and thus there maybe outliers in the data. However, for w1, kurtosis is considered to be low as it is 0.9777 and thus lies below 3. Low kurtosis implies that tails are thinner than in a normal distribution, and data may have to be revaluated and must be considered with caution.

Question 2

The percentage of banks running under each policy regime at each quarter in 1986 is reported in table 2. It is important to note that the percentage for policy four in each quarter is 0 as this policy was not implemented until the 1990’s.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Quarter 1 (%) | Quarter 2 (%) | Quarter 3 (%) | Quarter 4 (%) |
| Policy 1 | 21.67382 | 21.67382 | 21.67382 | 21.67382 |
| Policy 2 | 60.08584 | 59.65665 | 59.65665 | 59.65665 |
| Policy 3 | 18.24034 | 18.66953 | 18.66953 | 18.66953 |
| Policy 4 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 2- % of banks operating under each policy**

Question 3

Variables here are defined as the following:

* X1 = ln
* X2 = ln
* X3 = ln y1
* X4 = ln y2
* X5 = y3

Log returns are used in the model as, it converts the multiplicative relationships in to additive relationships, thereby converting exponential trends in to linear ones, making it more suitable to model **(Ford, 2018).** In this section, three separate regressions using three different policies are run, with several statistical values being reported for each below.

just write a sentence like the linear ones, with significance and its good for regression.

Interpretation of coefficients should include that they represent elasticity. XYZ change in one variable, results in XYZ change in the Y quantity being predicted.

In Table (INSERT number), which depicts the results for policy one, it can be said that all the variables aside from X2 , are statistically significant due to the p-value which is <2e-16, implying that it is close to zero. However, for X2, the p-value is not statistically significant as it is 0.605 as it is greater than 0.05

Additionally, from the regressions carried out for both policy two and three in tables (INSERT TABLE NO) respectively, it is observed that all variables are statistically significant as suggested by the p-value as it lies close to zero.

Furthermore, the adjusted R-squared statistic for all 3 policies lie above 0.99, implying that most of the variation occurring due to the different policies implemented can be explained by the variables. Lastly, the F-statistic, which tests for joint significance, suggests that all the variables are jointly significant and thus should remain in the model.

**Insert Tables 3,4,5 – for each of the three regressions/policies and make them nice**

Question 4

Having calculated the returns to scale (hereafter RTS) for all three policies discussed above, this section evaluates which policy would be the best to implement. It is important to note that RTS, can be classified in to three different types: increasing (>1), decreasing (<1) and constant (=1).

The RTS under policy one is 0.9949209 which is less than 1. Thereby, under this policy regime, banks are experiencing decreasing RTS. This could be explained by the ‘unit banking’ approach taken under this policy, whereby banks are geographically restricted to one area as they are only allowed to have one branch and thus are only able to access a limited cliental base.

However, under policy two, the RTS of banks is 1.023821 which is greater than 1, meaning that banks here are experiencing increasing returns to scale. The limited branching policy implemented here, can account for the increased returns to scale seen relative to policy one, as banks are allowed to operate a few branches opposed to one. Thus, banks can now make more efficient use of their resources relative to those in policy one.

Under policy three, an RTS of 1.050985 is observed, suggesting that there are increasing returns to scale, which is higher relative to banks returns under policy two. A large proportion of this could be attributed to the geographical deregulation banks are able to experience under policy three as banks are allowed to open more branches state-wide. Thus, economies of scale are able to occur, leading to a more efficient and productive use of resources.

After testing the three policies implemented in 1986, it can be said that policy three is considered to be the best in this context as it produces the highest RTS for commercial banks. Moreover, when analysing the policies above, it can be seen that the role of geographical deregulation has played a part in the productivity and thus returns to scale of the commercial banks in the USA, whereby greater geographical deregulation leads to higher returns to scale for commercial banks.

This rationale is reinforced by Jayaratne and Strahan (1997), who state that through geographical deregulation, the banking industry has seen an increase in its efficiency and performance over the years. According to Jayaratne and Strahan (1997), geographical deregulation has led to the expansion of better performing, in turn enabling it to make a more productive use of its resources and achieving economies of scale. Prior to this, the lack geographical mobility prevented these banks from being able to expand and efficient. Thus, in the subsequent periods of deregulation which removed restrictions on interstate and intrastate banking that have followed, the market share of profitable banks has sharply risen, as deregulation has forced selection where poor-performing banks to lose ground to the more profitable banks as they are forced to compete within the same industry, that have lower cost structures due to the scale of their operations. **Radecki (as cited in Clarke, 2004**), supports this with empirical data, as it is noted that in 1963 13,291 U.S. banks operated 13,581 branches whilst in 1997, the number of banks fell to 9,143 but the number of branches increased exponentially to 60,320. This implies that whilst the number of banks opened has fallen, the more profitable banks have seen an increase in its scale of operations.

**To do:**

**Add Tables 3,4,5 in text/body**

**Appendix -Plots of graphs you’ve given (we think you should include all the plots you’ve given us since its done)**

**R-Code**

**List of References**

<https://www.jstor.org/stable/pdf/3839141.pdf?refreqid=excelsior%3A16a0baa49d2c04533b7a9cb67c3d5f03>

<https://www.newyorkfed.org/medialibrary/media/research/epr/97v03n4/9712jaya.pdf>

<https://data.library.virginia.edu/interpreting-log-transformations-in-a-linear-model/>

Brooks, C. (2014). *Introductory econometrics for finance*. 3rd ed. Cambridge: Cambridge University Press.