Estimate Relative Factor Shares of Capital, Labor, and Energy of Iraq Economy

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Abstract

Oil is considered one of the strategic resources in Iraq. Unfortunately, after looking carefully at the literature, there is no paper dealing with estimating the interaction effect between capital, labor, and energy for the Iraqi economy. This study estimates these production factor demand elasticities with a particular focus on the oil sector in Iraq. Results from taking into account variation in the prices of input demand of the production function, using the Cobb-Douglas model, the interaction production function, and the translog production function. We prefer the first model because it is the only model provide significant coefficients. DW test indicates that there is no autocorrelation in this model. Moreover, model A provides more significant production elasticities compared to model B and C. The interpretation suggests that each one percent increase in the oil energy input will result in a large effect on the size of GDP. Energy input in Iraq is overpaid compared to other input factors, and the market is not competitive.

Introduction

Iraq is among the countries in the world that provide substantial oil energy to the global economy, accounting for about 5 percent of the world oil (Figure 1). Such a figure is attributed to the large oil deposits in the country and the intensive investment in the oil industry by the government of Iraq, which often devotes a large proportion of the nation’s budget to finance oil production, leaving little funds for investment in other sectors of the economy. The oil industry is capital-intensive and uses little labor. As a result, the energy industry employs a paltry 1 percent of the labor force despite the massive budget (Manama, 2016). Moreover, model A provides more significant production elasticities compared to model B and C. The interpretation suggests that each one percent increase in the oil energy input will result in a large effect on the size of GDP. Energy input in Iraq is overpaid compared to other input factors, and the market is not competitive.

Methods & Materials & Results

We estimated three models as Copeland and Thompson, (2016) used in their paper. Model A is Cobb-Douglas

\[ \Delta \ln y = c_0 + c_1 \ln x_1 + c_2 \ln x_2 + b_1 \ln x_3 + \epsilon_4 \]

Model B: Includes interaction terms

\[ \Delta \ln y = b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_1 b_2 \ln x_3 + b_1 \ln x_1 \ln x_2 + b_1 \ln x_1 + \epsilon_3 \]

Model C: Full translog production function

\[ \Delta \ln y = a_0 + a_1 \ln x_1 + a_2 \ln x_2 + a_3 \ln x_3 + a_4 \ln (\ln x_1) + a_5 \ln (\ln x_2) + a_6 \ln (\ln x_3) + a_7 (\ln x_1 \ln x_2) + a_8 (\ln x_1 \ln x_3) + a_9 (\ln x_1 \ln x_2) + \epsilon_2 \]

Where \( y \) is the Gross domestic product of Iraq, \( x_1 \) consumption of fixed capital, \( x_2 \) is the size of the labor force, and \( x_3 \) is the energy consumption, all measured with respect to the Iraqi economy.

Discussion

We started our estimation by doing a regression analysis for the three models A, B, and C equation as shown above. All estimated coefficients are not significant at any level except the coefficient for the first model “Model A” for the two parameters (see tables 2, 3, and 4). The coefficient of capital is significant at 5% and for coefficient for energy is significant at 1%. The interpretation of these two coefficients is that, if the fixed capital increase by one percent, the GDP will increase by 0.10% per year.

Optimization of cost minimization yields that output elasticities should equal to its usual factor cost share, while in our case results are not consistent to this condition. One economic implication is that because of technology constraints there is some shadow price here; also it implies that labor and energy markets are not perfectly competitive as we assumed, probably there is monopoly power in those two markets. This also indicates that this production function is not CRTS or homogeneous in \((K, L, E)\), because \(\sum_{i=1}^{3} \alpha_i = 1\) according to above tests. This assumption can be imposed in estimates for future analysis.

Conclusions

1. All estimated coefficients are not significant at any level except the coefficient for the first model "Model A" for the two parameters.
2. test 1 and test 2 fail to reject the null hypothesis, while test 3 would reject null hypothesis, indicating production elasticity of capital and labor is equal to its assumed factor share, but production elasticity of energy is not equal to its factor share.
3. Optimization of cost minimization yields that output elasticities should equal to its usual factor cost share, while in our case results are not consistent to this condition.
4. This results also indicate that this production function is not CRTS or homogeneous in \((K, L, E)\), because \(\sum_{i=1}^{3} \alpha_i = 1\) according to above tests.

References


