Labor Shortage and Immigration: Theory and Real World Examples

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1. Introduction

This paper examines the equilibrium outcomes of a two-stage Cournot duopoly model with limits in the labor supply market. We show that if the labor supply in the labor market is insufficient, then in equilibrium the market price rises, and both firms may earn higher profits than in the Cournot game without the limits.

Harris (CJE, 1985) examines the effect of a voluntary export restraint (VER) upon each producer's profits in the case of a duopoly with one foreign producer. The VER is an agreement by a country's exporters or government to limit their exports to some other country. The limit set may be in terms of quantity, value, or market share. The VER raises both firms' prices and improves both firms' profits. With respect to this point, the VER is similar to our model. However, the VER and our model differ in the following points. The VER raises market prices by reducing imports, but, on the other hand, we raise market prices by means of a labor shortage. Hence, in our model, governments are basically unrelated except as regards welfare improvements. It is well known that, similar to VERs, tariffs and quotas also lead to higher prices for imports than those at the free trade level. In this paper, there is no possibility for either imports or exports.

This paper is different from existing studies on the point of examining the equilibrium outcomes of Cournot competition when the labor supply in the labor market is insufficient.

2. The Model

We consider a two-stage Cournot duopoly model with limits in the labor supply market. The two stages of the quantity-setting game run as follows. In the first stage, each firm independently selects an output level and also tries to employ the number of laborers necessary to achieve the output level. We assume that there are limits in the labor supply market. Hence, each firm cannot necessarily employ all of the laborers necessary to achieve the output level. In the second stage, each firm employs the available number of laborers and produces the actual output that is possible with the employed laborers. At the end of the second stage, the market opens and each firm sells the actual output at a price corresponding to both firms' total outputs.

3. Equilibrium Outcomes

This section discusses the equilibrium outcomes of the quantity-setting model with limits in the labor supply market. If the labor supply in the labor market is sufficient, then from the demand condition of the goods of both firms, a unique Cournot equilibrium is achieved. On the other hand, if the labor supply in the labor market is insufficient, the firms cannot possibly produce the amounts in demand corresponding to the Cournot equilibrium. Therefore, we find that if the labor supply in the labor market is insufficient, then the total industry output decreases, the market price rises, and, as a result, the firms may earn higher profits than in the Cournot equilibrium with no limits in the labor supply market. Furthermore, we find that limits in the labor supply market and Cournot competition can yield monopoly price outcomes, though it is very rare.

4. Welfare Effects

This section discusses the welfare effects of the quantity-setting model with limits in the labor supply market. We find that labor shortages cause the loss of social welfare; therefore, the government is required to take measures for social welfare improvements, such as receiving immigrants.

5. Real-World Examples

This section introduces the next two examples of labor shortages in the actual industrial world. (I) We take up the case of Malaysia as an example of recent labor shortages in the real world, because the Malaysian economy accomplished rapid development during the last few decades and suffered from labor shortages. (II) We take up the case of Japan as an example of future labor shortages in the real world, because Japan is one of the countries where aging is the most advanced, and the Japanese do not have an open attitude toward foreigners as compared with people of various other countries.

6. Concluding Remarks

Since there are cases that enable both firms to earn more in a noncooperative setting, we can view them as though limits in the labor supply market facilitate tacit collusion. Therefore, the government is required to take measures against these cases, such as receiving immigrants.