[relocation of wholesale area: class241, class241b; inspired by: <http://www.chinadaily.com.cn/china/2016-12/18/content_27702588.htm>]

It is common for wholesale outlets of certain consumer products (e.g. clothing, toys) to concentrate in an area (a street or a mall) in the city center for agglomeration economies. These wholesale outlets are operated by the manufacturers, and consumers can buy from these wholesale outlets directly.

Consider this supply chain, which consists of two manufacturers M1 and M2, two retailers R1 and R2 and one market B1.

* The manufacturers face production costs:
* The manufacturers also face a (total) transaction costs when selling to retailers. With the existing wholesale outlet, there is no extra cost incurred in selling to the consumers directly:
* For each unit of product purchased from the manufacturers, the retailers face handling costs of
* Transaction costs (per unit) are incurred between the retailers and the market (consumers):

The total cost perceived by the consumers in market consists of the retail price and the transaction cost for going to the retailer and buying the product there.

* There are transaction costs (per unit) between the manufacturers and the market (consumers) because they can buy at the wholesale outlets:

These costs are slightly higher than buying from the retailers. The cost difference is due to consumers’ lack of information (on price, quality, etc).

* To the consumers, they see the products from retailers and the products from the wholesale outlets as identical. So the maximum willingness to pay in each market is jointly determined by the total quantity supplied by both retailers and wholesalers. The inverse demand curve is

where

Questions

1. Write down the problem as a VI and solve it. Fill in the following table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| 0.96 | 0.95 | 2.65 | 2.66 | 38.15 | 38.15 | 28.92 | 28.92 |
|  |  |  |  |  |  |  |  |
| 0.84 | 0.85 | 2.77 | 2.76 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 1.81 | 1.81 | 5.42 | 5.42 | 42.77 |  | 14.47 |  |
| Profit(M1) | Profit(M2) | Profit(R1) | Profit(R2) | Profit(R3) | Profit(R4) | CS(B1) |  |
| 92.54 | 92.54 | 6.6 | 6.6 | 0 | 0 | 104.6 |  |

1. This fast growing city is facing two problems: severe congestion and pollution at the city center. To tackle these two problems, the authority came up with two measures: (a) a cordon toll will be charged entering the city center, (b) a relocation of the wholesale outlet malls and streets to the outskirt of the city, will be organized. How would you express these changes in the model?

For the manufacturers, they face a decrease in transaction costs because they do not have transport the products into the city center, and in general the operating cost of the wholesale outlets is lower after the move (e.g. wages, rents).

Also, the consumers can no longer directly purchase from the manufacturers through wholesale outlets.

For the retailers, they face an increase in handling costs because they have to pay the cordon toll to deliver the goods from the wholesale points to their shops in the city center. The distance traveled also increases but congestion might be less serious.

Solve the VI problem again and fill in the following table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| 1.57 | 1.57 | -- | -- | 39.6 | 39.6 | -- | -- |
|  |  |  |  |  |  |  |  |
| 1.57 | 1.57 | -- | -- |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 3.13 | 3.13 | -- | -- | 46.86 |  | 6.27 |  |
| Profit(M1) | Profit(M2) | Profit(R1) | Profit(R2) | Profit(R3) | Profit(R4) | CS(B1) |  |
| 13.63 | 13.63 | 39.34 | 39.34 | -- | -- | 19.66 |  |

1. Suppose that the manufacturers and retailers each have a vote on whether the wholesalers should relocate. What do you think the outcome would be in this case? What are the main factors affecting the outcome?
2. Read the article in the link. Discuss how this model could be improved to describe the situation and predict the effect of the policies.