2.0 MODEL DESCRIPTION AND DISCUSSION

2.1 BASIC MODEL

There are two media firms, X and Y, and a continuum of measure one of citizens i, which is symmetrically distributed from zero to one. Suppose that on the left and right ends of the distribution lies the two extremes of ideological stands. For example, the liberalism and conservatism in United States, or the pan-green and the pan-blue preferences in Taiwan. The stand of a media firm represents his reporting strategy. Firm X locates on x and firm Y locates on y. Without loss of generality, let $0 \leq x \leq y \leq 1$.

As a qualitative analysis, suppose that for a citizen the probability of buying from media firm X is $f(|i-x|, |i-y|)$, where f_1 is negative and f_2 is positive. That is, the probability of buying from X is negatively related to the distance between the citizen's belief and firm X's stand and is positively related to the distance between his belief and firm Y's stand.

Similarly, the probability of buying from media firm Y is $g(|i-y|, |i-x|)$, where g_1 is negative, and g_2 is positive. The closer between a citizen and firm Y, the more likely for this consumer to buy news from firm Y. On the contrary, the closer between a citizen and firm X, the less likely for this consumer to buy from Y. For simplicity, let $f = g$.

Given the probability density function of citizens' distribution, $\theta(i)$, the market share of firm X is

$$F(x \mid y) = \int_0^1 f(|i-x|, |i-y|) \cdot \theta(i) di,$$

and the market share of firm Y is

$$G(y \mid x) = \int_0^1 g(|i-y|, |i-x|) \cdot \theta(i) di.$$

A media firm's goal is to maximize the market share by reporting the stories that could attract most buyers.

2.2 EXAMPLES AND DISCUSSION

Example 1. *Suppose that the distribution of the citizens is uniform on* $[0, 1]$. *For citizen* i *the probability of buying from firm X is simply*

$$f(|i-x|, |i-y|) = \max\{-|i-x| + |i-y|, 0\},$$

and the probability of buying from firm Y is

$$g(|i-y|, |i-x|) = \max\{|i-x| - |i-y|, 0\},$$

where the probability of buying from certain firm is directly measured by the difference of absolute distances. What has to be noticed is that, under this arrangement, one is not possible to buy from a firm that is much farther to him. Because of the symmetry, let us focus on firm X. Through some simple computation we know that

$$f(\cdot) = \begin{cases} y - x & i \leq x \\ x + y - 2i & i \in (x, \frac{x+y}{2}) \\ 0 & i \in (\frac{x+y}{2}, y) \end{cases},$$

As figure 1 shows, our task here is to find an optimal x^* to maximize the area under the $f(\cdot)$ line. We can get the optimal slanting x^* by solving

$$\max_x (a-x)x + \frac{1}{2} \cdot \frac{1}{2}(a-x)^2,$$

where $y = a$. It is easy to find that the optimal stand of firm X is $x^* = \frac{a}{3} = \frac{y}{3}$, and for the same reason, $1 - y^* = \frac{1}{3}(1 - x^*)$. As a result, $(x^*, y^*) = (\frac{1}{4}, \frac{3}{4})$. Therefore, there is no centralization ($x^* \neq y^* \neq \frac{1}{2}$) here. The result is presented in figure 2.

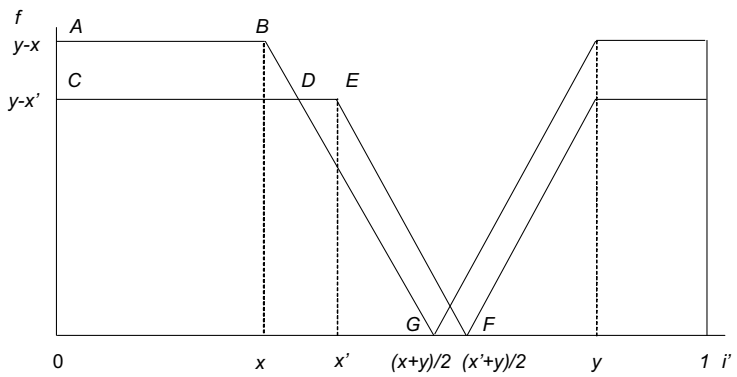

Figure 1: Given firm Y's stand y, as long as the area ABDC is greater than DEFG, firm X has incentives to move from x' to x. That is, firm X will move farther away from firm Y.

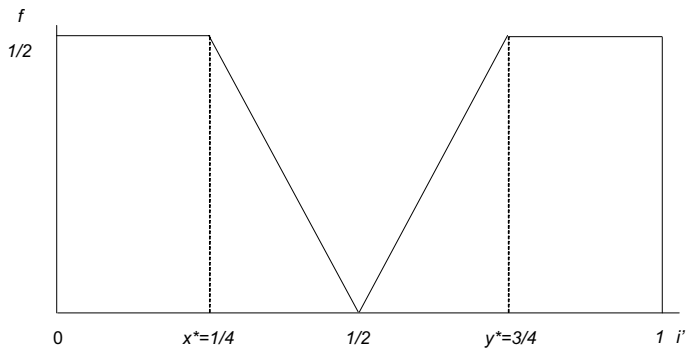

Figure 2: Firm X's optimal stand is $\frac{1}{4}$ and firm Y's optimal stand is $\frac{3}{4}$.

Example 2. *Following the above example, other things being equal, let us consider a maximum tolerated ideological difference, $\overline{u}$, in which all citizens beyond the frontier will not choose the firm in it. For the sake of simplicity, assume that the maximum tolerated ideological difference of the two firms are equal. In example 1, nobody would buy from firm J if the distance between his belief and firm J's stand is larger than $\frac{1}{4}$, $J \in \{X, Y\}$. So that if $\overline{u} \geq \frac{1}{4}$, there is no difference from example 1, i.e., $(x^*, y^*) = (\frac{1}{4}, \frac{3}{4})$. On the other hand, if $\overline{u} < \frac{1}{4}$, the question becomes*

$$\max_x (a - x)\overline{u} + \frac{1}{2}\left[a - x + a + x - 2(x + \overline{u})\right]\overline{u},$$

where $y = a$*. Again, because of the symmetry,* $(x^*, y^*) = (\overline{u}, 1 - \overline{u})$*. That is, the smaller the maximum tolerated difference is, the more polarized is the media outlets' reporting strategies.*