Chapter 1: When Do Markets Avoid, and Exhibit, the Tyranny of the Majority?

In this book we are concerned with differentiated products, where different firms' offerings within a category differ; and some consumers prefer the offering of one firm, while other consumers prefer different products. Think of Coke and Pepsi. Many consumers can tell the difference and prefer one over the other. In automobiles the distinctions are more visible: though both deliver motorized transportation on four wheels, a Humvee and a VW Beetle are quite different. Examples of differentiated products abound: automobiles, packaged foods, information products (books, music, movies, newspapers, video programming), furniture, housing, consumer electronics, and clothing. Essentially, everything available at the Mall, and most of the products outside the produce section of the grocery store, are differentiated products.[2]

Products differ in many ways. Still, to begin developing ideas and illustrating our points it is necessary to develop a way of characterizing differentiation. To this end, think of products as having a single dimension of differentiation that can be represented on a line segment between 0 and 100.[3] To fix ideas, one might think of shirts identical except in color, and the points on the line segment are points on the color spectrum running from red to violet.[4]

To develop an example that will illustrate our points, one needs to make some assumptions. First, suppose that each potential consumer has a favorite shirt color somewhere along the line and likes shirts of other colors less as they are farther from his

[2] Indeed, it is fairly difficult to come up with many products that are homogeneous, although examples arguably include steel, petroleum, wheat, and shares of a particular firm's stock. As consumer products, many of these are ultimately differentiated by location: for example, gasoline at a station near my house is not the same product as gasoline available across town.
[3] This characterization of differentiation originates with Hotelling (1929).
[4] From red to violet by way of orange, yellow, green, and blue. See http://www.usbyte.com/common/approximate_wavelength.htm, accessed June 9, 2004.

favorite color. Each consumer buys his most preferred shirt among those available. Second, suppose that there are 1000 consumers evenly, or "uniformly," distributed along the line. That is, there are equally many consumers whose favorite color is in any one-unit interval along the line. Third, offering shirts in a particular color entails a setup cost of $100, plus a per-shirt "variable" cost of $15. Anyone can enter as a seller and offer as many varieties as she wants, provided she pays the setup cost for each color offered. Suppose that the price of shirts is fixed at $20.[5]

What does the market outcome look like? By our assumption that everyone buys a shirt, we know that 1000 shirts will be sold at $20 each. Of the $20,000 in industry revenue, $15,000 covers variable costs, leaving $5,000 to cover fixed costs (of proving different color offerings) as well as any profit.

How many varieties can the market support? With $5000 available after covering variable costs, the market can sustain up to 50 varieties, evenly spaced along the line (at 1, 3, 5, …, 99). Each seller gets all of the customers within one segment on either side. For example, the seller at 1 gets all customers from 0 to 2, which is 2% of the 1000 customers total, or 20. Revenue from those 20 customers totals $400, of which $300 is used to pay for raw materials, and the remaining $100 covers the setup costs exactly. In this scenario there is not much "tyranny," or effect of other people's preferences on the appeal of my best available option. Every buyer gets an option within a distance of 1 of his most preferred color.

[5] In the economic literature on these sorts of models, pricing is a central question, and I do not deny its importance. I abstract away from pricing here for two reasons. First, my interest is in product positioning and availability rather than prices. Second, the analytics needed to discuss pricing put the arguments outside the reach of a general reader. See Hotelling (1929) and d'Asprement, Gasbewicz, and Thisse (1979).

What happens if setup costs are higher, say $1000? Then the market can sustain at most only 5 sellers evenly spaced along the spectrum (at 10, 30, 50, 70, and 90). This is the first important insight: *as fixed costs rise, the number of varieties available in the market declines*. Let's assume that everyone keeps buying. But customers are not as happy as they were with more options. The average distance between their favorite color and the color they buy provides a suggestive measure of dissatisfaction. With 50 colors available, the average distance is about 2; with 5, it's about 10.

In this example, the higher are fixed costs, the fewer options are available in the market. Conversely, if there were no fixed costs at all, then there would be no limit to the number of options available in this hypothetical example. Each customer would get her preferred color exactly.

So far, although we have customers getting less happy as fixed costs rise, we have no "tyranny of the majority" per se because we have no majority. Preferences differ across consumers, but only smoothly, via the uniform distribution of favorite colors along the line. There are no identifiable clusters.

We might instead suppose that there are two distinct groups. Because much of the evidence in later chapter concerns preferences that differ by race, let's simply call them "blacks" and "whites" even though I know nothing about how – or whether – preferences over shirt colors differ by race. Suppose that blacks' favorite colors are uniformly distributed over the range 0-20, while whites' favorite colors are uniformly distributed over the range 20-100. Suppose there are 100 blacks in the population and 900 whites. There are still 1000 consumers total, so that if setup costs are $100, the market can again accommodate 50 sellers. Each seller must have 20 customers for whom

she is the nearest seller. Where will sellers locate? In the 0-20 region (where blacks' preferred colors lie), sellers will locate 4 units apart (at 2, 6, 10, 14, and 18)[6]. From 20 to 100 the market can accommodate more varieties per consumer. On average, white-targeted varieties locate 1.77 from each other. As a result, since whites get shirts closer to their desired colors, their satisfaction with the market is greater than blacks' satisfaction. In more general terms, *the number of products near to one's preferences increases with the number of people sharing one's preferences*.

Figure 1.1 illustrates the situation. The 100 black consumers are distributed evenly between 0 and 20, and the products targeting them are located at the vertical lines between 0 and 20. The 900 whites' favorite shirt colors are distributed uniformly between 20 and 100. Whites' demand is denser across all of the white-preferred colors (11.25=900/80 versus 5=100/20); as a result, white-targeted entry is denser.

Thus far we have shown how the number of products targeting each group – and each group's satisfaction from consuming the available products – can increase with its own size and decrease with the size of setup costs. In the examples to this point, groups help themselves with increases in size but do not harm each other. It is conceptually possible for groups to actually harm each other through product markets.

Intuitively, when fixed costs become high enough so that the market supplies only one variety, the question becomes: where will this product locate? Location matters because consumers are more satisfied as the product is closer to their favorite. To add a

[6] To see this, find the distance along the color spectrum x such that x times the number of customers per unit length (100 blacks divided by 20 units, or 5) equals the setup costs of $100. Because there are five customers per unit interval, black-targeted varieties locate no closer than 4 units from one another (100/(5*5)=4). Mildly complicated things happen near 0 and 20, which we ignore because they don't change the basic story.

layer of realism, suppose that consumers purchase only if the product is within some distance of their favorite color. Now the firm's decision affects its revenue.[7]

Suppose there are two groups with the following preference distributions initially: 500 "red" persons with favorites distributed uniformly between 0 and 50, and another 500 "violet" persons with favorite colors distributed uniformly between 50 and 100. If the tendency to purchase declines with distance from the product, a single variety cannot do any better than locating at 50. Figure 1.2 illustrates this situation.

How does this change if the red population remains 500, while the violet population increases to 750? If the tendency to purchase declines with distance to the favorite, the best location for the single product must move toward violet (to the right). For example, if people buy only if the product is within 10 units of their favorite, then the best the seller can do is to locate somewhere between 60 and 90. See figure 1.3. The key point here is that, with only one product in the market, increase in the size of one group will not only tend to help the larger group; *it can also harm the smaller group*.

This is a startling statement. It is the tyranny of the majority translated almost literally from the realm of collective choice into the realm of markets. This is not what we tell our undergraduates about how markets work; and, indeed, it would appear to be an unfortunate feature of market allocation. (Whether it is really unfortunate is the subject of the next chapter). The examples in this chapter raise possibilities, rather than

[7] If we maintain the assumptions that prices are constant and that all consumers buy, then there is really no interesting decision for sellers to make. Regardless of where the single product locates, it will attract all consumers and will cover its costs. There is some location that will minimize the distance to customers – and therefore maximize satisfaction – but there is no reason why the firm would prefer one location over another if – again – by assumption, all persons purchase.

making tight predictions. Whether these possibilities are likely, or important, or significant is an empirical matter that I turn to in part II of the book.

Figure 1.1
Product Entry Targeting Large and Small Groups with Different Preferences

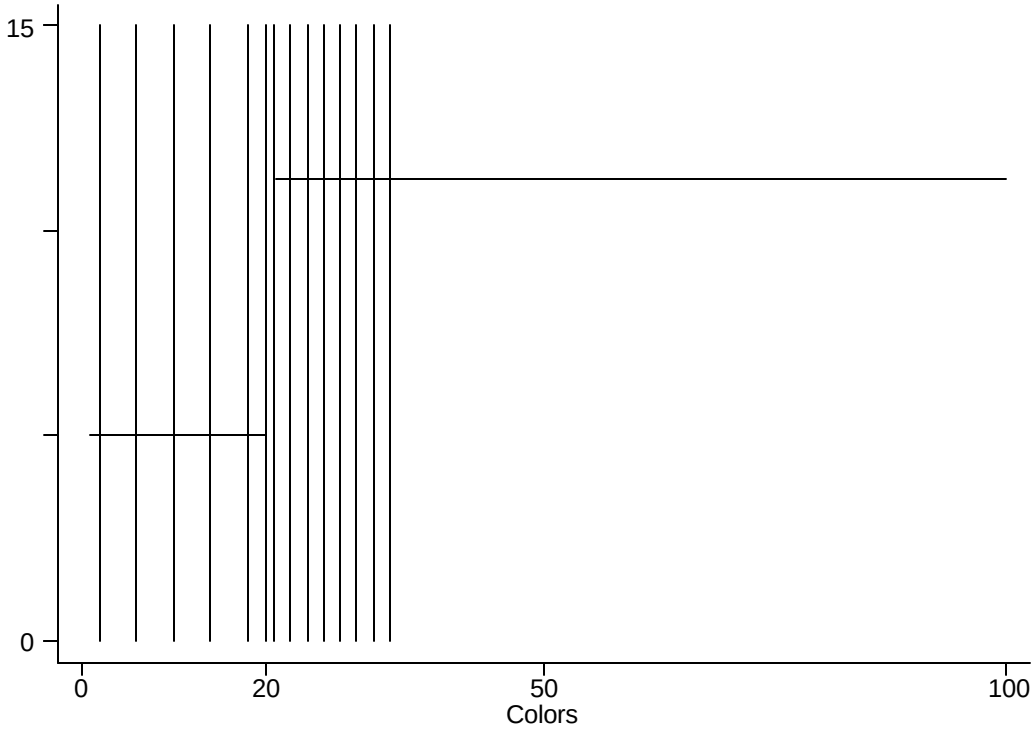

Figure 1.2
Positioning a Product to Accommodate Two Equal-Sized Groups with Different Preferences

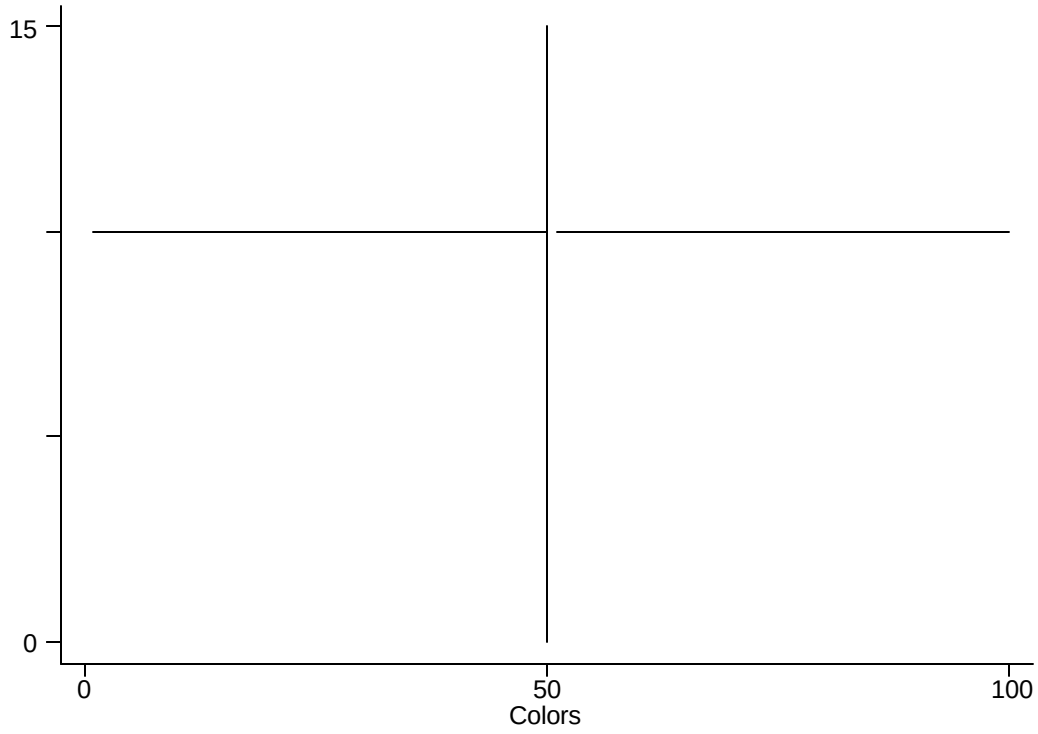

Figure 1.3
Positioning a Product to Accommodate Two Different-Sized Groups with Different Preferences