The Evolution of Homogeneity

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1 Introduction

In this lecture, we consider two simple models that show how the chaining of products, stores, and ideas can lead to homogeneity. In the first model, the products have qualities denoted by real numbers and cultural characteristics that we denote with colors. In the second model, the products have spatial characteristics instead of colors.

The lecture is divided into five parts: background on chain stores, the culture model, the spatial model, the benefits of cultural preservation, and the possibility of tipping.

2 Background

Chain stores are a prominent feature of the American and world economic landscapes. Drive through almost any moderately sized city and you will encounter McDonald's, Chi Chi's, and Olive Gardens. While the growth of chains demonstrates that they provide goods and services that people want, this same growth has been both decried and applauded by social observers and policy analysts. To critics, chains destroy communities, supplant local and regional culture with a uniform, corporate sterility, and replace meaningful careers with part time, low paying jobs.

According to these critics, chains destroy local character and even dissipate regional identities. If Rochester, New York, Columbus, Ohio, and Grand Rapids, Michigan contain identical stores, restaurants, hotels, radio stations, and community service organizations, and if in large villages, people no longer walk downtown and interact with one another, then something has been lost. While many people may agree with this statement, the "something" largely lies outside the realm of economics. It tends to be more ephemeral than tangible. How do you assign a value to a regional culture? How do you put a price tag on chatting with the local butcher? Simple economics suggests that if the local restaurants and store owners provided greater value, then the chains could not enter.

Attempts to tie chains to real economic losses have revealed limited impact. Consider the argument that chains encourage the creation of fads and speed their pace,

and that these fads do not increase social utility. All of these conjectures may prove true, but faddish goods may not be that large a segment of the economy to matter. Others worry about the destruction of central downtowns at the expense of gaudy strip malls. This argument also has merit, but the magnitude of the externalities may be difficult to measure. And still others claim that chains destroy moderate and high skill, living wage jobs and replace them with low pay, low skill jobs. This last attack has anti-Taylorist, and Marxist underpinnings. The chain store jobs require fewer skills because of task routinization. Again, while undoubtedly true, few analyzes of the sources for increased income inequality ascribe much weight to the growth of chain stores (Freeman 1996).

These arguments demonstrate the darker side of chains. And, examining them more closely shows that they all rely on the claim that chains create negative externalities. Since externalities can be difficult to price renders problematic the task of computing the social costs of chains. In contrast, the benefits of chains can be measured easily. Chains can exploit returns to scale in production, distribution, information, and advertising. They can use subunits as laboratories to test new products. Advocates of chains also argue that chains create jobs and by giving the people what they want increase utility.

Whether for bad or good, chain stores continue their market penetration, which leads one to ask several questions. What accounts for the growth of chains? Why is it occurring now? And are their other economic reasons to be against or for chains? To analyze these questions, we construct a model of the growth of chain stores in a multiple location model. The model has its foundations in both ecology and economics. Each location contains an ecology of heterogeneous firms. At any point in time, the collection of firms (or products) in any one location depends on the ideas that have been tested. Better ideas undoubtedly exist, and over time, these new ideas drive the old ideas out of the marketplace. Chains allow an idea that has been successful in one location to replicate itself in another location. In this setup, the impact of chains boils down to how they affect the ecological process.

We find that the answer to whether chain are good or bad hinges upon technical considerations. Putting these social welfare considerations asides, an analysis of chains also reveals intriguing dynamics. Independent of any technological breakthroughs or changes in organizational management, the change in the number of chain stores should increase and then decrease. The present increase in chains need not be due to any external cause. No advances in organizational management would have been needed for chains to become predominant.

3 The Culture Model

I begin by presenting a simple model highlights the main argument of the paper. In this simple model, there are three towns A,B,and C. Each town has three business enterprises: a diner (d), kitchen store (k), and a hardware store (h). Each business is

characterized by a culture denoted by a color, either red (r), blue (b), or green (g) and a quality (q). For example, a blue hardware store of quality three can be denoted as 3b. Businesses of the same color complement one another. Consumers prefer higher quality firms. Suppose that the three towns have evolved independently and that the collections of business firms look as follows:

Town	d	k	h
A	4r	5r	5r
B	5g	5g	3g
C	6b	4b	6b

Suppose that firms result from ideas. An idea is a combination of a color, a quality, and a location. Ideas arise from a distribution. Obviously, potential entrants would prefer to have higher quality ideas. They would also like to have ideas that coordinate with the colors in their location. Neither of these need be true. Someone can have a low quality idea of the wrong color. If so, he will not enter the market.

Suppose that chains are now a possibility. Let the value of a business in a town equal its quality plus the number of other businesses in the town that share its color. In the example above, the value of kitchen store in town A equals five plus two. An idea can enter a town if and only if it is of strictly higher value. The same is true for an existing business trying to expand. Using this rule, the only business that could expand to a second location is the hardware store in town C. It can move to town B. Once it moves to town B, then the diner from town C can move into town B as well. Once the diner moves, the kitchen store can also move from town C to town B. This example shows how cascades can occur. One chain can beget other chains. The final configuration looks as follows

Town	d	k	h
A	4r	5r	5r
B	6b	4b	6b
C	6b	4b	6b

The process does not stop here. New ideas continually arrive. Over time as the quality of firms rises having a successful idea will grow more difficult. Those ideas that do work are most likely to be blue. A green idea would have to be of very high quality to enter the market. If a red idea enters, it is likely to be in town A. Suppose that this happens, that a kitchen store 7r appears in town A. It can also enter towns B and C. Further, suppose that a diner 7r also appears. It too can enter. Once they have entered, the 5r hardware store can enter from A into B and C. Now, every town is identical. Any idea that is successful in one town can enter all of the towns.

To summarize: Chains speed the spread of high quality ideas, but as idea quality rises, the probability of entering with a new idea declines. Simultaneously,

chains increase homogeneity across towns, so the probability of being able to chain an idea increases.

4 A Spatial Model

In this model, the products or ideas have two spatial characteristics x_1 and x_2 in $\{0, \frac{1}{D}, \ldots, 1\}^2$ and a quality $q \in (1, 2)$. Quality can serve as a proxy for speed of service or cost in addition to denoting the intrinsic quality of the idea. There are K consumers. Each has spatial ideal points and also cares about quality. In the model, we assign to each consumer i an ideal point (a_{i1}, a_{i2}) in $\{0, \frac{1}{D}, \ldots, 1\}^2$. We calculate the consumer's utility from an idea as follows:

$$U_i(x_1, x_2, q) = \frac{1+q}{1 + 0.5[(x_1 - a_1)^2 + (x_2 - a_2)^2]}$$

Each consumer chooses the idea that gives her the highest utility. We assume that there N towns. Each town supports a collection of ideas. In order for an idea to survive it must maintain a market share of T_S and in order to enter, a firm must have a market share of T_E.

To initialize the model, we create $\frac{3}{T_S}$ random ideas for each town. We then loop through each town $\frac{3}{T_S}$ dropping the firm with the lowest market share. We call this the initial collection of firms. We then allow new ideas to enter the market. If an idea succeeds then it can tries to chain itself in the other towns. It is not necessary to think of ideas as being owned by the same firm. It does not matter if the Chinese restaurants in a town are part of a chain, so long as they are identical.

What happens in this model is that at first, chaining is very difficult, because the "niches" across towns differ. Eventually, an idea with extremely high quality arises. We will call this idea McD. McD works in every town and creates a shadow around it with no firms. Eventually, another idea works in many towns as well. Call this idea Den. Den also creates a shadow around itself in the space of characteristics. This means that the towns now look more similar. As a result, ideas that work in one town are now more likely to work in another town and that is exactly what happens. Eventually, when all of the towns are identical, any idea that works in one town automatically works in another. Therefore, we have the same effects as we had in the earlier model: *the probability of an idea working falls and the probability of a successful idea chaining, rises.*

5 Cultural Boundaries

The obvious question to ask is whether countries should prevent chains. The answer hinges on two technical conditions. First, do the inhabitants of the country have a predisposition (genetic or psychological) toward their own culture. If so (thinking

in the context of the first model), they may prefer to wait for their own culture to generate ideas of the same quality as the dominant culture. If not, they should succumb. There is no reason to not accept something that is not only better but likely to continue to be better.

Second, and here is the really important condition, it must be that the quality of the ideas has an upper bound. If qualities are between zero and ten, then eventually, any country will find quality ten ideas, so if they are patient enough, they will be better off with barriers. However, if new ideas build off old ideas, then it could be the case that these countries that do not buy into the dominant culture will never catch up. In fact, they could fall further behind.

6 Tipping

Chains can also cause cultural tipping. Suppose that there are ten countries and that each has it's own culture. Consider two scenarios. In scenario 1, each country erects barriers. As a result, each country maintains a separate culture. In scenario 2, only one country erects barriers, and as the model predicts, all of the other countries form a mono-culture. Let's compare the costs of maintaining the barrier in each of the two cases. In the first, case each countries biggest worry is whichever, among the other countries, has randomly generated the highest quality ideas. However, that country continues to generate ideas at the same rate as all of the other countries.

In contrast, in the second scenario, all nine of the other countries are generating ideas in the mono-culture, so there are *nine times* as many ideas created by the potential takeover culture. Thus, the costs of maintaining the barrier are much higher. Let's interpret this insight in the context of the US's influence on Europe. If all of the European countries maintain barriers, then the US alone is generating ideas that the French must keep out. However, if all countries but France adopt a US culture, then now the rest of Europe is also generating ideas that belong to this mono-culture and the French will have less reason to maintain their barriers.

This phenomenon resembles the domino theory that many held during the cold war. The Soviets and Americans both felt that if any one country switched allegiances, then many others would follow like dominoes.

7 Homework

Pick three of four cities and pick a store category, i.e. Mexican restaurants etc.... Go to Google or Yahoo and get a listing of the firms in that category and see if you think that the chain story fits.

8 Final

For the final, I want you to write approximately five pages on one of the following three topics:

- The implications of the increasing number of television and radio stations and the fact that they are owned by a decreasing number of firms on the heterogeneity of perspectives and therefore societal robustness.

- Do markets and political institutions create incentives so that we get the "optimal" level of diversity? To answer this, you will have to define how much diversity is optimal.

- How does the increasing mono-culture of the US effect the future, i.e. does it matter that our life experience are no longer tied to geography because of the fact that we have more choices?