Preference Externalities: An Empirical Study of Who Benefits Whom in Differentiated Product Markets

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Abstract

Theory predicts that in markets with increasing returns, the number of differentiated products – and resulting consumer satisfaction – grow in market size. We document this phenomenon across 246 US radio markets. By a mechanism that we term "preference externalities," an increase in the size of the market brings forth additional products valued by others *with similar tastes*. But who benefits whom? We examine the patterns of – and mechanisms for – preference externalities between black and white and between Hispanic and non-Hispanic radio listeners, and among listeners of different age groups. The patterns are striking: while preference externalities are large and positive within groups, they are small and possibly negative across groups. For example, while black-targeted station entry and the black listening share increase in black population, they are unaffected (or possibly reduced) by the size of the white population. Consequently, small groups receive less variety from the market. Forces that increase the size of the market, such as emerging satellite and Internet technologies, may increase the satisfaction of individuals whose preferences do not match their fellow local residents'.

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When fixed costs are large and preferences are heterogeneous, the number of products available - and resultant consumer welfare - will increase with the size of the market. The more potential consumers a product has, the more likely it will be brought to market. Larger markets will have more - and more varied - products, conferring greater utility on consumers. Through a mechanism that we term "preference externalities," consumers' utility will depend on the number of other consumers in the same market, *but only to the extent that they share similar preferences*. If I want Afghan food in Fargo, North Dakota, will it be available? Because restaurants have some fixed costs, it will need some minimum threshold of customers to be viable. I will find my Afghan restaurant only if enough other people in Fargo also want Afghan food to bring forth an Afghan restaurant.

A concrete example helps to introduce the question of who benefits whom. Does the satisfaction of blacks, as consumers, increase with the number of whites in the market, or does it depend only on the number of blacks in the market? If black and white consumers have identical preferences, they will confer positive preference externalities on each other. Additional blacks with bring forth products value by both blacks and whites, and *vice versa*. On the other hand, if black and white consumers have "orthogonal" preferences, they will confer no benefit on each other.[1] That is, preference externalities will be zero. But preference externalities need not be bounded at zero: additional consumers can actually reduce the welfare of other types of consumers, in an effect analogous to the tyranny of the majority.

Social scientists have long been concerned about the possible tyranny of the majority in political contexts (see, for example, Mill, 1859). The usual view among economists is that markets avoid this sort of problem by giving each consumer what she wants.[2] Embodied in the traditional view is the idea that production takes place subject to constant returns to scale, so that the size of the market is irrelevant to whether products are offered. While appealing, this argument is not always correct. In the presence of fixed costs, production cannot take place at arbitrarily small scale, so persons wanting unpopular items can go begging. A particular item is offered in a market only if it attracts a critical mass of consumers. This is part of what Spence (1976) terms the problem of "product selection." What is offered is what can attract a large base of customers.

[1] We illustrate "orthogonal" preferences at section I.2 below.

[2] According to Friedman (1962), While the use of political channels "tends to strain the social cohesion essential for a stable society," the "widespread use of the market reduces the strain on the social fabric by rendering conformity unnecessary." (pp. 23-4)

Yet, an analogue of tyranny of the majority can arise in the market as well. A consumer's welfare depends on whether her favorite product is provided which, in turn, depends on whether her favorite product's other customers continue to purchase it. When another firm introduces an imperfect substitute for her favorite product, she can be made worse off. Suppose that some fellow consumers of her favorite product prefer the new product, but she does not. Suppose further than enough of her fellow customers are diverted from her favorite product to the new product so that her favorite no longer attracts enough customers to cover its costs. Her favorite product is withdrawn. This negative preference externality mechanism operates like a tyranny of the majority in markets. It should be emphasized, however, that the "tyrannizing" group need not be the numeric majority.[3]

These considerations raise a series of empirical questions. First, do preference externalities exist? That is, can we find evidence that consumer satisfaction increases in the size of the market, as is implicitly suggested by existing theory? Second, who benefits whom? That is, do all consumers generate the same preference externalities for each other? Third, is there evidence of negative preference externalities ("tyranny") in markets? Do some types of consumers reduce the number of options, or the level of satisfaction, available to other consumers?

While preference externalities can operate in the market for any differentiated product produced with fixed costs, the empirical portion of this paper focuses on a particular media market, radio broadcasting. Radio shares many features of other information markets (see Shapiro and Varian, 1998), making it an interesting case study of preference externalities, for at least five reasons. First, as with other information markets, fixed costs are important in radio.[4] Indeed, the costs of operating radio stations are invariant with the number of users, as is true for developing computer software and many other kinds of information generation. Second, market size is limited technologically by the distance that broadcast signals travel.[5] Third, market size is further limited by the desire of local listeners for location-specific information (news, weather), which constrains the willingness of listeners in one city to listen to broadcasts from another city. Fourth, there are *a*

[3] As we detail below, an increase in the black population from low levels will bring forth black-targeted products. This, in turn, can allow formerly "stranded" black consumers to defect from white-targeted products, possibly undermining their viability. Despite on its face being a tyranny of the *minority*, this is no less an example of the phenomenon that concerns us here.

[4] Of course, the quality of programming determines both the cost and the number of users who will be attracted. In that sense, from which we abstract, fixed costs are endogenous. See Sutton (1991).

[5] New technologies, including both satellite (see www.cdradio.com) and Internet (see, for example, www.spinner.com), can substantially increase the size of the market. We return to this topic in the conclusion.

priori reasons to think that preferences for radio differ substantially across groups (e.g., by age and race). This renders interesting an examination of the extent to which preference externalities are confined to a single group or spill over across groups. A final important justification for using radio as a case study is that the relevant data (consumption by product type by consumer group by geographic market) are available.

We document a large and statistically significant overall preference externality: the average fraction of the population listening to radio increases by 2 percent with a one million person increase in population. We then ask who benefits whom, by race (black/white), Hispanic/non-Hispanic status, and by age. We find sharply different programming preferences between blacks and whites, between Hispanics and non-Hispanics, and between older and younger listeners. We find that the number of stations targeted at each group depends strongly and positively on the size of the group and substantially less – or negatively – on the size of the remaining population. We argue that this is evidence of a negative preference externality, or a tyranny of the majority, in the market. The share of each group listening – and, we infer, their satisfaction as radio listeners – is shown to be sensitive to the number of stations targeting the group. Connecting these links, we determine who benefits whom: each group's satisfaction as listeners grows in the size of the group's own local population and is unaffected by, and may even decline with, the size of remaining population. Not only do the product variety benefits of larger markets not spill across race, Hispanic status, or wide gulfs of age, groups may limit each others' product options.

While media markets are unusual, they are far from unique. Many other markets have features - large fixed costs and preferences differing sharply across consumers - which could give rise to preference externalities that do not spill across groups. Possible examples, in addition to many sorts of information goods, include pharmaceuticals. Some illnesses affect too few persons to make profitable the development of treatments. Markets can be small either because a disease is rare in the population generally or prevalent only in small sub-populations (such as Tay-Sachs, which affects only Ashkenazy Jews and French Canadians). Preference externalities of the sort we discuss may arise in other local services markets, such as restaurants and retailing.[6]

The paper proceeds in five steps. Section 1 connects arguments in the paper with existing literature and sketches a simple theoretical framework. Section 2 describes the data used in the study. Section 3 presents the basic evidence on preference externalities in radio broadcasting.

Section 4 examines who benefits – or hurts – whom, by race, Hispanic status, and age and documents the mechanism for the operation of preference externalities (market size determines entry, which determines consumption). Section 5 concludes with a discussion of the results' implications.

This paper is about the effects of sizes of various groups on the welfare of each of the groups, in their capacity as radio listeners. Hence, this paper is about the distribution of welfare. However, this is not a normative paper. We make no attempt to determine whether the beneficial effects of, say, black listeners on other black listeners outweigh their possible negative effects on white listeners. Instead, we simply pursue the more tractable – and still interesting – goal of documenting who affects whom.[7] To put this a different way, the externalities documented in this paper are pecuniary and not technological in nature.[8]

I. Background

1. Existing Literature

The theoretical background for this study is contained in Spence (1976a,b) and Dixit and Stiglitz (1977), who present characterizations of imperfect competition. In Spence's model, firms have fixed costs and produce imperfect substitutes for each others' products, and whether a product gets provided depends on whether the firm can cover the product's fixed and marginal costs. This, in turn, depends on the extents to which (a) the firm can price discriminate, and (b) near-substitutes divert business. In a world such as Spence's, the number and mix of products produced will depend on the number and mix of consumers. This provides the motivation for our empirical questions: how does the number and mix of persons in a market affect the number and mix of products, as well as the extent to which different sorts of persons find satisfaction as consumers?

While a good deal of existing research examines questions related to those in this study, although none (to the author's knowledge) looks at precisely these questions. A large group of studies examines effects of city size (or agglomeration) on productivity. Ciccone and Hall (1996) provides a recent example with citations to earlier literature. A related strand of literature looks at the interactions of increasing returns and transport costs for regional patterns of production, trade,

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[6] The scope for the size and mix of the local market to affect consumer satisfaction is mitigated for some sorts of retailing by catalogs and Internet commerce.

[7] A companion paper (Siegelman and Waldfogel, 1999) asks whether markets provide adequate minority-targeted programming.

[8] See Leibowitz and Margolis (1994) for a recent discussion of the distinction between pecuniary and technological externalities.

and development.[9] I am aware of few studies that examine the consumption side. One exception is Holmes (1998), which uses the cross-MSA relationship between population (as a measure of market size) and the size of the local food wholesaling sector to infer the importance of increasing returns to scale in production and love of variety on the part of consumers.

More closely related to the present are studies of entry, such as Bresnahan and Reiss (1990, 1991), which model the relationship between market size and the number of entrants in a number of industries. Models of the number of firms entering, these studies provide no information about effects of market size on product variety and consumer satisfaction. Berry and Waldfogel (1999) present a model of entry in radio broadcasting, along with evidence on the effect of the number of stations on the tendency to listen. Their results, that larger markets have more stations, and that more stations attract a larger fraction of the population to radio listening, presage our basic evidence of preference externalities, in section 3.

A final related literature consists of normative analyses of commercial broadcasting in general (see, for example, Spence and Owen, 1977; Borenstein, 1988; and Anderson and Coate, 1999, among others) as well as studies of minority broadcasting in particular (Spitzer, 1991; Wildman and Karamanis, 1997; Siegelman and Waldfogel, 1999). Because this is a positive study, our focus is quite different.

2. Simple Example

A very simple example illustrates that, with fixed costs and differentiated products, additional consumers may help, hurt, or have no effect on the satisfaction available to other consumers. To put this another way, preference externalities can be positive, zero, or even negative. This example is closely related to Beebe (1977) and Steiner (1952).

There are two products, apples and bananas, and three types of consumers:

1) *apple stalwarts* - those who will only purchase apples (preference ordering: apples > > nothing > bananas);
2) *prefer bananas* – with preference ordering: bananas > apples > nothing; and
3) *banana stalwarts* – with preference ordering: bananas > nothing > apples.

We will refer to these types as 1-3. Unless otherwise noted, assume that a product must attract 10 consumers to be viable (to cover its fixed costs).

[9] See Krugman (1980, 1991) and Ellison and Glaeser (1997) for examples.

Case 1: Preference Homogeneity and Positive Preference Externalities

Suppose that all consumers are apple stalwarts. Then adding consumers makes everyone (at least weakly) better off. In particular, the arrival of the 10^{th} consumer makes the first apple firm viable, discretely increasing everyone's options by making apples available somewhere. If consumers get benefits from additional apple firms beyond the first, then the arrival of the 20^{th} and 30^{th} consumers, etc. also increase welfare. Hence, in the case of homogeneous preferences, preference externalities are positive and uniform: everyone benefits everyone else, at least weakly.

Case 2: Orthogonal Preferences and Zero Preference Externalities

Suppose there are only apple and banana stalwarts (types 1 and 3) and no banana preferrers (type 2s). Each of the two types that are present consumes only her preferred option or nothing. Let us examine entry into apple and banana provision as populations of apple and banana stalwarts vary. In the table we describe entry as (*number of apple firms, number of banana firms*).

	Apple Stalwarts (type 1)			
Banana Stalwarts (type 3)		0	10	20
	0	(0,0)	(1,0)	(2,0)
	10	(0,1)	(1,1)	(2,1)
	20	(0,2)	(1,2)	(2,2)

When there are no apple or banana stalwarts, there is no apple or banana firm entry. When the number of apple stalwarts rises to 10, an apple firm enters, which we denote as (1,0). If 10 banana stalwarts arrive to accompany the 10 apple stalwarts in the market, a banana firm enters, while the apple firm remains. The number of type 1 consumers (apple stalwarts) affects only the number of apple firms, and the number of type 3 consumers (banana stalwarts) affects only the number of banana firms. In this example, preferences are "orthogonal," so that the markets for bananas and apples are distinct. Preference externalities are positive within type but zero across types. Additional apple stalwarts benefit other apple stalwarts. Additional banana stalwarts benefit other banana stalwarts. If consumers derive benefits from additional firms beyond the first offering their preferred product, then the arrivals of the 20^{th} and 30^{th} apple and banana stalwarts benefit other apple and banana stalwarts, respectively. The different groups have no effects on each other, however.

Case 3: Negative Preference Externalities and the Tyranny of the Majority.

Now suppose there are 5 "flexible" persons of type 2, who prefer bananas to apples but apples to nothing and so choose applies when bananas are not available but bananas when they are.

It is easy to see that an increase in the number of consumers of one type can reduce the number of options for another type.

Apple and Banana Entry with 5 Banana Preferrers (type 2)				
	Apple Stalwarts (type 1)			
Banana Stalwarts (type 3)		0	5	10
	0	(0,0)	(1,0)	(1,0)
	5	(0,1)	(0,1)	(1,1)
	10	(0,1)	(0,1)	(1,1)

When the five type 2's are accompanied by no persons of type 1 or 3, neither product can attract enough customers to cover its costs. With 5 apple stalwarts, 5 banana preferrers (type 2), and no banana stalwarts, a banana firm could attract 5 customers, leaving only 5 potential apple buyers. Neither firm would be viable. An uncontested apple firm would attract all 10 customers, and no further entry would be viable. Hence, the market would get (1,0). If the number of banana stalwarts increased to 5 (while the numbers of types 1 and 2 remain at 5), a banana firm would attract 10 customers, while the apple firm would retain only 5. The resultant pattern of entry would be one banana firm and no apple firms (0,1). Because of the existence of the flexible type 2 customers, an increase in the number of banana stalwarts actually makes the apple stalwarts worse off. This is an example of a negative preference externality.[10]

It is easy to see that reductions in fixed costs mitigate this negative preference externality. If only 1, rather than 10, customers are needed to make a firm viable, then if there are 5 type 1's, 5 type 2's, and 5 type 3's, there will be 10 banana firms and 5 apple firms (rather than one and zero, respectively). Both products have multiple outlets.

The distribution of persons across types has implications for the relationship between the number of products and the fraction of persons consuming. With only stalwarts in the economy, additional products will attract persons from abstinence to consumption, resulting in a strong positive relationship between the number of products and the share of persons consuming. The

[10] The apple stalwarts are vulnerable in this example because the apple availability that they value is dependent upon the banana preferrers, who are poised to defect from apples. The logic of this example suggests a reason, apart from naked rent-seeking by incumbent apple sellers, why some consumers' welfare might be reduced by entry of, say, a "big-box" banana retailer on the outskirts of town. While it is by no means obvious that such entry would be on balance welfare reducing, it can have different distributional impacts. Here, it makes apple stalwarts worse off. The example also suggests why apple stalwarts might exhort fellow customers to support an apple firm, an activity one might label "boosterism."

presence of consumers who prefer one product but are willing to consume an alternative will weaken the positive relationship between the number of varieties and the share of the population consuming.

The empirical goal in the remainder of the paper is to examine the operation of preference externalities across race, Hispanic status, and age using US radio broadcast markets as an example. In particular, we seek to document how whether the share of each group listening to radio, or the "listening share" (and, we infer, utility) increases with the size of the market and the number of varieties. We then turn to the question of "who benefits – or harms – whom?" Using data on listening behavior for groups of individuals whose preferences may differ, we examine how the programming targeting each group, and their listening, vary with the sizes of each of the groups.

II. Data

The basic data set used in the study is a 1997 cross section of radio listening shares and population, by group, for 246 large US radio markets. The data also include the number of stations, by programming format, along with a variety of city characteristics, for each market. The analysis in the paper is done at the market level, but the underlying data are station-level. The underlying data for all 246 markets include nearly 6000 stations.

The listening measure is Arbitron's average quarter hour (AQH) listening, the share of the population listening to radio for at least five minutes during and average quarter hour. Arbitron (1997a) reports listening data by 13 age and gender groups in 167 markets.[11] Arbitron (1997b) reports listening data by black/non-black for 100 markets and by Hispanic/non-Hispanic for 51 markets. Data on stations' programming formats come from Duncan (1997), which classifies stations into over 40 formats.[12]

We classify formats as "black-targeted," "Hispanic-targeted," "youth-targeted," or "older-targeted" using the following scheme: We classify a format as black-targeted if more than half of

[11] The 13 age and gender groups are teens (12-17) men 18-24, men 25-34, men 35-44, men 45-54, men 55-64, men 65+, women 18-24, women 25-34, women 35-44, women 45-54, women 55-64, women 65+.

[12] A slightly aggregated list of Duncan's formats includes: Adult Contemp. (AC), AC/Contemp. Hit Radio, Adult Contemp./New Rock, AC/Soft Adult Contemp., Album Oriented Rock (AOR), AOR/Adult Contemp., AOR/Classic Rock, Album Oriented Rock/New Rock, Album Oriented Rock/Progressive, Black, Black/Adult Contemp., Black/Gospel, Black/Oldies, Black/Talk, Big Band/Nostalgia, Big Band/Nostalgia/Religious, Country, Country/Full Service, Contemporary Hit Radio (CHR), CHR/Adult Contemp., CHR/New Rock, Contemporary Hit Radio/Urban, Classical, Classic Album Oriented Rock, Classic Hits, Ethnic, Easy Listening, Full Service/Variety, Full Service/Variety/Talk, Gospel, Jazz, News, News/Talk, Oldies, Religious, Soft Adult Contemp., Spanish, Sports, Talk, Talk/Classic AOR, Talk/Full Service, Talk/Jazz.

its listeners are black (Black, Black/Gospel, Black/Adult Contemp., Black/Oldies, Black/Talk, Gospel, Ethnic). By the same criterion, we classify only the Spanish-language (Spanish) format as Hispanic targeted. Finally, because over 50 percent of their listeners are 55 or older, we classify Big Band/Nostalgia, Full Service, Classical and the various News and Talk formats as older-targeted. No format has over half of its listeners in the under 25 age group. However, Top 40, Black/Top 40, Album Oriented Rock, and Black format stations have 25 percent or more. We classify these as youth-targeted.

Table 1a presents information on the number of stations targeting each group, listening data by group, and other city characteristics. Across all 246 markets there are an average of 24.5 commercial stations received in each market.[13] An average of 1.9 stations, or 7.8 percent, are black-targeted. An average of 1.1 stations, or 4.4 percent of stations are Hispanic-targeted. Nearly a quarter of stations (22.7 percent, or 5.6 stations per market) are youth-targeted. Another 19.6 percent (4.8 stations per market) are older-targeted.

Population averages 0.70 million persons across the 246 markets. Average population is larger in the samples of markets with black and Hispanic listening data. Arbitron only reports minority listening separately in markets with substantial minority populations, and these markets tend to be large. Population averages 1.16 million in the 100 markets with black listening data; black population in the same markets averages 190 thousand, and the percent black averages 18.7 percent. Population averages 1.62 million in the 51 markets with Hispanic listening data; the Hispanic population averages 334 thousand, and the percent Hispanic averages 24.5 percent. Because much radio listening takes place in cars, we have data on the percent of population driving to work, which averages about 40 percent.

Across all 246 markets, the simple average fraction of the population listening to radio for at least five minutes during an average quarter hour (the "AQH listening share") is 15.8 percent. Blacks listen more than whites (17.9 versus 15.4 in the 100 markets with black data). Hispanics listen more than non-Hispanics (17.5 versus 15.8 in the 51 markets with Hispanic data). That blacks listen more than whites, and Hispanics more than non-Hispanics, despite facing far fewer stations targeting them indicates greater tastes for radio listening among these communities.

Table 1b shows listening data by age and gender. Listening increases with age, from 11.2 percent for teens (12-17) to 17.9 percent for persons age 25-34, then declines steadily 15.8 percent

[13] Non-commercial radio accounts for a negligible amount of total radio listening. See Berry and Waldfogel (1999a) for evidence about the relationship between commercial and public radio.

for persons 55-64 and some what more sharply to 14.2 for persons over 65. The age patterns are similar for men and women, although women under 65 listen less than men.

III. Basic Evidence of Preference Externalities

The basic question is whether listener satisfaction, measured by the share of population listening to radio, increases in the size of the market.[14] To test this we simply regress the AQH listening share on population. Results are in the first two columns of table 2. Column 1 includes no additional controls. The remaining second column adds including region dummies, the percent black, the percent Hispanic, and the fraction driving to work. The result of interest, that the listening share increases in population, does not go away. An additional million persons raises the listening share by 0.31 percentage points (0.20 in the column 2 model with controls).

The remainder of table 2 explores the mechanism for the basic preference externality result. Columns 3 and 4 show that a higher fraction person listens to radio in markets with more stations. The AQH listening share is 0.07 percentage points higher in markets with an additional station (0.05 in the column 4 model with controls). Columns 5 and 6 show that a higher fraction of persons listens to radio in markets with more programming formats. The AQH listening share is 0.12 percentage points higher in markets with an additional format (0.08 in the column 6 model with controls). Because of the possible endogeneity of stations and formats - more, and more varied, stations might enter markets with greater unobserved tastes for listening - these results do not demonstrate that product variety *causes* greater listening and satisfaction.

In table 3 we address this concern by statistically explaining the determinants of products and variety. Our explanation of preference externalities, that larger markets bring forth more product variety, readily suggests population as an instrument for stations and formats. Columns 1 through 4 show how stations and formats vary with population, with and without controls. With controls, an additional million persons in the market brings forth 2.1 stations and 1.2 formats. The last two columns of table 3 show how AQH listening varies with stations and formats, including controls, using population as an instrument for stations and formats. The respective effects of stations and formats remain significant and are roughly double their OLS counterparts in table 2. This is a striking - although not a surprising - result. Consumers in larger markets face greater

[14] Of course, a listening share that increases with population is sufficient, but not necessary, to show that satisfaction increases in population.

programming variety, from which they derive greater satisfaction. For radio listeners, preference externalities across consumers as a whole are positive.[15]

The estimated relationships between the listening share and the number of stations or varieties, while significantly positive, have large intercepts and comparatively small slopes. While additional stations or formats draw some new listeners, much listening is diverted from existing stations. That the elimination of the marginal station or format would reduce the listening share only slightly indicates that many listeners to marginal stations would choose other stations, not radio abstinence, in the absence of their favorite station.

IV. Who Benefits Whom?

We have documented that listening - and therefore welfare associated with consumption of radio programming - increases in market size. This demonstrates that, in their capacity as consumers, people confer a benefit on each other. The next question, however, is whether all sorts of persons confer equal benefits on one another. Whether external benefits "spill" across groups depends on how sharply preferences vary across groups. Language differences make it easy to imagine why preferences in radio programming might vary between Hispanics and non-Hispanics. It is less obvious *a priori* that radio programming preferences would vary by race or age, although journalistic accounts of television viewing patterns indicate age and race-specific preferences.[16]

We proceed in four steps to determine who benefits whom. First, we examine how preferences differ across groups. Second, we examine how group-targeted entry varies with the respective sizes of each of the groups. Third, we ask whether listeners value group-targeted programming. The interested or impatient reader can skip to section IV.4 (and tables 11 and 12) to view direct evidence on the relationship between group listening and sizes of various groups.

1. Do Preferences Differ By Group?

Columns 2 and 3 of table 4 report 1997 distributions of black and white listening by format. It is obvious that blacks and non-blacks listen to very different programming. Just over half of black listening is concentrated in only two formats, Black, and Black/Adult Contemporary, which account for less than 2.5 percent of non-black listening. As mentioned above, blacks make up the majority of listeners to stations in seven formats: Black, Black/Adult Contemporary,

[15] This evidence indicates that individuals' quality of life – as radio listeners – is higher in larger markets. This provides a consumption-based rationale for residential agglomeration into cities. Benefits of additional product variety must in general be balanced against the costs of congestion. See Henderson (1974).

[16] See Sterngold (1998, 1999) for discussions of television viewing preferences by race and age.

Black/Gospel, Black/Oldies, Black/Talk, Gospel, and Ethnic, which we term black-targeted. Other formats attracting substantial amounts of black listening include Contemporary Hit Radio/Urban and Jazz. Altogether, black-targeted formats attract 61 percent of all black listeners, but only about 3 percent of white listeners.[17]

The Duncan index is commonly used to measure segregation—that is, the degree to which the allocation of blacks and whites to neighborhoods or formats differs from shares that are proportional to each group's population share. The index gives the proportion of all blacks and whites who would have to move (change format) in order to achieve completely integrated listening. For radio, the average 1997 black/white Duncan index is 72.2, which is comparable to levels of black/white residential segregation.[18]

The last two columns of Table 4 report 1997 listening data, by format and Hispanic status, for markets with 1997 Hispanic listening data. Like blacks, Hispanics listen to different programming than non-Hispanics. Hispanic listeners make up the majority of listeners to the broad Spanish-language format, Spanish, which attracts 45.7 percent of Hispanic listening, and which we classify as Hispanic-targeted. Other formats with substantial numbers of Hispanic listeners include Contemporary Hit Radio (attracting 8.6 percent of Hispanic listeners) and Contemporary Hit Radio/Urban (6.3 percent). Hispanic listeners are somewhat less segregated than blacks, with an average Duncan index of 46.9.

Table 5 reports listening data, by format and age and gender.[19] These data reveal substantial differences in preferences across age groups, both in formats, and number of formats, chosen. Teenaged (12-17) listening is heavily concentrated in three formats, top 40 (37.6 percent), Black (19.3 percent), and Album Oriented Rock (11.5 percent). Teenagers listen to 4.8 format

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[17] The distributions of listening by race in table 3 actually understate the true differences in preferences between blacks and whites because the reported distributions reflect all markets with black listening data, including many with few black-targeted stations.

[18] Let s_{ij} be the share of all listeners of type i (i =b,w) listening to format j in a given market. Then the Duncan index for that market is $D = 100 * \Sigma_j |s_{bj} - s_{wj}|/2$. By comparison, the Duncan index for residential segregation in the 15 Northern cities with the largest black populations in 1980 was 80.1 (Massey and Denton, 1993, p. 64).

Alternatively, let $\delta = \text{Min}(s_{bj}, s_{wj})/\text{Max}(s_{bj}, s_{wj})$, where s_{bj} is the percent of all black listeners listening to format j and similarly for whites. There are only two formats, News and Soft Adult Contemporary, for which δ is greater than 0.5.

[19] The age and gender listening data are computed from Spring 1993 Arbitron station level data. The format classification is somewhat different than the 1997 classification because of the format proliferation that followed the 1996 Telecommunications Act. See Berry and Waldfogel (1999b).

equivalents, fewer than any other age group.[20] The popularity of these formats declines steadily with age (across cohorts). Other formats are increasingly popular among older listeners. Listening of persons over 65 is heavily concentrated in Big Band/Nostalgia (14.0 percent), Classical (3.6), Full Service (7.6), News and News/Talk (16.3), and Talk (14.0). The remaining formats, such as Oldies, Country, and Classic Album Oriented Rock, have their peak popularity among middle aged listeners. Programming preferences differ little across listeners of similar ages but differ sharply as the age gap widens. The Duncan index grows in the distance between age groups. For example, the segregation index for 12-17s and 18-24s is 31.2, while the index for 12-17s and over-65s is 75.7, close to its black-white level in the 1997 listening data.[21] Thus, by this metric, black and white preferences in radio programming are as similar as teenager and elderly preferences.

With a few exceptions, male and female listening preferences are similar. Album Oriented Rock and Classic Album Oriented Rock are substantially more popular among men than women (20.2 percent, together, vs. 9.4), while Soft Adult Contemporary is more popular among women than men (10 percent vs. 6.4 percent). Men and women are considerably less segregated than blacks and whites, Hispanics and non-Hispanics, and older and younger listeners. The male-female Duncan index averages 19.6 across 169 markets in 1993.

Given these data on how listening preferences vary by group, we would expect some localization of preference externalities. In particular, we would not expect the benefit of black population to spill over to whites as much as to other blacks, and *vice versa*. Nor would we expect benefits to spill substantially across the Hispanic divide. By age we would expect different effects: we expect positive spillovers to persons nearby in age, declining as the age distance increases. We would expect large spillovers by gender.[22]

The preference differences that we document are necessary but not sufficient for the benefits of larger populations not to spill across groups. For this mechanism to affect

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[20] Obviously, some listeners in all age groups choose each format. Hence, we cannot simply count the number of formats that any persons choose. Our measure of the number of formats chosen is the *format equivalent*, or $1\Big/\sum_{f=1}^{N} s_f^2$, where s_f^2 is the square of the share of listeners (in an age group) choosing format *f* and *N* is the number of formats. When listeners are distributed symmetrically across formats, this is simply *N*. The concentration of teenage listening in few formats, in conjunction with their low listening share, might reflect either the difficulty of reaching this audience (Sterngold, 1999) or possible underprovision.

[21] Because these data use a different format classification scheme than the 1997 data, the Duncan indices are, again, not strictly comparable.

[22] Of course, there is virtually no independent variation in male and female population across markets, so this proposition is untestable.

satisfaction, we must further find evidence 1) that patterns of entry are affected (e.g. that the relative populations of different groups affects the relative numbers of different types of programming) and 2) that listeners from different groups value different types of programming differently. It is to these questions that we now turn.

2. Group-Targeted Entry and Market Size: Do Markets Tyrannize Minorities?

Given that listening preferences differ by race, Hispanic status, and age, we expect entry of the various types of stations to depend on the relative sizes of the groups.[23] Table 6 reports regressions of the numbers of black and white-targeted stations on white and black population, respectively, as well as region dummies and the percent driving to work. As expected, group-targeted entry depends positively on own-group population but, interestingly, negatively on the other group. While an additional million whites adds 4.6 white-targeted stations, and additional million blacks *reduces* the number of white-targeted stations by 12.8. An additional million blacks raises the number of black stations by 6.9 and an additional million whites *reduces* the number of black-targeted stations by 0.6.

The absolute magnitudes of these coefficients raise questions about the specification. For example, the estimates imply that additional blacks reduce the number of white stations more than they raise the number of black stations, suggesting that the linear specification is inappropriate. It is clearly apparent from prior research on entry (for example, Bresnahan and Reiss, 1990, 1991) that entry thresholds vary with the number of entrants. Ordered probit is natural model for accommodating this possibility, and table 6 also reports ordered probit estimates. The sign pattern of the OLS estimates survives here, but the magnitudes are more reasonable. Own effects exceed cross effects, and own effects are larger for blacks than for whites. Columns (1)-(4) provide evidence of negative preference externalities.[24]

The remainder of table 6 does the same exercises for Hispanic vs. non-Hispanic station entry. Both the OLS and ordered probit estimates show evidence of negative preference externalities. As expected, Hispanic-targeted stations increase with the size of the Hispanic

[23] We recognize that we introduce endogeneity by classifying stations' targeting according to who listens. However, we make our designation according to national listening to a format, rather than on station-level listening. The reader who remains concerned about endogeneity should note that we employ group population as an instrument for group-targeted stations in regressions of group listening shares on group-targeted stations (below at table 8).

[24] We explored whether this result was due to spectrum scarcity rather than negative preference externalities. With a fixed number of possible stations, increases in the number of whites might decrease the number of black-targeted stations. The same regressions re-run but including only the 60 markets with under 750,000 persons show the same substantive results.

population, but we also find that additional non-Hispanics *reduce* the number of Hispanic-targeted stations.

For both of the minority groups examined, the minority groups exert larger negative effects on the number of white-targeted stations than whites exert on the number of minority-targeted stations. If these results are due to negative preference externalities, then it must be the case that additional minorities in the market cause more defections from white programming than additional whites induce defection from minority programming. Furthermore, the effect must be stronger for blacks than for Hispanics.

Many markets have few minorities and few minority-targeted stations (or none at all). In markets with few or no minority-targeted stations, minorities listen to other (white-targeted) programming. From small levels, increases in minority populations bring forth the first few minority-targeted stations, allowing substantial "defection" of minorities from white-targeted stations.

Table 7 depicts these phenomena. In markets without black-targeted stations, 17.3 percent of blacks listen to the radio for five minutes during an average quarter hour, as opposed to 18.3 percent in markets with four or more black-targeted stations. By construction, all black listeners in the markets without black-targeted stations listen to white-targeted stations. By contrast, only two thirds of black listeners choose white-targeted stations in markets with one black-targeted station, and only a third of black listeners choose white-targeted stations in markets with four or more black-targeted stations. The pattern of defection from white-targeted stations for Hispanics is similar although less marked. Three quarters of Hispanic listeners choose white-targeted stations in markets with one Hispanic station, and half of Hispanic listeners choose white-targeted stations in markets with four or more Hispanic-targeted options.

The substantial minority defection from white options as minority-targeted options are available stands in contrast to the reverse phenomenon among whites. No market is without substantial white-targeted programming. Across 246 markets, the minimum number of white-targeted stations is 7. Thus, there is no sample variation in white population that brings forth one of the first few available white stations. Similarly, there are no sample markets in which white listeners are "stranded" listening to black- or Hispanic-targeted stations. Hence, we expect little white "defection" from minority stations and smaller negative preference externalities running from whites to minorities.

Table 8 asks how youth-, middle-age-, and elderly-targeted station entry varies with the size of the respective age groups. Results here are more equivocal. The high correlations of different age groups' populations across markets makes it quite difficult to measure distinct effects of age group populations on group-targeted entry (or other variables, as we see below). For example, the correlation of over-55 and under-25 populations is 0.97, and other correlations among the three aggregative age groups are higher. Making inference even more difficult, preferences differ only slightly between persons of adjacent age groups. The only clear result in table 8, in both OLS and ordered probit results, is that the size of the over-55 population has a strong positive effect on over-55-targeted entry. An additional million persons over 55 adds 7.3 stations targeting them.

3. Do Listeners Value Group-Targeted Programming?

We have documented that preferences differ across groups (particularly by race and Hispanic status) and that entry is responsive to the distributions of persons by type. We now turn to the question of whether listener satisfaction is affected by the pattern of programming available by asking whether group-targeted stations attract listeners from non-listening. If additional group-targeted programming reduces the group's share of non-listeners, the new listeners reveal that they prefer the programming to whatever outside option they forego by turning on the radio. Moreover, the stronger the relationships, the greater the apparent fraction of stalwart listeners.

Table 9 reports results of regressions of black and white AQH listening percentages on the numbers of white-targeted and black-targeted radio stations for 1997. The black listening share increases in the number of black-targeted stations and is nearly invariant with the number of white-targeted stations. The results for Hispanics are similar, although the smaller sample sizes makes them less precise. Each group's listening depends strongly on the stations targeted at it, and to a lesser extent—or not at all—on those targeted at other groups.

The OLS results are likely to suffer from the endogeneity problem that entry will tend to occur in markets where there is a high (but unobservable) tendency to listen. This would bias the coefficients in the top panel of table 9. To correct for this problem, we require instrumental variables that determine entry of black, Hispanic, and white-targeted stations without directly affecting AQH listening. Measures of market size, such as population, are natural candidates. We explore these instruments next.

In the bottom panel of table 9 we revisit the relationship between station entry (by target group) and group AQH listening share, using IV estimates with group populations as instruments

(see table 6). The IV results reinforce the OLS results: each group's listening depends only on the number of stations targeted at it; the number of stations targeted at the other group has no effect on its listening. These results provide strong evidence that groups value programming that targets them, and are far less sensitive to non-targeted programming.[25]

The relative sizes of the own group coefficients are noteworthy. In both the OLS and IV specifications, additional black or Hispanic-targeted stations attract larger fractions of their respective communities than an additional white-targeted station attracts whites. The effect is particularly large for blacks. This indicates that, relative to programming options existing at the margin, minority populations contain higher fractions of stalwarts drawn to radio by marginal minority-targeted stations but who would otherwise not listen. The existence of stalwart minority listeners provides additional plausibility for the proposition that blacks crowd out white-targeted stations.

Table 10 examines the relationship between different age groups' listening and the number of stations targeting various age groups. Results here (as with the relationship between listening shares and population) are equivocal. However, older listening increases sharply with the number of older-targeted stations. Given the limited success using age-group population to explain age-targeted entry, we do not perform IV estimates by age group.

4. Who Benefits Whom: Direct Evidence

We have now assembled the pieces allowing us to determine who benefits whom. Preferences differ across groups, sharply between blacks and whites and between Hispanics and non-Hispanics and increasingly in distance between age groups. Entry of group-targeted programming depends positively on the size of the own group and, for blacks and Hispanics, negatively on the size of the remaining population. Finally, listeners value group-targeted programming substantially more than they value other programming. This all implies that radio listeners' satisfaction grows in own-group population and is either invariant or declines in the size of the remaining population. Here we examine this set of relationships directly. Table 11 reports regressions of the shares of whites and blacks listening to the radio on the numbers of whites and blacks, respectively, in the markets, as well as controls. The results are striking, although by now not surprising: the white listening share increases in the number of whites and is negatively – but

[25] Note that listeners could still value variety even if we observed no effect of the number of stations on listening. Even if total listening is invariant with station entry, listeners are at least weakly better off with entry, as they get weakly more preferred choices.

insignificantly – related to the number of blacks. The black listening share grows in the number of blacks and is invariant to the number of whites. An additional million whites raises the white listening share by about 0.40 percentage points and has no significant effect on the black listening share. An additional million blacks raises the black listening share by roughly 3 percentage points with no effect on the white share.[26] The result in columns 1 and 2 of table 11 indicates that preference externalities in radio broadcasting operate and are positive within blacks and within whites but are indistinguishable from zero between them.

Each group's listening is increased more by its own size than by the size of the remaining population. A separate question is whether each group increases its own listening more than it increases listening by the remainder of the population. Column (3) of table 11 addresses this question with a regression of difference between black and white AQH listening on the respective populations and controls. The negative coefficient on white population indicates that white population increases white listening more than it increases black listening, although the difference is not statistically significant. The positive and significant coefficient on black population indicates that black population increases black listening more than it increases white listening.

Black population had a negative and significant effect on white stations (recall table 6), and white stations have a positive and significant effect on the white listening share (table 9). So why only a weak negative effect of black population on the white listening share? By the logic we have discussed above, a larger black population may reduce the number of white-targeted options. However, because of the large number of white-targeted options, the white listening share does not decrease much (recall the relatively flat relationship between the white listening share and the number of white-targeted stations).

The latter half of table 11 examines how Hispanic and non-Hispanic listening shares vary with Hispanic and non-Hispanic populations. Although significance levels are lower here (recall, we have only 51 markets with Hispanic listening data), results mirror those for blacks and whites: preference externalities are positive within Hispanic and non-Hispanic groups and zero between them. Each group has a larger effect on its own listening than on the listening of the remaining population, although these differences are not statistically significant.

[26] The relative sizes of the black and white own coefficients are consistent with the relative sizes of the populations. The black population is roughly a fifth the size of the non-black population. A marginal black-targeted entrant must attract a black listening share roughly five times the white listening share required of a white-targeted entrant. Of course, the coefficients do not show the shares attracted by the marginal entrant. Rather, they show the marginal impact on the overall listening share. Still, the logic is relevant.

Table 12 examines how each age group's listening varies across markets with the number of persons in each age group (the three groups are under 25, 25-54, over 55). Despite substantial multicollinearity, the results suggest that preference externalities operate differently by age: the over-55 listening share increases significantly only in the number of elderly.

V. Conclusion: What the Results Mean

Above we have argued that in differentiated product markets with increasing returns, depending on how preferences vary across groups, while all consumers benefit from others of their own types, additional consumers may have positive, zero, or negative effects on the products and satisfaction available to other consumers. Further, we have shown that these effects are important in local media markets. Radio programming preferences differ sharply between blacks and whites, between Hispanics and non-Hispanics, and (to a lesser extent) across age groups. Additional consumers bring forth additional products, but in this market the products brought forth are valuable almost exclusively to members of their own groups. This is an interesting finding, among other reasons, because it gives a non-discriminatory reason why markets will deliver fewer products – and, one might infer, lower utility – to "preference minorities," small groups of individuals with atypical preferences.

Is this an important effect in the economy, or a curious feature of radio markets? While only additional research can answer this question, we can speculate here about other markets where such effects might also operate. The fundamental conditions needed to produce compartmentalized preference externalities are large fixed costs and preferences that differ sharply across groups of consumers. These conditions are likely to hold, to greater or lesser extents, in a variety of media markets – newspapers, magazines, television, and movies. For all of these media, there is at least anecdotal evidence that preferences differ across demographic groups (see, for example, Sterngold (1998, 1999) on how television viewing preferences differ by age and race). We would expect offerings targeted to groups with atypical preferences to be especially thin in small local markets, where the number of persons in the preference minority might be small. While some national cable television networks target blacks (BET) and Hispanics (Univision), for example, relatively few local television outlets do.

Outside of media markets, we would expect to see similar effects for other goods involving large sunk investments, such as pharmaceuticals. Some diseases (e.g. Tay-Sachs, sickle cell anemia) affect only small population groups. Persons afflicted with rare diseases will face fewer

treatment options, all else constant, than persons afflicted with diseases affecting larger groups of potential sufferers. Tastes in food differ by ethnicity.

A consumer with atypical tastes will face less product variety than one with common tastes. The solution to the consumer's problem is to increase the size of the market to harness preference externalities from a larger group of potential fellow customers. The simplest means of accomplishing this is trade. Provided that shipping costs are not too high, trade increases the size of the potential market so that the variety that producers offer is not limited by local appetites. Some goods, such as restaurant meals, live performances, and radio signals (to name a few), have traditionally been non-tradable.

Where trade is not feasible, migration has provided an alternative way of internalizing preference externalities to the interested community. Persons sharing an interest in some non-tradable product produced with increasing returns will achieve higher utility living in an area with others also preferring the product. For example, orthodox Jews, who require a *minyan* (ten Jewish men) for prayer and may only walk to synagogue during the sabbath, will achieve higher satisfaction living within walking distance of one another. This is similar to the Tiebout (1956) mechanism, by which consumers choose communities on the basis of the publicly provided good bundle. One might imagine analogous forces encouraging agglomeration of persons sharing similar preferences for private goods. Voting with consumers' feet would simultaneously match consumers with their choices of publicly and privately provided goods only if such preferences were strongly correlated, for example if all vegetarians share the same preference for publicly provided goods.[27] However, it is easier to imagine this mechanism explaining an individual's choice of location within a metro area than his choice of metro areas.

Recent technological change expands the set of easily tradable commodities to include all "content" that can be digitized. Two emerging technologies, satellite radio and Internet radio, hold the promise of increasing the size of the audio content market. CD Radio plans to broadcast 100 channels of programming over satellites which can be received anywhere in the US. A listener wanting "Rock en Español" (channel 34 on the CD Radio list) in Fargo is not limited by the number of similarly inclined listeners in Fargo. Instead, she can benefit from similarly inclined listeners throughout the country. Technologies that increase the size of the market harness

[27] Black's preferences in radio programming must not be perfectly correlated with their preferences for city characteristics: although their satisfaction as listeners increases in the size of the local black population, blacks remain spread throughout the US. Indeed, this is clear evidence that the Tiebout mechanism does not simultaneously solve all public good and fixed-cost private good problems

preference externalities to make relatively unpopular products available. These technologies hold the promise of increasing the satisfaction of persons whose preferences do not match their neighbors.

Results in this study confirm a common feature of trade theory (see, for example, Krugman, 1980), that it is beneficial to have a large home market, as whites do. Although many blacks and Hispanics live in large US broadcast markets, the sharp difference between their preferences and majority preferences prevents them from enjoying the benefit of the home market effect of the large majority populations surrounding them. The market delivers fewer products – and less associated satisfaction – to these groups simply because they are small. The phenomenon can arise even if radio firms are rational and entirely non-discriminatory. Indeed, it may well be optimal for small groups to face fewer options; the value of additional variety to small atypical populations may fall short of the additional cost. Still, whether efficient or not, this is a positive feature of how differentiated product markets operate when there are increasing returns and consumer groups have sharply different preferences. Friedman argues, for markets and against politics, that markets give each consumer what she wants without the strain on social cohesion required by collective choice processes. This may be true in some contexts, but in differentiated product markets with increasing returns – as in politics – a consumer gets more of what she wants if there are more like her. Markets may be more like politics than Friedman suggests.

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Table 1a: Summary Statistics, 1997

	All Markets	Markets with Black Data	Markets with Hispanic Data
Formats	14.80	16.31	16.84
<u>Stations</u>			
Total	24.48	26.65	29.33
Youth-Targeted	5.56	6.48	5.53
Middle-Age-Targeted	14.12	15.32	17.96
Older-Targeted	4.80	4.85	5.84
White-Targeted	22.55	22.62	27.96
Black (non-white)-Targeted	1.92	4.03	1.37
Hispanic-Targeted	1.07	0.78	4.65
Non-Hispanic Targeted	23.41	25.87	24.69
<u>AQH Listening (%)</u>			
Total	15.77	15.98	16.36
White (Non-Black)		15.44	
Black		17.88	
Non-Hispanic			15.80
Hispanic			17.50
Fraction Black	0.08	0.19	0.05
Fraction Black	0.05	0.03	0.25
Fraction Driving to Work	0.42	0.42	0.40
Number of Markets	246	100	51

Table 2: Market Size, Variety, and Listening

	(1)		(2)		(3)		(4)		(5)		(6)	
	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.	Coef	s.e.
Constant	15.557	0.081	12.446	0.678	14.118	0.212	11.981	0.671	13.942	0.261	12.097	0.688
Population (m)	0.306	0.053	0.216	0.052								
Stations					0.068	0.008	0.049	0.009				
Formats									0.124	0.017	0.081	0.018
Northeast			0.905	0.225			0.761	0.222			0.837	0.226
North Central			0.524	0.230			0.667	0.225			0.632	0.230
South			-0.174	0.222			-0.049	0.219			-0.036	0.228
Percent Driving to Work			5.643	1.572			4.282	1.526			3.956	1.570
Percent Black			3.009	0.880			2.730	0.855			2.570	0.904
Percent Hispanic			4.001	0.652			3.468	0.652			3.879	0.654
R-squared	.1197		.3059		.2170		.3417		.1788		.3122	

Note: Regressions of AQH listening on population and measures of available programming variety. All regressions include 246 observations.

Table 3: Entry and Variety and Market Size

	Number of Stations				Number of Formats				AQH Listening (IV)			
	(1)		(2)		(3)		(4)		(5)		(6)	
	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.
Constant	22.552	0.533	13.266	4.553	13.767	0.258	6.766	2.192	11.089	0.824	11.220	0.816
Population (m)	2.736	0.349	2.114	0.347	1.476	0.169	1.193	0.167				
Stations									0.102	0.026		
Formats											0.181	0.046
Northeast			3.565	1.515			1.243	0.729	0.540	0.258	0.679	0.249
North Central			-2.729	1.546			-1.221	0.744	0.803	0.250	0.745	0.249
South			-4.234	1.492			-2.799	0.718	0.259	0.273	0.333	0.286
Percent Driving			20.000	10.565			15.876	5.086	3.597	1.669	2.766	1.739
Percent Black			17.095	5.914			12.810	2.847	1.260	1.129	0.688	1.236
Percent Hispanic			17.119	4.383			5.549	2.110	2.251	0.887	2.996	0.785
R-Squared	.2017		.3397		.2381		.3787		.2390		.2232	

Note: All regressions include 246 observations. Columns 2 and 4 are first-stage regressions for columns 5 and 6, respectively.

Table 4: Stations and Listening, by Race and Format, 1997

	101 Markets with Black Listening			54 Markets with Hisp. Listening		
	Percent of…					
	Stations	Listening		Stations	Listening	
	(1)	(2)	(3)	(4)	(5)	(6)
Format		Non-Black	Black		Non-Hisp.	Hispanic
Adult Contemp. (AC)	5.9	6.7	2.0	5.0	5.4	3.4
AC/Contemp. Hit Radio	2.1	2.9	0.8	2.3	2.9	1.5
Adult Contemp./New Rock	0.6	1.1	0.3	1.1	1.5	0.6
AC/Soft Adult Contemp.	0.1	0.1	0.1	0.1	0.1	0.0
Album Oriented Rock (AOR)	5.3	6.0	0.7	4.5	4.9	2.4
AOR/Adult Contemp.	0.1	0.1	0.0	0.1	0.1	0.0
AOR/Classic Rock	0.2	0.1	0.0	0.1	0.0	0.0
Album Oriented Rock/New Rock	3.0	3.7	0.5	3.1	3.3	1.9
Album Oriented Rock/Progressive	1.0	1.3	0.1	1.8	1.6	0.6
Black	7.5	1.7	32.5	1.6	4.0	1.6
Black/Adult Contemp.	3.2	0.8	18.3	1.4	4.6	1.7
Black/Gospel	1.2	0.0	1.8	0.1	0.0	0.0
Black/Oldies	1.0	0.1	2.4	0.3	0.5	0.0
Black/Talk	0.2	0.0	1.4	0.3	0.4	0.0
Big Band/Nostalgia	4.7	4.2	0.5	4.2	4.1	1.2
Big Band/Nostalgia/Religious	0.0	0.0	0.0	0.1	0.0	0.0
Country	13.0	11.9	1.5	10.6	8.7	4.0
Country/Full Service	0.1	0.2	0.0	5.2	6.0	8.6
Contemp. Hit Radio (CHR, top40)	5.6	6.7	2.5	0.4	0.8	0.4
CHR/Adult Contemp.	0.8	0.9	0.3	0.1	0.0	0.0
CHR/New Rock	0.2	0.3	0.1	0.1	0.2	0.0
Contemporary Hit Radio/Urban	1.1	2.7	7.7	1.5	4.2	6.3
Classical	1.2	2.4	0.5	1.8	3.0	0.9
Classic Album Oriented Rock	3.3	4.0	0.5	4.1	3.8	2.3
Classic Hits	1.5	1.5	0.2	1.1	1.1	0.3
Ethnic	0.2	0.1	0.6	0.4	0.3	0.2
Easy Listening	0.2	0.0	0.0	0.2	0.0	0.0
Full Service/Variety	0.9	0.7	0.2	0.5	0.3	0.1
Full Service/Variety/Talk	1.2	2.4	0.8	0.6	1.7	0.2
Gospel	2.0	0.1	3.8	0.4	0.3	0.0
Jazz	2.0	2.3	6.5	3.0	4.2	2.0
News	1.4	3.0	2.9	1.9	4.6	1.1
News/Talk	2.5	3.2	1.0	3.3	3.4	1.1
Oldies	5.6	6.7	1.7	5.2	6.1	4.4
Religious	5.4	1.2	2.5	3.5	1.2	0.9
Soft Adult Contemp.	3.4	5.2	2.3	3.8	4.7	3.2
Spanish	2.9	7.4	0.2	16.1	0.5	45.7
Sports	2.9	2.1	1.0	3.0	2.7	1.0
Talk	6.0	6.1	1.7	7.0	8.0	2.2
Talk/Classic AOR	0.2	0.4	0.1	0.1	0.5	0.0
Talk/Full Service	0.0	0.0	0.0	0.1	0.0	0.0
Talk/Jazz	0.1	0.2	0.1	0.1	0.2	0.0

Note: black-targeted formats appear bold; older-targeted formats are underlined; and younger-targeted formats appear in italics.

Table 6: Group-Targeted Entry and Own- and Other-Group Size

	White-Targeted Stations		Black-Targeted Stations		Non-Hispanic Stations		Hispanic-Targeted Stations	
	OLS	Ordered probit	OLS	Ordered probit	OLS	Ordered probit	OLS	Ordered probit
Constant	20.504		-1.909		13.255		5.629	
	(4.024)		1.124		(4.106)		(1.164)	
Population (millions)								
White (Non-Black)	4.639	0.681	-0.556	-0.129				
	(0.792)	(0.129)	(0.221)	(0.132)				
Black	-12.783	-1.846	6.916	2.835				
	(4.100)	(0.647)	(1.145)	(0.694)				
Non-Hispanic					3.089	0.491	-0.620	-0.131
					(0.563)	(0.089)	(0.160)	(0.109)
Hispanic					-2.561	-0.429	5.609	1.649
					(2.031)	(0.312)	(0.576)	(0.388)
Northeast	2.714	0.414	0.047	0.304	3.863	0.577	-1.739	-0.944
	(1.390)	(0.218)	(0.388)	(0.258)	(1.400)	(0.217)	(0.397)	(0.266)
North Central	-3.487	-0.436	0.023	0.303	-2.430	-0.325	-1.758	-1.673
	(1.428)	(0.226)	(0.399)	(0.265)	(1.422)	(0.219)	(0.403)	(0.344)
South	-4.221	-0.607	1.897	1.369	-1.913	-0.284	-1.393	-0.916
	(1.291)	(0.204)	(0.361)	(0.243)	(1.223)	(0.188)	(0.347)	(0.220)
Percent Driving to Work	5.170	0.558	6.740	4.207	21.275	3.160	-7.908	-3.017
	(9.731)	(0.152)	(2.717)	(1.683)	(9.913)	(1.524)	(2.810)	(2.062)
N	246	246	246	246	246	246	246	246
R-sq (pseudo for ord. Prob.)	0.348	0.055	0.394	0.122	0.275	0.046	0.470	0.156

Notes: Standard errors in parentheses.

NOTE: some tables have been excised to meet the TPRC space requirement. All tables are available in the version at www.nber.org.

Table 7: What Formats Do Listening Minorities Choose in the Absence of Minority-Targeted Programming? (1997 Listening Data)

	Black Listening					non-Black Listening				
	Number of Black-Targeted Stations									
	0	1	2	3	4+	0	1	2	3	4+
Percent Listening to…										
Black-Targeted Formats	0.0	36.6	62.0	51.5	63.1	0.0	0.9	1.7	2.0	3.3
Other Formats	100.0	63.4	38.0	48.5	36.9	100.0	99.1	98.3	98.0	96.7
AQH Listening Share	17.30	17.32	17.21	17.37	18.38	16.19	14.82	15.26	15.65	15.42
Number of Markets	2	8	13	21	57	2	8	13	21	57

	Hispanic Listening					Non-Hispanic Listening				
	Number of Hispanic-Targeted Stations									
	0	1	2	3	4+	0	1	2	3	4+
Percent Listening to…										
Hispanic-Targeted Format	0.0	25.0	21.0	23.1	49.0	0.0	0.0	0.2	0.7	0.7
Other Formats	100.0	75.0	79.1	76.9	51.0	100.0	100.0	99.8	99.3	99.3
AQH Listening Share	15.55	16.58	17.44	17.43	17.87	15.99	14.69	16.11	16.02	15.68
Number of Markets	4	4	10	6	30	4	4	10	6	30

Note: Black-targeted formats include Black, Black/AC, Black/Talk, Gospel, Ethnic, and Black/Oldies. "Hispanic" stations are classified as Hispanic-targeted.

Table 9: Do Listeners Value Group-Targeted Programming? (Race and Hispanic Status)

	White Listening		Black Listening		Non-Hisp. Listening		Hisp. Listening	
OLS Estimates	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.
Constant	10.687	1.214	13.686	2.337	13.908	1.533	14.376	2.759
White-Targeted Stations	0.111	0.019	0.051	0.036				
Black-Targeted Stations	0.045	0.051	0.298	0.098				
Non-Hisp.-Targeted Stations					-0.006	0.024	-0.064	0.043
Hispanic-Targeted Stations					0.054	0.048	0.238	0.085
Northeast	1.167	0.576	1.352	1.108	2.039	0.548	1.787	1.002
North Central	1.256	0.608	-0.314	1.171	1.737	1.044	1.008	1.933
South	0.617	0.607	0.372	1.168	-0.236	0.372	0.048	0.659
Percent Driving	3.024	2.385	3.464	4.592	4.056	3.740	8.556	6.614
R-Squared	.4754		.1874		.3339		.1799	
N	100		100		51		52	

	White Listening		Black Listening		Non-Hisp. Listening		Hisp. Listening	
IV Estimates	coef	s.e.	coef	s.e.	Coef	s.e.	coef	s.e.
Constant	9.240	1.727	9.073	3.852	13.444	2.421	11.394	4.533
White-Targeted Stations	0.154	0.041	0.187	0.091				
Black-Targeted Stations	0.119	0.133	0.784	0.297				
Non-Hisp.-Targeted Stations					0.102	0.063	0.163	0.124
Hispanic-Targeted Stations					-0.020	0.106	0.166	0.199
Northeast	1.284	0.630	1.520	1.405	0.809	0.951	-0.547	1.852
North Central	1.645	0.746	0.723	1.665	0.920	1.332	-0.662	2.607
South	1.132	0.877	1.556	1.956	0.657	0.645	1.764	1.196
Percent Driving	2.454	2.585	0.182	5.765	-0.985	5.998	2.008	10.824
R-squared	.4294				.0234			
N	100		100		51		52	

Note: Instruments for the numbers of group-targeted stations include group populations. See table 6 for first-stage regressions.

Table 11: Direct Evidence of Preference Externalities by Race and Hispanic Status

	White Listening	Black Listening	Black – White Listening	Non-Hispanic Listening	Hispanic Listening	Hispanic – Non-Hisp Listening
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	12.219	12.317	0.098	14.077	15.800	1.723
	(1.276)	(2.144)	(2.145)	(1.272)	(2.521)	(2.594)
White Population	0.404	0.041	-0.363			
	(0.180)	(0.303)	(0.303)			
Black Population	-0.593	2.723	3.316			
	(0.880)	(1.478)	(1.481)			
Non-Hispanic Population				0.175	0.046	-0.130
				(0.150)	(0.296)	(0.305)
Hispanic Population				0.017	1.004	0.987
				(0.408)	(0.808)	(0.832)
Northeast	1.491	1.299	-0.191	1.249	0.074	-1.175
	(0.721)	(1.212)	(1.214)	(0.595)	(1.179)	(1.214)
North Central	1.020	-0.471	-1.491	0.758	-0.267	-1.025
	(0.735)	(1.235)	(1.238)	(1.169)	(2.317)	(2.384)
South	0.168	0.670	0.502	-0.132	0.608	0.740
	(0.718)	(1.206)	(1.208)	(0.304)	(0.603)	(0.620)
Percent Driving	5.774	10.612	4.838	3.478	2.784	-0.695
	(2.681)	(4.505)	(4.514)	(3.150)	(6.243)	(6.424)
N	100	100	100	51	51	51
R-squared	.3690	.2552	0.068	.3794	.1386	0.154

Note: Standard errors in parentheses. Dependent variable is AQH listening share.