

**The Economics of Foreign Language Media in the U.S: An Empirical Study of
Radio Markets**

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For presentation at the Annual TPRC Conference, Washington, D.C.,
Sept. 29-October 1, 2006

Abstract

We identify 303 radio stations operating in 50 largest MSAs during 2004 that offered at least some programming in one or more of 18 different foreign languages (the large majority of these stations broadcasting Spanish language programming). Using U.S. Census counts of comparable foreign language-speaking populations in these markets, we confirm conventional wisdom that these populations tend to be “underserved”—ie, that the proportion of foreign language programming in these market tends to be less than the foreign language speaking group’s proportion of the population, although these effects are relatively slight for Spanish speakers. We find strong positive statistical relationships between the size of those foreign language populations (based on U.S. Census data) and the amount of radio programming in their respective language that is available. We also find consistently negative relationships between the amount of foreign language programming available and the size of the English language population, confirming the “preference externality” effect. We generally find that logarithmic forms of the language variables have more explanatory power than linear forms, suggesting that foreign language programming availability increases at a decreasing rate as foreign language populations grow. We find similar results for another measure of radio programming variety, the number of foreign language formats per market, and for a measure of programming quality, the % of news/talk programming that is locally produced.

I. Introduction

Wildman and Karamanis (1996) observe that there has been a general presumption in the United States that racial and ethnic minorities are “underserved” by radio or television programming that is directly oriented toward their preferences. The Federal Communications Commission has in fact had a long-standing concern with such apparent shortcomings of service to minorities by broadcast media. For example, a history of taxation and licensing provisions have given preference to minority broadcast station owners (Mason, Bachen, and Craft, 2001).¹

Radio markets in the U.S. offer an opportunity to study media service to minority populations systematically. In this paper, we investigate the availability and content of foreign language radio programming in the top 50 MSAs the United States during 2004. We report on programming offered in 18 different foreign languages within these markets, according to the Bacon’s Radio Directory (2005). Using corresponding demographic information for foreign language speaking groups from the U.S. Census, we demonstrate the extent of “underservice” that may occur, and we establish economic relationships between market size, foreign and English language population sizes, and other indicators of the quantity and quality of the foreign language programming.

Among the main research questions we address: Does the amount of foreign language radio programming that is offered tend to be smaller than, greater than, or approximately reflective of the relevant language group’s proportion of the market’s population? Does the amount of available foreign language programming tend to increase at the same rate, or at a faster or a slower rate than the relevant foreign language population increases? Similarly, how does variety (as measured by the number of different formats available) and quality (as measured by the proportion of originally produced programming) vary with population? Of particular economic interest, how does the availability of foreign language programming vary with the size of other population groups in the market, namely the dominant English language speaking population?

Several authors have focused on the issue of program supply to minority audiences by studying how audiences having different racial/ethnic compositions are valued by advertisers. Webster and Phalen (1997) found a significant negative

¹ The FCC has also acted in the past in an attempt to preserve certain radio formats, such as classical music.

relationship between advertising rates and the proportion of non-whites in a market, and an FCC-sponsored study by Ofori (1999) reported lower CPMs for radio stations targeting minority audiences. In an individual radio station-level study, Napoli (2002) reported significantly lower advertiser valuations for black and Hispanic audiences. In a related paper, Brown and Cavazos (2002) study advertising rates and their relationship to African-American representation in prime-time broadcast television program casts. They find strong preferences by black audiences for programs with African-American casts, and also that such programs statistically under represent the proportion of blacks in the general U.S. population.

Rogers & Woodbury (1996) investigated how market size affects the availability of minority programming. Using a universe of 115 local radio markets, they found that the presence of black and Hispanic audiences leads to high program diversity in terms of 11 defined radio formats.

Perhaps most central of works that the present study builds upon is Waldfoegel's (2003) empirical study of black-oriented and Hispanic-oriented radio programming in 246 U.S. radio markets. The premise of his paper is that due to fixed costs of establishing and operating a radio station and a listener's demand for variety, the number of "black-targeted" ("Hispanic targeted") stations, and the amount of black listening (Hispanic listening) should increase with larger black (Hispanic) populations. Other things equal, however, the number of minority oriented stations and the amount of minority listening accounted for them should decrease with the size of the white population because of "preference externalities." In effect, minority listeners with less intense demands for minority-oriented programming are competed away by an increasing variety and quality of white-oriented programming, although those programmers are presumably seeking primarily to serve the white population. Waldfoegel found that blacks and Hispanics do in fact have relatively intense preferences for programming, and there were strong own effects; that is, there is increasing variety and listening by these groups as their population sizes increase. He found negative cross-effects between white population size and black/Hispanic program variety and listening to be negative as hypothesized; generally, however, these effects were statistically significant only for models involving

the supply of programming, and not listening behavior. The present study offers an opportunity to test the preference externalities hypothesis in an alternative context.

We begin in Section II below with a brief theoretical discussion of the expected relationship between the availability of specialized programming and the size of audience groups to which that programming is directed. We then discuss our database and methodology, followed by some descriptive data, then the results of our statistical models, and finally conclusions.

II. The Economics of “Underservice”

Is there an economic rationale for the hypothesis that minority population groups are likely to have a proportion of available media directed to them that is less than that directed to “majority” (i.e., in our case, native English speaking) populations? One can identify various contributing factors, notably income or other differences that may reduce incentives of producers. Other things equal, however, a common theme of other possible explanations is that greater economies of scale in producing programming for a majority group has spillover effects, leading to a disproportionate supply of majority-oriented programming. That result may obtain either if minority listeners value program variety or if they value program quality in addition to the ethnic or language-specific focus of media programming. Or there may be asymmetric language barriers. If a majority group speaks only the majority language, for example, while a minority group speaks both a native language and the majority language, the supply of minority-focused programming should tend be disproportionately low.

A numerical example demonstrates the latter assertion most simply in the case of language barriers. Let us say that a radio market consists of 24 native English speakers and 16 native Spanish speakers, and that total listening is fixed. Say further that none of the native English speakers also speak Spanish, but that 8 of the 16 native Spanish speakers understand English and the other 8 understand only Spanish. For simplicity, say that the 8 dual language native Spanish speakers value variety and will simply divide themselves equally among the available stations. On the supply side, say that 10 viewers are required to support a single radio station of uniform program quality and that there is free entry.

Simple algebra indicates a unique equilibrium in which there is one Spanish language station and three English language stations, each breaking even. The 10 listeners supporting the Spanish stations consist of the 8 non-English speakers plus 2 (that is, 1/4) of the bilingual group. The 30 listeners of the English language stations consist of the 24 native English speakers and 6 (or 3/4) of the bilingual native Spanish speakers. In this sense, the Hispanics are “underserved,” having 40% of the population but only 25% of the Spanish-language programming. Obviously, these contrasts can become more extreme for small ethnic populations.

It is evident that this same basic result of undersupply to minorities can be obtained via other assumptions. An interesting variation, for example, involves program quantity and quality. If all listeners prefer programming that is oriented toward their native language group, but all listeners also value program variety and quality, then examples can easily be constructed to show that even if language proficiency is symmetric, then listening, along with the aggregate variety and quality of programming, will be disproportionately higher for the majority group. Basically, this occurs because economies of scale in producing programming for the larger size group gives producers an incentive to produce a greater variety of higher quality programming focused toward the larger group. The majority population disproportionately listens to the majority-focused programming because of cultural compatibility as well as higher variety and quality. The minority group, however, is disproportionately attracted to the majority programming because its greater variety and quality work counter to its cultural incompatibility.

Finally, what form should we expect a positive relationship between population size and programming availability to take: linear, increasing at a decreasing rate, or increasing at an increasing rate? If, for example, a population of 1000 is required to support one station and the quality of programming is uniform and consistent, then 2000 people (@ 1000 per station) should attract entry of 2 stations, etc—a linear relationship. If listeners value variety, program availability could increase even faster than population size. On the other hand, if stations increase the quality of their programming as potential audience expands, as we would expect from Shaked and Sutton (1983) and subsequent empirical evidence (Berry & Waldfogel, 2003), then we would expect the supply of

programming hours oriented toward minority groups to increase at a decreasing rate as population expands.

III. Data and methodology

Our primary database is constructed from the 2005 Bacon Directory of Radio Stations and the 2000 United States Census. The Bacon Directory for that year contains detailed technical and operational data on individual radio stations operating in the United States during 2004, notably the following information used for this study: the county in which the station is located, its band, wattage, format, programming language or languages, and the percentage of news and talk programming that is originally produced.² Our basic unit of analysis is the Metropolitan Statistical Areas (MSAs). This study covers the largest 50 MSAs in terms of their 2000 population as reported in the Census. The geographic definitions of MSAs differ from those of Arbitron Metro Radio Markets. The Arbitron markets tend to be somewhat smaller in size, but with only a few exceptions among the top 50 markets, their definitions roughly correspond.³ Individual radio stations were judged to be within an MSA if the county of its location, according to the Bacon directory, was contained in the MSA. The Bacon Directory appears to be relatively comprehensive in terms of radio station coverage. The number of FCC licensed stations reported to be operating at the end of 2004 was 13,525, while the Bacon Directory contained entries for 12,278 stations.⁴

A variety of corresponding demographic information for the general populations of MSAs, and for individuals “five years old and above who report that they speak a language other than English at home” was collected from the 2000 Census.

Table 1 shows summary characteristics of the Top 50 MSAs and the stations operating within them, reduced to quintiles. As indicated by the last two columns, we identified a total of 303 stations that were reported by the Bacon Directory to be (a) licensed in one of the counties contained in these MSAs, and (b) offering at least some

² The Bacon Directory collects information by surveying stations over the previous year, generally between February and October in the case of 2004 (private correspondence with a Bacon Directory spokesperson).

³ Forty two of Arbitron’s top 50 Metro Markets are contained within the top 50 MSAs.

⁴ (2005-02-12). *RadioNewsWeb.Com, February 2005 Archive*. Retrieved September, 2006, from <http://www.radionewsweb.com/2005-02.html>

programming in one or more of 18 different languages other than English, in 2004.⁵ Two hundred and twenty (220) of these stations broadcast one of these languages full-time, and the remaining 83 reported their programming time to be divided among two or more different languages, including English.

The large majority of the foreign language programming that we identified was in Spanish. While 267 of the stations were broadcasting in Spanish, only 36 broadcast in one of the other 17 languages. Roughly the same Spanish to non-Spanish ratio (220 to 26) obtained for stations broadcasting a single language fulltime.

As the end columns of Table 1 also show, the top 50 MSAs contain a little over half of the total U.S. population, about 69% of the Spanish speakers and about 76% of all the 18 foreign language speakers other than Spanish. The familiar tendency for ethnic groups to concentrate within large cities is reflected by their generally greater fractions of total population in the largest sized MSAs.

Similarly, it is apparent that larger markets tend to have disproportionate percentages of the foreign language stations. It is likely, in fact, that the top 50 MSAs contain virtually all radio stations that are broadcasting in languages other than Spanish. We found no radio stations in MSAs beyond the 33rd largest that offered any foreign language programming other than Spanish; only four of the 26 full-time non-Spanish stations were in MSAs smaller than the 13th largest. Although we do not have specific data, it is apparent that the majority of all stations with Spanish-language programming are licensed within the top 50 markets.

Although the total of 2707 stations licensed within the top 50 MSAs that we identified represented only 22% of all radio stations operating in the US, these stations account for a substantially greater fraction of industry revenues. The top 50 Arbitron

⁵ Among the 303 foreign languages stations we studied, eight (seven Spanish and one split between Italian and German) were classified by the Bacon Directory as “non-commercial.” We include these stations in our statistical analysis although their objective are presumably less focused on market forces. First, Berry and Waldfogel (1999) showed in another study that public radio stations tend to have a significant crowding out effect, which means that their existence tend to substitute for the presence of profit-making stations that would otherwise enter the market. Secondly, the contributions mechanism presumably insures that viability of these stations depends on their attracting a substantial audience. In any case, exclusion of these stations (which represent less than 3% of the total foreign language station group), did not affect our findings.

radio markets were reported to generate approximately 40% of total radio industry revenues.⁶

IV. Levels of Radio Service

Selected descriptive data organized by language group appears in Table 2. As shown in the last column, Spanish was by far the largest foreign language speaking group in the U.S. in 2000, accounting for 13.8% of the U.S. population, followed by Chinese, with 1.3%, with all others well under 1%. Comparably, forty-three of the top 50 markets had some foreign language service, although Spanish again dominated, having service in 40 of the top 50 MSAs, compared to a maximum of six MSAs for Chinese and Italian. Stations broadcasting a foreign language only part-time indicate the same basic pattern.. While all 18 languages had some service within the top 50 markets (which occurred by definition of our study criteria), only eight of the language groups were served at all by a full-time station.

Figures 1 and 2 indicate graphically the relationship between the proportion of foreign language minority populations and the proportion of radio programming available to those groups. Our primary measure along the vertical axes of these figures, foreign language, fulltime equivalent stations, measures the amount of available foreign language programming. In cases where the Bacon Directory indicates that a station splits its programming, eg, “Chinese-Vietnamese,” for example, or “Spanish-English,” it is assumed to be one-half equivalent station for each language, and comparably for stations splitting among 3 or more languages. We were able to find detailed information at the websites of 7 such multi-language stations in our sample about the actual proportions of programming hours devoted to the different languages. These few cases varied greatly, indicating no suggested proportional allocation. We know, however, that if a given language has one full-time station and one part-time (eg, a two way language split,) for example, station that the correct number of full time equivalent stations is greater than one and less than two, so that 1.5 is the best estimate.

A number of points are above and below the equal-fractions line for both Spanish language stations (Figure 1) and the combined 17 non-Spanish foreign language groups

⁶ Pearlman, Making Dollars and Sense of PPM. *Forrester Research Study*. Retrieved September, 2006, from www.arbitron.com/downloads/pearlman_summary.pdf

(Figure 2), although the cluster along the horizontal axis of Figure 2, at least, suggest a large number of cases in which a resident foreign language group has no foreign language radio service.

These levels of service data are summarized statistically in Table 3. Fifteen of the 18 foreign language groups have some population representation in all 50 MSAs, but with the exception of Spanish, the availability of any foreign language radio service is uncommon. A summary analysis of the Table 3 data we conducted indicates that in the 869 MSA-language pairs in which there are some speakers, only 80 cases (9.2% of the 869) had any foreign language service. In those cases where the language-speaking group did have at least some foreign language radio service, however, the supply of programming was much more representative of the presence of the foreign language speaking groups. In 50% of those cases (40 of 80), the % of full-time equivalent stations serving the relevant foreign language group exceeded that language group's proportion of the MSA population.

Figure 3 shows a positive relationship between the variety of foreign language formats and the comparable foreign language populations for all stations combined. Only full-time stations are included in this analysis because the formats reported in the Bacon Directory were not language specific in the case of multi-language stations. Similarly, Figure 4 suggests a generally positive relationship between the % of a foreign language station's news/talk programming that is locally produced, and the comparable population's size, again for full-time stations, and for all 18 languages combined. (There were not enough non-Spanish language cases for format variety and % local news/talk to illustrate the relationships usefully.)

We now turn to our regression analysis.

V. Empirical Models

We report a variety of models primarily intended to measure the functional relationship between the sizes of foreign language and English speaking populations and the availability and quality of foreign language programming directed toward those groups.

The general empirical model we test is:

$$FL-FESTATION_{ij} = \alpha + \beta (FL-POP)_{ij} + \gamma (E-POP)_j + \delta (REGION)_j + \eta (INCOME)_j + \theta (COMMUTE)_j + \varepsilon_j$$

where i indicates FL groups, $i = 1 \dots 18$; and j indicates markets, $j = 1 \dots 50$. All variables, and the various transformations of them that we use, are defined in Table 4 below.

The primary independent variables in the empirical models are measures of the foreign and English language populations in the MSA. In general we expect the own effect of an increase in stations broadcasting a given language will be positive with the size of that language group, but due to the preference externality effect, that program availability should fall with an increase in the English language population.

Among a variety of MSA specific demographic variables included to correct for exogenous market-to-market variations are: median family income for the MSA we expect positive signage for *COMMUTE* as an indicator of radio usage. The likely effects of *INCOME* are difficult to predict; greater incomes attract more radio advertising, inducing more programming, but higher income may also induce consumers to substitute higher priced goods and services for free radio. *COMMUTE* should be positive, and we have no prior expectations for the regional dummies.

In the estimated models below, we apply several variations on the general model above, using transformed variables such as logarithms and %'s, as indicated in Table 4. These consist of the % of all full time equivalent stations in the market (*% FL-FESTATION*) and logged forms of the population variables. All models exclude cases in which zero people in the MSA reported speaking a language, and for some models, as discussed below, we exclude zero stations cases.

We estimate comparable models for our measure of format variety and for *% LOCAL* as an indicator of programming quality.

VI. Results

Statistical results for the variety of models are reported in Table 5-9. For the most part, the demographic variables added relatively little to the models. As expected, *COMMUTE* was consistently positive and an often significant factor in programming supply. The *INCOME* coefficient was generally negative and sporadically significant, while regional variables rarely were significant.

Foreign Language Programming Availability vs. Population Size

Results for the number and percentages of full-time equivalent foreign language stations are reported in Table 5. Since there are 18 different languages in our study, and radio usage characteristics of these groups may differ, we estimated both fixed effects and pooled ordinary least square models. Wald's F-tests consistently failed to reject the hypothesis that the language-specific constant terms in the fixed effects models were different, however, so we report only the OLS results. Coefficients were generally more strongly significant in the fixed effects models, but these models otherwise differed very little.

Model (1) in Table 5 shows a significant positive relationship, as expected, between foreign language program supply and the number of full-time equivalent foreign-language stations serving the respective foreign-language speaking groups. Models (2) and (3) show the additional effects of English language population on program supply, confirming the preference externality effect both in linear and logarithmic form. As expected, cross-effects are generally smaller than the own effects for the linear model. Model (4) uses the % of full-time equivalent stations in the market as a dependent variable. As a ratio form, we clearly expect this dependent variable to increase at a decreasing rate with population, and results confirm strong significance of both own and English language populations in the expected directions.

The explanatory power of the logarithmic form (Model 3) is considerably lower than the linear form (Model 2). Inspection of scatter plots suggests this is probably due to the large number of zero station cases, among which there is relatively large variation in the logged population values. Models (5) and (6) compare the linear and log-linear model forms only for cases in which some programming in the relevant language group is provided. Coefficients should be interpreted with caution because excluding zero station cases introduces selection bias. We are interested here, however, in the shape of the station-population function as population increases. The logarithmic forms of these models fit the data somewhat better, suggesting that programming supply increases at a decreasing rate with population, but the overall explanatory power of these two models is not very different.

Because Spanish-language stations and populations tend to dominate our sample, separate results for the Spanish and non-Spanish language groups are of interest. Table 6

reports the Spanish language results. The effects of Spanish language-speaking population size are consistently significant, although English-language population effects are significant only in the log-linear model for % of stations (Model 10). The logarithmic forms (Models 9 and 12) show somewhat better explanatory power of the logarithmic forms.

Finally, Table 7 shows comparable models for the 17 non-Spanish language groups combined. In all of these models, own language effects are significantly positive, but the effects of English language populations are all insignificant. Note that in the unreported fixed effects models, however, all 4 of the comparable English language population cross-effects were negative and 3 were statistically significant. The same patterns of comparison between the linear and logged coefficients for the non-Spanish language OLS models emerged as in the overall population models. That is, the fit for the logged population models were somewhat better when the truncated non-zero station sample is used.

Format Variety and Population Size

In these models, we measure how foreign language radio format variety increases with foreign language speaking and English language populations for full-time stations.

We expect to observe the same basic relationships as with numbers of stations in these models. Results of selected models in Tables 8 and 9, for all languages combined and for Spanish only, confirm these expectations. For all languages combined, own population effects are significant and positive in all models. English language population effects are consistently negative, but significant (marginally) in only case. Results for models that exclude all zero station cases follow the same pattern as the estimates for the full-time equivalent station models reported above; results are marginally better for the logarithmic case when the zero stations cases are excluded. (There were insufficient cases for non-Spanish language models to be estimated.

Program Origin

Models for the percentage of news/talk programs that are locally produced on full-time foreign language radio stations indicate how program quality responds to increasing foreign language and English language populations. Results for all language groups combined and for Spanish only are reported in Table 10.

Only the results for Spanish language stations were statistically significant and had the expected signs. There was again insufficient data for non-Spanish language models alone.

VII. Conclusion

In this study of radio stations that broadcast foreign language programming in one or more of 18 different languages within the largest 50 Metropolitan Statistical Areas in the U.S., we confirm conventional wisdom that these populations tend to be “underserved”—i.e., that the proportion of foreign language programming in these market tends to be less than the foreign language speaking group’s proportion of the population, although these effects are relatively slight for Spanish speakers. In the great majority of cases—disproportionately so for the non-Spanish language cases—no foreign language radio programming is locally available.

We find consistently strong and positive statistical relationships between the size of foreign language populations and the respective amounts of radio programming that is available. We also find consistently negative relationships between the amount of foreign language programming available and the size of the English language population—although these effects are mostly evident for the Spanish-language group—confirming the preference externality effect found earlier for Black and Hispanic oriented radio stations by Waldfogel (2003).

We generally find that logarithmic forms of the language variables have more explanatory power than linear forms, suggesting that foreign language programming availability increases at a decreasing rate as foreign language populations grow.

Finally, we found similar, though generally weaker results for another measure of radio programming variety—the number of foreign language formats per market—and for a measure of programming quality, the % of news/talk programming that is locally produced.

A shortcoming of our study is that our database tended to be dominated by stations and populations of a single language group, Spanish, and we have considered only programming availability, and not listening behavior. We have also not considered factors such as differential value of foreign language speaking audience groups to advertisers to explain differences in programming availability. Overall, however, we find

clear positive relationships between own population size and the availability, variety, and quality of radio programming, and in many cases, negative relationships between those measures and the size of English language populations. As the English language population grows, that is, opportunities for foreign language groups to enjoy programming broadcast in their native languages tend to diminish.

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Table 1
Basic Population and Radio Programming Data by MSA Group Size: Top 50 MSAs

	1-5	6-10	11-15	16-20	21-25	26-30	31-35
Total population (millions)	50.6	23.4	17.9	13.5	10.7	8.7	7.8
% foreign language speaking population (total of the 18)	29.4	21.8	21.3	10.4	10.5	23.8	8.6
% Spanish language speaking	20.0	15.9	14.0	6.3	6.5	16.6	4.0
% foreign language speaking, except Spanish	9.5	5.9	7.4	4.1	4.0	7.1	4.6
Total # of radio stations	463	343	331	271	240	190	227
Total # of stations with foreign language programming (full and part-time)	81	63	46	14	17	33	10
Spanish only	61	59	43	11	15	31	8
non-Spanish	20	4	3	3	2	2	2
Total # of full-time stations with foreign language programming	55	51	36	8	11	24	6
Spanish only	39	47	34	8	11	22	4
non-Spanish	16	4	2	0	0	2	2
	36-40	41-45	46-50	Total of Top 50 MSAs	All US	Top 50 markets as a % of total US	
Total population (millions)	6.6	5.8	5.3	150.2	281.4	53.4 %	
% foreign language speaking population (total of the 18)	13.9	7.8	7.5	20.5	15.4	71.0	
% Spanish language speaking	10.4	4.0	4.6	13.8	10.7	68.9	
% foreign language speaking, except Spanish	3.5	3.8	2.9	6.7	4.7	76.0	
Total # of radio stations	215	190	237	2707	12278	22.0	
Total # of stations with foreign language programming (full and part-time)	20	10	9	303	NA	NA	
Spanish only	20	10	9	267	NA	NA	
non-Spanish	0	0	0	36	NA	NA	
Total # of full-time stations with foreign language programming	11	9	9	220	NA	NA	
Spanish only	11	9	9	194	NA	NA	
non-Spanish	0	0	0	26	NA	NA	

Table 2
Basic Population and Programming Data by Language Group:
Top 50 MSAs

Foreign languages	# of markets with any foreign language service	# of markets with at least one full-time station	Total % of population within the top 50 markets
Spanish	40	37	13.819 %
Chinese	6	2	1.260
Tagalog	1	0	.691
French	1	1	.648
Vietnamese	5	4	.592
Italian	6	0	.557
Korean	3	3	.526
German	2	0	.501
Russian	1	1	.436
Polish	2	2	.382
Portuguese	3	1	.323
Greek	3	0	.210
Persian	1	0	.199
Armenian	1	0	.137
Ukrainian	1	0	.097
Amharic	1	0	.072
Hungarian	1	0	.062
Slovene	1	0	.006
Total	43	37	20.517

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Table 3
Level of Service Measures for the Top 50 MSAs

	# of MSAs with some speaker of the language	% of MSAs with some speakers that have foreign language service	% of MSAs having some service in which the % of fulltime-equivalent foreign language stations is GREATER THAN the % of the foreign language population
Spanish	50	80%	42.5%
Chinese	50	12	50.0
Tagalog	50	2	0.0
French	50	2	100.0
Vietnamese	50	10	80.0
Italian	50	12	33.3
Korean	50	6	100.0
German	50	4	50.0
Russian	50	2	100.0
Polish	50	4	100.0
Portuguese	50	6	33.3
Greek	50	6	0.0
Persian	50	2	0.0
Armenian	50	2	100.0
Ukrainian	47	2	100.0
Amharic	48	2	100.0
Hungarian	50	2	100.0
Slovene	24	2	100.0

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Table 4
Definitions of Variables

Variables	Definitions
$FL-FESTATION_{ij}$	Number of full-time equivalent radio stations that are broadcasting in foreign language i in market j in 2004
$\% FL-FESTATION_{ij}$	% of full-time equivalent radio stations that are broadcasting in foreign language i , as a fraction of all stations broadcasting in market j in 2004
$FORMAT_{ij}$	Number of formats for full-time stations broadcasting in a foreign language i in market j
$\%LOCAL_{ij}$	% News/Talk programming that is locally produced for full-time stations broadcasting a foreign language i in market j
$FL-POP_{ij}$	Population five years and over that speak foreign language i at home in market j in 2000 (in millions)
$LN FL-POP_{ij}$	Natural logarithm of $FL-POP_{ij}$
$E-POP_j$	Population five years and over that speak English at home in market j in 2000 (in millions)
$LN E-POP_j$	Natural logarithm of $E-POP_j$
$INCOME_j$	Median income in market j in 1999
$COMMUTE_j$	% of workers 16 years and over who drive alone or carpool to go to work in market j * average commute time in minutes in market j in 2000
$NORTHEAST_j$	$NORTHEAST_j = 1$ if market j is in Northeastern region $NORTHEAST_j = 0$ otherwise
$MIDWEST_j$	$MIDWEST_j = 1$ if market j is in Midwestern region $MIDWEST_j = 0$ otherwise
$SOUTH_j$	$SOUTH_j = 1$ if market j is in Southern region $SOUTH_j = 0$ otherwise

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Table 5
Full-Time Equivalent Stations Models
All Languages
(OLS)

	Observations with non-zero foreign language population				Observations with non-zero fulltime equivalent foreign language stations	
	<i>FL-FESTATION</i>			<i>% FL-FESTATION</i>	<i>FL-FESTATION</i>	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Constant</i>	-.156 (.3)	-1.101 ^a (1.7)	.797 (.7)	7.064 ^c (3.2)	-7.363 (1.6)	-5.738 (1.1)
<i>FL-POP</i>	6.138 ^c (4.2)	6.284 ^c (4.2)			5.098 ^c (4.6)	
<i>E-POP</i>		-.093 ^b (-2.4)			-.318 ^a (2.0)	
<i>LN FL-POP</i>			.390 ^c (5.6)	.682 ^c (6.2)		2.189 ^c (7.0)
<i>LN E-POP</i>			-.248 ^b (2.1)	-.899 ^c (3.7)		-1.844 ^c (3.8)
<i>INCOME</i>	-.003 (.6)	.000 (.0)	-.018 ^b (2.1)	-.015 (.9)	-.025 (.8)	-.076 ^b (2.3)
<i>COMMUTE</i>	.018 (.9)	.059 ^a (2.0)	.033 (.9)	.069 (1.3)	.475 ^b (2.2)	.599 ^c (3.6)
<i>NORTHEAST</i>	-.138 (1.1)	.061 (.6)	-.121 (.8)	-.152 (.6)	.031 (.0)	1.489 ^a (1.7)
<i>MIDWEST</i>	-.061 (.8)	.027 (.3)	.020 (.2)	.077 (.4)	-.273 (.4)	1.971 ^b (2.3)
<i>SOUTH</i>	.073 (.6)	.022 (.2)	.124 (.7)	.160 (.6)	1.599 (1.6)	1.119 (1.4)
# Obs	869	869	869	869	80	80
F	5.30	4.50	7.03	6.93	7.06	8
Prob > F	.000	.000	.000	.000	.000	.000
R - squared	.576	.582	.214	.231	.656	.668
Root MSE	1.052	1.045	1.433	2.320	2.647	2.600

Note: t-values in parenthesis; ^a $p < .1$; ^b $p < .05$; ^c $p < .01$

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Table 6
Full-Time Equivalent Station Models
Spanish Only
(OLS)

	Observations with non-zero Spanish population observations			Observations with non-zero full-time equivalent Spanish stations		
	<i>FL-FESTATION</i>			<i>% FL-FESTATION</i>	<i>FL-FESTATION</i>	
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
<i>Constant</i>	-11.465 ^b (2.4)	-15.262 ^b (2.6)	-24.225 ^b (2.3)	29.433 ^a (1.8)	-20.826 ^c (3.6)	-28.098 ^b (2.6)
<i>FL-POP</i>	3.857 ^c (3.6)	4.979 ^c (2.9)			4.316 ^c (3.0)	
<i>E-POP</i>		-.671 (1.1)			-.649 (1.3)	
<i>LN FL-POP</i>			3.311 ^c (5.7)	5.679 ^c (6.6)		2.942 ^c (4.5)
<i>LN E-POP</i>			-1.075 (1.0)	-7.194 ^c (3.6)		-.838 (.7)
<i>INCOME</i>	-.044 (.8)	-.011 (.2)	-.133 ^c (2.9)	-.059 (.8)	-.026 (.4)	-.122 ^b (2.5)
<i>COMMUTE</i>	.762 ^c (3.5)	.883 ^c (3.6)	.463 ^a (1.9)	.720 (1.5)	1.172 ^c (4.1)	.663 ^b (2.5)
<i>NORTHEAST</i>	-1.913 (1.4)	-.596 (.4)	.055 (.0)	.383 (.2)	.091 (.1)	-.221 (.2)
<i>MIDWEST</i>	-2.436 ^b (2.6)	-1.408 (1.2)	.308 (.3)	.600 (.3)	.002 (.0)	1.106 (1.0)
<i>SOUTH</i>	-.619 (.6)	-.367 (.3)	.979 (.9)	1.217 (.6)	-.041 (.0)	1.112 (.9)
# Obs	50	50	50	50	40	40
F	13.00	9.32	16.66	15.40	9.73	11.86
Prob>F	.000	.000	.000	.000	.000	.000
R-squared	.646	.661	.795	.717	.713	.805
Root MSE	3.179	3.146	2.447	4.366	2.944	2.425

Note: t-values in parenthesis; ^a $p < .1$; ^b $p < .05$; ^c $p < .01$

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Table 7
Full-Time Equivalent Station Models
All non-Spanish
(OLS)

	Observations with non-zero foreign language population observations			Observations with non-zero full-time equivalent Spanish stations		
	<i>FL-FESTATION</i>			<i>% FL-FESTATION</i>	<i>FL-FESTATION</i>	
	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
<i>Constant</i>	.000 (.0)	-.144 (.9)	-.731 ^a (1.7)	.411 (.5)	-1.265 (.4)	-2.250 (.6)
<i>FL-POP</i>	4.643 ^c (3.5)	4.999 ^c (3.7)			3.897 (1.2)	
<i>E-POP</i>		-.016 (1.0)			.035 (.3)	
<i>LN FL-POP</i>			.038 ^c (4.1)	.071 ^c (3.1)		.431 ^c (2.8)
<i>LN E-POP</i>			.040 (1.0)	-.102 (.9)		-.227 (.5)
<i>INCOME</i>	-.001 (.4)	.000 (.2)		.007 (.9)	.000 (.0)	-.007 (.5)
<i>COMMUTE</i>	.001 (.2)	.007 (1.0)	-.004 (.5)	.011 (.8)	.071 (.6)	.089 (.9)
<i>NORTHEAST</i>	.002 (.1)	.033 (1.2)	.016 (.5)	.065 (1.0)	.055 (.1)	.331 (.7)
<i>MIDWEST</i>	.020 (.9)	.037 (1.4)	-.011 (.3)	.016 (.4)	.055 (.1)	.375 (.7)
<i>SOUTH</i>	.004 (.2)	-.002 (.1)	-.001 (.1)	-.036 (1.0)	.264 (.6)	.177 (.5)
# Obs	819	819	819	819	40	40
F	3.37	3.24	2.52	2.58	2.3	2.72
Prob>F	.003	.002	.015	.012	.051	.025
R-squared	.314	.319	.092	.068	.300	.314
Root MSE	.231	.230	.266	.533	.865	.856

Note: t-values in parenthesis; ^a $p < .1$; ^b $p < .05$; ^c $p < .01$

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Table 8
Format Variety Models
All Languages
(OLS)

	Observations with non-zero foreign language population		Observations with non-zero fulltime equivalent foreign language stations	
	<i>FORMAT</i>		<i>FORMAT</i>	
	Model 19	Model 20	Model 21	Model 22
<i>Constant</i>	-.260 (1.0)	.411 (.7)	-1.096 (.5)	-6.638 ^a (2.0)
<i>FL-POP</i>	2.719 ^c (4.3)		1.823 ^c (3.8)	
<i>E-POP</i>	-.032 (1.6)		-.120 (.9)	
<i>LN FL-POP</i>		.172 ^c (5.6)		1.130 ^c (4.7)
<i>LN E-POP</i>		-.100 ^a (1.8)		-.415 (1.4)
<i>INCOME</i>	-.002 (.9)	-.010 ^b (2.4)	-.042 ^c (3.0)	-.053 ^c (3.0)
<i>COMMUTE</i>	.020 (1.4)	.010 (.6)	.219 ^b (2.0)	.163 ^a (1.8)
<i>NORTHEAST</i>	-.022 (.5)	-.090 (1.4)	-.281 (.7)	-.059 (.1)
<i>MIDWEST</i>	-.034 (.9)	-.032 (.5)	-.227 (.6)	.222 (.4)
<i>SOUTH</i>	-.023 (.4)	.022 (.3)	-.184 (.4)	.219 (.4)
# Obs	869	869	51	51
F	5.35	7.43	5.38	4.87
Prob>F	.000	.000	.000	.000
R-squared	.567	.217	.595	.631
Root MSE	.468	.629	1.312	1.251

Note: t-values in parenthesis; ^a $p < .1$; ^b $p < .05$; ^c $p < .01$

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Table 9
Format Variety Model
Spanish Only
(OLS)

	Observations with non-zero foreign language population		Observations with non-zero fulltime equivalent foreign language stations	
	<i>FORMAT</i>		<i>FORMAT</i>	
	Model 23	Model 24	Model 25	Model 26
<i>Constant</i>	-3.834 ^a (1.7)	-5.399 (1.4)	-4.899 ^b (2.2)	-6.749 (1.5)
<i>FL-POP</i>	2.339 ^c (2.9)		2.114 ^c (2.9)	
<i>E-POP</i>	-.385 (1.5)		-.399 ^a (1.8)	
<i>LN FL-POP</i>		1.403 ^c (4.9)		1.262 ^c (3.7)
<i>LN E-POP</i>		-.654 (1.5)		-.533 (1.0)
<i>INCOME</i>	-.032 (1.5)	-.087 ^c (3.9)	-.042 ^a (1.8)	-.084 ^c (3.7)
<i>COMMUTE</i>	.338 ^c (3.4)	.192 ^a (1.9)	.413 ^c (3.7)	.246 ^b (2.2)
<i>NORTHEAST</i>	-.905 (1.6)	-.704 (1.6)	-.587 (1.1)	-.990 ^a (1.9)
<i>MIDWEST</i>	-.887 (1.5)	-.258 (.4)	.120 (.2)	.501 (.7)
<i>SOUTH</i>	-.692 (1.4)	-.258 (.5)	-.461 (.9)	-.133 (.2)
# Obs	50	50	37	37
F	9.23	15.6	8.78	7.22
Prob > F	.000	.000	.000	.000
R-squared	.688	.763	.721	.752
Root MSE	1.301	1.134	1.243	1.173

Note: t-values in parenthesis; ^a $p < .1$; ^b $p < .05$; ^c $p < .01$

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Table 10
% Local News/Talk Models
Spanish and All Languages Combined
(OLS)

	Spanish	All Languages
	<i>LOCAL</i>	<i>LOCAL</i>
	Model 27	Model 28
<i>Constant</i>	178.495 ^c	63.243
	(3.4)	(1.1)
<i>FL-POP</i>		
<i>E-POP</i>		
<i>LN FL-POP</i>	13.028 ^c	4.141
	(3.1)	(1.1)
<i>LN E-POP</i>	-13.081 ^b	0.285
	(2.5)	(0.1)
<i>INCOME</i>	0.404	0.267
	(1.4)	(1.0)
<i>COMMUTE</i>	-4.003	-1.869
	(1.6)	(0.7)
<i>NORTHEAST</i>	4.150	-5.813
	(0.5)	(0.5)
<i>MIDWEST</i>	32.824 ^c	14.338 ^a
	(3.9)	(2.0)
<i>SOUTH</i>	9.121	-5.102
	(1.5)	(.8)
# Obs	33	41
F	2.69	2.56
Prob>F	0.032	0.032
R-squared	0.436	0.185
Root MSE	17.238	19.912

Note: t-values in parenthesis; ^a $p < .1$; ^b $p < .05$; ^c $p < .01$

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Figure 2
% Non-Spanish Stations vs % Non-Spanish Population
Full-Time Equivalent Stations in the Top 50 Markets

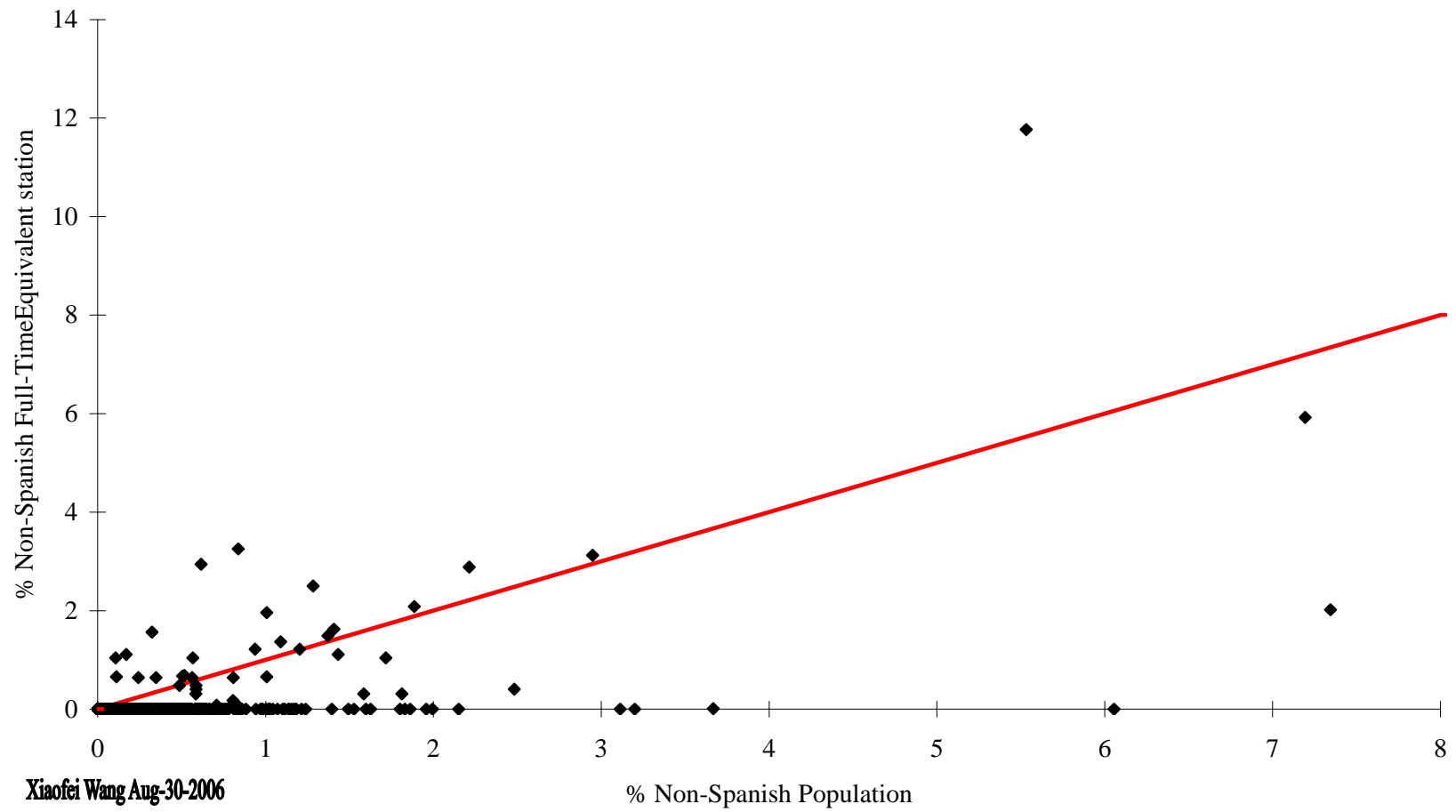
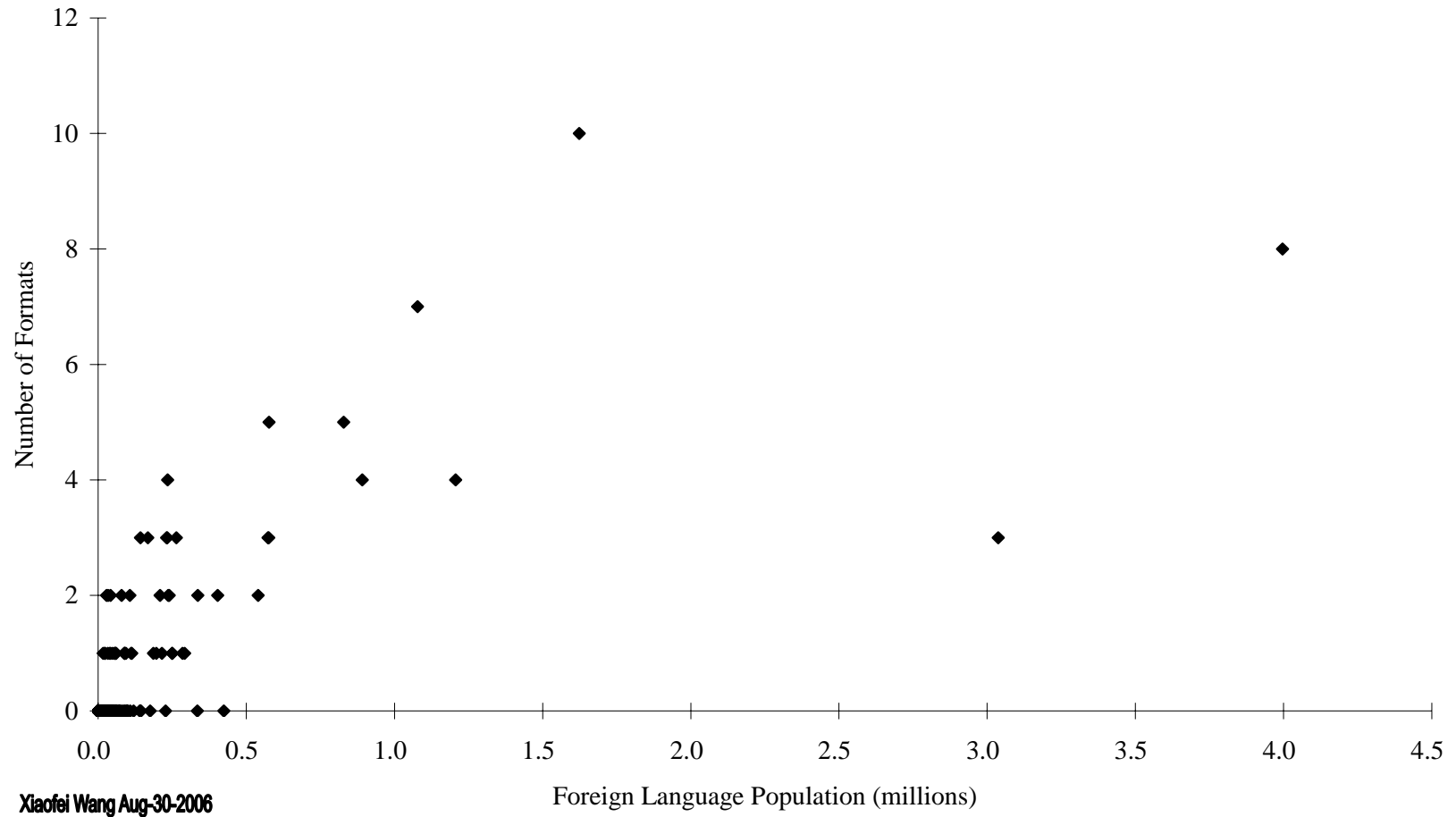
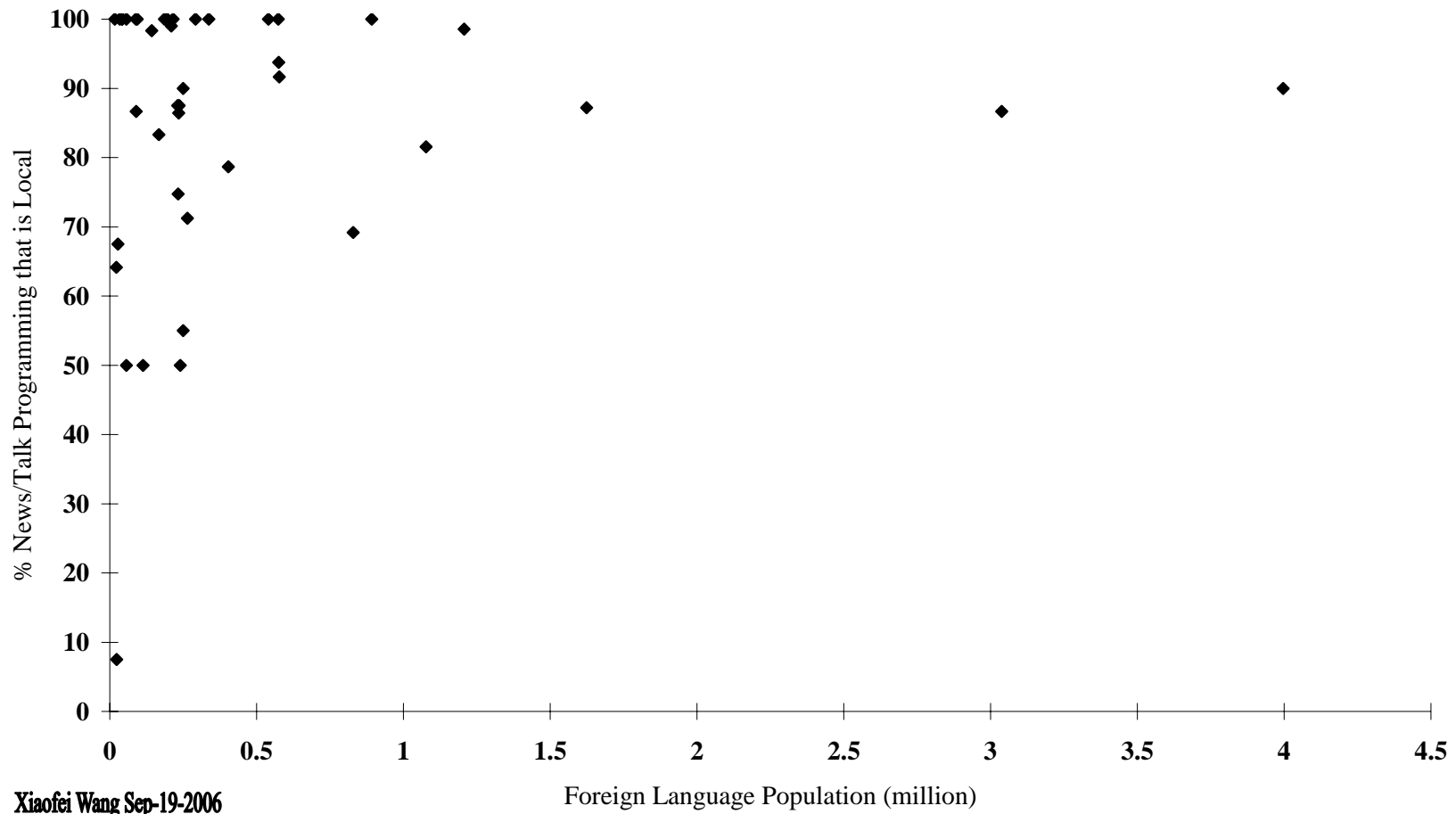


Figure 3
Number of Formats vs Foreign Language Population (Millions)
Full-Time Stations in the Top 50 Markets



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Figure 4
% News/Talk Programming that is Local vs. Foreign Language Population (Millions)
Full-Time Stations in the Top 50 Markets



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