

**THE SHIFTING GEOGRAPHICAL PATTERNS OF FOREIGN  
LANGUAGE ENROLLMENTS IN U.S. COLLEGES AND  
UNIVERSITIES 1960–1998**

by

**John Stefan Spindler**

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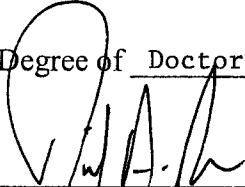
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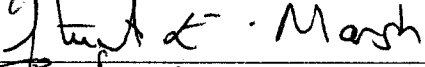
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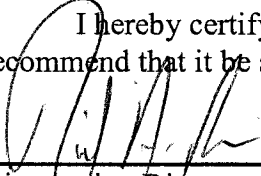
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## ***ABSTRACT***

The determinants of foreign language enrollment in U.S. colleges and universities were modeled for ten study years between 1960 and 1998. The units of analysis were at two different geographic scales: the state and EA (Economic Area) levels.

Developmental characteristics, foreign language study requirements, and foreign language availability were found to be the strongest determinants of *absolute* foreign language popularity, measured as the percentage of all college students in a given geographic area who study a foreign language. Demographic and geographic characteristics were found to be the strongest determinants of *relative* foreign language popularity, or the percentage of all foreign language students enrolled in a particular foreign language. Supply-side factors were of equal importance with demand-side factors in determining absolute foreign language popularity, but demand-side factors predominated in regards to determining relative foreign language popularity. Spanish displayed a distinctive pattern of determinants, consonant with its outsize share of enrollments.

## ***Chapter 1 - INTRODUCTION***

**"To attempt to be religious without practicing a specific religion," said Santayana, "is as possible as attempting to speak without a specific language."**

### **1.1 Lingua Francas**

One of the many barriers to universal humanity is that when we speak, we are constrained to use a particular language. It has often been observed that this locks us into the nuances, idiosyncrasies, and history of that language. More banal, and perhaps less observed in scholarly fashion, is the ensuing necessity for at least some people to learn new languages in order for different language groups to communicate. This means choosing a specific language (or a very small group of languages), and eliminating the countless others. Repetition of this process means that some languages attain 'lingua franca' status as a preferred means of exchange, in some ways like a commonly used currency. In some cases there is little competition for a preferred foreign language. In other cases, such as in the Netherlands, where English, German, and French are all widely studied, there is keener competition among foreign languages. This begs the question as to what factors contribute to the relative popularity of one foreign language over another. It has been said that 'language follows power,' but this is less than satisfying to those who believe more articulated explanations can be uncovered.

### **1.2 Study Purpose**

This dissertation work is an attempt to model the determinants of modern foreign language study in U.S. colleges and universities between 1960 and 1998. This work does not address a particular social or planning problem. It is basic research aimed at the most

fundamental level of understanding. However, this general line of research may some day be useful in evaluating the effects of foreign language study on regional economic competitiveness. As the chapter on significance details, the relevance of foreign languages sometimes appears in discussions of globalization, and there is rising concern in the U.S. about the integration into society of immigrants with limited English-language ability.

Foreign language study is operationalized as a dependent variable in two ways. The first of these is foreign language penetration, and the second of these is foreign language allocation. Foreign language penetration is the absolute popularity of a foreign language; the percentage of all students in a geographic area that study a given foreign language. Penetration can refer to a particular foreign language or to the combined, overall percentage of students that study any foreign language. Foreign language allocation, on the other hand, is the relative popularity of a foreign language. Foreign language allocation is the percentage of foreign language students that study a particular foreign language.

### **1.3 Language Learning Costs**

Not only does the specific nature of languages constrain the number of languages that are anointed as worthwhile to learn as a second language, but learning a second language is also quite costly. In most circumstances, our native language is bequeathed to us by our birth parents. Science has not yet provided us with the means to change our genetic endowments, but we do have the possibility of learning new foreign languages. We can learn new foreign languages in an organic, playground sense as a young child, or

when older, in an academic setting. In the case of the former, the process is not consciously work-intensive, but the grasp and applicability of the new language is limited. In the case of the latter, natural linguistic aptitudes vary, but to achieve fluency in a foreign language is usually a quite substantial investment of time and effort. One scholar estimates it would require a minimum of 12,000 hours of instruction and exposure to reach native-like fluency in a foreign language such as English. To achieve modest ability in a foreign language, 1,500 to 2,000 hours of instruction and exposure would be the corresponding figures (Piron 1994).

There is also a substantial cost in maintaining fluency. Fluency dissipates with nonuse of the foreign language. Thus, we can think of foreign languages as having both 'start-up' and 'maintenance' costs. Even if fluency is achieved, the telltale traces of an accent linger, just as our physical appearance suggests our ancestry. The language we first learn is not our destiny, but new languages in the adult, formal sense come at a great cost.

#### **1.4 Does Anyone Care?**

In economic geography, the 'Anglo-Saxon' bias is the name given to the lack of attention paid to geography's role in economics by British economists. Much of the early work in economic geography was carried out by those in Germany, like Alfred Weber. Today, one finds that the intersection of economics and language is not considered of any real importance. It can seem that those today who study the intersection of economics and second languages tend to be Francophones. This may be attributed in part to another type of 'Anglo-Saxon' bias; Anglo-Americans are the least likely of any linguistic group

in the world to have to learn a foreign language, and consequently, they see this field as less important than Francophones. The decline of French as a second language and the rise of English in the 20<sup>th</sup> Century is a likely explanation for this level of interest among Francophones. In the last two centuries, Francophones have gone from a situation where educated Anglophones would be expected to know French, to a situation where educated Francophones are expected to know English. However, Francois Grin says that North Americans study the economics of language to a greater extent than others (Grin 2003). North American study, however, is heavily concentrated on the earnings impacts of immigrants speaking languages besides English.

While there is some geographic study of native languages, there is no geographic study of second languages. This may be due in part to the variant of the 'Anglo-Saxon' bias mentioned above. According to D.W. Gade, American geographers ignore foreign languages and have weak language competency (Gade 1983). However, the geographer's motto is 'place matters', not 'place matters; languages do not.' A geographic component to foreign language study should not be too difficult to grasp. Native speakers of languages tend to be quite clustered. It makes sense that the clustering of native languages may reflect a subsequent clustering of second languages.

One can posit that language ability is a barrier to interaction, like space. Countries whose populations speak the same language should trade with each other more, just as countries that are located closer to each other should trade more. Greater foreign language ability among a country's inhabitants decreases the interaction cost, just like better transportation links decrease the spatial interaction cost. One could argue that the

linguistic effect is self-reinforcing; having a high foreign language penetration that leads to more trade could then lead back to even greater penetration of the required foreign language.

One would expect that foreign language popularity is influenced by a kind of linguistic gravity, in addition to 'lingua franca' effects. States that are more populous or have a larger economy, when divided by functional distance, should exert greater linguistic gravity. Outside of the United States, often people first study English for its role as a lingua franca, and then an additional, more localized foreign language. For example, in Eastern Europe, German is often the secondary, more local foreign language of choice. Japanese has a similar position in Korea.

If you look at Europe, you can see a clear division between northern Europe and Latin Europe (France, Italy, Iberia) in terms of spatial interaction. Latin European countries trade more among each other than with northern European countries, and northern European countries trade more with each other than with Latin Europe. English as a foreign language became popular first in northern Europe, and it did not replace French in Latin Europe until the 1960s (Portugal excepted).

America's dominance in the post World War II era helped to cement English as the world's lingua franca. Some argue that being native speakers of the world's lingua franca makes learning foreign languages less sensible for Americans. It is true that no foreign language will provide Americans with as much value as learning English provides to native speakers of other languages. The geographer David Plane has stated that for some Americans, learning foreign languages is essentially a hobby. Others

attribute the lack of foreign language ability of Americans to a conscious willfulness to be ignorant, but the cost of learning and maintaining a foreign language, in addition to English's role in the world, are more plausible explanations. At the college level, the democratization of higher education (and thus the lowering of average academic quality and demeanor) and lessening of foreign language study requirements are additional explanations that have been put forth.

Some have argued that English's role as the world's lingua franca accrues benefits to Americans in much the same way as the dollar's role as the world's reserve currency. We cannot use English's role as lingua franca to actively redistribute wealth in the same way as inflating the supply of dollars, but there is a passive, static benefit. Americans can often find foreigners who speak English. Sometimes Americans are surprised or even insulted when foreigners cannot understand English.

One could posit that foreigners need to learn English, and Americans can go play golf or do something else with their time. This gives us extra time, and less effort spent on the hard work of learning a foreign language. On the other hand, we give up some power in this exchange. For example, those in charge of translation chokepoints gain extra control over what information Americans learn about the outside world. We can access foreign newspapers via the internet, but unless we are multilingual, we are constrained to read the English language sections, which are often only a small subset of the size of the native language offerings.

Francois Grin (2003) further articulates the advantages that a lingua franca, such as English, accrues for its native speakers. An important example he cites is the

‘communication savings effect,’ whereby native speakers of languages other than the lingua franca will make an effort to initially express themselves in the lingua franca (such as non-native-English speakers publishing academic papers in English). Conversely, native speakers of the lingua franca do not need to translate their messages into other languages. Another example previously alluded to is the ‘language savings effect,’ whereby native speakers of the lingua franca do not need to invest time into learning foreign languages; very similar is the ‘alternative human capital investment effect,’ whereby money not invested in foreign language study can be diverted elsewhere. Grin estimates that the United States saves \$422 per year per child, or \$16 billion total a year, by not having to seriously focus on foreign languages in primary and secondary education.

Even though native speakers of English have the least incentive to learn foreign languages, this is not the same as to say there is no benefit at all. A geographer might point out that an American metropolitan area’s location (such as on an island or along a border) could significantly increase the benefits to the inhabitants of being able to communicate in a foreign language. Similarly, we might expect that in a country as geographically diverse and expansive as the United States, there is considerable heterogeneity in the influences determining foreign language study. In fact, the results of this dissertation do show considerable heterogeneity, with some broad underlying patterns.

An important distinction in these influences is whether to study any foreign language at all, and once that decision has been made, which specific language to choose.

This dissertation work provides general support for this two-stage conceptual process. Academic requirements that force students to take foreign languages, the presence of high quality instruction, and the developmental level of the social milieu serve to make student enrollment in foreign languages more likely. The ethnic background of students and the geographic location of colleges have more influence in the second stage of this process – the choice of the language to study.

There is an exception to this two-stage process in recent years in the case of Spanish. In the United States, Spanish has become the most popular modern foreign language by a large margin. Increased incidence of limited English ability or non-English use at home among the inhabitants of a region spurs the likelihood of enrollment in any foreign language. It also spurs the likelihood of enrollment of any student in Spanish, not just the relative share of all foreign language students enrolled in Spanish. This suggests that some students take Spanish for its own sake; Spanish has an appeal in the first stage of the process, unlike other foreign languages.

## ***Chapter 2 - SIGNIFICANCE***

This chapter discusses the relevance of the study of foreign language enrollment in theoretical economic terms, and then, later, in terms of current events relating to globalization and the integration into mainstream U.S. society of foreigners with limited English ability.

### **2.1 Foreign Language as a Regional Economic Characteristic**

In the broadest sense, the significance of this study is its relation to the idea of modern foreign language penetration as a regional economic characteristic, much like educational levels in general, or employment sectoral weightings. Of course, according to Francois Grin (Grin 1994), ethnic and linguistic variables are traditionally not thought to be important by economists in resource allocation, but this may be changing. Grenier says that second language learning is an investment in human capital (Grenier 1982). Others conceptualize foreign language study as tapping into a network (Harris 2001). If you presume that if you were to locate a business somewhere, a region where you could easily find speakers of your language could command a premium over a region where you could not, *ceteris paribus*. Less efficient communication raises the cost of doing business. Additional areas of significance include the provision of public services in foreign languages, education, and military intelligence.

### **2.2 Spatial Interaction**

You could hypothesize that learning modern foreign languages is a means of bridging a communication gap. More spatial interaction should occur among regions that have less of a communication gap. If all residents of the European Union woke up and

were able to speak native-speaker-quality English, exclusively, would patterns of spatial interaction significantly change? The economist Carr (Harris 2001) believes that communication would be more efficient if all communication were to be conducted in the same language. Should spatial interaction increase where there is greater foreign language study? Roger Vickerman (1998) believes that less French investment occurred in Kent after completion of the Channel Tunnel than otherwise expected. The functional distance was reduced, but the lack of French language ability among the region's population constituted a remaining barrier.

### **2.3 Globalization**

The ultimate goal of this line of research may well be to examine the economic impacts of foreign language study. This is most closely referenced in discussions of globalization and the concomitant need to study foreign languages by public school students. The following is a specific illustration of this. Recently, the San Diego Unified School District decided to implement a Spanish biliteracy program (Magee 1999). Native English speakers would begin instruction in Spanish at the earliest grades. Spanish would be incorporated into every school lesson, throughout the day, unlike standard instruction, which segregates Spanish instruction into a single class period. Most would agree that this policy is more likely to produce Spanish fluency than the standard practice of high school foreign language electives. However, it would also likely consume a far greater share of time and monetary resources. Policy makers might wish to know the cost/benefit ratio of such expenditures and relationship to geographic location. How might this change the cost surface of this region vis-à-vis other regions?

Will requiring students to study a foreign language induce greater spatial interaction for a metropolitan area, such as San Diego? Will San Diego trade more readily with other metropolitan areas in foreign countries? Is mandating foreign language study a means for a region to become connected to an expanded network? Granted, this is all likely more relevant for smaller countries where obscure languages are spoken, and returns to English speakers learning other languages are likely lower than the reverse.

Speaking more generally, the lack of foreign language ability among Americans is viewed as a detriment in terms of global competitiveness. According to James Murdoch, there is no guarantee that English will remain the language of the internet. Internet materials in Mandarin, Hindi, and Spanish are increasingly available. The English-speaking share of internet users is rapidly dropping (Wells and Teather 2000). There is also a large demand for translation among web pages of different languages. One of the companies in this business is located in Hawaii, facilitated by Hawaii's international characteristics (Lloyd 1999). In San Antonio, businessmen proposed to make that city completely bilingual. According to one local businessmen, this would allow San Antonio's population to take advantage of its natural resources, such as proximity and historic ties to Mexico (*Plan Proposes that San Antonio become Totally Bilingual* 2000).

#### **2.4 Public School Initiatives**

The specific mechanism for effecting this increased global competitiveness is increased foreign language study in public schools. This idea is found all over, not just in San Diego. In Texas, a state representative proposed requiring two years of Spanish study, specifically, in order for high school students in his state to graduate. He says that

the reason for this is global competitiveness, and not ethnic or minority accommodation. Teachers of other languages, such as French, were angry about this proposal. They believed it would virtually eliminate study of other languages, as very few students would study a second foreign language in addition to Spanish (Griest 1999). The Miami–Dade County school board has called bilingualism a ‘survival skill’ and has proposed mandatory study of a foreign language for students from kindergarten through high school (Farrell 1998).

One means of fostering foreign language ability is the ‘dual-immersion’ school, where general instruction is carried out in two languages. In Los Angeles, a proposed charter school would offer half of the instruction in Spanish, and the other half in English (*New Charter School in Los Angeles Unified School District* 2001). A dual-immersion program in Glendale, California would put equal numbers of English-speaking and Spanish-speaking students in the same classrooms (Gao 2001). According to the advocacy group LULAC, all children in Texas, starting with kindergarten, should have the option of dual language instruction (Dailey 2000). Former Education Secretary Richard Riley once called for the creation of a thousand new dual-immersion schools. According to him, these schools would help both to preserve ethnic heritage among Hispanics and increase global competitiveness (McQueen 2000)

Critics point out that English-French dual-immersion in Canada has not resulted in useful French ability among native speakers of English (Monastyrskij 2001). Commentator Steve Sailer says that proposed dual-immersion public schools tend to be English-Spanish, but that promoting Mandarin Chinese or Japanese would actually make

more sense in terms of improving Americans' global competitiveness (Sailer 2000a)

Despite admonitions about the need to learn foreign languages, Americans show little interest in them, and they often have nothing to show, even after years enrolled in a foreign language.

"I don't think there's ever been an idea of bilingualism in American society," said Charles L. Glenn, a professor of educational policy at Boston University. "We have neither attempted to help the immigrant maintain a home language, nor have we sought to make English-only kids be at all proficient in any other language." (Steinberg 2001)

Efforts to have native speakers of English in American public schools learn foreign languages are sometimes associated with efforts to accommodate native speakers of other languages besides English. As Americans are often limited in their foreign language ability, the need to achieve the latter accommodation is often of significance. Lack of English ability among students is a tremendous challenge in California public schools. In 1996, students with limited English proficiency were thought to comprise 25% of the total (Guthrie 1997). And elsewhere, Puerto Rican teachers are being sought in order to meet the demand for bilingual Spanish-English teachers in the U.S. proper (*Puerto Rico Becoming Recruiting Heaven for U.S. School Districts* 1998).

Bilingual instruction is provided because the 1964 Civil Rights Act is often now interpreted to mean that government entities must provide services in foreign languages to residents with limited English ability (Gribbin 2000). Typically these people are immigrants. In addition to schooling, this interpretation has implications for a wide variety of other government services, such as the courts, health providers, and police.

## **2.5 Other Public Services**

In 2000, five new languages were added to California's court interpreter program: Armenian, Cambodian, Mandarin Chinese, Russian, and Punjabi. Shortages of interpreters often delay court proceedings (Weinstein 2000). In New Mexico, a judge has ruled that potential jurors cannot be excluded simply because they cannot speak English (Koidin 1999). There are federal mandates for multilingual voting materials in Spanish, Asian, American Indian, and Native Alaskan languages. These mandates can greatly increase the cost of holding elections (Neidorf 2002). Under former President Clinton, there was a directive to greatly increase the number of federal documents available in languages other than English (Newman 2000).

Not a result of a federal mandate, but perhaps reflecting the general spirit of affairs, in El Cenizo, Texas, a law was passed that required all city meetings and functions to be held in Spanish (Diaz 1999). The courts have enforced multilingual requirements against private business, as well as government agencies. In Gilroy, California, a used car dealership was fined for not providing Spanish language buyer's guides to its Spanish-speaking customers (Bennert 2000).

Some New York hospitals have been sued for failure to provide Spanish-language services (Mozes 2002). Hospitals often rely on orderlies to provide Spanish translation, which is considered inadequate by some (Duarte 2000). Some doctors say multilingual service mandates are financially unreasonable (Chavez 2000). In California, most hospitals can offer services in Spanish. Greater challenges come when less commonly spoken foreign languages are needed (Donaldson 2001).

In Seguin, Texas, it was proposed to pay higher wages to Spanish-speaking city employees (Croteau 2003). Westminster, Colorado, pays multilingual police officers a bonus of between \$500 and \$1000 a year (Robinson and Kelley 2000). In Phoenix, Arizona, firefighters who start learning Spanish earn an extra \$100 a month (*Latino Culture Sweeps Across U.S.* 2003). Texas now requires police officers to learn Spanish as a requirement for intermediate police certification. Critics of multilingual public services point out that Spanish-speakers are accommodated to a much greater degree than native speakers of other foreign languages (Betsch 2002). ‘Survival’ Spanish is being taught to police officers in Tucson (Teibel 2001), and also in Tennessee (Whitaker 2001). In Santa Ana, California, all city employees are required to be bilingual; 80% of its residents speak a language other than English at home (Carter 2001). An employee of Miami–Dade county was actually fired for failing to learn Spanish in 60 days (Price 2002).

## **2.6 Spanish in the United States**

The significance of foreign languages is also often associated with the increased importance of Spanish in the United States. Spanish is the first challenge to the primacy of English in American life. Despite the evidence from the 1964 Civil Rights Act-derived mandates, some allege this is driven by Hispanic consumer power (Branigin 1999). It is sometimes asserted that Spanish is the ‘unofficial second language of the U.S.’ (Rodriguez 2000).

Monolingual English speakers fell to only 82% of the U.S. population in 2000, the lowest share since the 1920s and 1930s; Spanish speakers are 10% of the U.S. population

(Westphal 2001). A majority of nationwide ATMs are now multilingual; 90% offer both English and Spanish. Univision is the fifth-largest broadcast network in the U.S. (Price 2002), and there has been a large spread of Spanish broadcast media in the U.S., even in areas where Hispanics have not traditionally lived (Tobar 2000). As of 1998, there were 454 radio stations in the U.S. broadcasting full time in Spanish (*Spanish Broadcasting Builds on a Growing Radio Audience* 1998). The first time a Spanish-language television advertisement was used in a U.S. presidential primary election was for Bush in 2000 (*Bush to Air Spanish Ad in Arizona* 2000). However, commentator Steve Sailer points out that despite using Spanish in the 2000 election, Bush nevertheless lost the Hispanic vote by a landslide (Sailer 2000b). The poor English ability of Hispanic immigrants has led to a greater need for American businesses to communicate in Spanish (Oppenheimer 2000). Despite its growth, Spanish is often considered a downscale language. Dame Edna's following remark angered some U.S. Hispanics:

"Forget Spanish. There's nothing in that language worth reading except Don Quixote, and a quick listen to the CD of Man of La Mancha will take care of that. There was a poet named Garcia Lorca, but I'd leave him on the intellectual back burner, if I were you. As for everyone's speaking it, what twaddle! Who speaks it that you are really desperate to talk to? The help? Your leaf blower? Study French or German, where there are at least a few books worth reading, or, if you're American, try English."  
(Ortiz and Gonzalez 2003)

The significance of the growth of Spanish is that Americans are increasingly finding that lack of Spanish ability in the U.S. is a handicap. Some, like Mauro Mujica of U.S. English, allege that Americans learning Spanish reduce the incentive for Hispanic immigrants to learn English. The growth of Spanish has led to concerns that other

languages are being ignored, especially ones that have value to U.S. intelligence (Sharp 1997).

## **2.7 Spanish outside of the United States**

Outside of the U.S., the status of Spanish is more ambiguous. Spanish is overtaking Italian in Quebec as the third-most understood language. According to Jack Jedwab, Spanish is different in that ethnic roots are not a big motivating factor (Norris 1999). On the other hand, Spanish-speaking countries allege that the United Nations overly favors English. They say there is an imbalance between English and the U.N.'s five other official languages of Arabic, Chinese, French, Russian, and Spanish (*Plea to U.N.: 'More Spanish, Please'* 2001). Spain lodges a similar complaint against the European Union. It says the E.U. favors English, French, and German too much, and should include more Spanish. Spain is concerned that in order to reduce costs, the E.U. is moving towards a three-language system (Helm 1998).

## **2.8 Military Intelligence**

In the years following the September 11<sup>th</sup>, 2001 event in the U.S., there has been increased interest in the importance of foreign languages to intelligence gathering. Whereas in the past Russian was the most sought after language for intelligence, today it is Arabic. The demand is so great that the U.S. government has 'grabbed taxi drivers' (Brownfeld 2003). U.S. intelligence has a backlog of untranslated Arabic documents, as it lacks enough translators (Sperry 2003). The U.S. government has directed substantial new resources towards language and area studies to address this problem (Kramer 2002). Brigham Young University, University of California at Los Angeles, the University of

Washington, and the University of Hawaii, have been selected as one of the four flagship universities to supply translators in languages critically needed by U.S. intelligence.

Critics say that area scholars could be put in danger if they are presumed to be U.S. agents (Haney 2002).

## **2.9 Machine Translation**

It should be noted that there are efforts to eliminate the significance of foreign language study. This would be accomplished via machine translation. For more than five decades, researchers in computing, linguistics, and AI research have tried to come up with machine translation. There are still large deficiencies, and with the use of automatic translators, hilarity often ensues. Most professional translators use automatic translation to augment their human abilities. Accuracy is higher in translating scientific documents or when context is limited (Silberman 2000). It is plausible that advances in machine translation will someday reduce or obviate the need to learn foreign languages, but that day is not yet here.

## **2.10 Summary**

An early emphasis on the significance of foreign languages in the U.S. arose during the period of military competition with Soviets, and this military angle has been revived somewhat in recent years. Russian has lost ground, while Arabic has gained ground as a language important for the military. However, the two main rationales for foreign language study and use are the need to better effect globalization via communication with foreigners in foreign countries, and the need to accommodate the civil rights of immigrants who do not speak English adequately. There is increasing

emphasis on the former in public schools, and on the latter in the provision of other public services, such as policing or health care. While businesses use foreign languages more, in particular Spanish, efforts to demonstrate the significance of foreign languages are typically made via the public sector.

### ***Chapter 3 - REVIEW OF THE LITERATURE***

This review of the literature has three main parts. The first part is a history of foreign language study in the U.S. The second part covers what scholars have said about the motivations behind foreign language study. The third part attempts to situate the study question in the geographic literature.

#### **3.1 History of Foreign Language Learning in the U.S.**

The history of foreign language learning in the U.S. will be covered on two academic levels: high school before 1957, and college after 1957. National level data on high school study are available before 1957, but after 1957, college level data disaggregated by state became available. The organization that collected the principal data used in this study is the Modern Language Association. The Modern Language Association was founded by teachers of languages other than Latin or Ancient Greek, hence the name. They were concerned with the popularity of Latin and Ancient Greek in the latter half of the 19<sup>th</sup> century in the U.S. They feared that this popularity was negatively affecting the teaching of modern foreign languages and so felt the need to organize (Simon 1988). What were the reasons for the popularity of languages that lacked a self-perpetuating population base? There is little evidence to suggest that this was the result of political or policy decisions. It is more likely that these languages were studied for their historic prestige and aesthetic value – their contribution to being an ‘educated man’ (Allen et al. 1968). Latin was the most popular foreign language in American high schools as late as the 1930s. It peaked in 1905, with 56% of the public high schoolers enrolled in it (Draper 1991). This was the same year that foreign language

study peaked in American high schools, with almost 89% of high schoolers enrolled in a foreign language. In contrast, the corresponding figure for 1990 was 38%. After the 1930s the decline of Latin was slow and steady.

The other dominant foreign language at the turn of the century in the U.S. was German. German experienced rapid increases in enrollment in the time leading up to the 20<sup>th</sup> century, besting French in places like New York State and in the Midwest (Zeydel 1959). German commanded nearly a full quarter of public high school students in 1915. It was virtually excised from high schools in the latter half of WWI as a consequence of it being associated with a military opponent. Wartime propaganda was actually directed against the German language itself. Twenty-two state legislatures forbade the teaching of German in public elementary and high schools.

By 1922, less than 1% of public high school students studied German. It appears that French and Spanish benefited from this major policy decision, going from 9% to 16%, and 3% to 11%, respectively, of high school students. However, according to Edwin Zeydel, legislating away German also had an effect of dampening foreign language study in general in the U.S. The introduction of new classes dealing with commercial and social studies may have been a factor in the lack of a strong recovery in the years after WWI, as was the depression of the 1930s. German also declined after WWII, but the drop as a share of all public high schools was quite small because its base had already diminished. Japanese and Italian were not yet studied in sufficient numbers to have been affected by either war.

After the decline of German, French was briefly the most popular foreign language in high schools, but the mantle was soon passed to Spanish. The rise in popularity of Spanish is associated with the Good Neighbor Policy of the 1940s and its increased emphasis on political and economic relations within the Western Hemisphere (Allen et al. 1968). By 1948, Spanish had become the most popular foreign language at the high school level. It was then studied by 8% of high school students.

The next important event in the history of language study in the U.S. was the launch of Sputnik in 1957. The collection of data used in this study began after that event. There was concern as to how competitive the U.S. was with the Soviets in a linguistic sense, especially as to how it may have related to scientific progress or defense (Allen et al. 1968). Emphasis was put on learning languages, including Russian. Language study surged in the 1960s, but the study of Russian never became more than a fringe phenomenon. The National Defense Act of 1958 (Title VI) appropriated \$65 million for institutes to train about 50,000 foreign language teachers (Allen et al. 1968, Simon 1988). The Fulbright-Hays act also dates from this legislation, which includes promoting foreign language studies (Simon 1988). There is evidence that Sputnik also led to increased availability of Russian language courses in Britain (Hawkins 1987). The more detailed data collected after Sputnik allow us to examine the geography of foreign language study.

Despite a surge in foreign language study in U.S. colleges and universities in the 1960s, enrollments plummeted in the 1970s. One commonly attributed reason was the change in foreign language requirements in the late 1960s and 1970s. Rodamar and

Simon (1991, 1988) both point out that the student power movement during the Vietnam War had the perhaps curious effect of abolishing or lowering foreign language study requirements. Robert Giroud (1980) says anti-Vietnam War protests brought demands for 'curricular relevance'. Students asserted that foreign language study was irrelevant (Pelc and Sauder 1972, Allen et al. 1968) and wanted fewer requirements for graduation (Simon 1988). Administrators gave in to lower standards of academic rigor because they were concerned about general enrollment declines, and the influence of course marketing had begun. By 1987, at only 16% of four-year colleges was foreign language study of all students required for graduation (Lambert 1994b). 90% of such institutions had language requirements in 1968 (Allen et al. 1968). After 1980, requirements were reinstated at many colleges (Simon 1988), and foreign language registrations tended to keep pace with student enrollments. At the end of the 20<sup>th</sup> century, Spanish, Italian, Japanese, and Chinese had become more popular, while French, German, and Russian had become less popular.

It is important to consider requirements because critics say they may function as a 'supply-side experiment' (Rodamar 1991). In other words, some believe growth in foreign languages has more to do with requirements than anything else (Rodamar 1991, Simon 1988). One survey of students of the University of Illinois found that 69% were taking a foreign language because it was required. However, the same survey found that 45% said they would take a foreign language even if it were not required (Pelc and Sauder 1972). These results are contradictory.

### **3.2 Perspectives on Determinants of Language Learning**

This section has four parts. The first covers the debate regarding whether foreign language study is demand-driven or supply-driven. The second covers characteristics such as appeal to aesthetics, ethnicity, and sex. The third covers supply-side effects such as requirements, availability, institutional size, high school foreign language, and continuation and completion of foreign language classes. The final grouping discusses some additional information on policy effects, globalization, linguistic phylogeny.

An important part of the debate about reasons why people study foreign languages has to do with practical usefulness. According to Richard Lambert (1994a), the utilitarian view is that we learn languages so we can use them. He says supply-side factors influence how foreign languages are studied in the U.S., and our approach should be more rational. Daniele Rodamar (1991) disagrees with the supply-side argument, and says there are substantial payoffs to language skills. She acknowledges that time spent learning foreign languages can be reallocated to other tasks, but says business and other specific uses make foreign language ability a practical skill, and languages besides English will be more important in the future.

Carol Fixman (1989) finds that foreign language skills are very interactive. Language skills alone may not be important, but combined with other skills, such as those found in law, business, or engineering, they have an impact. Language skills are also in demand in law enforcement and health care. Douglas Hilt (1982) says that many Americans will never work outside of the U.S., and they are unlikely to ever need to speak a foreign language at work here. According to Frederick Starr (1994), American

firms only use foreign languages in low-level contacts with clients and suppliers, and otherwise use English for intrafirm communication, so the demand for foreign language ability is low, with the partial exception of those firms dealing with Japan. Even when foreign languages are needed, American firms would rather hire foreign nationals than provide language training for Americans. Marianne Inman (1980) says foreign language skills are viewed as commodities to be procured as the need arises.

Lambert (1983) argues that Europeans are more concerned with the foreign language penetration of the general population, while Americans concentrate on linguistically trained specialists for particular occupations. Don Iodice (1983) explains that language instruction has historically been geared towards a well-motivated elite. Claire Kramsch (1995) says that in the last twenty years, oral ability has received emphasis, and goals have been lowered below that of native-speaker proficiency. Non-academics in the business and political worlds have increasingly focused on the efficiency and utility of foreign language learning. This emphasis on proficiency is viewed with a certain disdain by academics, much as the Berlitz schools are viewed. Interestingly enough, according to Simon, in some cities more students are likely enrolled in the Berlitz schools than in local colleges and universities (Simon 1988). One may speculate that these Berlitz students are more practically oriented.

The trend toward practical emphasis is often associated with the trend towards Spanish. A survey by Barbara Moore (1993) found that in Ohio almost no students were attracted to Spanish due to its scholarly nature. The fact that Spanish is spoken more than other foreign languages in the U.S., is considered easier to learn, and more useful for

career plans were all much more important. Richard Brod (1979) disagrees with the view that students of Spanish are utilitarian-oriented. Rather, this phenomenon should be characterized as interest in languages that have an immediate claim on one's attention. Sisken and Mandrell say that Spanish should not be considered a foreign language, as it is useful for everyday life, not just travel or study abroad (Various Authors 1997). Cristina Gonzalez says that Spanish is becoming the de facto second national language of the United States, as does Donna Wilson (Various Authors 1997), and Spanish is required for many jobs (Various Authors 1997). Malcolm Compitello says the gradual trend towards Spanish is due to shifting national demographics (Various Authors 1997). Starr says new Spanish enrollments are concentrated in California and suggests that Spanish-speaking recent immigrants may play a significant role in the increases (Various Authors 1997). Daniel Eisenberg points out that the growth in Spanish enrollments has created problems for Spanish departments. He believes that its cause was not due to the liberal goal of love of learning, because other languages could satisfy this requirement, not just Spanish. He believes Spanish students are utilitarian-oriented and tend to lower the intellectual level in the classroom and create an overemphasis on oral skills. Their goal is not to communicate with people in Spanish-speaking countries but with the U.S. Hispanic population. These students make fewer commitments and do not value Spanish for its own sake (Various Authors 1997).

In addition to the practical aspects, scholars, such as Eisenberg, have commented on the aesthetic appeal that language study may have. According to Jonathan Pool (Pool 1991), there are reasons for acquiring or maintaining use of a language other than for

efficient communication. According to Francois Grin (1994), we should consider the psychic income one may derive from foreign language study. Also, the human capital aspect of foreign language study is something that can be empirically tested. In fact, according to Clifford Adelman (1994), a longitudinal study found that the economic benefits of foreign language study were negligible, and that people with a high degree of language skill are dispersed occupationally and geographically. This evidence would support the aesthetic argument. However, this study did find that the study of foreign languages in high school is one of the strongest predictors of college degree attainment, one much stronger than enrollment in science classes. It is particularly strong for those who take at least three years of a foreign language. Adelman also says personal reasons are more important than economic reasons in foreign language study. A survey found that of adults taking foreign languages, 80% of those taking French were doing it for personal reasons, not for job or career. The corresponding figures for German and Spanish were 67% and 51%, respectively.

Lambert (1981 pp.7-8), however, says the classical liberal arguments for language learning are not convincing to students, as "...calculus, organic chemistry, and physics supply as much scourging of the soul as students need." Lambert speculates that communicating with ethnic minorities within the U.S. may provide a rationale for our language study trends (Lambert 1994). Fixman (1989) says that the less foreign language ability people have, the less important they think it is. According to Simon (1988), most foreign language majors are women. Women comprised 84% of French majors, 75% of Spanish majors, and 62% and 59% of Russian and German majors, respectively. In the

longitudinal study analyzed by Adelman, women had higher grade point averages in foreign language classes. Women usually have higher GPAs than men, but foreign language classes had one of the widest spreads. According to Peter Eddy (1979), only 8% of Americans have studied two foreign languages, and just 2% of Americans have studied three or more foreign languages.

Schaefer (1972) says that monolingualism is an outgrowth of the American egalitarian ethic. Simon (1988) says the Americanization of immigrants has been an obstacle to linguistic proficiency, and, according to John Hope Franklin, the lack of foreign language study is a sign of American parochialism. Kramsch (1997) says foreign language study was traditionally oriented towards literary studies, where high culture took priority over communicative value. Schaefer says the study of foreign languages and literatures was essentially elitist.

Some scholars believe that aesthetics work against Spanish study. Cristina Gonzalez believes that academic administrators are resistant to the growth of Spanish departments, and this is evidence of chauvinism towards Hispanic culture (Various Authors 1997). Robert Mead (1980) says Spanish has a poor image because it is associated with underdevelopment in Latin America and the “Black Legend” of Spanish cruelty towards American Indians.

George Peters (1994) says that the declines in German enrollment have caused a crisis. German teachers were once proud they had the elite students, who would become the future scientists, engineers, and international business managers. German appeals to the elite, but increasingly not to the rank and file. Peters speculates that German

civilization is more similar to American civilization than French, Spanish, or Russian civilization. According to Richard Brod (1979), German has less of an exotic appeal than other foreign languages. Peters says German is not popular at historically black colleges, and few blacks or Hispanics enroll in German. Also, the ability to appeal to the ethnic heritage interests of German-Americans is increasingly less effective. He states that the U.S. study of German is "...sliding silently toward oblivion." Regarding French, Robert C. Carroll (1980) says French-Americans in Maine have low college attendance. This could account for French being less popular in Maine than one might expect.

Kathleen M. Brown (Brown 1978) finds that the curtailment of immigration in 1924 was associated with decreased attendance at foreign language schools, but that the pattern varied from city to city. Also, immigrants from particular world regions have varying English language abilities; those from Latin America have the worst English (Espenshade and Fu 1995). If the immigrants who speak a particular foreign language speak poor English, there could be a greater incentive for non-immigrants to study that particular foreign language.

Jeremy Finn (1998) used high school transcripts to estimate a regression model for the determinants of high school foreign language study. He found that requirements, ethnicity, and sex were all significant variables. Requirements led to increased foreign language study, ethnic minorities were less likely to study foreign languages, and female students were more likely to study foreign languages. Being Hispanic and having a foreign language required interacted strongly. Requirements and being Hispanic led to high rates of foreign language study.

Some scholars believe that supply-side factors are a key influence in U.S. foreign language study. In the words of Richard Lambert (1994a, p. 54),

“Since we already speak English, there is little overriding reason why a student should study a particular other language, or, for that matter, any foreign language at all. Hence the drift of tradition, along with the nonfungibility of teachers’ language skills, determines language choice in the English-speaking countries, and motivation to study a foreign language is weak...we drift with no clear rationale, currently toward Spanish...”

June K. Phillips (1994) says French, German, and Latin continue to be popular because we produce teachers of these languages. According to Clifford Adelman (1994), supply-side factors such as foreign language teachers, area studies scholars, and representatives of learned societies are key influences on the educational and training system, through their lobbying efforts.

Those who favor the supply-side argument also emphasize the role of requirements. According to Hilt (1982), foreign language enrollment would drop dramatically in the absence of foreign language requirements. Enrollment in foreign language classes did decline dramatically in the 1970s, and according to Richard Brod (1979), lowering requirements caused a change in student preferences for specific languages. Bettina Huber (1996) says the foreign language enrollment statistics suggest that language requirements may increase enrollment in the most commonly taught languages, but they have little effect on the less studied foreign languages. Mark Riley says that students who cannot find an open seat in a Spanish class do not migrate to another language (Various Authors 1997).

Another supply-side variable is availability of foreign language classes. According to Bettina Huber, between 1970 and 1990, almost all institutions offered at

least one course of French, German, or Spanish. Italian, Russian, Japanese, and Chinese became more available over time. The more commonly taught languages have higher registrations in four-year colleges than in two-year colleges, and four-year colleges are more likely to offer foreign languages besides Spanish. She says state state two-year colleges on the Pacific Coast are more likely to offer foreign languages besides Spanish, and they have higher penetration levels. Also, foreign language registrations in the Pacific Coast states have grown faster than in other regions, and penetration levels of foreign language study increase with institutional size.

Cristina Gonzalez says that despite Spanish classes being overfull and short of instructors, departments of Spanish and Portuguese are still not the biggest foreign language departments on campus, twenty-six years after Spanish became the predominant foreign language in the U.S. (Various Authors 1997). During the period of foreign language study decline, 150 colleges dropped German and 75 dropped Russian (Brod 1979).

Another possible supply-side factor is what may be termed the 'feeding effect' of high school foreign language enrollments. Richard Lambert (1994b) says that U.S. foreign language study is unusual in that it mostly takes place at college, whereas high school is the norm for the rest of the world. Most students of less commonly studied foreign languages such as Russian or Japanese have already studied French, Spanish, or German. Also, colleges often push those with minimal competency in one language in high school into another language once they begin college. According to Simon (1988), there is a high drop-off rate from the first year of foreign language study to the second in

college. The longitudinal study analyzed by Clifford Adelman (1994) found only a modest correlation between high school foreign language study and college foreign language study. This correlation was 25%, which was slightly smaller than the 27% correlation between high school and college science classes. While only becoming the leading college foreign language in the 1960s, Spanish became the leading high school foreign language in the 1940s (Brod 1979). If this was a feeder effect, there was a time lag.

This brings up the question of government policy effects on foreign language study. Richard Lambert (1994) says that the federal government provides funding, but rarely intervenes at the college level. Title VI, a major component in funding and thus influencing foreign language policy, survives because of support from the intelligence community and prestigious universities.

According to Daniele Rodamar, increases in spatial interaction via technical change have spurred language study. For example, there is anecdotal evidence of grain silo operators in the Great Plains states learning Russian or Chinese to sell their grain abroad (Rodamar 1991). Worldwide, the largest beneficiary of spatial interaction has been English; it is more efficient for most countries to use English in international dealings. However, the fact that so many people abroad speak English may be a damper on the necessity for Americans to learn other languages. Rodamar feels population base is a factor as well. The share of the world's population that speaks English as a first language has been declining (Simon 1988), so less influence may be exerted by this population base in the future. Likewise, markets where English is not spoken as a first

language are growing fastest. We can also think in terms of the purchasing power of the speakers of a foreign language, in addition to the population base. Rodamar points out there may be lags between the increases in population base and economic weight and concomitant increases in linguistic ‘pull.’

New enrollments in Spanish are concentrated in California (Lambert 1994a). A significant portion of the world’s Spanish language purchasing power emanates from the United States, due to the large number of Spanish-speaking immigrants that have been allowed in, and consequent rapid increases in their earnings as compared to what they might have earned in a mother country. This may account for some of the spatial and temporal distributions in the popularity of a foreign language within the United States.

The final factor to be discussed is that of linguistic phylogeny, which should be classified as a demand side factor. Phillips and Filmer-Sankey (1993) point out the effect of relative difficulty in learning languages. The Foreign Service Institute has come up with a difficulty classification that includes non-European languages (McGinnis 1994). These rankings are for native speakers of English who wish to learn other languages:

**Group I (easiest):** Afrikaans, Danish, Dutch, French, German, Haitian Creole, Italian, Norwegian, Portuguese, Romanian, Spanish, Swahili, Swedish

**Group II:** Bulgarian, Dari, Farsi, Greek, Hindi, Indonesian, Malay, Urdu

**Group III:** Amharic, Bengali, Burmese, Czech, Finnish, Hebrew, Hungarian, Khmer, Lao, Nepali, Pilipino, Polish, Russian, Serbo-Croatian, Sinhala, Thai, Tamil, Turkish, Vietnamese

**Group IV (hardest):** Arabic, Chinese, Japanese, Korean

What is the magnitude of the differences? An English speaker of reasonable aptitude can expect to spend 480 hours for a group I language, but 1320 hours for a group IV language, to achieve a particular level of ability. The time needed for an English speaker to learn all three of Spanish, French, and Italian is roughly equal to the same time needed to learn Japanese or Chinese. English speakers only use the left half of the brain to process language, but Chinese speakers use both left and right halves. The right half is otherwise used to process melody in music (*More Brain Power Needed for Mandarin than English* 2003). This may explain, in part, why Chinese is so difficult for English-speakers to learn.

Unfortunately for this dissertation, the difficulty for an American to learn French or any other foreign language is spatially invariant. It is as inherently difficult to learn French in South Dakota as it is in Florida! For that reason, this information cannot be operationalized for a sub-national study. A complete categorization of language learning difficulty for all languages in question would, however, be useful for a study at the national level.

### **3.3 Geographic Literature and Diffusion**

So far, little in the way of geography or geographers has been mentioned. There is virtually no geographic literature on the specific topic of the geography of *foreign* languages, but there is some on *native* languages. As previously mentioned, the geographer D.W. Gade says that American geographers ignore foreign languages, and have weak language competency (Gade 1983). This might explain the lack of research

on the geography of foreign language study. A few geographic studies on native language linguistic diffusion have been performed.

Coen Wessels and Jan Mansvelt Beck (1994) examine the hypothesis that proximity to road and railway networks and the centrality of urban municipalities affected the spread of Spanish as a first language in Catalonia. They did not find evidence that Spanish was spread via these means, but rather via the in-migration of Spanish-speaking minorities. If we were to extend these results to foreign language learning, we might not expect transportation links or urban size to be a factor in foreign language learning, but the presence of immigrants should. On the other hand, Stephen W. Williams (1981) found evidence that the spread of the English language in Wales was linked to the hierarchy of urban centers. However, in both these cases, the subject of interest was a native language. The diffusion of second languages may or may not have a great deal in common with the diffusion of first languages.

An important concept from geography that will be incorporated is that of the gravity model (Plane and Rogerson 1994). If one theorizes foreign language study as bridging the communication barriers that separate speakers of different languages, and that speakers of different languages tend to be geographically clustered, the popularity of a given foreign language should be affected by possible spatial interaction. In a gravity model, the estimated strength of interaction between any two possible locations is a result of their multiplied size, divided by the distance between them raised to some power. One variant would be to say that the popularity of a foreign language should be a function of the purchasing power of the native speakers, and possibly other second-language

speakers, divided by distance raised to some power. Languages whose clusters of speakers are larger, more affluent, and closer should be more popular.

So, in addition to the native speakers of a foreign language in a metropolitan area, we also have the gravity influence of the worldwide number of such speakers. For example, exerting influence on Los Angeles could be the number of Spanish-speakers in Los Angeles, as well as the weighted distances to Spanish-speaking countries.

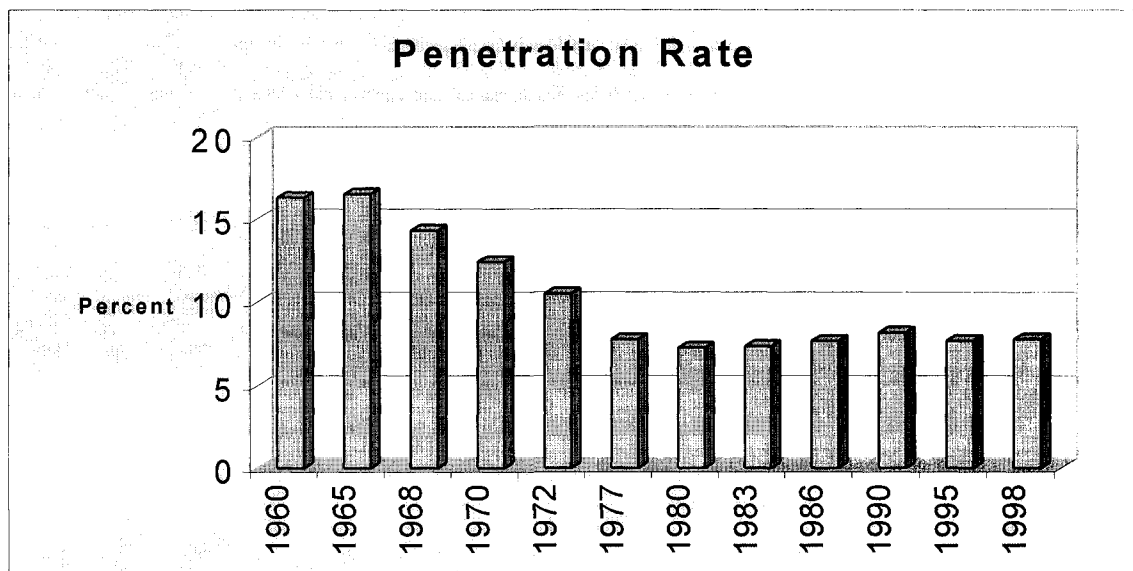
### **3.4 Summary**

Geographers have not had much to say regarding the determinants of foreign language study. Most commentary comes from those who work as teachers of foreign languages. Some other commentators come from the non-geography social sciences. These scholars have sharp disagreements over whether foreign language study in the U.S. reflects free choices of students, or whether it reflects university curriculum requirements. The most important trends in the past half-century have been declines in overall foreign language study with Spanish increasing its relative share of all foreign language enrollments. These and more trends are detailed in the following chapter on descriptive statistics.

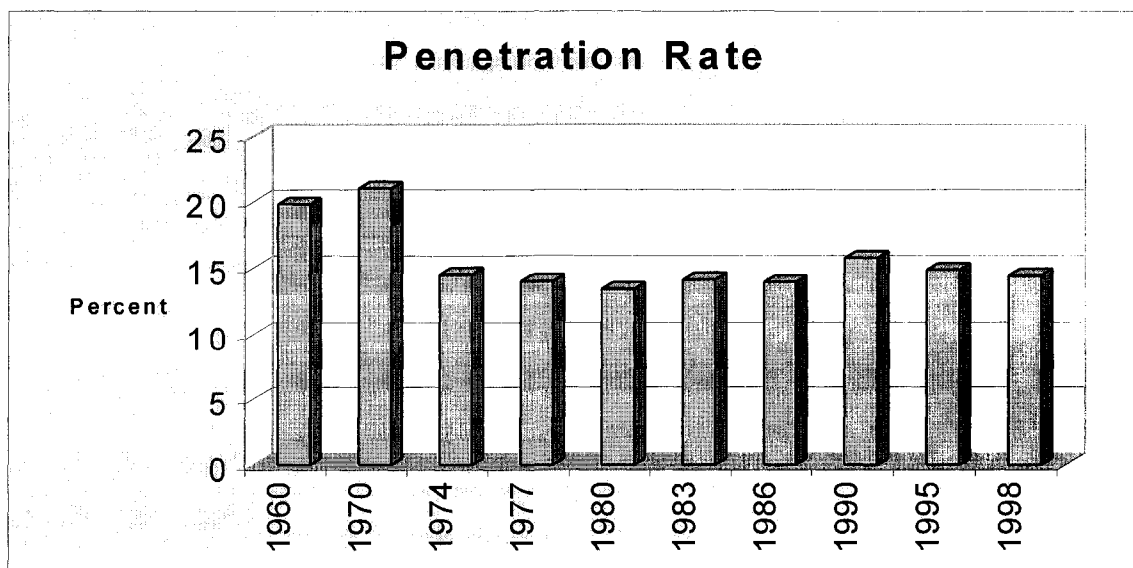
### Chapter 4 – DESCRIPTIVE STATISTICS

The following two charts depict the overall penetration rate over time of modern foreign languages in American colleges and universities.

**Figure 4.1 – Overall Penetration Rate of MFL in U.S. Colleges and Universities, MLA Definitions**



**Figure 4.2 – Overall Penetration Rate of MFL in U.S. Colleges and Universities, Dissertation Definitions**



The first chart shown is a reproduction of a graph by Bettina Huber (Huber 1996); the second is this study's data. The student base for this study was restricted to full-time students, deemed most relevant in terms of scholarly intensity and foreign language study requirements. Most likely, Huber used part-time as well as full-time students to form her student base population.

Restricting the student base to full-time students reduces the penetration rate by about half. It should also be noted that this study's base student population for 1960 was spurious; it only included students in colleges and universities where a foreign language was offered. It should have properly included students in colleges and universities where no foreign language was offered. This means that this study's penetration rate for 1960 is higher than the real penetration rate. The difference between the two respective 1970 penetration rates is also large.

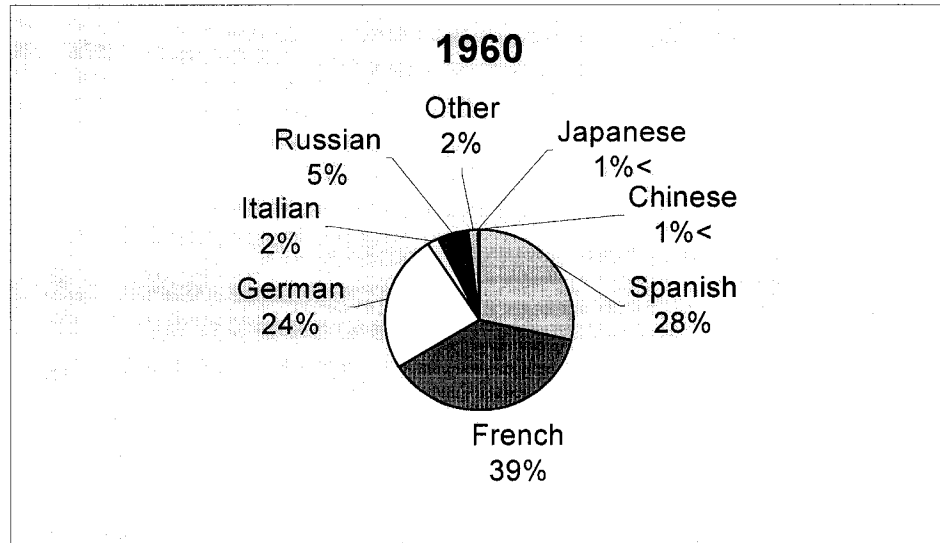
Both charts show much higher penetration rates in the 1960s, a decline in the 1970s, and then a small recovery. The 1974–1998 years of both charts show a similar oscillatory pattern, but the fluctuations are not as strong for this study's data. The exclusion of part-time students may have affected the modeling results of this study.

The following pie charts show the allocation of modern foreign languages for each study year. Allocation refers to the share of foreign language students who are enrolled in a particular foreign language.

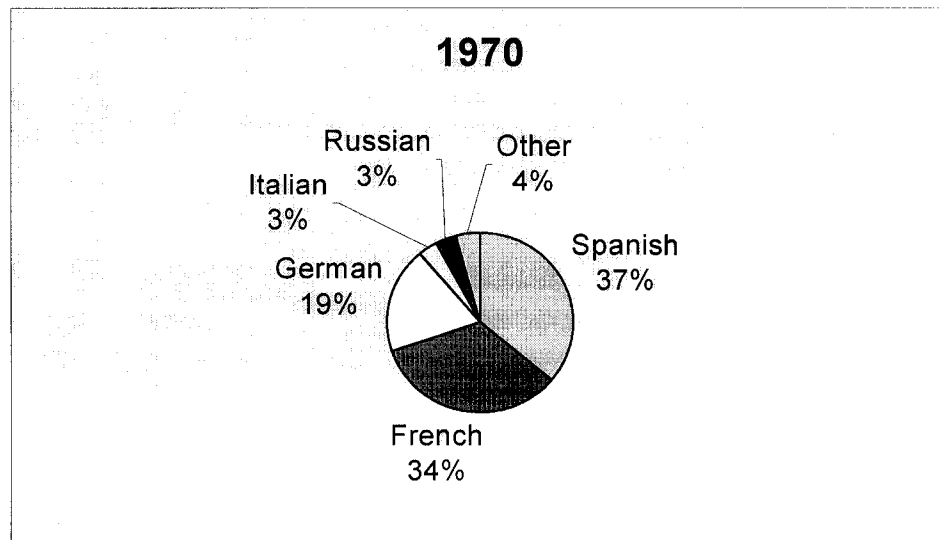
In 1960, French, Spanish, and German held sway as the main foreign languages. French was the most popular foreign language. Russian was more popular than the other

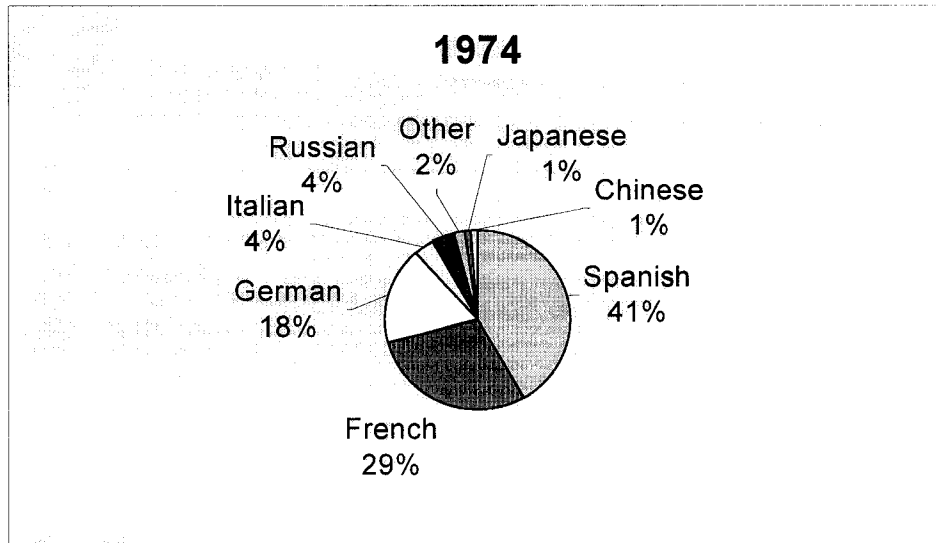
less commonly studied foreign languages. By 1970, Spanish had bypassed French as the most popular foreign language.

**Figure 4.3 – Foreign Language Allocations Pie Graph, 1960**

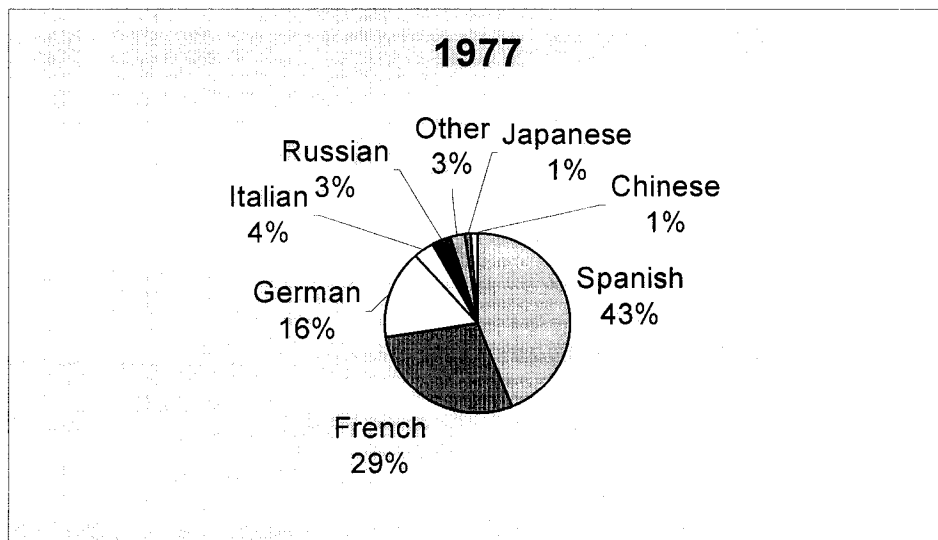


**Figure 4.4 – Foreign Language Allocations Pie Graph, 1970**



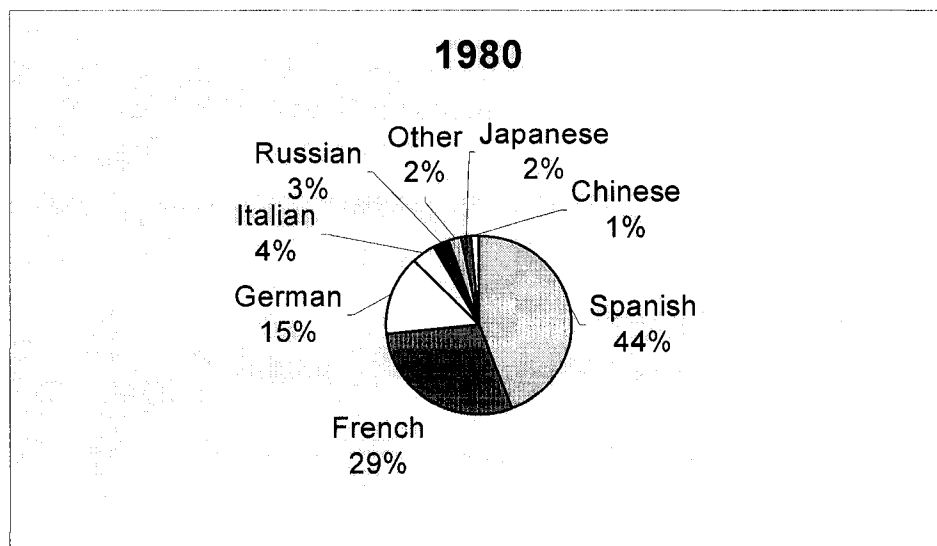
**Figure 4.5 – Foreign Language Allocations Pie Graph, 1974**

French had declined and Spanish increased further by 1974.

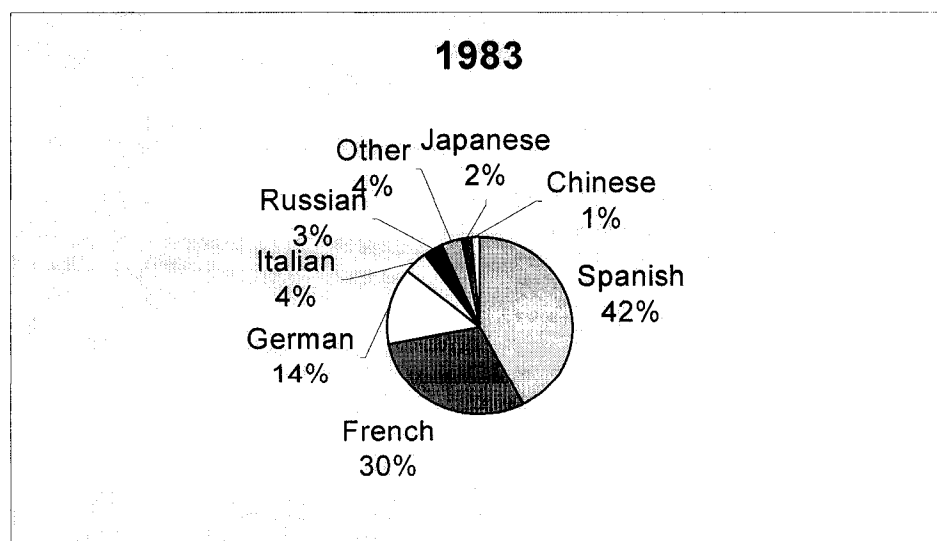
**Figure 4.6 – Foreign Language Allocations Pie Graph, 1977**

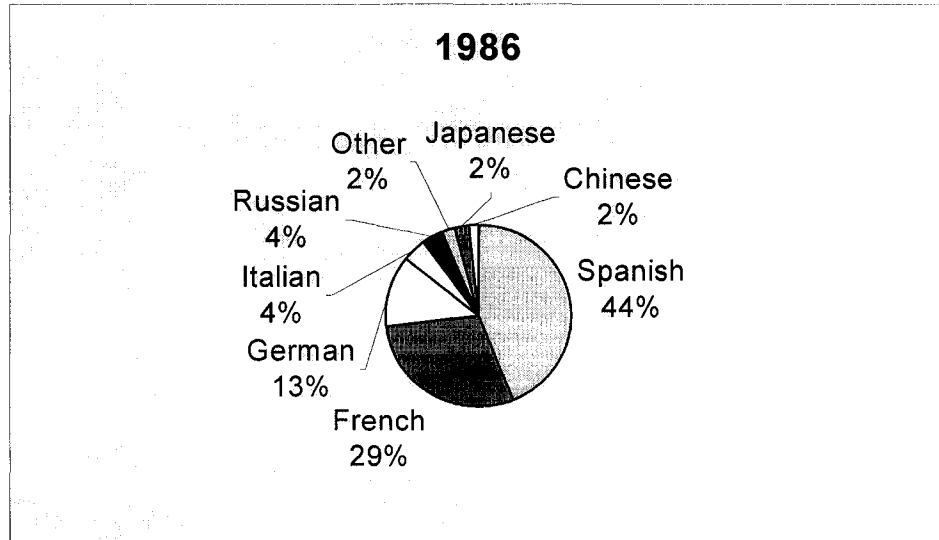
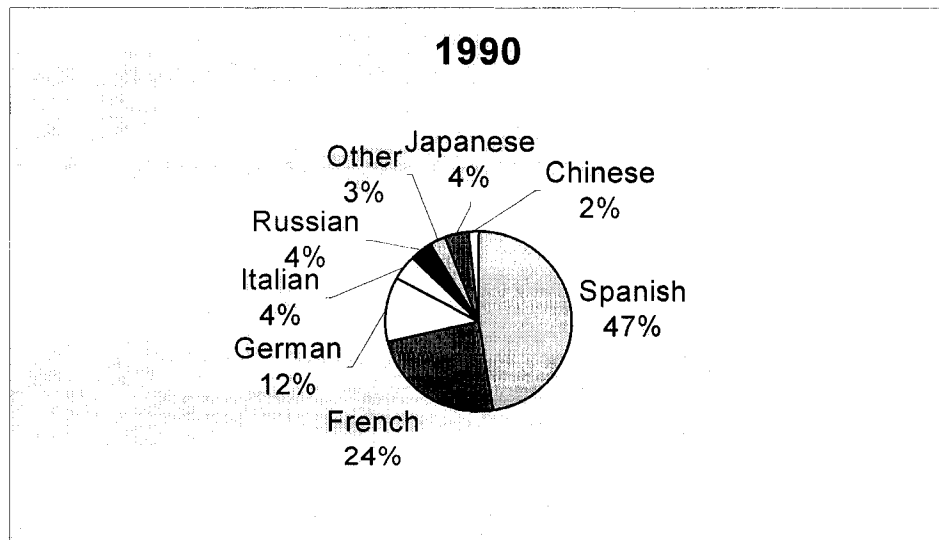
There was a slight reversal between French and Spanish in 1983, but this did not last.

**Figure 4.7 – Foreign Language Allocations Pie Graph, 1980**

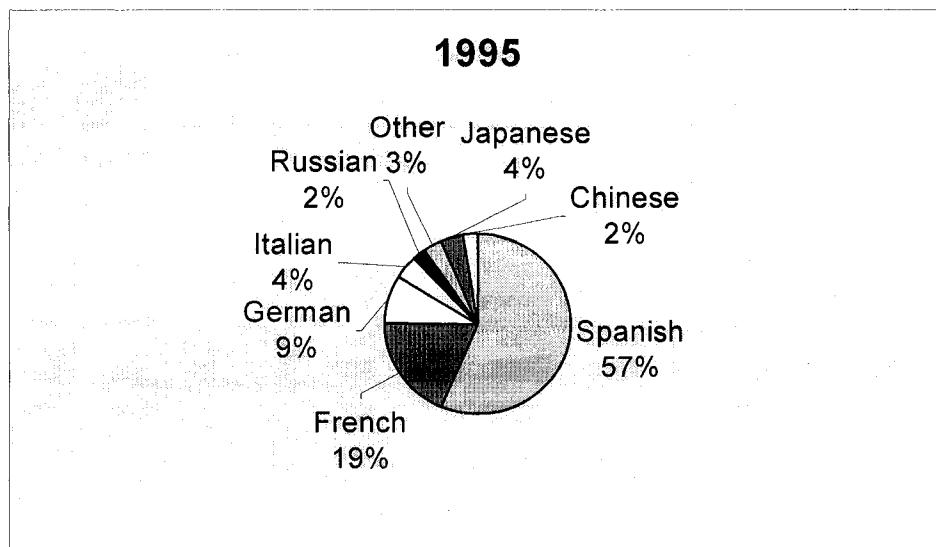


**Figure 4.8 – Foreign Language Allocations Pie Graph, 1983**



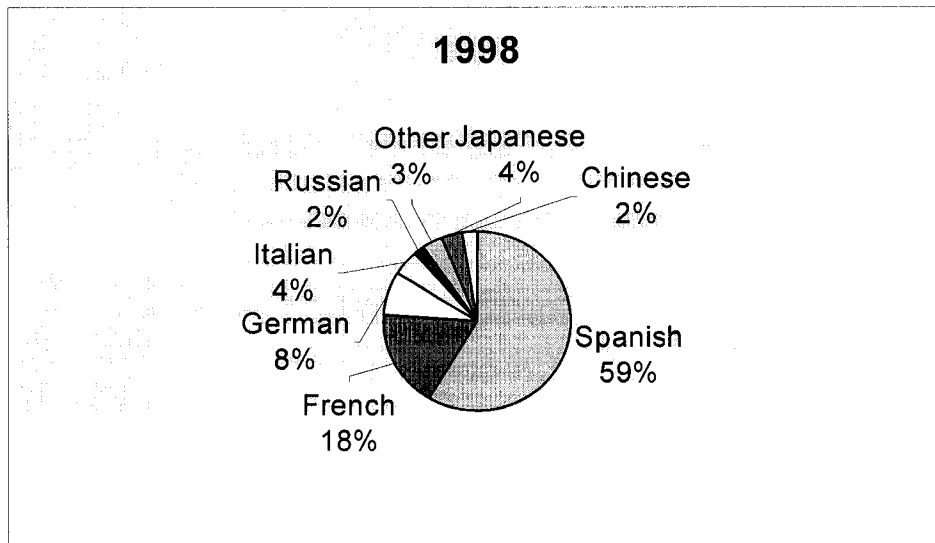
**Figure 4.9 – Foreign Language Allocations Pie Graph, 1986****Figure 4.10 – Foreign Language Allocations Pie Graph, 1990**

**Figure 4.11 – Foreign Language Allocations Pie Graph, 1995**



The first half-decade saw a particularly large increase in Spanish allocation, Spanish having increased its share by 10%.

**Figure 4.12 – Foreign Language Allocations Pie Graph, 1998**



In the latest study year, Spanish enrollments comprised nearly 60% of all enrollments. German had continued to decline to a point where it could be considered one of the less commonly studied foreign languages.

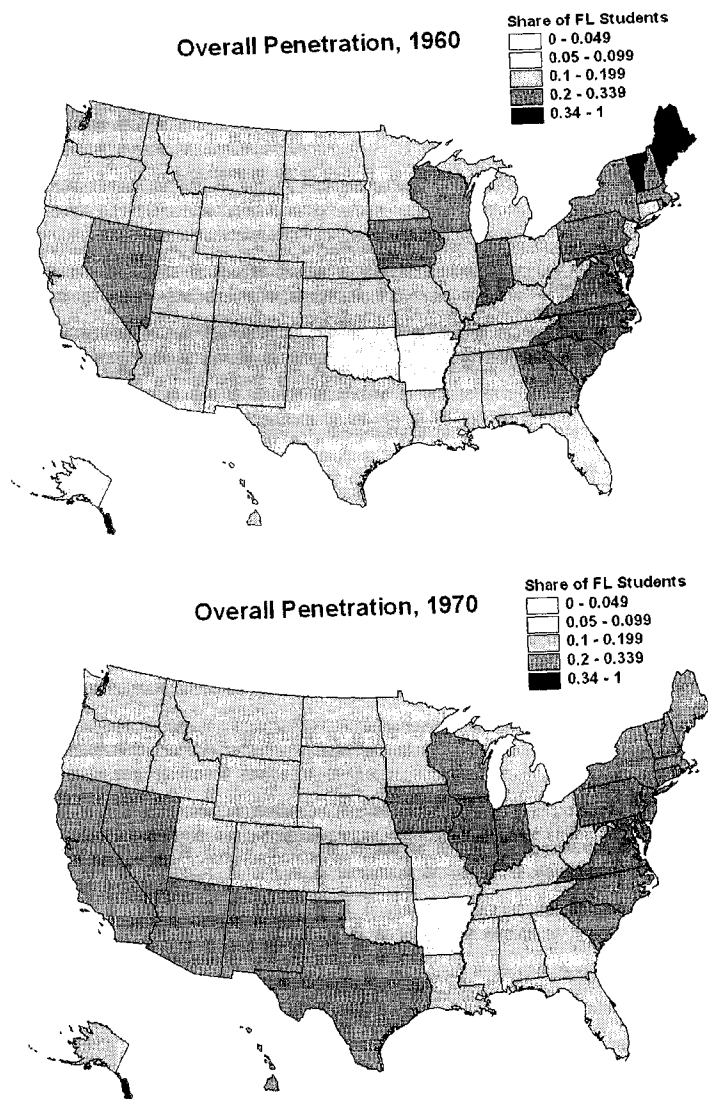
The remaining sections of this chapter show the maps of penetration and allocation, at both the state and at the Bureau of Economic Analysis's Economic Areas, or EAs. Economic Areas are formed from a city and that city's economic hinterland. There are 172 EAs that cover the entire United States. The first set of maps, shown on pages 58-60, is of overall penetration at the state level.

At the outset of the study period, states along the East Coast of the U.S. tended to have higher penetration rates. A decade later, a continued concentration of higher overall penetration rates remained along the East Coast, along with the Southwest and the western Great Lakes states. By 1980, there are declined overall penetration rates, and

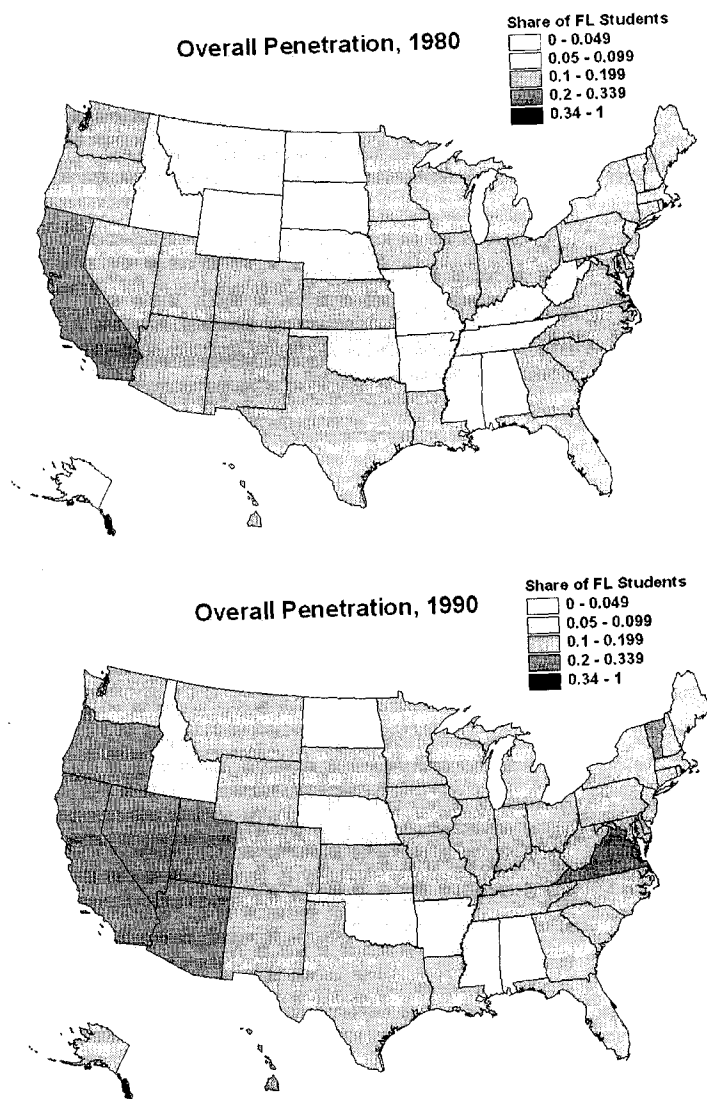
lower relative penetration rates in the mid-South and upper Plains and Rocky Mountain states. In 1990, the largest cluster of high penetration states was composed of California, Oregon, Nevada, Utah, and Arizona. At the end of the study period, in 1998, the high penetration states are scattered: Oregon, Arizona, Indiana, Virginia, and Vermont.

The states of high penetration were much more clustered at the outset of the study period than at the end of the study period. However, three states remained among those of high penetration in 1998, as they had been in 1960. These were Vermont, Virginia, and Indiana. The map year most reflective of the 1970s penetration declines is 1980. This is the same map year that shows the fewest states above a penetration rate of 20 percent. The map for 1990 shows increased clustering of the highest-penetration states over the map for 1980. Years of higher penetration are reflected in increased numbers and clustering of states of the highest penetration rates, understandably.

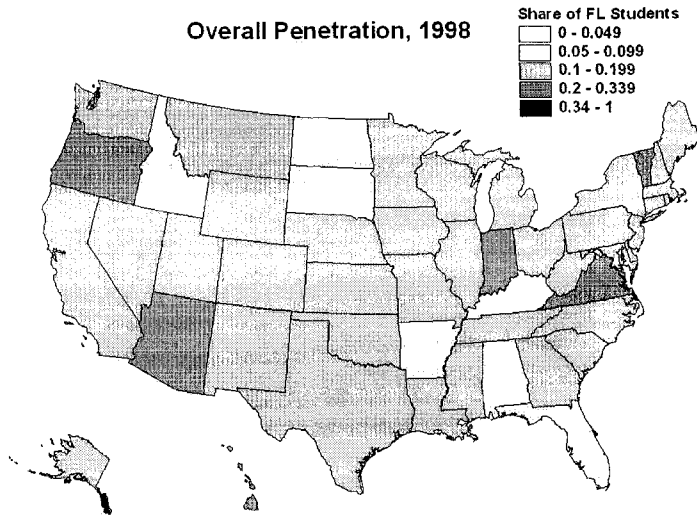
Figure 4.13 – State Overall Penetration Maps, 1960-1970



**Figure 4.14 – State Overall Penetration Maps, 1980-1990**



**Figure 4.15 – State Overall Penetration Map, 1998**

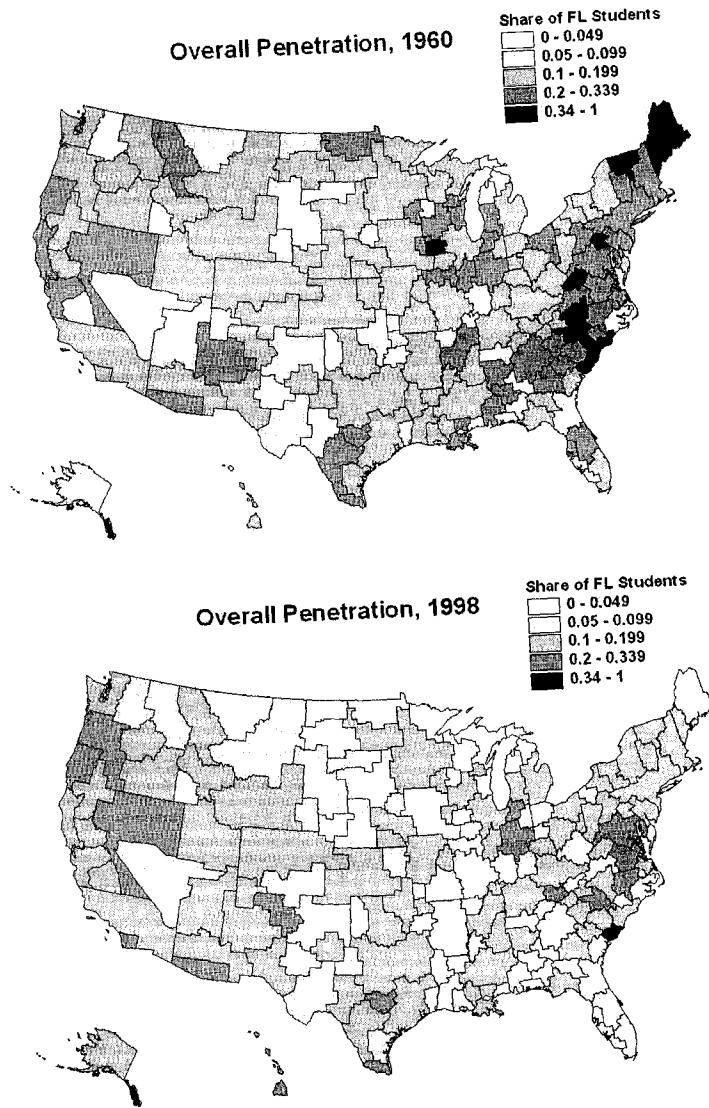


A common concern in geographic studies is the effect of a change in scale. To that end, this dissertation work examined foreign language enrollments not only at the state scale, but also at the Economic Area (EA) scale. The maps on the next page depict overall penetration at the EA scale.

The outset year shows a large concentration of high penetration EAs along the East Coast, similar to the overall penetration map at the state scale for the same year. Additional areas of high penetration, not visible at the state scale, are seen in parts of Arizona, New Mexico, Texas, Florida, and California, among others. The final study year shows high penetration EAs in the Washington, D.C.–Baltimore EA and adjacent EAs in Virginia and North Carolina, and also in Charleston, South Carolina, as well as three EAs that border Mexico, among others.

One can observe lower overall penetration rates in 1998 as compared with 1960, but any increased scattering of high penetration areas is less apparent, compared to the maps from the state scale.

Figure 4.16 – EA Overall Penetration Maps, 1960-1998

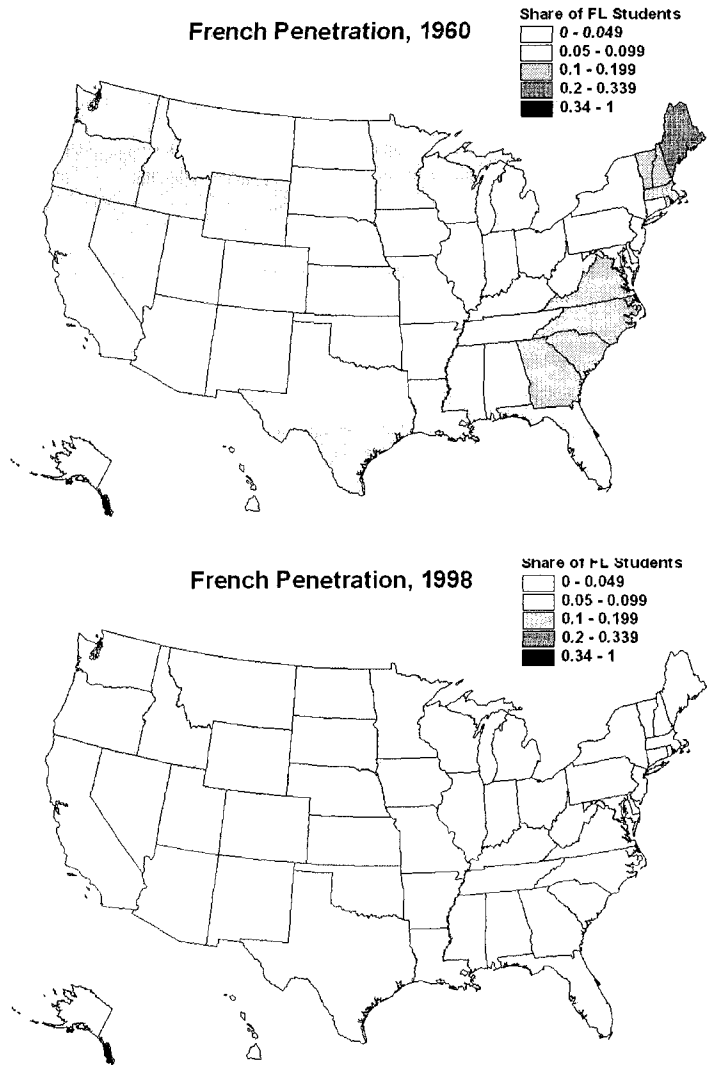


The maps on the following page show French penetration at the state scale. At the outset of the study period, French penetration was greatest in New England and a swath of East Coast Southern states from Virginia to Georgia. French penetration was below 5% in only a few states in the Upper Midwest and Southwest. In stark contrast, the final study year shows French penetration below 5% in every state.

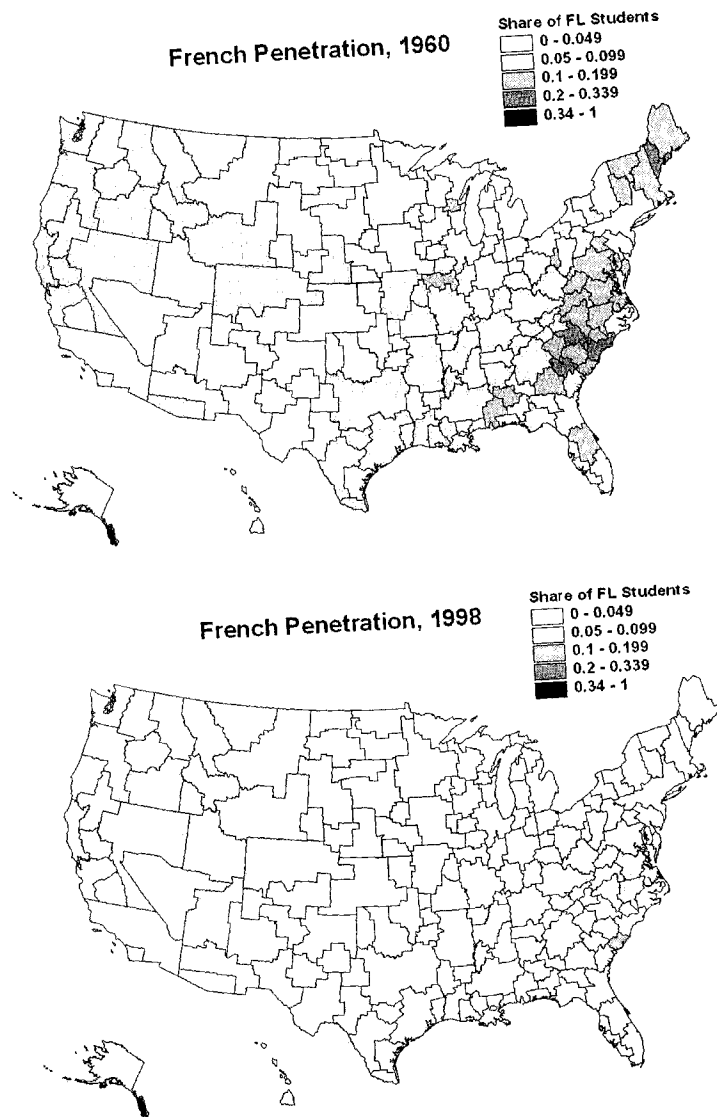
The maps on the second following page (figure 4.18) show French penetration at the EA scale. The two biggest concentrations of French penetration are in New England and an area stretching from Pennsylvania to Georgia, with the very highest penetration EAs in Maine and the Carolinas.

The EA scale shows there were a few EAs with penetration rates higher than 5%, in the final study year, unlike the picture at the state scale. The Charleston, South Carolina, EA had the highest French penetration, followed by the Richmond–Petersburg, Virginia and Raleigh–Durham-Chapel Hill EAs.

**Figure 4.17 – State French Penetration Maps, 1960-1998**



**Figure 4.18 – EA French Penetration Maps, 1960-1998**

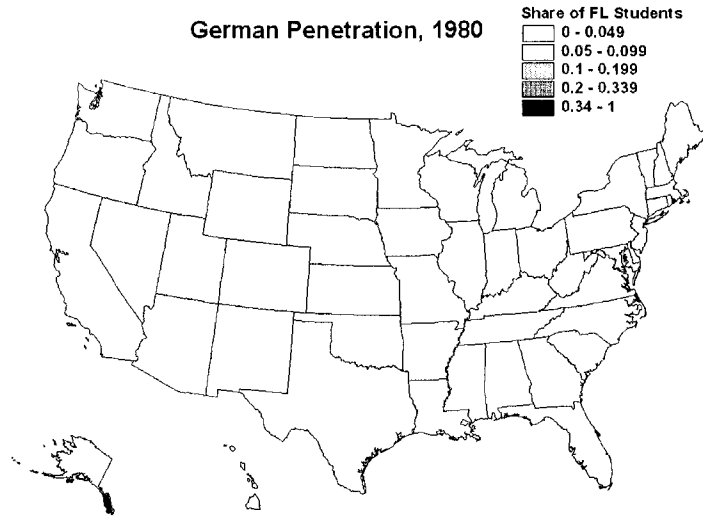
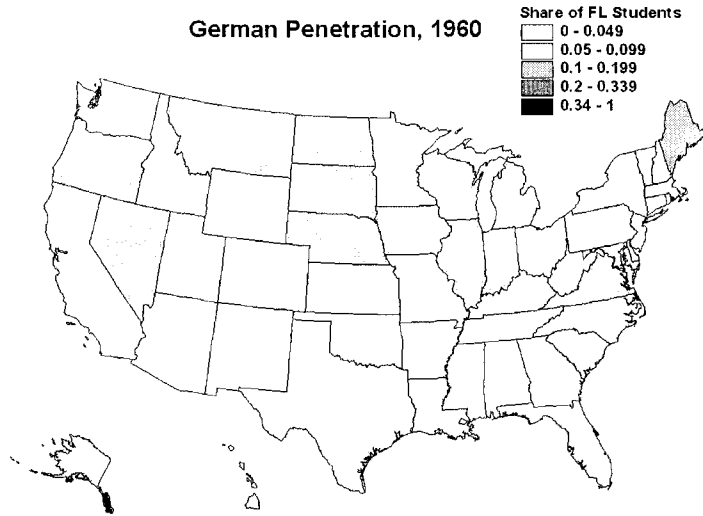


The next two sets of maps (figures 4.19 and 4.20) depict German penetration at the state and EA scales, respectively. In 1960, German penetration was greater in the northern states. One cluster of penetration was centered in the Upper Midwest. German was also popular along the East Coast, with the exception of the three states of New York, New Jersey, and Connecticut which comprise the New York Metropolitan Area. German also had greater penetration in Oregon and Nevada. In just twenty years, German had dropped below the 5% threshold of absolute popularity in every state. This remained the case in study years 1990 and 1998.

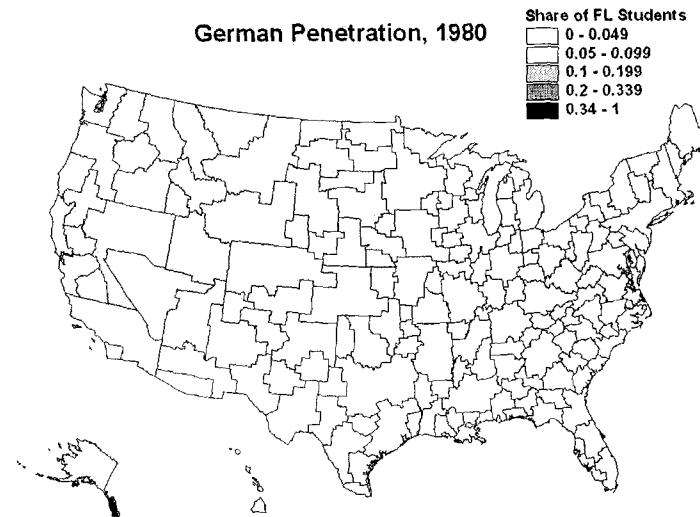
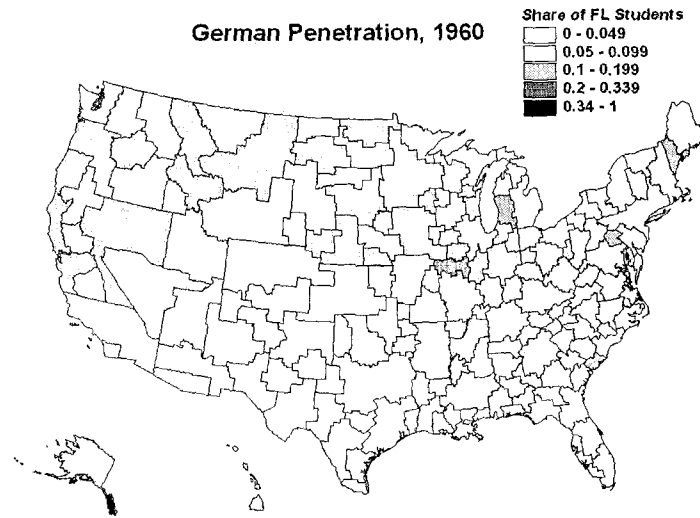
The EA scale map for 1960 shows German had greatest absolute popularity in eastern Michigan, northern Missouri, southern Maine, Charleston, South Carolina, and the Harrisburg–Lebanon–Carlisle EA. This map shows German as having greater penetration in the New York Metropolitan Area (the unit shown is the New York EA, which is somewhat larger) than one would suspect from the state map. Other EAs in New York state, such as Buffalo and Syracuse, actually account for lower penetration.

One might suspect that a greater scale would show German above the 5% threshold in at least a few places, in contrast to the state scale. However, the EA map for 1980 shows that not a single EA had more than 5% of students enrolled in German. This remained the case in 1990 and 1998.

**Figure 4.19 – State German Penetration Maps, 1960-1980**

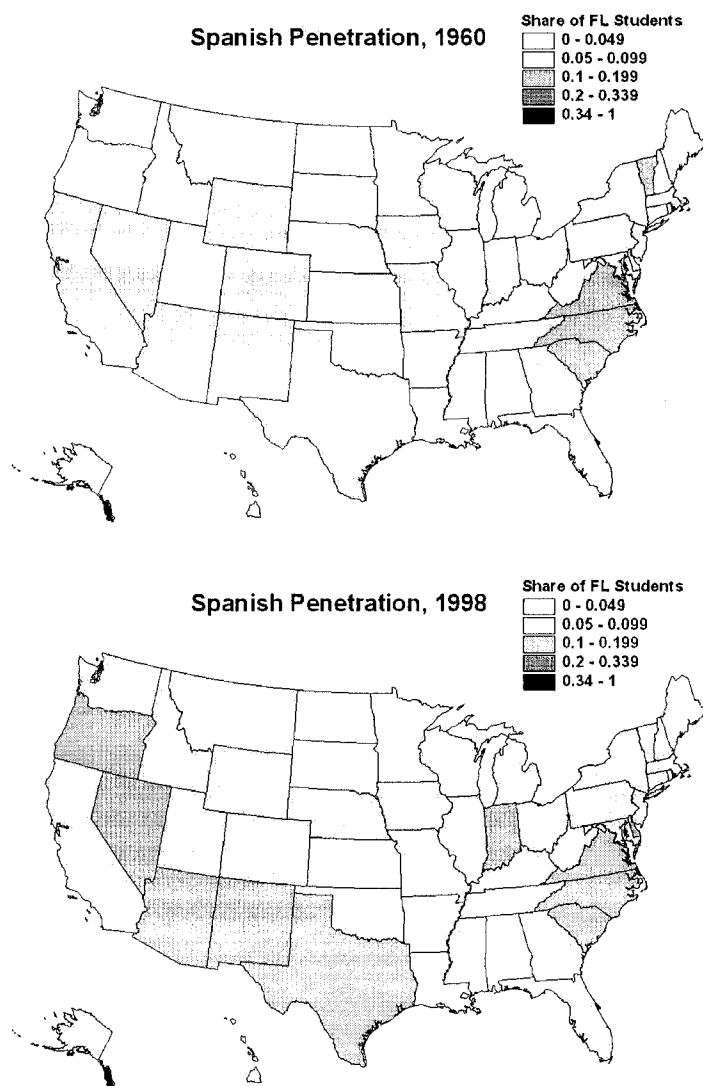


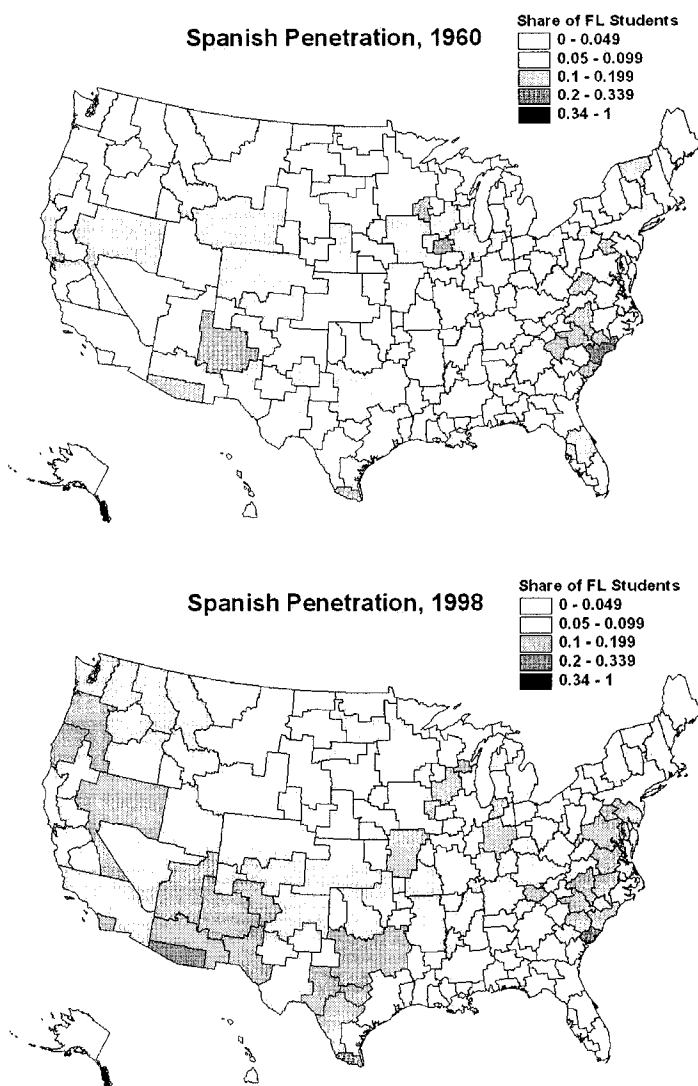
**Figure 4.20 – EA German Penetration Maps, 1960-1980**



Figures 4.21 and 4.22 on the following two pages show Spanish penetration at the state and EA scales, respectively. In 1960, Virginia, the Carolinas, and Vermont had the highest Spanish penetration rates. In general, Spanish was more popular along the East Coast and in the Southwest. Spanish in 1998 was most absolutely popular in the same states as at the outset of the study period, generally speaking; only a foursome of states had Spanish penetration rates lower than 5%. Three of these four states were among those with the lowest overall penetration in 1998. Also, only a few states had lower Spanish penetration in 1998 than they had had in 1960.

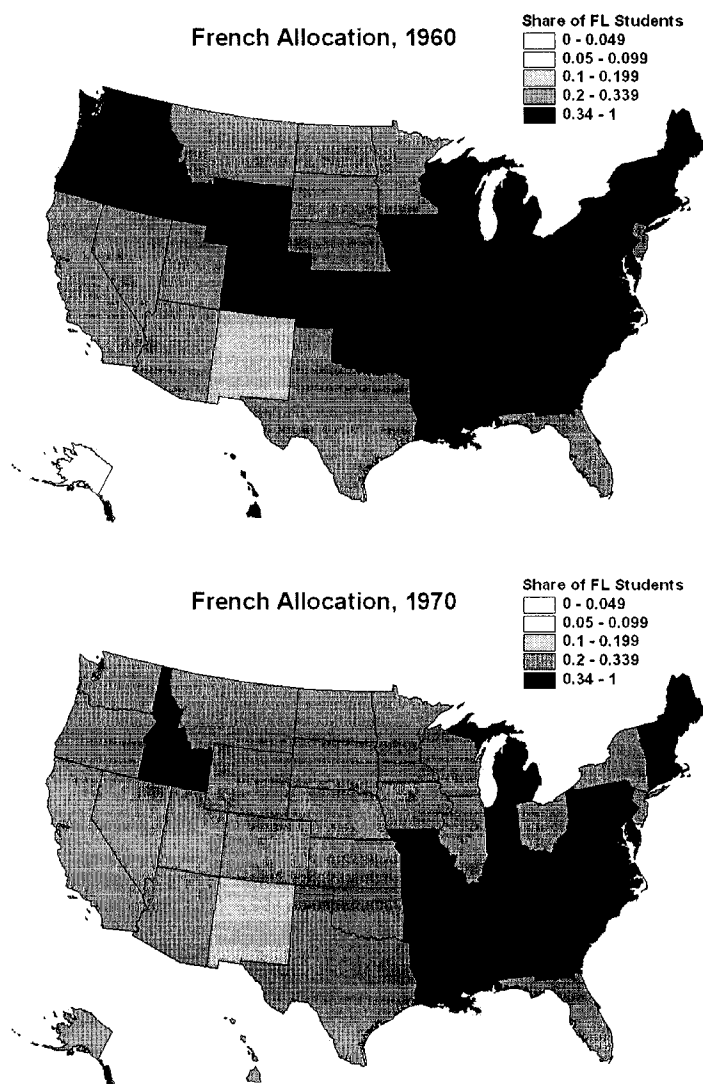
The 1960 EA map of Spanish penetration shows high rates in the Tucson, McAllen–Brownsville, and mid–Florida EAs; the highest was in the Wilmington, North Carolina–South Carolina EA. In 1998, the EAs with the highest penetration rates were Tucson, Arizona, McAllen–Brownsville, Texas, and Charleston, South Carolina. Clusters of higher Spanish penetration are seen in Arizona–New Mexico, Texas, and a swath from Philadelphia to South Carolina. The 1998 map shows a large increase in the number of EAs where more than 5% of all students were enrolled in Spanish, compared to 1960.

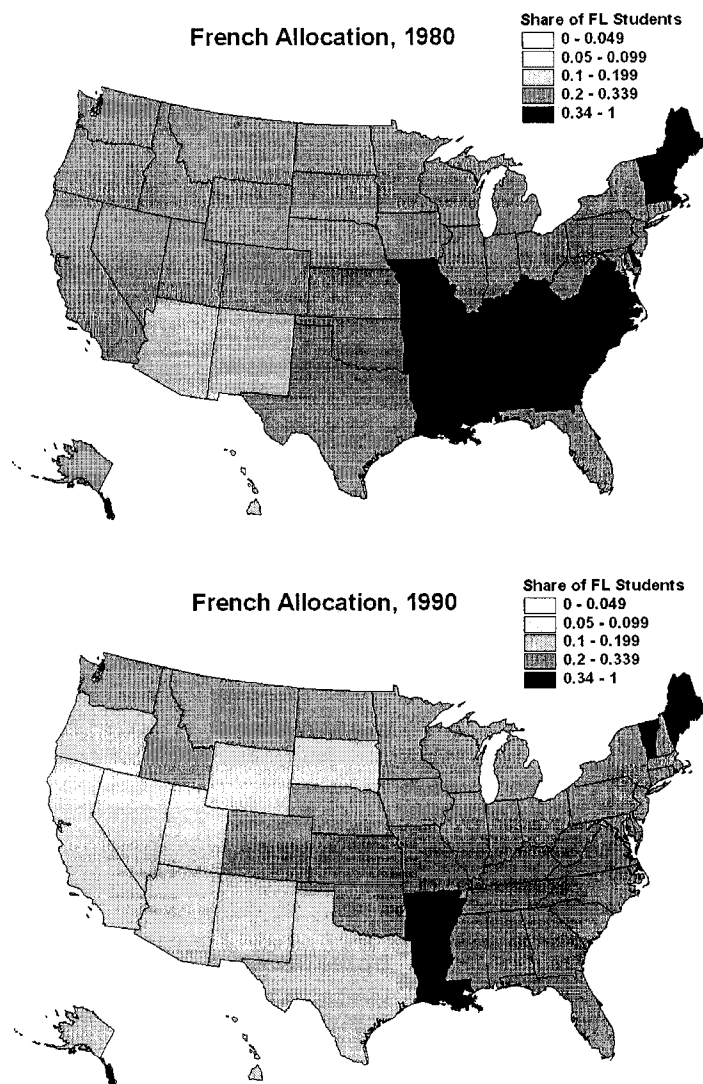
**Figure 4.21 – State Spanish Penetration Maps, 1960-1998**

**Figure 4.22 – EA Spanish Penetration Maps, 1960-1998**

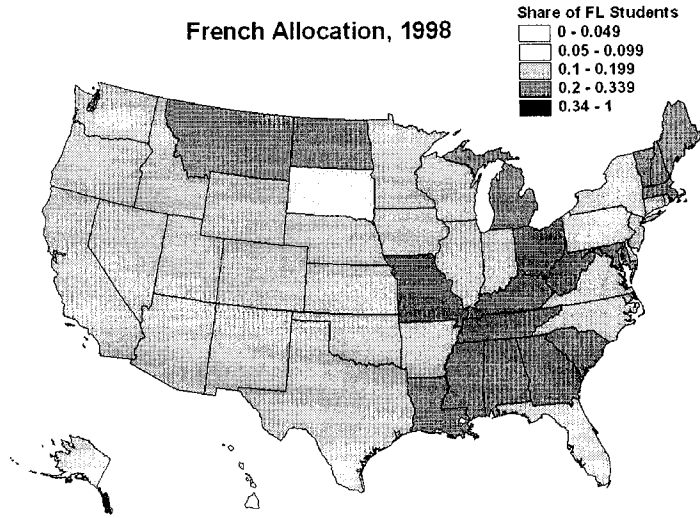
The next set of maps (figures 4.23, 4.24 and 4.25) show changes in state French relative popularity, or allocation, during five interval points in the study period. At the outset of the study period, French relative popularity was greater in the eastern half of the U.S. Over time, one can see two shrinking cores of French relative popularity in the South, and in New England. By 1990, these cores were reduced to Arkansas–Louisiana and Maine–Vermont. In the last study year of 1998, French enrollments comprise less than 34% of all foreign language enrollments in every state. One can still observe greater relative popularity, albeit reduced from previous years, in the South, New England, Michigan–Ohio, Missouri, and North Dakota–Montana. French has the lowest relative popularity in South Dakota.

French shows some small changes in the pattern of relative popularity between 1960 and 1998. These maps mostly reflect the declined overall popularity of French; French is most popular in the same places in 1998 as in previous years, but less so than in those previous years.

**Figure 4.23 – State French Allocation Maps, 1960-1970**

**Figure 4.24 – State French Allocation Maps, 1980-1990**

**Figure 4.25 – State French Allocation Map, 1998**



The next set of maps (figures 4.26, 4.27 and 4.28) show changes in EA French relative popularity. At the EA scale in 1960, one can see additional clusters of French allocation in the Pacific Northwest and in Colorado–Wyoming. In 1970, one can see that the New York EA, EAs in Ohio–Indiana–Michigan, and EAs in Florida are principal areas of lower French allocation east of the Mississippi River. The 1980 EA map shows the vast majority of EAs with allocations greater than 34% to be located in the South; New England looks comparatively less important. However, the three EAs of highest French allocation maintain their positions from 1980 to 1990, while many Southern EAs fall below the 34% French allocation threshold. This shows the 1980s as an important decade for the decline of French relative popularity in the South. The biggest holdouts of French allocation in 1990 are EAs in Louisiana and Arkansas, reflecting the state scale.

In the final study year of 1998, holdouts of French relative popularity are found in Maine, Louisiana, North Dakota. Anomalously, the Sarasota, Florida, EA is also included in this group.

French allocation at the start of the study period tended to be greater in the eastern half of the United States. As it declined in popularity nationally, holdouts of high allocation were still found in the South and New England. At the end of the study period, the only regions with the highest allocation were found in Louisiana, Maine, North Dakota, and Florida. The initial general pattern of greater French allocation in the eastern half of the U.S., however, remained the same at the end.

Figure 4.26 – EA French Allocation Maps, 1960-1970

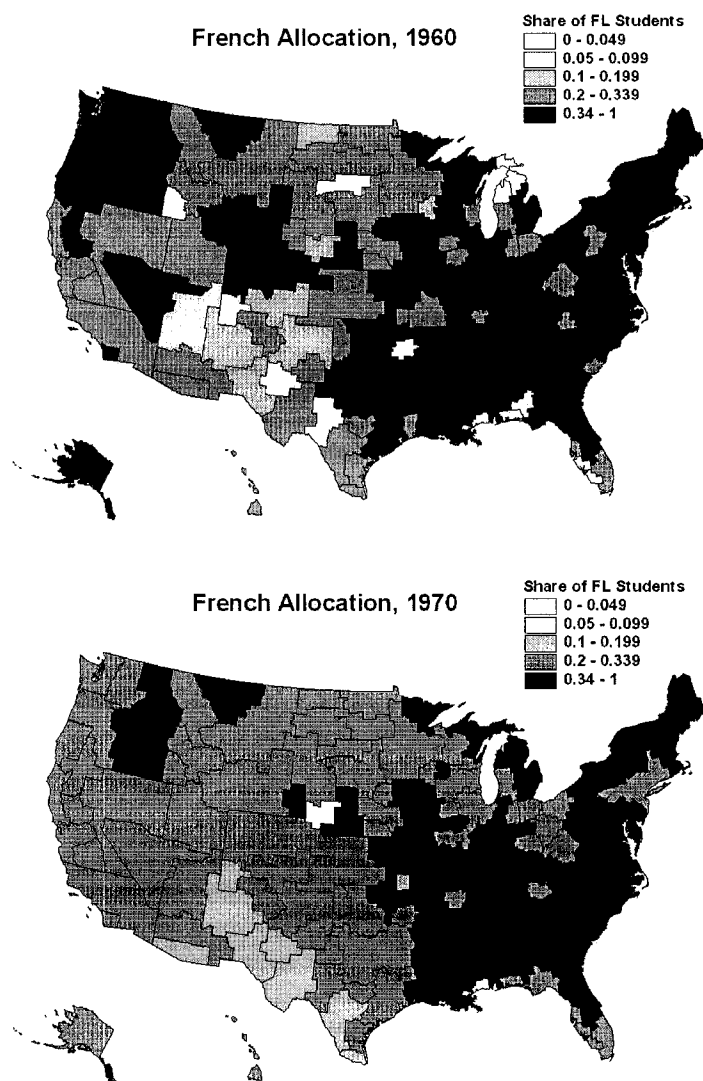


Figure 4.27 – EA French Allocation Maps, 1980-1990

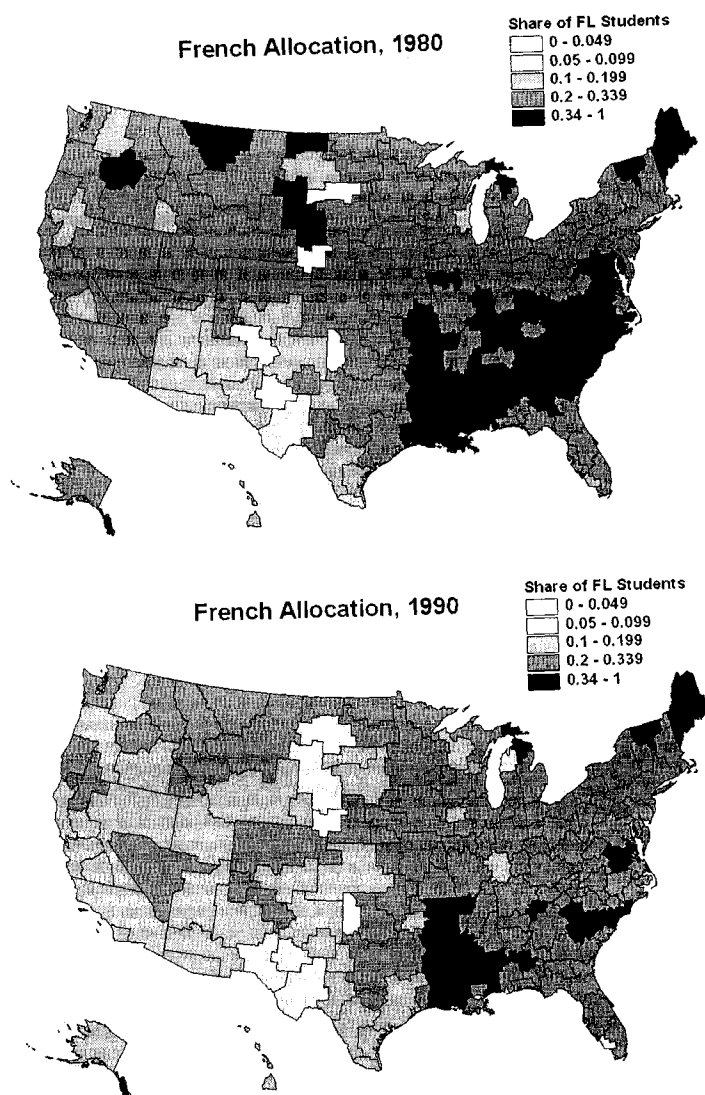
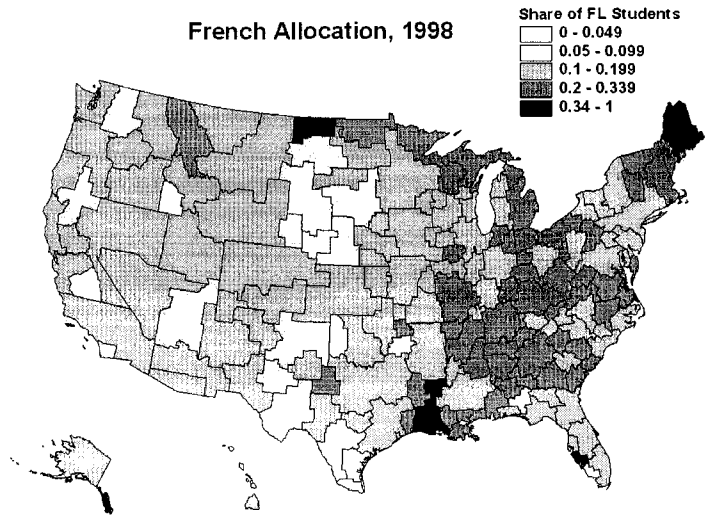


Figure 4.28 – EA French Allocation Map, 1998



The next set of maps (figures 4.29, 4.30, and 4.31) depict German allocation at the state level. German relative popularity was greatest in states centered in the Dakotas. German accounted for between a fifth and a third of enrollments in most states at the outset of the study period. One can observe, over time, a loss of German relative popularity starting in the southern parts of the United States, which then reached northwards. German reaches new lows of relative popularity in the Southwest, parts of the Gulf South, and New York–New Jersey–Connecticut. In the final study year of 1998, German had the lowest allocations in California, Louisiana, and Hawaii. German comprised less than 5% of all modern foreign language enrollments in these states, and did not reach 20% in any state.

Figure 4.29 – State German Allocation Maps, 1960-1970

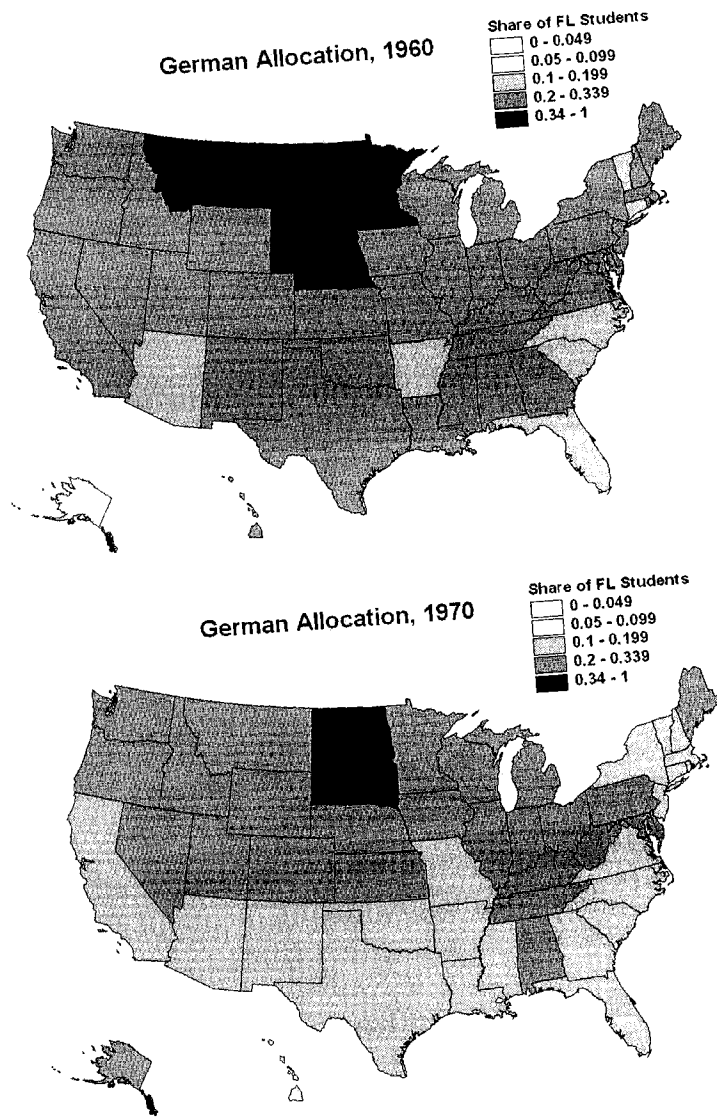
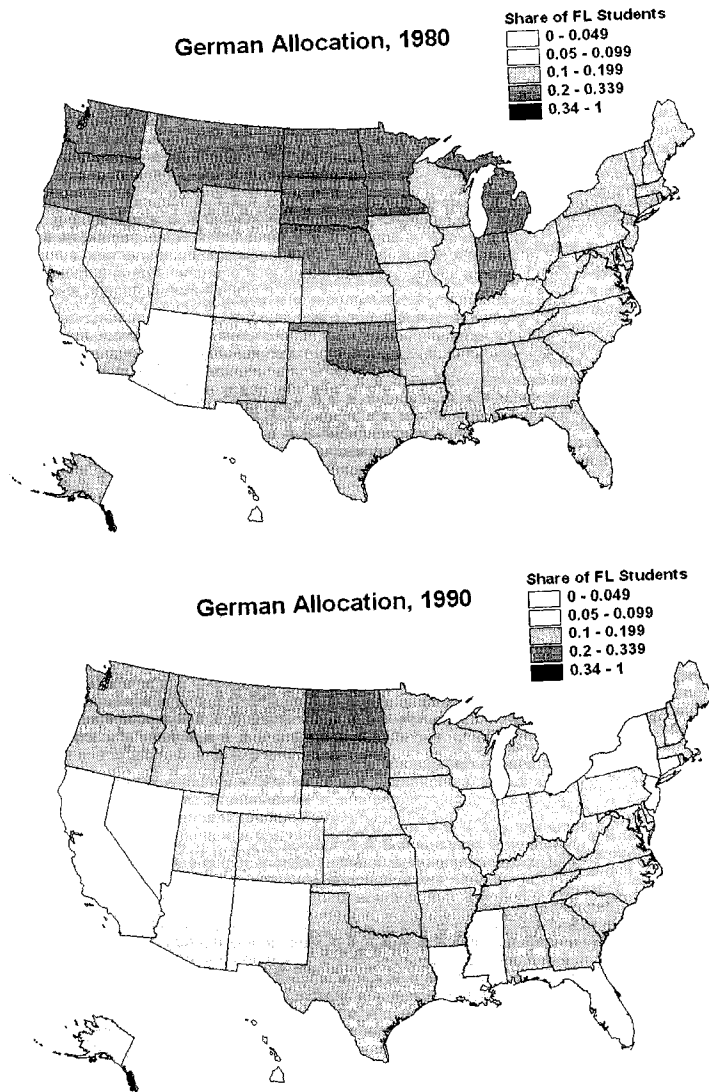
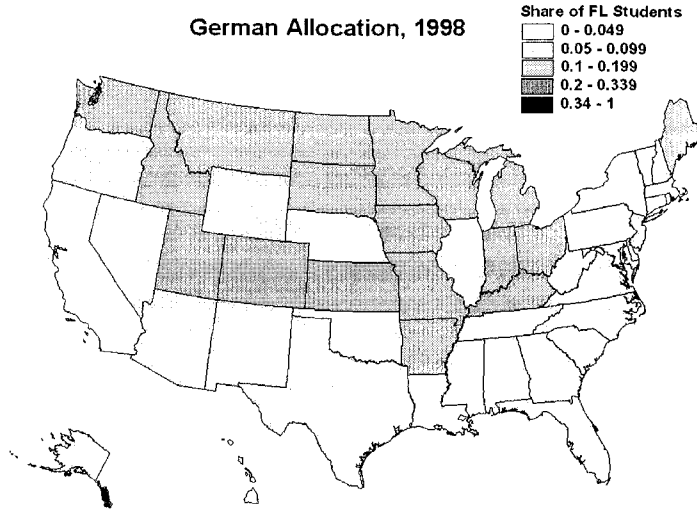


Figure 4.30 – State German Allocation Maps, 1980-1990



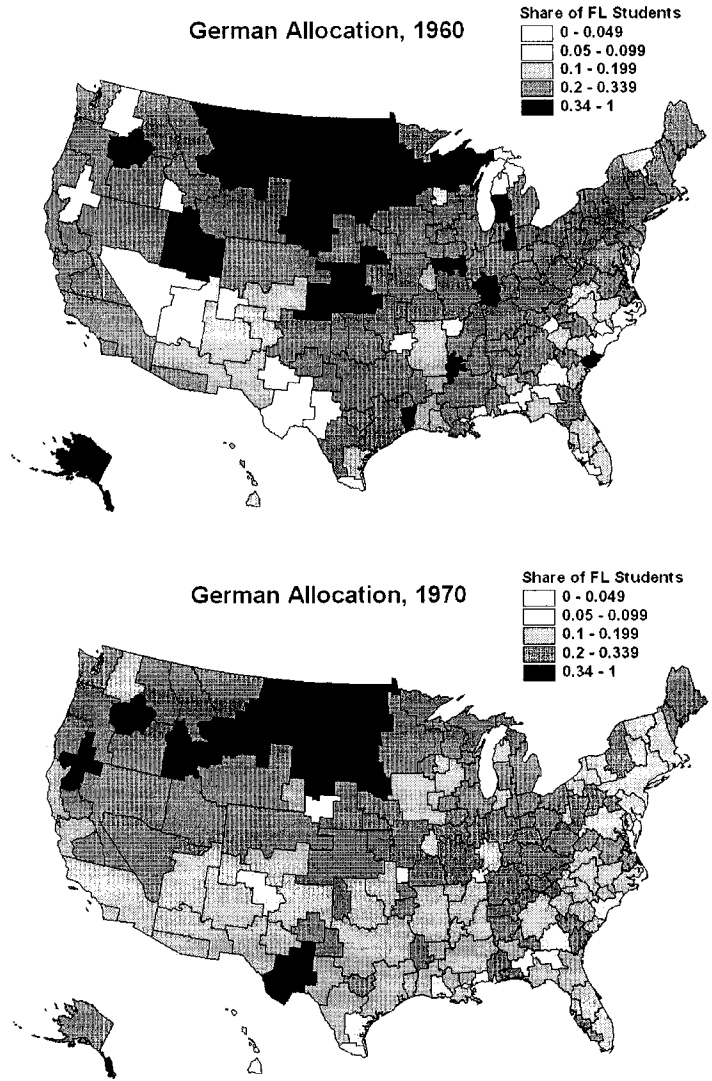
**Figure 4.31 – State German Allocation Map, 1998**



German allocation maps at the EA follow on the next two pages (figures 4.32, 4.33, and 4.34). One can observe the same large concentration of German relative popularity in 1960 centered in the Dakotas. A few scattered EAs also have high German allocations. In 1970, losses in German relative popularity are seen in the Northeast, South, and Southwest. In 1980, German relative popularity is still centered in the Dakotas, but appears to have a North–South component down to Oklahoma, rather than spreading along the Canadian border. The final study year shows German relative popularity centered in the Dakotas as previously, and also a swath running from Michigan down to Ohio.

German allocation at the outset of the study period was highest in the Dakotas and neighboring areas, and tended to be greater in the northern half of the U.S. German declined even faster than French nationally. By 1998, only EAs in North Dakota and northern Wisconsin had at least a fifth of foreign language students enrolled in German.

Figure 4.32 – EA German Allocation Maps, 1960-1970



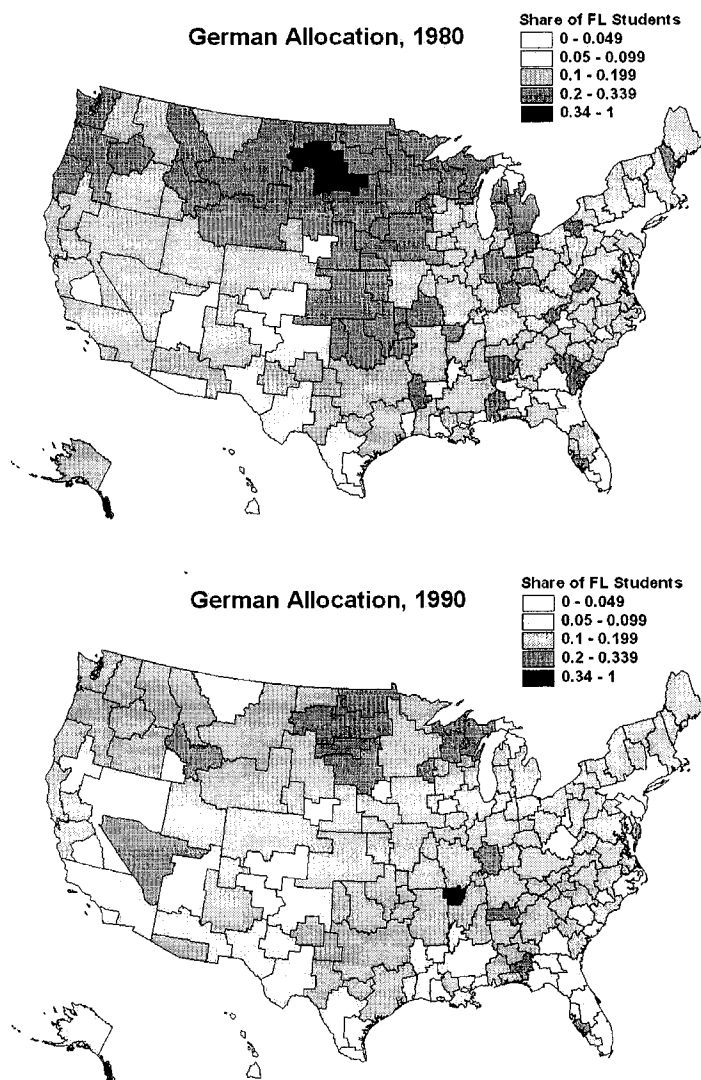
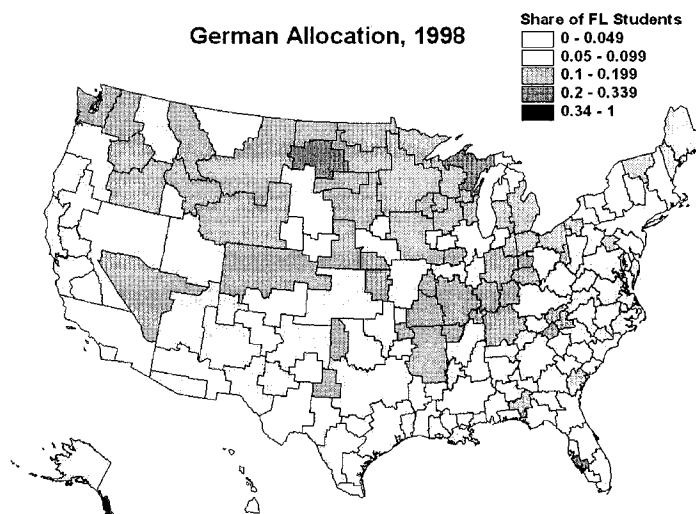
**Figure 4.33 – EA German Allocation Maps, 1980-1990**

Figure 4.34 – EA German Allocation Map, 1998

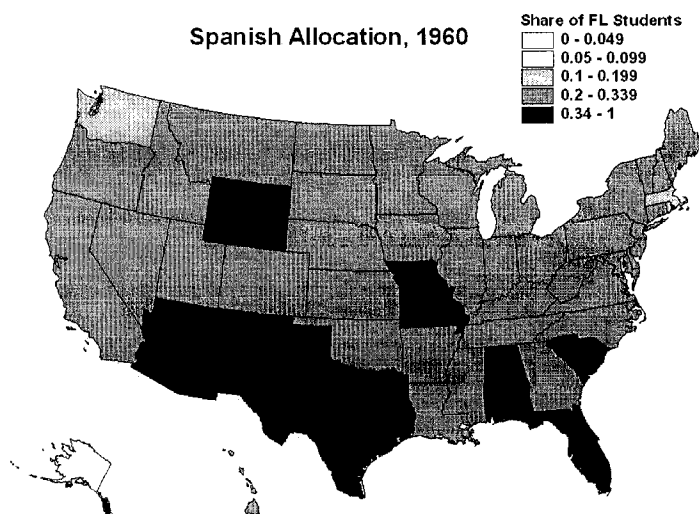


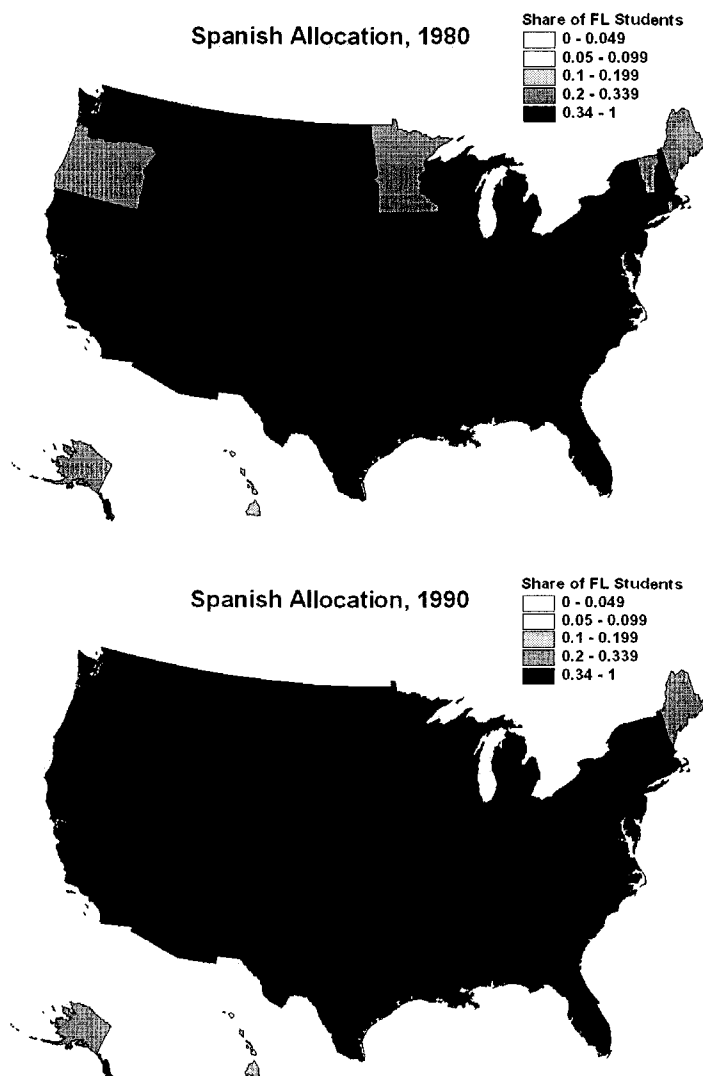
Figures 4.35, 4.36, and 4.37, seen on the following three pages, show Spanish allocation at the state level. Spanish allocation in 1960 was greatest in a band from Arizona to Texas. High levels were also seen in Alabama–Florida–South Carolina, and Missouri and Wyoming. Spanish was least relatively popular in Alaska, Washington State, and Massachusetts.

The map for 1970 shows a great many states had reached the 34% threshold of Spanish allocation. By 1980, the only holdouts of less than 34% Spanish allocation were Oregon, Minnesota, Vermont, Maine, and Hawaii. In 1990, only the geographic extremities of Maine, Alaska, and Hawaii were below this threshold, and at the end of the study period, Spanish comprised at least 34% of modern foreign language enrollments in every state except for Hawaii.

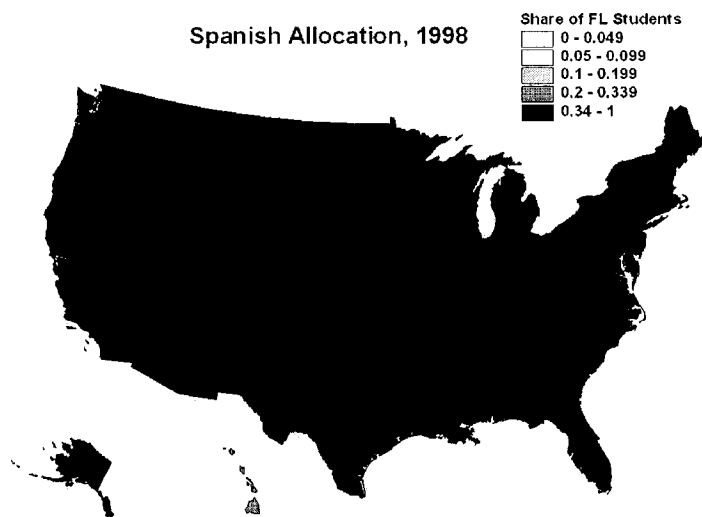
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Figure 4.35 – State Spanish Allocation Maps, 1960-1970



**Figure 4.36 – State Spanish Allocation Maps, 1980-1990**

**Figure 4.37 – State Spanish Allocation Map, 1998**



The final set of maps show Spanish allocation at the EA level (figures 4.38, 4.39, and 4.40). The map for 1960 shows high levels of Spanish allocation in additional areas, such as the coast of the Carolinas, parts of Wyoming, the San Diego EA, and eastern Washington State, among others. The map for 1970 shows only a few EAs in the South as below the 34% Spanish allocation threshold, and the New York EA as having greater Spanish relative popularity than other parts of the Northeast.

In 1980, holdouts of lower Spanish allocation are seen in the Pacific Northwest, the western border with Canada, and parts of New England. Even at the larger EA scale, Spanish allocation reached at least 34% nearly everywhere in the U.S. by 1998.

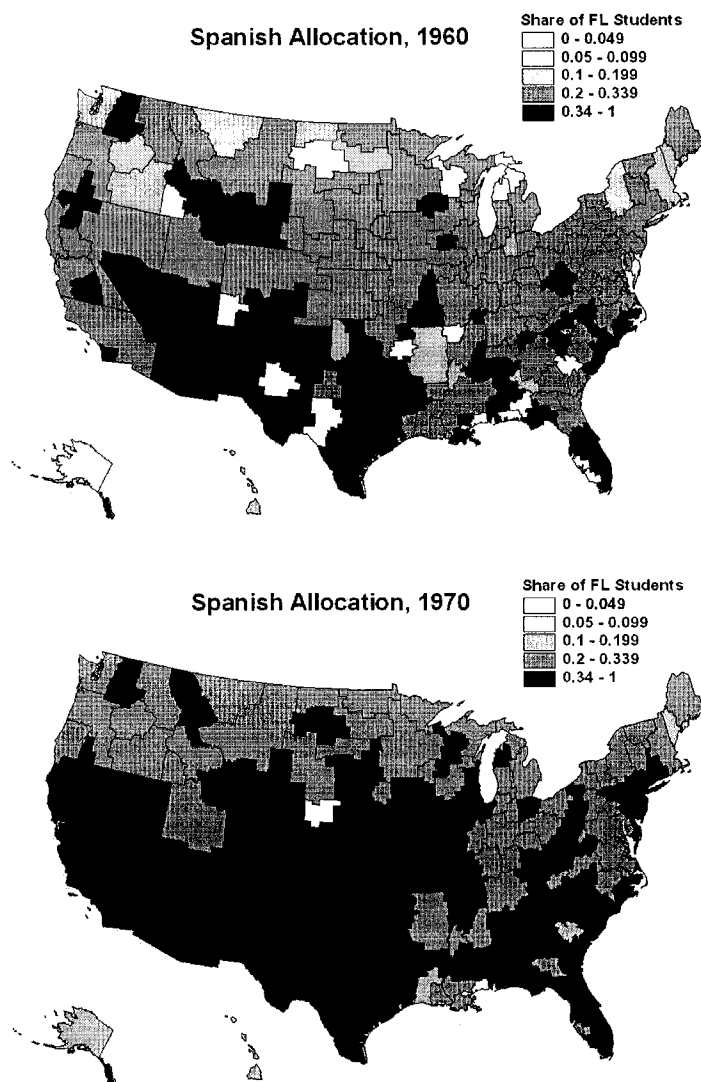
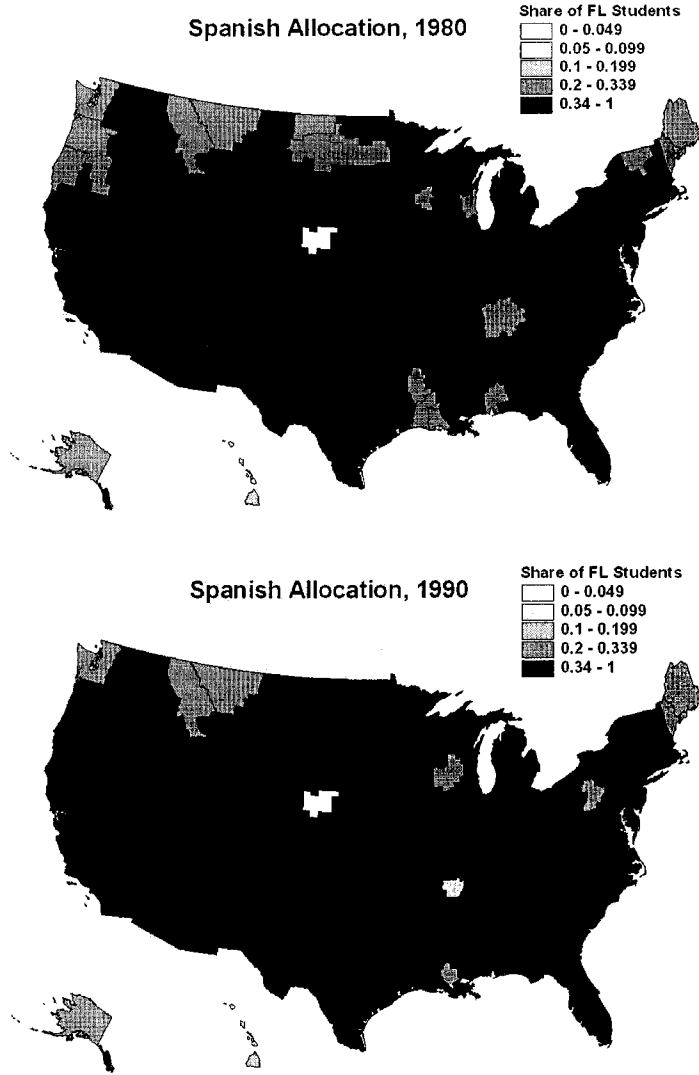
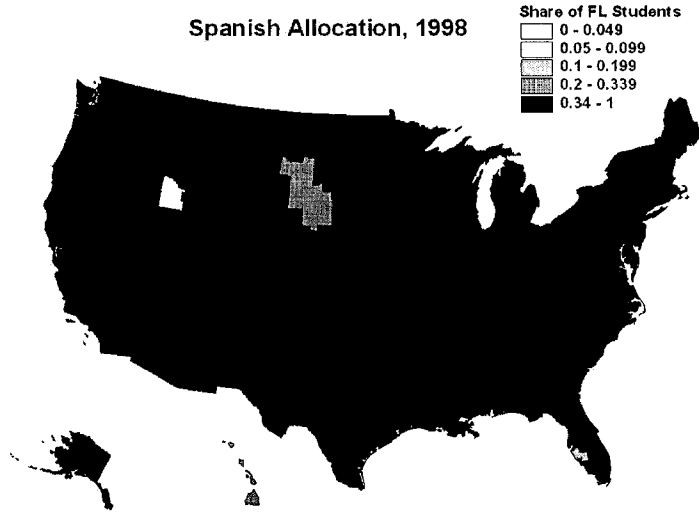
**Figure 4.38 – EA Spanish Allocation Maps, 1960-1980**

Figure 4.39 – EA Spanish Allocation Maps, 1990-1998



**Figure 4.40 – EA Spanish Allocation Map, 1998**



Penetration and allocation patterns for the less popular foreign languages of Italian, Russian, 'Other', Japanese, and Chinese (not shown) exhibit fewer changes over time than the patterns for French, German, and Spanish.

Initially, Italian allocation was greater in the San Francisco and New York Metropolitan Areas, as well as a few others. Subsequent geographic expansion of high Italian allocation was found in the Northeast near the New York Metropolitan Area. Italian stands out as a language concentrated in the Northeast.

Initial Russian allocation was lesser in the South and in the Plains states. In 1990 Russian had greater allocation in the Northeast, Northwest, and Alaska. At the end of the study period Russian accounted for at least five percent of enrollments in only Alaska, Utah, and Wyoming.

'Other' languages were often scattered. Sometimes a large share of 'Other' languages was comprised of Native American languages, so the patterns may reflect Indian reservations.

Japanese was initially popular only in Hawaii. In the 1980s it became more popular in the Pacific Northwest, and then spread into other parts of the West.

Chinese began without any state in which it comprised at least five percent of enrollments. The most consistent area of higher allocation was the San Francisco EA. In 1995, at least ten percent of all foreign language students in this EA were enrolled in Chinese.

## *Chapter 5 - DATA*

This chapter discusses the data used in this dissertation, their sources, and operationalization. For a full listing and definition of the variables used in this study, please consult Appendix 1.

### **5.1 Disparate Sources**

This dissertation work required the integration of disparate data sources. Such disparate data sources introduce more limitations than a complete data set collected from a single source. The principal sources were Modern Language Association surveys of foreign language departments, institutional data on American colleges and universities archived at the University of Michigan, data from the economic Census distributed via the Bureau of Economic Analysis, data from the U.S. Census, and data from the Penn World Tables. High school foreign language enrollment data were deemed infeasible to include. If they had been included, the goal would have been to create a ‘feeder’ variable. Also, there are no sufficient data on the effect of offering public services in Spanish and other foreign languages. One could argue that this affects foreign language study in college, even though the anecdotal evidence suggests that police, healthcare workers, and others are learning Spanish on the job, well after any college attendance. There is some finance information on bilingual education, but it was deemed inadequate.

Data were tabulated at two different geographic levels. The first was the familiar state level, and the second was the EA level.

## 5.2 Modern Language Association Data

The data compilation for this study was built around surveys carried out by the Modern Language Association, starting in the late 1950s. The launch of Sputnik in 1957 prompted fears of the U.S. becoming less competitive with the Soviets in the sciences and elsewhere. The foreign language ability of Americans, or supposed lack thereof, was one specific avenue of these fears. It was thought that advancements in science would be less permeable to monolingual Americans.

The U.S. government contracted the Modern Language Association to conduct surveys of enrollment in American colleges and universities, the better to assess trends in foreign language study, and, presumably, ability. This study used the surveys from 1960, 1970, 1974, 1977, 1980, 1983, 1986, 1990, 1995, and 1998. For reasons of lack of accompanying data, data from survey years 1958, 1959, 1963, and 1965 were not included. Data on Japanese and Chinese enrollment were missing from 1970. Some MLA survey data were accessed from a book published in 1961 (Vamos et al. 1961). Most data were accessed directly from computer paper printouts from the MLA offices. These data show the number of fall enrollments by foreign language, by institution, in a given year (Modern Language Association (i)). In conjunction with base student enrollments, foreign language enrollments were used to derive the availability of a particular foreign language.

In addition to data on foreign language study enrollments, the MLA also collected data on foreign language entrance and graduation requirements. Data on requirements were available and incorporated for study years 1960, 1970, 1983, 1986, and 1995

(Modern Language Association (ii)). Data on requirements from 1974 were also available, but were not incorporated into this dissertation work.

In order to conduct a statistical analysis, it was necessary to standardize the data. The units of analysis of this study were geographic. The state scale and the EA area scale were used. The number of enrollments in a particular foreign language in a state or EA area was divided by the number of total student enrollments in that state or EA area. This was the penetration rate; in the case of overall penetration rate, the numerator was the combined number of all foreign language enrollments. Keep in mind that the denominator of the penetration rate also included institutions where the foreign language in question was not offered, except for study year 1960. The allocation rate used enrollments in a particular foreign language in a state or EA area, divided by the combined number of all foreign language enrollments in that state or EA area.

The availability variables were derived by first identifying the colleges and universities in a state or EA area where there was any enrollment at all in a given foreign language. It was assumed that all students in that college or university had access to study of that foreign language. The enrollment of all students in all colleges and universities where a given foreign language was offered in a state or EA was summed, and then divided by the total student enrollment in that state or EA. Thus, the availability variable was a population weighted statistic, just like the penetration rate.

The process for converting the MLA requirements surveys into operationalized variables was more complex. The extreme heterogeneity of requirements directives at each college or university made a form of classification necessary. It was necessary to

differentiate places that had little in the ways of requirements from those that were more stringent. Three main categories were derived. Here are the classifications for graduation requirements:

- The first was the least stringent category; this was used to signify absolutely no language requirements.
- The next classification was used for requirements that applied to either the entire student body or BA/AA/liberal arts majors, but fell short of the equivalent of greater than one year of foreign language study. Requirements that could be fulfilled with testing proficiency, placement, high school study/transfer, college transfer or similar ways were also classified as this less stringent requirements category, even if the nominal time was greater than one year of foreign language study. For the last study year, 1998, an additional variable was created that signified colleges and universities with weaker requirements than just previously outlined.
- A third classification was used for the more stringent requirements; it was used for requirements that applied to either the entire student body or BA/AA/liberal arts majors, and were equal to the equivalent of greater than 1 years' time foreign language study. This could be 1+ years, 2+ semester courses or 3+ quarter courses, 6+ semester hours or 9+ quarter hours. If the requirements were exactly equal to one year, an institution was given this more stringent classification.

In terms of entrance requirements, there were only two categories: those institutions that had an entrance requirement, and those that did not. Typically, the majority of students in a state or EA were subject to neither entrance nor graduation requirements, and only a small share of students were ever subject to the most stringent graduation requirements.

The requirements variables were population weighted, like the penetration rate and availability. The number of students subject to a particular requirements classification in a state or EA was divided by the total number of students in that state or EA.

### **5.3 Limitations of MLA Data**

There are numerous limitations with the MLA language enrollment data. The data cannot be properly defined as longitudinal. Even though they form a time series, the same observations are not tracked from year to year. The only direct information about observations is the year, the institution, the language, and graduate/undergraduate status (this study is confined to undergraduates). Everything else must be inferred at some larger frame of reference. For example, the year of study of the enrollees is not known – whether they were freshman, sophomores, juniors, or seniors. It is known whether an institution is two-year or four-year. It is not known if enrollees are enrolled in more than one foreign language, or whether they have a previous history of foreign language study. It is not known what percentage of those enrolled actually completed the foreign language course. Some scholars have observed that many foreign language students study move from one foreign language to another, and some study two or more foreign languages simultaneously. The major of enrollees is not known, but in some cases the

foreign language requirements for particular majors at particular institutions is known. The requirements classification in this dissertation work did not incorporate these, however.

It is known if requirements apply to the entire student body, and the total undergraduate population for certain years, but not the number of students in particular majors. This means that requirements that apply to the entire study body are more useful for these purposes than those that apply only to certain majors. Besides total undergraduate population, and institutional two- or four-year status, there is also other institutional data. The size of an institution, academic rank, tier one- or other status, and race and sex percentages of the total undergraduate population is known. The grade point average of those actually enrolled, as well as those students' race and sex, is not known. Immigrant and ethnic status at either the individual or institutional level is not known, so inferences with regards to those variables were made at the state or metropolitan area level. The share of foreign students at institutions was known and incorporated, however. The Finn (Finn 1998) transcript study, while focusing on the less relevant high school level, does not have these disadvantages. His data set has considerable data for each individual case (also termed 'micro-data'), so inferences at a broader scale are less necessary. A study using his type of data, but also incorporating the geographic aspects of this one, would be a useful follow-up.

It is not known if a particular foreign language enrollee was a resident of the state where the institution is located. Students could be studying a particular foreign language for use in a markedly different geographic locale. Data are available for some years on

the out-of-state student population, at the state level; out-of-state student population shares were incorporated for these years. Finally, even though the MLA foreign language surveys were not taken at regular intervals (with spans of six, five, and three years, in some cases), response rates have typically been above 95% (Huber 1996).

#### **5.4 Institutional Data**

Data on individual colleges and universities were accessed via a data consortium hosted at the University of Michigan (United States Department of Education (i), United States Department of Education (ii)). The one exception was institutional data from 1960, obtained via an early MLA publication that happened to include such data, along with the MLA language survey data (Vamos et al. 1961). All data available for individual colleges and universities, understandably, were scaled to both state and EA levels. Institutional data were not available for 1983; thus, institutional data from 1982 were applied to the 1983 study year.

Data from each institution on demographics showed the total number of undergraduate enrollees, and undergraduate women, white, black, Hispanic, Asian, and non-resident foreign students. The total number of undergraduate enrollees in all of the institutions of a geographic unit was used as the denominator to obtain percentages for each geographic unit of women, whites, blacks, Hispanics, Asians, and non-resident foreign students. For 1974 and 1970, only data on women were available; for 1960, only the number of undergraduate enrollees per institution was known. For 1970–1983, sex code data on whether an institution had only male students, only female students, or was coed were available. For 1970–1977, race code data on whether an institution was

predominantly white or black were available. For 1970 and 1974, range code data classified institutions by the size of their student bodies. The population size of the community where an institution was located was available for 1980 and 1983.

Sector, control, level, and format data showed various combinations of two-year versus four-year, public versus private, and profit versus non-profit statuses for institutions. These data were available for most study years 1986–1998. Only control data (whether an institution was public or private) were available for 1970–1983, with the exception of 1980, where no control data were available.

Offering level data showed the highest level of degree each institution awarded. These were available for study years 1970–1998. Affiliation data showed public versus private nonprofit status, and religious affiliation of each institution. Affiliation data were available for study years 1990–1998.

Carnegie classification data were available for the 1998 and 1995 study years. A similar classification system called ‘affiliation’ was available for 1980, not to be confused with the affiliation data from 1990–1998. Carnegie units and the 1980 affiliation variable classify institutions in a wide variety of ways. Research I, ethnic, and religious status rank among them.

For 1970–1983, institute and status code data contrasted institutions by whether they were individual, main campuses, or various types of branch campuses. Also for 1970–1973 calendar system data showed whether an institutions followed the semester, quarter, trimester, 4/1/4, or had some other calendar system.

Institutional variables were converted to percentages. All the students in a region were summed according to one of the classifications of a variable. This was divided by the total number of students in the region. Generally speaking, the base student population attended two-year or four-year colleges and universities. Flight schools, beauty salons, and other trade schools where foreign languages are generally not offered were not included in this base population.

### **5.5 Limitations of Institutional Data**

One weakness of the institutional data is the formats and types of data available over the entire study period are inconsistent. Of course, this might be expected of any social data set that covers multiple decades. The latter years tended to have more institutional data available. Microdata would be preferable to data at the level of an entire institution. The combination of the institutional base population and the foreign language requirements variables enabled the operationalization of the requirements variables. Requirements variables unweighted by population would not have been meaningful.

### **5.6 Bureau of Economic Analysis Data**

Data from the Economic Census were accessed via materials available from the Bureau of Economic Analysis (United States Department of Commerce 1982). The larger scale geographic units of the analysis (those other than states) were also derived via the efforts of this institution, and thus bear its name. The population size, per capita income, total income, income attributed to services, and income attributed to government for states and EAs for 1970, 1974, 1977, 1980, 1983, 1986, 1990, 1995, and 1998 were used. The share of a state's population that lives in a metropolitan area was obtained for

the preceding years for the state level, but not the EA level. Population size, per capita income, total income, and income attributed to services and government were also available for 1960 at the state level.

Population size, per capita income, and metropolitan share of population required no transformation in order to be used as variables. Services income and government income were divided by total income to derive percentage share of services or government income for a particular geographic unit in a particular year.

Not actually from the BEA, but more closely linked than to any other main data category were educational expenditure data (United States Department of Education (iv)). These data were obtained from the NCES. These data showed per capita total, elementary, and higher education expenditures at the state level, for study years 1983–1998. Per capita total expenditures on education were available for study years 1970–1980. Some NCES data were also used to obtain the share of in-state students in college, at the state level, for study years 1974, 1980, 1986, 1995, and 1998 (United States Department of Education (iii), United States Department of Education (iv)).

### **5.7 Limitations of Bureau of Economic Analysis Data**

These data have the usual limitations that would apply to any application of their use, but there are no limitations specific to this application. In some cases, there were missing values for services income at the EA level.

### **5.8 Census Data**

Data from the 1980, 1990, and 2000 U.S. Censuses were used in this study (United States Department of Commerce, Bureau of the Census 1982, 1983, 1990, 2000). Data from the 1970 Census were not financially feasible, and data from 1960 were not

available in any case. Thus, Census data were applied to study years 1980–1998, but were absent for 1960–1977. Linear interpolation was used to obtain intercensal estimates for 1983, 1986, and 1995. Most Census data were available for both state and EA levels; county-level data were aggregated to the EA scale. Census 2000 data were applied to the 1998 study year, without adjustment.

Most Census data employed in this study referred to some aspect of ethnicity or language use. From the 2000 Census, the foreign born share of population, the share of population 18 years and older who spoke a foreign language at home, and the share of population 18 years and older who spoke Spanish, French, Italian, German, Russian, Chinese or Japanese at home, respectively, was derived. These variables were constructed at both state and EA scales.

Available at only the state scale were data on the share of population five years and older who spoke a language other than English at home, and the share of population five years and older that spoke a language other than English at home and also spoke English less than very well. Also only available at the state level was the share of population aged 18–24 enrolled in college, and the share of population with a bachelor's degree or higher.

The remaining variables from 1998 were all available at both state and EA levels. The shares of the Hispanic population aged 5 and over who spoke only English, only Spanish, English very well, English well, English not well, English not at all, or neither English nor Spanish were obtained. Likewise, the shares of the Asian population age 5 and over that spoke English very well, English well, English not well, or English not at

all were also obtained. The share of the population that was linguistically isolated and the shares of the linguistically isolated population aged 18–64 who spoke Spanish, some other Indo-European language, an Asian language, or some other language were also obtained. The share of the population who spoke Spanish and was linguistically isolated, and the share of the population who spoke an Asian language and was linguistically isolated were also derived.

In terms of ancestry, the share of the population that had French, German, Italian or Russian first ancestry was derived, as well as the share of the population that had either first or second ancestry attributed to the French, German, Italian, or Russian categories.

The remaining variables from the 2000 Census related to place of birth. The share of the population that was born in the state of residence, and the share of the population that was foreign-born, cross-referenced by eight different cohorts, the earliest being those who entered the U.S. before 1965.

The variables for 1990 and 1995 were the same, with the exception of the foreign-born cohorts. They were generally similar to those for 1998. In some cases the universe population was different, such as age five and over versus age 18 and over. In some cases, fewer categories of data were available for 1990 and 1995 versus 1998. The foreign born cohorts for 1990 were different from 1998; the earliest foreign born cohort was for those who entered the U.S. before 1950. The variables for 1980, 1983, and 1986 were generally similar to the previous years, with the same kinds of changes between 1990 and 1995 on one hand, and 1998 on the other.

### **5.9 Limitations of Census Data**

The biggest limitation of the Census data is that Census data from 1960 and 1970 were not available. Especially, study years 1970–1977 had fairly extensive institutional data, but no corresponding Census data. Small changes in formats from Census year to Census year compromise comparability.

### **5.10 Geographic Data**

A key point of interest in this study was the role of geography in influencing foreign language study choices. For this reason various versions of geographic variables were created. Mexico and Quebec were deemed two particularly important concentrations of speakers of foreign languages, where Americans are concerned. Thus, the first geographic measure was the great-circle distance from the centroid of each state or EA to the Mexican and Quebec borders. This measure was applied to all study years. In addition to great circle distance, the driving distance in hours from the centroid of each state to the Mexican and Quebec borders was also derived. This state measure was also applied to all state years; it is possible that differences in the road network may make the 2003 driving distances applied to earlier years less accurate.

Seven geographic dummy variables were created for both state and EA levels. These were whether or not a state or EA bordered Mexico, Quebec, the East Coast, the West Coast, the Gulf Coast, either the East or West Coasts, or all three coasts. Alaska and Hawaii were allocated as West Coast states and EAs.

The remaining geographic variables were the weighted distance measures. These were inspired by the geographic idea of gravity models. It was theorized that the popularity of a foreign language was influenced by the population and purchasing power

of the native speakers of that foreign language, weighted by distance. These weighted distance measures were obtained for both state and EA levels, for all study years.

For the weighted distance measures, the great circle distance from a domestic geographic unit to the centroid and largest city of a country allocated to a particular foreign language was derived. The Penn World Tables were consulted for the populations and sizes of the economies of countries for study years (Heston et al.). Foreign census data were used to obtain the share of population and estimate the share of the economy that French-speakers in Canada, Belgium, and Switzerland accounted for, and likewise, the appropriate shares for German- and Italian-speakers in Switzerland (Nationaal Instituut voor de Statistiek, Statistics Canada, Swiss Statistics). No other countries were sub-divided in this fashion. It was assumed the share of the economy was proportionate to the share of population.

To French was allocated French Canada, France, French Belgium, and French Switzerland. To German was allocated Germany, Austria, and German Switzerland. To Italian was allocated Italy and Italian Switzerland. To Russia was allocated the Soviet Union for 1990 and prior years, and Russia and Belarus for 1995 and 1998. To Spanish was allocated Spain and Spanish-speaking Latin America. To Japanese was allocated Japan, and China, Taiwan, and Hong Kong were allocated to Chinese. Understandably, no weighted distance measure was created for the 'other' foreign languages.

In addition to the great circle distance, the squared great circle distance was calculated for all U.S. geographic unit-foreign centroid and U.S. geographic unit-capital city combinations. The population and economic size of each country allocated to a

foreign language was divided by the great circle distance to the centroid, and to the largest city. The distance-weighted populations and economic sizes for each language were then summed for each state or EA. The process was repeated with the squared great circle distances. In total, there were eight weighted distance measures for each language, for each state or EA. This then yielded the theoretical population and economic gravity exerted by the speakers of a given foreign language on the residents of a particular state or EA.

### **5.11 Limitations of Geographic Data**

The population estimates of the Penn World Tables are probably more accurate than the economic estimates. It has been said that Western estimates of the size of the Soviet economy were exaggerated, just as current estimates of the size of the Russian economy are probably underestimated. The only measure of functional distance is driving distance; it is plausible that there are better measures of functional distance. However, international postal and telephone rates do not vary by U.S. state or region, so they were not applicable. Due to various government restrictions, trying to get air travel data was deemed infeasible.

One could argue that the gravity of a foreign language emanates not only from the native speakers of that language, but also those who have learned that foreign language. The weighted distance measures of this study only take into account native speakers. This could underestimate the gravity of languages that do have large numbers of non-native speakers. Efforts were made to subdivide multilingual countries in only three instances: Canada, Belgium, and Switzerland. However, there are minority native

speakers of Amerindian languages, Catalan, and Basque in Spain and Spanish Latin-America. Likewise, one could note similar instances in Russia, China, Italy, France, Germany, and Japan.

### **5.12 Trade Data**

Some trade data were available at the state level for the last three study years of 1990, 1995, and 1998 (United States Department of Commerce (ii)). These were obtained from the Bureau of Economic Analysis, but were sufficiently distinct to warrant their own data category. For 1990 and 1995, merchandise export share of gross state product, foreign direct investment share of gross state product, and international visitor travel impact expenditures share of gross state product were available. Also available for 1995 were share of merchandise exports to Canada, share of merchandise exports to Mexico, and foreign direct employment share of all businesses.

For 1998, foreign exports were allocated by language for each state. The same methodology employed previously for weighted distance measures was used. The share of all foreign exports linked to a particular foreign language relative to all exports, and the share of gross state product attributed to the same foreign language were derived.

### **5.13 Limitations of Trade Data**

The most extensive trade data were only available for the last study year, which limits comparability with other study years. No trade data are available for years prior to 1990.

## ***Chapter 6 - SHIFT-SHARE ANALYSIS***

This chapter uses a shift-share analysis to examine changes in foreign language enrollments in U.S. two and four year colleges and universities for the 1960–1970, 1970–1980, 1980–1990, and 1990–1998 intervals, at the state and EA levels. The shift-share technique is used to disaggregate the national trends into local trends. In this it reveals the extent to which individual states or regions may be responsible for changes in national popularity, or the extent to which changes in foreign language enrollments are widely reflected. This is the first known application to foreign language enrollment data. More typical applications are to sectoral employment change or population movement (Hoover and Giarratani 1984, Plane 1987, 1989, 1992).

### **6.1 Explanation of shift-share method**

The shift-share method is a means of comparing regional and national growth rates. Differences in growth rates are decomposed into “mix” and “competitive” components. A region with a favorable mix will have greater weighting in industries, for example, that have grown faster nationally. One would expect part of a region’s industrial growth to arise simply from how well it was represented in fast-growing or slow-growing industries at the national level. An unfavorable mix would mean the region was heavily weighted in industries that were declining nationally. This means that the mix component concerns the effects of the beginning of the temporal period of study. The competitive component concerns what happens regarding relative weightings during the period of study. If a region increases its relative weightings in the same direction as national growth rates, it is said to have a positive competitive component. If the region’s

relative weightings change in the direction opposite to national growth rates, it is said to have a negative competitive component. Thus, the mix component reflects regional differences arising from initial weightings, while the competitive component reflects changes that occur during the study period (Hoover and Giarratani 1984).

In this particular study the subject of interest is not industries, but foreign language enrollments. Enrollments for states and EAs were compared with national totals for enrollments. Japanese and Chinese enrollment data were not available for 1970, so Japanese and Chinese are not included in the 1960–1970 and 1970–1980 shift-share analysis intervals.

Analogous to the industry description, one expects that one component of growth in foreign language enrollments at the state or EA levels is due to the mix of enrollment weightings by language. If a region had a greater weighting in Italian at the beginning of a study interval, and Italian was a faster-increasing language at the national level, that state would see increases in overall foreign language enrollment, *ceteris paribus*. Italian would be contributing new enrollments vis-à-vis a mix that predisposes it to benefit from national enrollment trends.

The competitive component of growth in terms of language enrollments is the extent to which the relative popularities of specific foreign languages in a region change against national changes, for a study interval. If Italian increased from 10% of the foreign languages for a region to 20% of foreign language enrollments for that region, and nationally, Italian increased from 10% of all foreign language enrollments to 15%, we would say Italian was competitive in that particular state. It was growing at a rate

faster than we would expect, based on national figures. If the share increased to only 12%, we would say Italian was negatively competitive, as it increased at a rate more slowly than we would expect, based on national figures. Regional population growth rates were used to adjust the national growth rates in foreign language enrollments; we should expect part of enrollment increases to simply come from population growth.

## 6.2 Example of Shift-Share

This is a shift-share derivation example for the Alabama mix and competitive components for the 1990–1998 interval, as well as the French competitive component for Alabama in the same interval.

Total National Enrollment, All Languages, 1990: 1,101,814  
 Total National Enrollment, All Languages, 1998: 1,102,818  
 National Growth Factor, 1990–1998, All Languages:  $1,102,818/1,101,814 = 1.0009112$

Total National Enrollment, French, 1990: 264,304  
 Total National Enrollment, French, 1998: 193,992  
 National Growth Factor, 1990–1998, French:  $193,992/264,304 = 0.733973$

Total Alabama Enrollment, All Languages, 1990: 10,529  
 Total Alabama Enrollment, French, 1990: 2,855  
 Change in Total Alabama Enrollment, All Languages, 1990–1998: -102  
 Change in Total Alabama Enrollment, French, 1990–1998: -485  
 Population Growth Rate Factor, 1990–1998, Alabama: 0.0880162

The Population Growth Rate Factor is subtracted from the National Growth Factor to properly account for the influence of population growth.

Population Adjusted National Growth Factor, 1990–1998, All Languages:  $1.0009112 - 0.0880162 = 0.912895$   
 Population Adjusted National Growth Factor, 1990–1998, French:  $0.733973 - 0.0880162 = 0.6459568$

We next multiply Total Alabama Enrollment, All Languages, 1990 by the Population Adjusted National Growth Factor, 1990–1998, All Languages;  
 $(10,529)(0.912895) = 9611.8713$

Correspondingly, we multiply Total Alabama Enrollment, French, 1990, by Population Adjusted National Growth Factor, 1990-1998, French;  
 $(2,855)(0.6459568) = 1844.2066$

The sum of the immediately previous term for each foreign language, including French, =  
 9483.8242

Mix Component:  $9483.8242 - 9611.8713 = -128.04711$

A decline of approximately 128 enrollments in Alabama for the 1990-1998 interval should be expected, due to initial language weightings.

Expected Change, All Languages, based on Population Adjusted National Growth Factor:  
 $9611.8713 - 10,529 = -917.12868$

Expected Change, French, based on Population Adjusted National Growth Factor:  
 $1844.2066 - 2,855 = -1010.7934$

Competitive Component, All Languages:  $(-102) - (-917.12868) = 815.12868$

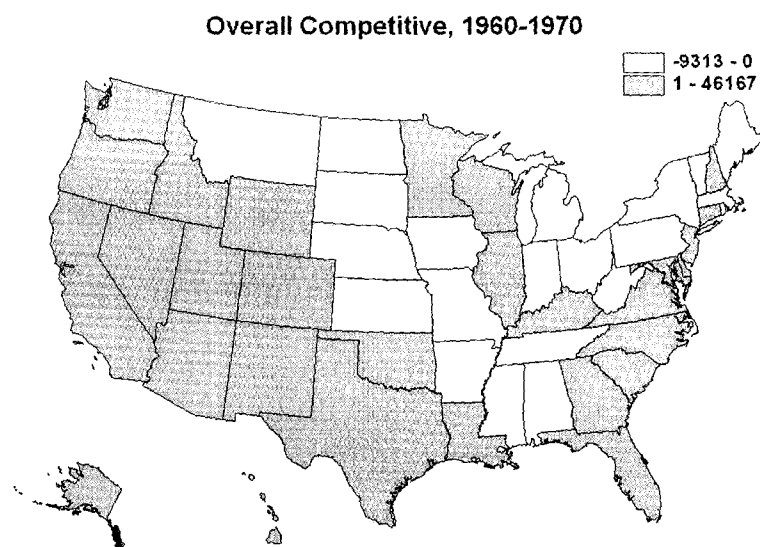
Competitive Component, French:  $(-485) - (-1010.7934) = 525.79344$

An addition of approximately 815 total enrollments and 525 French enrollments can be attributed to Alabama's foreign language competitiveness.

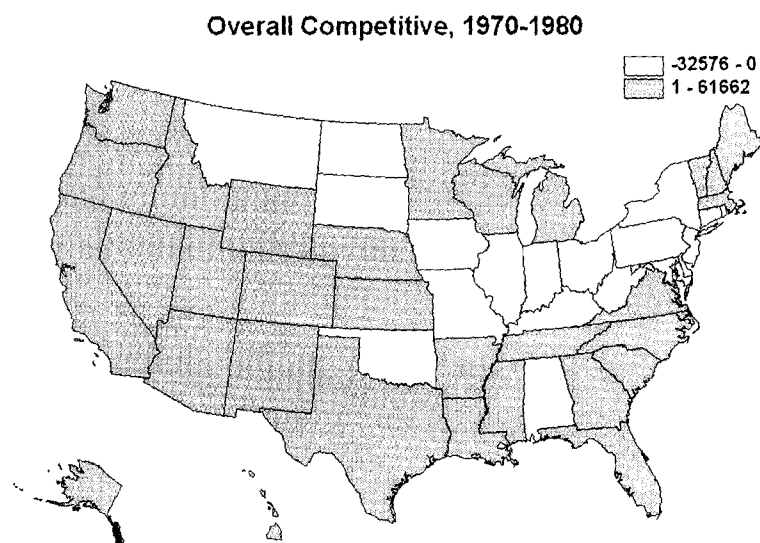
### 6.3 Shift-Share Results

Here are the state maps of the competitive component for all languages:

**Figure 6.1 – Shift-Share Competitive Map 1960–1970**



**Figure 6.2 – Shift-Share Competitive Map 1970–1980**





In the first interval, some Southern and Rocky Mountain/Plains states were non-competitive. These tended to become competitive over time. The largest concentration of non-competitive states apparently shifted from the industrial heartland over to the New York/New England region. In the 1960–1970 interval, shown on Figure 6.1, there are two notable swathes of negatively competitive states. One of these swathes extends from Montana in a southeast direction towards Alabama. This swath's states also tended to have low overall penetration rates. A small grouping of Great Lakes states were similar to these states, in having low overall penetration rates combined with being negatively competitive. In contrast, the other main swath of negatively competitive states contained a large share of the high overall penetration rate New England and Mid-Atlantic states. Tidewater South states, like those of New England and the Mid-Atlantic, had high overall penetration rates, but were positively competitive.

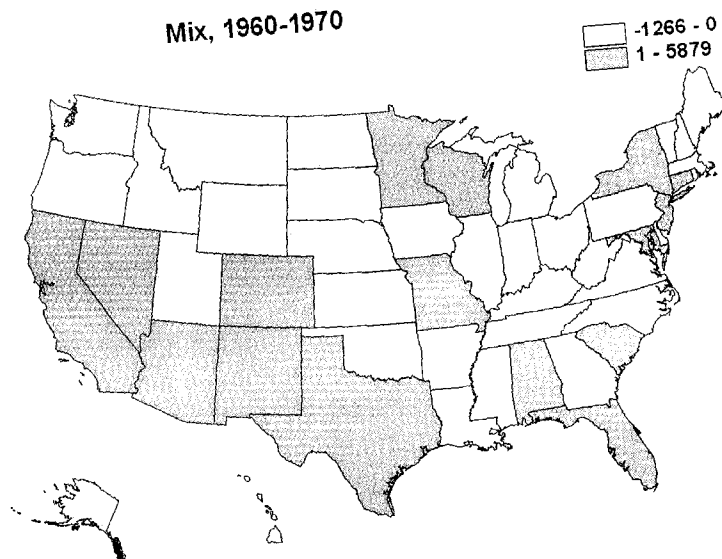
Figure 6.2 shows the 1970–1980 interval. This was the most significant period in terms of overall changes in foreign language enrollments, registering a sharp drop in enrollments. One can observe positively competitive results for the Tidewater South and New England, two areas of high overall penetration. The Mid-Atlantic states, on the other hand, are negatively competitive. The 1980–1990 interval, shown in Figure 6.3, shows mostly negatively competitive states in both the Mid-Atlantic and New England, but positively competitive states in the Tidewater South. The final interval also shows New England and New York as negatively competitive.

Many of the states in the Northeast were negatively competitive during the four study intervals, and these were a good chunk of the states with the highest penetration

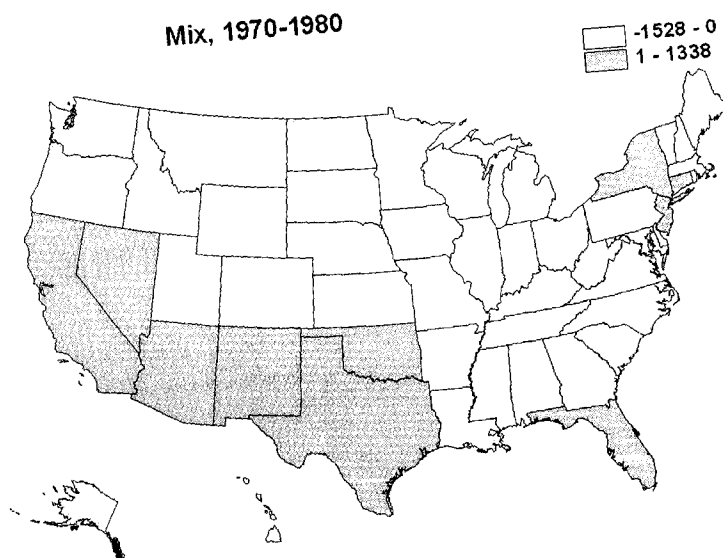
rates at the beginning of the study period. This implies that they played a disproportionate role in declines in overall foreign language enrollments, with the most important region and interval being that of the Mid-Atlantic states in the 1970–1980 interval. Other negatively competitive states tended to be in the Midwest, but these had lower overall penetration rates than those in the Northeast.

On the next pages follow the state maps of the mix component:

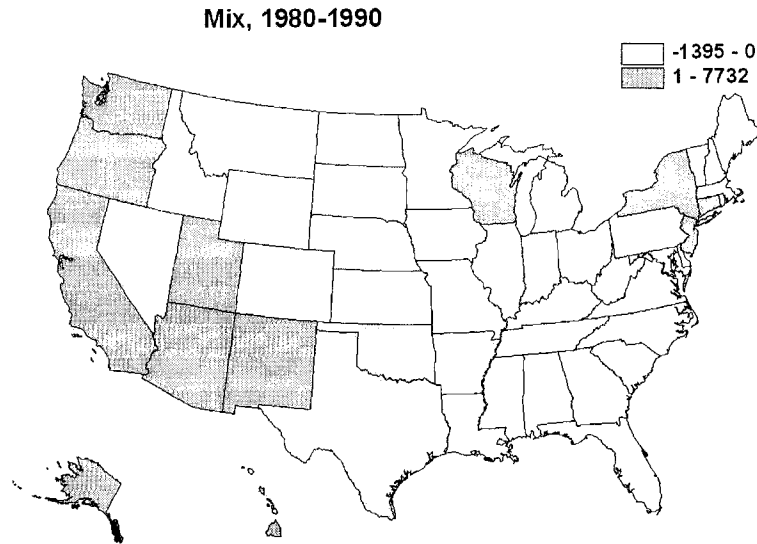
**Figure 6.5 – Shift-Share Mix Map 1960–1970**



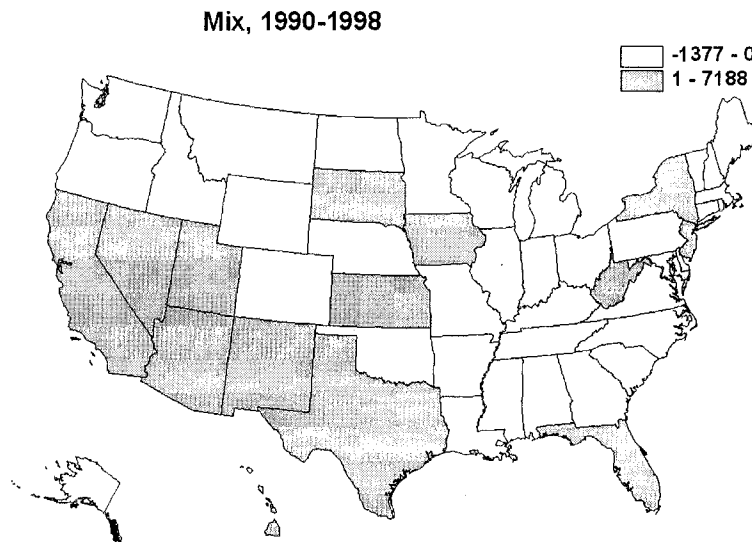
**Figure 6.6 – Shift-Share Mix Map 1970–1980**



**Figure 6.7 – Shift-Share Mix Map 1980–1990**



**Figure 6.8 – Shift-Share Mix Map 1990–1998**



In Figure 6.5, the 1960–1970 interval, the positive mix states are scattered. There is not much of any observable pattern. Figure 6.6, showing the 1970–1980 interval, is much different. One can see positive mix states in the Southwest, the Mid-Atlantic, and Florida. This is when Spanish first took a great leap forward in popularity. One associates the Southwest with Mexicans, the Mid-Atlantic with Puerto Ricans, and Florida with Cubans. It is notable that the Mid-Atlantic states had a positive mix for 1970–1980, but were negatively competitive for 1970–1980. This implies that these states had a favorable weighting in Spanish at the beginning of this interval, but then lost ground.

Figure 6.7 shows the mix interval for 1980–1990. The Mid-Atlantic and Southwestern states show a positive mix as before, with the addition of states in the Pacific Northwest. The Pacific Northwest states reflect the increased popularity of Asian languages in this interval, in particular Japanese.

Figure 6.8 shows the mix interval for 1990–1998. This is generally similar to the mix map for 1970–1980, with the addition of a few Plains states. Once again, this reflects the second abrupt jump in Spanish popularity during 1990–1995. The Plains states probably reflect increased Mexican immigration to the primary sector industries such as meat-packing in these states.

Usually, states with a positive mix tend to be in the Southwest and New York Metropolitan Area states, and this reflects the rise in popularity of Spanish.

In terms of individual languages, there is great variance from interval to interval. Spanish became competitive first in the Southwest and New York Metropolitan region.

Then, as Spanish became competitive elsewhere, Spanish in California and the Northeast became less competitive. This could be due either to a saturation point being reached earlier, or immigrants spurring the study of other languages.

The EA maps of competitive total component show competitive EAs in the Southwest and West early on, and then non-competitive EAs in the North and along the Canadian border. The positive mix EAs did not change much over time. Those with a favorable mix at the outset of each time period tended to be in Florida, the Carolinas, and the New York Metropolitan region.

In terms of individual languages, it seems the region-specific losses in French, German, and Spanish are concentrated east of Michigan. This is also where places with the highest penetration in 1960 tended to be located. Keep in mind that these states have many of the oldest colleges in the U.S. Many of these are private, and private colleges are more likely to have foreign language requirements. It would seem that places that had the highest penetration were more susceptible to losses than those less endowed. Thus, it seems that there was a regional element to the declines in foreign language study in the post 1970 era. The Northeast states contributed disproportionately to this decline.

## ***Chapter 7 – REGRESSION MODEL ANALYSES***

### **7.1 Introduction**

The purpose of this regression analysis was to derive models of both the penetration and the allocation of foreign languages in U.S. colleges and universities. Penetration refers to the absolute share of students in a given geographic area who study a foreign language, while allocation refers to the relative share of students who study a foreign language. For example, the percentage of all students who study German would be the German penetration rate, while the percentage of foreign language students who study German would be the allocation rate.

It is possible to have a high allocation rate, but a low penetration rate. For example, consider region 'A', where foreign language study, in general, is not popular, but where German occupies an unusually large share of the foreign language 'pie.' German has a penetration rate of 5%, but an allocation rate of 40%. Only 5% of all students study German, but 40% of foreign language students study German. One would say that in this case, German has a large relative popularity, but a low absolute popularity. Few students in region A study a foreign language, but of those who do, many are predisposed to study German. This situation is characteristic of a rural region with a high percentage of German-Americans.

It is also possible to have a high penetration rate, but a low allocation rate. Consider region 'B,' where foreign language study, in general, is popular, but other foreign languages squeeze German when it comes to the allocation of the foreign language pie. In region B, German has a penetration rate of 8%, but an allocation rate of

20%. Even though in absolute terms German is more popular in region B than in region A, its relative popularity is considerably less in region B. Many students in B are predisposed to study a foreign language, but not German in particular. This situation is characteristic of an elite urbanized region.

## 7.2 Expectations

The following is a table of integer variables originally proposed for this regression analysis. The actual analysis incorporated a greater number of variables; these are delineated in Appendix 1. The hypothesized sign on both penetration and allocation variables is shown.

**Table 7.1 – Hypothesized Effects of Originally Proposed Variables**

VARIABLE	GEOGRAPHY	SOURCE	PENETRATION	ALLOCATION
Requirements	Metro/State	MLA	+	+Spanish
College Availability	Metro/State	MLA	+Respective Languages	+Spanish
Institutional Size (avg.)	Metro/State	NCES	+	-Spanish
Institutional Status	Metro/State	NCES	+	-Spanish
Sex (female)	Metro/State	NCES	+	+French, Spanish
Race	Metro/State	NCES	-	-German
Native Speakers of Languages	Metro/State	U.S. Census	+Respective Languages	+Spanish
Ethnic Percentages	Metro/State	U.S. Census	+Respective Languages	+Respective Languages
Weighted Distance Measures	Metro/State	Various	+	+Respective Languages
Urban Size	Metro	U.S. Census	+	+Less Common FL
Metro Share	State	U.S. Census	+	+Less Common FL
Per Capita Income of U.S. Region	Metro/State	U.S. Census	+	+Less Common FL
Educational Level of U.S. Region	Metro/State	U.S. Census	+	+Less Common FL

Per Capita Education Spending	State	NCES	+	+Less Common FL
Services Share of Local Economy	Metro/State	U.S. Census	+	+Less Common FL
Exports Share of Local Economy	Metro/State	U.S. Census	+	+Less Common FL
Government Share of Local Economy	Metro/State	U.S. Census	+	+Spanish

The first variable type shown is that of requirements. Requirements are stipulations forcing students to study a foreign language in order to enter a college, or stipulations in full or in part in order to graduate from a college. It was expected that more stringent requirements should lead to higher penetration levels of foreign language study. More stringent requirements should also lead to greater allocation towards the more common foreign languages, and in particular, Spanish. Students who otherwise would not take a foreign language may be more likely to take Spanish due to its perceived utility and ease of study.

The next variable type shown is availability of foreign languages in college. Certainly one can imagine that if a particular foreign language is only available in a few colleges in a state, the popularity of that foreign language will be adversely affected. Greater availability of each foreign language should lead to greater penetration of each foreign language; it was hypothesized that Spanish should be relatively more popular where it is more available.

Institutions that are larger and have higher status were expected to have higher rates of penetration, but lower allocation for Spanish. These institutions are more likely

to have academic-oriented and less utilitarian students, and so it was expected that Spanish would be relatively less popular.

Based on the research of Finn (1998) and others, female students were expected to increase penetration rates and increase the allocation of French and Spanish. Similarly, ethnic minorities were expected to lower penetration rates and also to lower the relative popularity of German.

Native speakers of foreign languages were expected to increase that language's penetration. For example, French should be more absolutely popular where there are more native speakers of French. As the largest share of speakers of foreign languages in the U.S. speaks Spanish, it was expected that more speakers of foreign languages in general should lead to greater Spanish allocation. Similarly, more members of an ethnic group who speak a foreign language should increase the popularity of that language. A greater regional percentage of French-Americans, for example, should lead to more study of French.

The term 'weighted distance measures' refers to the hypothesized gravity exerted by the worldwide speakers of particular foreign languages. Clusters of speakers of foreign languages outside the U.S. that are closer, more affluent, and more populous should exert greater pull on students to study their respective languages.

Regions with larger cities and states with a higher percentage of urbanized residents should have higher penetration rates and greater allocation to less common foreign languages, similarly to students at larger and more prestigious institutions. Likewise, higher per capita incomes, educational levels, and greater services and

government shares of the economy are indicative of higher overall levels of development. With the exception of government share of the economy, these factors were expected to increase penetration, and increase the allocation of less common foreign languages. Government share of the economy was expected to increase penetration of foreign languages, and because government services are more likely to be offered in Spanish than in other foreign languages, to also increase the allocation of Spanish. Regions more dependent on foreign exports were expected to have higher penetration and greater allocation to less common foreign languages.

### **7.3 Derivation of Broader Variable Categories**

For a full listing and description of the specific variables used in this dissertation's regression analysis, please consult Appendix 1, entitled 'Variable Definitions Key.' The listing includes all variables that were used in any model. In many cases, the data available changed from year to year, so some variables were only used in particular study years. In some cases, variables were only available at the state level, and not the EA level.

In order to ease interpretation of results, the significant variables were classified according to a theoretical basis. It should be noted that this was an ex post facto decision; it took place after the regression models had been derived. These broad variable categories were penetration-allocation, geographic, demographic, developmental, availability, requirements, institutional, and trade. Availability and requirements were considered supply-side variables, while the rest were considered demand-side variables. In some cases, variables classified as institutional variables because they came from

institutional data sources were re-classified as a different type of variable. The following are explanations of these categorizations.

### **7.3.1 Penetration-allocation**

Quite often the penetration rate for a language was the strongest determinant of the allocation of that same language, and vice versa, the allocation rate was often the strongest determinant of the penetration. This prominence was accorded its own category, and referred to as penetration-allocation. This categorization encompasses the tendency of absolute and relative popularity of languages to be linked. One may question the logic that allows a penetration variable to be used as an explanatory variable in allocation, and vice versa. The logic is that while penetration and allocation are often linked, they are not necessarily so. As outlined earlier, it is possible to have a geographic area where foreign languages in general are not popular, but where a particular foreign language is relatively popular. It is possible to have a low penetration for a foreign language, and yet a high allocation, at the same time. On the other hand, foreign language study may be popular in general in a geographic area, and as a rising tide lifts all boats, a particular foreign language may have greater penetration in that area. However, other foreign languages will also have greater penetration, so that particular foreign language may end up actually having lower allocation than elsewhere. In this case, there is high penetration, but low allocation.

### **7.3.2 Geographic**

Variables deemed to have a geographic component were distances from the Mexican or Quebec border, the weighted distance measures, and whether a geographic area bordered Mexico, Quebec, the West Coast, the East Coast, or the Gulf Coast.

### **7.3.3 Demographic**

Demographic variables included most of the data from the U.S. Censuses, such as language spoken at home, linguistic isolation, and ancestry. Data on race and sex from individual institutions were deemed a better fit in this category than as institutional data.

### **7.3.4 Developmental**

Developmental variables were services income, government income, bachelor's degree holders, educational expenditures, metropolitan share of population, having been born in the state of residence, and city size. Geographic entities who have larger service sectors, larger government sectors, greater educational expenditures, more urban populations, and larger cities tend to be wealthier and more developed. The sizes of the cities that institutions were located within were deemed a better fit as developmental factors than demographic factors.

### **7.3.5 Availability**

The share of students that had access to study of a foreign language was the availability for that language. Availability variables were significant frequently enough to be considered sufficiently distinct from the institutional variables.

### **7.3.6 Requirements**

The effect of entrance and graduation foreign language study requirements was greatly anticipated, given the historical observations of other scholars. Requirements were considered to form their own category.

### **7.3.7 Institutional**

These included variables such as the Carnegie classification of institutions, highest degree offered, number of years of study, share of in-state students, public versus private status, and calendar system. Requirements, availability, and race and sex variables were not classified as institutional factors.

### **7.3.8 Trade**

Foreign direct investment and trade variables were available for some of the latest study years, and were sometimes significant. They were deemed theoretically distinct enough to warrant their own category.

## **7.4 Model Selection**

The models needed to fulfill several criteria. They needed to have all included variables significant at the .05 level, the highest adjusted  $R^2$  values possible, and no pairwise correlation among variables. Stepwise linear regression was used to derive models of five or fewer variables. Limiting the maximum number of variables included in each model aided in interpretation; sometimes the optimum model included fewer than five variables. In some cases more than one model was derived. This was performed when more than one variable seemed similarly significant as either the first or second variable included in the model. For example, on one occasion the distance from Mexico,

as well as the percentage of the local population that was Spanish-speaking and linguistically isolated, were both very significant determinants of Spanish allocation. In this case, each aforementioned variable became the first variable of two different models. Models that turned out to have obviously inferior adjusted  $R^2$  values were typically discarded. For a full listing of the models derived for all study years, consult Appendix 2.

Penetration rates were not used to model other penetration rates, and allocation rates were not used to model other allocation rates, but penetration rates were used to model allocation rates, and allocation rates were used to model penetration rates. The justification for this approach is that absolute and relative popularities are not necessarily linked.

Penetration and allocation models were derived for both the state and EA geographic scales. The state penetration models and EA penetration models for a language tended to contain different variables. The same was true for comparing the state allocation and EA allocation models. This means that the results at the two different scales quite often diverged. There was less correspondence between the two than one might have expected.

Overall penetration, French, German, and Spanish were not only the more difficult languages to model, but also tended to show less correspondence between state and EA scales. Penetration-allocation variables figured most prominently with the less popular foreign languages. Penetration-allocation variables also had the greatest correspondence between state and EA variables. The best chance of finding the same

variable significant at both the state and EA level was with the penetration rate as a covariate of allocation, and vice versa.

In order to more specifically discuss these regression results, the following are some of the equations from 1995, the most recent study year where requirements data were present. The first model example shown on the following page is for overall foreign language penetration at the state level.

### Model Example 1

#### *State Overall Penetration, 1995*

	<b>t-score</b>
<b>Adjusted R<sup>2</sup> = .665</b>	
ItalianAvail	5.698**
Borninstateofresidence	-3.554**
GradReq1	-3.133**
GovernmentIncome	3.053**
Carn14	-2.883**

\* significant at .05 level

\*\* significant at .01 level

The first variable in this model is ItalianAvail, which is the share of students in the state that theoretically have access to Italian foreign language classes. As is later detailed in this chapter, it also turned out that Italian availability was also in part a strong indicator of academic status, being correlated with Research I and doctoral university status. I interpret this here as meaning that states with more students attending universities that are high status and also that have high status foreign language departments are significantly more likely to have student enrollments in modern foreign languages.

Next in the model, one finds that those states that have a greater share of their residents born in them significantly decrease the likelihood of students enrolling in modern foreign languages. This is considered a proxy for state developmental status; less

migratory states tend to be less developed. The next variable, GradReq1, refers to the share of students that are subject to no foreign language graduation requirement. Not surprisingly, the absence of requirements significantly lowers student enrollment in foreign languages. Next one finds that the government share of the economy of a state increases student enrollment in foreign languages. While there are some exceptions, states with a larger public sector burden tend to be wealthier and more developed. This is interpreted as meaning that more developed states have a greater share of students enrolled in foreign languages.

Finally, Carn14 (Carnegie Classification 14) refers to the share of students at doctoral universities II. Surprisingly, this indicator of relatively high academic status results in smaller shares of student enrollment in foreign languages. In the case of this model, supply-side (requirements and availability) and developmental factors are most important.

The second focused interpretation presented is for overall penetration at the EA level.

#### Model Example 2

##### *EA Overall Penetration, 1995*

**Adjusted R<sup>2</sup> = .506**

	<b>t-score</b>
ItalianAvail	8.721**
ForeignLang.Home	7.153**
Jap.SpokenHome	3.040**
GradReq1	-2.522*
Carn31	2.222*

\* significant at .05 level

\*\* significant at .01 level

The model for overall penetration at this scale has a lower adjusted R<sup>2</sup> value, and this was generally characteristic of the EA models. This is not surprising given the

increased number of observations at the EA scale; 172 versus 51 (50 states plus Washington, D.C.) at the state scale. Italian availability and the absence of foreign language graduation requirements are significant in the same direction at the EA scale as they are at the state scale. It should be noted that this level of correspondence between the two scales was infrequent. In contrast to the two developmental factors at the state scale, at the EA scale foreign languages spoken at home and Japanese spoken at home (the two are pairwise uncorrelated) increase foreign language enrollments. Thus, there are two demographic factors in place of the two developmental factors. Carn31 refers to the share of students at liberal arts colleges. It makes sense that liberal arts colleges increase student enrollment in foreign languages. In the case of this model, I find that supply-side and demographic factors are most important. The following models show the results from 1995 for Spanish.

The next focused interpretation concerns the third model example of Spanish penetration at the state level.

### Model Example 3

#### *State Spanish Penetration, 1995*

	<b>t-score</b>
<b>Adjusted R<sup>2</sup> = .652</b>	
SpanishSpokenHome	6.553**
JapaneseAvail	3.736**
GradReq3	3.333**
ResMigInstate	-2.826**
Sector5	-2.154*

\* significant at .05 level

\*\* significant at .01 level

Spanish spoken at home in the general population is the strongest determinant in increasing Spanish enrollments in college. Japanese availability is a variant of Italian

availability; availability variables tend to be correlated. It means that Spanish has a higher penetration rate in high status colleges and foreign language departments. GradReq3 refers to the second strongest graduation requirements; graduation requirements increase the penetration rate of Spanish. Having a greater share of in-state college students (ResMigInstate) and students at private nonprofit two-year colleges (Sector5) reduce Spanish penetration. For this model, demographic and supply-side variables are most important.

The immediately succeeding model is one of the Spanish penetration models at the EA scale, and shows much the same picture as at the state scale. The then following model is the fifth and penultimate example.

#### Model Example 4

##### *EA Spanish Penetration, 1995*

Adjusted R<sup>2</sup> = .516

SpanishSpokenHome

JapaneseAvail

GradReq3

\* significant at .05 level

\*\* significant at .01 level

**t-score**

11.426\*\*

4.969\*\*

3.462\*\*

#### Model Example 5

##### *State Spanish Allocation, 1995*

Adjusted R<sup>2</sup> = .719

Distance to Mexican Border

Sector3

GermanPen

GermanComb.Ancest.

Borninstateofresidence

\* significant at .05 level

\*\* significant at .01 level

**t-score**

-7.069\*\*

-5.039\*\*

-4.568\*\*

3.388\*\*

-2.971\*\*

The negative sign on the variable 'Distance to Mexican Border' means that the farther away we get from the Mexican border, the lower the relative popularity of

Spanish, which is what we would expect. Sector3 refers to private for-profit four-year colleges; states with more students at these institutions had reduced allocation to Spanish. GermanPen indicates that in states where German was absolutely more popular, Spanish was relatively less popular. States with a greater share of German-Americans had greater allocation to Spanish. Less migratory states had lower allocation to Spanish. Geographic and institutional factors are most important in this case.

The final model example is for Spanish allocation at the EA level.

#### Model Example 6

##### *EA Spanish Allocation, 1995*

Adjusted R<sup>2</sup> = .615

SpanishLing.Isolated

FrenchPen

Nonres

Glfcoast

Sector3

\* significant at .05 level

\*\* significant at .01 level

**t-score**

12.530\*\*

-6.470\*\*

-3.985\*\*

3.279\*\*

-2.680\*\*

SpanishLing.Isolated refers to the share of the general population that speaks Spanish and is also linguistically isolated. This was a strong positive determinant leading to greater Spanish allocation at the EA level. Greater French penetration led to lower Spanish allocation at the EA level. Nonres refers to the share of foreign students in college; more foreign students reduced the allocation to Spanish, which is not surprising, if we consider that Spanish-speaking countries do not supply a large portion of foreign students to the U.S. Glfcoast refers to EAs that bordered the Gulf Coast. Bordering the Gulf Coast led to increased Spanish allocation, which is similar to the distance to Mexico of the Spanish state allocation model, but not as strong. Finally, private for-profit four-

year colleges (Sector3) led to reduced Spanish allocation, just as they had done at the state level.

### **7.5 Method for Combined Evaluation of State and EA Models**

The frequent differences in significant variables between state and EA levels contributed to the necessity of the ex post facto broader variable categorizations. These categorizations made relevant similarities between these two levels easier to observe. For example, one can appreciate that linguistic isolation of Spanish-speakers at the state level, and Spanish-speaking households at the EA level, make sense as part of the same underlying demographic substrate. The models at state and EA scales were jointly considered in the evaluation of the results for a particular language's penetration or allocation configuration. Higher adjusted  $R^2$  coefficients for models, the joint presence of a broader variable category significant at both scales, and higher t-scores for individual variables gave a broader variable category greater importance.

For example, consider Model A at the state scale, and Model B at the EA scale. Both Model A and Model B have the same dependent variable. Model A has a larger adjusted  $R^2$  coefficient than Model B. Model A's most important variable has a lower t-score than Model B's most important variable. The most important variables for Model A and Model B belong to different broader variable categories. Model B's second most important variable happens to belong to the same broader variable category as the most important variable for Model A. Thus, the broader variable category occupied by the top spot in Model A and the second spot in Model B would be considered the most important category for that dependent variable. The broader variable category occupied by the top

spot in Model B would then be considered the second most important category for that dependent variable.

Consider the following actual example from the analysis.

<b>Model A</b>	<b>adjusted <math>r^2</math> coefficient</b>
State Italian allocation	.941
<b>Variables</b>	<b>t-score</b>
ItalianPen	26.560**
GovernmentIncome	-5.364**
NCOGDPS	2.551*
<b>Model B</b>	<b>adjusted <math>r^2</math> coefficient</b>
EA Italian allocation	.783
<b>Variables</b>	<b>t-score</b>
ItalianPen	21.922**
Rstatus5	10.117**
glfcoast	2.421*
*        significant at .05 level	
**       significant at .01 level	

Note: ItalianPen here is Italian penetration; GovernmentIncome is the share of the local economy that government accounts for; Rstatus5 is response status 5 of institutions; NCOGDPS is a measure of the linguistic gravity of Spanish, and glfcoast is whether a geographic unit bordered the Gulf Coast or not.

The most important variable in both models is ItalianPen, which is Italian penetration, belonging to the broader variable category of penetration-allocation. Thus, penetration-allocation is the most important category of explanation regarding Italian allocation. Glfcoast and NCOGDPS both belong to the broader geographic variable category. Thus, geographic is the second most important category of explanation. Rstatus5, an institutional variable, would be considered the next most important, and then GovernmentIncome, a developmental variable. Quite often the state model contributed the most important broader variable category, and the EA model the second most

important broader variable category. For this reason the top two broader variable categories derived from the joint state and EA scales were considered the most important, and the other variable categories the less important.

## **7.6 Overview of the Results**

The results indicate that local conditions certainly do affect the foreign language study choices of students at American colleges and universities. There was an apparent temporal split between the pre-1980 models and the 1980 and later models; models from the 1980s compared to the 1990s were more consistent than models from the 1970s compared to the 1980s. This was due no doubt to the lack of Census data for the earlier years.

### **7.6.1 Three Main Patterns**

There are three main patterns to the models. First, for the less studied languages – Italian, Russian, Other, Japanese, and Chinese, allocation is the best predictor of penetration, and vice versa. For these less popular foreign languages, absolute popularity and relative popularity are closely linked.

The next pattern is the differences between the models for overall penetration and Spanish penetration. Overall penetration's most important factors are developmental and availability, while for Spanish penetration, there was a shift from penetration-allocation and geographic factors to demographic and availability factors. Of all the penetration models, penetration-allocation is the least important for Spanish penetration; absolute and relative popularity are the least associated here. For Spanish allocation, it is notable that geographic factors were the most important, with demographic and penetration-allocation

factors vying for second place. Geographic factors were more important for Spanish allocation than for any other models in the study. The penetration models for Spanish are the only penetration models where demographic factors are important; demographics are not important for the penetration models of any other language. The biggest difference between the overall penetration models and the Spanish penetration models was this increased importance of demographic factors in the Spanish penetration models. In the models for the other languages besides Spanish, demographics are only significant for explaining allocation. This implies that the demographic conditions influencing Spanish study are more decisive than those that influence other foreign languages. The factors most important in influencing Spanish run parallel to the outside popularity of Spanish, and distinguish it from the other foreign languages.

The third pattern is the similarity of French and German. French and German penetration both had a similar heterogeneity of factors; availability, penetration-allocation, institutional, developmental, and for German, geographic factors were most important. Geographic factors were second most important among all models for French allocation. For French allocation, geographic and penetration-allocation were the most important early on, with a switch in latter years to demographic factors. German allocation is quite similar to French allocation. Demographics are the most important factors with German allocation, with penetration-allocation in second place. Of all models, demographic factors are the most important in German allocation, and second most important in French allocation.

### **7.6.2 Four Key Differences between Penetration and Allocation Models**

There are four key differences between the penetration and allocation models. The first key difference is that requirements and availability are more important for penetration than for allocation. The second key difference between penetration and allocation is that developmental factors are more important for penetration than for allocation. The most consistently important developmental factors are services income or government income; these were usually better measures than bachelor's degree holders or city sizes, the other sometimes significant developmental factors. Government Income turned out to be a significant spur to Spanish penetration in only one instance. The third key difference is that demographic factors are more important for allocation than for penetration. The fourth key difference is that geographic factors are also more important for allocation than for penetration, but the gap between the two is not as large as for the previous three differences. Thus, the absolute popularity of a foreign language tends to be better explained by regional developmental level, as well as academic status and the stringency of requirements. Relative popularity, on the other hand, is better explained via demographic and geographic factors.

Generally speaking, places with a large service or government sector, and colleges of high academic status and foreign language study graduation requirements determine the size of the foreign language pie. Geographic location relative to Mexico and the coasts, and ethnic and linguistic characteristics determine how the foreign language pie is allocated.

### 7.6.3 Supply–side versus Demand–side

Some of the proposed hypotheses concerned the effects and relationship of ‘supply-side’ factors versus ‘demand-side’ factors. Supply–side in this case refers to factors explicitly forcing students to take a foreign language, or limit the choice thereof. These are a reflection of conditions imposed by universities. All other factors are considered to be from the demand side; these are assumed to reflect the pattern of student foreign language desires. The supply–side factors are requirements and availability. Had high-school foreign language study been included in the analysis, it would also have been considered one of the supply–side factors. It was proposed that supply–side factors should serve to enhance the popularity of the more popular foreign languages, and especially Spanish.

The results show that requirements are important for overall penetration, Spanish penetration, French penetration, and German penetration. Requirements also have some importance for Russian and Italian allocation, and also some for Spanish allocation. Requirements actually make Italian relatively less popular, which implies students that take Italian very strongly desire to take Italian.

As previously stated, requirements and availability are more important for penetration than for allocation. In fact, for overall penetration, Spanish penetration, French penetration, and German penetration, the supply–side factors are of as equal importance as the demand-side factors. In terms of the allocation models, however, demand-side factors predominate over supply-side factors by far.

The results indicate that relaxing requirements would reduce overall penetration and penetration of the three most popular foreign languages, but would unlikely be as important as changes in availability, development, or demographics. Overwhelming evidence that requirements differentially benefited Spanish was not found. Rather, requirements helped French and German penetration as well as Spanish. There is some evidence, but not overwhelmingly evidence, that supply-side factors make Spanish relatively more popular. For 1983 and 1986, graduation requirements increased Spanish allocation, and the absence of entrance requirements also increased Spanish allocation. However, these were the weakest factors in the models for both years. There is stronger evidence that Spanish availability helps increase Spanish allocation. This was the case for three study years. Availability of other languages such as Japanese, French, or German helped reduce Spanish allocation. Nevertheless, there is only weak evidence that supply-side factors increase the relative popularity of Spanish. They are only a minor part of the story of the massive increase in the relative popularity of Spanish over the latter half of the 20<sup>th</sup> century.

It should be noted that the availability variables turned out as measures of academic status, in part. For example, in study year 1998 Italian availability was correlated with Research I and doctoral universities. It also seems likely that it was correlated with foreign language departmental status above and beyond university-level academic status, when applied to non-same languages (that is, other than Italian). Italian availability was often an important determinant of the penetration of languages besides Italian. It seems implausible that Italian availability per se should affect other languages

so strongly; rather, it ended up being an indicator of the academic status, and likely the prestige and status of foreign language departments, as well.

After Italian availability, Japanese availability was the next most common to appear in this regard. Russian availability was significant only a few times, and Chinese and Other availability never or almost never. So offering Italian is an important threshold from small colleges with small foreign language departments to larger colleges with larger foreign language departments. It might be that Italian is the first language that a foreign language department will offer when it expands beyond the traditional big three, and this represents a qualitative improvement.

Availability probably also means not just availability of a foreign language per se, but also availability of better foreign language instruction, as well. Institutions that offer Japanese probably have better Spanish instruction than those that do not, and likely generate higher enrollments.

#### **7.6.4 Local versus Foreign Influence on Spanish**

A relevant question that this line of research might spark is the following: to what extent do Americans study Spanish in order to communicate with Spanish-speakers in other countries versus Spanish-speakers within the U.S.? In terms of penetration, Hispanic demographic indicators are more important than proximity to the Mexican border. This suggests that in terms of absolute popularity, Americans study Spanish first and foremost to communicate with Hispanics living in the U.S. Having a large local Hispanic population will help to convince American college students to study Spanish. In terms of relative popularity, Hispanic demographic indicators and proximity to Mexico

usually vie for first place in the models. This suggests that once Americans have already made the decision to study a foreign language, proximity to Mexico becomes a more important consideration.

### **7.6.5 Geographic Factors**

There were many interesting effects regarding the geographic factors. Proximity to the Mexican border helps overall penetration, Spanish penetration, and Russian penetration. It would make sense that overall penetration and Spanish penetration are linked, as in 1998 Spanish enrollments were nearly 60% of total foreign language enrollments. Russian penetration here seems anomalous, though. Proximity to the Mexican border also helps Spanish allocation, but hurts French allocation, German allocation, Italian allocation, and Other allocation.

One of the more surprising results was that in 1960, Spanish penetration was actually lower the closer one got to Mexico. This effect was reversed in all subsequent years. Also, it is plausible that at least a small part of the growth in Spanish allocation can be attributed to the Sunbelt migration of the latter decades of the 20<sup>th</sup> century.

The East and West Coasts are more likely to be of a pair than not, and help overall penetration, Spanish penetration, French penetration, German penetration, Italian penetration, and Other penetration. The West Coast, which included Hawaii and Alaska, hurt Spanish allocation. Both West and East Coasts hurt German allocation. Thus, the East and West coasts show a notable divergence in their effects on penetration versus allocation for Spanish and German.

The Gulf Coast decreased overall penetration, and occasionally had a negative sign for French penetration. The Gulf Coast increased allocation for both French and Spanish. For these two most popular foreign languages, relative popularity is high where absolute popularity of foreign languages in general is low. This is another notable divergence between penetration and allocation.

The northeast helps overall penetration, German penetration, and Russian penetration. It hurts Other penetration, Japanese penetration, and Chinese penetration. It helps French allocation, Italian allocation, and sometimes Russian or Chinese allocation.

The northwest helps Russian penetration and Japanese penetration. It helps German allocation, Russian allocation, Japanese allocation, and Chinese allocation, but hurts French allocation.

#### **7.6.6 Demographic Factors**

In terms of demographics, the corresponding language spoken at home and corresponding ancestry often help, while non-corresponding languages spoken at home and non-corresponding ancestries tend to hurt. French ancestry tends to help French study, for example. Russian ancestry or Russian spoken at home is never significant, though. An exception to the same ancestry trend is that German ancestry actually helps Spanish allocation.

Spanish spoken at home helps Spanish penetration and Spanish allocation. It hurts French allocation, German allocation, and Other allocation. Poor English ability increases overall penetration and Spanish penetration, but decreases German allocation.

Women in university increase overall penetration, French penetration, Italian penetration, Russian penetration, and Other penetration. They decrease Italian allocation and Chinese allocation. The finding that women help absolute popularity is in accordance with Finn's study (1998).

Whites in university hurt overall penetration, which contradicts the results from Finn's study. Whites in university help German allocation, Italian allocation, and Russian allocation. Blacks in university help French penetration and French allocation, but hurt Russian allocation, Other allocation, Japanese allocation, and Chinese allocation. Hispanics in university significantly increase Spanish study a few times, but are less important than other variables in those models, and Hispanics are less important than either whites or blacks in university. Limited English ability and Spanish spoken at home are much more important in spurring Spanish than Hispanics in university. This suggests that the growth in Spanish is mostly about non-Hispanics deciding to study Spanish, not Hispanics pursuing their ethnic roots. In contrast, for German, French, Italian, or Japanese, there is evidence of a pursuance of ethnic roots.

#### **7.6.7 Institutional Factors**

Perhaps due to the wide number of institutional factors, many different institutional measures were found to be significant. One assessment can be made regarding private colleges versus public colleges. Private colleges increase overall penetration, French penetration, German penetration, Other penetration, and decrease Spanish allocation. Public colleges decrease overall penetration, French penetration, and German penetration. In particular, private non-profit colleges have greater French

penetration, and Research I universities have greater penetration of 'Other' languages. It is difficult to make assessments regarding these institutional factors; there is too a great deal of statistical 'noise'.

#### **7.6.8 Trade Factors**

Foreign trade and foreign direct investment are associated with increased foreign language study. For example, foreign direct investment increased overall penetration. Data on foreign trade and foreign direct investment were only available for the last few study years, though, so comparability with other years is limited.

#### **7.6.9 Out-of-state Students**

An observer might point out that some states have more out-of-state students than others. These out-of-state students may be more inclined to study foreign languages that make sense in their home states, rather than in the state of education. This would confound the assumption behind the geographic variables. The results show that the out-of-state percentage was significant in five instances: more in-state-students decreased Russian penetration in 1974, decreased Spanish penetration in 1995, decreased German penetration in 1998, decreased Japanese penetration in 1998, and decreased Japanese allocation in 1998. This can be interpreted as meaning that less-developed states, states that have fewer out-of-state students, have less foreign language penetration. There was no converse evidence that states with more out-of-state students have greater foreign language penetration, though. The variable 'ResMigInstate' could plausibly be considered a developmental factor, given these results. However, there is only weak

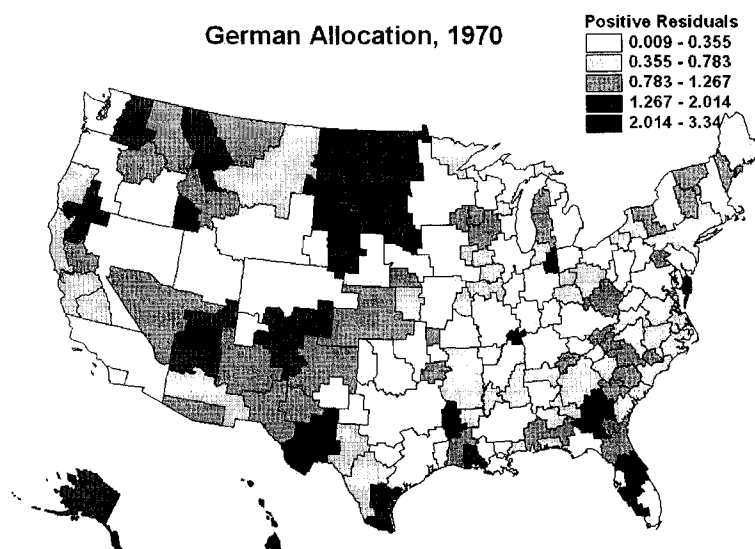
evidence for the effect of student migration on foreign language study patterns; it is unlikely to have a confounding effect.

### 7.7 Residual Analyses

The models derived from the state data sets tended to have greater adjusted  $R^2$  coefficients than those derived from the EA data sets. The less popular foreign languages were often optimally modeled with less than five variables, and tended to have greater adjusted  $R^2$  coefficients. Overall penetration, German, and sometimes Spanish and French were the most difficult models to derive, and tended to have the lowest adjusted  $R^2$  coefficients. The residuals of these models were mapped, in order to examine any autocorrelation. Models with adjusted  $R^2$  coefficients below .40 were selected.

In terms of positive residuals, generally speaking, visual inspection revealed autocorrelation. This means these models were probably missing relevant variables. The greatest positive error tended to occur where overall penetration, German, or Spanish was most popular. German demographic variables, missing from the 1960, 1970, 1974, and 1977 study years likely account for some of the missing elements, as some of the later study years do not seem to display autocorrelation so strongly for German. The following map is shown in order to illustrate this phenomenon. One can see how the popularity of German was underestimated in places like the Dakotas, in the absence of a German ethnic variable.

**Figure 7.1 – Residual Error for German Allocation, 1970**



More generally in this vein, variables that were not available prior to 1980 were concentrated in the demographic realm. This difference between pre-1980 study years on one hand and 1980 and later study years is not ideal, and limits comparability. For example, penetration and allocation rate variables were often correlated with demographic variables. Where most demographic variables were absent, penetration-allocation variables are likely stand-ins. They come the closest to approximating the effect of the absent demographic variables.

Appalachia displayed a repeated concentration of positive error in the overall penetration models. There could be a missing yet especially relevant to Appalachia developmental effect. Most of the models with adjusted  $R^2$  values below .40 were at the EA level. The last two study years, 1995 and 1998, had no models with adjusted  $R^2$

coefficients below .40. In general, the years with more variables, which were also the latter years, showed less evidence of missing relevant variables, as we should expect.

Examination of absolute value residuals shows general patterns like that of the positive residuals, but not as strongly. A fair number of study maps display no obvious autocorrelation. The Virginia–Carolina area has higher error for overall penetration. The Dakotas and other areas where German is more popular have higher error with the German models; anomalously, the Washington, D.C., area also shows outsize error in some of the latter study years. Again, spatial clustering of error is less evident in the more recent study years.

## **7.8 Summary**

To summarize, we find that study of Spanish is on a different ‘track’ from the other foreign languages, in terms of factors that influence its study. This is consonant with the outsize popularity of Spanish. We also find that French is most like German, and the less popular foreign languages most like each other, in terms of their determinants. We also find that key factors influencing absolute popularity are different from the key factors influencing relative popularity. In the former case, developmental and supply–side factors are most important, while in the latter case, demographic and geographic factors are most important. Requirements are an important factor for absolute popularity, but not the most important. The absence of requirements would decrease Spanish popularity, but not to the same extent as changes in demographics. There is more evidence that the local population of Spanish speakers is a more important influence on Spanish popularity than proximity to Mexico or Hispanics in university.

## ***Chapter 8 – CONCLUSIONS***

The results of this dissertation work have generally supported the non-statistical opinions of experts in the field. Conventional wisdom is generally valid. A decrease in requirements would lead to a corresponding decrease in foreign language penetration, but the decrease would not be as great as in the 1970s. A great deal of ‘low-hanging fruit’ was likely plucked by the 1970s lessening of requirements. The closer one gets to the absence of requirements, the lesser the proportionate decreases of foreign language study, it would appear. During the 1960–1998 era, immigration to the U.S. has increased relative attention paid to the main foreign language useful for communicating with immigrants (Spanish) and decreased relative attention paid to foreign languages that allow one to access the cultures of foreign countries (French, German, and Russian).

### **8.1 Urban Hierarchy vs. In-migration**

The results support many of the observations of the other scholars. Wessels and Beck (1994) found that the in-migration of Spanish-speaking minorities was more important in explaining the spread of Spanish as a first language in Catalonia than proximity to road and railway networks and the centrality of urban municipalities. Contrastingly, Williams (1981) found that the spread of English as a first language in Wales was linked to the hierarchy of urban centers. The results of this dissertation work are strongly aligned with those of Wessels and Beck. The spread of Spanish as a second language in the U.S. is closely linked to the spread of Spanish-speaking immigrants, as well as poor English ability. Urban size was occasionally a significant factor, but native

speakers of a given language were much more important in fostering study of that language as a second language.

## **8.2 Domestic Communication**

Espenshade and Fu (1995) found that immigrants to the U.S. from Latin America tended to have the worst English language abilities. The results that Spanish spoken at home and poor English language ability alternated as important predictors of the study of Spanish reinforce this. Or, it at least supports the idea that most of the limited English speakers in the U.S. are Hispanics. The statistical results suggest that poor English ability among immigrants may spur Americans to learn Spanish. This would support, in part, the perhaps negatively stereotypical views of those like Dame Edna that Americans learn Spanish to communicate with Spanish-speaking immigrant domestic helpers who speak English poorly.

An interesting finding of this dissertation work is that Americans appear to study Spanish first and foremost to communicate with Hispanics living in the U.S. and only secondarily to communicate with Hispanics living in Spanish-speaking countries. This echoes the opinions of a number of scholars, including Sisken and Mandrell (Various Authors 1997) who say that Spanish should not be considered a foreign language in the U.S., as it is useful for everyday life here, and not just for travel or study abroad. This finding can be interpreted as supporting the views of Gonzalez (Various Authors 1997), Wilson (Various Authors 1997) and many others that Spanish is becoming a de facto second national language of the U.S. Eisenberg (Various Authors 1997) believes the very large influx of students into Spanish classrooms is motivated by the desire to

communicate not with the people in Spanish-speaking countries, but with the U.S. Hispanic population. Eisenberg's view is statistically supported. Lambert's (1994) view that Americans learn foreign languages to communicate with ethnic minorities is also statistically supported, with regards to Spanish. Compitello's (Various Authors 1997) observation that changing U.S. demographics explain the rise of Spanish is, in general, supported. However, there were particular jumps in Spanish allocation between the years 1960–1970, 1970–1974, and 1990–1995. The Hispanic share of the U.S. population (even though prior to 1970 the U.S. Census Bureau had not yet defined Hispanics as such) was increasing throughout the whole study period, not just those years. It should be noted that increases in the worldwide popularity of Spanish could have been another plausible alternative explanation to the influence of Hispanic immigrants. Also, it is possible that the total number of Hispanics in the U.S. increases the popularity of Spanish, irrespective of local conditions. Students may consider Spanish to simply be useful anywhere in the U.S. This may have some validity, but there is definite evidence that conditions in terms of the local percentage of Spanish-speakers and proximity to Mexico are significant.

This phenomenon of immigrant-spurred foreign language study provides an interesting contrast to Europe. Critics of American foreign language study and ability point out the foreign language characteristics of European countries as the measure that should be lived up to. However, this particular finding of this dissertation work paints a picture of Americans learning foreign languages to communicate with immigrants, while Europeans are more likely to learn foreign languages to communicate with foreigners in

foreign countries. There is no evidence of Europeans learning Arabic or Turkish in any sizable numbers (European Commission 1995). This may, in part, contribute to differences in mindset towards foreign languages between the U.S. and European countries. Of course, these differences preceded the post-1960 era, but foreign language penetration in Europe has greatly increased in that period (European Commission 1995). In the U.S. it has either decreased or remained stagnant. One can imagine that the idea of learning a foreign language as a means of broadening one's horizons may be more consonant with the European situation than the American one. The geographic proximity of large numbers of speakers of foreign languages in foreign countries in Europe likely plays an important role in this difference.

### **8.3 German**

In terms of German, Peters (1994) says that German has less ethnic appeal to German-Americans than in the past, and that German is unpopular with African-Americans. There is no statistical evidence that German unpopularity with African-Americans is any significant factor in its decline. German may have less ethnic appeal than in the past, but for the last two study years of 1995 and 1998, German ethnicity was a significant spur to German allocation.

### **8.4 Supply-side Factors**

Huber (1996) says that penetration levels increase with institutional size. Insofar as the availability variables greatly reflected institutional size and rank, this was supported. Huber also believes that foreign language requirements may increase enrollment in the most commonly taught languages, but have little effect on the less

studied foreign languages. The results of this dissertation work lend statistical support to her view. Requirements were found to increase penetration of the three most popular foreign languages of Spanish, French, and German. Not anticipated was the finding that requirements sometimes decreased Italian allocation. In the dissertation proposal, a specific importance of requirements for spurring Spanish was hypothesized. This was not supported. There is also only weak evidence that the increase in Spanish allocation has been caused by supply-side factors; the rise of Spanish in the U.S. is not a spurious, supply-side anomaly.

The main finding from the shift-share analysis was that decreases in foreign language study along the East Coast played an outsized role in the early 1970s decline of overall foreign language study. This area has a larger share of private colleges, which are more likely to have foreign language study requirements. The decrease in foreign language requirements led to a proportionately greater decline of foreign language study in private colleges, which led to a particular decline along the East Coast. This geography of lessening of requirements also likely disproportionately hurt French allocation, as French had a regional concentration in the eastern parts of the U.S.

### **8.5 Gender Differences in Foreign Languages**

Finn (1998) performed the only other statistical study of the determinants of foreign language enrollment, prior to this one. He found that women were more likely to study foreign languages, and that ethnic minorities were less likely to study foreign languages, with the exception of Hispanics studying Spanish. Simon (1988) also pointed out female students' affinity for foreign languages. In this dissertation work, women in

university were found to increase overall penetration, French penetration, Italian penetration, Russian penetration, and Other penetration, but to decrease Italian allocation and Chinese allocation. This dissertation work further supports the idea that women have a special affinity for foreign languages. In contrast to Finn's findings, whites in university sometimes led to lower levels of overall foreign language study. Hispanics in university only rarely increased Spanish allocation; the rise of Spanish in the U.S. is not because of Hispanics in university pursuing their ethnic roots.

### **8.6 A Two-Step Process**

One can envision the foreign language study decision-making process in one of two ways. The first way is that students decide first to study a foreign language, and then later decide upon a particular foreign language. The second way is that particular foreign languages attract their own followings; in the absence of sufficient attractiveness of a particular foreign language, students do not enroll in a foreign language.

The evidence of this dissertation work suggests that the first way cited above has greater validity. There is more evidence that developmental status, requirements, and availability (again, a partial measure of also of university status and foreign language department status) spur students to enroll in some variety of foreign language, and then demographic and geographic factors help to determine the allocation of those enrollments. Developmental status, requirements, and availability create penetration, the first step of the foreign language process. These three factors are not tied to specific foreign languages in the same sense as demographic and geographic factors.

Demographic and geographic factors effect the second step of the foreign language process, which is the allocation of foreign language enrollments.

The main exception is in the case of Spanish. There is evidence that students enroll specifically in Spanish; Hispanic demographic indicators spurred both overall penetration and Spanish penetration. Other ethnic indicators mostly affected just allocation.

If Spanish continues to become more popular in the U.S., then foreign language study in the U.S. will become more like that in other countries. In most other countries, English has status as a primate language; it is by far the most popular foreign language, and likely attracts study for its own sake, as opposed to receiving the allocative fruits of supply-side factors.

### **8.7 The Future**

In the middle of the twentieth century, there were three main foreign languages studied in American colleges and universities. Today, German has declined in popularity so that it more closely resembles one of the minor foreign languages, which include Italian, Japanese, Russian, and Chinese. German enrollments comprised only 7.8 percent of modern foreign language enrollments in 1998. However, in the very latest MLA survey of 2002 (not included in this dissertation's analysis), German still managed to comprise 7.8 percent of modern foreign language enrollments.

French enrollments declined slightly, and Spanish enrollments remained with the same percentage allocation in 2002 as they had in 1998. Continued immigration of Spanish-speakers into areas east of the Mississippi, in particular the South, will decrease

the popularity of French. In another couple of decades, French could be relegated to a minor foreign language. If that should occur, Spanish enrollments would comprise upwards of 70 percent of all modern foreign language enrollments.

There is more foreign language diversity today in terms of the total number of different languages offered. Many of these are obscure foreign languages, with few people enrolled in each. On the other hand, there is less diversity in the sense that there is one dominant foreign language, whereas in the past there was a tripartite division among French, Spanish, and German. Learning Spanish does not offer the same value for Americans as learning English does for non-English speakers, but it does offer much more in terms of domestic and practical applications than other foreign languages. Moreover, college enrollment data do not take into account directly job-related study of Spanish in the public sector.

Overall penetration of modern foreign languages has been fairly stable since the decline of the early 1970s. Spanish penetration has increased from around 5.5 percent of around 8.5 percent, between 1960 and 1998. This may look less dramatic than the allocative change from 32 percent of all enrollments to 59 percent. Alone among foreign languages, Hispanic demographic determinants increased Spanish penetration. Hispanic immigration is causing a change in baseline demographics and population geography, resulting in increases not just in Spanish allocation, but also penetration. Hispanic immigration could nudge overall penetration slightly upwards in coming years. On the other hand, poverty immigration, much of it Hispanic, could lead to lower developmental levels, causing a decrease in overall penetration. Along similar lines, Hispanic poverty

immigration could lead to relatively more students enrolled at less prestigious and community colleges.

It seems unlikely that university administrators would allow a lessening of foreign language requirements as they did back in the early 1970s. Foreign languages then had a stodgy, traditionalist image, whereas today they have a more politically progressive image.

There is apparently only a limited influence arising from the worldwide economic weight of a foreign language, at least in the short term. Japanese enrollments did show a rapid increase in popularity in the 1980s, following Japan's 1970s postwar economic consolidation. Nevertheless, Japanese never managed to comprise more than 5 percent of modern foreign language enrollments. The Hispanic-immigration partially induced increases in Spanish were a bigger story over the 1980s to the mid-1990s. Increases in the size of the Chinese economy will increase the popularity of Chinese, but probably only to Japanese-type levels. Chinese, like Japanese, is classified among the most difficult foreign languages for English-speakers to learn, which will be a retardant on its growth. Spanish, in contrast, is classified among the easiest foreign languages for English-speakers to learn.

This dissertation shows little evidence of proximity to Quebec as spurring French enrollments. This is unlike proximity to Mexico or bordering Mexico, both of which do increase Spanish enrollments. This is perhaps unsurprising, given the struggle of French-speakers in Quebec to establish and maintain the dominance of French there. An

exclusively or near-exclusively French-speaking independent Quebec in the future might exert more influence on nearby American states.

The beginning of the study period showed a particular concentration of high foreign language penetration along the East Coast of the United States. Since then, the high penetration swathes have included the Southwest, along with the East Coast. This second pattern has stayed constant. Asian languages could increase foreign language penetration in the Pacific Northwest, but this is unlikely to have a large effect, as outlined previously about Chinese.

## Appendix 1

<b>Table Appendix 1-Variable Definitions Key</b>	
<b>Penetration</b>	
OverPen	Percentage of students who studied any Modern Foreign Language
FrenchPen	Percentage of students who studied French
GermanPen	Percentage of students who studied German
ItalianPen	Percentage of students who studied Italian
RussianPen	Percentage of students who studied Russian
SpanishPen	Percentage of students who studied Spanish
OtherPen	Percentage of students who studied an Other Language
JapanesePen	Percentage of students who studied Japanese
ChinesePen	Percentage of students who studied Chinese
<b>Allocation</b>	
FrenchAllo	Percentage of Modern Foreign Language students who studied French
GermanAllo	Percentage of Modern Foreign Language students who studied German
ItalianAllo	Percentage of Modern Foreign Language students who studied Italian
RussianAllo	Percentage of Modern Foreign Language students who studied Russian
SpanishAllo	Percentage of Modern Foreign Language students who studied Spanish
OtherAllo	Percentage of Modern Foreign Language students who studied an Other Language
JapaneseAllo	Percentage of Modern Foreign Language students who studied Japanese
ChineseAllo	Percentage of Modern Foreign Language students who studied Chinese
<b>Availability</b>	
FrenchAvail	Percentage of students at colleges who offered French
GermanAvail	Percentage of students at colleges who offered German
ItalianAvail	Percentage of students at colleges who offered Italian
RussianAvail	Percentage of students at colleges who offered Russian
SpanishAvail	Percentage of students at colleges who offered Spanish
OtherAvail	Percentage of students at colleges who offered an Other language
JapaneseAvail	Percentage of students at colleges who offered Japanese
ChineseAvail	Percentage of students at colleges who offered Chinese
<b>Requirements</b>	
EntReq1	Percentage of students at colleges with no foreign language entrance requirement
EntReq3	Percentage of students at colleges with a foreign language entrance requirement
GradReq1	Percentage of students at colleges with no foreign language graduation requirement
GradReq2	Percentage of students at colleges with the weakest foreign language graduation requirement
GradReq3	Percentage of students at colleges with the second strongest foreign language graduation requirement
GradReq4	Percentage of students at colleges with the strongest foreign language graduation requirement
<b>Developmental</b>	
PopSize	Population size of the state or EA
MetroPercentage	Percentage of the state's population who live in metropolitan areas
PerCapitalIncome	Per Capita Income of the state's or EA's population
TotalIncome	Total Income of the state or EA
ServicesIncome	Services income percentage of total income of the state or EA
GovernmentIncome	Government income percentage of total income of the state or EA
EducationExpendituresPerCapitaTotal	Per Capita expenditures on education
EducationExpendituresPerCapitaElementary	Per Capita expenditures on elementary education
EducationExpendituresPerCapitaCollege	Per Capita expenditures on higher education
EnrolledinCollege	Percentage of population enrolled in college
BachelorsDegree	Percentage of population 18 and over with bachelor's degree or higher
Borninstateofresidence	Percentage of population that was born in state of residence
CitySize1	Percentage of students at City outside any SMSA
CitySize2	Percentage of students at Anywhere within an SMSA of less than 250,000

CitySize3	Percentage of students at Anywhere within an SMSA of less than 250,000-499,999
CitySize4	Percentage of students at Anywhere within an SMSA of less than 500,000-999,999
CitySize5	Percentage of students In SMSA of 1,000,000-1,999,999 outside center city
CitySize6	Percentage of students In SMSA of 1,000,000-1,999,999 within center city
CitySize7	Percentage of students In SMSA or SCSA of 2,000,000 or more outside center city
CitySize8	Percentage of students In SMSA or SCSA of 2,000,000 or more within center city
<b>Institutional</b>	
ResMiglstate	Percentage of students who attend college in-state
Control Code1	Percentage of students at Public colleges
Control Code2	Percentage of students at Private, non-profit colleges
Control Code3	Percentage of students at Private, for profit colleges
Formrtef1	Percentage of students at four-year colleges
Formmrtef2	Percentage of students at two-year colleges
Level1	Percentage of students at Four or more years (Baccalaureate or higher degree) colleges
Level2	Percentage of students at At least 2 but less than 4 years (below the Baccalaureate) colleges
Level3	Percentage of students at Less than 2 years (below Associate's Degree) colleges
Offering Level3	Percentage of students at colleges requiring at least two but less than four years
Offering Level4	Percentage of students at colleges offering four or five year baccalaureate
Offering Level5	Percentage of students at colleges offering first professional degree
Offering Level6	Percentage of students at colleges offering master's degree
Offering Level7	Percentage of students at colleges offering beyond master's degree but less than doctorate
Offering Level8	Percentage of students at colleges offering doctorate
Offering Level9	Percentage of students at colleges offering undergraduate non-degree granting
Offering Level10	Percentage of students at colleges offering graduate non-degree granting
HLOffer1	Percentage of students at colleges that award degree of less than one year
HLOffer2	Percentage of students at colleges that award degree of at least one but less than two years
HLOffer3	Percentage of students at colleges that award Associate's Degree
HLOffer4	Percentage of students at colleges that award Postsecondary award, certificate or diploma of at least two
HLOffer5	Percentage of students at colleges that award Bachelor's Degree
HLOffer6	Percentage of students at colleges that award Postbaccalaureate Certificate
HLOffer7	Percentage of students at colleges that award Master's Degree
HLOffer8	Percentage of students at colleges that award Post-Master's Certificate
HLOffer9	Percentage of students at colleges that award Doctor's Degree
HLOffernull	Percentage of students at colleges that award something other
Status Code5	Percentage of students at individual institutions
Status Code6	Percentage of students at main campus institutions
Status Code7	Percentage of students at branch campus of a main campus institution
Status Code8	Percentage of students not having a main campus designated main campus
Status Code9	Percentage of students not having a main campus other campus
Status CodeE	Percentage of students at a system institution
Status CodeF	Percentage of students at a system institution main campus
Status CodeG	Percentage of students at a system institution branch campus
Institute Code1	Percentage of students at universities
Institute Code2	Percentage of students at other four year colleges
Institute Code3	Percentage of students at two year colleges
Institute Code4	Percentage of students at other four year branch campus of a multi-campus university
Institute Code5	Percentage of students at a two year branch campus of a multi-campus university
Institute Code6	Percentage of students at a two year branch campus of other four-year multi-campus institution
Sector1	Percentage of students at Public colleges, 4-year or above
Sector2	Percentage of students at Private nonprofit colleges, 4-year or above
Sector3	Percentage of students at Private for-profit colleges, 4-year or above
Sector4	Percentage of students at Public colleges, 2-year
Sector5	Percentage of students at Private nonprofit colleges, 2-year
Sector6	Percentage of students at Private for-profit colleges, 2-year
Sector8	Percentage of students at Private nonprofit, less-than-2-year colleges
Sector9	Percentage of students at Private for-profit, less-than-2-year colleges
Rstatus1	Response Status Value 1
Rstatus2	Response Status Value 2
Rstatus4	Response Status Value 4
Rstatus5	Response Status Value 5
Calendar System1	Percentage of students at colleges with the semester calendar system

Calendar System2	Percentage of students at colleges with the quarter calendar system
Calendar System3	Percentage of students at colleges with the trimester calendar system
Calendar System4	Percentage of students at colleges with the 4/1/4 calendar system
Calendar System5	Percentage of students at colleges with Other calendar system
Range Code1	Percentage of students at colleges with enrollment 1-109
Range Code2	Percentage of students at colleges with enrollment 200-409
Range Code3	Percentage of students at colleges with enrollment 500-999
Range Code4	Percentage of students at colleges with enrollment 1000-2400
Range Code5	Percentage of students at colleges with enrollment 2500-4999
Range Code6	Percentage of students at colleges with enrollment 5000-9999
Range Code7	Percentage of students at colleges with enrollment 10,000-19,999
Range Code8	Percentage of students at colleges with enrollment 20,000 and over
Affil1	Percentage of students at Public colleges
Affil2	Percentage of students at Private for-profit colleges
Affil3	Percentage of students at Private nonprofit, independent (no religious affiliation) colleges
Affil4	Percentage of students at Private nonprofit, Catholic colleges
Affil5	Percentage of students at Private nonprofit, Jewish colleges
Affil6	Percentage of students at Private nonprofit, Protestant colleges
Affil7	Percentage of students at Private nonprofit, other religious affiliation colleges
AffilNull	Percentage of students at unknown affiliation colleges
Affiliation11	Percentage of students at colleges that are federal
Affiliation12	Percentage of students at colleges that are state
Affiliation13	Percentage of students at colleges that are local
Affiliation14	Percentage of students at colleges that are state/local
Affiliation15	Percentage of students at colleges that are state-related
Affiliation21	Percentage of students at colleges that are independent nonprofit
Affiliation24	Percentage of students at colleges that are African Methodist Episcopal Zion Church
Affiliation25	Percentage of students at colleges that are organized as profit-making
Affiliation26	Percentage of students at colleges that are Advent Christian Church
Affiliation27	Percentage of students at colleges that are Assemblies of God Church
Affiliation28	Percentage of students at colleges that are Brethren Church
Affiliation29	Percentage of students at colleges that are Brethren in Christ Church
Affiliation30	Percentage of students at colleges that are Roman Catholic
Affiliation32	Percentage of students at colleges that are Church of New Jerusalem
Affiliation33	Percentage of students at colleges that are Wisconsin Evangelical Lutheran Synod
Affiliation34	Percentage of students at colleges that are Christian and Missionary Iance Church
Affiliation35	Percentage of students at colleges that are Christian Reformed Church
Affiliation37	Percentage of students at colleges that are Evangelical Covenant Church of America
Affiliation39	Percentage of students at colleges that are Evangelical Lutheran Church
Affiliation41	Percentage of students at colleges that are Free Will Baptist Church
Affiliation42	Percentage of students at colleges that are interdenominational
Affiliation43	Percentage of students at colleges that are Mennonite Brethren Church
Affiliation44	Percentage of students at colleges that are Moravian Church
Affiliation46	Percentage of students at colleges that are American Lutheran and Lutheran Church in America
Affiliation47	Percentage of students at colleges that are Pentecostal Holiness Church
Affiliation48	Percentage of students at colleges that are unknown
Affiliation49	Percentage of students at colleges that are Reformed Church in America
Affiliation51	Percentage of students at colleges that are African Methodist Episcopal
Affiliation52	Percentage of students at colleges that are American Baptist
Affiliation53	Percentage of students at colleges that are American Lutheran
Affiliation54	Percentage of students at colleges that are Baptist
Affiliation55	Percentage of students at colleges that are Christian Methodist Episcopal
Affiliation56	Percentage of students at colleges that are Church of Christ
Affiliation57	Percentage of students at colleges that are Church of God
Affiliation58	Percentage of students at colleges that are Church of the Brethren
Affiliation59	Percentage of students at colleges that are Church of the Nazarene
Affiliation60	Percentage of students at colleges that are Cumberland Presbyterian
Affiliation61	Percentage of students at colleges that are Christian Church(Disciples of Christ)
Affiliation63	Percentage of students at colleges that are Friends United Meeting

Affiliation64	Percentage of students at colleges that are Free Methodist
Affiliation65	Percentage of students at colleges that are Friends
Affiliation66	Percentage of students at colleges that are Presbyterian US and United Presbyterian USA
Affiliation67	Percentage of students at colleges that are Lutheran Church in America
Affiliation68	Percentage of students at colleges that are Lutheran Church, Missouri Synod
Affiliation69	Percentage of students at colleges that are Mennonite Church
Affiliation70	Percentage of students at colleges that are General Conference Mennonite Church
Affiliation71	Percentage of students at colleges that are United Methodist
Affiliation72	Percentage of students at colleges that are Presbyterian US
Affiliation73	Percentage of students at colleges that are Protestant Episcopal
Affiliation74	Percentage of students at colleges that are unknown
Affiliation75	Percentage of students at colleges that are Southern Baptist
Affiliation76	Percentage of students at colleges that are United Church of Christ
Affiliation77	Percentage of students at colleges that are United Presbyterian, USA
Affiliation78	Percentage of students at colleges that are Multiple Protestant Denominations
Affiliation79	Percentage of students at colleges that are Other Protestant
Affiliation80	Percentage of students at colleges that are Jewish
Affiliation81	Percentage of students at colleges that are Reformed Presbyterian Church
Affiliation82	Percentage of students at colleges that are Reorganized Latter Day Saints Church
Affiliation84	Percentage of students at colleges that are United Brethren Church
Affiliation87	Percentage of students at colleges that are Missionary Church Inc.
Affiliation89	Percentage of students at colleges that are Wesleyan Church
Affiliation91	Percentage of students at colleges that are Greek Orthodox
Affiliation92	Percentage of students at colleges that are Russian Orthodox
Affiliation94	Percentage of students at colleges that are unknown
Affiliation95	Percentage of students at colleges that are Seventh-Day Adventists
Affiliation99	Percentage of students at colleges that are other
Carn11	Percentage of students at RESEARCH UNIVERSITIES I
Carn12	Percentage of students at RESEARCH UNIVERSITIES II
Carn13	Percentage of students at DOCTORAL UNIVERSITIES I
Carn14	Percentage of students at DOCTORAL UNIVERSITIES II
Carn21	Percentage of students at MASTER'S (COMPREHENSIVE) UNIVERSITIES AND COLLEGES I
Carn22	Percentage of students at MASTER'S (COMPREHENSIVE) UNIVERSITIES AND COLLEGES II
Carn31	Percentage of students at BACCALAUREATE (LIBERAL ARTS) COLLEGES I
Carn32	Percentage of students at BACCALAUREATE COLLEGES II
Carn40	Percentage of students at ASSOCIATE OF ARTS COLLEGES
Carn51	Percentage of students at Theological seminaries, Bible colleges
Carn52	Percentage of students at Medical schools and medical centers
Carn53	Percentage of students at Other separate health profession schools
Carn54	Percentage of students at Schools of engineering and technology
Carn55	Percentage of students at Schools of business and management
Carn56	Percentage of students at Schools of art, music, and design
Carn57	Percentage of students at Schools of law
Carn58	Percentage of students at Teachers colleges
Carn59	Percentage of students at Other specialized institutions
Carn60	Percentage of students at Tribal colleges
Carnnull	Percentage of students at Carnegie units not applicable colleges
<b>Demographic</b>	
Female	Percentage of students who were women
White	Percentage of students who were white
Hispanic	Percentage of students who were Hispanic
Black	Percentage of students who were Asian
Indian	Percentage of students who were Indian
Asian	Percentage of students who were black
Non-Res	Percentage of students who were non-residents (foreign students)
Sex Code1	Percentage of students at male colleges
Sex Code2	Percentage of students at female colleges
Sex Code3	Percentage of students at coed colleges
Sex Code4	Percentage of students at coordinate colleges
Race Code0	Percentage of students at colleges that are predominantly non-white and non-black
Race Code1	Percentage of students at colleges that are predominantly white
Race Code2	Percentage of students at colleges that are predominantly black

Ling.Isolated	Percentage of population who is linguistically isolated
Ling.IsolatedSpanish	Percentage of linguistically isolated population who speak Spanish
Ling.IsolatedOtherIndoEuropean	Percentage of linguistically isolated population who speak an Other Indo-European language
Ling.IsolatedAsian	Percentage of linguistically isolated population who speak an Asian language
Ling.IsolatedOtherLanguages	Percentage of linguistically isolated population who speak an Other language
AsianLing.Isolated	Percentage of population who speak an Asian language and is also linguistically isolated
SpanishLing.Isolated	Percentage of population who speak Spanish and is also linguistically isolated
Asian&SpeakEnglishvery well	Percentage of Asian population who speak English very well
Asian&Englishwell	Percentage of Asian population who speak English well
Asian&Englishnot well	Percentage of Asian population who speak English not well
Asian&Englishnot at all	Percentage of Asian population who speak English not at
Hispanic&English	Percentage of Hispanic population who speak only English
Hispanic&Spanish	Percentage of Hispanic population who speak Spanish
Hispanic&English very well	Percentage of Hispanic population who speak English very well
Hispanic&English well	Percentage of Hispanic population who speak English well
Hispanic&English not well	Percentage of Hispanic population who speak English not well
Hispanic&English not at all	Percentage of Hispanic population who speak English not at
HispanicNonHispanic	Percentage of Hispanic population who speak neither English nor Spanish
AsianHome&Englishvery well	Percentage of Asian population at home who speak English very well
AsianHome&Englishwell	Percentage of Asian population at home who speak English well
AsianHome&Englishnot well/not at all	Percentage of Asian population at home who speak English not well or not at all
SpanishHome&Englishvery well	Percentage of Hispanic population at home who speak English very well
SpanishHome&Englishwell	Percentage of Hispanic population at home who speak English well
SpanishHome&Englishnot well/not at all	Percentage of Hispanic population at home who speak English not well or not at all

Englishnotverywell	Percentage of population who speak a foreign language at home and speak English less than very well
ForeignLang.Home	Percentage of population who speak a foreign language at home
FrenchSpokenHome	Percentage of population who speak French at home
GermanSpokenHome	Percentage of population who speak German at home
ItalianSpokenHome	Percentage of population who speak Italian at home
RussianSpokenHome	Percentage of population who speak Russian at home
SpanishSpokenHome	Percentage of population who speak Spanish at home
JapaneseSpokenHome	Percentage of population who speak Japanese at home
ChineseSpokenHome	Percentage of population who speak Chinese at home
FrenchSingleAncest.	Percentage of population with French as single ancestry
GermanSingleAncest.	Percentage of population with German as single ancestry
ItalianSingleAncest.	Percentage of population with Italian as single ancestry
RussianSingleAncest.	Percentage of population with Russian as single ancestry
French&otherAncest.	Percentage of population with French as an ancestry
German&otherAncest.	Percentage of population with German as an ancestry
Italian&otherAncest.	Percentage of population with Italian as an ancestry
Russian&otherAncest.	Percentage of population with Russian as an ancestry
French1stAncest.	Percentage of population with French as first ancestry
German1stAncest.	Percentage of population with German as first ancestry
Italian1stAncest.	Percentage of population with Italian as first ancestry
Russian1stAncest.	Percentage of population with Russian as first ancestry
FrenchComb.Ancest.	Percentage of population with French as first or second ancestry
GermanComb.Ancest.	Percentage of population with German as first or second ancestry
ItalianComb.Ancest.	Percentage of population with Italian as first or second ancestry
RussianComb.Ancest.	Percentage of population with Russian as first or second ancestry
Foreignborn	Foreign born Percentage of population
ForeignBorn87-90	Percentage of foreign born population who entered between 1987 and 2000
ForeignBorn85-86	Percentage of foreign born population who entered between 1985 and 1986
ForeignBorn82-84	Percentage of foreign born population who entered between 1982 and 1984
ForeignBorn80-81	Percentage of foreign born population who entered between 1980 and 1981
ForeignBorn75-79	Percentage of foreign born population who entered between 1975 and 1979
ForeignBorn70-74	Percentage of foreign born population who entered between 1970 and 1974
ForeignBorn65-69	Percentage of foreign born population who entered between 1965 and 1969
ForeignBorn60-64	Percentage of foreign born population who entered between 1960 and 1964
ForeignBorn50-59	Percentage of foreign born population who entered between 1950 and 1959
ForeignBornpre1950	Percentage of foreign born population who entered before 1950
ForeignBorn95-00	Percentage of foreign born population who entered between 1995 and 2000
ForeignBorn90-94	Percentage of foreign born population who entered between 1990 and 1994
ForeignBorn85-89	Percentage of foreign born population who entered between 1985 and 1989
ForeignBorn80-84	Percentage of foreign born population who entered between 1980 and 1984

ForeignBorn75-79	Percentage of foreign born population who entered between 1975 and 1979
ForeignBorn70-74	Percentage of foreign born population who entered between 1970 and 1974
ForeignBorn65-69	Percentage of foreign born population who entered between 1965 and 1969
ForeignBornpre1965	Percentage of foreign born population who entered before 1965
<b>Trade</b>	
ForeignExportsNonEnglishAllo	Foreign Exports to Non-English Speakers Percentage of Total Exports
ForeignExportsEnglishAllo	Foreign Exports to English Speakers Percentage of Total Exports
ForeignExportsFrenchAllo	Foreign Exports to French Speakers Percentage of Total Exports
ForeignExportsGermanAllo	Foreign Exports to German Speakers Percentage of Total Exports
ForeignExportsItalianAllo	Foreign Exports to Italian Speakers Percentage of Total Exports
ForeignExportsRussianAllo	Foreign Exports to Russian Speakers Percentage of Total Exports
ForeignExportsSpanishAllo	Foreign Exports to Spanish Speakers Percentage of Total Exports
ForeignExportsJapaneseAllo	Foreign Exports to Japanese Speakers Percentage of Total Exports
ForeignExportsChineseAllo	Foreign Exports to Chinese Speakers Percentage of Total Exports
ForeignExportsNonEnglishGSP	Foreign Exports to Non-English Speakers Percentage of Gross State Product
ForeignExportsEnglishGSP	Foreign Exports to English Speakers Percentage of Gross State Product
ForeignExportsFrenchGSP	Foreign Exports to French Speakers Percentage of Gross State Product
ForeignExportsGermanGSP	Foreign Exports to German Speakers Percentage of Gross State Product
ForeignExportsItalianGSP	Foreign Exports to Italian Speakers Percentage of Gross State Product
ForeignExportsRussianGSP	Foreign Exports to Russian Speakers Percentage of Gross State Product
ForeignExportsSpanishGSP	Foreign Exports to Spanish Speakers Percentage of Gross State Product
ForeignExportsJapaneseGSP	Foreign Exports to Japanese Speakers Percentage of Gross State Product
ForeignExportsChineseGSP	Foreign Exports to Chinese Speakers Percentage of Gross State Product
ForeignExportsTotalPercentageofGSP	Foreign Exports Total Percentage of Gross State Product
MerchandiseExportsCanada	Percentage of Merchandise Exports to Canada
MerchandiseExportsMexico	Percentage of Merchandise Exports to Mexico
MerchandiseExports	Merchandise Exports Percentage of Gross State Product
ForeignDirectInvestment	Foreign Direct Investment Percentage of Gross State Product
FDIEmployment	Foreign Direct Employment Percentage of Businesses
Internat.VisitorsGSP	International Visitor Impact Percentage of Gross State Product
<b>Distance</b>	
Distance to Mexican Border	Distance to Mexican Border in Miles
Distance to Quebec Border	Distance to Quebec Border in Miles
Driving Distance to Quebec Border	Driving Distance in Hours to Quebec

Driving Distance to Mexican Border	Driving Distance in Hours to Mexico
<b>Border</b>	
MexicoBorder	State or EA that borders Mexico
QuebecBorder	State or EA that borders Quebec
estcoast	State or EA that borders the East Coast
wstcoast	State or EA that borders the West Coast
glfcoast	State or EA that borders the Gulf Coast
estwest	State or EA that borders either the East or West Coasts
anycoast	State or EA that borders the East Coast, the West Coast, or the Gulf Coast
<b>Weighted Distance</b>	
ncipopfr	French-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdpfr	French-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopgr	French-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdpgr	French-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
ncipopgr	German-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdpgr	German-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopgr	German-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdpgr	German-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
ncipopit	Italian-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdpit	Italian-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopit	Italian-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdpit	Italian-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
ncipopru	Russian-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdpru	Russian-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopru	Russian-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdpru	Russian-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
ncipopsp	Spanish-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdsp	Spanish-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopsp	Spanish-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdsp	Spanish-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
ncipopjp	Japanese-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdpjp	Japanese-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopjp	Japanese-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdpjp	Japanese-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
ncipopch	Chinese-Speaking Population Divided by Country Centroid-State/EA Centroid Distances
ncogdpch	Chinese-Speaking GDP Divided by Country Centroid-State/EA Centroid Distances
ncipopch	Chinese-Speaking Population Divided by Largest City Centroid-State/EA Centroid Distances
ncigdpch	Chinese-Speaking GDP Divided by Largest City Centroid-State/EA Centroid Distances
scipopfr	French-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdpfr	French-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopfr	French-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdpfr	French-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scipopgr	German-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdpgr	German-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopgr	German-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdpgr	German-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scipopit	Italian-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdpit	Italian-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopit	Italian-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdpit	Italian-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scipopru	Russian-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdpru	Russian-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopru	Russian-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdpru	Russian-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared

scopopsp	Spanish-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdsp	Spanish-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopsp	Spanish-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdsp	Spanish-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scopopjp	Japanese-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdpjp	Japanese-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopjp	Japanese-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdpjp	Japanese-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scopopch	Chinese-Speaking Population Divided by Country Centroid-State/EA Centroid DistancesSquared
scogdpch	Chinese-Speaking GDP Divided by Country Centroid-State/EA Centroid DistancesSquared
scipopch	Chinese-Speaking Population Divided by Largest City Centroid-State/EA Centroid DistancesSquared
scigdpch	Chinese-Speaking GDP Divided by Largest City Centroid-State/EA Centroid DistancesSquared

Note: the universe for \_\_spokenhome is 18 years and older for 1998, and 5 years and older for other years; the linguistically isolated population's universe for 1998 was 18-64; otherwise, included entire population.

## Appendix 2

Table Appendix 2.1 - 1960 State Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		6.487** <sub>2</sub>							
GermanAllo			3.029**		-3.605** <sub>2</sub>				
ItalianAllo				30.895** <sub>1</sub> 29.211** <sub>2</sub>					
RussianAllo					7.205** <sub>1</sub> 9.226** <sub>2</sub>				
SpanishAllo						6.822**			
OtherAllo		- 3.124** <sub>1</sub>					43.537**		
JapaneseAllo								46.614**	
ChineseAllo									42.965**
<b>Requirements</b>									
EntReq3		4.580** <sub>2</sub>							
<b>Developmental</b>									
TotalIncome								2.190*	
<b>Distance</b>									
Distance to Mexican Border	2.516* <sub>2</sub>			2.931** <sub>2</sub>	4.749** <sub>2</sub>				
Distance to Quebec Border	- 4.455** <sub>2</sub>								
Driving Distance to Mexican Border			6.023**						
<b>Border</b>									
QuebecBorder						3.159**			
estcoast						3.893**	4.197**		
anycost		2.558* <sub>1</sub>							
<b>Weighted Distance</b>									
ncipopfr					4.273** <sub>1</sub>				
scopopfr	7.315** <sub>1</sub>	8.647** <sub>1</sub>							
scopopit				4.302** <sub>1</sub>					
<b>Adjusted R<sup>2</sup></b>	.512 <sub>1</sub> .367 <sub>2</sub>	.667 <sub>1</sub> .575 <sub>2</sub>	.497	.954 <sub>1</sub> .945 <sub>2</sub>	.621 <sub>1</sub> .731 <sub>2</sub>	.561	.976	.980	.974

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.2 - 1960 State Allocation Equations</b>								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen	6.737**		-5.733**					
ItalianPen			36.618**					
RussianPen				9.607**				
SpanishPen					6.202**			
OtherPen						44.762**		
JapanesePen					-2.147**		46.238**	
ChinesePen								44.917**
<b>Availability</b>								
FrenchAvail	2.574*	-4.382**						
GermanAvail		2.546*						
RussianAvail	-3.839**							
OtherAvail				3.039**				
JapaneseAvail				2.791**				3.487**
<b>Requirements</b>								
GradReq1				2.022**				
GradReq4			-2.296*	-4.255**				
<b>Distance</b>								
Driving Distance to Mexican Border					-8.891**			
<b>Border</b>								
MexicoBorder	-4.067**							
estcoast						-4.065**		
<b>Weighted Distance</b>								
scopopru	-6.260**							
<b>Adjusted R<sup>2</sup></b>	.777	.317	.966	.768	.696	.976	.978	.979

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.3 - 1960 EA Penetration Equations</b>								
	Overall	French	German	Italian	Russian	Spanish	Other	Chinese
<b>Allocation</b>								
GermanAllo		-3.590**	8.239**					
ItalianAllo				53.060**				
RussianAllo	-2.254* <sub>2</sub>	-3.163**						
SpanishAllo						7.791**		
OtherAllo							34.136**	
JapaneseAllo								
ChineseAllo								97.583**
<b>Availability</b>								
RussianAvail					16.469**	2.867**		
OtherAvail						2.742**		
<b>Requirements</b>								
GradReq3	3.838** <sub>1</sub> 3.848** <sub>2</sub>	2.507*	3.477**					
<b>Distance</b>								
Distance to Mexican Border	5.541** <sub>2</sub>							
<b>Border</b>								
estwest	3.525** <sub>1</sub>	3.598**				2.659**		
anycoast	2.872** <sub>2</sub>				3.024**			
<b>Weighted Distance</b>								
ncigdpfr					6.317**			
ncogdpsp						4.737**		
scopopfr			5.968**					
scipopfr				3.863*				
scopopit	6.471** <sub>1</sub>	8.450**						
scopopru					5.746**			
<b>Adjusted R<sup>2</sup></b>	.322 <sub>1</sub> .259 <sub>2</sub>	.438	.436	.949	.730	.401	.880	.984

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.4 - 1960 EA Allocation Equations</b>							
	French	German	Italian	Russian	Spanish	Other	Chinese
<b>Penetration</b>							
FrenchPen	8.550**		-4.604**	-6.839**			
GermanPen		8.454**					
ItalianPen			55.123**				
RussianPen	-5.912**			17.246**			
SpanishPen					8.630** <sub>2</sub>	-3.625**	
OtherPen						35.573**	
ChinesePen							97.583**
<b>Availability</b>							
FrenchAvail	4.065**	-5.582**					
GermanAvail					-4.189** <sub>1</sub>		
					-3.565** <sub>2</sub>		
SpanishAvail	-3.998**			-2.343*	8.675** <sub>1</sub>		
<b>Distance</b>							
Distance to Mexican Border					-8.717** <sub>2</sub>		
<b>Border</b>							
MexicoBorder		-2.280*			3.513** <sub>1</sub>		
estwest		-2.590*					
<b>Weighted Distance</b>							
ncogdpsp		-5.078**					
scigdpsp					3.025** <sub>1</sub>		
<b>Adjusted R<sup>2</sup></b>	.479	.485	.950	.665	.470 <sub>1</sub> .505 <sub>2</sub>	.888	.984

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.5 - 1970 State Penetration Equations							
	Overall	French	German	Italian	Russian	Spanish	Other
<b>Allocation</b>							
GermanAllo						-3.558**	-4.008**
ItalianAllo				28.671**			
RussianAllo					13.319**		
SpanishAllo						5.330**	
OtherAllo					2.121*		59.396**
<b>Availability</b>							
GermanAvail						2.333*	
RussianAvail	5.591**						
<b>Requirements</b>							
GradReq1			-4.354**				
<b>Developmental</b>							
ServicesIncome	4.046**	3.808** <sub>1</sub> 2.375* <sub>2</sub>	3.591**	4.475**	7.733**	3.618**	4.848**
<b>Institutional</b>							
Offering Level3		-2.614* <sub>2</sub>					
Offering Level5			5.108**				
Status Code6			-4.233**				
Calendar System1				3.738**	2.911**		
Calendar System2	-3.641**						
Range Code0							2.111*
Range Code2		2.172* <sub>1</sub>					
Range Code7		2.692** <sub>1</sub>					
<b>Demographic</b>							
Female	2.748**	3.485** <sub>2</sub>		3.402**			2.682*
Sex Code2		8.083** <sub>1</sub>					
<b>Distance</b>							
Driving Distance to Quebec Border					-4.976**		
<b>Border</b>							
estcoast	5.452**	7.686** <sub>2</sub>					
<b>Weighted Distance</b>							
ncigdpit						2.622*	
scipopsp			-4.736**				
<b>Adjusted R<sup>2</sup></b>	.732	.661 <sub>1</sub> .669 <sub>2</sub>	.572	.951	.926	.639	.831

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.6 - 1970 State Allocation Equations</b>						
	French	German	Italian	Russian	Spanish	Other
<b>Penetration</b>						
OverallPen						-4.998**
FrenchPen	9.031**					
GermanPen			-3.687**			
ItalianPen		-2.871**	31.576**			
RussianPen				16.283**		
SpanishPen					6.302**	
OtherPen					-2.888**	52.338**
<b>Availability</b>						
GermanAvail	-4.293**					
OtherAvail	-4.187**					
<b>Developmental</b>						
GovernmentIncome			-2.526*			
EducationExpendituresPerCapitaTotal	-5.358**					
<b>Institutional</b>						
Offering Level5		4.227**		-2.350*		
Calendar System1				-4.515**		
Calendar System2			4.708**			
<b>Demographic</b>						
Female			-3.701**			
Sex Code2		-3.672**				
Race Code1						2.433*
<b>Distance</b>						
Driving Distance to Mexican Border					-7.219**	
<b>Border</b>						
MexicoBorder	-3.791**	-2.242*				
QuebecBorder						
<b>Weighted Distance</b>						
ncopopru				6.437**		
scopopru		3.580**				
<b>Adjusted R<sup>2</sup></b>	.831	.560	.954	.893	.685	.983

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.7 - 1970 EA Penetration Equations							
	Overall	French	German	Italian	Russian	Spanish	Other
<b>Allocation</b>							
FrenchAllo		10.187**					
GermanAllo	-2.353* <sub>1</sub>		8.024** <sub>1</sub> 7.848** <sub>2</sub>			-4.186**	
ItalianAllo				33.257**			
RussianAllo			4.133** <sub>2</sub>		24.053** <sub>1</sub> 24.886** <sub>2</sub>		
OtherAllo							52.468**
<b>Availability</b>							
ItalianAvail	6.367** <sub>1</sub>	4.971**					
RussianAvail			7.201** <sub>1</sub>				
SpanishAvail							2.631**
<b>Requirements</b>							
GradReq3	5.785** <sub>2</sub>		5.721** <sub>2</sub>		2.721**	3.964**	
<b>Institutional</b>							
Control Code1	-4.305** <sub>2</sub>	-4.190**	-6.292** <sub>1</sub>			-2.925**	
Control Code2	5.237** <sub>1</sub>						
Offering Level6	-2.686** <sub>2</sub>		-2.898** <sub>1</sub>		-2.781**		
Calendar System1		3.344**		3.296**			3.797**
<b>Demographic</b>							
Sex Code3					-3.851** <sub>1</sub> -4.099** <sub>2</sub>		
<b>Border</b>							
MexicoBorder	3.749** <sub>1</sub> 4.031** <sub>2</sub>				3.242** <sub>1</sub> 3.154** <sub>2</sub>	7.953**	
estcoast	3.210** <sub>1</sub> 4.788** <sub>2</sub>			2.497*	3.263** <sub>1</sub> 3.377** <sub>2</sub>	3.209**	
glfcoast				-2.822**			
estwest			2.567* <sub>1</sub> 3.183** <sub>2</sub>				
anycoast		3.498**					
<b>Adjusted R<sup>2</sup></b>	.369 <sub>1</sub> .358 <sub>2</sub>	.501	.514 <sub>1</sub> .492 <sub>2</sub>	.867	.802 <sub>1</sub> .802 <sub>2</sub>	.414	.942

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.8 - 1970 EA Allocation Equations</b>						
	French	German	Italian	Russian	Spanish	Other
<b>Penetration</b>						
FrenchPen	10.007**					
ItalianPen			32.204**			
RussianPen				25.227**		
SpanishPen						-5.473**
OtherPen	-5.182**					54.445**
<b>Availability</b>						
GermanAvail		5.766**				
<b>Institutional</b>						
Offering Level4						2.447*
Offering Level6				2.142*		
Calendar System2		2.094*		3.136**		
Range Code1	2.502*					
Range Code6				3.187**		
<b>Distance</b>						
Distance to Mexican Border					-8.060**	
<b>Border</b>						
MexicoBorder	-4.786**					
QuebecBorder						
estcoast			-2.167*	-2.554*		
glfcoast			2.715**			
estwest		-2.899**				
<b>Weighted Distance</b>						
ncogdpru		7.524**				
<b>Adjusted R<sup>2</sup></b>	.475	.373	.859	.789	.272	.946

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.9 - 1974 State Penetration Equations</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		7.906**							
ItalianAllo				21.284**					
RussianAllo					13.482**				
SpanishAllo						9.915**			
OtherAllo							11.023**		
JapaneseAllo								35.064**	
ChineseAllo									26.048**
<b>Availability</b>									
ItalianAvail	3.254**	2.601*							
RussianAvail						3.471**			
<b>Developmental</b>									
PopSize									
MetroShare					5.242**				
ServicesIncome		3.346**					2.338*		
GovernmentIncome	3.148**								2.954**
<b>Institutional</b>									
Offering Level3			-3.607**						
ResMigInstate					-7.872**				
Institute Code3		-2.140*							
Institute Code6					2.137*				
<b>Demographic</b>									
Sex Code2	3.191**			3.074**					
<b>Distance</b>									
Distance to Quebec Border					-3.270**				
<b>Border</b>									
MexicoBorder	2.638*								
estcoast						2.602*			
estwest		3.515**							
<b>Weighted Distance</b>									
ncipopsp			-2.856**						
<b>Adjusted R<sup>2</sup></b>	.435	.719	.238	.909	.865	.703	.707	.961	.939

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.10 - 1974 State Allocation Equations</b>								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen	14.389**				-7.848**			
GermanPen		6.931**						
ItalianPen		-4.712**	20.438**					
RussianPen				10.793**			2.311*	
SpanishPen	-6.896**			-4.613**	13.941**	-2.743**		
OtherPen						11.928**		
JapanesePen							36.624**	
ChinesePen								26.581**
<b>Availability</b>								
FrenchAvail								2.185*
OtherAvail	-6.432**							
JapaneseAvail		-3.549**						
ChineseAvail					-2.806**			
<b>Institutional</b>								
Offering Level7	2.418*							
Institute Code3					2.566*			
<b>Demographic</b>								
Race Code2				-2.118*				
<b>Border</b>								
MexicoBorder		-2.474*						
glfcoast	2.618*							
<b>Weighted Distance</b>								
ncipopsp					6.800**			
scogdpru		2.634*						
<b>Adjusted R<sup>2</sup></b>	.867	.642	.893	.705	.881	.741	.964	.935

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.11 - 1974 EA Penetration Equations</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		9.549**							
GermanAllo			8.598**						
ItalianAllo		5.366**	6.698**	40.705**					
RussianAllo					17.736**				
OtherAllo							26.205**		
JapaneseAllo								80.264**	
ChineseAllo									50.440**
<b>Availability</b>									
SpanishAvail						4.717**			
OtherAvail	7.868**								
<b>Developmental</b>									
ServicesIncome					4.102**				
<b>Institutional</b>									
Control Code1	-2.432*								
Offering Level5									-2.873**
Status Code6							3.209**		
Status Code9								-2.534*	
Status CodeF				-2.229*					
Institute Code5								-8.995*	
Institute Code6	2.036*					3.693**			
Calendar System2		-2.630**							
Calendar System3					-3.765**				
Range Code2					-2.216*				
Range Code4								2.370*	
Range Code7				-2.311*					
<b>Distance</b>									
Distance to Quebec Border					-2.889**				
<b>Border</b>									
MexicoBorder	3.440**					7.714**			
anycoast	3.669**	2.838**							
<b>Weighted Distance</b>									
ncipopru							-4.515**		
ncipopch						-2.175*			
<b>Adjusted R<sup>2</sup></b>	.338	.439	.386	.908	.769	.401	.809	.974	.937

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.12 - 1974 EA Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen	9.937**							
GermanPen		7.737**						
ItalianPen			40.403**					
RussianPen				19.843**				
OtherPen						27.020**		
JapanesePen							105.702**	
ChinesePen								50.556**
<b>Availability</b>								
GermanAvail					-3.830**			
OtherAvail	-6.635**							
<b>Developmental</b>								
ServicesIncome		-3.054**						
GovernmentIncome		-2.885**						
<b>Institutional</b>								
Offering Level5								3.101**
Status Code8						2.428*	3.410**	
Status CodeF			2.650**					
Institute Code5		2.376*				6.509**		
Institute Code6	-2.966**							
Calendar System1		-3.654**				-2.051*		
Range Code5					3.012**		3.072**	
Range Code6								
Range Code7			2.797**					2.291*
<b>Distance</b>								
Distance to Mexican Border					-10.576**			
<b>Border</b>								
MexicoBorder	-4.212**							
<b>Weighted Distance</b>								
ncogdp ru								2.463*
scogdp fr							-3.403**	
scopop ru							17.146**	
scigdp sp			-2.040*					
scogdp jp				5.196**				
<b>Adjusted R<sup>2</sup></b>	.493	.475	.911	.729	.446	.833	.986	.941

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.13 - 1977 State Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		8.190** <sub>2</sub>							
GermanAllo							-3.804**		
ItalianAllo				38.627**					
RussianAllo					12.048**				
OtherAllo							21.035**		
JapaneseAllo								148.378**	
ChineseAllo									27.086**
<b>Availability</b>									
FrenchAvail		2.279* <sub>1</sub>							
GermanAvail			5.022**						
ItalianAvail		2.214* <sub>2</sub>				3.517**			
RussianAvail		2.507* <sub>1</sub>							
ChineseAvail	4.249**								
<b>Developmental</b>									
ServicesIncome	7.606**	7.114** <sub>2</sub>	2.984**	7.321**		5.493**	2.848**		6.089**
<b>Institutional</b>									
Asian								-4.215*	
Non-Res					2.481*				
Control Code2		5.738** <sub>1</sub>							
Offering Level3					-2.745**				
Offering Level5			2.359*						
Status Code8			2.093*						
Status CodeE									-3.770**
Institute Code4		2.964** <sub>1</sub>							
Sex Code3				-3.287**					
<b>Border</b>									
MexicoBorder	4.027**			3.257**	3.526**	7.946**			2.189**
estcoast					2.795**				
estwest	4.501**	3.580* <sub>2</sub>							
anycoast		2.530* <sub>1</sub>							
<b>Weighted Distance</b>									
ncipopsp			-3.117**						
<b>Adjusted R<sup>2</sup></b>	.750	.595 <sub>1</sub> .750 <sub>2</sub>	.550	.972	.778	.713	.914	.998	.950

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.14 - 1977 State Allocation Equations</b>								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
ItalianPen		-2.805**	35.484**					
RussianPen				11.822**		-8.329**		
OtherPen						19.598**		
JapanesePen							131.065**	
ChinesePen								28.213**
<b>Availability</b>								
FrenchAvail		-2.442*						
<b>Developmental</b>								
MetroShare	-2.400*							
GovernmentIncome			-5.712**					
<b>Institutional</b>								
White				3.397**				
Hispanic	-4.604**				5.843** <sub>1</sub>			
Black							-2.103*	
Offering Level6	4.218**				-2.177* <sub>1</sub> -2.179* <sub>2</sub>			
Institute Code4	3.374**							
Sex Code3			2.613*					
Calendar System1								-4.064**
Race Code2						-3.290**		-4.409**
<b>Distance</b>								
Driving Distance to Mexican Border						3.924**		
<b>Border</b>								
MexicoBorder		-2.137*	-3.099**		5.816** <sub>2</sub>			
wstcoast					-2.658* <sub>2</sub>			
<b>Weighted Distance</b>								
ncogdsp	8.119**							
<b>Adjusted R<sup>2</sup></b>	.782	.272	.964	.739	.442 <sub>1</sub> .445 <sub>2</sub>	.900	.997	.943

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.15 - 1977 EA Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		10.008**							
ItalianAllo				36.544**					
RussianAllo					17.924**				
SpanishAllo									
OtherAllo							14.039**		
JapaneseAllo								172.556**	
ChineseAllo									37.166**
<b>Availability</b>									
GermanAvail			9.012**						
ItalianAvail	7.440** <sub>1</sub> 7.531** <sub>2</sub>	6.244**				4.764** <sub>2</sub>		-2.458*	
<b>Developmental</b>									
ServicesIncome						4.106** <sub>1</sub>			
<b>Institutional</b>									
Female						-2.504* <sub>1</sub>			
Hispanic						9.053** <sub>1</sub>			
Non-Res	3.377** <sub>2</sub>								
Institute Code1							4.315**		
Institute Code6						2.655** <sub>2</sub>			
Sex Code4	2.172* <sub>2</sub>	2.491*							
Calendar System1	4.321** <sub>1</sub>	2.340*							
<b>Border</b>									
MexicoBorder	5.749** <sub>2</sub>			2.899**	4.671**	10.011** <sub>2</sub>			
wstcoast	3.427** <sub>1</sub>								
estwest							3.608**		
anycoast		2.855**							
<b>Weighted Distance</b>									
ncipopit							-4.340**		
ncipopru									-4.299**
scogdpru								-6.381**	
scipopsp			-5.157**						
<b>Adjusted R<sup>2</sup></b>	.345 <sub>1</sub> .401 <sub>2</sub>	.503	.416	.887	.665	.502 <sub>1</sub> .441 <sub>2</sub>	.631	.994	.892

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.16 - 1977 EA Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen	9.542**							
GermanPen		8.540**						
ItalianPen			36.080**					
RussianPen				16.777**				
SpanishPen					10.578**			
OtherPen	-4.604**					15.079**		
JapanesePen							172.556**	
ChinesePen								37.166**
<b>Availability</b>								
ItalianAvail							2.465*	
SpanishAvail						-3.326**		
<b>Institutional</b>								
Black	4.999**							
Hispanic	-5.317**							
Control Code2					-3.450**	2.171*		
Offering Level3					8.260**			
Institute Code2		3.319**						
Institute Code5		2.912**						
Sex Code3	2.844**				3.161**			
Calendar System2		3.868**						
<b>Distance</b>								
Distance to Quebec Border			-3.276**					
<b>Border</b>								
wstcoast					-4.413**			
anycoast		-3.512**						
<b>Weighted Distance</b>								
ncipopgr				3.351**				
ncigdpru								3.906**
scopopru							6.503**	
<b>Adjusted R<sup>2</sup></b>	.550	.414	.888	.645	.584	.580	.994	.890

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.17 - 1980 State Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		7.542**							
GermanAllo	-3.856**								
ItalianAllo				26.264**					
RussianAllo					11.216**				
SpanishAllo			-2.049*						
OtherAllo							20.395**		
JapaneseAllo								71.960**	
ChineseAllo					2.941**				25.260**
<b>Availability</b>									
GermanAvail			4.627**						
ItalianAvail						3.526**			
RussianAvail		3.885**							
<b>Developmental</b>									
ServicesIncome		5.533**	3.278**	4.718**		4.349**			
GovernmentIncome							3.224**		
BachelorsDegree	4.906**								
CitySize3		2.344*							
CitySize5				3.148**					
CitySize8									5.185**
<b>Institutional</b>									
Offering Level8									2.643*
Calendar System2					-2.222*				
Affiliation42									-2.933**
Affiliation46									2.883**
Affiliation56					-2.155*				
Affiliation59	-2.033*		-2.229*						
Affiliation67			2.771*						
Affiliation71					4.916**				
<b>Demographic</b>									
Sex Code2				2.952**					
Sex Code3						-2.834**			
SpanishSpoken Home						7.638**			
<b>Border</b>									
glfcoast	-2.632*								
estwest		3.773**							
<b>Adjusted R<sup>2</sup></b>	.579	.744	.502	.943	.819	.707	.907	.990	.946

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.18 - 1980 State Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
GermanPen			-3.663**					
ItalianPen			24.249**					
RussianPen				13.316**		-2.491*		
SpanishPen		-3.542**						
OtherPen						21.156**		
JapanesePen							71.960**	
ChinesePen								33.549**
<b>Institutional</b>								
Status Code6					-2.045*			
Status CodeF								7.364**
Calendar System2								4.365**
Affiliation21					-4.309**			
Affiliation39				2.043*				
Affiliation55				2.926**				
Affiliation64								2.144*
Affiliation71								-6.077**
Affiliation94	-3.231**							
<b>Demographic</b>								
White				3.160**				
SpanishSpokenHome	-6.608**				9.773**			
French&otherAncest.	2.176*							
GermanSingleAncest.		6.854**						
German&otherAncest.	-5.384							
ItalianSingleAncest.		-2.267*						
<b>Border</b>								
wstcoast					-7.160**			
<b>Adjusted R<sup>2</sup></b>	.622	.650	.922	.784	.743	.899	.990	.964

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.19 - 1980 EA Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
ItalianAllo				28.027**					
RussianAllo					20.920**				
OtherAllo							41.962**		
JapaneseAllo								148.109**	
ChineseAllo									52.259**
<b>Availability</b>									
GermanAvail	5.741** <sub>2</sub>		10.579**						
OtherAvail						6.791**			
<b>Developmental</b>									
EnrolledinCollege		6.532**							
CitySize3	2.614* <sub>1</sub>			2.384*					
CitySize6									-2.028**
<b>Institutional</b>									
Offering Level5			2.757**						
Status Code9				2.113*					
Institute Code1	6.613** <sub>1</sub>								
Institute Code2			-3.191**						
Institute Code6								-5.379**	-3.169**
Calendar System4	2.557* <sub>1</sub> 2.450* <sub>2</sub>	2.871**				3.265**			
Affiliation25						3.079**			
Affiliation29					3.194**				
Affiliation37					3.615**				
Affiliation42							-2.329*		
Affiliation49							-2.717**		
Affiliation56								-4.499**	
Affiliation59				3.472**					
Affiliation63									-5.028**
Affiliation64								-1.986*	
Affiliation76	2.268* <sub>2</sub>	2.919**				2.613*			
<b>Demographic</b>									
GermanSpoken Home	-2.661* <sub>2</sub>								
SpanishSpoken Home						14.827*			
FrenchSingleAnc est.		6.726**							
ForeignBorn50-59	7.447** <sub>1</sub>								
ForeignBorn60-64	5.634** <sub>2</sub>				3.141*				
<b>Border</b>									
estcoast	2.773* <sub>1</sub>								
wstcoast				3.276**					
estwest		4.487**	2.648**						

Table Appendix 2.19 - 1980 EA Penetration Equations - Continued									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Weighted Distance</b>									
ncigdpru			4.090**				-4.665**		
scipopru								-2.966**	
scigdpru									-4.069**
<b>Adjusted R<sup>2</sup></b>	.428 <sub>1</sub> .348 <sub>2</sub>	.433	.503	.838	.749	.614	.914	.992	.942

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.20 - 1980 EA Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
ItalianPen			27.870**					
RussianPen				22.774**				
SpanishPen		-5.492**						
OtherPen					-3.992**	41.845**		
JapanesePen	-2.482*						155.380**	
ChinesePen								51.689**
<b>Developmental</b>								
CitySize3						-2.635*		
<b>Institutional</b>								
ControlCode2			2.420*					
StatusCodeF			2.366*					
Institute Code3		-2.711**			6.153**			
Institute Code6								3.270**
Affiliation33				2.676**				
Affiliation42						2.838**		
Affiliation48				4.821**				
Affiliation49						3.192**		
Affiliation56							4.021**	
Affiliation63								5.364**
Affiliation65				3.437**				
Affiliation71			-2.018*					
Affiliation99							-3.251**	
<b>Demographic</b>								
SpanishHome&Englishverywell	-8.101**				13.113*			
FrenchSingleAncest.	6.487**							
German&otherAncest.		7.138**						
ItalianSingleAncest.		-2.514*						
<b>Distance</b>								
Distance to Mexican Border								4.606**
<b>Border</b>								
MexicoBorder			-2.494*	-2.266*				
anycoast					-2.142*			
<b>Weighted Distance</b>								
ncigdpru						4.206**		
scipopfr					-2.231*			
scopopru							7.640**	
<b>Adjusted R<sup>2</sup></b>	.421	.377	.827	.767	.600	.913	.993	.944

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.21 - 1983 State Penetration Equations</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japan ese	Chi nes e
<b>Allocation</b>									
FrenchAllo		5.749**							
ItalianAllo				28.489**					
RussianAllo					16.875**				
OtherAllo							18.663**		
JapaneseAllo								77.319**	
ChineseAllo	4.316**				2.335*				37.107**
<b>Availability</b>									
FrenchAvail							4.083**		
ItalianAvail	2.254*	2.836**							
<b>Developmental</b>									
ServicesIncome	5.927**	6.608**	4.774**	6.187**	6.409**			2.580*	7.032**
GovernmentIncome							2.345*		
CitySize2			2.817**						
CitySize6									-3.168**
CitySize7									-2.635*
<b>Demographic</b>									
Female					2.522*				
<b>Border</b>									
MexicoBorder	2.056*								
<b>Weighted Distance</b>									
ncipopsp			-3.159**						
scigdsp		-3.156**							
<b>Adjusted R<sup>2</sup></b>	.641	.647	.439	.948	.892		.884	.992	.971

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.22 - 1983 State Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen						-3.737**		
GermanPen			-7.450**					
ItalianPen			34.248**					
RussianPen				16.586**	-4.436** <sub>1</sub>			
SpanishPen		-3.146**		-5.271**			-3.011**	
OtherPen						18.890**		
JapanesePen							78.615**	
ChinesePen					-6.636** <sub>2</sub>			35.773**
<b>Availability</b>								
FrenchAvail	2.968** <sub>2</sub>							
SpanishAvail						-2.560*		
ChineseAvail	-5.464** <sub>1</sub>							
<b>Requirements</b>								
GradReq3					3.090** <sub>2</sub>			
<b>Developmental</b>								
CitySize6			2.618*					
CitySize8								-4.467**
<b>Institutional</b>								
Offering Level8								-2.558*
Status Code5					2.791** <sub>1</sub>			
Institute Code5	2.116* <sub>1</sub>							
Calendar System2								3.646**
Calendar System4					2.440* <sub>1</sub> 3.020** <sub>2</sub>			
<b>Demographic</b>								
White			4.439**					
Black				-2.734**				
ItalianSpokenHome	-4.313** <sub>2</sub>	-2.517*						
SpanishSpokenHome	-6.032** <sub>1</sub> -5.362** <sub>2</sub>							
SpanishHome&Englishverywell					9.191** <sub>1</sub> 8.975** <sub>2</sub>			
FrenchSingleAncest.	5.588** <sub>2</sub>							
GermanSingleAncest.	-5.189** <sub>1</sub>	6.238**						
<b>Border</b>								
wstcoast					-3.541** <sub>1</sub>			
<b>Weighted Distance</b>								
ncogdpsp	7.867** <sub>2</sub>							
scogdpfr					-2.803** <sub>2</sub>			
<b>Adjusted R<sup>2</sup></b>	.636 <sub>1</sub> .760 <sub>2</sub>	.610	.961	.853	.726 <sub>1</sub> .766 <sub>2</sub>	.877	.992	.963

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.23 - 1983 EA Penetration Equations</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
GermanAllo					-3.437**				
ItalianAllo				30.808*					
RussianAllo					25.651*				
OtherAllo							19.730*		
JapaneseAllo								98.260*	
ChineseAllo			4.000**						43.189*
<b>Availability</b>									
GermanAvail			10.861*						
ItalianAvail						7.199**			
OtherAvail		6.962**							
JapaneseAvail	8.762**								
<b>Developmental</b>									
CitySize3				2.286*		2.441*		2.386*	
CitySize5								-2.436*	
<b>Institutional</b>									
Offering Level6					-2.150*				
Status Code8			2.360*						
Institute Code1							4.430**		
Institute Code3	-3.486**								
Institute Code6								2.763**	
Calendar System2								-2.841**	
Calendar System3							3.745**		
Calendar System4						3.911**			
<b>Demographic</b>									
SexCode2	3.654**	4.438**							
Englishnotwell/n otatall						14.447*			
ForeignLangHome	8.681**								
FrenchSpokenHome			-2.873**						
FrenchSingleAnc est.		5.836**							
<b>Distance</b>									
Distance to Quebec Border							3.481**		
<b>Border</b>									
estcoast	2.971**								
wstcoast				3.057**					
estwest		5.308**						3.955**	
<b>Weighted Distance</b>									
ncopopit									-3.490**
scipopru			5.157**						
scigdpjp					4.936**				
<b>Adjusted R<sup>2</sup></b>	.537	.451	.522	.855	.810	.620	.758	.983	.919

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.24 - 1983 EA Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
GermanPen		6.044**						
RussianPen				25.238**				
OtherPen						20.715**		
JapanesePen							98.260**	
ChinesePen								44.176**
<b>Availability</b>								
FrenchAvail	4.133**							
SpanishAvail						-4.994**		
<b>Developmental</b>								
CitySize3							-2.464*	
CitySize5							2.593*	
CitySize6								2.845**
<b>Institutional</b>								
OfferingLevel3					4.149**			
Status Code6			2.589*					
Institute Code2						3.639**		
Institute Code5						2.237*		
Institute Code6				-2.301*			-2.611**	
CalendarSystem2					-2.697**		2.879**	2.158*
<b>Demographic</b>								
Englishverywell/well				-3.153**				
ForeignLangHome	-6.393**	-4.994**						
GermanSpokenHome		6.113**						
FrenchSingleAncest.	6.360**					-2.895**		
ItalianSingleAncest.			-2.525*					
<b>Distance</b>								
Distance to Mexican Border					-7.851**			
<b>Border</b>								
anycoast						-1.991*		
<b>Weighted Distance</b>								
ncigdpru								
scipopgr								3.039**
scogdpsp	3.713**							
<b>Adjusted R<sup>2</sup></b>	.416	.401	.848	.789	.386	.734	.983	.922

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.25 - 1986 State Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		7.674** <sub>1</sub>							
GermanAllo	-4.457**								
ItalianAllo				34.952**					
RussianAllo					13.121**				
OtherAllo							22.229**		
JapaneseAllo								44.601**	
ChineseAllo									19.973**
<b>Availability</b>									
GermanAvail			5.537**						
RussianAvail			2.608*						
JapaneseAvail				2.042*					
<b>Requirements</b>									
EntReq3		3.883** <sub>2</sub>				2.313*			
GradReq3						5.400**			
<b>Developmental</b>									
ServicesIncome	6.191**	7.051** <sub>1</sub> 5.602** <sub>2</sub>			9.430**	4.572**	3.438**	2.610*	7.533**
GovernmentIncome				6.127**					
<b>Institutional</b>									
HLOffer3				-2.359*					
HLOffer9						2.456*			
<b>Demographic</b>									
Hispanic		3.363** <sub>1</sub>							
SpanishSpokenHome						7.324**			
FrenchSingleAncest.		2.894** <sub>2</sub>							
GermanSingleAncest.							-2.201*		
<b>Border</b>									
glfcoast	-3.316**	-3.026** <sub>1</sub>							
estwest		3.093** <sub>1</sub>							
<b>Adjusted R<sup>2</sup></b>	.633	.739 <sub>1</sub> .605 <sub>2</sub>	.485	.962	.873	.762	.911	.976	.920

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.26 - 1986 State Allocation Equations</b>								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
OverallPen						-6.832**	-3.984**	
GermanPen			-3.911**					
ItalianPen			38.638**					
RussianPen				11.223**				
SpanishPen		-2.516*			3.925**			-6.182**
OtherPen						27.427**		
JapanesePen							47.918**	
ChinesePen								24.373**
<b>Developmental</b>								
GovernmentIncome			-7.731**					
<b>Institutional</b>								
White				3.640**				
Black	5.217**							-3.701**
HLOffer3					2.776**			3.892**
HLOffer6				2.059*				
HLOffer9						3.125**		3.252**
<b>Demographic</b>								
Englishnotwell/notall	-5.007**							
FrenchSpokenHome	6.155**							
GermanSpokenHome				-2.525*				
GermanSingleAncest.		5.936**						
<b>Border</b>								
MexicoBorder			-2.041*					
wstcoast					-5.347**			
<b>Weighted Distance</b>								
ncigdpru					-3.963**			
scogdpru				6.222**				
<b>Adjusted R<sup>2</sup></b>	.658	.499	.968	.823	.607	.938	.979	.929

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.27 - 1986 EA Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		6.454**					-2.146*		
GermanAllo			9.358** <sub>1</sub> 9.683** <sub>2</sub>						
ItalianAllo				25.999**					
RussianAllo					23.685**				
OtherAllo							16.670**		
JapaneseAllo								61.071**	
ChineseAllo			6.675** <sub>2</sub>				6.589**		32.403**
<b>Availability</b>									
ItalianAvail	9.824** <sub>1</sub>	9.332**							
RussianAvail			9.135** <sub>1</sub>						
SpanishAvail				2.839**	3.139**				
OtherAvail			2.115* <sub>1</sub>						
<b>Requirements</b>									
GradReq3	6.483** <sub>2</sub>		7.946** <sub>2</sub>				5.839**		
<b>Developmental</b>									
GovernmentIncome							1.996*		
<b>Institutional</b>									
HLOffer1							3.109**		
HLOffer2			2.685** <sub>1</sub>						
<b>Demographic</b>									
Indian								-2.366*	
ForeignLang.Home	6.253** <sub>1</sub> 5.671** <sub>2</sub>								
SpanishHome&Englishnotwell/notatall							12.051**		
<b>Border</b>									
MexicoBorder					2.560*				
estcoast		2.121*			2.971**				
estwest			2.638** <sub>1</sub>						
<b>Weighted Distance</b>									
ncipopru								-3.888*	
scigdpru									-2.446*
<b>Adjusted R<sup>2</sup></b>	.446 <sub>1</sub> .304 <sub>2</sub>	.457	.523 <sub>1</sub> .549 <sub>2</sub>	.806	.790	.530	.685	.958	.860

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.28 - 1986 EA Allocation Equations</b>								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen							-4.180**	
GermanPen		7.466**						
ItalianPen			25.954**					
RussianPen				23.588**				
OtherPen					-6.844**	17.365**		
JapanesePen	-3.096**						62.227**	
ChinesePen								32.566**
<b>Availability</b>								
FrenchAvail	7.005**							
<b>Requirements</b>								
EntReq1					2.877**			
GradReq1						2.257*		
<b>Institutional</b>								
HLOffer1					2.472*			
HLOffer7						3.078**		
Sector6							2.178*	
<b>Demographic</b>								
Female				-2.319*				-2.408*
Black	7.175**							
ForeignLangHome		-5.365**						
FrenchSpokenHome	6.072**							
GermanSpokenHome		7.083**						
SpanishSpokenHome					10.234**			
SpanishHome&Englishverywell				-3.082**				
SpanishHome&Englishnotwell/notatall	-7.924**							
FrenchSingleAncest.					-3.365**			
<b>Distance</b>								
Distance to Quebec Border			-3.047**					
<b>Weighted Distance</b>								
scipopru								3.163**
<b>Adjusted R<sup>2</sup></b>	.586	.476	.807	.778	.535	.687	.958	.866

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.29 - 1990 State Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
GermanAllo	-5.926** <sub>2</sub>		5.610** <sub>2</sub>		-3.030**		-4.960**		
ItalianAllo				29.025* *					
RussianAllo					27.980* *				
SpanishAllo						4.692** <sub>1</sub>			
OtherAllo		-3.599**					29.001* *		
JapaneseAllo								51.811* * 55.602* * <sub>2</sub>	
ChineseAllo			5.470** <sub>2</sub>						28.922* *
<b>Availability</b>									
ItalianAvail						4.995** <sub>1</sub>		3.841** <sub>1</sub>	2.974**
RussianAvail	8.014** <sub>1</sub>					3.862** <sub>2</sub>			
JapaneseAvail				3.549**					
<b>Developmental</b>									
ServicesIncome	6.428** <sub>2</sub>		5.376** <sub>1</sub>		6.815**		3.577**	2.761** <sub>2</sub>	
GovernmentIncome				6.023**					5.837**
Borninstateofresidence		-3.796**				-4.844** <sub>1</sub>			
<b>Institutional</b>									
HLOffer0	2.569* <sub>1</sub>	2.940**	2.261* <sub>2</sub>			2.873** <sub>2</sub>			
HLOffer9			5.350** <sub>2</sub>			3.758** <sub>2</sub>			
Sector2		8.255**							
Sector6	-3.419** <sub>1</sub>			-3.060**				-2.429* <sub>2</sub>	
Formmertef2	-2.593* <sub>1</sub>								
Affil5									-2.542*
Affil7							3.090**		
<b>Demographic</b>									
White	-5.183** <sub>1</sub>								
ItalianSpokenHome			-2.290* <sub>1</sub>						
SpanishSpokenHome						5.887** <sub>2</sub>			
FrenchComb.Ancest.				2.102**					
<b>Trade</b>									
FDIEmployment		2.742**							
<b>Border</b>									
glfcoast			-4.310** <sub>1</sub>						
<b>Weighted Distance</b>									
ncipopsp	-4.966** <sub>2</sub>								
scopopru								-3.092** <sub>2</sub>	
<b>Adjusted R<sup>2</sup></b>	.691 <sub>1</sub> .683 <sub>2</sub>	.653	.492 <sub>1</sub> .572 <sub>2</sub>	.953	.947	.643 <sub>1</sub> .627 <sub>2</sub>	.958	.982 <sub>1</sub> .985 <sub>2</sub>	.958

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.30 - 1990 State Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen						-4.084** <sub>1</sub>		
ItalianPen			26.560**					
RussianPen				36.230**				
SpanishPen				-8.793**	5.971**		-5.810**	-2.626*
OtherPen					-8.936**	28.988** <sub>1</sub> 28.481** <sub>2</sub>		
JapanesePen							63.948**	
ChinesePen								31.869**
<b>Availability</b>								
FrenchAvail					-3.970**			
<b>Developmental</b>								
GovernmentIncome			-5.364**					
EducationExpendituresPerCapitaElementary							4.076**	
<b>Institutional</b>								
Control2							-3.475**	
HLOffer3				3.195**				
Sector2				-4.222**				
Sector5	2.484* <sub>1</sub>							
Level3	2.285* <sub>2</sub>							
Affil5								2.527**
<b>Demographic</b>								
Black				-4.179**				-3.340**
Nonres	-2.199* <sub>2</sub>							
Ling.Isolated		-5.860**						
SpanishLing.Isolated	-4.240** <sub>1</sub> -6.512** <sub>2</sub>							
OtherLing.Isolated					3.036**			
GermanSpokenHome		7.389**				4.449** <sub>2</sub>	-2.217*	
French1stAncest.	5.150** <sub>1</sub>							
German1stAncest.					2.028*			
GermanComb.Ancest.	-5.212** <sub>2</sub>							
Italian1stAncest.	-2.322* <sub>1</sub>							
ForeignBornpre1950						2.506* <sub>1</sub>		
<b>Trade</b>								
Internat.VisitorsGSP								-2.946**
<b>Weighted Distance</b>								
ncipopru					-6.064**			
ncogdpsp	10.000** <sub>1</sub>		2.551*					
ncigdpjp	-6.712** <sub>2</sub>							
<b>Adjusted R<sup>2</sup></b>	.781 <sub>1</sub> .750 <sub>2</sub>	.661	.941	.966	.796	.945 <sub>1</sub> .943 <sub>2</sub>	.988	.957

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.31 - 1990 EA Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		7.757** <sub>1</sub> 7.604** <sub>2</sub>							
GermanAllo			6.439** <sub>2</sub>						
ItalianAllo				18.075*					
RussianAllo					22.839*				5.103** <sub>2</sub>
OtherAllo						-2.249* <sub>1</sub>	16.015*		
JapaneseAllo								39.909*	
ChineseAllo									26.492*
<b>Availability</b>									
FrenchAvail						2.248* <sub>1</sub>			
GermanAvail		3.002** <sub>1</sub>							
ItalianAvail	8.955** <sub>2</sub>	7.398** <sub>2</sub>				4.801** <sub>1</sub>		6.234** <sub>2</sub>	
RussianAvail			7.292** <sub>1</sub> 7.510** <sub>2</sub>						
SpanishAvail		2.788** <sub>2</sub>		3.524**					2.147* <sub>1</sub>
ChineseAvail			8.363** <sub>3</sub>				6.598**		
<b>Developmental</b>									
ServicesIncome					2.963**				
BachelorsDegree	8.576** <sub>1</sub>	8.004** <sub>1</sub>				4.620** <sub>2</sub>			
<b>Institutional</b>									
HLOffernull		2.455* <sub>1</sub>							
HLOffer6					-2.222*		5.024**		2.256* <sub>1</sub>
Sector2									2.786** <sub>2</sub>
Sector8				4.061**					
Affinull		3.022** <sub>2</sub>	2.237* <sub>1</sub> 2.263* <sub>2</sub>						
Rstatus1								-3.151** <sub>2</sub>	
<b>Demographic</b>									
White			4.546** <sub>3</sub>						
Indian						-2.478* <sub>2</sub>			
Englishnotverywell	5.199** <sub>1</sub> 4.857** <sub>2</sub>					10.519* * <sub>1</sub> 10.191* * <sub>2</sub>			
Jap.SpokenHome							35.853* * <sub>2</sub>		
ChineseSpokenHome									18.774* * <sub>2</sub>
GermanComb.Ancest.			3.614** <sub>1</sub>						
ForeignBorn60-64					1.994*				
ForeignBorn82-84							2.740**		
<b>Distance</b>									
Distance to Quebec Border					4.281**				
<b>Border</b>									
glfcoast				-3.290**					
estwest	4.352** <sub>2</sub>	4.418** <sub>2</sub>							

Table Appendix 2.31 - 1990 EA Penetration Equations - Continued									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Weighted Distance</b>									
ncipopgr									-3.490** <sub>1</sub>
ncipopru								-2.848** <sub>1</sub>	
ncopopru								8.365** <sub>2</sub>	
<b>Adjusted R<sup>2</sup></b>	.394 <sub>1</sub> .468 <sub>2</sub>	.456 <sub>1</sub> .500 <sub>2</sub>	.311 <sub>1</sub> .399 <sub>2</sub> .345 <sub>3</sub>	.700	.839	.495 <sub>1</sub> .447 <sub>2</sub>	.697	.907 <sub>1</sub> .899 <sub>2</sub>	.818 <sub>1</sub> .702 <sub>2</sub>

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.32 - 1990 EA Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen	7.120** <sub>1</sub>							
GermanPen								
ItalianPen			21.922**					
RussianPen				23.422**				
SpanishPen							-4.560**	
OtherPen						15.481**		
JapanesePen							40.790**	
<b>Availability</b>								
FrenchAvail	4.144** <sub>2</sub>						3.209**	
GermanAvail				2.362*		-3.134**		
SpanishAvail	-2.622* <sub>1</sub>	-3.622**			3.024**			
JapaneseAvail					-6.701**			
<b>Institutional</b>								
HLOffer7	2.550* <sub>2</sub>					2.286*		
HLOffernull				-2.226*				
Sector1		3.435**						
Sector3						3.373**		
Sector5				4.918**				
Rstatus5			10.117**					
Level3								2.370*
<b>Demographic</b>								
Female								-2.810**
White		8.488**						
Black	7.275** <sub>1</sub> 8.698** <sub>2</sub>				-2.207*		-2.673**	
SpanishLing.Isolated					11.850**			
OtherLingIsolated					2.772**			
FrenchSpokenHome	3.772** <sub>2</sub>							
ChineseSpokenHome								11.257**
French1stAnces.		-3.457**						
FrenchComb.Ances.					-3.019**			
ForeignBorn	-5.977** <sub>1</sub>							
ForeignBornpre1950						3.543**		
ForeignBorn50-59				3.935**				
<b>Distance</b>								
Distance to Mexican Border					-8.677**			
<b>Border</b>								
glfcoast			2.421*					
estwest					-3.403**			
<b>Weighted Distance</b>								
ncogdpfr	5.400** <sub>2</sub>							
ncigdpfr								3.390**
ncopopru								4.682**
<b>Adjusted R<sup>2</sup></b>	.495 <sub>1</sub> .479 <sub>2</sub>	.359	.783	.809	.450	.640	.916	.534

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.33 - 1995 State Penetration Equations</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		6.299** <sub>2</sub>							
GermanAllo		4.053** <sub>2</sub>			-2.893**				
ItalianAllo				33.583* *					
RussianAllo					26.503* *				
OtherAllo		2.742** <sub>1</sub>					18.261* * <sub>1</sub>		
JapaneseAllo								32.543* * <sub>1</sub> 18.727* * <sub>2</sub>	
ChineseAllo									19.598* *
<b>Availability</b>									
ItalianAvail	5.698**								
RussianAvail		3.003** <sub>2</sub>							
OtherAvail							6.174** <sub>2</sub>		
JapaneseAvail						3.736**			
ChineseAvail		2.240* <sub>1</sub>							
<b>Requirements</b>									
GradReq1	-3.133**	-2.661* <sub>1</sub>	-4.770**						
GradReq3						3.333**			
<b>Developmental</b>									
ServicesIncome				10.600* *	10.965* *			5.436** <sub>2</sub>	
GovernmentIncome	3.053**								
Borninstateofresidence	-3.554**								
<b>Institutional</b>									
ResMigInstate						-2.826**			
Control1		4.486** <sub>2</sub>							
Control2		5.099** <sub>1</sub>							
HIOffer6								4.127** <sub>2</sub>	

<b>Table Appendix 2.33 - 1995 State Penetration Equations - Continued</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japane se	Chines e
HIOffer9									4.526**
Sector5						-2.154*			
Affil4			3.388**				4.970** <sub>2</sub>		
Affil6			2.981**						
Carn14	-2.883**						- 3.185** <sub>1</sub>		
Carn22					3.819**		2.359* <sub>2</sub>		
Carn51				-3.053**					
Carn59				-2.160*					
Carn60							3.026** <sub>2</sub>		
<b>Demographic</b>									
SpanishSpoken Home						6.553**			
Jap.SpokenHom e							31.931* * <sub>2</sub>		
GermanComb.A ncest.								-2.579* <sub>2</sub>	
German1stAnce st.		- 4.089** <sub>1</sub>							
<b>Weighted Distance</b>									
scoposp				-2.488*					
<b>Adjusted R<sup>2</sup></b>	.665	.601 <sub>1</sub> .676 <sub>2</sub>	.527	.970	.955	.652	.871 <sub>1</sub> .961 <sub>2</sub>	.955 <sub>1</sub> .913 <sub>2</sub>	.886

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.34 - 1995 State Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>					-4.568** <sub>1</sub>			
GermanPen								
ItalianPen			33.512**					
SpanishPen				-5.821**				
RussianPen				22.436**				
OtherPen				-3.805**		25.889**		
JapanesePen							35.333**	
ChinesePen					-5.106** <sub>2</sub>			19.598**
<b>Availability</b>								
SpanishAvail					2.373* <sub>2</sub>			
<b>Requirements</b>								
GradReq1		-2.372*	2.772**					
<b>Developmental</b>								
GovernmentIncome			-6.485**					
Borninstateofresidence			3.649**		-2.971** <sub>1</sub>			
<b>Institutional</b>								
ResMigInstate							2.514*	
HLOffer9								-4.549**
Sector3	-2.160*				-5.039** <sub>1</sub>			
Sector4					-2.284* <sub>2</sub>			
Affil7					-3.823** <sub>2</sub>			
Carn59			2.719**					
Carn60						8.424**		
<b>Demographic</b>								
Black	5.609**			-2.897**			-2.644*	
SpanishLing.Isolated		-4.212**						
ForeignLangHome	-8.113**							
FrenchSpokenHome	10.300**							
German1stAncest.		6.660**						
GermanComb.Ancest.					3.388** <sub>1</sub>			
<b>Distance</b>								
Distance to Mexican Border					-7.069** <sub>1</sub> -8.843** <sub>2</sub>			
<b>Adjusted R<sup>2</sup></b>	.832	.661	.965	.912	.719 <sub>1</sub> .740 <sub>2</sub>	.937	.963	.886

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.35 - 1995 EA Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		7.761**							
GermanAllo			12.155**						
ItalianAllo				37.342**		4.560** <sub>2</sub>			
RussianAllo					25.392**				
OtherAllo							14.507** <sub>2</sub>		
ChineseAllo									29.888**
<b>Availability</b>									
ItalianAvail	8.721**	9.238**	9.769**			6.425** <sub>1</sub>		7.742*	
SpanishAvail						2.730** <sub>2</sub>			
JapaneseAvail						4.969** <sub>3</sub>			
<b>Requirements</b>									
GradReq1	-2.522*								
GradReq3						3.462** <sub>3</sub>			2.575*
GradReq4							2.939** <sub>1</sub>		
<b>Institutional</b>									
HLOffer6									2.879**
Carn11							5.474** <sub>1</sub> 4.435** <sub>2</sub>		
Carn31	2.222*	2.456*							
Carn52		2.551*							
Carn55							4.564** <sub>1</sub>		
<b>Demographic</b>									
Indian							8.838** <sub>1</sub>		
ForeignLangHome	7.153**								
SpanishSpokenHome						11.892* <sub>1</sub> 11.241* <sub>2</sub> 11.426* <sub>3</sub>			
Jap.SpokenHome	3.040**						21.766** <sub>1</sub>	36.689**	
GermanComb. Ancest.							-2.045* <sub>2</sub>		
<b>Border</b>									
MexicoBorder				3.855**	4.638**				
wstcoast							4.681** <sub>2</sub>		
anycoast		2.834**							
<b>Weighted Distance</b>									
ncogdpsp				-2.036*					
ncopopru								4.209*	
ncigdpru									-4.394**
<b>Adjusted R<sup>2</sup></b>	.506	.525	.579	.893	.795	.517 <sub>1</sub> .490 <sub>2</sub> .516 <sub>3</sub>	.797 <sub>1</sub> .627 <sub>2</sub>	.897	.849

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.36 - 1995 EA Allocation Equations</b>								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen					-6.470**			
GermanPen		10.120**						
ItalianPen			37.342**					
RussianPen				25.755**				
OtherPen						13.898**		
JapanesePen							32.264**	
ChinesePen								29.565**
<b>Availability</b>								
FrenchAvail	5.103**						2.786**	
GermanAvail								
SpanishAvail						-4.427**		
JapaneseAvail								
<b>Requirements</b>								
EntReq1								-2.099*
GradReq2				3.058**				
<b>Institutional</b>								
HLOffer7								
Sector3					-2.680**		2.787**	
Sector5				2.833**				
Carn22	2.185*	3.582**						
Carn32						3.075**		
Carn53							2.090*	
<b>Demographic</b>								
Asian				-2.513*				
Nonres					-3.985**			
SpanishLing.Isolated	-7.381**			-4.721**	12.530**			
Englishnotverywell		-6.292**						
FrenchSpokenHome	7.159**							
GermanSpokenHome		7.262**						
<b>Border</b>								
MexicoBorder			-3.521**					
glfcoast					3.279**			
<b>Weighted Distance</b>								
ncogdsp			2.533*					
ncogdpru						3.002**	5.925**	
ncipopru								4.449**
ncipopjp	-5.188**							
<b>Adjusted R<sup>2</sup></b>	.544	.604	.893	.812	.615	.607	.877	.841

\* significant at .05 level

\*\* significant at .01 level

<b>Table Appendix 2.37 - 1998 State Penetration Equations</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo	-2.136*								
GermanAllo					-3.456**	-2.748** <sub>2</sub>			
ItalianAllo				30.349*					
RussianAllo					18.569*				
SpanishAllo				2.429*					
OtherAllo		-2.359*					13.959*		
JapaneseAllo								19.343*	
ChineseAllo									20.310* * <sub>1</sub> 18.345* * <sub>2</sub>
<b>Availability</b>									
GermanAvail			6.581**	3.778**					
ItalianAvail						6.191** <sub>1</sub>			
SpanishAvail						2.969** <sub>2</sub>			
JapaneseAvail	3.172**	3.782**					4.061**		
<b>Developmental</b>									
ServicesIncome	6.194**				9.457**	2.851** <sub>2</sub>	8.451**		
GovernmentIncome				8.535**					8.129** <sub>1</sub>
<b>Institutional</b>									
ResMigInstate			-5.751**					-5.634**	
HIOffer7			3.049**						
HIOffer8						-3.595** <sub>1</sub>			
HIOffer9									4.930** <sub>2</sub>
Sector2		6.700**							
Carn22					4.878**				
Carn31			3.469**						
Carn54					2.925**			3.481**	
<b>Demographic</b>									
Black		4.036**							

<b>Table Appendix 2.37 - 1998 State Penetration Equations - Continued</b>									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
SpanishLing.Isolated						4.098** <sub>2</sub>			
ItalianComb.Anc est.			-3.323**						
ForeignBorn95-00						2.522* <sub>1</sub>			
<b>Trade</b>									
FDIEmployment	3.212**								
ForeignExportsEnglishAllo						-3.303** <sub>1</sub>			
ForeignExportsRussianAllo						-2.417* <sub>2</sub>			
ForeignExportsChineseAllo									
ForeignExportsItalianGSP	2.544*	2.807**		4.494**			5.449**		
<b>Border</b>									
glfcoast									
<b>Weighted Distance</b>									
scogdpru								-3.447**	
<b>Adjusted R<sup>2</sup></b>	.625	.662	.711	.963	.922	.525 <sub>1</sub> .530 <sub>2</sub>	.917	.897	.925 <sub>1</sub> .881 <sub>2</sub>

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.38 - 1998 State Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
FrenchPen						-9.435**		
ItalianPen			31.649**					
SpanishPen				-6.572**			-6.625**	
RussianPen				16.669**				
OtherPen						21.289**		
JapanesePen							25.344**	
ChinesePen					-7.884**			19.543**
<b>Availability</b>								
GermanAvail			-2.538*					
ItalianAvail		-4.421** <sub>1</sub>						
SpanishAvail		-2.721** <sub>1</sub>			3.750**			
<b>Developmental</b>								
GovernmentIncome			-7.725**					
<b>Institutional</b>								
ResMigInstate							3.930**	
HLOffer9								-3.671**
Affil7						-2.592*		
Carn14	3.069**							
Carn54	-3.213**				2.352*	5.970**	-3.044**	
<b>Demographic</b>								
White		9.713** <sub>1</sub>						
Black	6.598**							
SpanishLing.Isolated	-9.401**	-4.802** <sub>2</sub>						
HispanicSpeakSpanish					4.012**			
FrenchSpokenHome	9.589**							
SpanishSpokenHome						-4.448**		
Jap.SpokenHome		-4.002** <sub>2</sub>						
German1stAncestor		6.401** <sub>2</sub>						
ForeignBorn95-00								-4.553**
<b>Trade</b>								
ForeignExportsGermanGSP							3.295**	3.882**
ForeignExportsItalianGSP			-3.155**					
FDInvestmentGSP								-2.378*
<b>Distance</b>								
Distance to Mexican Border					-8.843**			
<b>Adjusted R<sup>2</sup></b>	.874	.737 <sub>1</sub> .685 <sub>2</sub>	.954	.852	.829	.928	.941	.925

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.39 - 1998 EA Penetration Equations									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Allocation</b>									
FrenchAllo		6.590** <sub>1</sub> 6.434** <sub>2</sub>							
ItalianAllo		6.419** <sub>2</sub>		31.454* *		3.924** <sub>2</sub>			
RussianAllo					20.903* * <sub>1</sub> 19.986* * <sub>2</sub>				
JapaneseAllo								30.967* * <sub>1</sub>	
ChineseAllo									33.891* *
<b>Availability</b>									
GermanAvail			9.687**						
ItalianAvail	8.876** <sub>1</sub> 8.723** <sub>2</sub>	7.013** <sub>1</sub>				6.117** <sub>1</sub>			
SpanishAvail		3.704** <sub>2</sub>			2.451* <sub>2</sub>	4.523** <sub>2</sub>		2.107* <sub>1</sub>	
ChineseAvail								6.715** <sub>2</sub>	
<b>Institutional</b>									
Control2							2.815**		
HLOffer4					- 5.118** <sub>1</sub>				
Carn11							5.678**		
Carn31	2.602* <sub>1</sub> 2.542* <sub>2</sub>								
Carn52		2.898** <sub>1</sub> 3.321** <sub>2</sub>				2.276* <sub>2</sub>			
Carn56						- 3.053** <sub>1</sub>			
<b>Demographic</b>									
Hispanic	4.110** <sub>1</sub>								
OtherIndoLing .Isolated				-2.417*					
OtherLing.Isol ated							6.377**		
HispanicEngli shnotwell	2.508* <sub>2</sub>					2.459* <sub>1</sub>			
HispanicEngli shnotatall	2.433* <sub>1</sub>					2.173* <sub>2</sub>			
AsianEnglishn otatall				-2.491*					
GermanSpoke nHome			2.322*						
SpanishSpoke nHome						8.208** <sub>1</sub> 7.648** <sub>2</sub>			
Jap.SpokenH ome	3.944** <sub>2</sub>						29.846* *	26.054* * <sub>2</sub>	
ForeignBornpr e1965					-2.309* <sub>2</sub>				
ForeignBorn9 5-00		2.741** <sub>2</sub>							
<b>Distance</b>									
Distance to Quebec Border									3.988**
<b>Border</b>									
MexicoBorder	5.000** <sub>2</sub>				2.668** <sub>1</sub> 2.279* <sub>2</sub>				
wstcoast	4.591** <sub>1</sub>								
glfcoast		-2.461* <sub>1</sub>							

Table Appendix 2.39 - 1998 EA Penetration Equations - Continued									
	Overall	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Weighted Distance</b>									
ncipopgr			3.042**						
ncipopru								- 3.706** <sub>1</sub>	
scopopru								4.908** <sub>2</sub>	
ncogdpsp				-3.205**					
scogdpsp					- 3.737** <sub>1</sub> - 3.088** <sub>2</sub>				
<b>Adjusted R<sup>2</sup></b>	.449 <sub>1</sub> .450 <sub>2</sub>	.459 <sub>1</sub> .489 <sub>2</sub>	.471	.889	.806 <sub>1</sub> .786 <sub>2</sub>	.488 <sub>1</sub> .486 <sub>2</sub>	.889	.855 <sub>1</sub> .827 <sub>2</sub>	.878

\* significant at .05 level

\*\* significant at .01 level

Table Appendix 2.40 - 1998 EA Allocation Equations								
	French	German	Italian	Russian	Spanish	Other	Japanese	Chinese
<b>Penetration</b>								
GermanPen								4.393** <sub>2</sub>
ItalianPen			35.389**		-4.210** <sub>2</sub>			
RussianPen				26.406**			6.130** <sub>2</sub>	
OtherPen						13.907**		
JapanesePen							29.979** <sub>1</sub>	
ChinesePen								33.941** <sub>1</sub>
<b>Availability</b>								
ItalianAvail		-2.021*						
JapaneseAvail					-5.254** <sub>1</sub>			
ChineseAvail							5.297** <sub>3</sub>	
<b>Institutional</b>								
HLOffer3	-4.950**							
HLOffer6						2.154*		
Sector5		-4.281**		2.038*		7.348**		
Carn21								-2.696** <sub>2</sub>
Carn51								2.085* <sub>1</sub>
Carn56	2.461*	5.509**	2.748**	6.824**	-6.186** <sub>1</sub> -5.838** <sub>2</sub>			
Carn57								2.519* <sub>1</sub>
<b>Demographic</b>								
White		7.865**		2.697**				
Black	5.274**							
SpanishLing.Isolated					9.768** <sub>1</sub> 9.774** <sub>2</sub>			
HispanicEnglishnotall				-2.118*				
GermanSpokenHome		2.868**				4.291**		
Jap.SpokenHome							16.414** <sub>2</sub> 15.842** <sub>3</sub>	
ChineseSpokenHome								14.464** <sub>2</sub>
FrenchComb.Anc est.	7.503**							
ForeignBorn65-69			3.270**					
ForeignBorn85-89	-4.486**							
<b>Border</b>								
MexicoBorder			-2.963**					
wstcoast					-3.008** <sub>2</sub>			
<b>Weighted Distance</b>								
scipopfr								3.886** <sub>1</sub>
scigdpfr								6.571** <sub>2</sub>
scigdsp								
<b>Adjusted R<sup>2</sup></b>	.597	.531	.885	.822	.571 <sub>1</sub> .575 <sub>2</sub>	.759	.841 <sub>1</sub> .649 <sub>2</sub> .667 <sub>3</sub>	.882 <sub>1</sub> .644 <sub>2</sub>

\* significant at .05 level

\*\* significant at .01 level

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