Distribution of Foreign-born S&E Talent in American Cities and its Effects

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Abstract

The foreign-born S&E talent represents a considerable share of the skilled labor force in the United States and has contributed tremendously to American leading industries. Hence their geographic movement and distribution have important effects on regional economy in the US and should be concerns of policymakers.

Previous literature on talent migration bifurcates into economic and non-economic branches. This paper combines the two approaches and gives an encompassing new theory to explain foreign S&E talent's movement and distribution in the United States. A crucial notion, exotic element, is introduced to measure the concentration of foreign-born S&E talent in the talent pool of a metropolitan area. Bivariate and multivariate statistical analyses support the hypotheses that American cities with higher talent concentration and stronger purchasing power can more successfully attract foreign-born skilled immigrants in S&E industries. By contrast, purchasing power has no effect on the distribution of native-born S&E talent. In addition, diversity has no direct impact on foreign-born talent after controlling the level of talent concentration.

The paper also explores the demographic, cultural and industrial effects of foreign-born talent on urban ecology. A major finding indicates an strongly positive role of foreign-born talent in facilitating development of local high-tech industries.

1. Introduction

The foreign-born population represents a crucial portion of the American talent pool, especially among those with postgraduate degrees or senior occupational status. The foreign-born talent represents 12.3% of bachelor degree holders, 14.7% of master degree holders and 24% of doctoral degree holders in this country according to the author's estimation based on the micro data from U.S. 2000 Census. The proportions of foreign-born are much higher in science and technology fields than in all industries and the American workforce has been increasingly dependent on foreign-born scientists and engineers in the 1990's. The proportion of S&E occupations filled by foreign-born talent increased considerably at every degree level from 1990 to 2000: at the bachelor's degree level, the share increased from 11% to 17%; at the master's level, from 19% to 29%; and at the doctorate level, from 24% to 38% (NSB, 2003). Foreign-born talent has contributed tremendously to American leading industries in past decades. Some outstanding figures can be easily enumerated, such as former CEO of IBM Andrew Grove, co-creator of Yahoo.com Jerry Yang and former Hollywood actor and now governor of California Arnold Schwarzenegger, to name only a few. This is also the case in academe: around 20% of the yearly job openings for university faculty in S&E are being filled by permanent immigrants or temporary visa holders (NSB, 2003). The proportion can be even higher if naturalized citizens are included.

However, whether the U.S. can retain these highly educated foreign-born people has come into doubt in recent years. Florida (2005) and Heenan (2005) both report a phenomenal talent outflow from the U.S. to one's home country or other OECD countries after 2001, triggering a national concern that the U.S. is losing its foreign human capital.

As global competition for talent is intensifying, the United States may not be able to rely on international labor intake to meet its skill shortages in the coming decade. Bush administration's anti-terrorism measures have been contributing to a further deterioration of the situation as many foreign students, engineers and scientists are "stopped at the gates" of the U.S. (Levy, 2004).

Migration of foreign talent to the United States is largely an urban phenomenon. Urbanization rate in the U.S. was as high as 78% in 2003 and 42 million Americans lived in those large cities with a population of more than 1 million by then (World Bank, 2005). Major economic activities and leading industries highly concentrate in some large American cities (Florida 2002b). Foreign talent is attracted to the U.S. and mainly lives in these cities (U.S. Census Bureau, 2003). They fuel urban population growth, staff high-tech firms and academic institutions, revitalize neighborhoods and spur entrepreneurial activities. The United States can keep this foreign human capital largely by retaining it in the old and new attractive cities and taking advantage of their economic potential (Singer, 2006). While the immigration policy has been give much attention in the federal government, media and academia, far less research has been done on the factors that enable cities to attract foreign-born talent according to the author's survey of previous literature.

This paper mainly aims to address two research questions related to foreign-born talent. First, what factors induce the residential distribution of foreign-born S&E talent at the city level? And second, what is the effect of foreign-born S&E talent on the development of American high-tech industries? The proposed study will test the effects of economic and non-economic factors affecting the geographic distribution of skilled

immigrants and also explores its demographic, cultural and industrial effects on urban ecology. Part 2 reviews theories of previous literature on talent migration and distribution. Part 3 gives a new theory explaining foreign-born talent distribution and generates corresponding hypotheses. Part 4 briefly presents the methodology, data set and measurement in this study. Part 5 reports the findings of bivarate analysis and discusses the results of the two regression models. A conclusion follows.

2. Literature Review

There are two lines of literature on foreign talent migration. One line takes an economic approach, assuming a skilled immigrant as a rational person who seeks maximization of his or her income with perfect or imperfect information. Most economists in migration study field favor this approach though they give a variety of theories in explaining migration strategies and behaviors. An immigrant may boost his income by a once-for-all movement to a country with higher expected wage level (Todaro, 1969) or return for seeking local entrepreneurial opportunities after having accumulated some financial capital in the host country (Stark, 1991; Taylor, 1996; Borjas & Bratsberg, 1996). He or she may also move on to the rest of the world for a higher return of his human capital acquired in an entrepot country[1] (DeVoretz & Ma, 2002). The economic maximization proposition seems to make sense since the larger the per capita GDP gap between the U.S. and a foreign country, the more likely its talent flows to the U.S. with other conditions being equal (Williamson, 2002). Following this rationale, it can be expected that foreign-born talent tends to concentrate in American cities with relatively higher wage level and lower living expenditure.

[1] Here an entrepot country refers to a host country where an immigrant stays before he immigrates to the next destination

Although the logic of economic approach is convincing, it ignores other motivations of human migration besides economic incentive. Hence the second line of literature turns to analyze talent migration from a non-economic perspective. Unlike economic theories of talent migration, this body of literature is so interdisciplinary that no coherent structure exists. Here several often discussed theories are reviewed.

Among the literature of the non-economic approach, life cycle theory explores the effects of important events in one's life history on migration (Ley & Kobayashi, 2004), such as enrollment in university, marriage, first employment and geographic job transfer. A hypothesis relevant to this study is that foreign-born talent tends to stay in the cities where local universities have a greater share of foreign students.

As an important field in migration study, social network theory emphasizes the role of interpersonal or organizational networks in providing reliable and efficient conduits for the flow of information and support to immigrants, which leads to a "chain migration" (Waldinger, 1997). Foreign-born talent usually resorts to local ethnic groups in seeking jobs, raising funds or establishing start-up enterprises (Saxenian, 1999). Therefore, it can be expected that new skilled immigrants tend to live close to the early birds, who have become the core members of local ethnic communities.

Other studies on non-economic factors focus on the attractiveness of urban amenities to the residential choice of talented people (Glaeser, Kolko, & Saiz, 2001). Empirically, they find that high amenity cities have grown faster than low amenity cities. Florida (2002a) has extensively examined the role of diversity in attracting the "Creative Class". He argues that diversity creates low barriers to entry for talent, thereby increasing the potential for talent to enter a city. Multivariate analysis in his study based on the data of

all talent living in America supports the importance of diversity in attracting talent. However, whether it is applicable to foreign-born talent remains an open question which this .

3. Theory and Hypotheses

Although all these factors may play a role in attracting and retaining foreign talent to American cities, their importance and mechanism differ. This paper tries to develop an encompassing theory to explain the distribution of foreign talent in American cities. The theoretical framework contains all the aforementioned economic and non-economic factors. Chart 1 illustrates the functional mechanism of these factors. In the right part of Chart 1, "Exotic Element", defined as concentration of foreign-born talent in the local talent pool, is the central notion of this study and the theoretical framework is named after it. Exotic element indicates the extent to which the skilled labor force in a geographic region is composed of foreign-born talent.

As shown in Chart 1, employment, network and purchasing power are the three direct factors determining exotic element. Thanks to the institutional restriction given by American immigration laws, employment is the single most important factor for foreign talent distribution. The skilled immigrants who hold temporary residence visas can only stay in this country for a long term by seeking a legal job and soliciting their employers to sponsor their application of permanent residence status. The pivotal consideration of a temporary immigrant is whether they can and should reside in the U.S. or not, instead of what cities they prefer to live in. If they have intentions to stay, the highly educated immigrants with temporary visas like H1-B or F-1 usually move to a city after accepting a job offer or before seeking local employment opportunities according to the author's

interviews with some foreign-born employees in Washington DC area. They will be required to leave the U.S. if they can not acquire a legal job in a stipulated period. Those immigrants who already hold the permanent residence visas or become naturalized citizens can move freely without concern of residence status, but their migration rates decrease to a much lower level in the same phase of life cycle. 78% highly educated (a bachelor degree or above) immigrants without a citizenship migrated at least once during the past five years before 2000 census moment, while only 42% highly educated naturalized citizens did so during the same period. Once a foreign skilled migrant establishes a citizenship status, he/she tends to stay where he/she already have settled down.

Purchasing power refers to the real individual economic gain. It is a more accurate indicator than either nominal income or living expenditure since the latter two only give information on a single side of urban economic life. It can be arguably assumed that foreign-born talent is sensitive to purchasing power and these skilled immigrants have a strong incentive to maximize their economic gain. Compared with their native-born counterparts, immigrants generally lacks financial resources and can assure their economic security mainly by seeking the available highest return of their human capital in the domestic labor market, especially for those who come from developing countries (Ewing, Walter, & Johnson, 2003). In addition, foreign immigrants have the obligation to send remittance back to the relatives in their home country who financed their tuition fee and living expenditure before.

University and talent are two indirect factors affecting foreign talent migration via network and employment. American universities function as crucial channels and training

bases which transfer and nurture potential foreign talent for the domestic labor market. Foreign-born talent masters professional skills and enhances language proficiency in American universities so that he/she can be prepared for highly skilled jobs after graduation. American universities are also places where local ethnic networks of foreign-born talent emerge and maintain.

The factor "Talent" in Chart 1 refers to the concentration of talented people in an urban population. Skilled immigrants probably are not aware of the geographic distribution of talent and are not attracted to the locations of larger talent population simply based on this information. Instead, it is the plenty of highly paid job opportunities which pull skilled immigrants to these locations, thanks to the law of increasing return in a creative economy (Sbergami, 2002). According to the creative class theory, the cities where talent concentrates are also the locations of high-tech and highly skilled service industries. These industries are often dynamic and expansive, inducing skilled labor shortage. Employers will probably resort to foreign labor pool for additional skilled workers when the domestic labor force can not meet their demand. Hence it is among native-born talented population that a skilled immigrant can find his or her desirable niche.

Exotic element has three major effects on urban ecology. First, as a direct demographic effect, exotic element brings a more visible and active presence of foreign-born population. Once a foreign skilled migrant works or studies in the U.S., he or she may bring his/her dependents into this country, therefore increasing the number of immigrants. Next, exotic element enriches the ethnic and cultural diversity of American cities, which in turn attracts native-born talent. Finally and most importantly, exotic

element can facilitate the development of local high-tech industries. Florida (2002b) explores the close relationship between high-tech industries, innovative activities and talent. He concludes that urban diversity contributes greatly to local high-tech industries by exchanging information directly and attracting talent indirectly.

According to Exotic Element Model, this study makes the following four major hypotheses. First, the higher the share of foreign students in the local universities, the more foreign talent is in the local talent pool. Second, skilled immigrants tend to migrate to cities with higher purchasing power, namely, relatively lower cost or relatively higher salary. Third, the higher the proportion of all S&E talent in a city's population, the higher the proportion of foreign-born S&E talent is in its talent pool. Finally, the more foreign S&E talent the talent pool has, the more prosperous the local high-tech industries are.

4. Methodology, Data and Measurement

To study the effects of various urban attributes on attracting foreign-born S&E talent, this paper uses a bivariate analysis (correlation) and then a multivariate analysis (OLS regression) to regress Exotic Index (e) on selected explanatory variables (v).

$$e = (v)\,\beta + \varepsilon \qquad \text{…….. (Model I)}$$

To study the effect of foreign-born talent on the development of high-tech industries, the study uses another OLS model to regress Tech-pole Index (t) on the selected explanatory variables (v). Three model specifications are given for Model I and II with different selected variables.

$t = (v)\ \beta + \varepsilon$ …….. (Model II)

This study mainly employs micro data from the U.S. 2000 Population Census (5% sample). Each observation is weighed according to its sampling probability. The census contains residential information of respondents' location at the state level and the city level. It also offers migration information of place of birth, residence 5 years prior, and nationality status as well as some economic-demographic items, such as income, house value, occupation, school attendance, education level, relationship to the head of household and the number of family members. The population under study is confined to individuals with at least a bachelor degree. The unit of analysis is a metropolitan area defined by 2000 U.S. census as "MSA". The largest 58 metropolitan areas with a population of 1 million or more are selected because a majority of foreign-born talent resides in these cities.

With respect to measurement, purchasing power is measured as the ratio of the average household income divided by the average house price in a city. It is better to use a basket of commodity prices to generate an index of local purchasing power but the author has not found such an ideal measurement by far. The scale of network of foreign-born talent is measured by identifying a group of highly educated (bachelor degree or above) immigrants who arrived in the U.S. before 1990 and did not migrate in the past five years before the 2000 census moment. These skilled immigrants had stayed in the U.S. for at least ten years and lived in the same city for at least five years, so they can be assumed to be the core members of the local ethnic community and might provide a variety of resources in facilitating and assimilating new comers from their home country.

As the operational variable of network, the network index is the proportion of this group of immigrants in an urban population. A weakness of this measurement lies in its mixture of all ethnic groups. The University Index is defined as percentage of foreign-born students in all college students in an American city.

Florida (2002a) measures Talent Index as percentage of degree holders with bachelor diploma or above in all population in a city. This paper uses a similar measurement as the percentage of degree holders working in science and engineering fields in all population in a city. The Melt-pot Index, measured by percentage of foreign-born people in an urban population, is an effective indicator of concentration of immigrants. This study adopts the measurements of diversity in Florida (2005), namely, the Gay Index and Bohemian Index. The former mainly represents the social diversity or the degree of tolerance and the latter is more related to cultural diversity or the degree of colorfulness. The "Tech-pole" score from Milken Institute report is used here to measure the development of high-tech industries in a metropolitan area. In addition, two indicators of amenity, Art Index and Climate Index, are employed from "1989 Places Rated Almanac".

A brief introduction of the aforementioned operational variables is given in Table 1. Table 2 shows some descriptive statistics of all the variables in the data set. The data of Orange County, CA, are missing for the two indexes of amenity.

5. Results and Analysis

All bivariate correlation relationships between Exotic Index and other indexes are significant at 5% significance level. The correlation coefficients between Exotic Index and Melt-pot Index, University Index and Network Index are as high as 0.9313, 0.9383

and 0.8842 respectively, showing very strong positive associations. The close relationship between foreign-born students and foreign-born talent reflects the importance of local universities in attracting skilled immigrants, which supports the first hypothesis in this study. Other correlation coefficients are reported in Table 4.

The correlation coefficient between Exotic Index and Talent Index is modest (0.3087) but significant. Figure 1 shows the scatter plot of the two variables. The scale of exotic element in a metropolitan talent pool is modestly associated with the talent concentration and their relationship tends to be stronger in cities with more densely populated S&E talent.

Exotic Index is also significantly correlated with Bohemian Index (0.4521) and Gay Index (0.4207), indicating a close relationship between exotic element and diversity (Figure 2 and Figure 3). However, this correlation does not indicate a direct causal effect from diversity to exotic element. As the theory in this study argues, urban diversity can increase the inflow of foreign-born talent mainly by attracting more native-born talent first, and the native-born talent in turn can create desirable job opportunities for its foreign counterpart.

Purchasing Index is strongly correlated with Exotic Index (0.5015), which supports the second hypothesis on the economic sensitivity of foreign-born talent (Figure 4). By contrast, there is no significant correlation (-0.0675) between Talent Index and Purchasing Index (Figure 5), which offers another evidence for the creative class theory since it claims that talent movement is not directed by economic income. The sharp contrast of the relevance or irrelevance between exotic element, talent and purchasing power indicates the different attractive attributes of American cities to native-born and

foreign-born talent. The former group is attracted by urban diversity and openness while the latter is induced by highly-paid jobs and low cost living expenditures.

Figure 6 shows the moderate association between Tech-pole Index and Exotic Index (correlation coefficient = 0.5138), showing a significant positive impact of foreign-talent concentration on local technological development. The figure can be more illuminating after two outliners, San Jose, CA and Miami, FL, are deleted. Biverate analysis can not control other relative factors, so this part next turns to the findings of multivariate analysis.

Each of Model I and II has three specifications. Specification I1 of Model I contains Talent Index, Purchasing Index, Bohemian Index and two amenity indexes, with Exotic Index as the dependent variable. Melt-pot Index, University Index and Network Index are not included from Model I in order to avoid the problem of multicollinearity since they are strongly correlated with Exotic Index and highly correlated with other independent variables. For the same reason, Gay Index is not included since it is highly correlated with Bohemian Index (0.7082). The effects of talent and purchasing power are significant at 10% significance level while the coefficients of indexes measuring diversity and amenity are not statistically significant. In specification I2, all the insignificant factors in I1 are excluded and Gay Index is added. The coefficients of Talent Index and Purchasing Index are significant at the significance level of 0.05. However, Gay Index has no significant impact on Exotic Index at all. The effects of talent concentration and purchasing power on foreign-born talent distribution can be even more significant when only the two factors are reserved in Specification I3. These findings support the second and third hypotheses in this study.

Specification II1 of Model II includes Exotic Index, Talent Index and Bohemian Index as the explanatory variables, with Tech-pole Index as the dependent variable. The coefficient of Bohemian Index is not significant after controlling Talent Index and Exotic Index, so specification II2 replaces Bohemian Index with Gay Index. Contrary to the author's expectation, the effect of Gay Index has a negative effect on Exotic Index at the significance level of 0.1. However, the strong positive effects of exotic element and talent on the development local technological industries are consistent in all the three specifications. Even at the same level of talent concentration, the local high-tech sector can benefit from a larger share of foreign-born talent. This finding refutes the popular perception that high-tech firms employ skilled foreign workers only for their cheap labor.

6. Conclusion

Depending on adoption of the economic approach, previous literature on talent migration bifurcates into two branches. This paper attempts to integrate the two approaches and give a new theory on foreign S&E talent distribution in the United States. The significant new contributions of this paper come from two findings, the role of purchasing power for foreign S&E talent concentration and the role of foreign S&E talent on development of local high-tech industries.

The theory elaborated in this study, the Exotic Element Model, assumes the importance of urban diversity and amenity in attracting creative workers, but argues that it is only applicable to native-born S&E talent who can move freely in the United States. Foreign-born S&E talent tends to stay and maximize their economic income by seeking a legal job in the cities with denser talent population and higher purchasing power.

A phenomenal presence of foreign-born S&E talent in an urban talent pool can

significantly facilitate the development of local high-tech industries. It can also enrich cultural diversity in a metropolitan area, which in turn attracts native-born talent.

Based on the findings in this paper, a city can attract more foreign-born S&E talent by opening the doors of its universities to more foreign students and scholars. Municipal governments are suggested to offer sponsorship or low interest loan programs to skilled S&E immigrants. The importance of exotic element should be given more policy consideration on the agenda of all relevant aspects of urban planning.

Future research can compare the asset and income of native-born and foreign-born S&E talent and the economic impact on the location choice of the foreign-born. The contribution of foreign-born S&E talent and native-born S&E talent in science and engineering fields can also be examined.

References and Bibliography

Borjas, George & Bratsberg, Bernt, 1996, "Who leaves? The Outmigration of the Foreign-Born", The Review of Economics and Statistics, 78(1): 165-176

DeVoretz D. J., Ma Zhongdong, 2002, "Triangular human capital flows between sending, entrepot and the rest of the world destinations", in Special Issue on Migration and Globalization, Canadian Studies in Population

Ewing, Walter, & Johnson, Benjamin, Immigrant Success or Stagnation?: Confronting the Claim of Latino Non-Advancement, Immigration Policy Brief, The American Immigration Law Foundation, 2003

Franke, Sandra, Measurement of Social Capital Reference Document for Public Policy Research, Development, and Evaluation, Report from Policy Research Initiative, Canada, 2005

Florida, R, 2002a, The rise of the creative class: And how it's transforming work, leisure, and everyday life, New York: Basic Books

_____,2002b,The Economic Geography of Talent, Annals of the Association of American Geographers, 92 (4): 743 – 755

_____, 2005, The Flight of the Creative Class, New York: Harper Business

Glaeser, E. L., J. Kolko, and A. Saiz., 2001, Consumer city, Journal of Economic Geography 1:27-50

Gates, Gary, & Ost, Jason, The Gay and Lesbian Atlas, Urban Institute, 2004

Heenan, David A., 2005, Flight capital: the alarming exodus of America's best and brightest, California, Davies-Black Publishing

Levy, D, 2004, Foreign students share tales of visa woes in a post-9/11 world,

Stanford Report, May 25, 2004

Ley, David & Kobayashi, Audrey, 2004, Back in Hong-Kong or Transnational Sojourn? RIIM, Working Paper Series, Vancouver Centre of Excellence

The Science and Engineering Workforce: Realizing America's Potential, 2003, Americian National Science Board

Saxenian, A, 1999, Silicon Valley's new immigrant entrepreneurs, Berkeley: Public Policy Institute of California

Sbergami, Federica, 2002, Agglomeration and Economic Growth: Some Puzzles, Graduate Institute of International Studies (HEI), Working Paper No.2

Singer, Audrey, February 21-23, 2006, The New Metropolitan Geography of U.S. Immigration, at the Conference of "Mayors' Institute on City Design, Rethinking Neighborhoods for Immigrants", The Brookings Institution,

Stark, O., 1991, The Migration of Labor, Cambridge, Basil Blackwell.

Taylor, J. E. ed., 1996, "Development Strategy, Employment and Migration : Insights from Models", Paris, OECD Development Centre

U.S. Census Bureau, 2003, The Foreign-Born Population: 2000, Census 2000 Brief

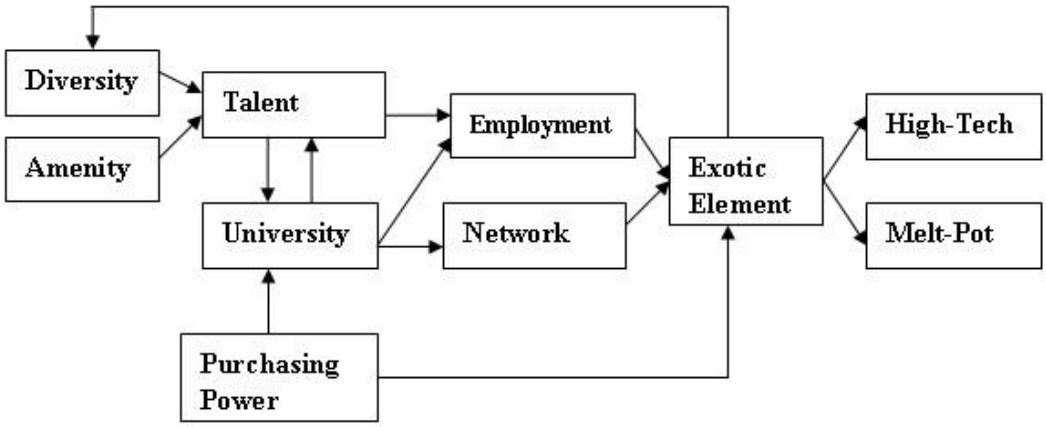
Waldinger, Roger, 1997, Social Capital or Social Closure: Immigrant Networks in the Labor Market Working Paper Series No. 26, Lewis Center for Regional Policy Studies

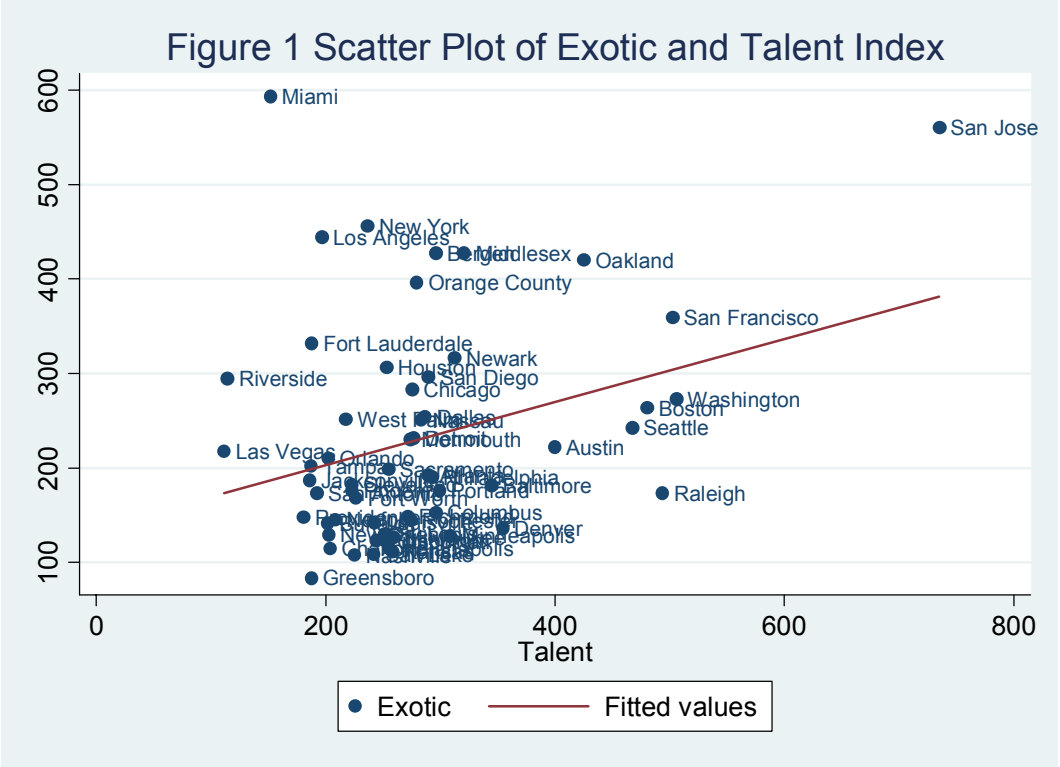
Williamson, J, 2002, Winners and Losers over Two Centuries of Globalization, UNU/WIDER

World Bank, 2005, World Development Indicators, Table 3.10

Appendix

Chart 1 Exotic Element Model





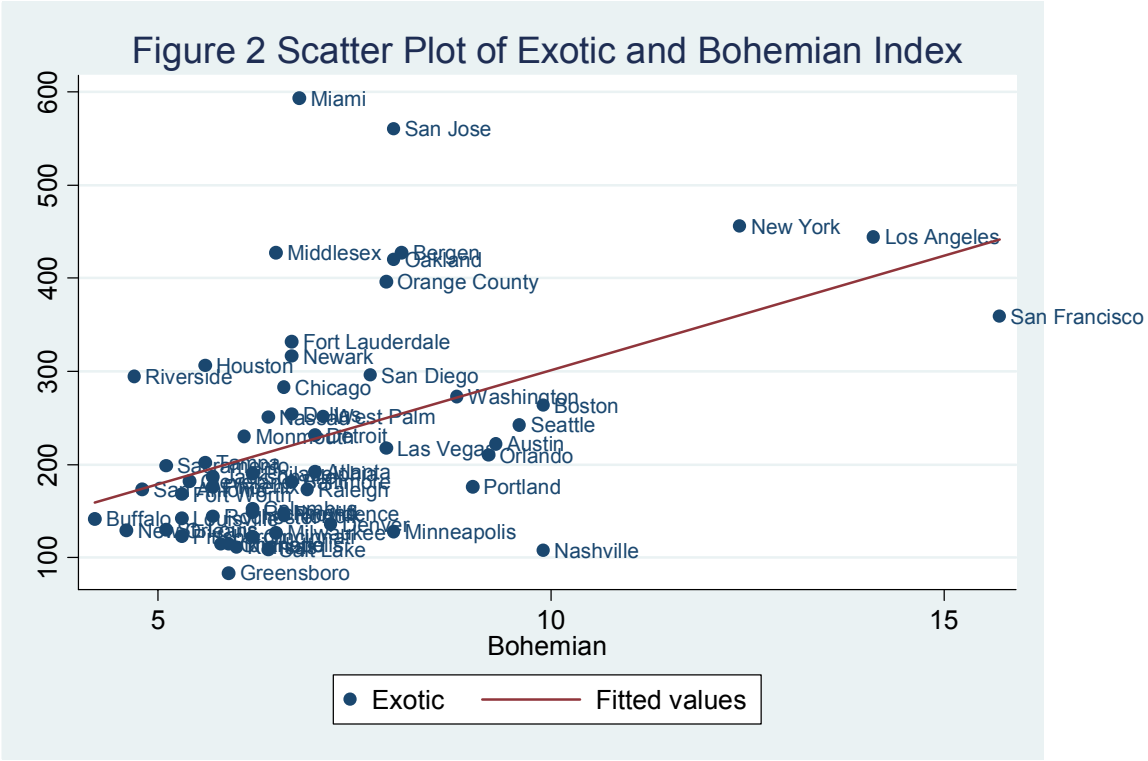


Figure 2 Scatter Plot of Exotic and Bohemian Index
Miami
San Jose
New York
Los Angeles
Middlesex
Bergen
Oakland
Orange County
San Francisco
Fort Lauderdale
Newark
Houston
Riverside
San Diego
Chicago
Washington
Boston
Seattle
Monmouth
Detroit
Las Vegas
Austin
Orlando
Portland
Minneapolis
Nashville
Greensboro
100
200
300
400
500
600
5
10
15
Bohemian
Exotic
Fitted values

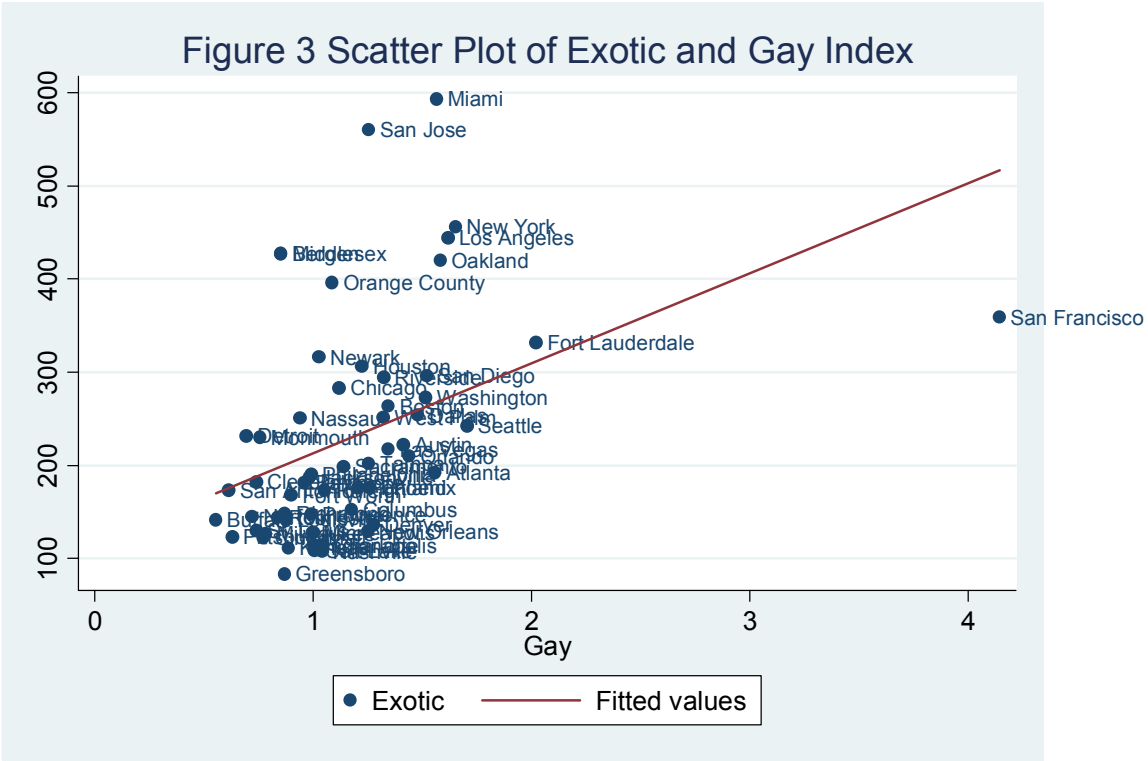


Figure 3 Scatter Plot of Exotic and Gay Index
Miami
San Jose
New York
Los Angeles
Oakland
Orange County
San Francisco
Fort Lauderdale
Newark
Chicago
Washington
Seattle
Greensboro
100
200
300
400
500
600
0
1
2
3
4
Gay
Exotic
Fitted values

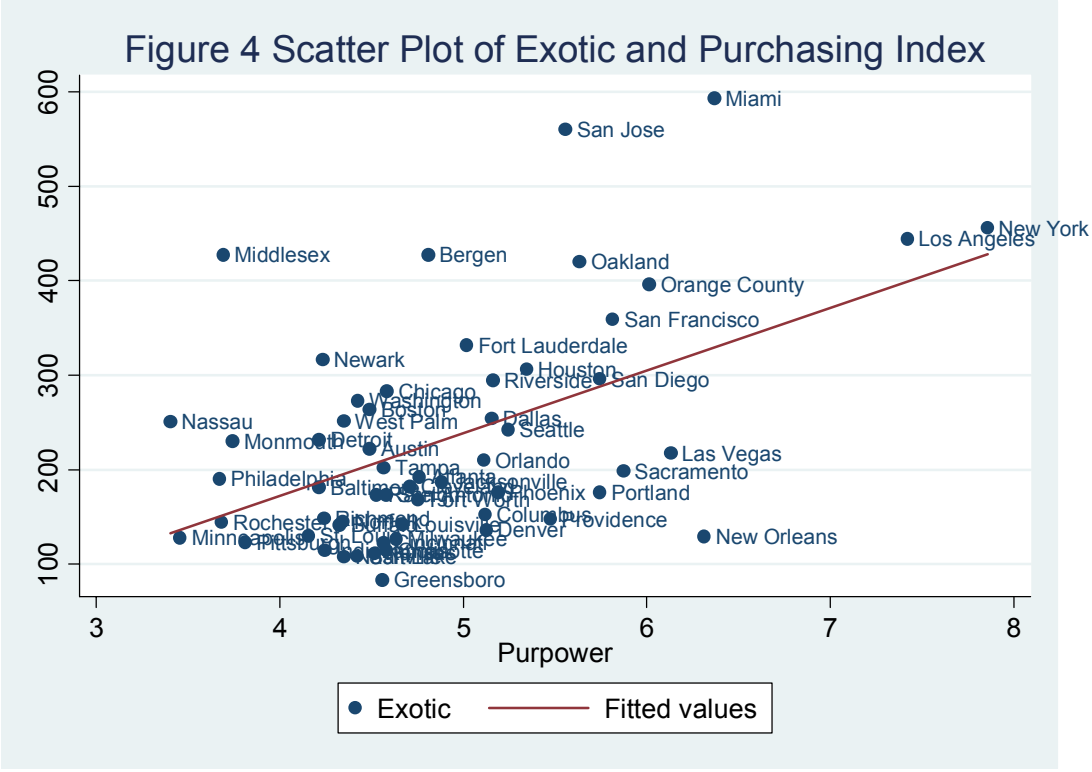


Figure 4 Scatter Plot of Exotic and Purchasing Index
Miami
San Jose
New York
Los Angeles
Middlesex
Bergen
Oakland
Orange County
San Francisco
Fort Lauderdale
Newark
Houston
Riverside
San Diego
Chicago
Nassau
West Palm
Dallas
Seattle
Monmouth
Detroit
Austin
Las Vegas
Orlando
Sacramento
Tampa
Philadelphia
Portland
Rochester
Columbus
Providence
Denver
New Orleans
Greensboro
100
200
300
400
500
600
3
4
5
6
7
8
Purpower
Exotic
Fitted values

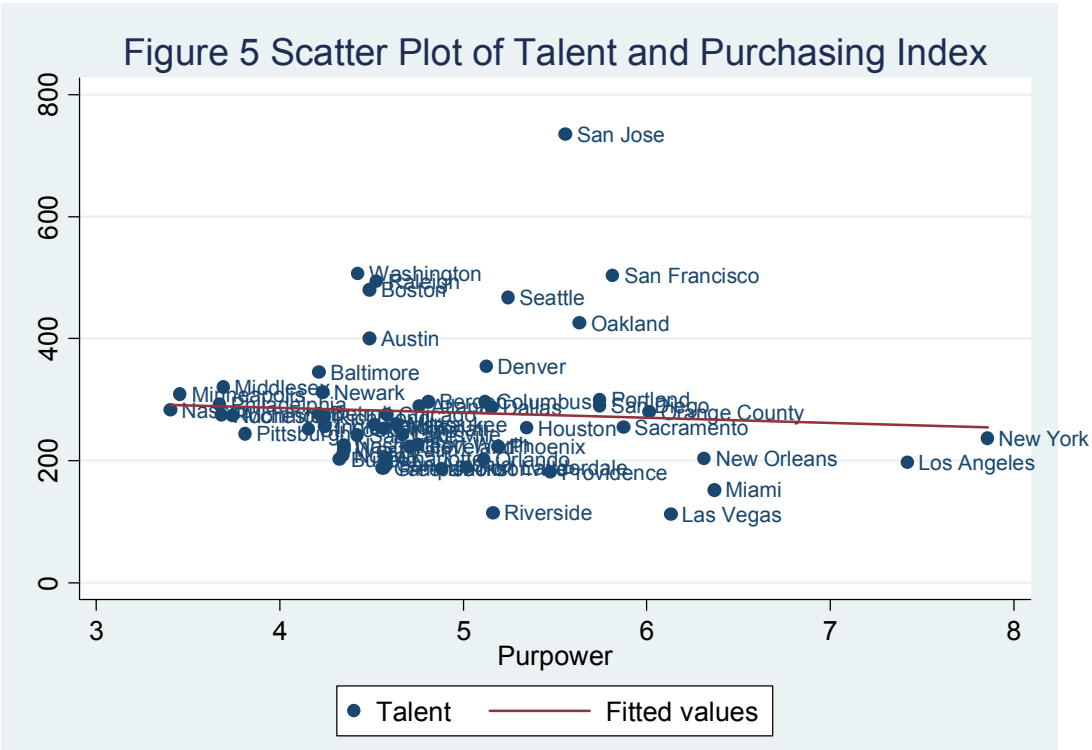
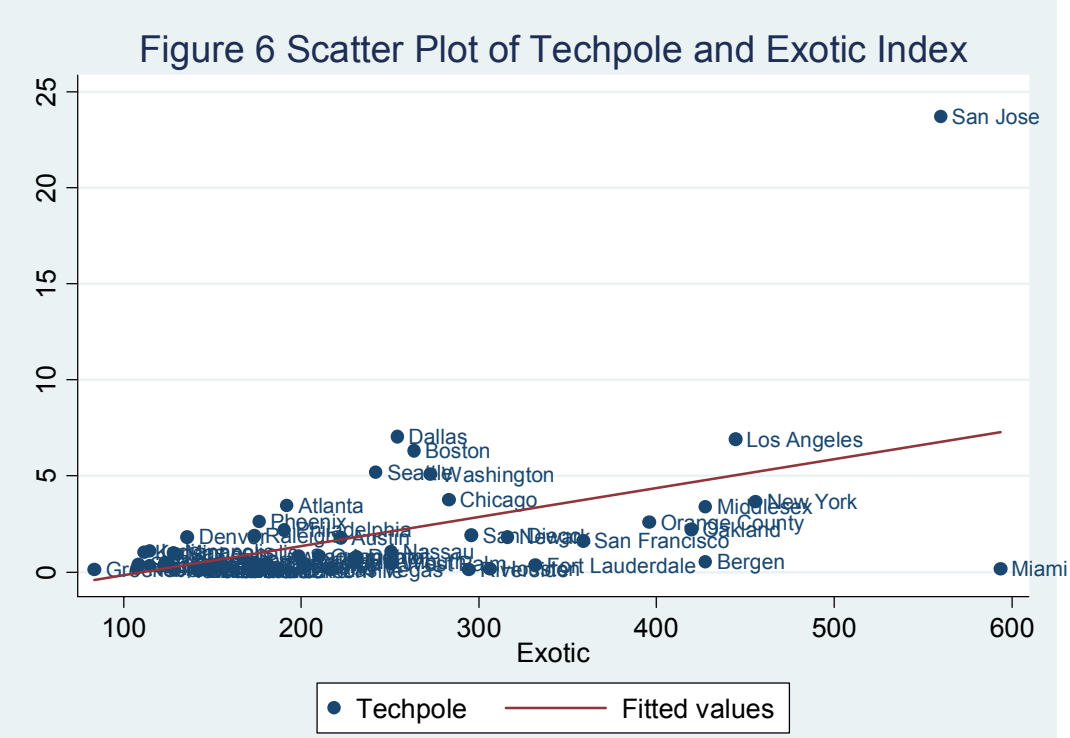
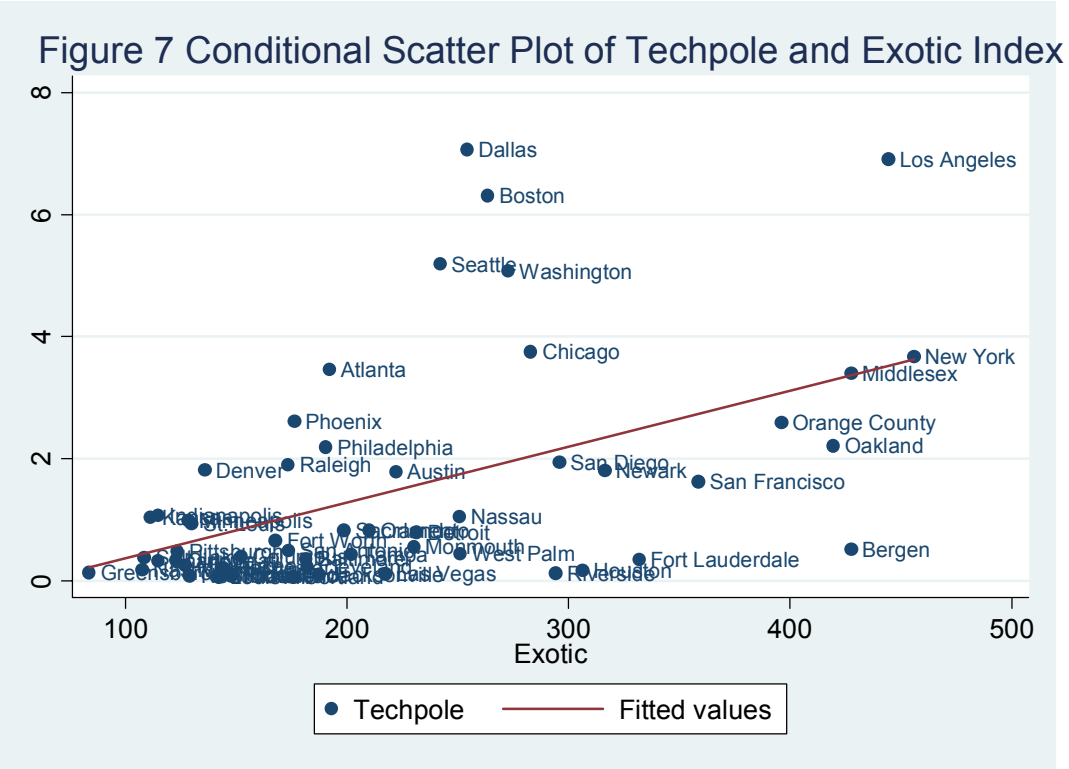


Figure 5 Scatter Plot of Talent and Purchasing Index
San Jose
Washington
San Francisco
Seattle
Oakland
Austin
Baltimore
Denver
Middlesex
Newark
Portland
Orange County
Houston
Sacramento
New York
Pittsburgh
New Orleans
Los Angeles
Miami
Riverside
Las Vegas
0
200
400
600
800
3
4
5
6
7
8
Purpower
Talent
Fitted values





Note: San Jose, CA and Miami, FL are excluded.

Table 1 Variables

Variable	Measurement	Definition	Data Source
Exotic Index	Exotic element	Foreign-born S&E degree holders per thousand local highly educated people	2000 U.S. Census
Talent Index	Concentration of talent	S&E degree holders per ten thousand people	2000 U.S. Census
Melt-pot Index	Concentration of immigrants	Foreign-born in per thousand people	2000 U.S. Census
Network Index	Scale of network	Highly educated immigrants who arrived before 1990 and did not migrate during 1995-2000 per thousand people	2000 U.S. Census
University Index	Concentration of foreign students	Foreign students per thousand local college students	2000 U.S. Census
Bohemian Index	Cultural diversity/ Colorfulness	Writers, artists and professionals in entertainment industries per thousand population	2000 U.S. Census
Gay Index	Social diversity/ Tolerance	Location quotient of gay population	Gates, 2004
Art Index	Facilities of art like music hall or gallery	Total score of nine amenities2	1989 Places Rated Almanac
Climate Index	Hospitability of climate	Score derived from six criteria3	1989 Places Rated Almanac
Purchasing Index	Purchasing Power	Average household annual income divided by average house price	2000 U.S. Census
Tech-Pole Index	Development of high-tech industries	A score combining the percentage of national high-tech real output and the concentration of high-tech industries for each metro.	Milken Institute Report

[2] The nine amenities used for Art Index are (1) concert or classical-format radio stations; (2) public television stations; (3)public libraries; (4)non-profit art museums and galleries; (5)touring-artist bookings at local campus and civic auditoriums; (6) residential symphony orchestras; (7)resident opera companies; (8)resident professional theatres; (9) resident dance companies. Metro areas also earn bonus points for shared amenities if they part of Consolidated Metropolitan Statistical Areas (CMSAs).

[3] The six criteria used for Climate Index are (1) very cold and very hot months; (2) seasonal temperature variations; (3)heating- and cooling- degree days; (4) freezing days; (5)zero-degree days; (6) ninety-degree days.

Table 2. Descriptive Statistics of Variables

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Exotic Index	58	229.6	116.8	83.7	593.5
Talent Index	58	279.6	108.1	111.6	735.2
Melt-pot Index	58	140.4	101.8	27.6	515.4
Network Index	58	1.25	1.18	0.21	5.42
University Index	58	169.7	109.5	50.1	525.1
Bohemian Index	58	7.08	2.15	4.20	15.70
Gay Index	58	1.17	0.51	0.56	4.14
Art Index	57	2010.8	2098.8	438.0	15487.0
Climate Index	57	589.8	130.5	293.0	910.0
Purchasing Index	58	4.86	0.88	3.40	7.86
Tech-Pole Index	58	1.80	3.42	0.06	23.69

Table 3 Correlation Analysis Results

	Exotic Index	*Talent Index*	*Bohemian Index*	*Gay Index*	*Art Index*	*Climate Index*	*Purchasing Index*	*Tech-pole Index*
Exotic Index	1							
Talent Index	0.3087*	1						
Bohemian Index	0.4521*	0.3902*	1					
Gay Index	0.4207*	0.3175*	0.7082*	1				
Art Index	0.4274*	0.1672	0.5242*	0.2777*	1			
Climate Index	0.4498*	0.4098*	0.5040*	0.4792*	0.2413	1		
Purchasing Index	0.5015*	-0.0675	0.4748*	0.4788*	0.401*	0.431*	1	
Tech-Pole Index	0.5138*	0.6919*	0.3069*	0.184	0.2467	0.4046*	0.216	1

*significant at 95% confidence level

Table 4 Findings of Regression Model I and II

	Model I			***Model II***		
	Dependent variable: Exotic Index			**Dependent variable: Tech-pole Index**		
Variable	I1	I2	I3	II1	II2	II3
Exotic Index				0.011***	0.017***	0.01***
Talent Index	0.255*	0.337**	0.372***	0.02***	0.02***	0.019***
Purchasing Index	46.309**	63.24***	69.412***			
Bohemian Index	0.498			-0.16		
Gay Index		21.328			-1.22*	
Art Index	0.011					
Climate Index	0.129					
Observation	57	58	58	58	58	58
Adjusted R^2	0.345	0.340	0.346	0.563	0.582	0.563

Note: * significant at 90% confidence level, *** significant at 99% confidence level