Analyzing Immigrant Environmental Behaviors in the Arizona Tourism Industry

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Abstract   There is little agreement on the relationship between the environmental behaviors of immigrants and those of native-born citizens in the U.S. Hunter (2000*a*) claims attitudes are similar, while Pfeffer and Stycos (2002) show divergences in specific types of behavior. This study starts with the premise that there is a difference between the environmental behaviors of immigrants and native-born residents working in the tourism industry in Tucson, Arizona. I hypothesize that immigrants are more likely to engage in environmentally-conscious behavior that has more to do with individual action, such as limiting personal consumption, and less to do with group action, such as political activity. I then suggest that the difference can be explained by series of factors quantifying background experiences; among these, time of residency in Arizona, attitudes about the physical environment, preference for leisure activities, and awareness of environmental risk are analyzed in detail. Principal Components Analysis first reduces the collinearity of the behavior responses, which are subsequently used in ANOVA and multiple regression to test for differences among categories of background factors and to account for shared effects respectively. Results show immigrants differ from U.S. citizens in behavior, but that the difference works oppositely than hypothesized (group behaviors are preferred over individual behaviors). It was also found that background factors cannot explain the aforementioned difference, though in some cases (env. risk) results are statistically significant. Findings from an improved approach may prove important in influencing immigration policy, as well as reevaluating the relationship between the environment and an economy dependent on foreign-born labor.

Introduction

The recent national controversy on immigration has brought into the spotlight the impact that immigrants, legal or otherwise, have on the American economy. Statistical data show immigrants tend to fill most of the unskilled and low-profile service jobs (Bureau of Economic Analysis [BEA] 2005), thus accounting for a critical component of the U.S. economy. However, immigrants also bring with them and/or adopt environmental attitudes that may be distinct from the rest of American society and which may pose special challenges for the environmental reform of the American populace. Analyzing these profound transformations can begin by providing answers to the question, how do immigrant attitudes and experiences predict their environmental behavior?

My research examines the relationship between immigration and the environment in the Southwestern United States, a region where the interaction of these topics shows signs of becoming critical in formulating social and economic policy in the years to come. In the case of Arizona, immigration is particularly important because of its direct relationship with the tourism industry, which, as of 2002, was the state's largest employment sector (Cothran 2002). Tourism in Arizona, like in most other Western states, is heavily dependent on the natural features of the area and tends to negatively affect the environment in places such as Phoenix, Sedona and the Grand Canyon through traffic congestion, urban sprawl or inefficient usage of resources (Brogden and Greenberg 2003).

Environmental degradation is important for the people employed in the tourism industry, a significant proportion of which are immigrants seeking entry-level work. As a southern border state, Arizona's foreign-born residents come mostly from Mexico and Latin America, and of these many are employed in the tourism industry as service workers (Economic Research Service [ERS] 2006). Their attitudes and behaviors regarding the environment and its problems have not been studied in detail so far, even though misinformation could prove to be an important element in answering questions about how immigration affects the environment and, through it, the economy of Arizona.

The Hispanic or Latino population in Arizona was 1,295,617 in 2000 and is estimated to be growing at 3% annually (ERS 2006). In some areas this group has become proportionally significant to the total population, a trend especially pronounced in Phoenix and Tucson, the state's biggest urban centers, where Latinos make up a quarter or more of the number of

inhabitants (Bureau of Census 2002). In an important note, official figures do not include illegal immigrants and are expected to have changed dramatically since the 2000 census.

Meanwhile, the number of tourists in Arizona was estimated at 29.5 million in 2000, almost six times the number of actual residents of the state, which the latest Census had standing at about 5.1 million (Bureau of Census 2002). According to the 2002 Arizona Statewide Economic Study, the direct impact of travel and tourism on the state economy was $9.5 billion in 1999, growing at a rate of more than 3% per year and projected to continue at this pace through the next decade (Cothran 2002).

In terms of employment, the Arizona tourism industry impacts directly or indirectly one of every five jobs in the state. By 2000, tourism supported approximately 155,000 jobs. Employment was growing at a rate of 3.7% per year by the same year, despite the fact that Arizona was experiencing the second-highest population growth rate in the nation (BEA 2000). Due to acute labor shortages, many companies began employing immigrants much more rapidly than before. After the events of September 11, 2001, tourism demand declined, causing employment in the industry to drop (Cothran 2002). Nevertheless, between 2002 and 2003 Arizona ranked second in the nation in terms of payroll growth rate, indicating a recovery that has continued through recent years (Kazmierczak and Platzer 2005).

Existing research on immigrant attitudes toward the environment varies widely and is inconclusive. One trend prevalent in the literature is that of no significant differences. Pfeffer and Stycos (2002) compared immigrant behavior toward environmental issues in New York City with non-immigrant behavior. They found no significant differences between the two, a result which they attributed to a globally-shared concern for the environment and to the exposure of immigrants to post-materialist U.S. societal values. Though Pfeffer and Stycos (2002) found no overall difference, they did discover a few interesting specific divergences: immigrants were more likely than native-born individuals to adopt constraints on personal consumption, such as saving water, and they were much less likely to engage in environmentally-related political activity.

Research by Hunter (2000*a*) showed that U.S. immigrants and native-born residents express similar attitudes toward environmental issues. The most interesting find was a trend showing shorter-term immigrants (those who had arrived in the U.S. after age 16) being significantly more concerned with environmental problems and more likely to engage in "environmentally

friendly" behaviors. Also prevalent are studies which claim that significant differences in behavior arise because of impacted environmental factors. In the U.S., the failure to include environmental concerns in the dispute over property rights has fueled political and economic arrangements that deny immigrants basic rights, as well as preventing them from expressing their own attitudes toward the environment (Chapman 2000). An updated analysis by Hunter (2000*b*) confirmed previous findings that areas with higher proportions of immigrants and minorities are more likely to be exposed to measures of environmental risk, particularly Superfund sites.

On a larger scale, immigrants to Canada were found to be affected by the physical features of the country much more than previously believed (Ng 1998). Although the impact of the environment was found to be smaller than that of the economy, political structure and religion, evidence suggests that it plays crucial role in determining the behavior necessary for successful settlement. Stodolska (2002) showed that environmental differences between the new country and the old contributed to the cessation of leisure activities in Eastern European immigrants to Canada. She concluded that the results of this study can be used to determine "patterns of changes in post-arrival leisure behavior that are likely to be *universally applicable* [emphasis added]." Similarly, immigrant attitude toward nature in Los Angeles was found to be strongly influenced by engagement in and accessibility to leisure activities, such as beach-going and related outdoor opportunities (Wolch and Zhang 2004).

The above-mentioned studies by Pfeffer and Stycos (2000) and Hunter (2000*a*) have provided insight into environmental attitudes and behaviors of immigrants, but these findings now prove insufficient, as they were derived mainly from heavily urbanized areas, like New York City, or from a much broader analysis of an outdated national immigrant sample. Very few studies have looked at the Southwestern states, which presently have become the main recipients of a fast-growing immigrant population (Institute for Policy and Economic Development 2006); even fewer, if any, have paid particular attention to Arizona, whose economy relies heavily on tourism. Since those employed in the tourism industry are among the groups of immigrants most likely to be affected by environmental problems, in regard to which there is evidence that tourist activities may be contributing, researching their behavior toward the environment is important.

Findings may prove useful in explaining broader behavior patterns, consumption patterns and/or the political potential of immigrants. For example, an aspiring Arizona politician can no longer ignore the necessity of courting the immigrant vote; consequently, they may choose to

focus on addressing issues that new research indicates are important to immigrants, such as environmental ones. In terms of economic policy, the drive toward implementing environmental responsibility in tourism may be eased by dealing with employees who already exhibit an environmentally-friendly behavior; new employment opportunities may also open up for immigrants as the industry promotes sustainability.

My study aims to address two questions: 1) is there a difference between the environmental behaviors of immigrants and native-born workers in the Arizona tourism industry; and 2) if such a difference exists, can it be explained by the background and personal choices of the individuals involved in the study. First, I am testing the hypothesis, "Immigrants are more likely to engage in environmentally friendly behavior that has more to do with individual action, such as limiting personal consumption, and less to do with group action, such as political activity." I then propose a four-way hypothesis that suggests immigrants have different environmental behaviors which can be explained by time of residency in Arizona, attitudes about the physical environment, leisure activities, and awareness of environmental risk. These hypotheses are summarized in the table below.

Table 1: Hypotheses

H1	Immigrants are more likely to engage in environmentally friendly behavior that has more to do with individual action, such as limiting personal consumption, and less to do with group action, such as political activity.
H2	The longer an immigrant resides in Arizona, the less environmentally conscious his/her resource consumption behaviors will become.
H3	The more an immigrant engages in outdoor leisure activities, the more environmentally conscious his/her behavior will be.
H4	The more positive an immigrant's attitude is about the physical environment of Arizona, the more environmentally conscious his/her behavior will be.
H5	The more aware of environmental risk an immigrant is, the more environmentally conscious his/her behavior will be.

Based on the results of the studies mentioned in the literature, I expect the following findings:

- Similar to Pfeffer and Stycos (2002), immigrants will be more likely to engage in environmentally friendly behavior that has more to do with individual action and less to do with group action (H1);

- The physical environment will not explain the difference between the two groups (because of climate); for immigrants, the pro-environment behaviors will increase as

leisure activities increase and as awareness of environmental risk produces a greater degree of environmental concern;

- A differentiation in behavior will arise within the immigrant group between shorter-term and longer-term members of this group, as predicted by Hunter (2000*a*). Shorter-term immigrants will be more likely to exhibit environmentally-friendly behaviors.

Methods

Data collection was done through a survey instrument (see Appendix A) which was designed to take up both sides of a single sheet of paper. The first part of the survey recorded the principal set of variables—behaviors toward the environment—and included six questions. A scale of preference was designed to cover a consistent and reasonable range of answers, from very involved (5) to no involvement at all (1). Questions 1-2 tracked respectively the likelihood of saving water and turning off lights or air-conditioning when not needed; Questions 3-4 measured the frequency of recycling and of using energy-saving appliances respectively. Together, the first four questions were designed to be indicative of *individual behaviors*. Questions 5-6 looked respectively at the likelihood of signing a petition or writing a letter about an environmental issue, and the likelihood of talking to an official or participating in community action about an environmental issue. These last two questions were expected to represent *group behaviors*. Results from this section are used to test Hypothesis H1, namely that for immigrants, individual behaviors dominate.

The last part of the survey gathered information about the secondary set of variables— background "attributes," described in the table below.

Table 2: Background attributes

birth place (U.S. or another country)
gender
age (for immigrants, age when arrived in the U.S.)
years resided in Arizona (from less than one to over 20 years)
preference for the *physical environment* (in terms of climate)
participation in *leisure* activities (in terms of outdoor activities)
awareness of *environmental risk* (in the case of a hypothetical neighborhood pollutant)

Answers to each of the seven questions in this part were recorded as either points (for birth place, age, gender) or a range (for residency time, leisure time). Based on these results, Hypotheses H2 (negative relationship between environmental behavior and length of residency) and H3 through H5 (positive relationship between environmental behavior and preference for climate, participation in leisure and awareness of environmental risk respectively) are tested. The survey was made available in English and Spanish (see Appendix B).

The city of Tucson was chosen as study site for two reasons: it is the state's second largest urban area, with a substantial Latino population, and it is also the center of the so-called Old Southwest, one of the most popular tourist destinations in Arizona. Via a tour of the city and searches on the internet, a list of potential sampling locations was compiled; it included hotels (small and large), museums, spas and resorts, casinos, and an area in downtown known as a tourist hotspot.

The process of collecting data typically began with an introduction of the researcher at the reception area of the establishment. After the reason for the study was stated, permission was requested of the manager to approach employees for the survey. For the most part, people showed considerable understanding and no one was vehemently opposed to allowing surveying, especially after the confidential and non-identifiable nature of the questions was made clear. Once permission had been secured, the first five or 10 randomly-appearing employees were approached.

Subjects were informed about the information being sought and about the permission from the manager to conduct the survey. Only in one or two instances did a potential respondent refuse to participate. They were then handed the survey (choice of English or Spanish), which took two to five minutes to complete, depending on the individual. The researcher stood nearby and simply waited to be handed the filled-out form. Upon completion of the targeted number of questionnaires at one specific location, the researcher moved on to the next.

Data collection was completed within a week at the beginning of January 2007, at an average of 10-15 responses per day. A wide spectrum of workers was sampled, including housekeepers, secretaries, valets, waiters, concierges, drivers and receptionists. There were 103 surveys in total, three over the projected sample size; the number was divided somewhat evenly between immigrants (47) and U.S. citizens (56). In terms of gender, there were far more females than males (71 v. 32), which is not atypical of the hospitality sector. An important piece of

information to mention is the unwillingness of subjects to disclose their age: only 56 individuals indicated their age on the survey and of the immigrants, only 30 chose to list the age at which they came to this country.

Analysis of the data requires a combination of multivariate and univariate statistical techniques. Because responses to the behavior questions are expected to indicate collinearity (for example, the likelihood of saving water is related to the likelihood of recycling), Principal Components Analysis—PCA—can be employed to reduce the multidimensionality of the data. Simultaneous consideration of all six environmental behavior responses allows for the confirmation or invalidation of Hypothesis H1 by indicating which category of behavior (individual or group) dominates. PCA also creates a few new variables that can be used in univariate techniques such as Analysis of Variance (ANOVA) and multiple regression to test for differences among background categories and to account for shared effects respectively. Hypotheses H2 through H5 can thus be confirmed or invalidated.

Results

In order to show the effects of collinearity in the behavior responses, results from simple descriptive statistics are given as an example. The software program JMP yielded the following information for the sample:

Table 3: Average and median behavior scores for the two study groups

	Immigrants		U.S. Citizens	
	Average score (mean +/- standard error)	Median score	Average score (mean +/- standard error)	Median score
Water consumption (I)	3.69 +/- 0.19	4	3.14 +/- 0.17	3
Electricity conservation (I)	4.48 +/- 0.15	5	4.21 +/- 0.15	5
Recycling (I)	2.83 +/- 0.21	3	3.27 +/- 0.18	3
Energy-saving appliances (I)	2.71 +/- 0.21	2	3.34 +/- 0.16	3.5
Sign petition/write letter (G)	3.27 +/- 0.21	4	2.43 +/- 0.17	2
Talk to official/participate in community action (G)	3.35 +/- 0.23	4	2.16 +/- 0.14	2

The results in Table 3 are on a scale of preference from 1 (very unlikely) to 5 (very likely) and show the likelihood of the two groups to engage in the respective behaviors. For immigrants,

it is unclear whether individual (I) or group (G) behaviors are more important, as both categories record high average and median scores. Meanwhile, the situation is much simpler for citizens, where individual behaviors are clearly dominant. Since the breakdown of importance of behavior is needed to answer Hypothesis H1, univariate techniques are inadequate in providing meaningful results.

As mentioned before, Principal Components Analysis (PCA) emerged as the most straightforward way to reduce multidimensionality. PCA was used to create a few key variables (each a composite of the original six behavior responses Y_1-Y_6) that characterize as fully as possible the variation in the multivariate dataset. These new variables—from here on referred to First Principal Component, Second Principal Component, etc.—for the immigrant group are given in Table 4 below:

Table 4: Principal Components for immigrants

	First Principal Component (Z1)	Second Principal Component (Z2)	Third Principal Component (Z3)	Fourth Principal Component (Z4)	Fifth Principal Component (Z5)	Sixth Principal Component (Z6)
Eigenvalues	5.62	2.54	1.69	1.19	0.62	0.39
Percent	**46.6**	**21.0**	**14.0**	9.91	5.19	3.26
Cumulative Percent	46.6	67.6	**81.6**	91.5	96.7	100.
Eigenvectors						
Water (Y1)	0.41	-0.03	0.49	0.30	-0.67	-0.20
Electricity (Y2)	0.18	-0.05	0.23	0.75	0.57	0.13
Recycling (Y3)	0.25	0.71	0.44	-0.35	0.22	0.23
Energy-save (Y4)	0.28	0.57	-0.67	0.32	-0.16	-0.11
Sign/write (Y5)	0.56	-0.20	-0.06	-0.29	0.37	-0.65
Talk/participate (Y6)	0.59	-0.35	-0.23	-0.17	-0.06	0.67

Eigenvalues and eigenvectors are constituents of the sample variance-covariance matrix, which PCA makes use of to reduce dimensionality. It is important to note that PCA, like other multivariate techniques, is fundamentally based on matrix algebra, the details of which are beyond the scope of this analysis. The only explanation needed here is that the sum of all eigenvalues is the total variance explained, while eigenvectors serve as parameters in the formula obtained for the Principal Components. For example, the First Principal Component Z_1 has the formula $0.41Y_1 + 0.18Y_2 + 0.25Y_3 + 0.28Y_4 + 0.56Y_5 + 0.58Y_6$. Formulas for the other Components were similarly determined.

The next step was to determine how many Principal Components to use. There is no complete agreement in the literature as to how to decide a cutoff point, but one useful way is to employ a scree plot (Gotelli and Ellison 2004). A scree plot can be thought of as a histogram in which the magnitude of each bar represents the percent of variance (the eigenvalue) explained by each Component in decreasing order. Thus, the figure looks like a mountainside with a lot of rubble at the bottom. Eigenvalues show that Components 1-3 appear useful, accounting for more than 81% of the total variance, whereas Components 4-6 look like rubble, none explaining more than 10% of the remaining variance. Therefore, only the first three Components were retained for the second part of the analysis.

For U.S. citizens, the PCA summary is:

Table 5: Principal Components for citizens

	First Principal Component (Z1)	Second Principal Component (Z2)	Third Principal Component (Z3)	Fourth Principal Component (Z4)	Fifth Principal Component (Z5)	Sixth Principal Component (Z6)
Eigenvalues	2.96	2.56	1.31	0.91	0.74	0.48
Percent	**33.0**	**28.6**	**14.6**	10.2	8.27	5.32
Cumulative Percent	33.0	61.6	**76.2**	86.4	94.7	100.
Eigenvectors						
Water (Y1)	0.48	-0.44	0.24	0.51	0.38	-0.34
Electricity (Y2)	0.41	-0.09	0.62	-0.13	-0.53	0.35
Recycling (Y3)	0.22	0.69	-0.11	0.58	-0.30	-0.13
Energy-save (Y4)	0.19	0.55	0.38	-0.29	0.64	0.11
Sign/write (Y5)	0.58	0.04	-0.36	-0.53	-0.15	-0.47
Talk/participate (Y6)	0.41	-0.09	-0.51	0.11	0.18	0.72

According to Table 5, eigenvalues for citizens also indicate that only Components 1-3 seem useful, combining to explain about 76% of the total variance. The other Components were discarded.

Since the new variables are not correlated with one another, they can be used in ANOVA as simple univariate response variables. Figures 1 and 2 below show the results of the analysis for Principal Component Z_1 of the immigrant group:
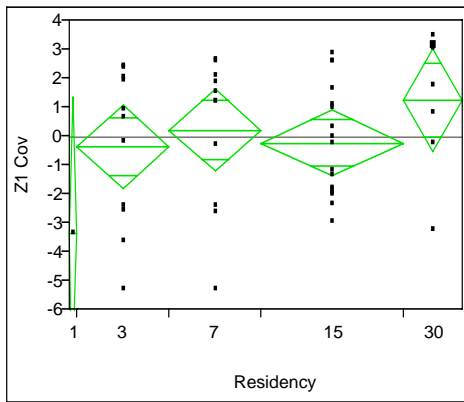
Figure 1: ANOVA for Z_1 and residency time in Ariz.
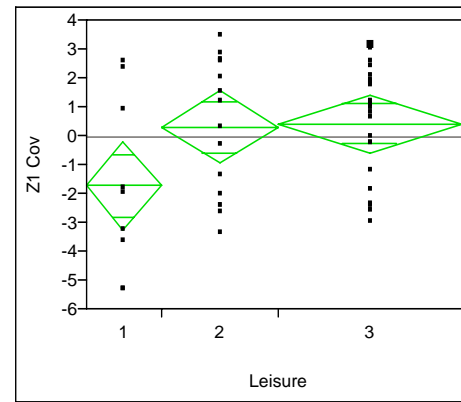
Figure 2: ANOVA for Z_1 and participation in leisure

In Figure 1, the five categories describing the background attribute *Residency* represent the ranges into which the subjects recorded their time of residency in the state of Arizona. For example, 1 represents the "less than 1 year" range, 3 represents the "1 to 5 years" range and so forth. Similarly, in Figure 2 the three categories for *Leisure* are codes for the various frequencies which the subjects indicated to represent their participation in outdoor leisure activities (1 is for "A few times a month," 2 is for "Every few months," etc.) ANOVA tested to see if there were significant differences between the categories of each of the attributes. Results were not statistically significant for any of the Components Z_1-Z_3; conclusions are addressed in detail in the Discussion section.

For the last two background attributes, Principal Component Z_3 illustrates the results of the analysis better than Z_1:
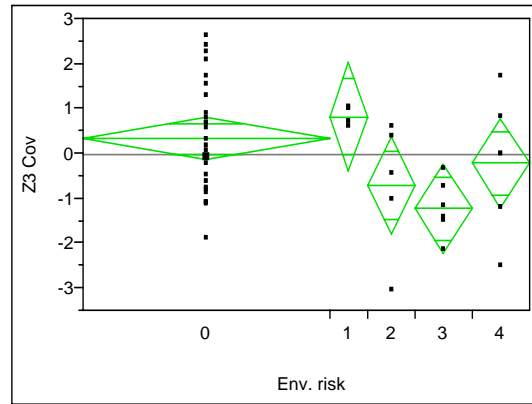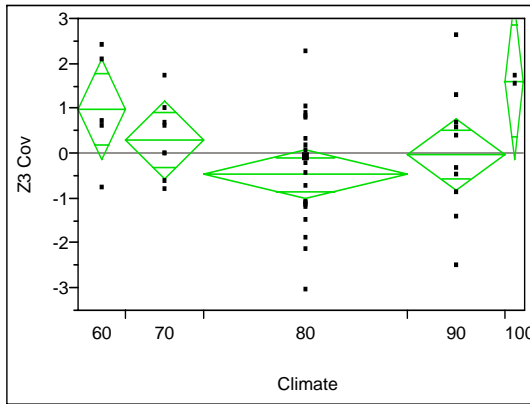
Figure 3: ANOVA for Z_3 and preference for climate   Figure 4: ANOVA for Z_3 and awareness of env. risk

In Figure 3, the five categories of *Climate* correspond to the attitudes expressed by subjects toward the climate of Arizona; these attitudes range from "Too hot and dry" (60) to "I love the desert" (100). And in Figure 4, *Env. risk* categories quantify the span of responses on awareness of environmental risk, which go from "Not aware at all" (0) to "Very concerned and taking action" (4). For these two attributes, the results of the ANOVA for Component Z_3 are statistically significant, especially for *Env. risk*, but they are not helpful in answering the hypotheses; the reasons are presented in the Discussion section.

Finally, the results in JMP of a multiple regression on Principal Component Z_1 with all the background factors included as explanatory variables are given in Table 6 below:

Table 6: Parameter estimates from multiple regression for immigrants

Term	Estimate	Std error	t-ratio	Prob > |t|
Age	0.03	0.03	0.98	0.33
Gender	-0.51	0.89	-0.57	0.57
Residency	-0.007	0.05	-0.14	0.89
Leisure	0.57	0.54	1.05	0.30
Climate	-0.07	0.04	-1.57	0.13
Env. risk	0.56	0.29	1.94	**0.06**

Multiple regression analysis shows that behaviors among different background factors are almost significant ($F_{6,34} = 2.12$, $p = 0.08$), with environmental risk exhibiting the greatest significance.

Discussion

To recapitulate, Principal Components Z_1-Z_3 are composites of all six original behavior observations Y_1-Y_6. In order to identify whether individual behaviors (water consumption, electricity conservation, recycling etc.) or group behaviors (signing/writing, talking/participating) are more important, the formulas for the Components are compared. Table 7 gives the values of the eigenvectors for Z_1-Z_3 for both immigrants and citizens; the eigenvectors are the specific parameters used in the equations describing the Components as exemplified in the Results section.

Table 7: Comparison of PCA eigenvectors for immigrants and U.S. citizens

Immigrants	First (Z1)	Second (Z2)	Third (Z3)	*Citizens*	First (Z1)	Second (Z2)	Third (Z3)
Eigenvalues	5.62	2.53	1.69		2.96	2.56	1.31
Percent	46.6	21.0	14.0		33.0	28.6	14.6
Cumulative Percent	46.6	67.6	81.6		33.0	61.6	76.2
Eigenvectors							
Water (Y1)	0.41	-0.03	**0.49**		**0.48**	-0.44	0.24
Electricity (Y2)	0.18	-0.05	0.23		**0.41**	-0.09	**0.62**
Recycling (Y3)	0.25	**0.71**	**0.44**		0.22	**0.69**	-0.11
Energy-save (Y4)	0.28	**0.57**	-0.67		0.19	**0.55**	0.38
Sign/write (Y5)	**0.56**	-0.20	-0.06		**0.58**	0.04	-0.36
Talk/participate (Y6)	**0.59**	-0.35	-0.23		**0.41**	-0.09	-0.51

Large positive values for the eigenvectors indicate which of the original behaviors are best measured by the respective Component. According to Table 7, Z_1 for immigrants is a good measure of group behaviors, represented by observations Y_5—signing/writing and Y_6—talking/participating. Components Z_2 and Z_3 are measures that work only for observations Y_3-Y_4 and Y_1-Y_2 respectively, which are the individual behaviors; however, since Z_1 explains almost 50% of the variance by itself, PCA shows that group behaviors are more important than individual behaviors for immigrants. Therefore, Hypothesis H1, which states that immigrants are more likely to engage in environmentally friendly behavior that has more to do with individual action and less to do with group action, is not supported. If anything, group behaviors appear to be more important, a finding which goes against the general trends found in previous research (Pfeffer and Stycos 2002).

At first sight, the situation for citizens is not as clear-cut as descriptive statistics showed initially. Coefficients for Z_1 are almost equal for observations Y_1-Y_2 (individual) and Y_5-Y_6 (group), making it unclear which ones are dominating. In contrast, Components Z_2 and Z_3 both

show a strong dominance of observations Y_1-Y_4, though not at the same time. Since the Second and Third Components explain more of the variation together, it can be concluded that for U.S. citizens individual behaviors are more important than group behaviors. As this was predicted to be the case, the expected findings for native-born residents are confirmed by PCA.

The findings of ANOVA lead to interesting conclusions as well. While Figure 1 may appear to indicate important differences between residency time categories, these differences are not in fact significant. The *p*-values for Components Z_1-Z_3 are 0.35, 0.45 and 0.54 respectively, leading to Hypothesis H2 being infirmed: immigrant resource consumption in fact *does not* become less environmentally-conscious with length of residency time. Since most of the responses fall in the "10-20 years" range (represented by code 15 in Fig. 1), it seems that environmental behavior is positively, rather negatively, correlated with residency time. This conclusion is not unreasonable: the longer an immigrant resides in the United States, the more he or she can expect to be exposed to increasingly positive attitudes toward environmental sustainability, even in Arizona, where these attitudes take longer to come by. It can also be the case that as low-profile employees, immigrants who have held the same jobs for long periods of time translate the mandated sustainability at work into more environmentally-conscious behaviors at home.

Figure 2 also appears to indicate important differences between the categories of participation in leisure activities. While the *p*-values for Components Z_2 and Z_3 are not significant (0.85 and 0.69 respectively), the results for Z_1 fall just short at $p = 0.06$. Thus, Hypothesis H3, which says more leisure leads to more environmentally-conscious behavior, is not confirmed. The breakdown of responses actually shows the opposite: for immigrants, environmentally-conscious behaviors are correlated with *less* leisure, not more. There are more people in category 3, which indicates the least frequent participation – "Once a year or less." Drawing a conclusion is once again related to the nature of the jobs into which immigrants are employed: working long hours in positions that do not pay enough forces immigrants to forgo leisure time in order to earn their living. How this affects the likelihood of behaving more environmentally-conscious is not clear, but it appears immigrants still have a positive opinion toward behavior despite the reduced importance of leisure as a background factor.

In Figures 3 and 4, Component Z_3 was selected for the illustration because it is more statistically significant than the First Component. It does not matter which one is chosen because significant probabilities for any of the first three Components can confirm or infirm the

hypotheses (since these are new variables composed of the original behavior observations). For Figure 3, it is not entirely clear from the graph which if all the climate categories are different from one another. The *p*-values for Components Z_1 and Z_2 do not support this conclusion (at 0.58 and 0.33 respectively), but for Z_3, the probability is just a little over 0.05. Hypothesis H4, stating that a more positive attitude toward the physical environment (i.e. climate) leads to more environmentally-conscious behavior, is almost confirmed, but not quite. Most of the responses fall in the 80 category, which represents neutral attitudes ("I'm simply OK with this climate; I neither love it, nor hate it").

Even if the difference was significant, it would have probably not been enough to support the hypothesis. It is true from the distribution of responses that most immigrants who behave environmentally-conscious do not have a negative attitude toward the physical environment of Arizona, but neither do they have an extremely positive view of it; they are right in the middle. Thus, contrary to the findings of previous studies (Ng 1998), the attitude toward the physical environment does not appear to be an important enough background factor in explaining immigrant environmental behaviors. One possible explanation could lie in the fact that since most of the immigrants hail from Mexican regions close to the United States border (e.g. Sonora), the Arizonan climate does not affect them since it is very similar to that of their native areas.

Figure 4 is the only one in which perceived differences are actually statistically significant. However, the significance only applies to Component Z_3 ($p = 0.03$); the other two Components come relatively close at $p = 0.08$ for Z_1 and $p = 0.10$ for Z_2, but that is not enough. Even though the results are significant, Hypothesis H5 is infirmed because most of the responses fall in the 0 category, which means no awareness of environmental risk. These findings do not agree with those from the past (Hunter 2000*b*); however, it is unreasonable to think that environmentally-conscious behaviors would not increase with awareness of risk, even for a group with less access to information such as immigrants. One reason why most of the responses fall within the "Not aware at all" category may be due to the fact that the hypothetical polluting agent was not exemplified in the survey (e.g. former dumping ground or toxic contamination), so the subjects did not take the time to think about the answer thoroughly.

Multiple regression confirmed the significant differences between categories of environmental risk for all three Components ($p = 0.02$, 0.01 and 0.03 respectively), but Hypothesis H5 cannot be confirmed yet again. The figure below shows the visual distribution of

responses for environmental risk; the large number of responses in the first category invalidates H5 for reasons discussed above:
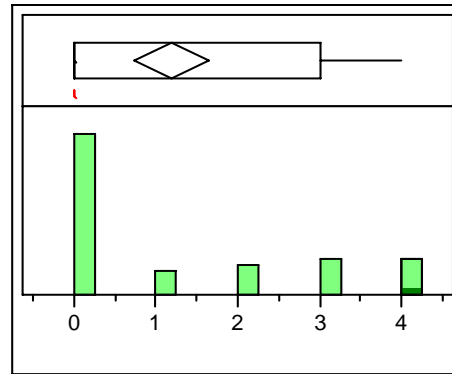

Figure 5: Distribution of responses for
awareness of env. risk

Small probabilities for leisure and climate (0.08 and 0.06 respectively) in the regression of Component Z_1 also indicate possible significant differences, but as proven by ANOVA, these differences would not be enough to support the claims of Hypotheses H3 and H4. It should be mentioned that in multiple regression analysis both gender and age were included as background factors, whereas ANOVA did not provide any significant results when those variables were considered. Gender and age were used in multiple regression because they share effects with the other factors; for example, age may be a determinant of both leisure and an environmental risk (older people may be less interested to partake in leisure activities more often, while younger people may be more aware of risk through education and access to information). Even with this inclusion, the results of multiple regression were not significant, except for environmental risk, and no hypothesis was proved regardless.

As far as the U.S. citizens group goes, results from both ANOVA and multiple regression were not statistically significant or even close to significant. Comparison of factors affecting environmental behaviors between immigrants and citizens is thus irrelevant.

In conclusion, the findings predicted at the beginning of this study were not supported by the evidence. Firstly, a difference does exist between the environmental behaviors of immigrants and native-born residents, but its dynamics are opposite as hypothesized: immigrants tend to be more group-oriented, while citizens prefer individual action. Secondly, factors representing background experiences were unable to explain the varying behaviors of immigrants. The only

prediction that somewhat held was that the physical environment (i.e. climate) was unable to explain the difference; otherwise, both participation in leisure activities and awareness of environmental risk failed to prove that they positively affect environmentally-conscious behaviors among immigrants. Finally, it was not possible to prove a differentiation in behavior within the immigrant group, as hypothesized by Hunter (2000*a*). Due to the fact that only half of the entire sample disclosed age, the ability to use age as a background factor was compromised; furthermore, the only 30 responses to immigration age were insufficient for testing Hunter's hypothesis.

It is recommended that future studies address the issue of sample size—103 is not a large enough number for trends to show up very clearly—and sample demographics. In this study, a significant proportion of the subjects were females, over 40 years of age and working in the hospitality sector for a long time. These individuals are not representative of the greater immigrant population, so findings cannot be applied on a greater scale. Suggestions for improvement include sampling beyond the hospitality sector (to the transportation and/or service sectors, both of which have a close relationship with the tourism industry as a whole in Arizona) and the expansion of the survey instrument to better capture the details of behavior and background.

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Appendix A - Survey (English)

Consent statement
"The purposes of this study are strictly academic and no information I provide will be used to any other end. Data collection is confidential and all the information I choose to provide will be anonymous. NO identifiers such as name, address or workplace will be collected. I understand that I may freely choose to fill out the survey after being told of what it is about. I may discontinue taking the survey at any time without any consequences. I understand that the completion and return of the survey signifies my consent in participating in this study."

Declaración del consentimiento
"Los propósitos de este proyecto son solamente académicos y no se utilizará ninguna información que yo escribo a ningún otro extremo. La colección de esta información es confidencial y toda la información que doy será anónima. No se recogerá NINGUNOS identificadores tales como nombre, dirección o lugar de trabajo. Entiendo que puedo elegir libremente responder a las preguntas después de ser informado sobre el asunto de estas preguntas. Puedo terminar de responder en cualquier momento sin ningunas consecuencias. Entiendo que la terminación y la vuelta del documento significa mi consentimiento en participar en este proyecto."

Part I [**THESE QUESTIONS ARE ABOUT YOUR BEHAVIOR AT HOME, NOT AT WORK**]

1. How likely are you to use less water when showering/irrigating?

1 – Very unlikely   2 – Somewhat unlikely   3 – Neutral   4 – Somewhat likely   5 – Very likely

2. How likely are you to turn off the lights/air conditioning when not necessary?

1 – Very unlikely   2 – Somewhat unlikely   3 – Neutral   4 – Somewhat likely   5 – Very likely

3. To what extent do you practice recycling?

1 – Not at all   2 – Rarely   3 – Regularly   4 – Often   5 – All the time

4. To what extent do you use energy-saving appliances (light bulbs, refrigerators)?

1 – Not at all   2 – Rarely   3 – Regularly   4 – Often   5 – All the time

5. How likely are you to sign a petition or write a letter about an environmental issue?

1 – Very unlikely   2 – Somewhat unlikely   3 – Neutral   4 – Somewhat likely   5 – Very likely

6. How likely are you to talk to an official or participate in community action about an environmental issue?

1 – Very unlikely   2 – Somewhat unlikely   3 – Neutral   4 – Somewhat likely   5 – Very likely

Part II

1) Were you born in the United States or in another country? If another, which one?

___United States   ___Other (please specify):

2) What is your age? If not born in the U.S., what was your age when you came to this country?

3) What is your gender?

___Male   ___Female

4) For how long have you resided in Arizona?

___Less than 1 year   ___1-5 years   ___5-10 years   ___10-20 years   ___Over 20 years

5) How often do you engage in leisure activities in nature, such as going to a picnic or traveling?

___A few times per month   ___Every few months   ___Once a year or less

6) How is the climate of Arizona affecting you?

___Too hot and dry   ___Mild discomfort   ___Ok with it   ___Could use more rain   ___I love the desert

7) How aware would you be of the existence of a polluting agent in your neighborhood?

___Not aware at all
___Would have heard rumors, but not pay attention
___Would seek information for myself
___Would inform others of risk
___Would be very concerned and take action for my neighborhood

Appendix B - Survey (Spanish)

Declaración del consentimiento
"Los propósitos de este proyecto son solamente académicos y no se utilizará ninguna información que yo escribo a ningún otro extremo. La colección de esta información es confidencial y toda la información que doy será anónima. No se recogerá NINGUNOS identificadores tales como nombre, dirección o lugar de trabajo. Entiendo que puedo elegir libremente responder a las preguntas después de ser informado sobre el asunto de estas preguntas. Puedo terminar de responder en cualquier momento sin ningunas consecuencias. Entiendo que la terminación y la vuelta del documento significa mi consentimiento en participar en este proyecto."

Parte I [**ESTAS PREGUNTAS ESTÁN ACERCA DE SU CONDUCTA EN CASA, NO EN TRABAJO**]
1. ¿Usaría menos agua cuando bañando o irrigando?
  1 – inverosímil
  2 – probablemente no
  3 – neutral
  4 – probablemente sí
  5 – claro que sí

2. ¿Apagaría la luz y el aire acondicionado cuando no es necesario?
  1 – inverosímil
  2 – probablemente no
  3 – neutral
  4 – probablemente sí
  5 – claro que sí

3. ¿Con qué frecuencia reciclas?
  1 – nunca
  2 – de vez en cuando
  3 – regularmente
  4 – mucho
  5 – siempre

4. ¿Usa máquinas que conservan la energía (luces, refrigeradores)?
  1 – nunca
  2 – de vez en cuando
  3 – regularmente
  4 – mucho
  5 – siempre

5. ¿Firmaría o escribiría una carta sobre una causa ambiental?
  1 – inverosímil
  2 – probablemente no
  3 – neutral
  4 – probablemente sí
  5 – claro que sí

6. ¿Hablaría con oficiales o participaría en una accion de comunidad sobre una causa ambiental?
      1 – inverosímil
      2 – probablemente no
      3 – neutral
      4 – probablemente sí
      5 – claro que sí

Parte II
1. ¿En qué país fue nacido Ud.?
___Estados Unidos
___Otro país (escribirlo):

2. ¿Cuantos anos tiene?

¿Si no fue nacido en los EEUU, cuantos anos tenía cuando llegó a este país?

3. ¿Su género?
___Mujer
___Hombre

4. ¿Por cuánto tiempo ha vivido en Arizona?
___Menos que 1 año
___1 a 5 años
___5 a 10 años
___10 a 20 años
___ Más que 20 años

5. ¿Con qué frecuencia participa en actividades relacionadas coc naturaleza, cómo un "picnic" o viaje?
___Unas veces cada mes
___Algunos meses
___Una vez cada año o menos

6. ¿Como está afectando el clima a Ud.?
___Demasiado caliente y seco
___Un poco incómodo
___Está bien
___ Me gustaría más lluvia
___A mí me encanta el desierto

7. ¿Estaría informado sobre la existencia de contaminación en tu vecindad?
___No sé nada sobre eso
___Habría oído rumores, pero no he pagado atención
___Habría buscado información
___Habría hablado con otros sobre el riesgo
___Sería muy asustado y tomar acción para mi vecindad