Defining Marketing Generational Cohorts in Mexico

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Abstract

Different types of segmentations are used in marketing research studies. The main objective of segmenting a market is to identify homogenous groups in which individuals in the same group are expected to behave similarly with respect to the offered product or service. Customer variables such as gender, age and income are commonly used to identify the different market segments.

Generational cohort theory states that groups of individuals who experience the same social, economic, political and cultural events during their early adulthood or formative years (17 to 23 years old) will be similar in their values during their whole lives and will act similarly when making decisions in different aspects of life, particularly when making decisions as consumers. In Mexico, it is common in practice to use the same generational cohorts as in the U. S., even when there exists evidence that the two groups are not equivalent due to differences in historic events in Mexico and the U.S. In this paper, a methodology based on change point analysis and ordinal logistic regressions is proposed to obtain a new classification of generational cohorts for Mexican consumers using data from a 2010 nationwide survey on the values of individuals across age groups.

Keywords: Generational Cohort Theory, Generational Marketing, Values, Change Point Analysis, CUSUM, Logistic Regression, Ordinal and Multinomial Logistic Regression.

1. Introduction

In the sociology literature, Mannheim (1952, first published in 1923) is one of the first systematic treatments of the concept of generational cohort (see Pilcher, 1994), in which the experiences that individuals have in the period of early adulthood, from seventeen to the early twenties, are considered to be determinants of certain modes of decision making and behaviors that persist over their lifetime. These generational cohorts have common core values that do not change in the course of cohort members' lives.

Schwartz (1992) considers values to be guiding principles in life with five characteristics: "Values (1) are concepts or beliefs, (2) pertain to desirable end states or behaviors, (3) transcend specific situations, (4) guide selection or evaluation of behavior and events, and (5) are ordered by relative importance" (see also Schwartz and Bilsky 1987 and 1990). Rokeach (1973) defines value as "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" and makes a difference between "instrumental" (mode of conduct) and "terminal" (end-state of existence) values and presents a survey named the Rokeach Value Survey (RVS), which is a 36-item questionnaire with 18 items related to instrumental values and 18 items related to terminal values. The instrumental values are phrased as the following adjectives: ambitious, helpful, capable, polite, honest, imaginative, obedient, intellectual, loving, logical, courageous, independent, broad-minded, clean, responsible, forgiving, cheerful and self-controlled. The terminal values are phrased as nouns and include true friendship, a comfortable life, a sense of accomplishment, an exciting life, a world at peace, a world of beauty, family security, happiness, equality, inner harmony, national security, pleasure,

salvation, social recognition, mature love, freedom, wisdom and self-respect. Many of these values can be grouped in common dimensions. For a discussion of the use of the Rokeach paradigm in cross-cultural marketing see Munson and McIntyre (1979). Inglehart (1977) proposes that values can be arranged from material to postmaterial values in a manner similar to Maslow's (1954) hierarchy of needs. Individuals living in societies in which basic needs are largely satisfied will concentrate in postmaterial values that are contrary to values related to basic physical and economic security.

Schwartz (1992) proposed a circumplex structure of values in which the values are placed on the circumference of a circle to reflect that the association between the values increases as the distance between them in the circle decreases. Schwartz (1992 and 2004) identified ten different values (included inside parentheses), which are grouped into four dimensions in the circle in the following order: Openness to Change (self-direction, stimulation and hedonism), Self-Enhancement (hedonism, achievement and power), Conservation (security, conformity and tradition) and Self-Transcendence (benevolence and universalism). In the circle, the dimension Openness to Change opposes Conservation, indicating a conflict between independent thought and action (individualism) versus the preservation of traditional practices and preservation of stability (conformism). Hedonism shares elements of the dimensions of Openness to Change and Self-Enhancement. In a similar way, the Self-Transcendence dimension opposes Self-Enhancement, reflecting a conflict between the concern for the welfare of others (altruism) and the desire for personal success over others (egoism). Table 1 includes the explanation of the Schwartz dimensions and values as appears in Schwartz (1992).

DIMENSION	VALUE TYPE	MOTIVATIONAL GOAL	SET OF VALUES INTENDED TO MEASURE IT
Openness to Change (Individualism)	Self-direction	Independent thought and action	Creativity, freedom, choosing one's own goals, curious, independent
	Stimulation	Excitement, novelty and challenge in life	A varied life, an exciting life, daring
	Hedonism	Pleasure or sensuous self-gratification	Pleasure, enjoying life
Self-Enhancement (Egoism)	Hedonism	Pleasure or sensuous gratification self-gratification	Pleasure, enjoying life
	Achievement	Personal success through demonstrating competence according to social standards (social esteem)	Ambitious, success, capable, influential
	Power	Attainment of social status and prestige, and control or dominance over people and resources (social esteem)	Authority, wealth, social power, preserving my public image, social recognition
Conservation (Conformism)	Security	Safety, harmony, and stability of society, of relationships and of self.	Social order, family security, national security, reciprocation of favors, clean, sense of belonging, healthy
	Conformity	Restraint of actions, inclinations and impulses likely to upset or harm others and violate social expectations or norms	Obedient, self-disciplined, politeness, honoring one's parents and elders
	Tradition	Respect, commitment and acceptance of the customs and ideas that one's culture or religion impose on the individual	Respect for tradition, humble, devout, accepting my portion in life, moderate
Self-Transcendence (Altruism)	Benevolence	Concern for the welfare of close others in everyday interaction	Helpful, loyal, forgiving, honest, responsible, true friendship, mature love
	Universalism	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature	Broad-minded, social justice, equality, world at peace, world of beauty, unity with nature, wisdom, protecting the environment

Table 1: Schwartz circle values, value types and dimensions.

Essentially, the Schwartz circle of values contrasts independence of thought and action (individualism) versus conformity (conformism) and concern for others (altruism) versus pursuit for personal success (egoism). Schwartz considered a fifth value type called spirituality, mainly related to religion, which will be included in the analysis in this paper.

There exist different surveys that in their questionnaires include items that operationalize each value. For example, the World Values Survey, WVS, (WORLD VALUES SURVEY 1981-2008 OFFICIAL AGGREGATE v.20090901, 2009) includes responses to questions related to values, from 1981 to 2007, in 87 societies, over more than 256,000 interviews in total. One of the countries included in the WVS is Mexico, but the last wave was in 2005 and only includes data for individuals born before 1989. More recently, in 2010, a nationwide survey called ENVUD2010 (What divides and unites Mexicans) collected data from individuals of different

ages in rural and urban areas of Mexico. The sample size is equal to 15,910. This survey was funded by Banamex and Fundación Este País and downloaded from www.bdsocial.org.mx. In this paper, the ENVUD2010 is used to obtain the generational cohorts in Mexico because it is more recent and has a larger sample size than the WVS in Mexico and because many questions in ENVUD2010 are similar to those in WVS, which enables the operationalization of the values in Inglehart's (1977) postmasterialism hierarchy and Schwartz's (1992) circle of values.

From an exploratory analysis of data from the ENVUD2010, it was clear that the analysis should be restricted to individuals living in urban areas. When including the data of individuals from rural areas, it was not possible to identify different homogeneous groups.

In marketing, Meredith, Schewe and Karlovich (2007) use generational cohort analysis to identify seven generational cohorts in the U.S. The core values are formed during early adulthood, from 17 to 23 years of age. These core values define consumer behavior that may be considered, for example, in the segmentation of a market in terms of generational cohorts or in the design of marketing strategies. Meredith, Schewe and Karlovich (2002) also indicate that younger generational cohorts are converging around the world due to the globalization in communications, as the use of the Internet is more common in many countries. Other articles pointing to the usefulness of generational cohorts in marketing are Meredith and Schewe (1994), Noble and Schewe (2003), Schewe, Meredith and Noble (2000) and Brosdahl and Carpenter (2011). In consumer behavior, some important references of the use of human values are Allen and Ng (1999) and Allen (2001). References that include the identification of generational cohorts outside the U.S. include Schewe and Meredith (2004), who identify generational cohorts in Russia and Brazil; Egri and Ralston (2004), who compare generational

cohorts in China and the U.S.; and Fukuda (2010), who also compares vehicle expenditures for different generational cohorts in U.S. and Japan. In Mexico, it is common practice among marketing researchers to use the same generational cohorts as in the U.S., although historic events that could shape core values during the formative years of the individuals differ substantially between the two countries. For example, World War II did not have the same effect in Mexico as it did in the U.S., and Mexico suffered many economic crises during the second half of the 20th-century, which did not happen in the U.S. Therefore, the main objective of this paper is to define generational cohorts in Mexico by identifying homogeneous groups in their core values and relate these homogeneous groups to historic events in Mexico that happened during the early adulthood or formative years (17 to 23 years of age) of the individuals in each of the homogeneous groups. The identification and characterization of the different generational cohorts in Mexico is performed by the application of statistical methods such as cumulative sums (CUSUM, see Barnard, 1959 and Montgomery, 2009) to identify change points in a time series and, logistic regressions and ordinal and multinomial logistic regressions to identify homogeneous age groups in terms of their responses to questions related to values in the ENVUD2010.

The process of identifying different generational cohorts in a country can be divided into two steps. The first step is the identification of the most important economic, political, cultural, natural and technological (historic) events in the history of the country that may have been responsible for defining the values of different generations. The second step consists of the identification of the intervals of years where the birth of a member of a generational cohort could occur. In the case of Mexico, the following statistical methodology is proposed in a

second step: the average of different variables of the ENVUD2010 were obtained by the year of birth of the respondents to construct different time series in which a change point analysis based on cumulative sums, CUSUM, was applied to identify the intervals of birth years corresponding to different generational cohorts. The time intervals of the different generational cohorts obtained by the CUSUM analysis are confirmed by fitting an ordinal logistic regression to the data of all of the individuals in the ENVUD2010 who were born in the time interval of the generational cohort. The dependent variable is an ordinal variable that identifies each of the consecutive years included in the time interval defining the generational cohort. If the generational cohort is well defined, one expects that all of the considered variables of the ENVUD2010 are not significant; i.e., all of the coefficients associated with explanatory variables are not significantly different from zero. If one aggregates the data for individuals in a year that follows the upper limit of the time interval of the generational cohort, one expects that there should exist at least one significant variable because the individuals in the new year belongs to the following generational cohort.

At the end, a multinomial logistic regression model (see Franses and Paap, 2001), using as its dependent variable the generational cohort to which the individual belongs, was fitted to characterize the differences among the generational cohorts and the most important variables in the ENVUD2010 to discriminate among different generational cohorts. In addition, univariate logistic regressions, using as the dependent variable an indicator variable for the individuals in a generational cohort, were implemented to identify variables distinguishing individuals in the considered generational cohort from individuals in any other generational cohort.

The paper is divided into five sections, including this introduction. The second section includes a summary of the most important historic events in Mexico since 1935. The third section includes a description of the selected variables from the ENVUD2010 that were used in the statistical analysis. The fourth section presents the results of the statistical change point analysis based on CUSUM to identify the time intervals of each generational cohort. In addition, in the fourth section, the results of univariate and multinomial logistic regressions to identify the differences among the generational cohorts identified in the previous section are included. The fifth section presents the table of the proposed classification of generational cohorts in Mexico and their main characteristics in terms of values and the historic events that give rise to them. Finally, the conclusions for this article are presented.

2. Mexican Historic Events

The first step to identify different generational cohorts in a country or population is to make a list of social, economic, political, technological and cultural (historic) events that may shape the values of individuals during their formative years (17 to 23 years old). Table 1 presents a chronological list of historic events in Mexico.

YEAR	PRESIDENT	EVENTS
1935	*Cárdenas*	*Cárdenas* distributes land to the peasants
1936	*Cárdenas*	*Cárdenas* deports *Calles* to the United States
1937	*Cárdenas*	Rails expropriation
1938	*Cárdenas*	Oil expropriation
1939	*Cárdenas*	Word War II
1940	*Cárdenas-Ávila Camacho*	*Ávila Camacho* wins the president election
1941	*Ávila Camacho*	Newspapers *El Sol de México* and *ESTO* begin distribution
1942	*Ávila Camacho*	Mexico declares war with Japan, Germany and Italy
1943	*Ávila Camacho*	Meeting between Roosevelt and *Ávila Camacho*
1944	*Ávila Camacho*	*Ávila Camacho* announces literacy program
1945	*Ávila Camacho*	End of World War II
1946	*Ávila Camacho-Alemán*	The ruling party *PRM* change its name to *PRI*
1947	*Alemán*	Economic development
1948	*Alemán*	Devaluation: exchange rate moves from 4.85 to 8.65 pesos per dollar
1949	*Alemán*	*Alemán* gains absolute power
1950	*Alemán*	First TV channel: XHTV 4
1951	*Alemán*	Creation of teachers unions with political objectives
1952	*Alemán-Ruíz Cortines*	125000 televisions in Mexico City
1953	*Ruíz Cortines*	Women are allowed to vote
1954	*Ruíz Cortines*	Devaluation: exchange rate moves from 8.65 to 12.50 pesos per dollar

1955	*Ruíz Cortines*	Development of heavy industry in Mexico.
1956	*Ruíz Cortines*	Development of urbanism e.g. *Torre Latino* in Mexico City
1957	*Ruíz Cortines*	Film star *Pedro Infante* and artist *Diego Rivera* dies
1958	*Ruíz Cortines-López Mateos*	Building of highways, e.g., *México-Querétaro*
1959	*López Mateos*	Rail leaders such as *Demetrio Vallejo* are imprisoned
1960	*López Mateos*	Medical social security system announced: *ISSSTE and DIF*
1961	*López Mateos*	Food security government agency CONASUPO instituted
1962	*López Mateos*	Guerrilla leader *Rubén Jaramillo* is murdered
1963	*López Mateos*	Infrastructure development undertaken
1964	*López Mateos-Díaz Ordaz*	Muralist *Siqueiros* released from prison
1965	*Díaz Ordaz*	Strike of medical doctors in *IMSS* and *ISSSTE*
1966	*Díaz Ordaz*	Student repression in *Michoacán* (*Universidad San Nicolás Hidalgo*)
1967	*Díaz Ordaz*	One million telephones in Mexico
1968	*Díaz Ordaz*	Student repression and killing in Mexico City (*Tlatelolco*). Closing of *UNAM* and *IPN*. Olympic Games held in Mexico.
1969	*Díaz Ordaz*	First subway in Mexico City (*Línea 1*)
1970	*Díaz Ordaz-Echeverría*	Rail leaders *Demetrio Vallejo* and *Valentín Campa* are released. FIFA World Cup held in Mexico.
1971	*Echeverría*	Students killed in "*El Halconazo*"
1972	*Echeverría*	Government system to promote the building of homes: *FOVISSSTE* and *INFONAVIT*
1973	*Echeverría*	New guerrilla groups: *FARP* and Comunist League
1974	*Echeverría*	Guerrilla kidnaps the president's father in law and a Mexican senator
1975	*Echeverría*	International Women's Conference in Mexico
1976	*Echeverría-López Portillo*	Devaluation: Exchange rate moves from 12.50 to 26.00 pesos per dollar. High inflation.
1977	*López Portillo*	External debt increases very rapidly
1978	*López Portillo*	Oil boom in Mexico
1979	*López Portillo*	Pope John Paul II visits Mexico
1980	*López Portillo*	Official application of a value-added tax (*IVA* 10%)
1981	*López Portillo*	North-South Conference held in Cancun
1982	*López Portillo-De la Madrid*	Devaluation: Exchange rate moves from 22 to 70 pesos per dollar. Banking system nationalized. High inflation (60%).
1983	*De la Madrid*	High inflation (80%). First HIV cases in Mexico.
1984	*De la Madrid*	Reporter *Manuel Buendía* is murdered
1985	*De la Madrid*	Earthquake of magnitude 8.0: serious damage in Mexico City with at least 10,000 deaths
1986	*De la Madrid*	*De la Madrid* visits Japan and China. FIFA World Cup held in Mexico.
1987	*De la Madrid*	High inflation (150%)
1988	*De la Madrid-Salinas*	Hurricane Gilbert causes massive financial damage
1989	*Salinas*	Salinas sends the leader of *PEMEX* (Public oil company) to prison. The left-wing party *PRD* is founded.
1990	*Salinas*	Restructuring of Mexican external debt
1991	*Salinas*	Closing of the *Azcapotzalco* Refinery in Mexico City due to pollution
1992	*Salinas*	Large explosion in *Guadalajara* due to problems at a gas station
1993	*Salinas*	New peso: 1 new peso = 1,000 pesos. Low inflation (7%).
1994	*Salinas-Zedillo*	Devaluation: Exchange rate moves from 3.50 to 6.50 pesos per dollar. Guerrilla: Zapatista Army of National Liberation (*EZLN*). PRI presidential candidate Colosio is murdered . NAFTA.
1995	*Zedillo*	First elections held in Distrito Federal
1996	*Zedillo*	*PRD* president: *López Obrador*
1997	*Zedillo*	*Cárdenas* wins elections for government head of the Distrito Federal.
1998	*Zedillo*	Kidnapping: "*Mochaorejas*"
1999	*Zedillo*	Fourth visit of Pope John Paul II to Mexico
2000	*Zedillo-Fox*	*Fox* wins presidential election: He is the first president from an opposition party since 1910. His win ends 71 years of *PRI* control.
2001	*Fox*	Terrorist attacks in New York on September 11. Problems with farmers for the construction of an airport in *Texcoco*.
2002	*Fox*	Law of access to government public information. Federal Agency of Investigation (AFI).
2003	*Fox*	*Fox* opposes to Iraq war
2004	*Fox*	Conflict between *Fox* and *López Obrador* ("*Desafuero*" of *López Obrador*)
2005	*Fox*	Record housing construction, growth with low inflation, record level of international reserves
2006	*Fox-Calderón*	*PRD* and *López Obrador* protests in *Reforma* (main street in Mexico City). Represents the beginning of *Calderón*'s war against drug dealers and crime organizations.
2007	*Calderón*	*Calderón* continues war against drug dealers and criminal organizations: Insecurity ensures
2008	*Calderón*	*Mouriño* (Secretary of State) dies in an airplane crash

2009	*Calderón*	The A(H1N1) flu poses a sanitary and economic crisis
2010	*Calderón*	Mexico's Independence Bicentennial Celebrations
2011	*Calderón*	*Blake* (secretary of state) dies in a helicopter crash
2012	*Calderón-Peña*	*PRI*'s presidential candidate *Peña* wins the presidential election. Students protests against *PRI* and TV channels (*Yo soy 132*). *López Obrador* protests the result of the presidential election.

Table 2: List of Mexican historic events from 1935 to 2012.

Clearly, the events related to economic crises, such as those in 1954, 1982 and 1994; political events, such as the student's rebellion of 1968 and the end of a party's 70-year control of the government in 2000; international events, such as the Olympics in 1968 and the FIFA World Cup tournaments in 1970 and 1986; natural catastrophic events, such as the earthquake of 1985; technological events, such as the introduction of the TV at the end of the 1940s and the popularization of the internet in 2006; and religious events, such as Pope John Paul's visits to Mexico are among the most important historic events in Mexico.

3. Mexican Values Survey ENVUD2010

The dataset used to identify the generational cohorts was obtained from the ENVUD 2010. This survey was sponsored by *Banamex* and *Fundación Este País*, and the interviews were held between November 13 and December 15, 2010. The sample design was stratified by state and by the type of electoral geographic unit (urban, rural and mixed). A total of 15,910 interviews were held. The population under study is the set of individuals with at least 18 years of age. From the results of an explanatory analysis, it was clear that only the responses of individuals in urban areas could be used because when using the data of individuals in rural areas, it was not possible to identify any homogeneous groups.

The questionnaire includes many questions related to values. Of these questions, we considered those in which the respondent provides a grade from 1 to 10; for example, question 71 is related to economic values, and in the first item, the respondent is asked to give a grade between 1=There should exist greater income equality and 10=There should exist greater differences in income to reflect individual effort.

Table 3 includes the variables that were used in the identification of the time interval of each generational cohort. There are a total of 10,337 interviews in urban areas with individuals who responded to all of the questions in Table 3.

SCHWARTZ VALUE TYPE	VARIABLE NAME	QUESTION	ITEMS	POSSIBLE ANSWERS	MEAN	STANDARD DEVIATION
Universalism	Q8.1EQUALITY	Most important value for Mexicans	Q8.1 Equality	1= The value was mentioned 0= The value was not mentioned	28%	
Universalism	Q8.2JUSTICE		Q8.2 Justice		21%	
Self-Direction	Q8.3LIBERTY		Q8.3 Liberty		26%	
Universalism	Q8.4SOLIDARITY		Q8.4 Solidarity		23%	
Security	Q13.01UNITE.NATIONALISM	Concepts that divide or unite Mexicans	Q13.1 Nationalism	1,2,3,4,5,6,7,8,9,10	7.02	2.35
Conformity	Q13.02UNITE.HISTORY		Q13.2 History		7.42	2.10
Power	Q13.03UNITE.POLITICS		Q13.3 Politics	1=Divide	5.09	2.49
Spirituality	Q13.04UNITE.RELIGIONS		Q13.4 Religions		6.15	2.50
Universalism	Q13.05UNITE.URBAN.VS.RURAL		Q13.5 Urban vs. rural areas	10=Unite	5.65	2.33
Conformity	Q13.06UNITE.YOUNG.VS.OLD		Q13.6 Young vs. old people		5.68	2.33
Universalism	Q13.07UNITE.RACE		Q13.7 Race		5.55	2.39
Security	Q13.08UNITE.SOCIAL.CLASS		Q13.8 Social class		5.08	2.53
Security	Q13.09UNITE.SPORTS		Q13.9 Sports		7.32	2.17
Security	Q13.10UNITE.IDEOLOGY		Q13.10 Ideology		5.91	2.34
Universalism	Q13.11UNITE.REGIONS		Q13.11 Different regions of Mexico		5.98	2.30
Power	Q13.12UNITE.POLITICAL.PARTIES		Q13.12 Political parties		4.76	2.57
Self-Direction	Q26.01TEACH.INDEPENDENCE	What is important to teach a child at home?	Q26.1 Independence	0,1 1=Yes 0=No	52%	
Hedonism	Q26.02TEACH.HARD.WORK		Q26.2 Hard work		62%	
Benevolence	Q26.03TEACH.RESPONSIBILITY		Q26.3 Responsibility		72%	
Self-Direction	Q26.04TEACH.CREATIVITY		Q26.4 Imagination and creativity		44%	
Universalism	Q26.05TEACH.TOLERANCE		Q26.5 Tolerance		49%	
Hedonism	Q26.06TEACH.TO.SAVE.MONEY		Q26.6 To save money		51%	
Achievement	Q26.07TEACH.DETERMINATION		Q26.7 Determination and perseverance		45%	
Spirituality	Q26.08TEACH.RELIGION		Q26.8 Religious faith		30%	
Universalism	Q26.09TEACH.NOT.TO.BE.SELFISH		Q26.9 Not to be selfish		38%	
Conformity	Q26.10TEACH.OBEDIENCE		Q26.10 Obedience		43%	
Self-Direction	Q44.1INTEREST.POLITICS	How much do you …	Q44.1 show interest in politics?	1,2,3,4,5,6,7,8,9,10 1=Nothing/Never 10= /Always	5.32	2.65
	Q44.2KNOW.CIVIL.RIGHTS		Q44.2 know your civil and political rights?		5.65	2.43
	Q44.3PARTICIPATE.ELECTIONS		Q44.3 participate in elections?		6.44	2.70
	Q44.4FOLLOW.POLITICAL.NEWS		Q44.4 follow the news about politics and government?		5.55	2.52
Self-Direction	Q57FREEDOM	Freedom to choose and liberty in your life	Q57 Freedom to choose	1,2,3,4,5,6,7,8,9,10 1=None 10=Full	7.84	1.74

Universalism	Q59ENVIRONMENT	How important is to take care of the environment ?	Q59 Take care of the environment	1,2,3,4,5,6,7,8,9,10 1=Not important 10=Very important	8.97	1.54
Universalism	Q70POLITICS.RIGHT	In politics, do you consider yourself to be left or right wing?	Q70 Left or right in politics	1,2,3,4,5,6,7,8,9,10 1=Left 10=Right	6.20	2.20
Achievement	Q71.1DIFFERENCES.IN.INCOME	In economic terms, do you agree with …?	Q71.1 Greater income equality (1) vs. greater differences in incomes to reflect individual effort (10)	1,2,3,4,5,6,7,8,9,10	5.23	2.73
Self-Direction	Q71.2PUBLIC.PROPERTY		Q71.2 Increase private property (1) vs. increase public (government) property (10)	1=Totally disagree	5.92	2.43
Self-Direction	Q71.3INDIVIDUALS.ECONOMIC.RESP		Q71.3 Government is economically responsible for individuals (1) vs. individuals are economically responsible for themselves (10)	10=Totally agree	5.20	2.64
Self-Direction	Q71.4COMPETION.BAD		Q71.4 Economic competition is good (1) vs. economic competition is bad (10)		4.38	2.64
Universalism	Q71.5DECREASE.TAXES		Q71.5 Increase taxes (1) vs. decrease taxes (10)		5.51	2.51
Self-Direction	Q71.6FREE.MARKET		Q71.6 Economy directed by the government (1) vs. free –market economy (10)		5.46	2.49
Power	Q75.1EASIER.GOVERNMENT	What makes more difficult or easier the economic development of Mexico?	Q75.1 Elected government officials	1,2,3,4,5,6,7,8,9,10	5.47	2.52
Self-Direction	Q75.2EASIER.ENTERPRENEURS		Q75.2 Entrepreneurs		6.40	2.23
Self-Direction	Q75.3EASIER.CITIZENS		Q75.3 Citizens	1=Makes it more difficult	6.53	2.08
Power	Q75.4EASIER.POLITICAL.PARTIES		Q75.4 Political parties		4.98	2.45
Conformity	Q75.5EASIER.LAWS		Q75.5 Laws		5.90	2.36
Power	Q75.6EASIER.BUREAUCRACY		Q75.6 Bureaucracy	10=Makes it easier	5.20	2.44
Universalism	Q75.7EASIER.UNIONS		Q75.7 Unions		5.12	2.44
Universalism	Q75.8EASIER.FOREIGN.INVESTORS		Q75.8 Foreign investors		6.34	2.38
Universalism	Q81.01JUSTIFY.NOT.PAYING.TAXES	Is it possible to justify …?	Q81.1 Not paying taxes	1,2,3,4,5,6,7,8,9,10	2.98	2.63
Conformity	Q81.02 JUSTIFY.ACCEPT.BRIBE		Q81.2 Accepting a bribe		2.75	2.47
Self-Direction	Q81.03 JUSTIFY.HOMOSEXUALITY		Q81.3 Homosexuality	1=Never	4.07	2.92
Self-Direction	Q81.04 JUSTIFY.ABORTION		Q81.4 Abortion		3.48	2.84
Self-Direction	Q81.05 JUSTIFY.DIVORCE		Q81.5 Divorce	10=Always	4.58	3.09
Self-Direction	Q81.06 JUSTIFY.EUTHANASIA		Q81.6 Euthanasia		3.96	3.08
Conformity	Q81.07 JUSTIFY.WIFE.BEATING		Q81.7 Wife beating		2.17	2.22
Conformity	Q81.08 JUSTIFY.MURDER		Q81.8 Murder		2.05	2.14
Conformity	Q81.09 JUSTIFY.MARITAL.INFIDELITY		Q81.9 Marital infidelity		2.79	2.56
Conformity	Q81.10 JUSTIFY.PRETEND.SICK		Q81.10 Pretending being sick		2.72	2.55
Tradition	Q84CONSERVATIVE	Do you classify yourself as conservative or progressive?	Q84 Conservative or progressive	1,2,3,4,5,6,7,8,9,10 1=Progressive 10=Conservative	6.36	2.45
	Q96HAPPY	Degree of happiness	Q96 Happines	1,2,3,4,5,6,7,8,9,10 1=Unhappy 10=Very happy	8.52	1.60
Spirituality	Q100IMPORTANT.GOD	How important is God in your life?	Q100 Importance of God	1,2,3,4,5,6,7,8,9,10 1=Unimportant 10=Very important	9.01	1.76

Spirituality	Q101IMPORTANT.VIRGIN.GDPE	How important is the Virgin of Guadalupe in your life?	Q101 Importance of the Virgin of Guadalupe	1,2,3,4,5,6,7,8,9,10 1=unimportant 10=Very important	8.19	2.77
Tradition	Q102MEXICO.VERY.MODERN	Do you think Mexico is a traditional or very modern country?	Q102 Mexico is traditional or very modern	1,2,3,4,5,6,7,8,9,10 1=Traditional 10=Very modern	5.37	2.84

Table 3: Variables selected from ENVUD 2010.

Question 44 is related to political values, and question 71 is related to economic values. Question 81 concerns fundamental values, such as respect for life, respect for sexual orientations and marital fidelity, among others. The first column of Table 3 includes the value type in the Schwartz circle of values to which the question relates and was used in the characterization of the identified generational cohorts in terms of individualism (vs. conformism) and egoism (vs. altruism) in the next section. The sixth and seventh columns of Table 3 include the mean and standard deviation of the variables for the individuals in urban areas. From the mean values, individuals in urban areas believed Equality to be the most important for Mexicans, History and Sports to be the concepts that most unite Mexicans and Political Parties to be the concept that most divides. Responsibility is the most important value to teach children at home, and religious faith is the least important value. Freedom, care for the environment, the importance of God and the importance of the Virgin of Guadalupe obtained average grades greater than 7.5. As expected, all of the actions in question 81 obtained low average grades with murder being the least justified action. The standard deviations for grade variables are between 1.54 and 3.09.

4. Identifying Generational Cohorts in Mexico: Statistical Analysis

4.1 CUSUM Charts

To identify the limits of the generational cohorts, a change-point CUSUM analysis of the yearly time series of the average of different variables in Table 3 were implemented for the years 1940 to 1992. The years previous to 1940 were not included because there were few observations for these years in the ENVUD2010. Let $Y(1940), Y(1941), \ldots, Y(1991), Y(1992)$, be the time series of yearly averages of a variable of the ENVUD2010 in Table 3. The CUSUM of Y, Y_c, is defined as

$$Y_c(t) = \sum_{k=1940}^{t} (Y(k) - \bar{Y})$$

where $\bar{Y}$ is the mean of all of the Y values. The CUSUM chart is used to detect change points in the original data. The left plot in Figure 1 presents the time series for the yearly averages of variable Q71.11DIFFERENCES.IN.INCOME of ENVUD2010. This variable is related to equality in income versus differences in income to reflect individual effort. The possible values are 1, 2, …, 10, with a value of 10 implying that the respondent totally agrees with the existence of differences in income to reflect individual effort.

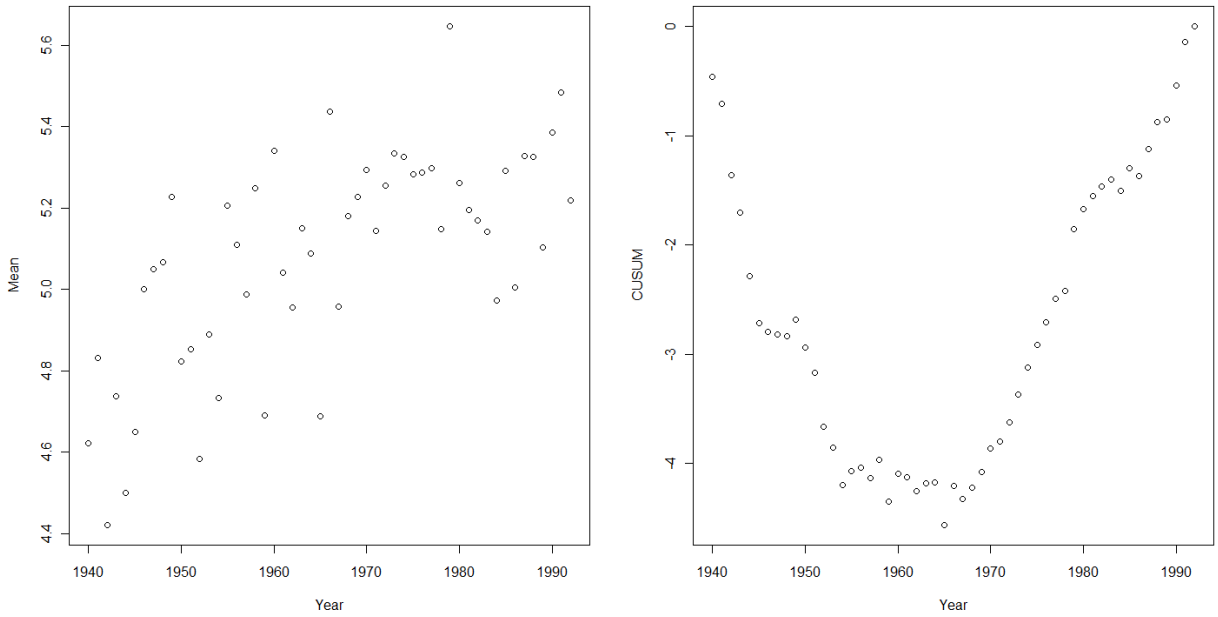

Figure 1: Time series of the yearly mean and CUMSUM of variable Q71.11DIFFERENCES.IN.INCOME of ENVUD2010.

Figure 1 shows a clear increasing trend in the time series. From the point of view of an exploratory analysis, changes in the slope of the CUSUM chart on the right side of Figure 1 reflect changes in the behavior of the yearly mean values around the following years: 1943-44, 1953-54, 1965-66, 1977-78, 1983-84, 1988-89 and 1991-92. These are possible years where a change in the mean of the original time series has changed. The left plot in Figure 2 includes the different lines for the changes of slope in the CUSUM chart.

By using the historic events in Table 1, one can define the intervals of consecutive years for the different generational cohorts. The following statistical model is assumed:

$$Y(k) = \mu_g + \varepsilon_g \quad (1)$$

for $g = 1, \ldots, G$ and $k = 1940, 1941, \ldots, 1992$ where G is the number of generational cohorts, μ_g is the constant mean for generation g and ε_g is an error term with mean 0 and constant

variance σ_g^2. Then, for the years that correspond to the birth years of the members of a same generational cohort, a model with constant mean is assumed. The means and variances of different generational cohorts may differ. By analyzing the CUSUM charts of different variables in the ENVUD2010 included in Table 2 and the historic events in Table 1 and their effects in the coming-of-age years of the individuals (17 to 23 years old), the following intervals for 8 different generations are proposed: 1940-1943, 1944-1953, 1954-1965, 1966-1977, 1978-1983, 1984-1988, 1989-1991 and 1992. The right plot in Figure 2 includes the original time series in Figure 1 with the estimated values of μ_g for $g = 1, \dots, 8$, which corresponds to the mean of the observations in each generational cohort interval. The estimated variances for the eight groups are as follows: 0.0503, 0.0487, 0.0572, 0.0120, 0.0377, 0.0324, 0.0392 and 0. Clearly, the first three generational cohorts have estimated variances larger than the variance of the other generational cohorts.

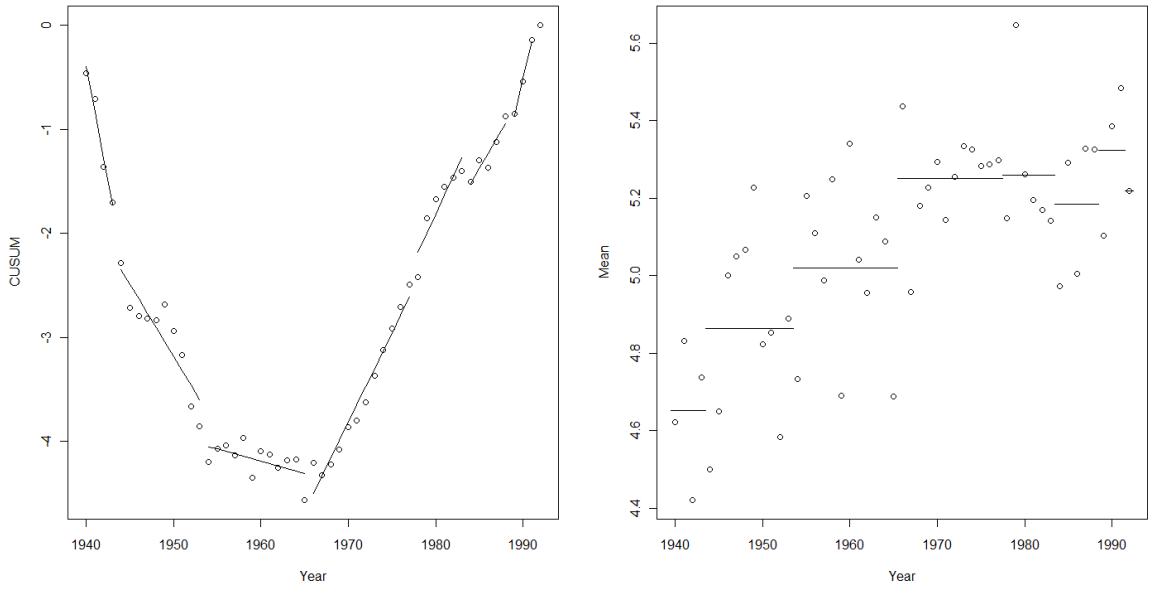

Figure 2: Fitted generational cohort means of question 71 item 1 of ENVUD2010.

The right plot in Figure 3 presents the yearly time series of the mean values of the variable Q81.04 JUSTIFY.ABORTION related to the justification of abortion. Again, an increasing trend is observed. The left plot in Figure 3 includes the CUSUM chart with the fitted lines with different slopes that define the limits of the generational cohorts.

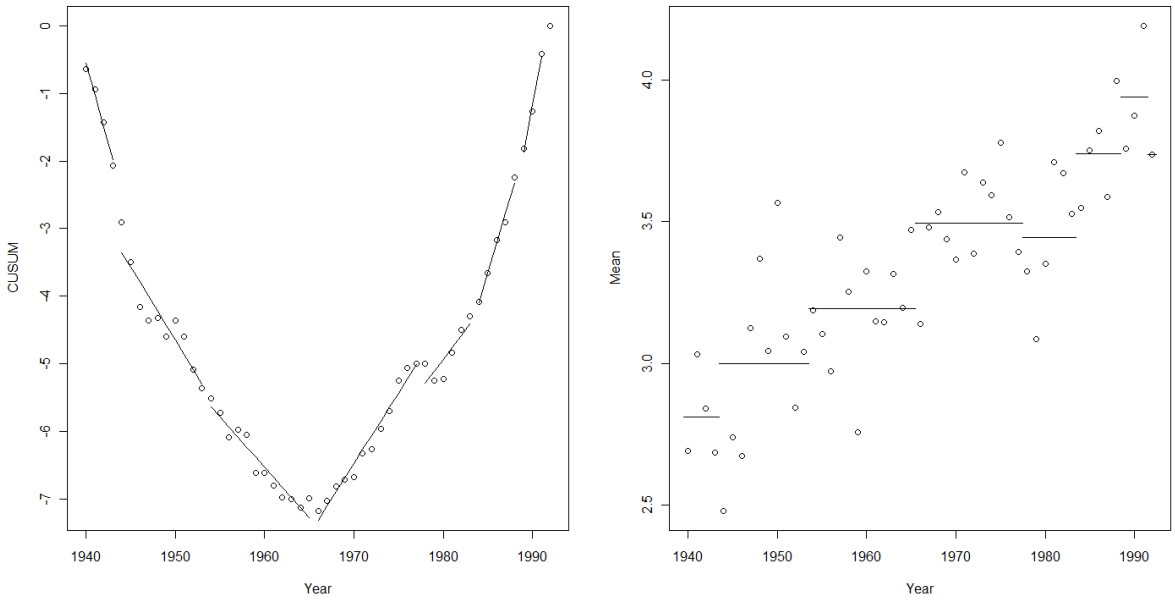

Figure 3: Fitted generational cohort means of question 81 item 6 of ENVUD2010.

To confirm the proposed time intervals for each generational cohort identified by using the CUSUM charts, an ordinal logistic regression using the data from each individual in urban areas in the ENVUD2010 was fitted to the years in the time interval defining the generational cohort. The ordinal logistic regression considers the ordinal variable of the year of birth of each individual in the generational cohort to be the dependent variable and all of the variables in Table 2 to be explanatory variables. For a well-defined time interval for a generational cohort,

one expects that any of the explanatory variables yield information with which to determine the year of birth of the individuals in the same generational cohort. Equivalently, one expects the p-value for the null hypothesis, that all of the coefficients in the ordinal logistic regression are equal to zero, to be greater than the significance level. Table 4 presents the p-values for the starting years of the proposed time intervals for each generational cohort and different ending years.

STARTING AT	ENDING AT	ORDINAL LOGISTIC REGRESSION p-value	STARTING AT	ENDING AT	ORDINAL LOGISTIC REGRESSION p-value
1944	1953	0.2401	**1978**	1980	0.2819
	1954	0.0514*		1981	0.7187
	1955	0.2483		1982	0.4320
	1956	0.3559		1983	0.1893
	1957	0.1367		1984	0.0110**
	1958	0.2090		1985	0.0112**
	1959	0.2333		1986	0.0001***
	1960	0.0664			
	1961	0.1661			
	1962	0.0252**			
	1963	0.0620*			
	1964	0.0932*			
	1965	0.0203**			
	1966	0.0025***			
	1967	0.0016***			
1954	1956	0.1405	**1984**	1986	0.8510
	1957	0.5391		1987	0.9547
	1958	0.2337		1988	0.7045
	1959	0.7795		1989	0.0451**
	1960	0.4583		1990	0.0008***
	1961	0.8247		1991	0.0000***
	1962	0.6784		1992	0.0000***
	1963	0.6395			
	1964	0.7426			
	1965	0.1473			
	1966	0.0469**			
	1967	0.1465			
	1968	0.0077***			
	1969	0.0001***			
1966	1968	0.8652	**1989**	1991	0.4087
	1969	0.5826		1992	0.0069***
	1970	0.0897*			
	1971	0.3352			
	1972	0.9289			
	1973	0.8720			
	1974	0.8098			
	1975	0.5427			
	1976	0.2073			
	1977	0.2542			
	1978	0.0180**			
	1979	0.0008***			
	1980	0.0050***			

Table 4: p-values of ordinal logistic regressions to identify the limits of the time intervals of each generational cohort *=Significant at the 10% level, **=Significant at the 5% level and ***=Significant at the 1% level.

From the results in Table 4, the time interval for the generational cohort starting in 1966 ends in 1977, the one starting in 1978 ends in 1983 and the one starting in 1984 ends in 1988. The time interval for the generational cohort starting in 1954 may end in 1965 or 1967, and the one starting in 1944 may end in 1953 or 1961. Based on the results in Table 4 and the historic events in Table 2, the following generational cohorts with their respective time intervals are defined in Table 5.

GENERATION	TIME INTERVAL	FORMATIVE YEARS	SEQUENCE OF HISTORIC EVENTS	MOVIES, RADIO AND TV	MUSIC
gen0	1911-1932	1928-1949	Oil and rails expropriation World War II Economic development President *Alemán* gains absolute power 1948 Peso devaluation	Golden age of Mexican movies (*Jorge Negrete, Cantinflas, Pedro Infante, Joaquín Pardavé* …) Radio soap operas are very popular Domestic movies: *Vámonos con Pancho Villa* (1935), *Allá en el Rancho Grande* (1936) *Ahí está el detalle* (1940) *El Baisano Jalil* (1942) *Santa* (1943) *Los Tres García* (1946) *Nosotros los Pobres* (1947) *Ustedes los Ricos* (1948) *Salón México* (1948)	*Ranchero* and Romantic Music Domestic music: *Jorge Negrete* *Pedro Infante* *Agustín Lara.*
gen1	1933-1943	1950-1960	In 1953 women are given the right to vote Economic development 1954 Peso devaluation Social security	1950 First TV channel 1958 End of the golden age of Mexican movies 1958 first TV soap opera (*Telenovela*) Domestic movies: *Los Olvidados* (1950), *La Ilusión Viaja en Tranvía* (1953) and *Nazarín* (1958) directed by *Luis Buñuel*. *A.T.M A Toda Máquina!* (1951) *Escuela de Vagabundos* (1954) *Macario* (1959)	*Ranchero*, Romantic and Caribbean Music
gen2	1944-1953	1961-1970	Strike of medical doctors in 1965 Student repression in 1965 Student repression and killing in Mexico City in 1968 1968 Olympic Games in Mexico 1970 FIFA World Cup in Mexico	Open TV covers the majority of urban areas in Mexico Domestic movies: *El Pecador* (1964) *Los Caifanes* (1966) *El Grito* (1968) *Modisto de Señoras* (1969)	Rock and Roll
gen3	1954-1965	1971-1982	Guerrilla groups 1976 Peso devaluation High inflation Oil boom Economic prosperity Rapid increase in external debt 1982 Peso devaluation	TV: *Chespirito* Show (*El Chavo del Ocho*) Domestic movies: *Mecánica Nacional* (1971) and *Cadena Perpetua* (1978) Foreign movies: The Exorcist (1973) Jaws (1975)	Romantic music Domestic music: *José José* and *Julio Iglesias* (Romantic) *Rigo Tovar* (*Tropical*)

				Star Wars (1977) Superman (1978) Grease (1978) Indiana Jones (1981) E.T. (1982)	
gen4	1966-1977	1983-1994	High inflation Video games HIV 1985 Earthquake 1986 FIFA World Cup in Mexico Restructuring of external debt Economic prosperity: NAFTA Growth with low inflation Presidential candidate *Colosio* murdered Revolts in *Chiapas* EZLN 1994 Peso devaluation	Domestic movies: *Nocaut* (1983) *Amor a la Vuelta de la Esquina* (1985) *Sólo con tu Pareja* (1991) Foreign movies: Indiana Jones and the Temple of Doom (1983) Ghostbusters (1984) Back to the Future (1985) Batman (1989) Dead Poets Society (1989) Pretty Woman (1990) The Silence of the Lambs (1991) Jurassic Park (1993) Forrest Gump (1994, The Lion King (1994)	Pop Music Domestic music: *Timbiriche* *Flans* *Pandora* Foreign music: Michael Jackson Madonna Music videos
gen5	1978-1983	1995-2000	President *Zedillo* in office Substantial economic problems *Fox* elected president (first president from an opposition party since 1910)	TV: Tabloid talk shows boom Domestic movies: *Cilantro y Perejil* (1996) *La Ley de Herodes* (1999) *Todo el Poder* (1999) *En el País de No Pasa Nada* (1999) Foreign movies: Independence Day (1996) MIB (1997) Titanic (1997) Good Will Hunting (2007) Toy Story (1999) The Matrix (1999) Gladiator (2000)	Electronic Pop Domestic music: *Fey* *Onda Vaselina*
gen6	1984-1988	2001-2005	9/11 terrorist attacks in New York Economic prosperity Record housing construction Record level of international reserves Growth with low inflation Deep disappointment with high expectations about President Fox	TV: Reality shows boom Domestic movies: *De la Calle* (2001) *Amar te Duele* (2002) *Ciudades Oscuras* (2002) *Nicotina* (2003) *Temporada de Patos* (2004) Foreign movies: The Lord of the Rings (2001) Harry Potter (2001) Shrek (2001) Monsters Inc (2001) Spiderman (2003) Pirates of the Caribbean (2003) The Passion of Christ (2004) The Incredibles (2004) Narnia (2005)	Electronic Pop and Reggaeton Domestic music: *RBD* *Belanova* *Natalia Lafourcade*
gen7	1989-1991	2006-2008	*Calderón* wins in a close presidential election *López Obrador* protests the results of the presidential election Internet boom in Mexico *Calderón*'s war against drugs and criminal organizations Insecurity 2008 world economic crisis	Domestic movies: *Drama/Mex* (2006) *Sultanes del Sur* (2007) *Malos Hábitos* (2007) *La Misma Luna* (2007) Foreign movies: The da Vinci Code (2006) Cars (2006) Ratatouilee (2007) Kung Fu Panda (2008) Madagascar (2008)	Foreign music: Shakira Ricky Martin Rihanna Black Eye Peas Lady Gaga … Domestic music: *Alejandro Fernández* *Paulina Rubio* *Julieta Venegas*

				Iron Man (2008) Batman The Dark Knight (2008) Slumdog Millionnaire (2008)	*Camila*
gen8	1992-…	2009-…	A(H1N1) flu pandemic World economic crisis 2010 Mexican Independence Bicentennial Celebrations 2012 *PRI*'s candidate *Peña* wins the presidential election PRI returns to presidency after 12 years	Domestic movies: *Presunto Culpable* (2009) *El Infierno* (2010) *Un Mexicano Más* (2010) *El 24* (2011) Foreign movies: Avatar (2009) Up (2009) The Twilight Saga: New Moon (2009) Alice in Wonderland (2010) Marvel's the Avengers (2012) The Hunger Games (2012)	Foreign music: Shakira Ricky Martin Rihanna Black Eye Peas Lady Gaga, … Domestic music: *Alejandro Fernández* *Paulina Rubio* *Julieta Venegas* *Camila*

Table 5: Time intervals of the generational cohorts and historic events during the formative years.

We added the generational cohort gen0 with time interval 1911-1932 with only information from the historic events in Mexico contained in Table 2. From the results in Table 4, it is possible for generations gen2 and gen3 to be joined in one generational cohort from 1944 to 1965.

Ordinal logistic regressions were applied to the years in generational cohorts gen 2, gen3, gen4, gen5 and gen6 but used as explanatory variables the questions in the World Values Survey, WVS, (WORLD VALUES SURVEY 1981-2008 OFFICIAL AGGREGATE v.20090901, 2009) related to the 10 value types according to Schwartz (1992) for urban individuals in Mexico. The variables in the WVS are a189 to a198 which are responses to the following prompt: "Indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you?." The valid responses range from 1 (Very much like me) to 6 (Not at all like me) for the following variables: a189 (to think up new ideas and being creative=self-direction), a190 (to be rich=power), a191 (living in secure surroundings=security), a192 (to have a good time=hedonism), a193 (to help people nearby=benevolence), a194 (being very

successful=achievement), a195 (adventure and taking risks=stimulation), a196 (always behaving properly=conformity), a197 (looking after the environment=universalism) and a198 (maintaining tradition=tradition). For variables a189 to a198, dummy variables were constructed with the value 1 if the individual responded 1 (very much like me) or 2 (like me) in the corresponding question. These dummy variables were used in the ordinal logistic regressions for the years in the time interval of a generational cohort as explanatory variables. The p-values for the null hypothesis, that all coefficients in the regression are equal to zero, were equal to 0.8094 for gen2, 0.4065 for gen3, 0.1727 for gen4, 0.8697 for gen5 and 0.5257 for gen6, confirming the classification performed by considering the data from the ENVUD2010.

4.2 Univariate Logistic Regressions

A series of univariate logistic regressions were implemented to identify the characteristics of individuals in a particular generational cohort, in terms of the variables that are significant, when taking as a dependent variable the dummy variable indicating whether the individual belongs to the generational cohort, i.e., whether the year of birth of the individual is inside the interval of years defining the generational cohort. For example, the variable gen2 is equal to 1 if the individual is born between 1932 and 1947; otherwise, the variable gen2 is equal to 0.

Note that the results of the univariate logistic regressions enable the identification of the relevant characteristics of a particular generational cohort when this one is compared to the individuals in all other generational cohorts. In the next subsection, a multinomial logistic regression that allows for the simultaneous comparison of all generational cohorts is fitted.

Table 6 includes the results of the univariate logistic regressions. Only the estimated coefficients of the variables that are significant at the 1% significance level are included in the table. Each column of Table 6 presents the results of the logistic regression for a particular generation.

SCHWARTZ VALUE TYPE	VARIABLE	gen0 1911-1932	gen1 1932-1943	gen2 1944-1953	gen3 1954-1965	gen4 1966-1977	gen5 1978-1983	gen6 1984-1988	gen7 1989-1991	gen8 1992-
Self-Direction	Q8.3LIBERTY								-0.2657	
Universalism	Q8.4SOLIDARITY								-0.3471	
Universalism	Q13.05UNITE.URBAN.VS.RURAL								-0.0776	
Conformity	Q13.06UNITE.YOUNG.VS.OLD								0.0710	
Security	Q13.09UNITE.SPORTS									0.0743
Self-Direction	Q26.01TEACH.INDEPENDENCE				-0.1792	0.1791				
Hedonism	Q26.02TEACH.HARD.WORK								-0.2431	
Hedonism	Q26.06TEACH.TO.SAVE.MONEY		0.3150						-0.3595	
	Q44.1INTEREST.POLITICS								0.0526	
	Q44.2KNOW.CIVIL.RIGHTS	-0.1510								0.1037
	Q44.3PARTICIPATE.ELECTIONS	0.1002				0.0259			-0.0686	-0.2026
	Q44.4FOLLOW.POLITICAL.NEWS				0.0268				-0.0602	
Universalism	Q59ENVIRONMENT					-0.0459		0.0657		
Universalism	Q70POLITICS.RIGHT									0.0685
Self-Direction	Q71.2PUBLIC.PROPERTY			-0.0442						
									0.0503	
Power	Q75.1EASIER.GOVERNMENT								-0.0540	
Self-Direction	Q75.3EASIER.CITIZENS									-0.0710
Power	Q75.4EASIER.POLITICAL.PARTIES								0.0851	
Universalism	Q75.7EASIER.UNIONS			-0.0457	-0.0372		0.0386			
Universalism	Q81.01JUSTIFY.NOT.PAYING.TAXES					0.0240				
Self-Direction	Q81.03 JUSTIFY.HOMOSEXUALITY		-0.0641	-0.0710	-0.0387			0.0644	0.0709	
Self-Direction	Q81.05 JUSTIFY.DIVORCE		-0.0607							0.0491
Tradition	Q84CONSERVATIVE	0.1358	0.1079	0.0819					-0.0756	-0.1071
	Q96HAPPY				-0.0930			0.0631	0.1181	0.1171
Spirituality	Q100IMPORTANT.GOD		0.1086	0.1132	0.0676			-0.0919	-0.1099	-0.0888
Spirituality	Q101IMPORTANT.VIRGIN.GDPE		0.0606		0.0291				-0.0527	
Tradition	Q102MEXICO.VERY.MODERN								0.0383	

Table 6: Univariate logistic regression results.

The main objective of fitting univariate logistic regressions taking as the dependent variable the indicator variable of each generational cohort is the identification of significant variables that distinguish the members of the generational cohorts from the members of any other generation. From the results in Table 6, the members of generational cohort 4 (1966-1977) attach more importance than members of other generational cohorts to teaching children at

home the value of independence, but they attach less importance to taking care of the environment than other cohorts, and it is more justifiable to them not to pay taxes to the government relative to other generational cohorts. These characteristics may result from the fact that the members of this generational cohort, during their formative years, experienced the earthquake of 1985, in which the government demonstrated its incompetence and lack of preparedness to help the civil population. Similarly, teaching children to be independent is the most effective means of preparing them for natural disasters and an incompetent government. For generational cohort 5 (1978-1983), only the variable Q75.7EASIER.UNIONS, related to the perception that unions facilitate the economic development, is significant. This finding is related to the fact that members of generational cohort 5 were those who voted for the first time in the 2000 presidential elections, which ended over 70 years of rule by the same political party. According to members of generational cohort 5, the value of being able to create organizations, such as unions, to defend the rights of citizens or workers is very important. Generational cohort 6 (1984-1988) is the only one that presents a significant positive coefficient associated with taking care of the environment (Q59ENVIRONMENT), the first one with a significant positive coefficient in the justification of homosexuality (Q81.03JUSTIFY.HOMOSEXUALITY) and in the perception of being happy (Q96HAPPY) and the first one with a significant negative coefficient for the importance of God (Q100IMPORTANT.GOD), implying a decrease in the level of spirituality. Generational cohort 7 (1989-1991), whose members have lived their young adulthood amid a drug war between the government and drug dealers and criminal organizations, is the one with the larger number of variables with associated significant coefficients. Given this war scenario, the members of this

generation do not consider that liberty and solidarity to be values that identify Mexicans (Q8.3LIBERTY and Q8.4SOLIDARITY), and they believe that it is not necessary to teach children at home hard work or to save money (Q26.02TEACH.HARD.WORK and Q26.06TEACH.TO.SAVE.MONEY), it is necessary to increase the government's ownership of industry (Q71.2PUBLIC.PROPERTY) and the government inhibits economic development, but political parties facilitate it. This is the first generation in which the coefficient associated with being conservative is negative, meaning that they consider themselves to be more progressive (Q84CONSERVATIVE). They place less importance than other generational cohorts on God and the Virgin of Guadalupe (Q100IMPORTANT.GOD and Q101IMPORTANT.VIRGIN.GDPE). Although generational cohorts 7 (1989-1991) and 8 (1992) lived their early adulthood in a drug war, the economic condition during their early adulthood was very good in comparison with previous generations that suffered long and difficult economic crises. This characteristic may be the main reason why the coefficient representing being happy (Q96HAPPY) is positive and significant in both generational cohorts and why the coefficient associated with the variable Q102.MEXICO.VERY.MODERN, which is related to the opinion that Mexico is a very modern country against the perception that Mexico is a traditional country, presents a positive and significant value for generational cohort 7. In addition, the generational cohorts 6 and 7 present significant positive coefficients for the justification of homosexuality (Q81.03JUSTIFY.HOMOSEXUALITY). Generational cohort 8 (1992) is the only one that presents significant positive coefficients for the variables Q13.09UNITE.SPORTS, Q44.2KNOW.CIVIL.RIGHTS, Q70POLITICS.RIGHT and Q81.05JUSTIFY.DIVORCE, which reflects that the members of this generational cohort, in comparison with the members of other

generational cohorts, consider sports to be something that unite Mexicans, know their civil rights (which is very important in a war scenario), are more right-wing oriented in politics and find divorce more justifiable.

When analyzing the results for generational cohorts 0 (1911-1932), 1 (1932-1943), 2 (1944-1953) and 3 (1954-1965), one immediately identifies the significant coefficients as related to variables reflecting a more traditional view of the world. For these groups, divorce and homosexuality are less justifiable (Q81.05JUSTIFY.DIVORCE for generational cohort 1 and Q81.03JUSTIFY.HOMOSEXUALITY for generational cohorts 1, 2 and 3), God and the Virgin of Guadalupe are more important compared to other generational cohorts (Q100IMPORTANT.GOD for generational cohorts 1,2 and 3 and Q101IMPORTANT.VIRGIN.GDPE for generational cohorts 1 and 3), it is more important compared to other generational cohorts to teach children at home to save money (Q26.06TEACH.TO.SAVE.MONEY for generational cohort 1) and less important to be independent (Q26.01TEACH.INDEPENDENCE for generational cohort 3). Compared to other generational cohorts, these generational cohorts are more against public ownership of industry (Q71.2PUBLIC.PROPERTY for generational cohort 2) and more strongly believe that unions do not facilitate the economic development (Q75.7EASIER.UNIONS for generational cohorts 2 and 3). Although univariate logistic regressions are a valuable resource with which to compare one generational cohort against all of the other generational cohorts taken as one, it is important to identify significant variables that are related to a particular generational cohort when comparing it with all of the other generational cohorts simultaneously. For this reason, in the next subsection, a multivariate logistic regression is fitted to the data at the individual urban level of the ENVUD2010.

4.3 Multinomial Logistic Regression

Table 7 includes the results of the multinomial logistic regression when using as the dependent variable a nominal variable with 8 levels, one level for each generational cohort in Table 5 (gen0, gen1, …, gen8). Only the estimated coefficients that were significant at the 1% significance level are included in Table 7. In addition, the coefficients of the generational cohorts gen0 (1911-1932), gen1 (1933-1943) and gen2 (1954-1965) were not significantly different and were considered to be one generational cohort in the final multinomial model. The union of these three generational cohorts is the base category.

SCHWARTZ VALUE TYPE	VARIABLE	gen3 1954-1965	gen4 1966-1977	gen5 1978-1983	gen6 1984-1988	gen7 1989-1991	gen8 1992-
Power	Q13.03UNITE.POLITICS	0.0568				0.0705	
Spirituality	Q13.04UNITE.RELIGIONS		-0.0435			-0.0785	
Universalism	Q13.05UNITE.URBAN.VS.RURAL					-0.1137	
Conformity	Q13.06UNITE.YOUNG.VS.OLD				0.0666	0.0989	
Security	Q13.09UNITE.SPORTS				0.0544	0.0700	0.1027
Self-Direction	Q26.01TEACH.INDEPENDENCE		0.2019				
Hedonism	Q26.02TEACH.HARD.WORK					-0.3256	
Hedonism	Q26.06TEACH.TO.SAVE.MONEY		-0.2057	-0.2471	-0.3216	-0.5465	
Spirituality	Q26.08TEACH.RELIGION			-0.2184		-0.3040	-0.4438
Self-Direction	Q44.2KNOW.CIVIL.RIGHTS						0.1264
	Q44.3PARTICIPATE.ELECTIONS				-0.0643	-0.1111	-0.2343
Self-Direction	Q57FREEDOM				0.0893		
Universalism	Q59ENVIRONMENT		-0.0890	-0.0817	-0.0927		
Achievement	Q71.1DIFFERENCES.IN.INCOME		0.0336				
Self-Direction	Q71.2PUBLIC.PROPERTY			0.0422		0.0668	
Power	Q75.1EASIER.GOVERNMENT					-0.0861	
Power	Q75.6EASIER.BUREAUCRACY						0.1079
Universalism	Q75.7EASIER.UNIONS			0.0671	0.0699		
Self-Direction	Q81.03 JUSTIFY.HOMOSEXUALITY		0.0573	0.0644	0.1097	0.1020	0.0863
Self-Direction	Q81.04 JUSTIFY.ABORTION			-0.0492			
Self-Direction	Q81.05 JUSTIFY.DIVORCE		0.0549	0.0517	0.0498	0.0715	0.0932
Tradition	Q84CONSERVATIVE	-0.0758	-0.0901	-0.1225	-0.1580	-0.1709	-0.2057
	Q96HAPPY				0.1064	0.1504	0.1507
Spirituality	Q100IMPORTANT.GOD		-0.0864		-0.1471	-0.1824	-0.1678
Spirituality	Q101IMPORTANT.VIRGIN.GDPE			-0.0525	-0.0531	-0.0790	-0.0659
Tradition	Q102MEXICO.VERY.MODERN			0.0393		0.0598	

Table 7: Multinomial logistic regression results.

Table 7 shows that some coefficients were significantly different from zero for only one generation. These coefficients identify important unique characteristics of the generational cohort with respect to other generational cohorts. Generational cohort gen4 (1966-1977) is

uniquely characterized by the fact that its members believe the most important value to teach children at home to be independence. Given that this generation lived their formative years during difficult economic times due to the 1982 economic crisis and the earthquake of 1985, it is logical that they believe that the best value for children to be independence because it is an important value for survival in times of economic problems or natural disasters. In addition, another unique characteristic of generational cohort 4 (1966-1977) is that this group believes that there should exist differences in salary to reflect individual effort. This unique characteristic of generational cohort 4 may be related to the fact that its members lived during their formative years the opening of the Mexican economy with the signing by the federal government of trade agreements such as NAFTA. The members of generational cohort 6 (born 1984-1988) believe freedom to be a very important value. This generational cohort comprises individuals whose formative years correspond to the first years of the mandate of President Fox. This presidential mandate is characterized as being the first in over 70 years in which a president from a party other than PRI ruled the country. In this sense, the members of generational cohort 6 experienced an event during their formative years that they consider to constitute liberation from an old regime. Generational cohort 8 (1992) is characterized by the fact that its members know their civil rights. It has this characteristic because the members of generational cohorts 7 and 8 lived their formative years during the drug war waged by the federal government against drug dealers and criminal organizations. In a war environment, it is important to know one's civil rights and discourage potentially illegal acts by elements of the government such as the army or federal police. For generational cohort 7 (1989-1991), a similar effect is observed because the members of this generational cohort believe that the

government inhibits economic development, that it is not important to teach hard work to children at home and that Mexicans are divided by differences between urban and rural areas. The members of generational cohort 5 (1978-1983) were influenced during their formative years by the Pope John Paul II's visit to Mexico, and they present the unique characteristic of more strongly finding abortion unjustifiable compared to other generational cohorts. In addition, the members of generational cohort 8 (1992) believe bureaucracy to be important for a country's economic development. This finding may be explained by the efficient operation of the bureaucracy in public medical services during the A(H1N1) flu pandemic in 2009 that occurred during their formative years. Other explanatory variables in the multinomial logistic regression reflect changes in the perception through the generations. For example, the generational cohorts have become less conservative or, equivalently, more progressive. This fact is evident by the increase in the absolute value of the coefficient associated with variable Q84CONSERVATIVE from generation 3 to generation 8. A similar effect is observed for the variable Q26.06TEACH.TO.SAVE.MONEY from generation 4 to generation 7, the variable Q26.TEACH.RELIGION for generational cohorts 5, 7 and 8; Q44.3PARTICIPATE.ELECTIONS for generational cohorts 6, 7 and 8 that could be only an effect of the age of the respondents when the survey was distributed in 2010. Among this group of explanatory variables, the coefficients associated with the variables Q81.03JUSTIFY.HOMOSEXUALITY and Q81.05JUSTIFY.DIVORCE present a pattern in generational cohorts 4 to 8 that reflects, in general terms, more tolerance towards homosexuality and divorce through time. However, in the last generational cohort 8 (1992), a change in the trend is observed for the variable Q81.03JUSTIFY.HOMOSEXUALITY. The inverse pattern is observed for the variables Q100.IMPORTANT.GOD and

Q101.IMPORTANT.VIRGIN.GDPE, reflecting a decrease in the importance of God and the Virgin of Guadalupe through the generational cohorts. Again, for these two variables, the trend is reversed for generational cohort 8 (1992). Note that the only generational cohorts that consider themselves to be happy are generational cohorts 6, 7 and 8, with an increasing trend in the values of the estimated coefficients. This finding may be an effect whereby these 3 generational cohorts are the only ones whose members have lived during good economic conditions. There are some explanatory variables that are significant only for two generational cohorts; for example, the variable Q13.03UNITE.POLITICS only has a significant positive coefficient for generations 3 and 7. Similarly, Q13.06UNITE.YOUNG.VS.OLD has significant positive coefficients for generations 6 and 7, Q71.2.PUBLIC.PROPERTY for generations 5 and 7, as do Q75.7EASIER.UNIONS for generations 5 and 6 and Q102MEXICO.VERY.MODERN for generations 5 and 7. The variable Q13.04UNITE.RELIGIONS has significant negative coefficients for generations 4 and 7. Finally, the variable related to taking care of the environment, Q59ENVIRONMENT, presents negative coefficients for generations 4, 5 and 6.

With regard to Schwartz circle of values, it appears that an increase in individualism and a decrease in spirituality occurred over time. To confirm these empirical facts, an index of individualism (vs. conformism) and an index of egoism (vs. altruism) were constructed by calculating the estimated probability under the multinomial logistic regression using the variables in Table 7 related to individualism and egoism.

GENERATIONAL COHORT	BIRTH TIME INTERVAL	ESTIMATED PROBABILITY OF INDIVIDUALISM	ESTIMATED PROBABILITY OF EGOISM
0	1911-1932		
1	1933-1943	0.6172	0.4291
2	1944-1953	(moderate)	(-weak)
3	1954-1965		
4	1966-1977	0.7702 (strong)	0.7222 (strong)
5	1978-1983	0.7641 (strong)	0.5063 (undefined)
6	1984-1988	0.8043 (strong)	0.5782 (weak)
7	1989-1991	0.6392 (moderate)	0.5882 (weak)
8	1992-…	0.8815 (strong)	0.3664 (-moderate)

Table 8: Estimated probabilities of individualism and egoism for each generational cohort. The probabilities are calculated at the mean values of the variables for the entire sample. Each probability is classified as weak if the probability is greater than 0.5 in less than 0.1 units, moderate if the difference between the estimated probability and 0.5 is between 0.1 and 0.2 and strong if the difference is larger than 0.2. The probability is classified as undefined if it is very near 0.5.

Table 8 presents the estimated probabilities of individualism (openness to change) and egoism (self-enhancement) for each generational cohort. The probabilities were calculated at the mean values of the variables with significant coefficients in Table 8 for the entire sample in the multinomial logistic model. The variable Q44.3PARTICIPATE.ELECTIONS, which is related to the participation in elections, was not included because it is difficult to identify the Schwartz value type to which this variable corresponds and also because the variable is affected by the respondent's age. From Table 8, all generational cohorts present probabilities of individualism greater than 0.5. The generational cohorts gen0, gen1, gen2 and gen3 present the lowest value for the probability of individualism (0.6172) and a probability of egoism lower than 0.5 indicating that these generational cohorts present moderate individualism and weak altruism. Generation 4 presents high values for the probabilities of individualism and egoism displaying strong individualism and egoism. Generation 5 is strong in individualism but undefined on egoism-altruism because the estimated probability of egoism is near to 0.5. Generational cohort 6 is strong in individualism but weak in egoism. Generational cohort 7 is weak in egoism

and is moderate in individualism. Finally, generational cohort 8 presents the highest estimated probability for individualism (0.8815) and the lowest for egoism (0.3664), indicating that this generational cohort is strong in individualism and moderate in altruism.

When analyzing the differences among generational cohorts in terms of individualism and egoism, it is important to assess the value types in which the generational cohort is unique. For example, generational cohort 4 is unique in egoism in terms of achievement, and generational cohort 5 is unique in terms of egoism because its members find abortion to be less justifiable. Similarly, generational cohort 6 is unique in terms of individualism in the value of freedom, generational cohort 7 is unique in its individualism by being more hedonistic and, finally, generational cohort 8 is altruistic by its support for the bureaucracy.

4.4 Ordinal Logistic Regression

The results of an ordinal logistic regression are included in Table 9. Only the variables that were significant at the 1% significance level are included in the table. The results of an ordinal logistic regression do not enable the identification of the important characteristics of each generational cohort, only the variables that increase or decrease the probability of belonging to more recent generational cohorts.

SCHWARTZ VALUE TYPE	VARIABLE	ESTIMATED COEFFICIENTS
Universalism	Q8.1EQUALITY	0.1471
Universalism	Q13.05UNITE.URBAN.VS.RURAL	-0.0360
Conformity	Q13.06UNITE.YOUNG.VS.OLD	0.0347
Security	Q13.09UNITE.SPORTS	0.0384
Hedonism	Q26.02TEACH.HARD.WORK	-0.1574
Hedonism	Q26.06TEACH.TO.SAVE.MONEY	-0.2315
Achievement	Q26.07TEACH.DETERMINATION	-0.1399
Spirituality	Q26.08TEACH.RELIGION	-0.1972
Self-Direction	Q44.2KNOW.CIVIL.RIGHTS	0.0322
	Q44.3PARTICIPATE.ELECTIONS	-0.0634
Self-Direction	Q57FREEDOM	0.0369
Universalism	Q59ENVIRONMENT	-0.0395
Self-Direction	Q71.2PUBLIC.PROPERTY	0.0328
Power	Q75.1EASIER.GOVERNMENT	-0.0384
Power	Q75.6EASIER.BUREAUCRACY	0.0282
Universalism	Q75.7EASIER.UNIONS	0.0380
Self-Direction	Q81.03 JUSTIFY.HOMOSEXUALITY	0.0490
Self-Direction	Q81.05 JUSTIFY.DIVORCE	0.0334
Tradition	Q84CONSERVATIVE	-0.0894
	Q96HAPPY	0.0876
Spirituality	Q100IMPORTANT.GOD	-0.0882
Spirituality	Q101IMPORTANT.VIRGIN.GDPE	-0.0434
Tradition	Q102MEXICO.VERY.MODERN	0.0243
	Cut gen1	-4.8802
	Cut gen2	-3.3403
	Cut gen3	-2.2926
	Cut gen4	-1.1675
	Cut gen5	0.0664
	Cut gen6	0.8419
	Cut gen7	1.7260
	Cut gen8	3.0311

Table 9: Ordinal logistic regression results.

In general terms, when comparing the recent generations with the older ones, it is possible to conclude that the members of the more recent generations are less conservative, believe that God and the Virgin of Guadalupe are less important in their lives, feel happier, are more tolerant of homosexuality and divorce, believe that the bureaucracy and unions are important for the economic development of the country but that the government inhibits economic development in Mexico, believe that they have more freedom to make decisions about their own lives, are more aware of their civil rights but participate less in elections (this could be an effect of the age of the respondents when the survey was implemented in 2010) and are less concerned about the environment. They believe that it is not very important to teach hard work, thrift, self-determination or religion to children at home. In addition, they believe that the most important value for Mexicans is equality and that the differences between young and

old and sports unite Mexicans despite differences between urban and rural areas. In terms of the Schwartz's circle of values, more recent generations tend to be more individualistic and hedonistic and less egoistic and spiritualistic.

5. The Proposed Classification

Based on the historic events in Table 5 and the characterization of generational cohorts in terms of individualism and egoism in Table 8, the following final proposed generational cohorts for urban areas in Mexico are presented in Table 10.

	GENERATION	YEARS	INDIVIDUALISM	EGOISM	ALTRUISM	ESTIMATED NUMBER OF INDIVIDUALS IN 2010	QUADRATIC DISCRIMINANT HIT RATIO
gen0	PATRIOTIC	1911-1932 80 and older	Moderate		Weak	993,542	90.28%
gen1	CONSERVATIVE	1933-1943 69 to 79 years old	Moderate		Weak	3,168,066	74.23%
gen2	OLYMPIC GAMES AND FIFA WORLD CUP OR, THE SIXTIES	1944-1953 59 to 68 years old	Moderate		Weak	5,951,258	52.54%
gen3	FIRST PROGRESSIVE	1954-1965 47 to 58 years old	Moderate		Weak	11,100,000	30.31%
gen4	POP ACHIEVERS	1966-1977 35 to 46 years old	Strong	Strong		15,100,000	30.05%
gen5	DEMOCRATIC LIBERATION FROM PRI	1978-1983 29 to 34 years old	Strong	Undefined	Undefined	8,659,754	36.29%
gen6	FOX 9/11 FREEDOM	1984-1988 24 to 28 years old	Strong	Weak		7,275,217	38.06%
gen7	DRUG WAR AND INTERNET BOOM	1989-1991 21 to 23 years old	Moderate	Weak		4,868,285	51.65%
gen8	FLU PANDEMIC CRISIS ALTRUISM	1992 … 20 and younger	Strong		Moderate	2,071,059	66.57%
TOTAL						59,200,000	

Table 10: Proposed classification of generational cohorts in Mexico (for urban areas).

The hit ratios of a quadratic discriminant analysis applied to the ENVUD2010 data are presented in the last column of Table 10. The hit ratios in Table 10 are much larger than those presented by Noble and Schewe (2003) for generational cohorts in the U.S. According to Meredith, Schewe and Karlovich (2002), the U.S. generational cohorts are as follows: Depression (1912-1921), World War II (1922-1927), Post War (1928-1945), Boomers I (1946-1964), Boomers II (1956-1965), X(1966-1976) and N (1977-). Although some similarities were found among the Mexican generational cohorts defined in this paper and the U.S. generational cohorts, it is clear that for the most recent generational cohorts, in Mexico there exist particular events that gave rise to new generational cohorts such as the Democratic Liberation from PRI (1978-1983), Fox 9/11 (1984-1988), Drug War and Internet Boom (1989-1991) and Flu Pandemic Crisis Altruism (1992-), which differ from the N generational cohort in the U.S.

Conclusions

By using data from a national survey on values in Mexico, the ENVUD2010, it is possible to identify different generational cohorts which correspond to homogeneous groups in terms of the responses of the individuals to questions related to values. These groups are identified through CUSUM change point analysis and ordinal logistic regression models. Once the generational cohorts were identified, the characterization of these groups in terms of the Schwartz dimensions of individualism and egoism were obtained by applying a multinomial logistic regression. A total of 9 generational cohorts were identified: Patriotic (born 1911-1932), Conservative (1933-1943), Olympic Games and FIFA World Cup or the Sixties (1954-1965), POP Achievers (1966-1977), Democratic Liberation from PRI (1978-1983), Fox 9/11 Freedom (1984-

1988), Drug War and Internet Boom (1989-1991) and Flu Pandemic Crisis Altruism (1992-). The more recent generations are different from the N generational cohort in the U.S. Recent generational cohorts tend to be more individualistic and less egoistic than previous generational cohorts. These facts must be considered in the design of marketing strategies, especially in the segmentation of a market and the definition of a target market.

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