MEASURING THE EXPECTATION FOR LIFE AND THE SPREAD OF VIOLENCE IN LATIN AMERICA

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Introduction and Framework

The following are the headlines in the main national newspapers in Latin America for September 19, 2003. In Colombia, "El Tiempo" begins the news with the Human Rights Watch report, which states that there are 11,000 boys enlisted in the illegal armed forces. While other news claimed that the international community is getting more involved in the civilian conflict after the kidnapping of five foreign tourists at a national park. In Argentina, "El Clarin" prints the interview to the official defendant of Androge, who was kidnapped the day before for six hours, while he witnessed three more kidnappings made by the same gang. In Chile, "El Mercurio" emphasizes that three men died and two more are severally injured from patriotic celebrations during the previous night in Temuco. In Brazil, Lula's government admits that even though his administration spent US$25,000 per year against crime, the country is ranked as the fourth most violent in the world as measured by the level of delinquency and homicides; only overcome by Colombia, South Africa and Jamaica. And many more quotes could have been made for the rest of the Latin American countries.

The economic and sociologic literature concentrated efforts in trying to explain the causes of increasing violence in Latin America. Most theoretical and empirical research have addressed the issues associated with violence within countries as well as trying to answer why homicides rates, or crime rates, vary across regions and over time. In general, results show that greater income inequality is associated with higher homicides rates.

We are interested in discussing the patterns of the spread of violence in Latin America within and across countries based on the diffusion model of epidemiology. Our basic hypothesis is that violence is not concentrated in some areas of the country but it is spreading over regions where the economic literature would not predict.

The spread of violence can, by some means, be related to the spread of an infectious contagious disease. The similarity between violence and epidemic models is not trivial, but if one assumes violence as a behavioral disease which is contagious across individuals and regions the analogy becomes more clear and understandable.

The poster presents preliminary results measuring the impact and spread of violence in Latin America. We present data for seven countries since the mid 1900's, collected from a variety of sources. We show that violence has a significant impact on reducing years of life, mainly for males, and affects the contribution of specific age groups to gains in life expectancy.

Moreover, violence is not anymore a phenomenon concentrated in the largest urban areas of the region of study. In recent years, we observe a spread of violence, and violent causes of death, to areas that were consider safe heavens in the countries.

Methods

The study of adult mortality in the developing world remains a poorly understood problem. The registration of death is incomplete and in the few cases in which is complete, the age declaration cannot be trusted (Hill, 2000). To solve this problem, several indirect methods were developed in past decades to adjust for incomplete death coverage and/or erroneous age reporting. This section covers two of those methods: general growth balance (or Brass-Hill) and synthetic extinct generation (or Bennet-Horiuchi).

These two methods have several points in common. They require two census age distributions and the distribution of intercensal deaths by age. The methods also assume that the population experiences no or negligible migration what, as we are going to see later, causes a problem to the analysis of mortality in Mexico. They also assume that completeness of death reporting is the same for all ages and that the completeness of enumeration in the two censuses does not vary by age (UN, 2002; UN Manual X, Hill, 2000).

The ***general growth balance*** was proposed by Hill (1974). This method estimates both the completeness of death reporting and the relative completeness of enumeration in two censuses. It has most of the assumptions of the previous method, but does not assume that the population has to be stable. In Hill (2002) words: "... *relationship of entry rate minus the growth rate to the death rate, segment by segment, estimates an intercept that captures any change in census coverage (...) and a slope that estimates the coverage of death recording....".*

The ***synthetic extinct generation (SEG)*** developed by Bennett-Horiuchi is an alternative way of using the information of two censuses and the distribution of deaths by age over an intercensal period. In addition to taking the same data from the previous technique, it also assumes that migration is negligible and under-reporting is uniform by age. The idea is to

calculate age specific growth rates for the period of analysis and used these values to expand the observed distribution of deaths to a model population (stable population or life table distribution). It is clear, in this case, that deaths in a life table over certain age x are equal to the population of that age x, the ration of these two measures gives us a estimate of the deaths coverage relative to census coverage (UN, 2002; UN Manual X; Hill, 2000).

After evaluating the quality of the data and correcting for underegistration, we use three approaches to study the spread and impact of violence in Latin America. The first approach decomposes the contribution of years of life to the change in life expectancy by cause of death. By doing that, we can see how the epidemiological transition affect the age structure of mortality and its impacts on life expectancy. In the second approach, we apply a backward-simulating model to the growth of homicides for the last thirty years of the last century to check the pattern of violent deaths. The third approach is applied for a limited number of countries, due to availability of data (Colombia, Brazil, Peru and the United States), maps the distribution of homicides over time in these countries. The graphical analysis helps us to test the hypothesis of diffusion or not of violent mortality in the regions of interest.

Data

The data collected for a number of countries – Colombia, Brazil, Puerto Rico, Mexico, Peru, Costa Rica, Chile, Panama, Dominican Republic, Argentina and the United States – come from the National Statistics Office and, when it is necessary, complemented with information from the United Nations (UN) and the World Health Organization (WHO). We have information on sex, age distribution and causes of deaths for all countries. Unfortunately, we do not have the same temporal coverage for all nations, but for most of the countries data go back to 1950.

Findings and Conclusions

The Colombian case is the most dramatic among the Latin American countries. As we can see in following graph, although life expectancy has increased during the last intercensal period for both males and females the latest have experienced a much larger gain that males. There would not be any surprise in this result if it were not for the scale difference at which each age group has apportioned to this change.

Two facts are remarkable. First, females at all age groups always showed a positive contribution to life expectancy while men only do it at the extreme age groups. Second, males' greatest loss is concentrated between ages 10 and 54, having the most dramatic effect on the young males (ages 20-24). As a result, this shows how the efforts made to reduce infant and child mortality are offset by the unusually high mortality levels of young males.

Table 1 stresses the last claim. This table presents a decomposition of the contribution of years of life to the change in life expectancy by cause of death. We can see an improvement in life expectancy by a reduction of intestinal infectious diseases (traditionally one of the main causes of infants and child's death) both for males and females, and mainly concentrated at the first age group. However, there is a reduction in life expectancy due to the main external causes of death for both sexes, and for almost all age groups. In particular, homicides take away almost one year of females' life expectancy and two and a half years for males. Moreover, for both the main lost is highly concentrated on the 25-49 age group. Finally, for the males the gain obtained by reducing mortality in "all other causes" (2.63 years) is almost completely offset by the loss due to homicide.

The same analysis is available for the set of countries under study, and will be presented during the seminar. The patterns of the results are similar to those of Colombia, even though the levels are lower. Finally, we will provide the results of the model testing if violence has spread the Latin American in the way of which an infectious disease would do, following a backward-simulating model applied to the growth of homicides for the last thirty years of the last century.

Graph 1. Improvement in expectation of life at birth, Colombia, 1985-1993

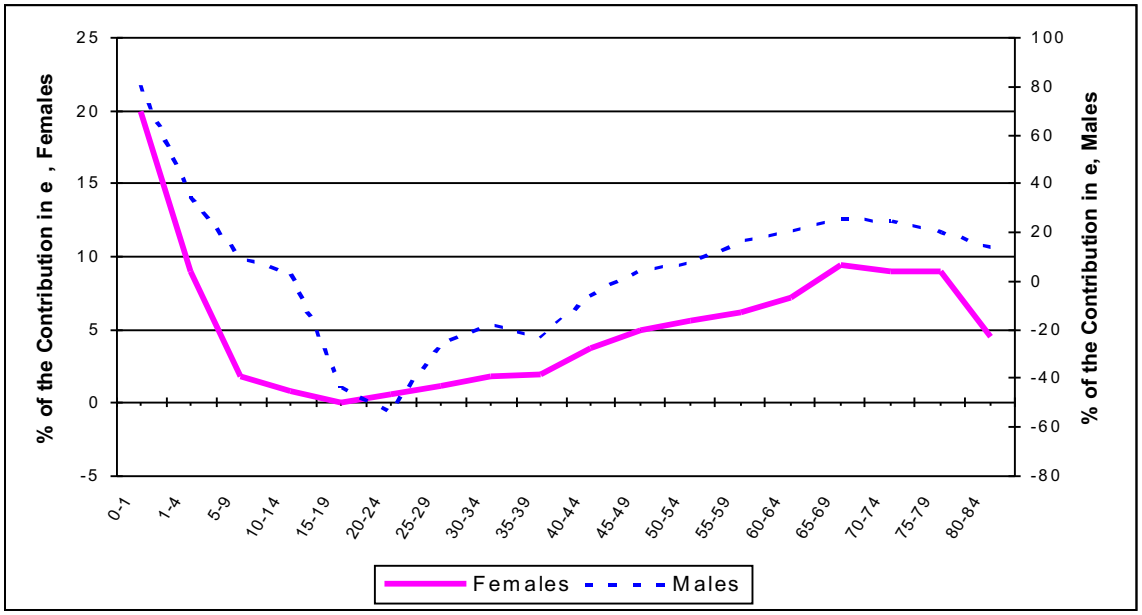

Table 1. Contribution (years of life) of selected causes of death to improvement in expectation of life at birth, Colombia 1985-1993

	Intestinal Infectious Diseases	Accidents	Homicide	All Other Causes
Females				
0-4	0.057	0.00	0.00	0.219
5-14	0.007	0.00	-0.01	0.094
15-24	(0.002)	-0.07	-0.39	(0.262)
25-49	0.016	-0.06	-0.48	(0.192)
50+	0.100	0.01	-0.03	1.3126
Total years	0.178	-0.12	-0.91	1.171
Males				
0-4	0.056	0.00	0.00	0.220
5-14	0.009	0.01	-0.03	0.102
15-24	0.002	-0.01	-0.91	0.167
25-49	0.007	0.00	-1.27	0.522
50+	0.032	-0.02	-0.25	1.6173
Total years	0.104	-0.02	-2.46	2.629