Determinants of International Tourism Flows into Mexico: Externalities of the Perception of Crime and Other Factors *

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Abstract

This paper examines factors which determine the international tourism flows into Mexico. Besides analyzing only traditional factors, such as exchange rate, and economic activity, the contribution of this study is including a measure of international perception of the crime in a country and analyze its differentiated effects in the country's regions. The perception of violence in Mexico is built from the proportion of words related to violence in all the articles with at least two mentions of Mexico or Mexican and its variations published by the New York Times from July 2007 to December 2016. I used AR models with independent variables. The results show that the safest places in Mexico receive a negative externality of the perception of crime. Meanwhile, the most dangerous places are not affected by the perception. Actual crime has an adverse effect on the number of visitors. Visits to highly touristic places are positively correlated with the American economy, while non-popular destinations are negatively correlated.

keywords: Perception of crime, crime, Mexico, tourism.

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1 Introduction

Tourism has emerged as one of the main economic activities in Mexico. For instance, during 2014, the touristed sector account for about 8.5% of the GDP. Moreover, in 2015 Mexico received 32.1 million tourists, the number nine in the world ranking. As a reference, Germany received 35 and Italy 50.7 million visitors. In the same vein, the money spent by tourists in Mexico the same year was 17,734 million USD (Secretaria de Turismo, 2016).

Despite the number of international visitors has steadily increased in the last years, there is a general intuition that crime and its perception can affect choices regarding touristic destinations. After 2016, it was an increase in the violence in some places of the Mexican territory, mainly driven by conflicts among drug cartels. As a result, the perception of violence in the country increased as the crime augmented. However, the delinquency is not homogenous among the states. The Figure 1 shows that there are places where violence is living on a daily basis and others where crime is not relevant.

Figure 1: Homicides with Firearms by State (2016)
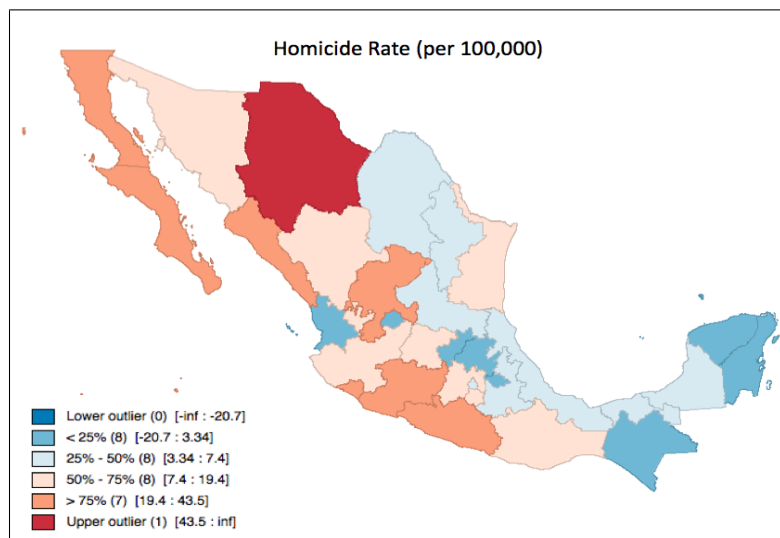
This study analyzes the externalities of the general perception of violence in Mexico on the number of tourists to different regions of the country. I found that the safest places in the country are negatively affected by the perception of crime, con-

trolling for other factors, including the actual crime in those areas. Furthermore, I analyze other variables that can determine the international tourism flows, such as the real exchange rate and economic activity in Mexico and the USA. From those, the American economy has differentiated effects in each destination, positive and adverse; those vary according to the popularity of each destination. Highly touristic destinations benefit from a stronger economy in the United States, while non-traditional destinations are negatively correlated with economic growth in the USA.

The novelty of this study relies on using a measure of perception of crime. Previous studies have analyzed crime factors, but without considering the externalities of the perception of violence.

2   Literature Review

I classify literature regarding this topic in two broad categories. On the one hand, papers which use crime and tourism data, both from aggregate and individual level. On the second hand, studies which try to understand the perception of crime and its effects on tourism.

Regarding the first category, there is research focus on aggregate measures of tourism. Many of these articles study the determinants of visitors? arrivals without considering the crime. Lim (1997) identified that many of these models concentrate in demand for international travel services which depends on per capita income of the country of origin, a factor of difference in relative prices, the exchange rate, the round-trip travel cost, and qualitative factors in the country of origin. Those factors have been life expectancy, literacy, good information (Vietze, 2011); supply-side explanations, like nature or infrastructure (Zhang & Jense, 2007); transportation and communication (Phakdisoth & Kim, 2007); and political risk (Eilaf & Einav, 2004). Moreover, there is other studies wich focus in time series analysis, using autoregressive models and vector error correction models (Lim & McAleer, 2001; Bonham et. al., 2009).

In the same family of papers, there are "gravity models;" wich states that inter-

national tourism flows are positively correlated with the size of its economies, and negatively correlated with the distance between them. An example of this model is Vietze (2012), who analyzed the touristic flows to the USA from 208 countries. He found that, as expected, GDP growth in the country of origin is correlated with more visits towards the USA, while the distance from the capital of the country of origin to the capital of the USA is negatively correlated. Furthermore, he explains that others factors positively associated with visits towards the USA are characteristics of the country of origin, such as English speaking country, strong institutions, Christian, and non-Muslim. Meanwhile, the cost of living of the destination country is negatively correlated.

Also, there are other articles with study crime and tourism. Duha, Tore & Altindag (2009) examine the effect of crime in international tourism with a panel data for European countries. They used a fixed effects model which depend variable is foreign tourists or revenue, and the independent variables are lagged crime (one year), and control variables like unemployment, GDP growth rate, exchange rate, urbanization rate, among others. They found that violent crimes are negatively associated with incoming international travels and touristic revenue. However, this effect was smaller in highly traditional touristic places, such as the southern European countries.

In addition, there are studies for developing countries which link crime and tourism. Chiquiar, Herrera, and Lopez (2012) studied the determinants of international tourism towards Mexico from 2000 to 2012 through a fixed effects model. The dependent variables are touristic arrivals and average expenditure, while the independent variables are insecurity, business cycle (origin and destination country), fluctuations in the real exchange rate, and other controls. They conclude that insecurity index has a significant adverse effect on non-border touristic arrivals and border and non-border average expenditure by tourists. The data from the models imply that insecurity caused a decrease of 6.33% in average international visitors from 2008 to 2012.

In contrast, another set of articles focuses on the opposite effect. That is to say, on the impact of tourism on crime. The intuition behind this is that touristic places suffer higher crime rates due to more naive people in the city, which is a favorable

environment for crime. For instance, Biagi, Brandano, and Detotto (2012) explain that for a subsample of Italian cities, touristic places tend to have a greater amount of crime that non-touristic ones. However, after some controls, tourism does not have explanatory power but agglomeration and urbanization. Then, tourism does not cause crime but confounding factors. In the same vein, Baker and Stockfon (2014) studied the relationship between the number of tourism and crime in Honolulu and Las Vegas. They found that in the first city there is an inverse relationship between the number of visitors and violent crime, while in the latter there is a positive correlation between the number of visitors and crime.

Concerning the second family of papers, a few articles investigate the effect of perception of crime in international tourist travel decisions. George (2012) made a survey of 398 attendants to the 2010 FIFA World Cup in South Africa. His analysis is primarily descriptive. He found that the perception of safety depends on the origin of tourist. For example, people from the middle east and Asia fell the safest, while people from South America and Western Europe fell the least safe in South Africa. However, according to the survey, the perception of crime does not affect future travel decisions to the country.

Another example which primary source is a survey. Snmez & Graefe (1998) analyzed data from 240 surveys filled out by individuals who expressed interest in traveling internationally or has traveled abroad. They build a risk perception level from the amount and types of risk perceived by the respondents by country. The report that 88% of the respondents consider that tourist must avoid politically unstable countries. Through econometric techniques, they found that attitude towards risks, risk perception, and income affect decision making. Moreover, risk perception level decreases with higher travel experience. Their results, as they recognize, are biased to a very particular subset of a population, namely, older and well-educated American males (70%) who has travel experience or at least want to go abroad. Snmez & Graefe says that it is unclear if watch terrorist events in the news change vacation decisions. They hypothesize that media sensationalism can discourage people from traveling, and that perceived risk may overcome reality. However, the "links between

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real and perceived risk and their influences on decisions need illumination" (137).

This paper will link these two broad pieces of literature, the one about decisions about travel destinations, and the one regarding the perception of crime. I created a variable for the perception of risk from a newspaper, and I link it with objective risk indicators. I leave the complete discussion of the methodology for the next section.

3   Model

The equation estimated for the 32 dependent variables is:

$$T_{jt} = \beta_0 + \beta_1 P_{t-3} + \beta_2 C_{jt-3} + \beta_3 R_t + \nabla E_t + \Omega AR + \epsilon_t \tag{1}$$

Where T_{jt} is the number of international arrivals in time t to a particular state or airport j; P_{t-3} is the index of perception of crime lagged three months; C_{jt-3} is the indicator of crime, defined as the number of homicides in place j lagged three months; R_t is the real exchange rate; and E_t is a vector of monthly economic indicators of the performance of the American and Mexican economies. Finally, AR is a vector of control for autoregressive terms, in this case AR(1) and AR(12). Only the regressions without serial autocorrelation in their residuals will be considered for the results section. An independent regression by each dependent variable is reported.

4   Data

All the monthly-basis data comprises from July 2007 to December 2016. Then, the total number of observations is 114, one by month. To measure the number of tourists, I utilize the data available on the website of the National Institute of Immigration (Mexico). I scraped the site to download and process about 120 differents files, which I processed and merged. I consider arrivals of international visitors without Mexican passport who identified themselves as tourists. I used all the persons who arrived at any international port of entry (land, sea, airport) by state. Furthermore, I used data for some international airports as a dependent variable. I only utilize the data

compatible and complete for all the years. Then, I do not use data for all the Mexican states. The final number of dependent variables is 32, from those, 21 are states, and 11 are airports.

I built the perception of crime from analysis of all New York Times articles which contains at least two words related to Mexico, such as Mexico and Mexican (and all variations of those words, like Mexicans). The index is the proportion of words related to violence, such as crime, delinquency, fatality, kill, murder, trafficker, among others. For a complete list, please see the Appendix. The reference number is the total number of words by month in those articles. The sample is 5469 articles. I gather the complete articles data trough about 30,000 queries to the New York Times API, and I process them with Python 3.6.

As a measure of crime, I use the number of intentional homicides committed with firearms in state j in time t. For airports, I used the data of the state. I utilize this measure of crime because it is the less biased by its collection process and standards of reporting among all states. I gathered from the website of the Executive Secretariat of the National System of Security in Mexico. Note that this measure varies by each dependent variable against all other independent variables that are the same for all the dependent variables.

Finally, for controls of economic activity, I use several renown sources of macroeconomic data. I download the real exchange rate from the Mexico's Central Bank (Banxico). In this index, an increase in the number is a decrease in the real value of the Mexican currency. Furthermore, for USA Economy I use the Economic Activity Index for the United States (Federal Reserve Bank of St. Louis); and for the Mexican economy, I work with the General Index of Economic Activity build by the National Institute of Geography and Informatics (INEGI).

The Figure 2 shows that the relationship between crime and the total number of tourist by country is not evident. On the one hand, maybe the crime between 2009 and 2013 stopped tourist flows to the country. However, after 2014, the number of homicides and the number of international visitors increases steadily. Furthermore, the pattern of tourist which arrives by land is similar, according to the Figure 3.

The total number of tourist does not have a strong relationship with the number of homicides. Also, in some cases, the number of visitors grows with the number of murders.

Figure 2: Homicides and Country-level Number of Tourists
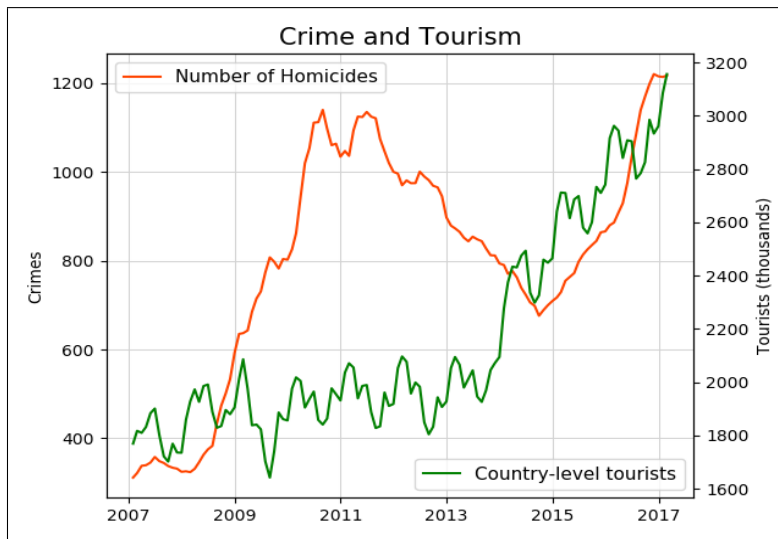
**Figure 3: Homicides and Tourists who Arrive by Land**
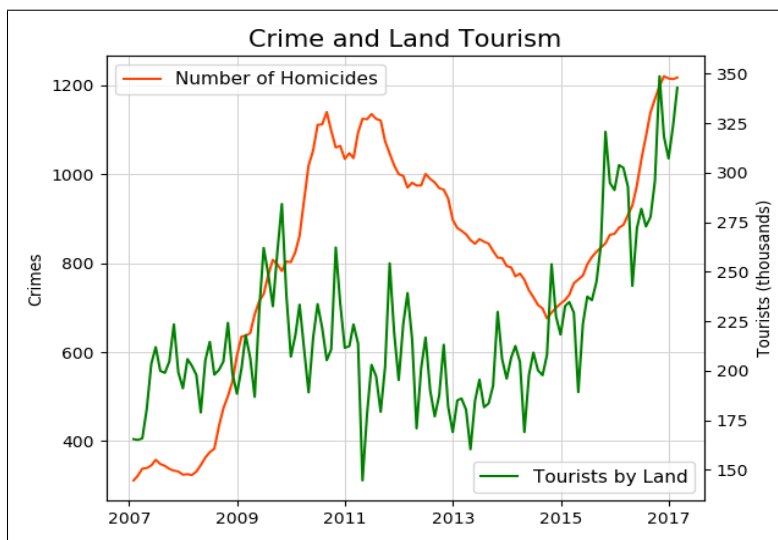
As depicted by Figure 4, the Index of Perception of Crime follows the total number of homicides in the country, although those diverge after 2015. Then, the Index of

Perception of Crime is a proxy for the general number of murders in the country.

Figure 4: Relationship between Country-level Homicides and Perception of Crime
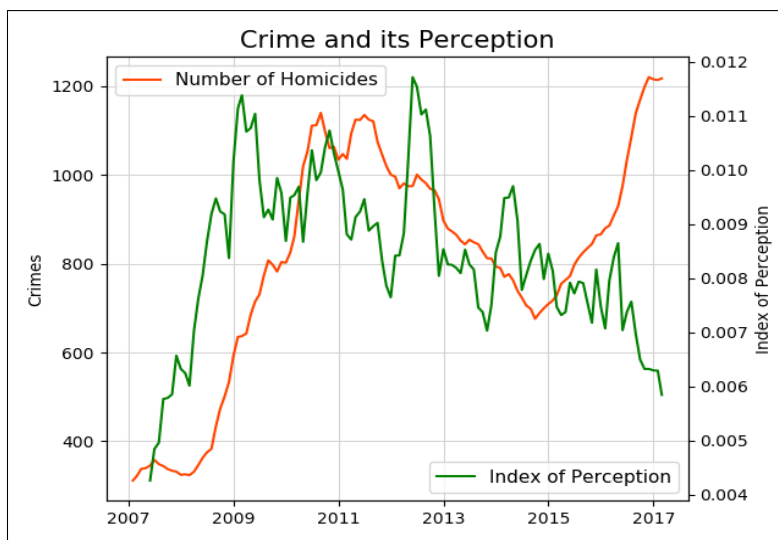
The Figures 5, 6, 7, 8 illustrate the heterogeneous evolution of criminality against the general perception of crime. For instance, the state of Coahuila in Figure 7, one of the most dangerous places, follows the peception of crime well. Meanwhile, Quintana Roo in Figure 5 portrays an opposite trend in certain dates. In addition, the other two figures show an apparently non-relationship with the perception of crime.

5 Results

The Table 1 and 2 show the general results of the ARIMA models. The variables with the suffix IA means International Airport. The coefficients of the AR1 and AR12 terms were omitted. Overall, the variables with the highest number of significant coefficients are those related to the USA economy and the real exchange rate.

Table 1: Main Results

| Touristic flows	Exchange Rate	MXN Economy	USA Economy	Perception Index	Crime j	Mean Touristic Flows by Month
Campeche	-0.002	-0.009	-0.013	-15.597	0.004	121
	0.015	0.063	0.048	12.678	0.02	
CancunIA	-0.0	0.011	0.012	-7.51	-0.004	414181
	0.001	0.004	0.003	2.307	0.004	
MexicoIA	-0.002	0.012	-0.015	-11.202	0.002	132121
	0.003	0.012	0.008	5.039	0.002	
Chiapas	0.013	0.07	-0.021	9.645	-0.002	6164
	0.003	0.012	0.009	6.926	0.005	
Chihuahua	-0.02	0.002	0.003	-7.177	-0.0	9307
	0.004	0.014	0.011	7.719	0.0	
Coahuila	-0.023	-0.049	0.039	-13.026	-0.001	1816
	0.003	0.013	0.01	6.607	0.002	
Colima	-0.001	-0.003	0.016	-6.028	-0.008	3285
	0.004	0.013	0.01	6.804	0.003	
CozumelIA	-0.007	0.004	0.001	-10.096	-0.001	16652
	0.002	0.006	0.005	3.388	0.005	
Durango	-0.02	0.055	-0.061	4.558	-0.003	257
	0.009	0.03	0.024	16.337	0.003	
EnsenadaIA	-0.05	0.237	-0.125	16.814	0.007	44
	0.018	0.117	0.06	26.939	0.008	
EstadoDeMexico	-0.011	0.06	-0.068	-18.445	-0.003	805
	0.013	0.045	0.031	15.495	0.003	
Guanajuato	-0.007	-0.011	0.018	-7.805	-0.004	6860
	0.003	0.01	0.008	5.688	0.002	
Guerrero	-0.006	-0.02	0.016	-4.018	-0.002	12006
	0.004	0.014	0.01	6.997	0.001	
Jalisco	-0.001	-0.002	0.002	-0.395	-0.0	122235
	0.0	0.001	0.001	0.687	0.0	
MazatlanIA	-0.005	-0.004	0.002	-11.422	0.001	11309
	0.002	0.009	0.007	4.45	0.0	
Michoacan	-0.014	-0.005	-0.022	-6.048	-0.003	3134
	0.01	0.033	0.025	14.224	0.004	
MonterreyIA	-0.013	0.005	-0.013	-14.336	-0.001	4920
	0.006	0.023	0.016	9.012	0.001	
Morelos	-0.063	-0.07	0.047	29.52	0.014	4
	0.026	0.077	0.051	46.785	0.014	
MeridaIA	0.006	0.005	0.013	-14.332	-0.022	1750
	0.004	0.013	0.01	6.692	0.017	

Table 2: Main Results

| Touristic flows	Exchange Rate	MXN Economy	USA Economy	Perception Index	Crime j	Mean Touristic Flows by Month
Nayarit	0.04	0.261	-0.252	-62.345	-0.042	5
	0.055	0.171	0.132	113.253	0.042	
NuevoLeon	-0.017	-0.008	-0.006	-15.05	-0.0	5711
	0.006	0.024	0.017	9.993	0.001	
Puebla	-0.014	-0.005	0.029	2.616	-0.003	507
	0.005	0.016	0.012	9.729	0.005	
PuertoVallartaIA	-0.0	-0.0	0.0	0.016	-0.0	84749
	0.0	0.0	0.0	0.058	0.0	
Queretaro	-0.001	-0.005	0.042	-9.741	-0.008	1455
	0.004	0.013	0.01	6.992	0.016	
QuimtanaRoo	-0.0	0.012	0.011	-7.437	-0.004	437175
	0.001	0.004	0.003	2.277	0.004	
Sinaloa	-0.005	-0.002	0.001	-11.644	0.001	11464
	0.003	0.009	0.007	4.603	0.0	
Sonora	-0.002	-0.003	0.0	-7.365	-0.0	7387
	0.002	0.008	0.006	4.126	0.001	
Tamaulipas	-0.0	-0.017	0.026	-0.473	-0.003	31598
	0.003	0.009	0.007	5.126	0.001	
TijuanaIA	-0.013	0.024	0.049	-26.784	-0.0	710
	0.017	0.063	0.059	12.429	0.006	
TolucaIA	-0.011	0.06	-0.068	-18.445	-0.003	805
	0.013	0.045	0.031	15.495	0.003	
Veracruz	0.003	0.121	-0.082	3.744	-0.002	645
	0.01	0.029	0.02	19.465	0.005	
ZihuatanejoIA	0.0	0.009	-0.006	0.292	-0.0	8265
	0.001	0.002	0.002	1.519	0.0	

Figure 5: Relationship between Homicides in Quintana Roo and Perception of Crime
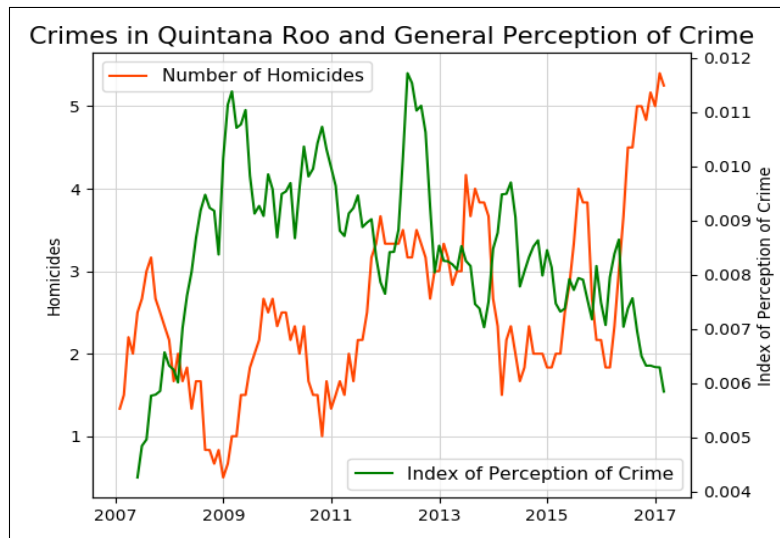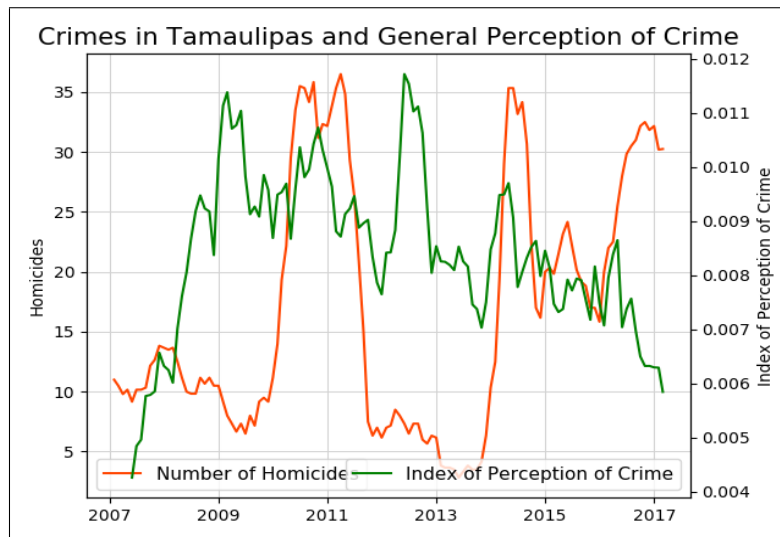

Figure 6: Relationship between Homicides in Yucatan and Perception of Crime
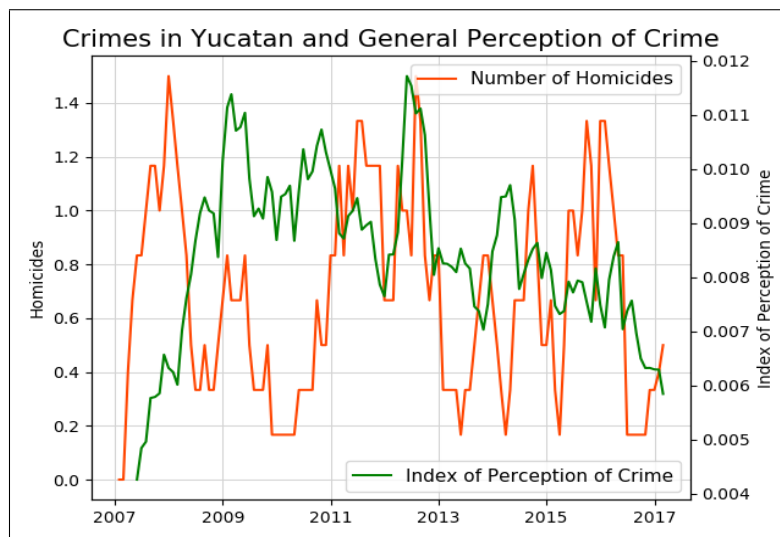
## Figure 7: Relationship between Homicides in Coahuila and Perception of Crime
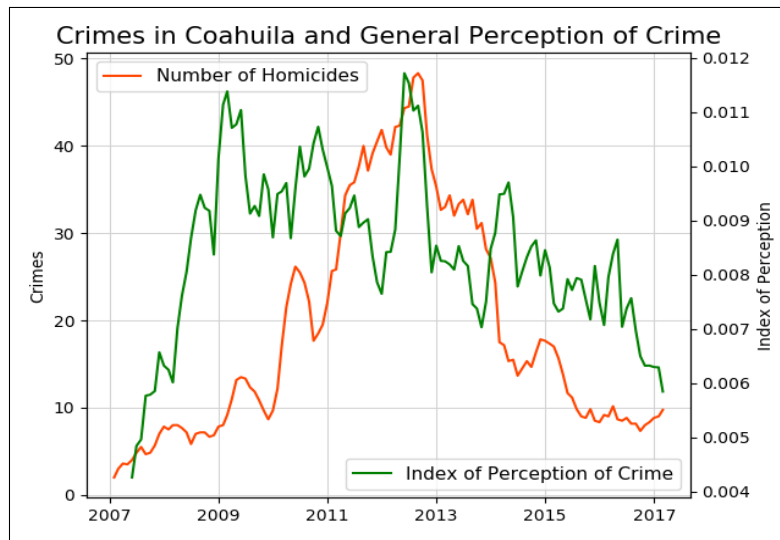
Figure 8: Relationship between Homicides in Tamaulipas and Perception of Crime

Effect of the Perception of Crime

As depicted in Figure 9, in places below the mean in the homicide rate by each 100,000 the negative effect is notable against those above the mean. Then, the safest places to visit in Mexico receive a negative externality produced by the states where crime is high and receive media attention. On the other hand, in places where the homicide rate is high, the effect is limited. It is possible that in areas with high crime rates the violence has become normal. Then, changes in crime do no affect the touristic flows anymore; those are not even an option to consider by many tourists.

Figure 9: Perception of Crime and Homicides
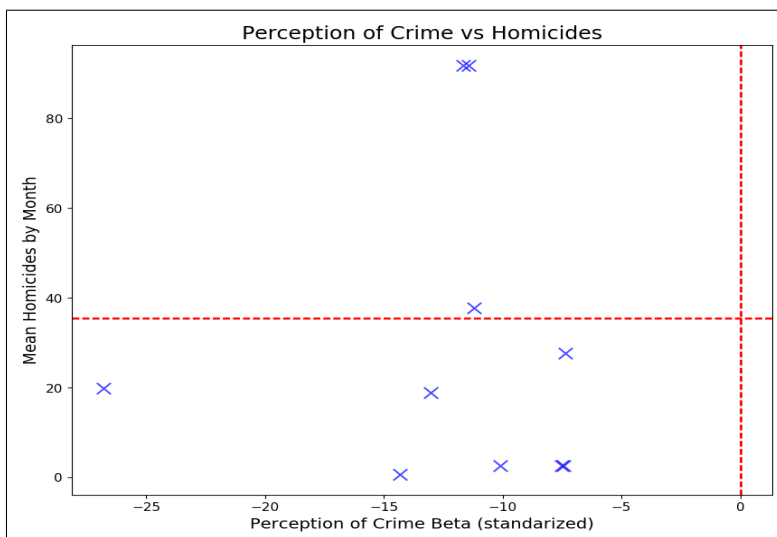
Effect of Actual Crime

Figure 10 shows a similar trend of the first section about the perception of crime. Places with a homicide rate above the mean have smaller coefficients of crime against areas with lower homicide rates. That is to say, in relatively safe places, changes in crime have a higher impact that crime changes in unsafe areas. Then, a joint interpretation of Figure 9 and Figure 10 is that the safer places are affected by the crime in their territory as well as by the general perception of safeness in the country. Finally, it is notorious that crime has not a significant result in almost all the places.

Figure 10: Crime and Homicides
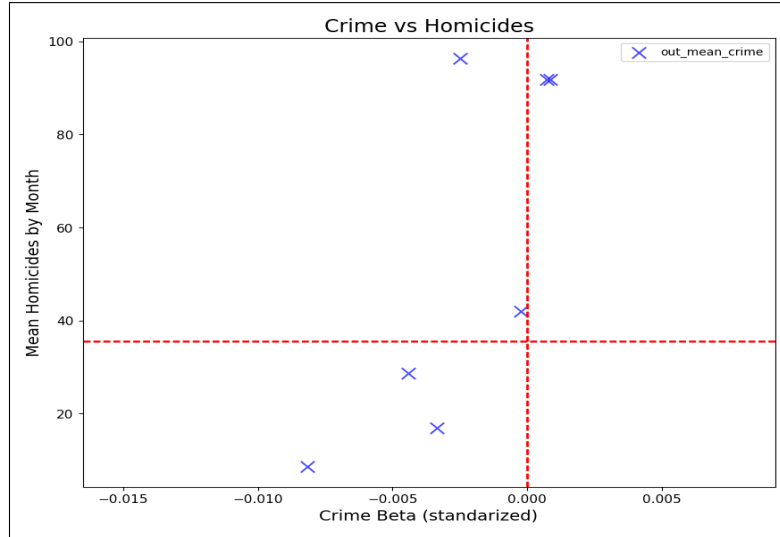
Effect of Exchange Rate

The Figure 11 illustrates that the coefficients for exchange rate present a non-intuitive sign. In theory, assuming all factors constant, an appreciation in the value of the USD will decrease the real price of visiting Mexico, at least for American tourists. However, the results show the opposite. One of the hypotheses behind this is that the visitors from other parts of the world where the USD is not the primary currency dominate the effect. The second alternative is that there are other unobservable variables positively correlated with the exchange rate, such as macroeconomic or political instability.
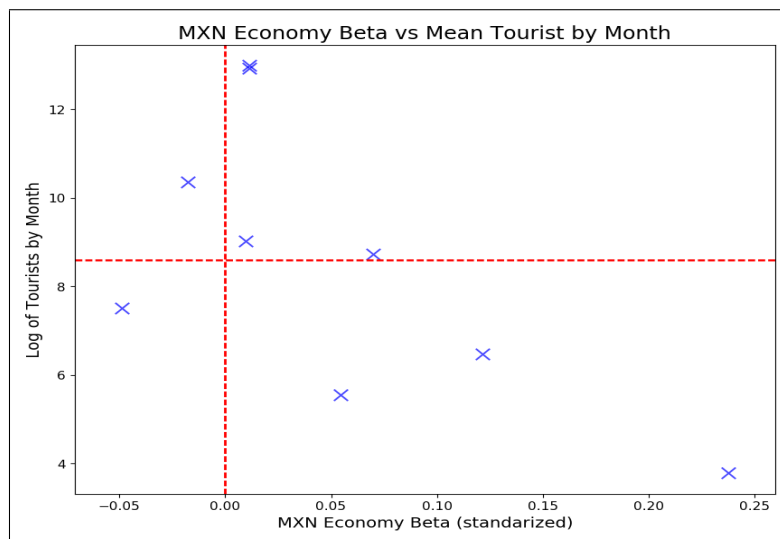
Effect of the Economy

Overall, as depicted in Figure 12, the effect of the Mexican economy is positive, and it is more important in places where the relative size of tourists flows is small. On the other hand, the USA Economy has the opposite effect, according to Figure 13. That is to say, in places where the mean number of tourist is above the average, an increase in the performance of the American economy also increases the touristic flows. However, in areas where the number of visitors is below the average, a positive performance of the American Economy has a negative effect on the total number of international arrivals. Then, apparently, in seasons where the growth of the American

Figure 11: Real Exchange Rate and Tourists by Month
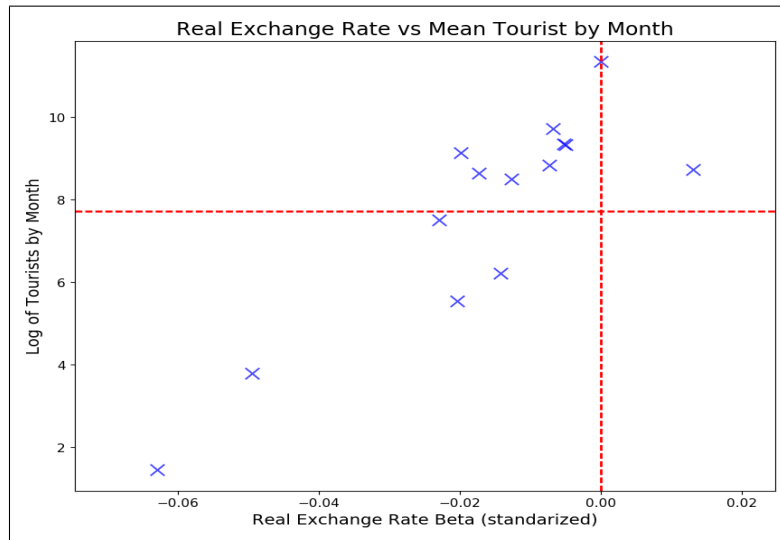
economy is positive, the number of tourist increases in big and traditional touristic places. Meanwhile, in less touristic places, the number of tourist augments as the USA economy decreases. Then, maybe tourist look for non-traditional places due to better prices where the economy is not doing well.

Figure 12: Mexican Economy and Tourists by Month

Figure 13: USA Economy and Tourists by Month
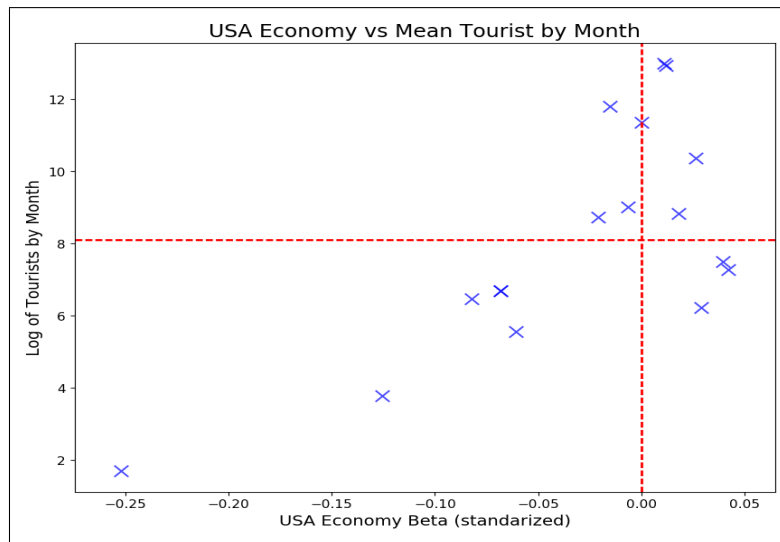
6 Conclusion

The effect of the perception of crime in touristic flows has not been analyzed with a comprehensive data set that links both concepts. This paper contributes to understanding the externalities of crime in tourism.

The places more negatively affected by the general perception of crime are those with relatively low delinquency. Then, safe places receive the negative externalities of areas which define the overall perception of crime. Those are not necessarily close to the safe places. Then, the tourist might not be at risk in safe places even when the perceive the opposite.

Changes in actual crime in safe places affects negatively touristic flows. In contrast, in areas with a high number of homicides per capita, changes in crime are not as important as those in safe places. Then, additional delinquency in already dangerous places does not impact the number of visitors to those areas.

This study relies on the fact that the crime depicted in the New York Times is representative of the international perception of insecurity in Mexico. However, about 70% of the touristic flows come from North America, and more than 50% from the USA. Further analysis is necessary to comprehend the relationship between the real exchange rate and the tourism flows.

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APPENDIX

A-1 List of Words to Track the Perception of Crime

violence—Violence—crime—Crime—criminality—Criminality—criminal—Criminal—Criminal—Criminals—delinquency—Delinquency—illegality—Illegality—delict—Delict—insecurity—Insecurity—risk—risks—Risk—Risks—risky—Risky—death—Death—decease—Decease—deceases—Deceases—fatality—Fatality—fatalities—Fatalities—mortality—Mortality—mortalities—Mortalities—Army—army—police—Police—marine—Marine—marines—Marines—soldier—Soldier—soldiers—Soldiers—murder—Murder—murders—Murders—assassination—Assassination—assassinations—Assassinations—arrest—Arrest—arrests—Arrests—kill—Kill—killed—Killed—killing—Killings—shoot—shoots—Shoot—Shoots—shooting—Shooting—shooted—Shooted—levantado—Levantado—levantados—Levantados—cartel—Cartel—cartel—Cartels—gun—Gun—guns—Guns—drug—Drug—drugs—Drugs—cocaine—marijuana—marihuana—amapola—weed—cannabis—Cocaine—Marijuana—Marihuana—Amapola—Weed—Cannabis—crisis—Crisis—trafficking—Trafficking—trafficker—traffickers—Trafficker—Traffickers—prison—Prison—prisons—Prisons—kidnapping—Kidnapping—kidnapped—Kidnapped—war—War—wars—Wars—homicide—Homicide—homicides—Homicides—extortion—extortions—Extortion—Extortions