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Initial Results

Introduction and Research Question

Tourism is a primary source of revenue for many countries. For instance, in Mexico, South

Africa and Italy, it represents more than 8% of the GDP. There is an intuition that crime and its

perception can affect choices regarding touristic destinations although there is not a

comprehensive study which relates both concepts. This paper will link the traditional

determinants of tourism, such as aggregate income and relative prices, with the perception of

crime and its effects on tourism. In specific, the question that I would like to address is what is

the effect of the aggregate perception of crime on the number USA visitors towards specific

places in Mexico?

Methodology

The main model will be based in the following:

$$T_{jt} = f(P_t, C_{jt}, O_{jt})$$

Where,

$$T_{jt} = touristic\ data\ for\ place\ j\ in\ time\ t$$
$$P_t = index\ of\ general\ perception\ of\ crime\ at\ time\ t$$
$$C_{jt} = crime\ for\ place\ j\ in\ time\ t$$
$$O_{jt} = other\ controls$$

That is to say, tourism to place j in time t will depend on the general perception of Mexico in time t, but all other variables will be specific for each location. The econometric model, assuming linear relationships,

$$T_{jt} = \beta_{0jt} + \beta_{1jt}(P_t) + \beta_{2jt}(C_{jt}) + \nabla_{jt}(O_{jt}) + \epsilon_{jt}$$

However, for this report, I present analysis considering country-level data. In the same vein, I restrict the data section to country-level descriptions. Then, the equation for this exercise will be:

$$T_t = \beta_{0t} + \beta_{1t}(P_t) + \beta_{2t}(C_t) + \nabla_t(O_t) + \epsilon_t$$

Data

The available data comprises from January 2012 to December 2016, which represent the maximum compatible data gathered at the moment. To measure the number of tourists, I utilize the data provided by the Ministry of Tourism, which is collected by the Bank of Mexico. The data follows the methodology defined by the World Tourism Organization (UNWTO), which divides the international travellers into three broad categories: international tourist, frontier travellers, and cruise travellers. For this study, I only consider the first two types because there is more data available for these kinds of travels. Moreover, as an alternative measure of touristic activity, I will utilize the expenses made by tourists. This information is also provided by the Ministry of Tourism and it is collected by the Bank of Mexico.

As a measure of crime, I will utilize the total number of federal law crimes at country-level, those includes drug-related issues. The National Commission on Security provides this data on

Security. Although I will only use monthly measures of crime from 2012 to 2017, it is possible to build longer series. I am not using them now for compatibility issues.

I built the perception of crime from analysis of all New York Times articles from 2012 to 2016 which contains at least two words related to Mexico, such as Mexico and Mexican. For the preliminary results, I define two measures of perception of crime. The first one is the total number of crime-related words in the corpora by month. The second one is the proportion of words with crime-related words among all the words in the previously selected articles, by month. For instance, some of those words are violence, crime, delinquency, fatality, kill, murder, trafficker, among others. For a complete list, please see the Appendix. In the final version, I will also utilize topic modelling and sentiment analysis to create a time series of perception of violence.

Finally, the primary controls are monthly indicators of economic activity in the USA and the real exchange rate between the Mexican peso and the USA dollar. In this index, an increase in the number is a decrease in the value of the Mexican currency. The indicator for USA's economic activity will be the Economic Activity Index for the United States provided by the Federal Reserve Bank of St. Louis, which is seasonally adjusted. The real exchange rate is the real exchange index build by the National Institute of Geography and Informatics (INEGI). All controls are monthly basis.

Exploratory Data Analysis

In the analyzed time frame, the number of tourists increased steadily, while the number of crimes decreases during 2012 and remain in 2013 level afterwards. There is not a clear trend on how crime can affect tourism. In spite the number of crimes has been at a similar level in the last four years, the number of tourists has increased. This pattern is robust to different definitions of tourism, such as a total number of tourist, tourism that arrives exclusively by land, tourism of people who cross the frontier in cars, and total expense of tourist who goes to non-frontier destinations. Then, others factors besides crime are defining the touristic flows.
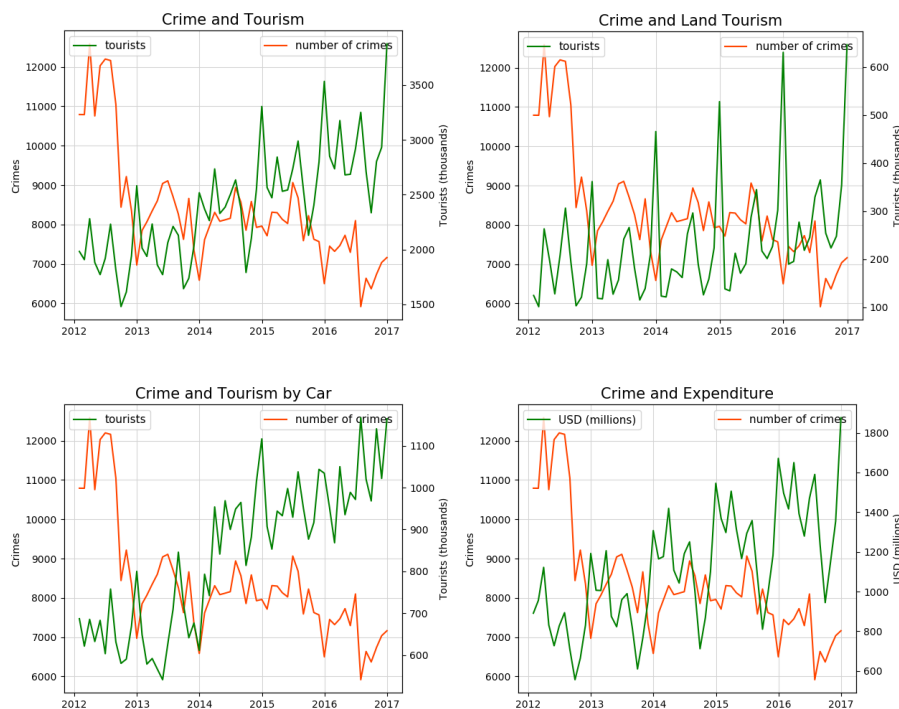
On the other hand, the actual number of crimes and the indicator of crime perception follows a similar trend. However, their correlation is not perfect, and sometimes their changes are in opposite directions. Moreover, the data at the state level depicts that some Mexican states are more violent against the general perception, and other states are safer that the public perception.

As a result, maybe some states benefit from the common understanding of crime because they look more harmless than they are. Meanwhile, secure states can be affected by the general perception because they are safer that they appear. Then, probably there are positive and negative externalities of crime perception.
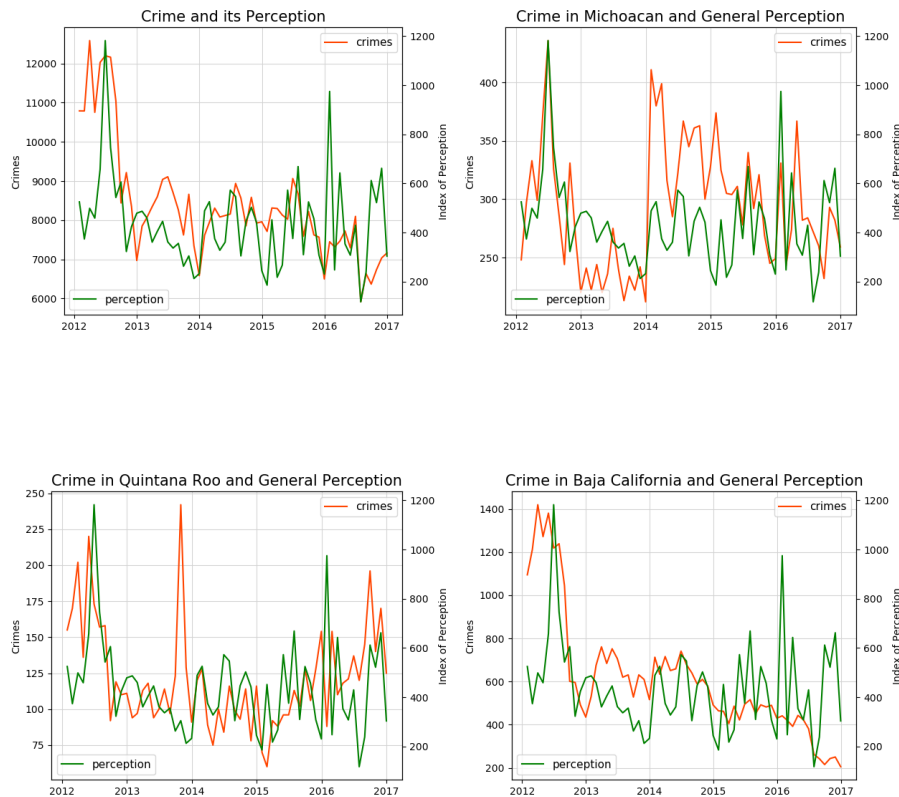
Preliminary Results

I run several models like the one described in the methodology section. However, I used AR(1) models to maintain stationarity in the series. Furthermore, in some cases, I utilized seasonally adjusted variables signaling with the suffix "sa." Overall, the preliminary results show that the most significant variable is the USA

Economic Activity, which has the expected positive sign in all the regressions and is significant in four of the five reported regressions.

Table 1

Dependent Variable: Total tourism (thousands)

	estimate	std.error
ar1	0.224	0.142
intercept	-7736.816	3350.549
Crime_sa	0.075	0.135
Real Exchange Rate	-7.518	12.331
USA Economic Activity	60.417	16.578

Table 2

Dependent Variable: Total tourism (thousands)

	estimate	std.error
ar1	0.218	0.142
intercept	-6718.243	1721.644
Real Exchange Rate	-12.638	15.786
USA Economic Activity	58.412	12.848
Perception_sa	0.819	1.246

Table 3

Dependent Variable: Total tourism (thousands)

	estimate	std.error
ar1	0.260	0.133
intercept	-5394.908	1158.297
Real Exchange Rate	2.434	9.358
USA Economic Activity	45.985	8.471
Num of crime ocurrences	-0.248	0.233

Table 4

Dependent Variable: Tourists that arrive by land (thousans')

	estimate	std.error
ar1	0.020	0.140
intercept	-701.590	502.618
Number of crimes	-0.004	0.014
Real Exchange Rate	2.883	2.507
USA Economic Activity	4.334	3.033

Table 5

Dependent Variable: Total expense in tourist destinations to non-frontier destinations (USD millions)

	estimate	std.error
ar1	0.479	0.118
intercept	-3361.130	1371.341
Number of crimes	0.007	0.032
Real Exchange Rate	-3.699	7.513
USA Economic Activity	28.235	8.594

Concluding Remarks

The relevant variables for this study, crime and perception of crime, lack of explanatory power in the regressions. However, the final report will include a panel analysis, which will include visits to different touristic places inside Mexico. That methodology can potentially increase the significance of the regressors. Another possible approach is to analyze tourism from different states of the USA to Mexico. That is to say, visitors from Texas to Mexico, New York to Mexico, and so on. It can be another way to create a panel.

A hypothesis of why the coefficients are not significant is because crime and perception of crime are regressed at in the same time as the data for tourism. Intuitively, crime can affect travel decisions, but when crime happen before you decide to visit a place. Then, the next step is to test different lagged values for crime and its perception and analyze if it makes a difference. The data will be expanded five years more to complete the data from 2006 to 2016. It can increase the explanatory power of the regressions.

APPENDIX

List of words related with 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"