PROPERTY CRIME AND INEQUALITY
AN EMPIRICAL STUDY OF CA 49 COUNTIES

A Project
Presented to the
Faculty of
California State Polytechnic University, Pomona

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science
In
Economics

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2017
ACKNOWLEDGMENTS

Thank you for Dr. Lange provide the example and signature pages
ABSTRACT

This research project examines the relationship between property crime and economic inequalities from counties 49 counties in California from 2010 to 2012. We choose the data less a decade, it is easier for us to forecasting than older data. First, we investigate the correlation between poverty rate and property crime rate. Second, we study the relationship between property crime rate and our explanatory variables that included poverty rate, foreclosure rate, welfare receive rate, unemployment rate, and gang membership rate, medium income. My research contains different type of variables and will exam which one will make impact to the property crime rate. We eliminate insignificant variables, one at a time by analyzing adjusted R square, P-value, and T-test, and then run the regression analysis with relevant variables. Our results prove that poverty rate, medium income, foreclosure rate and welfare receive rate have statistically significant effect one property crime rate.
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Chapter 1

Introduction

Crime or more specifically criminal like property crime and violent behavior has become a major concern in recent year across the world. In common sense, Crime rate vary enormously across countries and region, and norms that promote fairness such as equity and equality are sometimes considered to be more closely related to level of criminal activates. Since many years ago, the relationship between inequity and the incidence of crime has been an important subject of study for economics. Suppose if growing inequality has a huge impact on crime, we should find out precisely which components of inequality affect crime. We can then relocate our resource and adjust policies to reduce criminal activities. To test what kind of relationship between inequality and crime rate, we locked most of our cross-sectional datas in 2010 for 49 counties in California, which is a period of general economic decline. Big recession began with the bursting of trillion-dollars housing bubble. The resulting loss of wealth led to sharp cutbacks in consumer spending. During the financial crisis, rising inequality makes problems like poverty, unemployment, and foreclosure more intractable, and as we mentioned before, social inequality issues and crime rates are always positively related. These generate
interest and motivated this study, we target on property crime with this strong economic background, and have incentive to predicate relationships between property crime rate and inequality factors such as poverty rate, foreclosure rate, and welfare receive rate and unemployment rate. The relief that our results show that poverty rate, foreclosure rate, medium income and welfare receive rate have a statistically significant effect on property crime rate.
Chapter 2

Lecture Review

The idea of our topic is initially inspired by a journal called “Crime and Income Inequality: The case of Malaysia” by A.H. Baharom 2009. This paper examines the causality between income inequality and crime in Malaysia for the period 1973-2003” (Baharom 2009). As mentioned by Baharom (2009). Data in this article was obtained from Royal Malaysian Police, which included the total crime, burglary, theft, violent crime and property crime. The paper used ARDL bounds testing framework to test those macroeconomics variables on criminal activities particularly on income inequities, and The outcome most people would suppose income inequality is positively associated with crime rate. However, the surprising result shocked everyone there is no direct relation in the short-run or long-run crime rate. We are curious and do not understand why the outcome is unexpected. Is it possible Malaysia is a unique environment and culture that other country will not follow it? Then, we come up with this interesting topic and we keep asking it may be true for Malaysia only, no other place will similar to Malaysia. Secondary, should we choose crime rate that included the violence crime as well? However, we have made the claim that violence crime links with individual emotional factor.
Therefore, we are focus on the property crime instead of violent crime for our model. Finally, we define our study target for the inequality and the property crime rate for California forty-nine counties. We are debating choose the whole country or just California alone for our data, but since we live in California, if our topic focus on California alone will be more interesting and close relate to us than the whole country; therefore, we are choosing the whole California counties data over the whole country. So, what is property crime? “In the FBI’s Uniform Crime Reporting (UCR) Program, property crime includes the offenses of burglary, larceny-theft, motor vehicle theft, and arson” (FBI). So basically, the definition for property crime is not hard for understanding, and the object of the theft-type offenses is the taking of money or property, but there is no force or threat of force against the victims. The property crime category includes arson because the offense gets involved with the destruction of property; however, arson victims probably be referred to force due to limited survey datas and differing collection methods by local law enforcement agencies, only restricted data are obtainable for arson. Now we jump to our next step, and what causes our target “property crime”.

There is one interesting article named “What causes property crime?” (Bansal 2012). That article bring out that the property crime is one of the most common crime in Australia, and it stated that there are four major causes of property crime, which are inadequate security, poverty, substance abuse, and peer group pressure. The first two causes are reasonable and easy to understand. Higher security level always gives a good explanation to prevent the property crime, otherwise insecurity as a driving force would be easy to turn negative effect. Besides, it pointed out “A 2002 study found that property crime is more common in areas where unemployment is around 10% ”(Bansal 2012). This roughly indicates that there should be a correlation between crime and poverty. When people earned by lower incomes, they educated less with more possibilities than
usual. When they see something that we will never owned in freely accessible area, they have strongly intentions to steal the items. By contract, advanced degrees people on good wages are less likely to steal in similar circumstances.

The combination of poverty with opportunity leads to property crime. Truly, poverty is unfortunate situation for every resident, these people have to find a way to survive like receiving welfare from government, work extra job but paid low, and commit the crime activity like property crime. The third causes are the substance abuse. “People who are addicted to drugs or alcohol will steal to gain funds to fuel their addiction. Car theft and home invasion are commonly linked to substance abuse. In addition, drug and alcohol addiction leads to lowering of inhibitions and isolation from mainstream social standards. The combination of physical need for a drug with low social conformity will encourage criminal activity” (Bnasal 2012). The last cause is the peer group pressure, most people found guilty of property crime are young people aged 15 to 24, it is predictable and reasonable because the 15 to 24 age range have more chances to be tempted crime. These people usually belong to the blue collar, and lack of education level; therefore, these group pressure them commit property crime activity.

Now we have researched two different countries Australia and Malaysia, it is not hard to say that the poverty still is the main reason why people committed a property crime. Also unemployment factor usually plays a large role to poverty and the crime activity. We still believe no one was born to be criminal, but the living environment force them to do so. One of article named “Unemployment causes higher property and violent crime rates” was written by Bill Mitchell. This article unemployment exerts a consistent, positive, and highly significant effect on the total property crime rate. That is, “higher unemployment unambiguously increases property crime rates” (Mitchell). After studying multiple article research, we determined that we focus on property crimes rate
on California, we will collect our own data that highly relate to our property rate in CA such as poverty rate, unemployment, education level, median income, enforcement population and even the county population. In our research paper, we try to explore how the social inequality highly relate to the property crime rate in U.S. One advantage for cross section data is we can try different type of variable in any year whereas time series usually heavily depend on the past few years which can lead to good for bad fit. Like California passed the proposition in 2014, the property crime rate increased in 2015, and 2016 which is may not be a good fit for time series if we use year 2014 data to forecast 2015 property crime rate.
Chapter 3

Method of Collection

The proper crime data used in our research paper from California Department of Justice 2010 Crime in California Report. From this report, property crime includes burglary, motor vehicle theft and larceny theft over $400. Then, to obtain per capita crime rate for each country, we use total number of property crime divide by country’s population. The unemployment data used in our research paper from U.S. Census Bureau. The data foreclosure rare, was collected the Current Landscape of The California Housing Market by Laura Choi who is a senior researcher associated in Community Development at Federal Reserve Bank of San Francisco. We obtained the gang membership data from Organized Crime in California-2010 Annual Report to the Legislature by Attorney General Kamala D. Harris. For each county in this research, we have divided the gang membership statistics by county population to obtain per gang membership rate. Finally, for the poverty rate, welfare received rate and unemployment rate from the Federal Reserve Bank of St.Louis website at fred.stlouisfed.org.

We believe FRED has strong economic data, and also we collected our data mainly from the government agencies website that provide the most accurate and complete in-
formation. However we could not be able to find enough data for our model in year 2015 or 2016 because mainly not all of data available for each. As we know, the U.S. will do the census each decade, and the last census operation was 2010, and the most accurate and best available information was 2010. To sum up, Our data has included the property crime rate, inflation rate, minimum wage, poverty rate, gang membership rate, median income, and unemployment rate. We would like to minimize the variable less than ten, because we want to make our regression simple. The effect of the unemployment, minimum wage, poverty rate should be a big factor for our model, but another factor may not overlook it if we want our model perfectly.
Chapter 4

Data Analysis

The relationship between poverty rate and crime has also been the subject of sociologies theories. The reason should be given, with a degree of consistency, lower-class people, and people who living in the lower-leading areas have a higher official crime rates than another group. Broadly speaking, for poor, the feeling of disadvantage and unfairness leads the poor to seek compensation and satisfaction including committing crimes against both poor and rich. In a sense, crime is the easiest way for them to get it. To prove it, we investigate the correlation between poverty rate and property crime rate across 49 counties in California. Firstly, we set up crime rate as our dependent variable, and the property crime data used in our research paper from California Department of Justice 2010 Crime in California Report. From this report, property crime includes burglary, motor vehicle theft and larceny-theft over $400. Then, to obtain per capita crime rate for each county, we use total number of property crime divide by County’s population to refine our dependent variable.

To see how poverty can cause property crime, from the Table 4.1 of property crime rate and poverty rate which states that for most of counties, there has positive relationship
between property crime and poverty. We cannot be argued that increase in poverty rate lead to increase in property crime rate in most of counties of California in 2010. However, there has a few countries such as Santa Barbara County (Compare to rate of property crime is 1.05, Rate of poverty is 17.7), Inyo County, Lassen County, Mendocino County, Modoc County and Siskiyou County who has high poverty rate but low property crime rate.

Observed date in this literature is different than the Baharom article in term of we are living in two different countries, and the living environment is not the same so that we selected our own data to fit our California regression model. As we proved before, poverty rate probably is the biggest factor influenced the property crime for each county. Another concern is the effect of police on crime. According to the article ”The Effect of Police On Crime New Evidence From U.S. Cities 1960-2010”, pointed out that ”One of the most intuitive predictions of deterrence theory is that an increase in a typical offender’s chance of being caught decreases crime” (McCrary and Chalfin 2012). This prediction reveals that police power is viewed as a important factor influencing the opportunity of fear facing a potential offender, and we also agree that the population of law enforcement employees should have reverse relationship with property crime rate. However, Aaron Chalfin and Justin McCrary using a new panel data method, which is set on
crime in medium to large U.S. cities over 1960-2010, overturn their previous prediction and assumption. They estimated “each dollar spent on police is associated with approximately $1.60 in reduced victimization costs, suggesting that U.S. cities employ too few police”(McCrary and Chalfin 2012). This discovery study proved a disputed conclusion from the previous literature that police reduce violent crime and property crime. We recognize that the conclusion from this research paper strongly justified police power or population of law enforcement employees are unimportant for decreasing city’s crime rate and property crime rate. We determine to take out enforcement population from our model. Next, unemployment rate of each county could also be closely related to the poverty rate, we expect to keep both of them if it is possible. Another concern is about the data of minimum wage, because it may highly related to median income. We will run a regression test to check if minimum wage and median income have high correlation. The remaining data are less important, and cross section model may face potential problem like included similarity variables. In case of our model will fail, we try our best to pick up different types of individual data. Some of them may however be related to each other. Nonetheless, 6 independent variables for our regression analysis, we have introduced allows us to be clear about the assumptions supporting our hypothesis in such a scenario.
Chapter 5

Data Correlation

Correlation is two or more variables relate to each other, and it causes the regression model failed if correlation value is too high. We can run correlation table to find out their correlation among all the variables. The value range is between -1<R<1, which represents positive or negative relationship between them. If the positive correlation is 1, which is identical it showed the following table. Correlation can be a serious problem, if the correlation relationship is too high, it will cause our model failed. Among all of our seven variables, the highest correlation positive correlation is 0.63 between poverty and unemployment whereas the highest negative correlation is -0.81 between poverty and median income. If we believe the correlation is too high, and it will cause our model, it is better we drop one of these variable in order to improve our regression.

Table 5.1: Correlation Table for all the variables

<table>
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<tr>
<th></th>
<th>WELFARE</th>
<th>PROC</th>
<th>FORECLOSURE</th>
<th>MEDIAN</th>
<th>UNEM</th>
<th>POV</th>
<th>GANGSTER</th>
</tr>
</thead>
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<td>1.00000</td>
<td>0.188481</td>
<td>0.379433</td>
<td>-0.621326</td>
<td>0.560486</td>
<td>0.627937</td>
<td>0.030641</td>
</tr>
<tr>
<td>PROC</td>
<td>0.188481</td>
<td>1.00000</td>
<td>0.555208</td>
<td>-0.176900</td>
<td>0.377989</td>
<td>0.455047</td>
<td>0.429566</td>
</tr>
<tr>
<td>FORECLOSURE</td>
<td>0.379433</td>
<td>0.555208</td>
<td>1.00000</td>
<td>-0.109693</td>
<td>0.483766</td>
<td>0.284765</td>
<td>0.461023</td>
</tr>
<tr>
<td>MEDIAN</td>
<td>-0.621326</td>
<td>-0.176900</td>
<td>-0.109693</td>
<td>1.00000</td>
<td>-0.629098</td>
<td>-0.811527</td>
<td>-0.013523</td>
</tr>
<tr>
<td>UNEM</td>
<td>0.560486</td>
<td>0.377989</td>
<td>0.483766</td>
<td>-0.629098</td>
<td>1.00000</td>
<td>0.638513</td>
<td>0.047922</td>
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<tr>
<td>POV</td>
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<td>0.455047</td>
<td>0.284765</td>
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<td>0.350538</td>
<td>1.00000</td>
</tr>
</tbody>
</table>
Chapter 6

Multi-collinearity and other errors

There is another error named multi-collinearity. Severe multi-collinearity will cause the program unable to come up with model. For example like $\beta_2 = 0.4\beta_1$, if we include $\beta_2$ in our model, it will cause the matrix failed and will not able to run the regression. And the two way causality like consumption affect GDP each other, these type of errors we need to minimize it. The Granger causality test can help us find out whether there is $X$ causes $Y$ or $Y$ causes $X$. It usually through a T or F tests to see whether is statistically significant enough.
Chapter 7

Regression Model Analysis

We go a step further by use regression analysis to test the relationship between dependent variable - property crime rate and explanatory variables.

The following is our predicated regression model with six variables:

\[ Y = \beta_0 + \beta_1 F + \beta_2 G + \beta_3 M + \beta_4 P + \beta_5 U + \beta_6 W + e \]

- F is Foreclosure Rate, G is gang membership rate, M is Median Income, P is Poverty Rate, U is Unemployment Rate, and W is welfare receive rate

- The observations are 49 which represent California 49 counties.

- We will exam the adjusted $R^2$ then whether we take out our variables in order to improve our model.

The adjusted $R^2$ is a good predictor shown how well terms fit a curve or line. If we put more and more useless variables into a model, adjusted r-squared will decrease. If you add more useful variables, adjusted r-squared will increase. We also focus on P-value and Coefficient Significant level. If the coefficient is not strong enough or have improper value then we need to take out. Our regression result from the range six independent
variable to four independent variables. The testing process can be summary by slowing testing each variable at once, and take out one each time. Every time we took out one variable, our adjusted $R^2$ increased, it showed each variable has more damage than contribute to the model, which is a surprised result for us. The best model came with left four variables that included welfare, poverty, foreclosure, and median income. The median income have strong positive coefficient but the standard error is high, and it seems the median income should not provide a positive effect even this variable will increase our adjusted $R^2$. 
Chapter 8

Regression Model Result Figures

Figure 9.1 illustrates our result of regression unemployment rate \( (U = 0.001961) \) has positive sign, and Gang membership rate \( (G = -0.087869) \) has negative sign, which is good as we expected.

Welfare receive rate also has negative sign which means that increase welfare receive rate will decrease inequality, thus, property crime rate will decrease. Also, decreasing the unemployment rate will put people to work, then they do not have time to commit crime, in addition, directly affect welfare receive rate, then property crime rate will decrease.

Figure 8.1: Regression model with 6 variables
Then we decide to optimize our necessary explanatory variables. First, we drop one explanatory variable – Medium income, and then our new categories reduce to gang membership rate, unemployment rate, foreclosure rate, poverty rate, welfare receive rate.

The following is our predicated regression model with five relevant variables:

After we drop one variable, Figure 9.2 shows the summary statistics of new variables chosen, and having noted that new adjust R square decrease to 40.78%. But the sign of Gang membership rate changes into positive sign, which is not our expectant. We decide to drop off Gang membership rate to see what will happen next.

From figure 9.3 we noted that new adjust R square increase to 0.421. To help us out, new R square presents a variety of goodness-of-fit statistics, which determines how well the model fits the data. However, the sign for unemployment rate changed into negative, so we want to drop off unemployment rate to see if the left variables could explained properly our model.

The following is our predicated regression model with three relevant variables:
Figure 8.3: Regression model with 4 variables

Figure 8.4: Regression model with 3 variables
Figure 8.5: The best model highest adjusted $R^2$ with 2 variables

Now, adjusted R square increase to 43.3%, and our model improve a little. We continue to drop off Welfare received.

Figure 9.5 stated that from 2 variables model, Adjusted R square sharply decrease into 37.83% after we kick out welfare received, which implies we need to keep welfare received into our model for sure.

After testing each variable, we reach our conclusion that the best significant variables are poverty rate, foreclosure rate, medium income and welfare receive rate. With 4 variable model, our adjusted R square can be reached to 45.01%.
Figure 8.6: The best predicted model with highest adjusted R square

Figure 8.7: The comparison between actual and forecasting values

Figure 8.8: Forecasting chart with 2 S.E.
Chapter 9

Conclusion

The idea to predicate relationship between property crime rate and differential inequality factors such as is came from the journal regarding the case of crime and income inequality for Malaysia, the unexpected result driven us to test the relationship between inequality and crime rate 49 counties in California. In our California build-up model, it also prove there is no direct relationship between inequality and property crime by running regression. The best significant variables are poverty rate, foreclosure rate, medium income and welfare receive rate. But we have to point out the adjusted $R^2$ is only 45%, which we can fairly say the inequality is not highly related to property crime.
Bibliography


