**Introduction:**

The purpose of this project is to investigate the effect of real disposable personal income on the property crime rate in the United States from 1960-2012. In the past, much of the previous literature has discussed the effects of environmental factors and other population characteristics like GDP, population density, and income inequality on violent crime rates, but there has never been an analysis specifically focusing on the variable of disposable personal income. The literature suggests that variables such as poverty or income inequality showcase strong, positive correlations with the violent crime rate, and disposable income is well-correlated with those independent variables. Smaller disposable incomes indicate a lack of ability to purchase goods and services; because of its nature as disposable and not essential income, it is plausible that violent crime rates might not be perpetuated by this statistic. In this case, it would be better to investigate how a change in disposable personal income would affect property crimes, such as larceny, burglary, or any other forms of general theft or damage to property. This paper examines two key pieces of literature. The first study uses the environmental factor of population density as its independent variable to try and predict violent crime rates in the city of Nashville, Tennessee and the counties surrounding it. The researchers hypothesized that urban locations would have lower violent crime rates and suburban locations would have lower crime rates because of the differences in population density and cultures. The study used GDP as its primary environmental factor to investigate and also looked at various non-environmental factors as possible determinants to provide information about crime while controlling for GDP. One major limitation of the study is that they did not use longitudinal data, so they couldn’t see how previous periods of population density or violent crime affected the current values; for my analysis, I intend to conduct a time series analysis with autoregressions to make the model dynamic. In my study, I will be examining the effect of a population characteristic, real disposable personal income, as my primary factor and environmental factors like GDP per capita as my determinants. Because of the largely influential nature of these factors, I hypothesize that GDP per capita will have the largest magnitude of significance on the property crime rate. The second study examines violent crime rates through the lens of income inequality while diving into three different dimensions of data, namely cross-country, within-country, and time series analyses. The researchers hypothesized that there was a positive correlation between inequality and violent crime, which turned out to be true and statistically significant. They conducted single and multiple regression analyses while also making the model dynamic by introducing lagged values of the dependent variable. Based on the results from the preceding literature, I will be elaborating on these studies by examining the effect of real disposable personal income on property crime rates in the United States from 1960-2012 through a time series context. I hypothesize that there will be a weak, negative correlation between the two variables. After conducting my regression analyses, my hypothesis was disproven because the two variables actually exhibit a nonlinear, quadratic specification. As the square of disposable income increases, the property crime rate decreases, which is in line with my original hypothesis when accounting for nonlinear affects.

**Literature Review:**

To expand off the brief discussion of the literature used in this study in the introduction, here I will be going into more detail about the intricacies of the econometric models used in each study. The first paper investigates the effect of population density on violent crime rates by looking at the differences in crime rates from the city vs. county specification in Nashville, Tennessee. Past studies have hypothesized that higher population densities in urban areas actually work to deter crime, in which the abundance of informal surveillance methods like windows prevent criminal activity from occurring. While suburbs experience a lesser degree of crime overall, the culture surrounding wealthier suburbs changes the narrative because they can have access to resources such as gated communities and private policing. Thus, past studies have hypothesized that lower population densities, because of the wealth associated with it, lead to lower violent crime rates. The researchers in this study used both of these hypotheses and integrated GDP as their primary environmental factor/explanatory variable; environments tend to be more varied and unstable, so they exhibit greater contribution to the overall variance in the regression analysis. The econometric model used two regressions ran at each geographic label (county, city) where the first model contained just the determinant control variables and the second model adds in the environmental factor GDP. The single regression analysis showed that there was a non-significant negative correlation between the population density and crime rate variables in urban locations and a non-significant positive correlation in the suburban locations, which is in line with the initial hypotheses. The multiple regression analysis showed that population density was the most significantly negative explanatory variable to predict violent crime, as it had the highest R2 value. The discussion of the findings shows that further investigation is warranted because of the non-significant values of the coefficients, and also that the relationship between the variables is likely nonlinear. In the second study, the researchers decided to investigate the relationship between income inequality and violent crime rates through a cross-country, within-country, and time series analysis. Income inequality, when measured by the Gini coefficient, is an important factor in determining violent crime rates. But, there are questions that remain regarding the robustness of the link between income inequality and violent crime because of the potential of simultaneous factors that could be affecting both variables, which could diminish the possibility of a causal relationship. The study first looked at simple correlation plots between the Gini coefficients and the homicide and robbery rates in both panel data and time series datasets. In both cases, the correlations were both positive and significant. Next, multiple regression analysis was performed while controlling for other determinants such as GNP per capita, the average years of education in the adult population, and the growth rate of GDP. In addition, the study also included the crime rate in the preceding period as an additional explanatory variable in order to make the model dynamic. Finally, the study effectively controlled for measurement errors and possible serial correlation effects by giving the model random noise. The results showed that an increase in income inequality had a significant effect on raising the rate of violent crime. Furthermore, the GDP growth rate also had a significant impact as an additional explanatory variable; it always appeared consistently with a negative and statistically significant sign, as opposed to the other regressors used in multivariate analysis. The results of the multiple regression showcase that the model maintained its positive and significant correlations with violent crime rates. It was possible that the OLS estimates of the coefficients might have been biased because they didn’t consider that crime persists over time, so additional analysis was performed by adding a lagged version of the independent variable onto the multiple regression.

**Model:**

For the econometric model, first I will conduct a single and multiple regression analysis to investigate the effects of disposable income on property crime by itself, then when controlled for in the presence of other determinants, which are a combination of population characteristics and environmental factors, in this case. Next, I will conduct autoregression analyses by adding lagged versions of the dependent variable as an explanatory variable and lagged versions of an additional independent variable X in AR and ADL tests. To estimate the correct number of lags to use, BIC tests are done using trial and error. Then, an ADF test will be conducted in order to see if the property crime rate has a stochastic trend.

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**Empirical Application:**

Since the data was gathered as population parameters, the condition of simple random sampling is satisfied. Furthermore, looking at the correlation table, there is no evidence of perfect multicollinearity. Therefore, we can move forward with our analysis. The initial scatterplot shows that when real disposable personal income increases up to the level of ~$20,000-$30,000, the property crime rate increases, but then begins to decrease after that. This is interesting because it does not correspond to the initial hypothesis. This could be because as felons commit crimes, particularly in cases such as theft and burglary, their personal disposable income increases, but up until a point, that is when felons begin to ease down on their criminal activities and thus the property crime rate goes down. When looking at the scatterplot, however, it is clear upon initial observation that the graph is nonlinear. Thus, I conducted a linear hypothesis test with variables for the squared and cubic versions of the disposable real income explanatory variable. The test showed that the alternative specification was statistically significant at the 0.0001% level, showing that the relationship between the two variables was indeed nonlinear. So, I had to revise my initial regression analyses to now account for nonlinearity in the econometric model: the single regression analysis now included squared and cubic specifications. Here, we can see that two specifications of the disposable real income independent variable were statistically significant and positively correlated, with the squared association being negative and statistically significant. However, the magnitudes of the coefficients themselves are quite small at 1.815e-05, -5.508e-10, and 5.027e-15, respectively. Upon examination, we can see that the linear association has the highest magnitude of significance, which shows a positive relationship between property crime rates and disposable personal income, up until a point, where the squared association proves this with a negative correlation coefficient. The multiple regression analysis, when adding possible determinants of property crime rates in the employment level, GDP per capita, and the unemployment rate, we can see that all but one of the coefficients were statistically significant. Because the unemployment rate was completely insignificant, I decided to drop it entirely from the final specification. Thus, the revised multiple regression showcases the same signs as before on the disposable income explanatory variables. When controlling for these other two determinants, we can see that the magnitudes of the coefficients increased; but, because of the small magnitude of the initial observations, this difference is not quantifiably significant. When looking at the determinants, we can see that employment level was positively correlated and that GDP per capita was negatively correlated with property crime rates. This is interesting because we expect that as employment level increases, the property crime rates should decrease because there would be less of an incentive to commit property crime as one’s employment level reaches a level of sustainable satisfaction. However, when we look at GDP per capita, we can see that its magnitude of significance does not follow our initial hypothesis in its nature as an environmental characteristic. Further investigation is warranted in order to draw a meaningful conclusion from the current data. Next, I decided to conduct a series of autoregressions in order to make the model dynamic. Preceding values of the property crime rate can provide useful information about the present value. Thus, in order to estimate the correct number of lags to use for the autoregression analysis, I calculated the BIC for autoregressions of one lag all the way up to four lags of the property crime rate. Two lags provided the smallest BIC value, which is what I used proceeding into the regression analysis. The first lag has a positive and significant coefficient estimate, showcasing that increasing values of the previous period of property crime will generate increased values of the current period of property crime. However, the second lag has a negative and significant coefficient estimate; this might be because of other potential determinant factors creating omitted variable bias. Next, I conducted an ADL test using disposable personal income and its lags as a secondary regressor in addition to the lags on the property crime rate. This analysis shows that the two period lags of property crime rate and disposable income are negative, while the one period lags are both positive. Further analysis is required in order to draw a significant conclusion. Finally, I conducted an ADF test in order to see if a stochastic trend existed in the property crime rate variable. Of all the tests considering stochastic trends with drift or no drift, the null hypothesis of non-stationarity was never rejected. Thus, the property crime rate variable is stochastic with a random walk. It can be reasonably concluded that property crime rate is incredibly difficult to forecast because of this.

**Conclusion:**

To conclude, my original hypothesis that there would be a weak, positive correlation between the dependent variable of property crime rate and the independent variable of disposable personal income was disproven. This was due to the nonlinear nature of the correlation. When looking at the square of disposable personal income, when this increased, the property crime rate went down. Looking at the multiple regression analysis, this result is still in line when controlling for outside determinant variables such as GDP per capita, employment level, and the unemployment rate. In addition, because the unemployment rate is entirely statistically insignificant, I decided to drop it from the final specification. We find that as GDP per capita increases, property crime rate decreases; but, when the employment level increases, the property crime rate also increases. I hypothesize that this might be because it might also rely on a nonlinear specification. After accounting for dynamism in the econometric model, I found that two lags of the property crime rate were sufficient for estimating the current period’s property crime rate value. Although the first lag was in line with my initial hypothesis, the second lag wasn’t. This result was also present in the ADL regression analysis as well. Further investigation will be needed in order to fully understand the result.

References:

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