

5-2022

## **An Analysis of the Suspect: The Impact of Economic Conditions on Crime**

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Perez, R. (2022). An Analysis of the Suspect: The Impact of Economic Conditions on Crime. *Economics Undergraduate Honors Theses* Retrieved from <https://scholarworks.uark.edu/econuht/40>

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**An Analysis of the Suspect: The Impact of Economic Conditions on Crime**

**by**

**Ryan R. Perez**

**Advisor: Dr. Amy Farmer**

**An Honors Thesis in partial fulfillment of the requirements for the degree Bachelor of Science in Business Administration in Economics and Management.**

**Sam M. Walton College of Business  
University of Arkansas  
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**May 14, 2022**

## **Acknowledgements**

I would like to thank the outstanding faculty in the Walton College for assisting me throughout my academic journey. Specifically, I would like to thank Dr. Amy Farmer for her guidance on this thesis and for broadening my understanding of the scope of economics. Additionally, Dr. Robert Stapp was instrumental in my college experience; without his wisdom, his support, and his belief in me, the maturity of my writing, the rigor of my research methods, and my discipline as a student would be starkly different.

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## **Abstract**

Every place in the world experiences a level of crime within its borders, but there is much contention as to which factors lead to crime. Economic conditions, due to their association with poverty, are frequently discussed as a possible contributors to crime rates. This analysis examines four macroeconomic variables (GDP per capita, unemployment rate, inflation rate, and interest rate) and their effect on crime rates (violent, property, and total). After thoroughly reviewing the philosophical nature of crime, the current economic conditions through the lens of the selected macroeconomic variables, and the present criminal landscape throughout the United States and the rest of the world, this study focuses on the United States' data from 1961 to 2019. Regression analyses indicate that GDP per capita (change) was not a statistically significant variable for any type of crime rate; additionally, unemployment rate was not a statistically significant variable for violent crime. Overall, economic conditions, as defined by the selected (and significant) variables, can explain 36% of the variance in violent crime rates, 63% of the variance in property crime rates, and 60% of the variance in total crime rates. The data, in conjunction with numerous corroborating sources, shows that changes in economic conditions contribute to changes in crime rates. Additionally, the regressions suggest that property crimes are more responsive to changes in economic conditions than violent crimes.

## I. Introduction

Crime has existed since civilization's inception. No matter the method of deciding the rules and guidelines which keep society contained, there have always been instances where people have broken their social contracts. Once civilizations grew aware of these inefficiencies, they began developing codes and laws in order to declare and immortalize the directives.

The Sumerian people, who settled in the area now known as Iraq, were likely the first group to develop a written law code; additionally, the surviving tablets even indicate a separation between civil and criminal disputes (Crime Museum, 2021). Still, the Sumerians were not the only civilization in the region at this time. In fact, most of the adjacent civilizations to the Sumerians documented their own laws in the same system of writing, *cuneiform*. The summation of all these laws became known as *cuneiform law* (Encyclopedia Britannica, 2011). Because these civilizations shared linguistic and cultural elements, there was noteworthy overlap between the laws of each civilization. The critical point for the sake of this analysis, however, is the simple recognition that all the involved civilizations, which existed in a cluster circa 2100 BCE, developed these systems for the purpose of maintaining order under their individual domains, the primary purpose of legal systems even to this day (Encyclopedia Britannica, 2011).

Social stability is an entry ticket for any thriving society; too many people violating the rules uproots the entire system. In an ideal world, people would move about in coordinated conjunction, adhering to the laws in place and progressing their civilization economically, culturally, and politically. This remarkable notion of continued human progression, however, is indeed a fantasy. Every single country in the world has a legal system and a number of violations that occur within that legal system, represented through crime. In fact, a crime, in this analysis, will serve as any action that violates a legal system under the relevant jurisdiction(s).

As noted, everywhere in the world experiences crimes every year, even though a few countries do not have the infrastructure to report accurate information or simply do not release crime statistics (World Population Review, 2022). As the data is investigated, clear patterns are discernable. Venezuela, Papua New Guinea, South Africa, Afghanistan, and Honduras hold the highest five spots on the *crime index* list in 2021, and *none* of these countries have left the top six spots since 2016, barring a gap Afghanistan's data for 2016 (Numbeo, 2022). The same phenomenon manifests itself at the other end of the spectrum, although admittedly to a lesser degree. Countries such as Japan, Taiwan, Switzerland, South Korea, Hong Kong, Iceland, Qatar, and the United Arab Emirates frequently finish at the bottom end of the crime index, meaning they finish at the top of the *safety index* (Numbeo, 2022).

There are numerous factors that lead into a country's aggregate placement on the crime index. On Numbeo's crime indices, values were generated using variables such as: level of crime, crime vector (increasing, constant, or decreasing), respondents' reported safety alone at different times in the day, problems with drugs / property crimes / violent crimes / corruption, and more (Numbeo, 2022). The combination of these variables aims to cover as many aspects of crime as possible in order to maximize validity and scope while still remaining concise, yet these crime index standings are not the primary concern for this study: the objects of fascination are the reasons why some countries place where they place. As stated before, legal systems seek to maintain order, and every government desires maximum social stability within their regions. If this is the operating presumption, investigating the reasons for routine placements at the polar regions on the crime index should provide some insight. What characteristics are shared between

Venezuela, Papua New Guinea, and Afghanistan that are not shared by Japan, Switzerland, and South Korea?

Surely, there are a lot of commonalities associated between these two groups of countries, but some are not relevant to this study. Furthermore, some common characteristics may be present in both groups. A prime example of both of these concepts is the strictness of gun control. Japan, for instance, has some of the strictest gun laws in the world, with an estimated 377,000 civilian firearms as of 2017 (0.30 per 100 persons) (Small Arms Survey, 2018). Conversely, Afghanistan's data suggests around 4,270,000 civilian firearms (12.5 per 100 persons), which seems like a large number until accounting for the United States, a country with around 393,347,000 civilian firearms (120.48 per 100 persons) (Small Arms Survey, 2018). Of course, evaluating two countries' crime based a single characteristic is clearly unthorough, but the example of gun strictness is useful for another reason: it shows that policy decisions or the number of necessary elements for a type of crime alone cannot holistically determine a country's placement on the crime index. To further illustrate this, Venezuela's gun regulations are categorized as "restrictive" since their passage of stricter gun regulations in 2012 and 2013 (Alpers et al, 2022). Still, they had a homicide rate of 56.33 per 100,000 people, placing third overall on the 2020 list of all countries and territories; this is compared to the United States' placing of 89<sup>th</sup> with a homicide rate 5.3 per 100,000 people (Pariona, 2020).

As has been proclaimed, however, this study is not based on guns. This study is not based on policy decisions, nor is this study on the psychological processes that drive crime on a micro-level. Additionally, this study is not on cultural or geographical differences. Although all these factors (and many more) certainly contribute to total crime levels or crime indices, they are not the focus of this study either. The problems with variables like these is that they are difficult to quantify due to their subjective nature. Also, other variables fluctuate to such a degree that it would be irresponsible to track and incorporate them into any serious analysis. This begs the question: what, then, is a viable variable to predict crime?

*Economic conditions* refer to the state of *macroeconomic variables* and trends in a given country at a specific point in time (Chen, 2020). Macroeconomic variables over a given area are tracked by governments and international organizations across the world, leading to measurable, quantifiable, reliable information. Most importantly about macroeconomic indicators, however, is that they are an *output* of sorts. No matter the *inputs* of cultural influences, government structure, war status, general tolerance levels, particular pieces of legislation, alliances, environments, or any other macro-variable that may contribute to crime, a macroeconomic indicator is generated from the combination. These will be the variables of concern, as they innately control for, theoretically, many omitted elements.

Still, a noteworthy limitation here is that macroeconomic variables, while derived from a plethora of factors (some of which are listed above), can also play into them a bit. Similar to the other options presented, they are not *perfect* for the sake of analysis alone due to their feedback-loop relationship with some of the other variables. Despite this, the macroeconomic variables of economic conditions, due to their summative nature and succinct, reliable data, may very well be the *best* tool for this analysis on crime. As far as specific macroeconomic variables, four of the most important metrics include aggregate output or income, unemployment rate, inflation rate, and interest rate (Sahu, 2022).

Now that economic conditions and crime are bound in this analysis, preexisting research and analyses may offer additional information on the relationship between the two. Additionally, these findings, along with supplementary information, may aid in crafting the research method

aimed at ascertaining the impact of economic conditions on crime. This examination will cover the relationships between certain macroeconomic variables and crime within a particular country over many time periods; it will also use a comparative approach and investigate this relationship internationally among the same time period. There will be a review of macroeconomic variables *and* other factors that influence crime in order to ascertain the magnitude of the relationship between economic conditions and crime, even though solely macroeconomic variables will be used in the manual analysis at the end of the survey.

## II. Reasoning for the Variables

Before exploring the various studies and documentation surrounding economic conditions and crime, it is necessary to understand the essences and present conditions of these variables. In analyzing crime, there are numerous angles that could be selected. Criminologists routinely group crimes into the following categories: violent crime, property crime, white-collar crime, organized crime, and consensual/victimless crime (University of Minnesota, 2010?). Although there is certainly diversity within these categories, the divisions they impose can be analyzed separately (and even tested against each other). For example, perhaps white-collar crimes are affected more by economic conditions than violent crime. Regardless, it is important to consider that whichever method of crime assessment is utilized will include an array of crimes. Numbeo's crime index's methodology is detailed above; any other measurement (such as total crimes per 100 people) will also have some sort of unique methodology in counting crimes. Is an issuance of a speeding ticket an example of a logged crime? Is it weighed the same as armed robbery? These are questions that researchers must consider when aggregating and displaying their data.

The primary reason that economic conditions are tracked in relation to crime is that these conditions may relate to *poverty* in some way, and poverty is understood to be a reason why people commit crime. In fact, poverty is sometimes considered the number one reason for crime (NetNewsLedger, 2019). On this same list, however, sits unemployment, a macroeconomic variable of interest in representing overall economic conditions, specifically in the realm of labor. This is already known, but this contradicts the idea of poverty and unemployment being the *same*. Still, there is a relationship. The Bureau of Labor Statistics cites that periods of unemployment, along with involuntary part-time employment and low earnings, "hinder a worker's ability to earn income above the poverty threshold" (Bureau of Labor Statistics, 2018). Poverty inflicts a sense of desperation within people. When people lack necessary resources to live, or they lack anything above the survival threshold, they will sometimes commit crimes out of necessity. If everyone had a stable, high earning job (relative to their area's economy), there would be no need for anyone to commit crimes out of financial necessity.

The issue of poverty remains a primary objective for governments, organizations, and charities to remedy. Whether eradicating poverty is based solely on lowering the amount of crime it induces or whether this mission is far more humanitarian in its core is irrelevant; other than a select few who opt to renounce worldly possessions, there are little who would choose poverty over wealth. The United Nations, which is comprised of over 193 Member States, has a list of 17 *Sustainable Development Goals* to be accomplished by 2030 (United Nations, 2022). The very first goal on this list is *No Poverty*, which aims to "end poverty in all its forms everywhere" (United Nations, 2022). There were massive strides being made in this endeavor until the onslaught of the COVID-19 pandemic in 2020. Decades of progress on this front have



disintegrated, and the United Nations projects, although estimates were that the world was not on track to meet this goal by 2030 anyways, there will be an increase from the original projection of 6% of the world's population living in extreme poverty by 2030 (United Nations, 2022). International cooperation is definitely needed to eradicate poverty worldwide due to how interconnected the world has become. Some international organizations, such as UNICEF, are working hard to craft analyses of child poverty and to develop sound, tested policy recommendations for world governments and international bodies (UNICEF, 2022).

### **III. The State of Economic Affairs**

It is impossible to discuss contemporary economic conditions adequately and sufficiently without discussing the pandemic. COVID-19 has been ravaging the world's economies since late 2019 and early 2020. There have been brief moments of celebration, but much of the world and its economies have fallen victim to its infectious nature. The New York Times aggregates COVID-19 information (daily) from the World Health Organization, the World Bank, the US Census Bureau, the Center for Systems Science and Engineering at Johns Hopkins University, and assorted world governments and health agencies to produce a leading hub with an interactable interface capable of displaying an abundance of data. As of March 24<sup>th</sup>, 2022, there have been approximately 476 million COVID-19 cases that have resulted in approximately 6.1 million deaths (New York Times, 2022). The relevance of these figures, in addition to each individual loss of life, is seen in the *opportunity cost* brought about by COVID-19's existence and current cases. The disease transformed the landscape of just about every form of interaction and commerce.

There is still discourse on whether or not the magnitude of the restrictions in place to protect the public against COVID-19 match the gravity and danger of the disease, but most sensible people would admit that the measures should be as adaptive and responsive as the virus itself. Regardless of opinion, a significant number of deaths caused by COVID-19 (including all immediate, subsequent deaths arising from COVID-19 complications) affected people who were active, contributing members to the economy. The impact is even larger than this, however, as those individuals often had families who were left without a source of income. These families, for the most part, were left worse off as a consequence of the deaths; the same could be said about the workplaces that employed these people. The situations only worsen in areas in the world with limited social safety barriers in place. The problem expands further when the calculations include those who did not die from COVID-19 but who could not work during their time of infection. Of course, these individuals could not contribute to total productivity of the workplace during this time, posing an opportunity cost on their companies. The employees, depending on their negotiated (or determined) benefits and pay structure, may not have even been compensated during their time away from their occupation, inching them (and their families) closer to poverty. Throughout the pandemic, an overwhelming number of companies across the globe were forced to cease operations (either temporarily or permanently) as a result of restrictions imposed to counteract the deadliest disease in American history and one of the deadliest in global history (Branswell, 2021).

US Vice President, Kamala Harris, said during an interview on MSNBC that, as of June 2021, one third of small businesses closed as a result of the pandemic and its associated externalities (Harris, 2021). Independent fact checkers from Politifact.com ruled these remarks as "mostly true," noting, while the numbers agree with the results of a survey performed by the

Small Business Roundtable and additional data from Harvard University, that it was impossible to distinguish how many businesses had closed forever and how many were biding their time until better conditions arose (Nichols, 2021). Based on these statistics, it is bleak to imagine the true impact on small businesses after an additional year of COVID-19.

There is tremendous turmoil in each individual case of COVID-19 affecting business and commerce, but it is the larger, cumulative macroeconomic variables that will aid in investigating the relationship between economic conditions and crime. The pandemic, due to its vast influence on a multitude of worldly affairs, has led to a discounting of modern statistics to a degree. In many publications, surveys, and analyses, there are asterisks in the years 2020, 2021, and 2022. These years, many feel, do not adequately represent a *traditional* year. Part of this is indisputable: the aforementioned years were certainly not traditional. Despite this, how valid is it to discount the data based on the existence of COVID-19? If the pandemic persists for many more years to the point in which it becomes indistinguishable from *baseline reality*, does the old data become *unrepresentative*? This issue is important in the academic community, yet the crux of the answer resides in factors beyond the control of any singular party: the resolution of the pandemic. Without an answer in sight, however, this analysis must operate while balancing this intellectual dispute. While current, updated information is crucial in understanding modern events and the latest academic studies, data for the regression analyses in this study will *not* incorporate information past the year of 2019. Perhaps this is based on a subconscious, optimistic outlook that the pandemic will soon cease, and the world will return to normalcy. In any case, this may be considered a limitation in the accuracy of the findings since it does not account for the externalities caused by the pandemic. The longer the clutches of COVID-19 persist, the more this study may regret its decisions. This portion will be condensed and referenced in the methodology and limitations sections.

Processing COVID-19's impact on economic conditions will take a large quantity of time and resources; knowing this, it will likely need a very long study of its own. Still, it would be ridiculous and regrettable not to discuss the issues it brings about, especially as a powerful, change-inducing mechanism of the macroeconomic variables that are the focus of this study. This is, of course, factoring in that the original regressions produced by this study will not use this data; post-2019 data is *more* pertinent than pre-2019 in many ways.

The Center on Budget and Policy Initiatives contains a research division tasked with tracking economically related information to help form and justify policy decisions. Notably, this organization primarily conducts internal analyses within the United States. There have been allusions to COVID-19's effects regarding unemployment, but this research indicates that approximately 3 million less people are currently employed in early 2022 than before the pandemic (Center on Budget and Policy Priorities, 2022). Notably, the unemployment rate has been recovering since the worst portion of the pandemic. The unemployment rate in April 2020 "jumped to a level not seen since the 1930s", eventually landing at 4.9% by October 2021, a far cry from the pre-pandemic recording of 3.5% in February 2020 (Center on Budget and Policy Priorities, 2022). Additionally, global median GDP (a common measure of aggregate output, an important macroeconomic variable) fell by 3.9% from 2019 to 2020, representing the worse downturn since the Great Depression (Oum et al, 2022). Domestically, GDP in the United States alone fell by 3.5% during this same period (Bureau of Economic Analysis, 2021). Due to the restrictions introduced as a result of pandemic, coupled with the tangible effects of the public health emergency, companies simply lacked the ability to increase (or even sustain) their current levels of production. While exact, accurate counts of GDP are not available for 2021 at the time

of writing, the World Bank does project an increase in American GDP from 2020 to 2021 and from 2021 to 2022 (World Bank, 2022). Still, considering the economic tensions stemming from Russia's invasion into Ukraine in Q1 2022, experts are predicting that a decrease in American GDP growth forecasts by .2pp to 3.5% (Coulton, 2022). This comes as a result of the higher energy prices induced by the sanctions against Russian energy and the United States hiking the interest rate at a faster rate than was predicted (Coulton, 2022).

Governments across the world responded to COVID-19 in a myriad of ways. The United States introduced *stimulus checks* in an effort to *stimulate* the economy and help people remain afloat for the duration of the pandemic. As referenced earlier, many businesses had to either restructure their business model, close temporarily, or close completely. Economists at the Federal Reserve concluded that 800,000 US establishments had closed in 2020 alone, which is approximately 200,000 more than historical levels (Simon, 2021). The service sector was hit particularly hard, with barber shops, nail salons, and restaurants affected the most (Simon, 2021). These closures led to the increased unemployment that has been mentioned already. The enormity of this problem in the United States cannot be emphasized enough: from March 2020 to October 2020 alone, there were 60 million unemployment claims filed (Cutler & Summers, 2020). For perspective, these filings often exceeded 1 million unique filings a week; the previous largest number of filings (based on data from 1967 on) came in 1982 with 695,000 unique filings in a week (Cutler & Summers, 2020). It must be noted that the unemployment rate does not consider everyone who files as unemployed to be truly, in fact, unemployed (via legal definitions and criteria), but these statistics show how desperate of a time 2020 was in terms of unemployment.

The United States stimulus checks helped remedy some of the immediate economic consequences of the pandemic, but they may have had another affect as well: inflation. The exact cause of inflation, whenever it occurs at a level that falls too far outside of an agreed-upon upper and lower bound, is often hotly contested; the inflation seen in early 2022 is no exception to this pattern. Still, there seems to be somewhat of a consensus that the stimulus checks distributed by the US government played *a part* in the increase in the consumer price index in conjunction with the Russian war in Ukraine. Specifically, this index rose 7% from January 2021 to January 2022; Robert Triest, who is a chair and professor of economics at Northeastern University, attributes *a portion* of the increase to the above factors, adding that supply chain bottlenecks contributed as well (Thomsen, 2022). Triest added that the associated fiscal and monetary policies were not a government mistake; rather, these decisions were successful in preventing a full economic collapse, despite some consequences (Thomsen, 2022). The precise level in which policies should be instituted will *always* be clearer after the fact, but a bit of extra inflation beats a totally desecrated economy. Arguments continue to be presented both in support of and against the policy decisions enacted as a response to COVID-19, but the United States (as of March 2022) has avoided hyperinflation and other apocalyptic economic consequences depicted in disaster movies.

In the United States, there may be an even more structural factor that is contributing to these inflation peaks. The factor in question has long been discussed in political and financial circles yet it is just now coming to the forefront of the minds of the American public: the increasing cartelization of corporate America and its profit maximization mechanisms. Before supplying concrete examples of this phenomenon, it is best to break down the relevant parts to their simplest, most essential forms via a hypothetical bird's eye view on a single market. If there are four major companies in a market segment for an entire region that supply a product or

service with relatively uniform characteristics, there is little stopping the four firms from collaborating (or not) and simultaneously raising their prices. It would be easy in the current era; simply blame the supply chain, increasing labor costs, or increasing transportation costs. With cooperation (or suspicious synchronization), these leading firms could increase prices *past* what is necessary to cover the higher costs imposed on them. If there was a cost increase of  $Y$  to a firm's product currently priced at price  $X$ , one would expect the traditional economic assumption of perfect competition to hold, forcing the new price for the product to become  $X + Y$ . This would allow the firm to maintain current profit levels and simply pass the associated cost increases back to the consumer. Depending on how competitive the market is, the firm may even price lower than  $X + Y$  in order to maintain price advantage over competitors and draw in more customers. Still, evidence claims the exact opposite of this occurred in the United States from 2020 through 2022.

Perhaps the most flagrant violators were the four largest meat processing companies in the United States. After investigating the official earnings statements from Tyson Foods Inc, JBS SA, Marfrig Global Foods SA, and Seaboard Corp RIC, National Economic Council Director Brian Deese published his team's findings on the White House website in December 2021 (Shalal, 2021). The analysis concludes that there was a 50% increase in gross profit margins and at 300% increase in net profit margins (Deese et al, 2021). If the increased meat prices were simply a result of increased input prices, the profit margins likely would have remained relatively flat (Deese et al, 2021). This has occurred since the pandemic's inception: the aforementioned statements detail a 120% collective jump in gross profits and a 500% increase in net income between these four companies since the COVID-19's beginning (Shalal, 2021). More shocking than these numbers, however, is that these increased meat prices accounted for 25% of the rise in consumer prices for food consumed at home during November 2021, meaning that these meat price increases were a "big driver in the surge of inflation" observed throughout 2021 (Shalal, 2021).

While some may claim this a cruel overreach by these companies in the pursuit of profit maximization, others may argue that it is merely an unfortunate side effect of the American version of capitalism. Whichever viewpoint one chooses to adopt is strictly their decision, but what is clear is that the commerce in the United States may not be as competitive as it ought to be. To be perfectly clear, this cartelization and collaboration has long been a concern with the capitalistic economic system, and the meat processing industry is far from the only market segment to be accused of fostering uncompetitive conditions. With the chaos emanating from the pandemic, there exist opportunities for dominant companies with large market shares to increase their prices past their increases in costs; whether these companies choose to collaborate with other industry giants may be relevant too, but the end result will be inflation, especially if the industry is as foundational as the meat processing industry. For example, the diamond industry contained the De Beers cartel out of South Africa, a clearly uncompetitive entity whose uncontested domination eventually dwindled with time (Dharmadhikari, 2008). The legitimacy of dominant American telecom company practices has been widely questioned due to concerns over conglomeration, cooperative price hiking, and transparency issues (Transparency International, 2015). Despite the characteristics of a country's economic system of choice, there will be trade-offs of some kind; this concept is innately embedded within the fabric of economics. What truly matters is having the ability to investigate the underlying causes of the shifts in macroeconomic variables, such as inflation, to better understand how to safeguard against catastrophe.

The last major remaining macroeconomic variable to examine is the interest rate. The Federal Reserve Board of Governors chair, Jerome Powell, oversaw a large purchasing of US government and mortgage-backed securities and supportive lending to households, employers, financial market participants, and state and local governments; Powell acknowledged that the Federal Reserve would be maintaining these positions to an “unprecedented extent” until there was confidence that the United States was “solidly on the road to recovery” from COVID-19’s effects on the economy (Milstein & Wessel, 2021). The Federal Reserve offered “forward guidance” on the interest rates, claiming that they would keep them “near zero” until the economy regains normalcy (Milstein & Wessel, 2021). In March 2022, the Federal Reserve increased interest rates for the first time in three years, simultaneously forecasting six more increases throughout 2022 in order to combat inflation (Davison, 2022). This is because, by February 2022, the employment situation has improved. The unemployment decreased to 3.8% with job growth in leisure and hospitality, professional and business services, health care, and construction (Bureau of Labor Statistics, 2022). It is because of this metric that Powell and the rest of the Fed personnel feel comfortable raising the interest rate. Powell is currently ready to risk an increase in unemployment to remedy the ongoing situation with inflation; Powell remarked that there remains a “high priority on the labor market”, but price stability is necessary for a strong labor market (Davidson, 2022). The increase in interest rate may be indicative of the American economy recovering from its sluggishness, but the overall objective is likely to reduce any excess demand in the labor market, among other things.

#### **IV: The State of Crime**

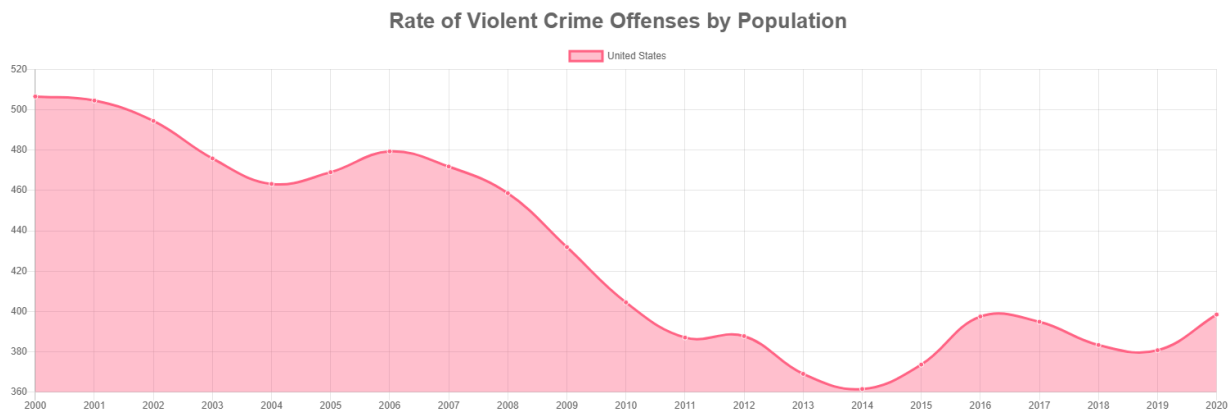
Crime is the dependent variable of this analysis, but it may be trickiest to develop a succinct, all-encompassing metric for. Among the available options, there is the crime index that has already been mentioned, but this is largely used in international comparisons. There is also specific separations of crime rates per  $X$  amount of people (usually per 100,000), but these distinctions often come with their own problems, namely their over-specificity; of course, these can sometimes be combined into the five aforementioned categories for the sake of productive analysis. In addition to these concerns, a multitude of local, regional, and national sources collect and publish time statistics. With so many parties submitting information, there are increased odds for making mistakes. On this same tangent, different jurisdictions have different laws, meaning they have different crimes. Sometimes the disparity is small, but sometimes this is not the case, especially when comparing crimes across countries. For instance, the United States and China have long been at odds on the subject of intellectual property law (Schulze, 2020). China is often willing to (all but) copy exact products from America; these replications would be considered illegal infringement (a crime) in the US (Schultze, 2020). This example illustrates that problems arise in comparing crime across jurisdictions with different legal codes due to certain actions being labeled legal or illegal depending on the place they occurred in.

Regardless of the issues within developing definitive criteria for crime, achieving a current understanding of domestic and international crime is critical before selecting a method for representing crime in regression. Through the issues here, there is still an abundance of recent crime data available, and it is important to see where the United States and the rest of the world sit in terms of crime before delving into crime’s relationship with economic conditions. The present economic situation has been explored at length; layering it with crime information will begin the primary portion of analysis for this piece, even if there will be certain exemptions in

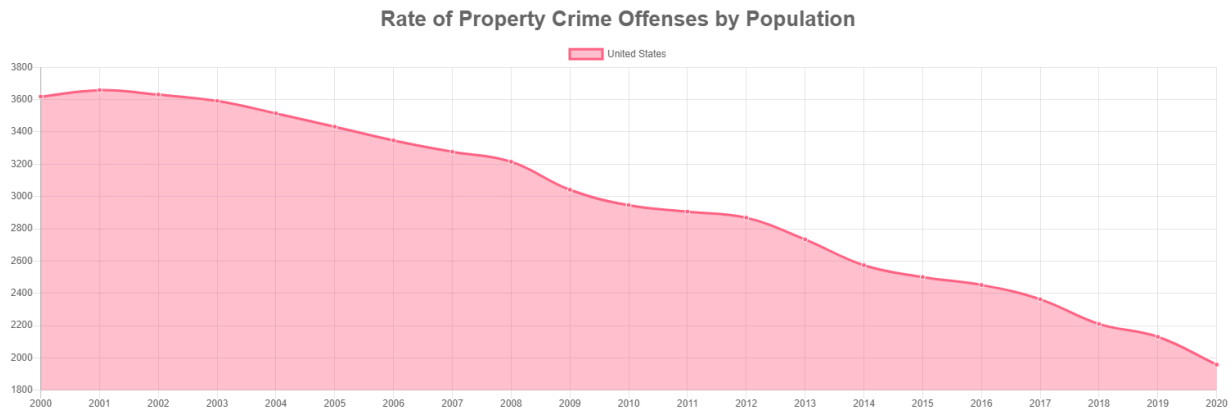
data past 2019. Inflection points in history with especially favorable or especially poor economic conditions could prove valuable in evaluating the relationship between the variables, as well.

The current situation for crime in the United States is one that many predicted would occur following the onset of the COVID-19 pandemic. Since restrictions have been easing and since people have been returning to a somewhat pre-2019 lifestyle, the crime levels have since changed. Because of the effects of the pandemic, including being the resulting economic conditions, crime increased in 2020 and 2021 in the United States with violent crime increasing at a more rapid rate than property crime (King, 2021). The FBI notes that 2020 featured a highest-in-decades peak in homicides; more than this, the data collected shows that violent crime increases were occurring in areas outside of major metropolitan centers, contrary to previous *crime waves* (King, 2021). Still, while there was an uptick of violent crimes for 2020 and some of 2021, there was an overall reduction in property crimes, mainly attributed to many businesses being closed and more people staying at home (King, 2021). Still, as is the case for most crime, the effects of crime were most apparent in low-income communities, perhaps due, at least in part, to the economic conditions within those communities (King, 2021). Low-income communities have often have higher rates of unemployment, lower salaries and wages, and few opportunities for childcare and mental health resources, but many of these factors increased substantially in early 2020, right when the crime wave began in the United States.

The previous article cited data from the FBI's *Crime Data Explorer*, which aggregates data from over 15,500 law enforcement sources across the United States. This tool is accessible to anyone, and it is perhaps the best source of information because of its ability to accurately display different kinds of crimes over any area in the country. The most overarching division is between violent crimes and property crimes, which will serve this analysis well. Attached below are the violent crime data and property crime data expressed in terms of rate per 100,000 people, as published by the FBI.

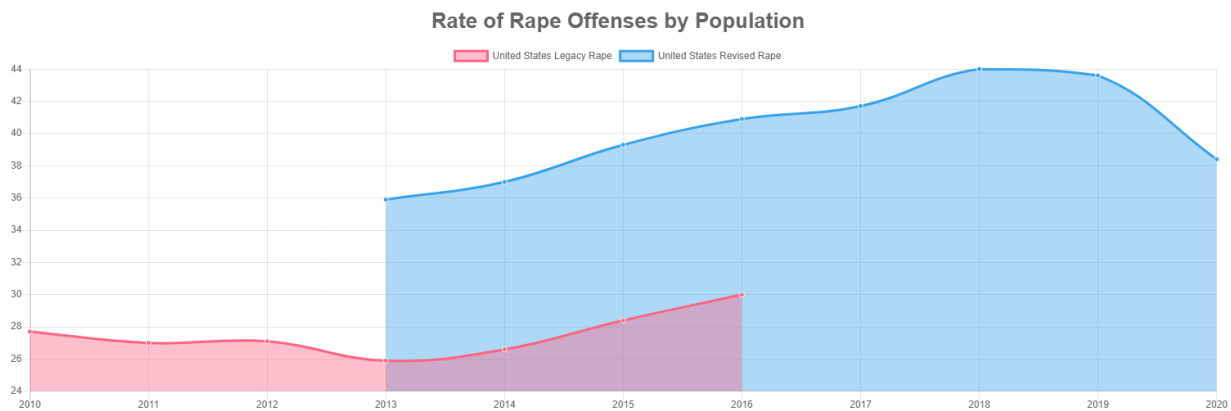


(Figure 1. United States Rate of Violent Crime Offenses per 100,000 people, by year. Source: FBI Crime Data Explorer)



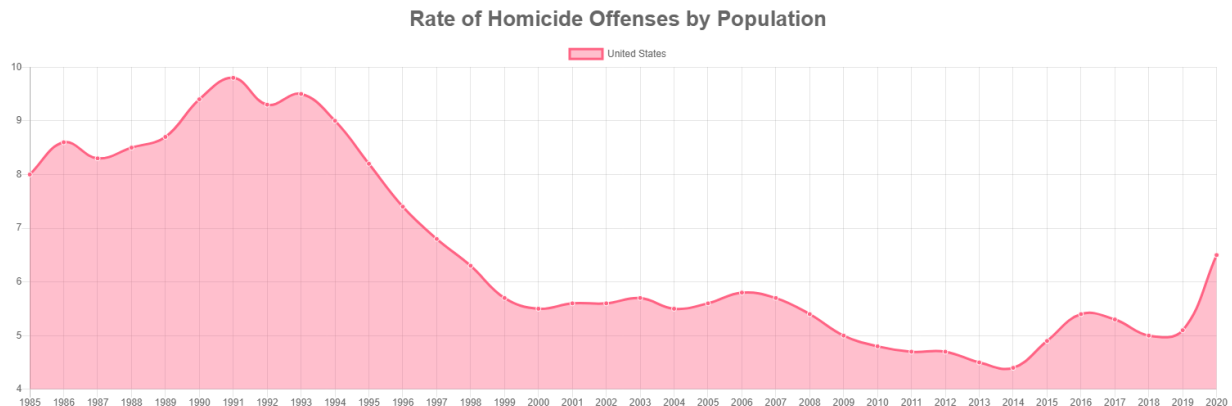
(Figure 2. United States Rate of Property Crime Offenses per 100,000 people, by year. Source: FBI Crime Data Explorer)

From this information, and from additional records on the Crime Data Explorer, it is observable that violent crime rates tend to fluctuate more than property crime rates, at least since the FBI started tracking this data in 1985 (FBI, 2021). In fact, property crimes rates have decreased in the United States since 2001, with the only variations being in the magnitude of the decrease. Whether the cause of this is due to advancements in policing, technological improvements in cameras and remote security, or other factors remains the subject of discourse within political and law enforcement circles. Violent crimes, in contrast, experience both shifts in magnitude and direction. Violent crimes, as far as for the purposes of the crimes catalogued by the FBI in the Crime Data explorer, consist of homicide, rape, robbery, and aggravated assault; property crimes consist of arson, burglary, larceny-theft, and motor vehicle theft (FBI, 2021). The rape data shows the sharpest decline in rate of rape since the start of data collection in 1985, and this comes even after a more accurate, inclusive, and generous definition for the crime was developed in 2013. A representation of this data starting from 2010 is shown below.

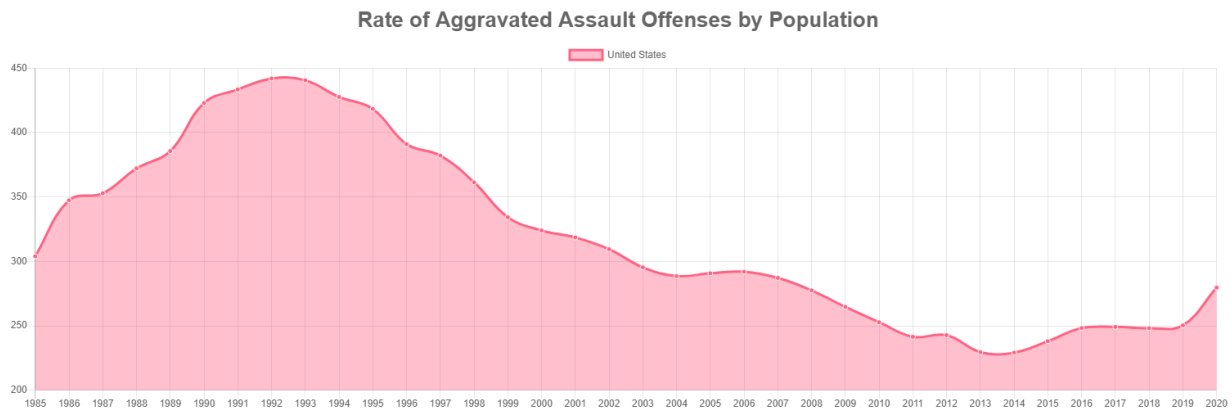


(Figure 3. United States Rate of Rape Offenses per 100,000 people, by year. Source: FBI Crime Data Explorer)

While the significance of reduction is not as dramatic as seen in rape offenses, robberies also saw a decrease in rate from 2019 to 2020. In both instances, the most compelling reason is likely due to the tendency for more people to remain at home during the pandemic, lowering opportunities for these crimes to even occur. Despite the reductions in rape and robbery offenses, however, violent crime rates grew at a rate not seen for decades; the lower rates in rapes and robberies were nullified by the sheer magnitude of homicides and aggravated assaults (FBI, 2021). The appropriate graphs are inserted below, starting from the start of FBI data collection for maximum perspective.



(Figure 4. United States Rate of Homicide Offenses per 100,000 people, by year. Source: FBI Crime Data Explorer)



(Figure 5. United States Rate of Aggravated Assault Offenses per 100,000 people, by year. Source: FBI Crime Data Explorer)

While arson and motor vehicle theft rates increased from 2019 to 2020, there was a larger decrease in burglary and larceny-theft rates, causing overall property crime rates to decrease as we observed in figure 2 (FBI, 2021). Despite the accuracy of the data above, there is unfortunately no complete, full-year data from the FBI past 2020, but there is no shortage of articles detailing crime 2021 and 2022; in fact, there have already been quite a few.

The New York Times published that, at least before September 22, 2021, that homicides were increasing at a slower rate than their historic increase in 2020 (Asher, 2021). There is additional information in this article that addresses the unprecedented nature of a portion of the



data above. Even considering available information before 1985 that is inaccessible through the FBI's Crime Data Explorer, the 29% increase in homicide rates in 2020 was the largest in United States history, destroying the previous largest increase of 12.7% in 1968 (Asher, 2021). Another interesting takeaway was that the overall 5% increase in violent crime was overshadowed by decreases in other crime areas, as there was about a 4% to 5% decrease in major crimes in 2020 (Asher, 2021).

New York City, America's most populated city by a wide margin, has long been a harbinger for other American cities. Being at the forefront of commerce and culture as well, New York City often experiences things *before* other areas of the United States. Of course, due to the population and population density, some phenomena will be *more serious* in New York City; other phenomena will *only* occur in New York City, but this is rarer. NYC officials reported that major crimes spiked 60% in February 2022 compared to February 2021 (Tucker & Morales, 2022). A professor at John Jay College of Criminal Justice and former crime analyst supervisor with the NYPD claimed that the increase in hate crimes and subway crimes is "just an increase of more people being outside", which further corroborates the theory revolving around crime rates fluctuating as a function of the number of victims readily available (Tucker & Morales, 2022). A higher slope in the decreased property crime rates than in previous years from 2019 to 2020 was hypothesized to have occurred due to a lesser availability of people wandering about; this was especially evident in the rate of rape offenses as shown in figure 3. NYPD data shows that sexual assault offenses (which includes rape) surged 322% from 9 offenses for a given week (March 29<sup>th</sup>-April 4<sup>th</sup>) in 2020 to 38 during the same week in 2021; experts again blamed the rising rates on more people journeying out of their homes (Balsamini, 2021). With even lesser restrictions in 2022, it will be interesting to see what the crime data reveals when it is published by national and international organizations. As for now, the world is only able to predict and project.

The previous information details how the United States has been faring in terms of crime over the last few years with special attention directed at the most recent results, but what about the rest of the world? After this next stage, we will be ready to investigate the link between economic conditions and the crime. The FBI is an excellent source of information for the United States due to its authority and its status as a national agency, not a regional one. In the international environment, the United Nations functions like a national agency functions within a country in that it collects data from its regions (countries). Specifically, the United Nations Office on Drugs and Crime (UNODC) is in charge of compiling and presenting this information. Among other categories, the UNODC aggregates information by violent crime, intentional homicide, sexual crime, property crime, and financial crime. There are some differences in fields compared to the FBI's, such as homicide and sexual-related offenses being separated from violent crime, but the subcategories within each field matches up decently with the data obtained from the FBI's Crime Data Explorer (UNODC, 2022). Despite its abundance of information, the UNODC themselves do not combine the different crime offenses into a single rate. Rather, the overarching category, such as violent or property crime, is simply a label above the other crimes that are tracked. Direct data comparisons are cumbersome without an aggregation into a rate. Additionally, there are numerous gaps in the data collection with an emphasis on recent data, which was the primary piece of interest while investigating current and recent domestic crime rates.

While not a one-to-one comparison, returning to Numbeo's crime indices will suffice as an overview for current international crime. The methodology for determining a country's crime

index was described in the introduction section of this analysis, but the larger the crime index, the worse off a country is in terms of crime. This measurement factors in property crimes and violent crimes as well as other metrics. It must be noted that recent data must be taken with a grain of salt, as even the UNODC has had trouble obtaining official data submitted by its Member States. Still, Numbeo’s Crime Index condenses a respectable amount of information into a single statistic and has data on a most countries. Since a lengthy review was performed on the semi-current state of crime in the United States, it only makes sense to view its crime index first as a reference point. In 2019, the United States ranked 45<sup>th</sup> out of 118 possible countries with a crime index of 47.13 (Numbeo, 2022). In 2020, this score increased to a 47.20, but the United States moved to 50<sup>th</sup> of 129 entries (Numbeo, 2022). 2021 saw the United States crime index increase to 47.74, but his was accompanied by the United States descending to 56<sup>th</sup> out of 135 entries (Numbeo, 2022). The limited data from 2022 (up until March 2022) has the United States crime index increasing again to 48.16; the United States moved down to 57<sup>th</sup> out of 142 entries. The differences in relative movement and index scores suggest that the world, as a whole, may be experiencing an aggregate uptick in crime in recent years.

The indices themselves are more important than the exact positioning of a country in the standings due to differing amounts of entries by year. Relative positioning, however, could be useful, especially as analysis begins on tying economic conditions and crime. As a precursor to the next section, which will consider prior research and discussion linking the aforementioned variables, and the regression analysis, which will feature linear regression to generate a predictive equation to predict crime levels based on the inputs of economic conditions, the remaining bit of this section will compare the crime indices of the United States and five other countries based solely on GDP per capita. Notably, there will be no international data in the regression, but perspective is invaluable in understanding the United States’ exact position.

The International Monetary Fund (IMF) is a part of the United Nations system of organizations but retains its independence as an agency, nonetheless. A report was published on October 26<sup>th</sup>, 2021 that projects GDP for all countries barring Syria, Pakistan, Afghanistan, and Lebanon for the 2021 year using recent data (IMF, 2021). An excerpt from the data compiled from the IMF is attached below; random countries with different GDP (in USD) were selected to evaluate their crime indices.

Country	Subject Descriptor	Scale	2020	2021	Estimates Start After	Estimates Start After
United States	GDP (USD), current prices	Billions	20,893.75	22,939.58	2020	2020
Japan	GDP (USD), current prices	Billions	5,045.10	5,103.11	2020	2020
Argentina	GDP (USD), current prices	Billions	389.064	455.172	2020	2020
Morocco	GDP (USD), current prices	Billions	114.602	126.035	2020	2020
Costa Rica	GDP (USD), current prices	Billions	61.833	61.46	2020	2020
Papua New Guinea	GDP (USD), current prices	Billions	23.279	26.461	2019	2019
Mongolia	GDP (USD), current prices	Billions	13.137	14.28	2020	2020
<b>International Monetary Fund, World Economic Outlook Database, October 2021</b>						

(Figure 6. Selected Countries’ GDP Projections for 2020 and 2021. Source: International Monetary Fund October 2021 Report)

It is only customary to begin with the United States. Even if China were considered, the United States still remains in the top position when ranked by projected GDP in USD (IMF, 2021). Its Numbeo crime index for 2021 is 47.74 (Numbeo, 2022). In the order of projected 2021 GDP in USD, Japan’s crime index is 21.95, Argentina’s crime index is 63.31, Morocco’s crime

index is 49.10, Costa Rica's crime index is 55.34, Papua New Guinea's crime index is 80.24, and Mongolia's crime index is 55.64 (Numbeo, 2022). Of course, GDP is only one of the four macroeconomic variables of interest representing overall economic conditions, so any pattern drawn from this is incomplete. Still, the point of this section is to generate an image of how crime has fared internationally in recent years; the GDP was merely used to put a few randomly selected countries in order. Papua New Guinea happens to be the country with the second highest crime index in 2021, and Japan is the 9<sup>th</sup> lowest crime index, potentially skewing some of the data (Numbeo, 2022). Notably, a G7 country (countries known to dominate the world economy with the notable exclusion of China) is not observed until the 47<sup>th</sup> entry; France had a crime index of 49.20 in 2021 (Numbeo, 2022). This is hard to outright dismiss, but true numerical analysis is required to dismiss any calls of coincidence. It would likely not be unreasonable to predict lower crime indices, on average, for a more advanced economy. Let's investigate discourse surrounding this relationship.

### **V: Economy Meets Crime**

If there was ever a landmark negative economic focal point in American history, the Great Depression makes a strong case for one. What is curious about this, however, is that documentation from that time period suggest that there was *not* a rise in crime during this period (Newton, 2018). There is additional contradictory information from periods of supposed prosperity where crime rates climb or remain even, such as the 1960s or the 1980s and 1990s, yet both violent crime rates and property crime rates fell during the Great Recession in 2008 and 2009 (Newton, 2018). This article concludes that "crime is not affected by the economy" based on the philosophy of the above information applied to a few more circumstances (Newton, 2018). While this may certainly be the case, there was no quantitative analysis of American crime data and economic data, and its description of "good" economic conditions is undoubtedly vague; undefined terminology can be harmful to meaningful discussion. What about a period where there is a high unemployment rate but GDP or GDP per capita increased drastically from the last period? There is nuance here.

Another article references similar information sources and acknowledges the same conclusion, but it considers another factor: the further division of crime into multiple categories. Namely, the Great Depression's crime increase was largely due to violent crime surging, and this was not stopped until President Roosevelt's facilitation of an anti-crime package and the New Deal (Razumich, 2020). Furthermore, the Great Recession was plagued by increases in robberies, burglaries, and motor vehicle theft, raising the notion that perhaps economically motivated crimes would increase in periods of hard economic conditions (Razumich, 2020). Lastly, there is research suggesting that "consumer perception of the state of economy" highly correlates with rising crime rates, isolating perceptions from the reality of the general economy (Razumich, 2020).

The United States Department of Justice (DOJ) presented a microanalysis of the causes of the different viewpoints on the relationship between economic conditions and crime, but ultimately determined that both of the positions depend on the "questionable" assumption that crime is "a rational act based on opportunity and risk on the part of the offender" (Schneider et al, 2012). A subsequent prediction of economic conditions' explanatory power on crime is labelled as "limited" to mirror the "limited rational decision making" possessed by criminals (Schneider et al, 2012). The Department of Justice echoes the viewpoints considered by

Razumich and many others, claiming that perhaps certain types of criminal activity are dependent on economic conditions whereas other types are not (Schneider et al, 2012).

The National Bureau of Economic Research (NBER) labels peaks in the unemployment rate, a macroeconomic variable for economic conditions in this study, as recessions. Additionally, they are the most trusted source as to what is considered a recession in the United States economy. Attached below is a graph obtained from their website (using the Bureau of Labor Statistics as a source for the exact numbers) cataloging recession periods after 1948 (NBER, 2022).



(Figure 7. Business Cycle Dating in the United States. Unemployment Rate, by year. Recessions in Grey. Source: Bureau of Labor Statistics via the Federal Reserve Bank of St. Louis)

Research published by the institute of World Economic Forum (WEC) in 2015 articulates that recessions carry high youth unemployment rates that translate into student graduates becoming criminals at higher rates during a recession than student graduates becoming criminals during times with lower unemployment rates (Bell, 2015). There is quite a bit of additional information detailing the ceilings that the former group encounter after they commit their first crimes, but what is more pertinent to the central theme of this analysis is the following: when examining data from the United States and the United Kingdom, the average arrest rate for a recent graduate entering the labor market during a recession is 10.2% higher than the average arrest rate for a recent graduate entering the labor market with a lower unemployment rate (Bell, 2015). Of course, arrest rates are not the same as convictions, but this data still claims statistical significance with the respective 4% higher conviction rates (Bell, 2015). Additionally, the WEC's focus on this population suggests there could be populations that respond to a particular variable (or a combination of them) at a higher rate than other populations. Lastly, this report highlights that effects of a recession can be felt for many, many years past the recession itself. For the recent graduates detailed above, the arrest rates and conviction rates were for life, also showing that the full effects of a variable do not always manifest themselves immediately. Residual effects can last through a lifetime, and this is important to remember regardless of the regression results. Perhaps there are related phenomena visible with the other macroeconomic

variables that mirror the WEC’s findings of an “initially strong and long-lasting detrimental effect of entering the labor market during a recession for individuals at the threshold of criminal activity” but on the entire population rather than people entering the labor market. (Bell, 2015).

## VI: Regression Analysis

### *i) Methods, Data Selection, and Limitations*

For the regression analysis, the data representing crime (the dependent variable) was compiled from Disaster Center, and it includes information on the United States dating back to 1960 on population, total crime rate per 100,000, violent crime rate per 100,000, and property crime rate per 100,000 (Disaster Center, 2019). Further, there is additional breakdowns of violent crime and property crime rates through (in rate per 100,000) murder, forcible rape, robbery, aggravated assault, burglary, larceny-theft, and vehicle theft (Disaster Center, 2019). For the four macroeconomic variables, GDP per capita change (annual %), average unemployment rate for age 16 and over (annual %), average inflation rate of consumer prices (annual %), and real interest rate change (annual %) were selected to quantitatively represent economic conditions; the World Bank supplied the data for all economic variables except for unemployment, which uses the Bureau of Labor Statistics as a source.

Due to some of the variables predicating on *change*, 1960 would be occupied with zero-values. With this in consideration, the data will run from 1961 to 2019; this is more than enough data points to assume a normal distribution under the Central Limit Theorem.

A per capita change approach was adopted for GDP due to this measurement being more catered toward individuals, as it is individuals that commit crimes. Additionally, *changes* were favored over flat readings of a variable; the findings may be more applicable to other countries this way, although that will be a journey for a subsequent analysis.

Earlier, there was a reference to the idea that data beginning after the COVID-19 pandemic would not be used, and this remains true. The textual analysis sections explored the current situation of crime and economic conditions quite well, so a three-year exemption in the data is passable. Additionally, even if there was a desire to include the data, a lot of information is missing in these years; many of the cells would feature projections rather than measurements. It is still true, however, that the longer the duration of the pandemic, the less merit these findings may hold. Macroeconomic variables may also be influenced by crime, creating a feedback loop of sorts that muddies data.

Lastly, it must be noted that this study is examining the effects of *four* macroeconomic variables. Although these four do stand out in political and economic literature alike, the inclusion of many more economic variables may yield a more holistic picture on crime. Of course, this is something for a subsequent analysis, but it is necessary to mention.

### *ii) Equations and Explanations*

The implicit function for this regression captures all portions of economic conditions and crime, and its two implicit forms are listed below:

$$\text{Crime Rate} = f(\text{Economic Conditions})$$

Crime Rate = f(GDP per capita change, average unemployment rate for ages 16 and over, average inflation rate of consumer prices, real interest rate change)

For the purposes of regression modeling, the following function will represent the output of the analysis:

$$Y = \beta_0 + \beta_1 X_G + \beta_2 X_U + \beta_3 X_P + \beta_4 X_I + \varepsilon$$

In this last equation,  $Y$  represents crime rate;  $\beta_0$  represents the intercept of the regression;  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ , and  $\beta_4$  represent the calculated coefficients from the regression;  $X_G$ ,  $X_U$ ,  $X_P$ , and  $X_I$  represent GDP per capita change, average unemployment rate for ages 16 and over, average inflation rate of consumer prices, and real interest rate change, respectively;  $\varepsilon$  represents the error term of the regression.

In total, there will be three initial regression summaries. Each equation will look the same, except that  $Y$  (the crime rate) will differ between *total crime rate per 100,000*, *violent crime rate per 100,000*, and *property crime rate per 100,000*. For the data collected by the Disaster Center, total crime is equivalent to the sum of violent crime and property crime, leaving no other categories. In the results section, these three regressions will be compared, but it appears as if the sheer magnitude of property crime in relation to violent crime will translate into very similar results for property crime and total crime. All of the other parts of the equation above will retain their same assignment for every regression.

Lastly, for the alpha level, .05 should suffice, as this is the generally accepted value to use in related disciplines.

### iii) Results

The summary outputs of the *original* regression equations are listed below in the order in which they were described above:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.7806975							
R Square	0.609488587							
Adjusted R Square	0.580561816							
Standard Error	765.7072548							
Observations	59							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	4	49414127.4	12353531.85	21.07005239	1.6446E-10			
Residual	54	31660610.4	586307.6					
Total	58	81074737.8						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1449.472043	441.3732306	3.284005332	0.001799708	564.5719945	2334.372091	564.5719945	2334.372091
GDP per Capita Growth (Annual %)	-53.01674584	52.88754917	-1.002442856	0.320600732	-159.0498978	53.01640609	-159.0498978	53.01640609
Average Unemployment Rate for Age 16 and over (Annual %)	186.700132	65.0030258	2.872176021	0.005814249	56.37691191	317.0233521	56.37691191	317.0233521
Average Inflation Rate, Consumer Prices (Annual %)	225.0050369	37.05825808	6.07165713	1.30865E-07	150.7077028	299.302371	150.7077028	299.302371
Real Interest Rate Changes (Annual %)	236.1230026	45.00979816	5.24603558	2.66563E-06	145.8837905	326.3622147	145.8837905	326.3622147
TOTAL CRIME								

(Figure 8. Regression Analysis Output: Total Crime)

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.663991852							
R Square	0.440885179							
Adjusted R Square	0.399469267							
Standard Error	117.8267781							
Observations	59							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	4	591161.6599	147790.415	10.6453088	1.96448E-06			
Residual	54	749690.0801	13883.14963					
Total	58	1340851.74						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	200.6979347	67.91836615	2.954987673	0.00462576	64.52980913	336.8660603	64.52980913	336.8660603
GDP per Capita Growth (Annual %)	-16.87447729	8.138318502	-2.073459927	0.04291397	-33.19082349	-0.558131082	-33.19082349	-0.558131082
Average Unemployment Rate for Age 16 and over (Annual %)	21.14552583	10.00264402	2.113993638	0.03914998	1.091431996	41.19961965	1.091431996	41.19961965
Average Inflation Rate, Consumer Prices (Annual %)	11.16203558	5.702512447	1.957389077	0.055478717	-0.270813518	22.59488467	-0.270813518	22.59488467
Real Interest Rate Changes (Annual %)	36.04853438	6.926092794	5.204743201	3.09106E-06	22.16255439	49.93451437	22.16255439	49.93451437
<b>VIOLENT CRIME</b>								

(Figure 9: Regression Analysis Output: Violent Crime)

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.793485803							
R Square	0.62961972							
Adjusted R Square	0.602184144							
Standard Error	661.779644							
Observations	59							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	4	40202312.44	10050578.11	22.94902475	4.06217E-11			
Residual	54	23649424.05	437952.2973					
Total	58	63851736.5						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	1248.167556	381.4666997	3.272022319	0.001864438	483.3728701	2012.962241	483.3728701	2012.962241
GDP per Capita Growth (Annual %)	-36.22866454	45.70924886	-0.792589365	0.431485558	-127.8701909	55.41286178	-127.8701909	55.41286178
Average Unemployment Rate for Age 16 and over (Annual %)	165.7298179	56.18032089	2.949962108	0.004690898	53.09505611	278.3645796	53.09505611	278.3645796
Average Inflation Rate, Consumer Prices (Annual %)	213.7003195	32.02842952	6.672207244	1.40259E-08	149.4871845	277.9134545	149.4871845	277.9134545
Real Interest Rate Changes (Annual %)	200.2583956	38.90072612	5.147934643	3.7875E-06	122.2671355	278.2496557	122.2671355	278.2496557
<b>PROPERTY CRIME</b>								

(Figure 10: Regression Analysis Output: Property Crime)

Even before intensely examining these summaries, it is important to note that, for all of the models, the *Significance F* approaches zero, meaning that there is the probability that all of the coefficients in these equations are zero also is approaching zero. In other words, all three regression models are significant enough to be interpreted (valid); they do not need to be thrown out on the basis of an inadequate Significance F (say, higher than the chosen alpha level of .05).

Additionally, checking the signs of the variables is recommended before analyzing the data. Of the variables mentioned, one would intuitively expect a negative relationship between GDP per capita growth rate and crime rates. GDP growth would indicate some measure of overall economic prosperity; it is not an innately “negative” tracker such as unemployment rate and inflation rate. The summary outputs all include a negative sign on the coefficient for GDP per capita growth, which is undoubtedly a good sign. The other coefficients (including the intercept coefficient) all bear positive signs, indicating positive relationships.

Despite these positive signs, GDP per capita growth has a *P-value* above the designated alpha level of .05, which means that all the regressions (since all of them contain this issue) must

be reran without this variable. The previous data summaries will be preserved for posterity, but the primary analyses will stem from the following summary outputs *without* GDP per capita growth included. This will change the original function to the following and the summary outputs to the following:

$$Y = \beta_0 + \beta_1 X_U + \beta_2 X_P + \beta_3 X_I + \varepsilon$$

SUMMARY OUTPUT								
<b>Regression Statistics</b>								
Multiple R	0.776029329							
R Square	0.602221519							
Adjusted R Square	0.580524511							
Standard Error	765.7413049							
Observations	59							
<b>ANOVA</b>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	3	48824951.77	16274983.92	27.75597069	4.60189E-11			
Residual	55	32249786.03	586359.746					
Total	58	81074737.8						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	1394.252858	437.9418565	3.183648324	0.002394355	516.5977647	2271.90795	516.5977647	2271.90795
Average Unemployment Rate for Age 16 and over (Annual %)	175.1099475	63.9693584	2.73740353	0.008325349	46.91248851	303.3074065	46.91248851	303.3074065
Average Inflation Rate, Consumer Prices (Annual %)	233.0854389	36.1725835	6.443704494	3.06346E-08	160.5939616	305.5769161	160.5939616	305.5769161
Real Interest Rate Changes (Annual %)	233.0359479	44.90632196	5.189379528	3.14289E-06	143.0416676	323.0302281	143.0416676	323.0302281
<b>TOTAL CRIME</b>								

(Figure 11: Fixed Regression Analysis Output: Total Crime)

SUMMARY OUTPUT								
<b>Regression Statistics</b>								
Multiple R	0.629580005							
R Square	0.396370983							
Adjusted R Square	0.363445764							
Standard Error	121.309298							
Observations	59							
<b>ANOVA</b>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	3	531474.7223	177158.2408	12.03852226	3.6256E-06			
Residual	55	809377.0177	14715.94578					
Total	58	1340851.74						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	183.1224522	69.37906944	2.639448088	0.010782963	44.08369002	322.1612144	44.08369002	322.1612144
Average Unemployment Rate for Age 16 and over (Annual %)	17.45653469	10.13407258	1.722558681	0.090587651	-2.852600592	37.76566998	-2.852600592	37.76566998
Average Inflation Rate, Consumer Prices (Annual %)	13.73391276	5.730487154	2.396639656	0.019972494	2.249759873	25.21806565	2.249759873	25.21806565
Real Interest Rate Changes (Annual %)	35.0659687	7.114092393	4.929085365	7.96856E-06	20.80900895	49.32292844	20.80900895	49.32292844
<b>VIOLENT CRIME</b>								

(Figure 12: Fixed Regression Analysis Output: Violent Crime)



SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.79076607							
R Square	0.625310977							
Adjusted R Square	0.604873394							
Standard Error	659.5390231							
Observations	59							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	3	39927191.73	13309063.91	30.59613139	9.04627E-12			
Residual	55	23924544.77	434991.723					
Total	58	63851736.5						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	1210.433868	377.2027738	3.208973931	0.002223838	454.5026165	1966.365119	454.5026165	1966.365119
Average Unemployment Rate for Age 16 and over (Annual %)	157.8097371	55.09731274	2.864200254	0.00590787	47.39225497	268.2272193	47.39225497	268.2272193
Average Inflation Rate, Consumer Prices (Annual %)	219.222012	31.15573136	7.036330153	3.28895E-09	156.7845311	281.6594929	156.7845311	281.6594929
Real Interest Rate Changes (Annual %)	198.1488759	38.67816915	5.123015909	3.9896E-06	120.6360928	275.661659	120.6360928	275.661659
<b>PROPERTY CRIME</b>								

(Figure 13: Fixed Regression Analysis Output: Property Crime)

With the fixed regressions, the Significant F values are all below the alpha level of .05, but the P-value for the unemployment rate is above .05 on the violent crime rate regression. This variable was thrown out and the regression was redone. The resulting summary output is below.

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.603163041							
R Square	0.363805654							
Adjusted R Square	0.341084427							
Standard Error	123.4216275							
Observations	59							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	487809.4442	243904.7221	16.01170833	3.16603E-06			
Residual	56	853042.2958	15232.89814					
Total	58	1340851.74						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	284.644673	37.24203755	7.643101498	2.99571E-10	210.0399069	359.2494391	210.0399069	359.2494391
Average Inflation Rate, Consumer Prices (Annual %)	13.79528325	5.830158063	2.366193694	0.021456941	2.116073217	25.47449328	2.116073217	25.47449328
Real Interest Rate Changes (Annual %)	35.88626059	7.221734433	4.969202471	6.68783E-06	21.41938811	50.35313307	21.41938811	50.35313307
<b>Violent Crime</b>								

(Figure 14: Final Regression Analysis Output: Violent Crime)

## VII: Discussion and Conclusion

The *R Square* values for total crime and property crime are around 0.61, meaning that approximately 61% of the variance in total crime rates or property crime rates can be explained by the three remaining macroeconomic variables (average unemployment rate for age 16 and over, average inflation rate for consumer prices, and real interest rate change). For violent crime rates, approximately 36% of the variance can be attributed to the average inflation rate and the real interest rate.

This disparity is consistent with hypotheses and studies cited earlier in the analysis, and the difference in R-squares seems to also follow intuition. A downturn in economic conditions likely constrict certain people into committing property crimes to achieve a certain standard of living, or perhaps these individuals perceive unfairness in the economy and lash out by claiming

what they rationalize they are entitled to. Notably, the especially violent year of 2020 (and 2021, to a lesser but still significant extent) was not included in this data, but it is more likely that this single data point would have served as an outlier, merely increasing *Standard Error*.

Of the four variables chosen to depict overall economic conditions, only GDP per capita growth was statistically insignificant for every crime rate. The unemployment rate metric was statistically insignificant only for violent crime. From 1961 until 2019, in the United States, around 60% of the variance in total crime rates and 63% of the variance in property crime rates can be explained through the average unemployment rate for age 16 and older, the average inflation rate based on consumer prices, and the change in real interest rates; 36% of the variance in violent crime rates can be explained through the average inflation rate based on consumer prices and the change in real interest rates.

Perhaps with more variables or a different selection in variables, these coefficients of determination could be even greater. Studies comparing international crime rates and macroeconomic variables could offer greater insight on the universality (or lack thereof) of the findings from this analysis. Crime rates for specific offenses could also be tested, as well as consolidating total economic conditions into an index-like number and including it as an independent variable alongside other metrics, such as population, firearms per person, or wealth inequality. As years progress, studies utilizing data from the COVID-19 pandemic could provide an answer to whether or not the criminal landscape was truly uprooted during this time. Follow-up studies should make use of bias testing as well, especially in the case where a variable must be omitted due to an inadequate P-value.

Nonetheless, the conclusions drawn from this analysis oppose viewpoints stating that economic conditions (at least for those which served as independent variables in the regression) have zero effect on crime rates. Furthermore, property crime rates are generally more responsive to economic conditions than violent crime rates.

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