10 Reasons

to Carefully Consider

How Insurance Carriers Use Crime Scores to Assess Risk in the Affordable Housing Industry

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EXECUTIVE SUMMARY

Many insurance carriers use third-party crime scores to evaluate their exposure to criminal risk when underwriting general liability insurance policies. At worst, a high crime score may preclude the owner of a multifamily housing complex from obtaining insurance coverage, and at best, a high crime score may result in higher premium costs. These underwriting practices are especially impactful to the affordable housing community because affordable housing may be in areas with higher crime scores when compared with traditional multifamily properties. Thus, affordable housing providers are highly likely to experience a loss of coverage or relatively high insurance premiums. If a housing provider was enrolled in any of the following programs, they were considered an affordable housing provider: low income housing tax credits, tenant-based rental assistance programs, project-based rental assistance programs, choice neighborhoods, HOME investment partnership program, national housing trust fund, and capital magnet fund.

Scott Insurance, a leader in property and casualty insurance, funded the research into this pressing affordable housing issue, with funding support from the Stewards of Affordable Housing for the Future, a nonprofit collaborative of affordable housing providers, and Virginia Community Capital, a non-profit Community Development Financial Institution and a for-profit bank who provides investment capital to underserved markets. This research addresses one main question: Do crime score accurately predict property-specific crime risk? While a crime score may narrow the overall range of crime-related uncertainty, there are at least 10 reasons why crime scores may not accurately depict the risk associated with criminal activity for a specific property:

1 Property-level crime scores are estimates from larger census block geographies.

2 The FBI database, which serves as the main dataset for crime scores, may have data entry, coding technique, or crime assignment imperfections.

3 Crime scores may misrepresent crime risk near census block group boundaries.

4 Crime scores treat all crimes as equal, thereby failing to take into account heightened general liability risk associated with certain types of crime.

5 Affordable housing providers are subject to more regulations than owners of traditional multifamily housing and these regulations may reduce property specific crime rates.

6 Affordable housing complexes often have programming in place that reduces the risk of crime onsite.

7	Affordable housing improves neighborhoods and serves to reduce local crime rates.
9	Crime scores do not account for geographic characteristics associated with surveillance and crime prevention.
8	A crime score may capture a concentration of crime in the block group and inaccurately attribute that concentration to neighboring properties.
10	Crime scores do not account for property-specific characteristics such as architectural designs or management practices.

THE CRIME SCORE CONUNDRUM

Carriers that insure multifamily housing often rely on crime scores to help them assess and price general liability risk.[1] Some adjust their premiums based on crime scores, while others refuse to issue insurance coverage all together once crime scores exceed a defined threshold. These practices have important implications for affordable housing providers because rental units accessible to low- and moderate-income families are often located in areas with relatively high crime scores.[2] Thus, procuring insurance coverage may be costly for this type of multifamily housing investor, if it is available at all.

High insurance premiums may be appropriate if crime scores are a reliable predictor of criminal activity at the site level, and in turn general liability risk. However, no studies conducted to date directly test whether this is the case. There are even reasons to believe crime scores have notable limitations.[3] Some of these limitations relate to the way crime scores are calculated, others to the unique characteristics of affordable housing complexes, and still others to the geographies of crime.

Drawing on research conducted in the fields of statistics, urban studies, and criminal justice, this report identifies 10 limitations of crime scores that insurance companies should take into account. These limitations, presented in no particular order of importance, do not render crime scores valueless as an analytical tool, but they do speak to the importance of using them cautiously in the underwriting process if accurately assessing general liability risk is the ultimate goal. Insurance companies who use crime scores in this way are not only likely to position themselves as leaders in their own field, but also as key allies of other parties interested in increasing the supply of safe, decent, and affordable housing.

STATISTICAL CONSTRUCTION OF CRIME SCORES

As previously noted, some of the most concerning limitations of crime scores relate to the way they are constructed. Companies that provide crime scores often use national datasets and proprietary modeling. Published methodologies offer insights into common estimation techniques. Generally, raw crime data originate from the Federal Bureau of Investigation's Uniform Crime Reporting (UCR) database. The National Incident-Based Reporting System (NIBRS) exists within the UCR Program and obtains data from more than 18,000 city, higher education institutions, county, state, tribal, and federal law enforcement agencies.[4] Two categories of crime exist in the database: property crime and violent/personal crime. Vandalism, burglary, larceny, and vehicle theft fall into the property crime category, whereas murder, rape, robbery, and assault fall into the violent/personal crime category. The most detailed crime score data comes from the largest cities, counties, and metropolitan areas.

Limitation #1. Property-level crime scores are estimates

Since the UCR database does not provide detailed crime data at the property level for the entire nation, crime scores are estimates, often to the block group geography. According to the Census Bureau, block groups are partitions of census tracts that typically contain 600 to 3,000 people and 240 to 1,200 housing units.[5] Crime score estimates at this geography vary depending on their methodological construction and statistical design.

Many crime scores stem from detailed location crime data for the largest cities, counties, and metropolitan areas over a five to seven-year rolling period with slight modifications for temporal changes. Pooling crime estimates for all block groups based on their demographic attributes is a common technique, which allows for the development of models distributing crime equally across these block group pools.

The demographic attributes used for this modeling may include over one hundred socioeconomic inputs such as household income or highest education attainment level. Omitting inputs such as race, ethnicity, language, and ancestry may be necessary to satisfy redlining policies.

The Federal Bureau of Investigation's Uniform Crime Reporting (UCR) database does not contain detailed crime data at the property level for the entire nation.

As a basic illustration, assume a model uses only one input, highest education attainment level. This input translates the population of a census block group into three segments, such as the following:

1. Percent of residents with less than a high school degree
2. Percent of residents with a high school diploma or GED
3. Percent of residents with more than a high school degree

Assume that a fictitious census block group has the following characteristics: 20% of the population falls under category 1, by having less than a high school diploma, 50% is described by category 2, and the remaining 30% in category 3. In this census block group, the FBI UCR database provides an estimated crime score of 50.

For all other census block groups that do not have known crime rates, the model evaluates the percentage of population education attainment looking for a match to known census block groups.

Once a match between the demographic characteristics has been found, the same crime score would be applied to the area. In effect, another census block group with similar demographic attributes such as the 20%, 50%, 30% education attainment levels, would have the modeled crime score of 50, even though the actual levels of crime are not provided by the FBI or any other data source.

Ultimately, the model estimates localized crime based on national sampling. The actual levels of crime surrounding an individual property may therefore differ from what the crime score indicates.

Limitation #2. Data accuracy

Concerns about data accuracy are no less pressing than concerns about modeling techniques. Regardless of the source, no data are perfectly accurate. The UCR dataset is no exception. Reliable crime score calculation and analysis therefore requires the removal or modeling of data errors, omissions, and re-alignments. For example, policing agencies located within multiple counties may attribute all crime to the county with the highest

population, with smaller population counties containing no arrest data.[6] Without correction, crime scores would be over-reported in the higher population counties and under-reported in the lower population counties. Data inaccuracies may also stem from duplicative reporting of the same crime on the part of multiple agencies working in partnership.[7]

Alternative means of identifying the location of crime are yet another potential source of data inaccuracies. A comparison of centerline and point geocoding illustrates this issue. In centerline geocoding, crimes are reported in the center of the roadway, whereas in point geocoding, crimes are reported in the center of the property address.

In Figure 1, the roadway is the centerline and the boundary between two census block groups, block group 1 and 2. If a policing agency reports a crime using the point geocoding technique, dot J represents the crime as occurring in census block 1. However, if the same crime is reported using the centerline geocoding technique, dot K represents the crime. Dot K is located in the
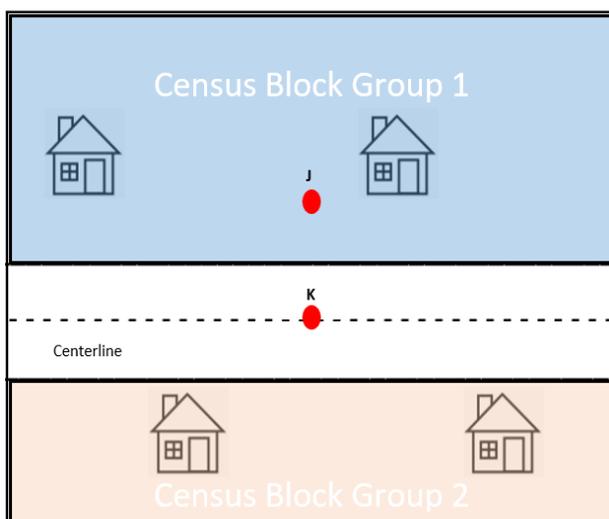

Figure 1. Difference in crime reporting techniques.

roadway, which is the line between the two census block groups and does not belong to either. The uncertainty of the crime's location may lead to data inaccuracies.

There are techniques to help identify the correct census block group for the crime, but positional errors may occur during this match process.[8] Further complicating the issue, research indicates that the rate of accuracy for this match process is consistently lower for multifamily residential properties in comparison to single-family residential properties.[9]

Limitation #3. Geographic boundaries may misrepresent actual crime risk

Similar to centerline geocoding, aggregation bias may obscure the location of criminal activity when crime scores are constructed. This is the case because individual crimes frequently aggregate to a single value for a geography of interest such as a block group. As a result, the threat of crime appears to be equally likely across that geography irrespective of whether the assumption is reasonable.

Figure 2 shows five geographic areas with five different crime scores, yet these areas are within a thousand feet of each other. Two properties located across the street from each other have different crime scores despite

Consider this modeling similar to elevation mapping, where each crime stacks on top of each other to generate different heights. The higher the elevation, the higher the crime score within each block group. While the boundaries of block groups conform to waterways, roadways, and other distinguishable geographic features, there may be very little difference in the actual crime risk of the block group across the boundary lines.[10]

having very similar general liability risk profiles. Thus, crime scores constructed at the block group level may not provide an accurate depiction of property level risk.
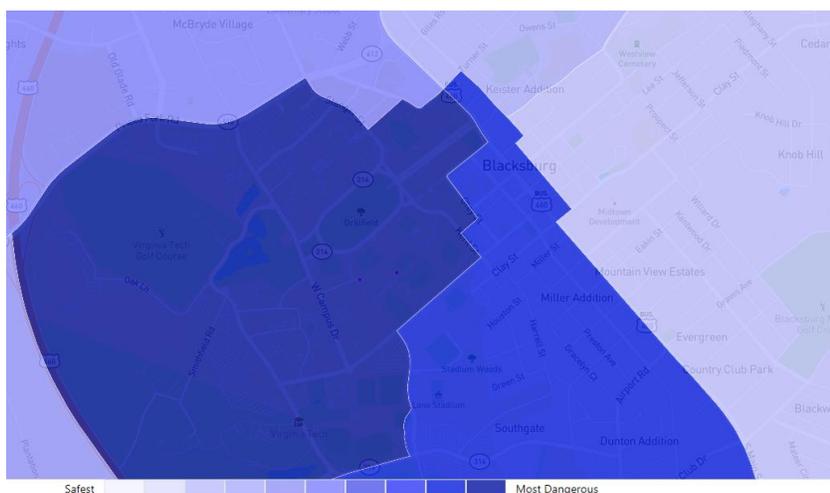

Figure 2. Crime in Blacksburg, Virginia.[11]

Limitation #4. All crimes are equal

A final statistical limitation relates to the fact that crime scores do not differentiate between the types of crime. As such, they are a count-based representation of crime. The higher the count of crime, the higher the crime score. There is an implicit equality weighting for the severity of the crime.

As a simple example, a block group with three disorderly conduct crimes may have the same aggregate crime score value as a block group with three homicides, as illustrated in Figure 3. The decision to weight crime equally avoids the impractical challenge of setting values to balance crime types. A crime severity weighting might require the data provider to state that a certain number of burglaries are equal to one murder, an

arduous and imperfect science to say the least.

While count-based representations of crime are convenient, there is little reason to believe all crimes are equal from an insurance risk-of-loss standpoint. Some types of crime are likely to generate substantially higher insurance claims and settlements than others. Jury awards for a homicide can be in the millions of dollars, while jury awards for robberies without an injury may only be a few thousand.[12] Thus, failing to adjust for the severity of crime may result in crime scores that do not accurately reflect risk-of-loss exposure for insurance companies underwriting general liability policies.
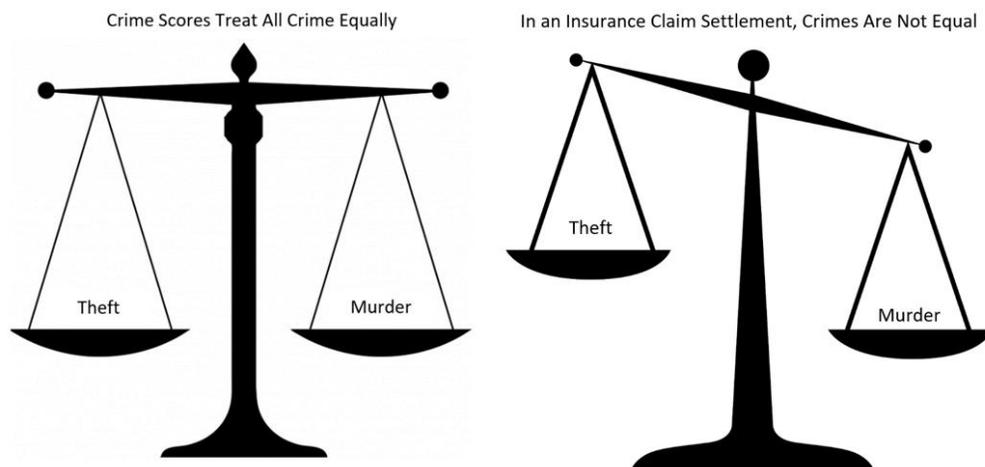

Figure 3. Crime is not equal.

UNIQUENESS OF THE AFFORDABLE HOUSING INDUSTRY

The discussion presented in the preceding section of this report clearly demonstrates that the data, spatial analysis, and statistical methods used to construct crime scores can impinge upon their predictive power. However, research suggests other limitations may be more significant to insurance underwriters. More specifically, the uniqueness of the affordable housing industry may make crime scores a poor proxy for general liability risk in some instances. This is likely to be the case because of operational and structural differences between subsidized housing and market rate housing that can lead to very different risk profiles.

Limitation #5. Affordable housing regulations

Affordable housing programs are organized and operated at various levels of federal, state, and local government. Requirements and regulations vary greatly. Some of these requirements and regulations may require affordable housing operators to maintain their property to a higher level of quality than other multifamily property.

As an example, some affordable housing providers must participate in physical assessments with the Department of Housing and Urban Development's (HUD) physical assessment Uniform Physical Condition Standards (UPCS) inspections to maintain program status. The primary purpose of these assessments is to inspect the property for hazards affecting the health and safety of tenants.[13] On the HUD UPCS form, Figure 4, there are multiple indicators of security that must be assessed.[14] The owner of the property must fix any revealed safety deficiencies.

Uniform Physical Condition Standards - Comprehensive Listing
Inspectable Area: Site

Page: _____ of _____

Property ID / Name: _____   Inspection Date: _____

Inspectable Item	Observable Deficiency	NOD	Level 1	Level 2	Level 3	NA	H&S
Fencing and Gates	Damaged/Falling/Leaning						NLT
	Holes						NLT
	Missing Sections						NLT
Grounds	Erosion/Rutting Areas						NLT
	Overgrown/Penetrating Vegetation						
	Ponding/Site Drainage						
Health & Safety	Air Quality - Sewer Odor Detected						NLT
	Air Quality - Propane/Natural Gas/Methane Gas Detected						LT
	Electrical Hazards - Exposed Wires/Open Panels						LT
	Electrical Hazards - Water Leaks on/near Electrical Equipment						LT
	Flammable Materials - Improperly Stored						NLT
	Garbarge and Debris - Outdoors						NLT
	Hazards - Other						NLT
	Hazards - Sharp Edges						NLT
	Hazards - Tripping						NLT
	Infestation - Insects						NLT
	Infestation - Rats/Mice/Vermin						NLT
Mailboxes/Project Signs	Mailbox Missing/Damaged						
	Signs Damaged						
Market Appeal	Graffiti						
	Litter						

Figure 4. HUD-26481 UPCS form.[15]

Through this third-party oversite process, affordable housing providers may offer greater security and safer housing compared to market rate housing providers. Improved security may reduce the property specific risk of crime.[16]

As a result of their affordable housing status, many affordable housing properties are regulated far more rigorously by state agencies than their conventional property peers. In addition to mandatory inspections, "all applicants to and residents of housing assistance programs may be subject to federal alcohol, drug, and criminal activity restrictions, intended to increase the safety of assisted housing."[17] While different affordable housing programs have different screening standards, there are no legal requirements for traditional multifamily housing operators to provide the same level of tenant scrutiny. As a result of these screening standards, affordable housing providers may have lower criminal activity when compared with nearby market rate multifamily properties.[18]

Limitation #6. Affordable housing mission

In addition to regulatory oversight, affordable housing providers may have different goals than market rate housing providers that influence the way they do business. The former may be more concerned about advancing a social mission than maximizing profits and more committed to improving communities than increasing returns on investment. These motivations not only reduce the risk of crime at the property and neighborhood levels, but also make it easier for insurance companies to predict.

Affordable housing complexes often enjoy rent role stability derived from the quality of service mission-driven operators provide their residents.[19] In fact, research suggests affordable housing tenant turnover rates are 3.2 to 8.3 times lower than turnover rates in other sectors of the multifamily housing market.[20] The sense of community that comes along with this stability may help foster a positive sense of collective living, which may help deter property-specific crime. Additional stability may come from the presence of resident service coordinators onsite, who can indirectly reduce the risk of crime by linking low- and moderate-income families to resources.[21]

Rent role stability also speaks to the predictability of crime at the property level. If many of the same residents have lived in an affordable housing complex for an extended period, historic insurance claims may serve as a better indicator of general liability risk exposure than crime scores. This proposition remains untested, but the intuition behind it begs empirical analysis.

Limitation #7. Effects of affordable housing

While, research indicates that affordable housing may actually have a mitigating effect on neighborhood crime,[22] when examining crime scores, the location of affordable housing has a negative impact. Factors such as government housing policies, resource allocation and zoning,[23] together with the mission of some affordable housing developers to stabilize and invest in communities may have led to higher concentrations of affordable housing locating in areas with lower property values and potentially higher crime rates when compared to conventional multifamily.[24] These factors weigh negatively in crime scores, however numerous studies offer evidence that the development of new affordable housing reduces crime by removing disadvantageous influences and strengthening neighborhoods.[25]

Moreover, the conversion of market rate housing to subsidized housing may have the same effect.[26] Backward-looking crime scores may not capture these forward-looking trends triggered by the delivery of affordable housing.

Constructing crime scores with data 5 to 7 years old exacerbates temporal problems. It may take nearly a decade for crime scores to reflect the full positive impact an affordable housing complex has had on the area that surrounds it. As such, crime score that do not credit affordable housing for mitigating crime may inadequately measure the actual threat of crime in a given locale.

Research indicates that affordable housing may have a mitigating effect on neighborhood crime rates.

CRIMINAL JUSTICE

Just as the unique characteristics of affordable housing influence the risk of crime, so do the characteristics of the neighborhoods that surround that housing. A growing body of research clearly illustrates this point by focusing on the geographies of crime and the relationship between crime and the built environment. These studies highlight additional concerns surrounding the use of crime scores in insurance underwriting processes.

Limitation #8. Concentration of crime

Crime is often concentrated in a small number of properties. Research indicates that nearly 50% of police calls originate from as few as 3-5% of addresses in a given geography.[27] When aggregated crime within a the census block group serves as the basis for crime scores, a small number of properties with high concentrations of crime can make an entire neighborhood appear dangerous.

In Figure 5, crimes are added together to generate the peak in the red-colored center. The higher the peak, the greater the crime score. While there are spatial decay calculations that reduce the influence of high crime areas on the surrounding properties, the aggregate construction of crime scores may spill over to surrounding properties.

For example, a property may be located in the yellow region of the image below because it

is geographically near the 3-5% of high crime addresses. Yet, the crime score may significantly overstate the risk of crime at that location. A review of the property's insurance loss history is likely to provide a more realistic estimation of property-specific crime risk than the aggregate crime score in such cases.
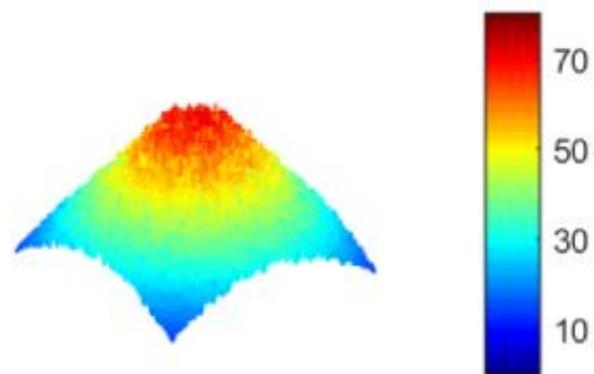

Figure 5. The concentration of crime.[28]

Limitation #9. Geographic characteristics

Failing to take into account the composition of an area and the existing land uses may also result in crime scores that over or understate the risk of crime. Crimes may be less prevalent in areas without "target and spatial attractiveness."[29] Target attractiveness relates to the perceived criminal vulnerability of an area, while spatial attractiveness links the physical development of the area to the probability of criminal success.

Historically, large zones of commercial and industrial activity have been indicative of criminal activity. Yet, surveillance by commercial and industrial owners dampens crime.[30] Some crime score models attempt to

account for the percentages of land use within each census block group, but the models fail to account for differing levels of surveillance. In situations where surveillance is stronger than average, the crime score would be overstated.

There is evidence that affordable housing communities experience detrimental criminal justice outcomes from additional policing when compared with traditional multifamily housing.[31] These geographic areas may be targeted by criminal justice systems, which could promote additional crime reporting and arrest records.

In addition, the academic research additionally indicates there is a positive relationship between crime rates and population density.[32] By architectural design, multifamily real estate has higher levels of population density when compared with other residential real estate. Accordingly, multifamily housing could be associated with higher crime scores because of higher population density. The population density input in crime score modeling may inadequately account for the property specific features.

Limitation #10. Influence of property-specific characteristics

Similar to geographic characteristics, property-specific traits may encourage or discourage crime. Yet, reliance on crime scores fails to account for property-specific traits such as architectural design, property specific loss history, and operational practices of the property management company. Each of these things can influence the relative risk of crime occurring on a parcel of real estate.

In regards to design, the literature indicates that four architectural features deter criminal activity: those that accommodate natural surveillance, those that develop a sense of resident-controlled territory, those that build community, and those that directly protect people from crime.[33] Affordable housing with ample lighting, visible common areas, and programming that promotes interpersonal engagement may therefore suffer from far less crime than crime scores might indicate.[34]

Furthermore, property management practices

Estimated crime scores may not account for property specific characteristics that enhancement security.

Photo courtesy of Pexels.com

can prevent crime at the property level in ways crime scores cannot capture. Active property management programs have the greatest potential[35] Championing investments in security systems, gates, lighting, and safety audits are but a few of the ways in which property managers can help create safer environments for their residents.[36]

CONCLUSION

This paper outlined 10 concerns across three research fields related to the use of crime scores in property-level crime risk modeling. From a statistical standpoint, larger census blocks may not adequately model individual property crime risk. While the FBI database is a large depository of crime information, some of its data may not be accurate, which calls into question the resulting crime score value. The equal treatment of all crime scores represents a glaring problem for insurance companies as they model the potential cost of crime at the property level. Moreover, the uniqueness of the affordable housing sector further reduces the reliability of crime scores for property specific crime risk modeling. Affordable housing regulations, missions, and programing may result in a lower property specific crime rate compared to traditional multifamily housing. Furthermore, there is abundant evidence that affordable housing improves safety in the neighborhood. Without accounting for that improvement, the use of an aggregate block group crime score may not correctly model property level crime risk. From a criminal justice standpoint, the concentration of crime and the geographic characteristics associated with surveillance and crime prevention may overstate the crime risk of an affordable housing property. An aggregate block group crime score does not credit property traits such as architectural designs or management practices. For all of these reasons, this paper cautions the sole use of crime scores in property-level crime risk modeling.

While there are many limitations to the use of crime scores for property level crime risk modeling, there is some value to the use of crime scores. Crime scores may reduce some of the overall uncertainty of crime in a regional context. Crime scores could be used in a larger modeling context, but efforts should be made to avoid the use of arbitrary crime score thresholds where insurance is provided only if the crime score is below an absolute cutoff value. Crime score ranges should be employed and the property specific characteristics, including management track record, must be credited to create a property specific crime score. Similar to the influence of property characteristics, the actions of the property management company should be used to modify the crime score as well. In a situation where the property characteristics or lack of management oversight exacerbate crime, the crime risk may be higher than the crime score indicates. This modified crime score may be a more accurate predictor of property specific crime risk than an aggregate block group crime score.

The use of crime scores for insurance modeling will only increase in the years to come as insurance companies seek to model all forms of risk. While the affordable housing industry is especially vulnerable to the use of aggregate crime scores to model property specific crime risk, the entire multifamily industry should be cautious. A multifamily property cannot operate without access to adequate and affordable property insurance. As a direct result, there is a need for more empirical research on the influence of crime scores and general liability loss. At what level of accuracy and reliability do crime scores predict future crime-related insurance losses? How does the accuracy and reliability of that prediction change based on different housing types such as affordable housing and traditional multifamily housing? What other factors and inputs could be used in combination with crimes scores to provide more accurate and reliable crime risk models? Future research could help answer all of these questions and provide more knowledge to both insurance companies and multifamily property operators.

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