Community Development Block Grants – Distress Score Index

The Indiana Business Research Center (IBRC) at IU's Kelley School of Business developed the first iteration of the Community Development Block Grants Distress Score Index in the early 2000s as a tool to provide a measure of economic distress at the city/town and county level. This measure is intended to assist communities in the development of CDBG grant applications and to be used by the State of Indiana's Office of Community and Rural Affairs (OCRA) as a key component in evaluating and scoring CDBG applications.

In 2009, the IBRC updated its distress index methodology and began to incorporate data from the Census Bureau's newly available American Community Survey 5-year estimates (ACS). This distress index has been updated annually as new ACS data are published. In 2022, OCRA asked the IBRC to re-evaluate the distress index methodology and recommend any changes that could improve the measure. The proposed changes to the index are shown in **Table 1.**

Table 1: Changes to Distress Score Index variables beginning in 2023 (changes in italics)

Previous Index Variables (2009 to 2022)	**Updated Index Variables (starting in 2023)**
Poverty Rate	Poverty Rate
Median Household Income	Median Household Income
Unemployment Rate	Unemployment Rate
Housing Vacancy Rate	*Non-seasonal Housing Vacancy Rate*
Median Housing Value	*Housing Cost Burden*
Labor Force Participation Rate	*Population Change (10-year % Change)*

Rationale for variable changes

Replacing total housing vacancy rate with non-seasonal vacancy rates: Many communities—particularly in some rural areas—have significant seasonal housing used for recreation/second homes or for seasonal workers. These units are considered vacant when calculating a total vacancy rate. The non-seasonal vacancy rate excludes these homes from the calculation.

Replacing median housing value with housing cost burden: The median housing value variable is strongly correlated with median household income, making it redundant in the distress score index. The housing cost burden variable—which here is defined as the share of renters and homeowners with a mortgage who spend more than 30% of household income on housing--adds a new dimension to the index by including information on affordability.

Replacing labor force participation rate with population change: Some factors that are unrelated to distress can impact labor force participation (e.g., a large number of college students or retirees in a community). Population change shows the degree to which communities retain current residents and attract new ones. Factors such as higher mortality rates or lower fertility rates also influence population change in a community. Communities with a declining population are also likely to have an older population than those that are growing.

Methodology

Using the data above, calculate six different distress variables:

Variable name	Source (table # in parenthesis)	Explanation
POV	ACS (C17002)	Percentage of population with income under poverty level
MHI	ACS (B19013)	Median household income
NVR	ACS (B25002 and B25004)	Percent of housing units that are not for seasonal, recreational, or occasional use that are vacant
HCB	ACS (DP04)	Percent of renters and homeowners with a mortgage who spend more than 30% of household income on housing
UER	ACS (B23001)	Unemployment rate = (unemployed persons)/(labor force)
POP	Census Population Estimates	Percent change in total population over a ten year period

After calculating the above variables, calculate the mean, standard deviation, maximum and minimum values. The maximum and minimum values are adjusted for outliers. The adjusted max is defined as the minimum of (1) the largest observation and (2) the mean plus three standard deviations. The adjusted min is defined as the maximum of (1) the smallest observation and (2) the mean minus three standard deviations. The range is the adjusted max minus the adjusted min.

For each variable, a variable distress score is calculated so that the score takes values from zero to the desired maximum variable distress score. The maximum variable distress scores can be changed in the spreadsheet; see the green highlighted cells. Figure 1 graphs the desired function for MHI, MHV, and LFPR. For these variables, a relatively low variable value corresponds to relatively high distress. Figure 2 graphs the function for POV, VHR, and UER; here, a relatively low variable value corresponds to relatively low distress. The functions have the desirable property of being linear and continuous on the open interval between the adjusted min and adjusted max.

It is straightforward to check that the function drawn in Figure 1 is given by:

(1) Var distress score = (-max distress score)*(var value)/(range) + (max distress score) + (max distress score)*(adjusted min)/(range)

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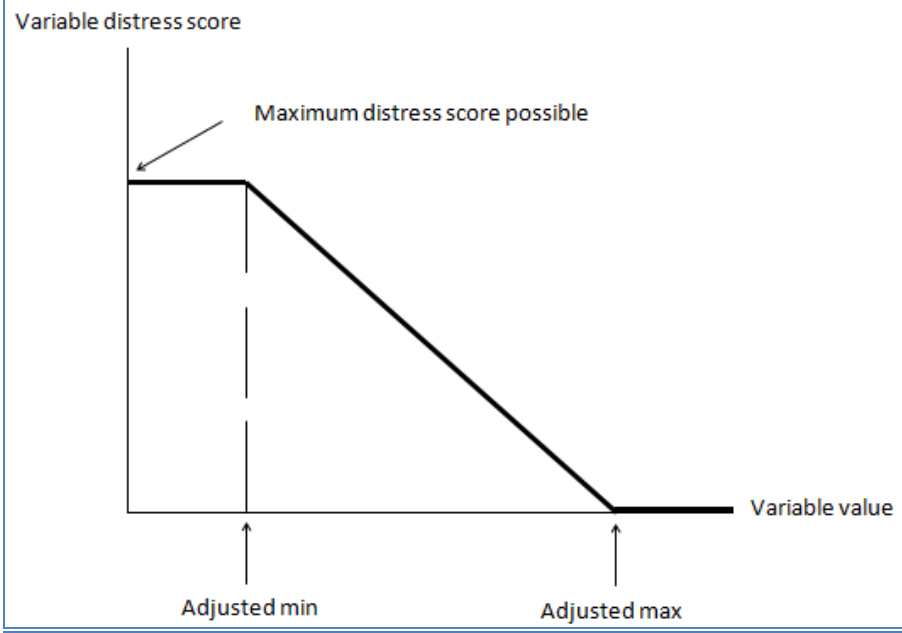
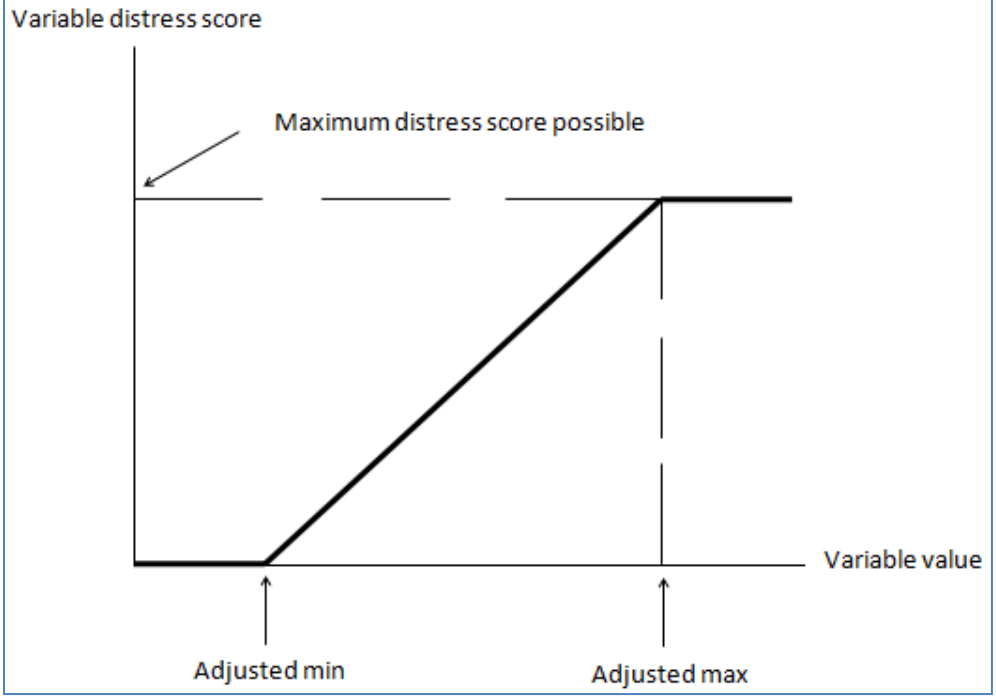
FIGURE 1



The function in Figure 2 is given by:

(2) Var distress score = (max distress score)*(var value)/(range)– (max distress score)*(adjusted min)/(range)

FIGURE 2



Equations (1) and (2) are included in the variable score columns of the spreadsheet.

The (overall) distress score is the sum of the six variable distress scores. In the spreadsheet, one can adjust the weights attached to each variable by changing the maximum variable distress scores. One potential formulation is:

Variable	Maximum distress score (equal to implied weight as % of total)
POV	28
MHI	28
NVR	28
HCB	28
UER	35
POP	28
Total Distress	**175**