THE HAMILTON PROJECT

The Geography of Prosperity

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TECHNICAL APPENDIX – FRAMING PAPER

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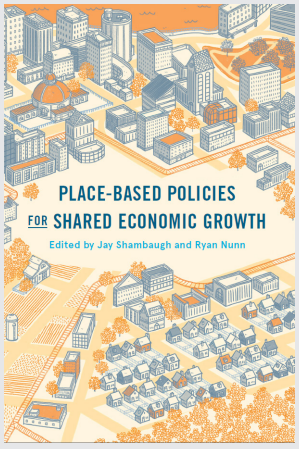
A CHAPTER IN THE HAMILTON PROJECT BOOK



Place-Based Policies for Shared Economic Growth

For a century, the progress our nation made toward realizing broadly shared economic growth gave our economy much of its unparalleled strength. However, for the last several decades, that progress has seemed to stall. On critical measures such as household income, poverty, employment rates, and life expectancy, there exist yawning, persistent gaps between the best- and worst-performing communities. These conditions demand a reconsideration of place-based policies. The evidence-based proposals contained in this volume can help restore the conditions of inclusive growth that make it possible for individuals from any part of the country to benefit from economic opportunity.

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Construction of the Vitality Measure

We selected six outcome variables that are available from 1980 through the present, and, with the exception of life expectancy and the prime-age employment-to-population ratio (EPOP), from 1960 to the present. These county-level variables are median household income, the poverty rate, life expectancy, the unemployment rate, prime-age EPOP, and the housing vacancy rate. We selected these variables because (a) they were available at the county level over time and (b) they are observable aspects of the underlying economic success and quality of life in a location, which is not directly observable. The underlying economic success measure is termed the "vitality" of a location.

By contrast, we classify variables like educational attainment, population density, and industry composition as predictors of vitality. They may be causally linked to vitality: for example, an increased manufacturing share might lower vitality in a place, for example through a reduction in median income, but the increased manufacturing share does not itself constitute a reduction in vitality.

Using the most recent five-year American Community Survey (ACS) data (2012–16) published at the county level, we use confirmatory factor analysis (CFA) to construct a single vitality measure based on the six outcome variables described previously. The single vitality measure is measured at the county level for the 48 contiguous states. The confa Stata command was used for this purpose (Kolenikov 2009).

CFA entails the estimation of factor loadings and the vitality measure in a series of simultaneous equations. Formally, with only one latent factor ξ,

$$y_{ij} = \mu_j + \lambda_j \xi_i + \delta_{ij}$$

where μ_j are the intercepts; λ_j are regression coefficients, or factor loadings; and δ_{ij} are measurement errors, or unique errors. Subscript i denotes county observations and subscript j denotes outcome variables, such as life expectancy.

In order to achieve identification, we assume that the mean and standard deviation of the underlying vitality measure are zero and one, respectively. The factor loadings are permitted to vary freely. The outcome variables themselves are all standardized to have mean zero and standard deviation one (using sample weights). Notably, we impose some structure on the correlation of the errors δij, such that errors in the unemployment rate and the prime-age labor force participation rate equations are permitted to be correlated. Both of these variables reflect labor demand shocks, and therefore embody similar information.

The vitality index is assumed to be mean zero and standard deviation one (using sample weights). Intuitively, the CFA procedure exploits the covariances of the six outcome variables (except for the covariance between the unemployment rate and the participation rate) to construct a single measure that embodies the common variation in the outcomes. Because some outcome variables (e.g., median household income) are closely correlated with the other variables, they are particularly closely correlated with the single vitality measure. In this way, different outcome variables take on different roles in the formation of the vitality measure, with some having larger roles than others. Appendix table 1 shows coefficients from a 2012–16 regression of vitality on the standardized outcome variables; note that poverty, unemployment, and housing vacancy rates are reverse-coded.

APPENDIX TABLE 1.

Vitality Index Outcome Loadings for 1980–2016

Outcome	Loading
Median Household Income	0.50
Poverty Rate	0.27
Life Expectancy	0.15
Unemployment Rate	0.04
Prime-Age EPOP	0.10
Housing Vacancy Rate	0.05

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(For presentation in the text in box 1 of The Geography of Prosperity, these weights are renormalized such that they sum to one.) The weightings from this CFA procedure are then applied to 1980 standardized values of vitality index components in order to maintain a consistent index over time. The resulting 1980 vitality index is then re-centered so that it has a mean of zero for the U.S. population.

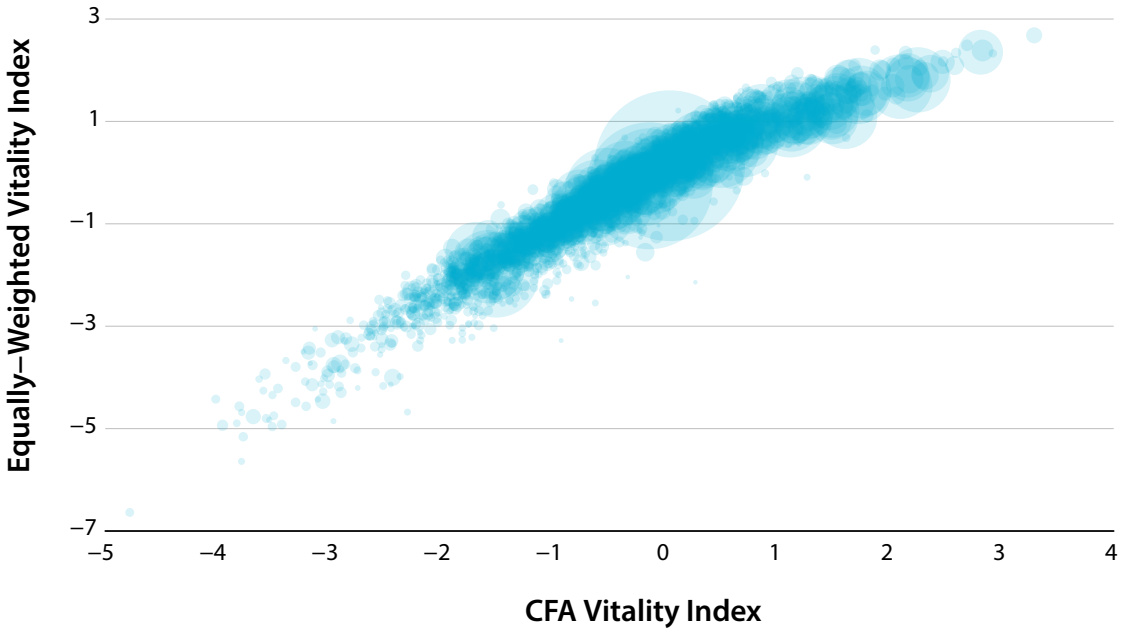
Rationale for CFA Approach

We chose CFA over three alternative approaches: (1) equal weighted index, (2) principal components analysis, and (3) exploratory factor analysis.

The first alternative is the equally-weighted method, in which suitably reverse-coded standardized outcome variables would receive equal weight in the construction of a vitality measure. In 2012–16 the correlation of this alternative measure with our preferred CFA measure was 0.95. To give a sense of how this choice would have mattered to our results, in appendix figure

APPENDIX FIGURE 1.

Equally Weighted versus CFA Vitality Index, 2012–16



1 we show the relationship between the equally-weighted Vitality Index and the CFA Vitality Index in 2012–16.

We chose not to use an equally weighted method for two reasons. First, it is unlikely that each outcome variable conveys the same amount of information about the vitality of a place. Second, an equally weighted approach is more sensitive to choices about the number of outcome variables used. An additional outcome variable will receive the same weight as each previous variable, whereas in the CFA approach an additional outcome variable will receive a weight that depends on how correlated it is with the other outcome variables and, presumably, the underlying level of vitality.

The second alternative approach is to use principal components analysis. However, this approach is not designed to infer the latent factor to which our components are related. Instead, it would combine as much of the total variation of our components as possible into one factor that would be orthogonal to additional factors containing the remaining variation.

The third alternative approach is to use a form of exploratory factor analysis (EFA). We deemed this less suitable than CFA to our needs, however. EFA leaves open the question of how many factors underlie the outcome variables, whereas we aimed to identify a single summary statistic for the vitality of a place. In addition, CFA allows us to specify the relationships between errors associated with different components: specifically, we assume that errors in counties' EPOP and unemployment rate are correlated.

Modified Vitality Index from 1960 to 2016

In order to compare vitality and convergence in vitality over a longer period, we use data from 1960 to construct a longer-running vitality measure (appendix table 2). However, due to data availability constraints, we create a modified vitality index that does not include life expectancy, and that uses overall EPOP instead of prime-age EPOP. The main difference in the weighting of our factor variables is that the modified index weights more heavily on poverty.

APPENDIX TABLE 2.

Vitality Index Outcome Loadings for 1960–2016

Outcome	Loading
Median Household Income	0.41
Poverty Rate	0.40
Unemployment Rate	0.07
Overall EPOP	0.14
Housing Vacancy Rate	0.06

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COUNTY CHANGES AND EXCLUSIONS

Due to data availability constraints, we restrict our vitality analysis to the contiguous United States. We then calculate vitality in each period in every county for which we have data on all of the vitality index components.

When we calculate changes in vitality rather than levels, we take name and FIPS code changes and new counties into account to make accurate comparisons across time. Shannon County (FIPS code 46113) in South Dakota became Oglala Lakota County (FIPS code 46102) in 2015 but maintained exactly the same borders, so we simply recoded the earlier FIPS code to match to the later period. Ste. Genevieve County in Missouri changed its FIPS code from 29193 to 29186 in 1979. In Florida, Dade County (FIPS code 12025) was renamed Miami–Dade County and changed its FIPS code to 12086 in 1997.

Several changes to cities and county equivalents occurred in Virginia over our period. These changes were often accompanied by boundary changes. For this reason, we excluded Clifton Forge City (51560), South Boston City (51780), and Bedford City (51515) from the analysis.

Finally, there are three modern counties for which we do not calculate vitality changes because they did not exist in 1980: Cibola County, New Mexico (founded in 1981); La Paz County, Arizona (founded in 1983); and Broomfield County, Colorado (founded in 2001).

Data Sources

Most data—including income, employment, poverty, population, and housing vacancy rates— for the contemporary index come from the 2012–16 ACS. The ACS is a rolling survey that is sent to respondents every month. The five-year samples used here are based on 60 months' worth of surveys from January 2012 to December 2016, and do not represent any single year. Most data for the 1980 index come from the 1980 decennial census. Data from the ACS was prepared by Social Explorer.

Life expectancy data for both the contemporary and 1980 indices come from the Institute for Health Metrics and Evaluation at the University of Washington. The contemporary index uses life expectancy data from 2014 since they are the most recent data available.

For 1980, income inequality data are courtesy of Professor François Nielsen at the University of North Carolina, and measures of urbanicity are from the 1983 City and County Data Book, downloaded via ICPSR. In constructing both our measures of fiscal capacity and fiscal effort, we use the 2017 Total Taxable Resources estimates published by the U.S. Department of the Treasury. Our index of fiscal effort also incorporates the Annual Survey of State Government Tax Collections maintained by the U.S. Census Bureau. Because the 2017 Total Taxable Resources data release includes data only through 2015, we use the 2015 State Government Tax Table in our index to match.

Migration estimates for both 1980 and 2016 come from IRS tax data and were downloaded via ICPSR.

References

Kolenikov, Stanislav. 2009. "Confirmatory Factor Analysis using Confa." *The Stata Journal* 9 (3): 329–73.

APPENDIX TABLE 3.

Data Sources

Variable	1960	1980	2016
		Vitality Index Components	
Median Household Income	County data books	Social Explorer T53 (1980 Census): Median Household Income	Social Explorer T57 (2016 ACS, 5-Year Estimates): Median Household Income
Poverty Rate	Census Historical County Level Poverty Estimates Tool	Social Explorer T82 (1980 Census): Poverty Status	Social Explorer T117 (2016 ACS, 5-Year Estimates): Ratio of Income to Poverty Level
Life Expectancy	N/A	Life Expectancy and Mortality Risk by County 1980-2014 (Global Health Data Exchange)	Life Expectancy and Mortality Risk by County 1980-2014 (Global Health Data Exchange)
Unemployment Rate	County data books	Social Explorer T40 (1980 Census): Unemployment Rate For Civilian Population	Social Explorer T37 (2016 ACS, 5-Year Estimates): Unemployment Rate for Civilian Population
Prime-Age Employment to Population Ratio	N/A	1980 Census (STF 4Pb): Age by Labor Force Status	2016 ACS, 5-Year Estimates: Sex by Age by Employment Status for the Population 16 Years and Over
Employment to Population Ratio	County data books	Social Explorer T36 (1980 Census) Employment status for total population	Social Explorer T33 (2016 ACS, 5-year estimates) Employment status for total population
Housing Vacancy Rate	County data books	Social Explorer T82 (1980 Census): Occupancy Status	Social Explorer T95 (2016 ACS, 5-Year Estimates): Occupancy Status
		Other Factors	
Educational Attainment	County data books	Social Explorer T31 (1980 Census): Educational Attainment for Population 25 Years and Over	Social Explorer T25 (2016 ACS, 5-Year Estimates): Educational Attainment for Population 25 Years and Over
Gini Coefficient	N/A	Professor François Nielsen (University of North Carolina)	Social Explorer T157 (2016 ACS, 5-Year Estimates): Gini Index of Income Inequality
Total Taxable Resources	N/A	N/A	2017 Total Taxable Resources (U.S. Treasury Department)
State Tax Revenue	N/A	N/A	2015 Annual Survey of State Government Tax Collections (U.S. Census Bureau)
Migration	N/A	IRS Migration Data by County (ICPSR 8139)	IRS State and County Migration Data
Industry Composition and Concentration	County data books	Social Explorer T49 (1980 Census): Industry	Social Explorer T49 (2016 ACS, 5-Year Estimates): Industry by Occupation
Population	County data books	Social Explorer T1 (1980 Census): Total Population	Social Explorer T1 (2016 ACS): Total Population
Patents	N/A	HistPat, for 1975	N/A

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The Hamilton Project seeks to advance America's promise of opportunity, prosperity, and growth. We believe that today's increasingly competitive global economy demands public policy ideas commensurate with the challenges of the 21st Century. The Project's economic strategy reflects a judgment that long-term prosperity is best achieved by fostering economic growth and broad participation in that growth, by enhancing individual economic security, and by embracing a role for effective government in making needed public investments.

Our strategy calls for combining public investment, a secure social safety net, and fiscal discipline. In that framework, the Project puts forward innovative proposals from leading economic thinkers — based on credible evidence and experience, not ideology or doctrine — to introduce new and effective policy options into the national debate.

The Project is named after Alexander Hamilton, the nation's first Treasury Secretary, who laid the foundation for the modern American economy. Hamilton stood for sound fiscal policy, believed that broad-based opportunity for advancement would drive American economic growth, and recognized that "prudent aids and encouragements on the part of government" are necessary to enhance and guide market forces. The guiding principles of the Project remain consistent with these views.

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