Who is poor?[1]

Poverty in the United States Re-examined from a Multidimensional Perspective

Poverty is a long-established economic outcome worthy of scholarly and political concern. The issue of addressing poverty deals primarily with identification: who is poor? This paper constructs a Multidimensional Poverty Index (MPI) assessing dimensions relevant to Martha Nussbaum's central capability approach utilizing the framework established by Alkire and Foster (2011). I build upon a similar application of the Alkire and Foster method in Dhongde and Haveman (2015) by providing more sufficient conceptual support for the inclusion of dimensions in the specification and selecting different thresholds for some variables with more robust justification for this selection than the original authors provide. In addition, I make the case for examining the MPI by identifying any person deprived in at least one dimension as poor. My empirical analysis further improves on the work of Dhongde and Haveman by utilizing sample weights present in the American Community Survey (ACS). I estimate my specification of the MPI using one percent samples from the ACS for 2015, and I provide decompositions of the estimate for race, sex, and age by state. I find that 72 percent of Americans are poor such that the poor experience about 18 percent of all possible deprivations. Moreover, I find large and statistically significant sex, race, and age gaps that vary by state.

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Introduction

Poverty is perhaps traditionally regarded as ”the state of one who lacks a usual or socially acceptable amount of money or material possessions” (Poverty). Robert Hunter offers a definition of poverty as an ability to ”get a bare sustenance... [but not] to maintain those necessities which will permit them to maintain a state of physical efficiency” (1905). Moreover, he acknowledges that ”no one will fail to realize how low such a standard is. It does not necessarily include any of the intellectual, aesthetic, moral, or social necessities,”and he even compares it to ”precisely the same standard that a man would demand for his horses or slaves” (1905). The selection of a poverty standard focused on material need has seemingly persisted to the present day, often taking the form of empirical analyses on incomes (e.g., the Official Poverty Measure). However, its not clear that such a low standard truly captures a meaningful quality of human life; in fact, Hunter's comparison would suggest that the standard internalizes particularly dehumanized qualities. Thus, it seems necessary to re-evaluate the conception of poverty, which Amartya Sen does with his capability approach, describing poverty as the deprivation of human dignity and well-being. According to Sen, *functionings* are a person's actual state of being whereas *capabilities* are the alternative possibilities of such states available (1993). Consequently, consideration of whether a person's capabilities includes those functionings deemed valuable by society (i.e., inseparably related to well-being or dignity) allows us to determine whether such a person is impoverished.

Although Sen chooses not to codify these valuable functionings, he does indicate that they range from the primitive (e.g., nourishment) to the complex (e.g., social integration). Therefore, Sen's definition of poverty would certainly count as poor the same persons as Hunter's, but it would undoubtedly set a much higher threshold that would likely count others as well. Notably, this capability approach and its much higher threshold is preferable to the traditional definition since it seems to evaluate, albeit ambiguously, a meaningful quality of human life (i.e., dignity) whereas the latter is concerned with the inhumane standards prescribed to enslaved persons or animals. The challenge therefore deals with untangling the ambiguity of the capability approach such that is can be leveraged to actually describe poverty. Subsequently, Martha Nussbaum contributes to this capabilities literature by constructing a list of ten generally described Central Human Capabilities: Life; Bodily Health; Bodily Integrity; Senses, Imagination, and Thought; Emotions; Practical Reason; Affiliation; Other Species; Play; and, Control Over Ones Environment

(2011). Nussbaum suggests that consideration of these central capabilities beneficially directs the identification of those valuable functionings Sen referred to and thus the identification of poverty. Moreover, Nussbaum argues that these central capabilities are compatible with an international literature of political principles, thereby identification of poverty with this framework is conducive to policy intervention.

With consideration to Nussbaum's central capabilities the task of describing poverty in the United States has various conceptual and empirical components. Supposing that capability deprivation implies impoverishment, a decision must be made to determine what constitutes deprivation and how much deprivation constitutes impoverishment. In other words, a threshold for deprivation must be established for each central capability to determine at what point a person's functioning is unjustly constrained. A particular appeal of utilizing Nussbaum's central capability framework is that the second threshold is built-in: that is, deprivation in any of the central capabilities is sufficient to be classified as poor. With this conceptual identification strategy in mind, the empirical task presents further complications. First, what variables should be used to proxy for the capabilities? Furthermore, what thresholds for these variables are satisfactorily analogous to the conceptual deprivation thresholds? Although Nussbaum's framework lends itself to easily resolving the matter of how many capability deprivations constitute poverty, the empirical question is more complex. If a given variable is a perfect proxy for a capability, then deprivation of this variable would be sufficient to determine poverty. Otherwise, this may not be the case. The primary objective of this paper is to present a Multidimensional Poverty Index for the United States, and discuss how this measure is the most preferred measurement available.

In this paper I improve upon Dhongde and Haveman's (2015) application of the Multidimensional Poverty Index (MPI) as devised by Alkire and Foster (2011) using census data from the American Community Survey one percent sample. Alkire and Foster's design of the MPI is rooted in Sen's capability approach, and thus well-suited for describing poverty and consistent with Nussbaum's central capability approach. Dhongde and Haveman's specification of the MPI examines eight dimensions: health insurance coverage, disability status, education attainment, English proficiency, employment, "poverty" status relative to the OPM, housing burden, and crowded housing. In contrast, I propose a specification including health insurance coverage, disability status, education attainment, English proficiency, employment, housing burden, crowded housing, and household technology. Although many dimensions overlap, I select different deprivation thresholds for disability status, education attainment, English proficiency housing

burden, and crowded housing than Dhongde and Haveman. Moreover, I provide sufficient justification for the inclusion of these dimensions and my selection of the threshold relevant to the surrounding literature, which Dhongde and Haveman fail to do. Additionally, Dhongde and Haveman incorrectly treat the ACS sample as unweighted, which I correct for. Notably, I deviate from Dhongde and Haveman's selection of the secondary threshold (which lacks conceptual support).

I estimate a national headcount ratio of 72 percent, average deprivation share of 24.22 percent, and MPI of 17.71 percent. That is, I find that about 72 percent of Americans are deprived in at least one of the eight dimensions I assess and are therefore poor. Moreover, the average poor person experiences about two deprivations and the poor as a group experience about 18 percent of all possible deprivations. In addition I find economically significant differences by sex, race, and age at national and state levels for all three of these estimates. My findings suggest that poverty in the US is dramatically understated by reviewing measurements such as the OPM or even Dhongde and Haveman's specification of the MPI. Moreover, while my estimates are persistently high across region and demographic characteristics, the gaps between females and males, blacks and nonblacks, and persons aged 18-64 and aged 65-and-up are particularly alarming. Illustratively, I find a headcount ratio for blacks as high as 94.37 percent in Maine (68.73 percent for nonblacks) and a headcount ratio for persons aged 65-and-up as high as 85.02 percent in Louisiana (75.23 percent for persons aged 18-64). My results suggest that well-being and dignity, as measured by my specification, are severely and prevalently restricted in the United States. Although the stark severity between traditional measurements and mine may be an initial source of shock or skepticism, its worth noting that a specification correctly internalizing the capability approach perhaps ought to find very different results since its concern with dignity is so very different (and I think more meaningful) than the traditional focus on material needs.

This paper is divided into six sections. Section 1 offers a brief discussion of the most common unidimensional poverty measure, the Official Poverty Measurement (OPM) including its various shortcomings. Section 2 reviews the theoretical framework for the headcount methodology of the MPI as described by Foster and Alkire (2011). Section 3 explores Dhongde and Haveman's (2015) specification, especially the shortcomings of it. Section 4 presents my alternative specification of the MPI for the US and discusses the conceptual benefits it provides over Dhongde and Haveman's. Section 5 reports and examines the results of estimating the MPI using Dhongde and Haveman's approach relative to my own for 2011 and then further explores my 2015 estimations

including decompositions by race, sex, and age. Section 6 concludes by reviewing the contributions of this paper to the literature with brief consideration to the next steps for future research.

1 The Official Poverty Measurement

In the United States, the most common empirical method of describing poverty is the Official Poverty Measurement (OPM). Despite its longstanding and widespread use, the OPM offers a variety of well-documented conceptual as well as empirical shortcomings especially with regards to the capability approach. I contend that my specification of the MPI overcomes many of these shortcomings, thereby making it a preferable measurement. Henceforth I will briefly discuss the framework behind the OPM and some of its leading criticisms, especially its conceptual inconsistency with the capability approach.

The Census Bureau publishes the Official Poverty Measurement (OPM) by utilizing poverty thresholds originally developed by Molly Orchansky in 1963 and 1964 in order to identify national estimates of the number of people living in poverty with decompositions for various demographic characteristics such as race, sex, residence, etc (Fisher 1992). Ideally, Orchansky would have perfectly constructed these thresholds as reflective of the "standard budget" required for a family of given size and composition to consume vital goods and services associated with a particular standard of living. However, due to data collection restrictions of the period, Orchansky proxies for the standard budget by using "generally adequate" standards for food consumptions using plans prepared by the Agriculture Department. Specifically Orchansky established poverty thresholds using the low-cost and economy food plans, for which the former offers food expenditure associated with the lower third of income earners while the latter, called an "emergency plan", represents approximately seventy-five to eighty percent of the low-cost plan. Subsequently, Orchansky stratified families based on size and composition, determined that families on average spend about a third of their total income on food consumption using survey data from the Agriculture Department's 1955 Household Food Consumption Survey, and constructed separately these thresholds for farm and nonfarm families. With these poverty thresholds, Orchansky used Current Population Survey data about people's before-tax income to determine whether they were positioned above or below the thresholds. Since their original construction, these thresholds have undergone various revisions by Orchansky as well as other researchers. Today, the Census Bureau uses Current Population Survey data to estimate forty-eight poverty thresholds that vary by family size

and composition, and are updated annually for inflation using the Consumer Price Index (CPI). Moreover, the Census Bureau sums money income before taxes, excluding capital gains and noncash benefits, by household and compares these household incomes to the established thresholds. If income falls below the threshold then every person in that household is identified as poor, otherwise a person is nonpoor. Finally, the Census estimates the OPM, which is a headcount ratio, or rather the proportion of the number of people identified as poor over the total population.

Common empirical criticisms of the OPM can be divided into two groups: first, those pertaining to the determination of poverty thresholds, and second, those pertaining to estimation of a household's income. The former focus particularly on the OPM's disregard for residence and the salient difference that may have on standards of living (e.g., the differential costs of living for rural or urban environments), as well as the limited consideration offered by the emergency bundle approach to setting thresholds (Institute). For example, some critics point towards medical-out-of-pocket expenses as a significant drain on household resources that the OPM does not account for (Institute).That is, critics claim that the thresholds should be raised such that they adjust for the medical-out-of-pocket expenses that a household may encounter in a given year. The failure to do so results in some households being categorized as nonpoor despite substantial income deprivation. Moreover, the original construction of the thresholds as three times the emergency food plan is consistently regarded as an insufficient proxy for the standard bundle (Institute). The latter focus on the types of incomes included in the estimation of a household's income, with particular concern pointed towards the use of pre-tax incomes and the exclusion of noncash benefits (Institute). The use of pre-tax income may overstate a household's resources and thus mis-categorize people as nonpoor. On the other hand, the exclusion of noncash benefits may understate a household's consumption capability, and thus mis-categorize as poor. Given that the purpose of the identification strategy and measurement tool is to accurately describe poverty in the US, these concerns all suggest that the OPM may be doing this inaccurately.

In addition to the empirical limitations, the OPM presents a particular conceptual inconsistency with the capability approach. Consider that Sen and Nussbaum propose conversion factors as the "degree in which a person can transform a resource into a functioning" (Robeyns 2011). Income is certainly a resource that "enables or contributes to a functioning" (Robeyns 2011); however people may have varying conversion factors between their incomes and any number of capabilities. Recall, the OPM's deprivation thresholds are stylized to reflect food budgets; therefore, it seems intuitive to connect the OPM's identification of deprivation to an identification of

hunger, which in terms of central capabilities relates to Life, Bodily Health, etc. The twofold underlying assumption here is that people generally convert income into a eating functioning that would absolve a central capability concern similarly (i.e., people have the same conversion factor for income and eating) and that the OPM's thresholds have correctly internalized this conversion factor. Recall, the OPM thresholds presume that an average household expends one-third of their income on food consumption relative to an emergency standard. Firstly, its not clear that the emergency standard is consistent with the capabilities approach (i.e., the emergency standard may identify some deprivation of capability but not all if its too low). While it may be reasonable to assume that persons near the threshold would consume similar proportions of their income on food, its not at all clear that they would consume a third of their income on food. In fact, some estimates suggest that the average household spends about one-seventh of their income on food (Greenberg 2009). As mentioned above, this shortcoming of the OPM is a holdover from its original construction in the 1960s. Supposing that an updated version of the OPM were produced, which accounted for the various empirical concerns outlined above, then this could be a valuable dimension to include in a multidimensional poverty index. However, its not sufficient for measuring poverty on its own since it only observes a limited scope of capabilities. Although its seemingly unlikely to perfectly measure poverty insofar that accounting for every capability perfectly may be an empirical impossibility, its certainly preferred to assess more dimensions than less whenever possible. Consequently, I contend that the OPM as it exists is an insufficient measure of poverty and also should not currently be included in a specification of the MPI; although, various revisions to the OPM may resolve the latter concern.

2 Alkire and Foster MPI Framework

Constructing the MPI involves two components: identification and aggregation. Broadly speaking, identification refers to determining whether a person is poor and aggregation refers to compiling poverty status information into an estimate corresponding to a particular group. For example, the OPM identifies poverty using the Orchansky thresholds and then constructs the OPM estimate using the headcount ratio, which is the national poor population proportion. Similarly, Alkire and Foster (2011) establish a dual-cutoff identification strategy and discuss various potential methods of aggregation. Henceforth, I will semi-formally review their dual-cutoff strategy as well as their headcount ratio aggregation method. Notably, the other aggregation methods

discussed by Alkire and Foster (e.g., deprivation gap and squared gap) do provide more information than the headcount ratio, but these methods require the use of cardinal data. Since most of the dimensions I prefer to examine are in the form of ordinal data, my analysis is limited to the headcount ratio; however, improvement in data availability could resolve this for future research.

Suppose that a researcher is examining a population of n people with d dimensions each. The dimensions are variables that proxy for one or more capabilities. The first stage of identification requires that the researcher examine each of these dimensions to determine whether the person's achievement is sufficient to be categorized as non-deprived. Thus, one must establish a cutoff threshold whereby a person whose dimension achievement is above the threshold is classified as "non-deprived" and a person whose dimension achievement is below the threshold is classified as "deprived." For example, if the dimension is education attainment (measured in years of schooling) then a person's achievement would be the number of years of schooling they have attained (e.g., perhaps twelve for a high school graduate). If the threshold for deprivation was eight years of schooling, then this person would be considered non-deprived. More formally, let x_{ij} be the measure of achievement for person i in dimension j, z_j be the threshold for dimension j, and $\rho_j(x_{ij}, z_j)$ be a function constructing a dummy-variable for dimension-specific deprived status. That is, $\rho_j(x_{ij}, z_j) = 1$ if the person is below the threshold (i.e., $x_{ij} < z_j$) and thus is deprived, otherwise $\rho_j(x_{ij}, z_j) = 0$ and the person is non-deprived. Suppose that v_i represents the vector of person i's deprivations such that $v_{ij} = \rho_j(x_{ij}, z_j)$. Furthermore, let $|v_{ij}| = \sum_{j=1}^{d} v_{ij}$ or rather this is the sum of person i's deprivations. Therefore, suppose that g^0 represents the n x d deprivation matrix where row i is the deprivation vector of person i, previously written as v_{ij}. Furthermore, suppose that c is a column vector of deprivation counts wherein $c_i = |g_i^0| = |\rho_i(x_{ij}, z_j)|$. That is, c_i is the sum of deprivations experienced by person i. The second stage of identification regards determining whether a person is sufficiently deprived such that they ought to be considered poor. Therefore, this stage requires that the researcher establish a deprivation threshold, k, such that $k \in [1, d]$. If a person i is deprived in at least k dimensions then they are categorized as poor (i.e., whenever $c_i \geq k$), otherwise they are categorized as non-poor. Consequently, let $\phi_(c_i, k)$ be a function constructing a dummy-variable for poverty status such that $\phi(c_i, k) = 1$ if $c_i \geq k$, otherwise $\phi(c_i, k) = 0$. Moreover, let $\bar{c}_i$ be the censored deprivation count of person i such that $\bar{c}_i = c_i$ if $c_i \geq k$, otherwise $\bar{c}_i = 0$. In summary, ρ_j offers deprivation status for a particular dimension, c_i offers the deprivation count of any given person, ϕ offers the poverty status of any given person, and $\bar{c}_i$ offers the censored deprivation count, or rather the deprivation count of any poor person

(nonpoor persons are assigned to zero).

Having settled the identification issue, the next empirical step is aggregation wherein we seek to construct an overall multidimensional poverty measure $M(x, z)$. One of the most intuitive ways of doing this is by first constructing a headcount ratio, which recall measures the proportion of the population that has been identified as poor. Suppose that the number of poor people is given by $q = \sum_{i=1}^{n} \phi(c_i, k)$. Moreover, let H be the headcount ratio such that $H = \frac{q}{n}$. This measure is useful for knowing how prevalent poverty is in the population given pre-determined thresholds z_j and k; however, an important limitation of the measure is that it fails to satisfy dimensional monotonicity. That is, if a poor person becomes deprived in another dimension, this measure will not change at all. In this regard, H alone doesn't offer any information about the depth of poverty. To address this concern, Alkire and Foster devise the average deprivation share given by $A = \frac{|\bar{c}_i|}{qd}$ such that $|\bar{c}_i| = \sum_{i=1}^{n} \bar{c}_i$. Note: If $q = 0$, then $A = 0$. As its name suggests, the average deprivation share captures the number of deprivations experienced by the average poor person. Consequently, the dimension-adjusted headcount ratio is given by $M_0 = HA$. Notice, M_0 is sensitive to changes in the number of people who are poor (via H) and also the number of deprivations experienced by those people (via A). A persistent limitation of M_0 is that it doesn't relay information about the severity of deprivation. For strictly ordinal data, this concern is indomitable insofar that the dimensions themselves lack such information. Although utilizing strictly cardinal data would allow a research to perform alternate identification and aggregation methods that do preserve information about deprivation depth, this data is not available for every dimension worth evaluation. Consequently, I choose simply to let the MPI be measured by M_0, although improvements of data availability could offer the opportunity for revising this in future work.

I offer a final note on the framework, which regards weighting. Ideally, the dimensions included in a specification of the MPI would serve as perfect proxies for capability. Imagine some factor δ exists that measures the relevance of a particular dimension to capabilities such that $\delta \in [0, 1]$. If $\delta = 0$ then the dimension should be excluded from the specification since this suggests that the variable does not proxy for capability at all. In contrast, if $\delta = 0$ then the dimension truly is a perfect proxy as desired. However if $0 < \delta < 1$, then a researcher would want to capture the imperfectness of the dimension's relevance to capabilities. One way of doing this would be to incorporate weights for dimensions where $w_j = \frac{\delta_j}{\sum_{j=1}^{d} \delta_j}$ such that $v_i = w_j * \rho_j(x_{ij}, z_j)$. Remember capabilities are themselves proxies for dignity and well-being such that I truly would want to know the relationship between each dimension and dignity and set my weights to reflect this as

outlined above. However, dignity is not a clearly observable characteristic such that I can assess this relationship. Therefore, since δ is unobservable, I choose to let $\delta = 1$ for all dimensions, which simplifies the model by eliminating weights altogether. Let's suppose that δ truly equals one for every dimension. One might be falsely concerned that weights should then reflect the relative importance of some capabilities over others. However, capabilities are regarded as having equal relative importance, which is reflected in weighting consideration.

Having thoroughly reviewed Alkire and Foster's MPI framework including their dual-cutoff identification strategy and dimension-adjusted headcount ratio aggregation method, its time to try implementing it. In the following section, I will discuss an application of this framework to the US by Dhongde and Haveman (2015). I find various shortcomings with their specification, which leads me to constructing my own specification that I will present in the subsequent section. Thereafter, I discuss my findings from estimating the MPI and its two subcomponents (H and A) with our specifications, respectively.

3 Dhongde and Haveman MPI Application to the United States

In their 2015 work, Dhongde and Haveman utilized 2011 American Community Survey (ACS) data to apply Alkire and Foster's MPI framework as described in the previous section to the United States. Their paper included various conceptual and empirical shortcomings that this paper will correct, namely their failure to sufficiently support their choice of dimensions and associated dimension thresholds, as well as their secondary threshold (k). Furthermore, although the ACS is a weighted-sample Dhongde and Haveman fail to use person-weights, which introduces inaccuracy into their results. Henceforth, I will discuss the various dimensions chosen by Dhongde and Haveman for their specification as well as any justification the authors offer for their selection. I find that they fail to suitably justify the inclusion of all dimensions. Although some dimensions' relevance to a capabilities influenced MPI may appear intuitive, they are by no means trivial and some (e.g., disability status) are rather complex. For that matter, their inclusion of "poverty" status as a dimension is actually inconsistent with a MPI focused on capabilities. Moreover, their lack of justification for deprivation thresholds actually leads to inappropriate selections. Consequently, I resolve these issues with my specification that I will discuss in the next section.

Dhongde and Haveman purport to examine deprivation across four "dimensions" of

health, education, standard of living, and housing. Notably, they diverge from Alkire and Foster's use of the term dimension, which they instead let label a set of indicators (Alkire and Foster would call these dimensions).The health indicators are health insurance coverage and disability status. Specifically, they assess whether or not a person has any health insurance coverage (public or private) and whether or not a person has serious difficulty with their hearing, vision, cognition, and ambulation as well as whether a person has difficulty with self-care (e.g., bathing or dressing) or independent living (e.g., shopping errands). Since health insurance coverage is an ordinal variable, its threshold is essentially built-in. If a person has no health insurance coverage then they are deprived, otherwise they aren't. For disability status, they set the deprivation threshold to be two or more disabilities described. The authors offer no support for their choice of including these indicators or their thresholds. The education indicators are education attainment and English proficiency wherein education attainment measures years of schooling and English proficiency measures the degree that a person speaks English (e.g., "Not Well", "Well", "Very Well"). The deprivation threshold for education attainment is set to high school graduation (i.e., 12 years of schooling). For English proficiency, the authors group by households and set the threshold to be whether all persons aged 14 or above in a household doesn't speak English at least "Very Well". That is, if anyone aged 14 or above in the household does speak English "Very Well" then every person in the household is marked as non-deprived. The authors omit justification for their choice of these education indicators or their thresholds as well. The standard of living indicators are "poverty" status (as determined by the OPM thresholds discussed in section 1) and employment status whereby being unemployed (rather than jobless) identifies a person as deprived. For these indicators, the authors fail to support their choice of poverty status, although they briefly mention the UNDP-HPI's use of employment status as a measure of social exclusion. Finally, the housing indicators are whether or not a housing unit is crowded (i.e., there are more occupants than livable rooms, which excludes bathrooms or half-rooms, but not kitchens) and whether or not a person's housing costs exceed fifty percent of their household income. For their crowded unit indicator, the authors mimic the ACS's identification of crowded housing and for the housing burden indicator they utilize the severe burden threshold established by Schwartz and Wilson (2007). Notably, consistent with preceding variable selections, they do not justify their inclusion of either indicator or associated deprivation threshold.

Regarding the second stage of identification, Dhongde and Haveman choose to let $k = 2$ for their preferred specification. However, in line with their lack of justification for the deprivation

thresholds, they choose not to motivate this selection. Consequently, the authors remove individuals who experience just one deprived dimensions from poor consideration despite offering no distinction between this person and a person who experiences two or more deprived dimensions. The most obvious concerns with this work is the complete absence of conceptual justification to support their empirical results. Some dimensions are not trivially related to poverty from a capabilities approach, for example, disability status. Furthermore, they include highly objectionable thresholds for several of their dimensions such as English proficiency, disability status, crowded housing, housing burden, and education attainment. Moreover, their inclusion of ”poverty” status as determined by the OPM thresholds is inconsistent with the capability approach. Recall, in section 1 I established that the OPM ultimately fails to reconcile the capability approach in its current form. All of these mistakes I attempt to correct with my specification, which I present in the subsequent section. Notably, in more recent work Dhongde and Haveman (2016) exclude ”poverty” status and employment from their specification of the MPI. In addition, they provide some evidence for the importance of studying these dimensions as individual outcomes; however, the connection to capabilities remains weak at best. Furthermore, in this study Dhongde and Haveman correctly utilize person-weights. Although their most recent work corrects many of the failings from their 2015 paper, I believe that I can construct and justify a more robust specification, which I will do in the next section.

4 My Specification of the MPI

For my specification, I include the following dimensions: health insurance coverage, disability status, education attainment, English proficiency, employment, housing burden, crowded housing, and household technology. I utilize the same variables as Dhongde and Haveman for all of these dimensions with the exception of household technology; however, I set different deprivation thresholds for all but health insurance coverage and employment, which are both built-in. The household technology dimension, which is unique to my specification, examines whether a household has access to a refrigerator, telephone, computer, or the Internet (Note: Computer and Internet access is restricted to 2015 ACS data). Henceforth, I will explain the connection between each of these dimensions and Martha Nussbaum’s central capabilities: Life; Bodily Health; Bodily Integrity; Senses, Imagination, and Thought; Emotions; Practical Reason; Affiliation; Other Species; Play; and, Control Over Ones Environment. In addition, I will explain and justify my se-

lection of deprivation thresholds for each of these. I'll end this section by discussing my choice of the secondary threshold: $k = 1$.. Thereafter, I present the results from estimating my specification of the MPI.

According to the Center for Disease Control and Prevention (Preventative), preventive services are used at only about half the recommended rate nationally, despite about seven out of ten deaths resulting from chronic diseases, which may be prevented or detected through such services. Moreover, the CDC points to financial barriers related to health insurance coverage (i.e., either due to lack of coverage or burdensome cost-sharing policies such as deductibles or co-payments) as a potential cause of these low usage rates, and subsequent bolstered mortality rates. Consider that Nussbaum describes the Life capability as the ability to "to live to the end of a normal length human life, and to not have one's life reduced to not worth living" as well as the Bodily Health capability as the ability to "to have a good life which includes (but is not limited to) reproductive health, nourishment and shelter" (Kleist). Given the CDC's concern that health insurance coverage restricts use of preventive care services, which thereby leads to greater prevalence of life-ending chronic diseases, deprivation in regards to health insurance coverage may serve as a viable proxy to deprivation of Life and Bodily Health. Consequently, I will include health insurance coverage as a dimension in my specification such that the threshold for deprivation is whether or not a person has any (public or private) coverage. Notably, there is some concern that even persons with coverage still face deprivation due to particular components of their policies. Consequently, my threshold selection likely under-estimates the prevalence of health insurance coverage related deprivation. Further research into these restrictive policies may alleviate this concern in the future.

Although, Dhongde and Haveman include disability status in their specification of the MPI, their decision to do so detrimentally lacks nuanced consideration of the matter. One might take their inclusion of disability status to suggest that a person with a disability is impoverished by a capability approach by virtue of having a disability. In other words, the claim would thus be that the impairment associated with the disability deprives the person of their well-being or dignity. This view is consistent with a "medical model" of disability wherein disability is regarded "as a defect or sickness that must be cured or normalized through medical intervention" (Key 2016). This model incorrectly posits that "obstacles to participation are in the person rather than in the environment" (Key 2016). In contrast, the social model treats "problems related to disability [as] caused by the interaction between the individual and the environment rather than the individuals disability itself" (Key 2016). Notably, this social model is vastly more consistent with Nussbaum's

central capability framework, which offers three varieties of capabilities: combined, internal, and basic (Nussbaum 2011). Combined capabilities are the substantial freedoms to choose among a combination of valuable functionings. Internal capabilities are the fluid characteristics of a person such as personality traits or intellectual/emotional capacities. Basic capabilities are ”innate equipment” or rather the ”innate faculties of a person that make later development and training possible” (Nussbaum 2011). Notably, Nussbaum’s discussion of basic and combined capabilities related to, for example cognitive disabilities, includes ”the goal should be for them [person’s with cognitive disabilities] to have the same capabilities as ”normal” people, even though some of those opportunities may have to be exercised through a surrogate” (Nussbaum 2011). Notably, Nussbaum’s view of capabilities suggests that a person with a particular disability (e.g., hearing, vision, cognition, and ambulation) may face restricted basic capabilities; however, that person’s particular political, economic, and social environment determines whether their freedom to choose (i.e., combined capability) among the same set of valuable functionings as anyone else is deprived. Consequently, identifying a person as having such disabilities is not sufficient on its own to establish central capability deprivation. Consequently, an accurate assessment of whether disability status constitutes capability deprivation would require in-depth study of the disability-oriented accessibility and inclusiveness of a person’s environment. According to a ”Call to Action” published by the Surgeon General of the United States in 2005, persons with disabilities in the United States are subject to being incorrectly classified as having poor-health or dependence based on their disability status, to lacking appropriate access to primary or secondary health care services due to medical professionals misconceptions of disability status or incomplete prevention and treatment services. Consequently, in regards to health, this would suggest that at the national level persons with disabilities are capability deprived. Therefore, I will include disability status into my specification of the MPI. I will count any person with a hearing, vision, cognition, ambulation, self-care, or independent living disability as deprived in this dimension of disability-related health. Notably, it may be the case that this deprivation interacts with other dimensions (e.g., education or employment); moreover, accurately identifying poverty at more local levels would require local level analysis of these environment concerns. Therefore, its possible that local estimates of the MPI may overstate disability-related health deprivation; however, without thorough localized environment research to reconcile this I will treat this concern as immutable.

Consider that Nussbaum’s definition of Senses, Imagination, and Thought includes the ability to ”use one’s senses to imagine, think and reason in a ’truly human way’-informed by

an adequate education" (Kleist). Moreover, Nussbaum defines Practical Reason as the ability to "form a conception of the good and critically reflect on it" (Kleist). Furthermore, Nussbaum breaks Control Over One's Environment into Political and Material subcategories wherein ability to "effectively participate in the political life" and "having the ability to seek employment on an equal basis" are central (Kleist). In regards to the satisfactory fulfillment of these capabilities, education is clearly key. Consequently, I will include education attainment (i.e., years of schooling) as a dimension of my MPI specification. Recall, Dhongde and Haveman identify any person who doesn't graduate from high school as deprived; however, its not clear that simply graduating from high school satisfactorily fulfills those capabilities. Notably, "high school graduates and dropouts are today considered close substitutes in the labor market" (Goldin Katz 2007). This suggests that in terms of employment seeking ability Dhongde and Haveman may have selected the wrong cutoff. Intuitively, education likely has monotonic properties relative to capabilities (i.e., raising the threshold to collegiate levels makes more sense than lowering it). Furthermore, a polarization phenomena driven by technological advancement (e.g., computers) has been well-documented in the labor market such that "the computerization of relatively low-wage, routine jobs (such as those in lower-wage manufacturing industries and some clerical work) might be easier to initially envision and implement than for other work" (Autor et al. 2006). Given that these low-wage, routine jobs are commonly held by less educated workers, then this could suggest that present disinvestment in collegiate education could pose future capability restraint concerns. Consequently, its seems acceptable to classify any person without at least some college education as deprived in this dimension. Notably, these arguments above may lend towards raising the threshold to college graduate (thereby I would be under-estimating the number of deprived persons in terms of an education dimension), nevertheless, I will err on the side of caution by just treating anyone without any college education as deprived.

Language is closely related to a variety of central capabilities. Insofar that lack of language proficiency may present obstacles to education attainment, there may be a concern for the deprivation of Senses, Imagination and Thought, Practical Reason, or Control Over One's Environment capabilities. Furthermore, given that Affiliation is in part described as a "capability of justice and friendship", then these inproficiencies may present a deprivation of this capability (Kleist). Therefore, it seems important to include language proficiency as a dimension for my specification of the MPI. Considering that summary statistics from the Census Bureau suggest that almost four-fifths of Americans over the age of five only speak English (Ryan 2013), I will use

English proficiency as my dimension. This choice seems moreover relevant given the potential education obstacles encountered by students who lack English proficiency in the United States. I will categorize any person in a household as deprived if no person eighteen or older in their household reports speaking English only or "Very Well." Given the US Department of Education's establishment of the importance of college or career preparedness relative to English proficiency (King 2016), I will depart from Dhongde and Haveman's threshold choice since some households may have a minor who speaks English very well but not an adult, in which case I would falsely categorize the members of this household as non-deprived even though I have strong reason to believe that they are from the central capability viewpoint.

I will also assess employment as a dimension of my MPI specification. Given the aforementioned definitions of Senses, Imagination and Thought and Control Over One's Environment, employment status seems to be a crucial and obvious point of consideration. I will follow Dhongde and Haveman by setting the threshold for deprivation in this dimension to be unemployed status. As noted by Dhongde and Haveman, this specification fails to identify the people who are jobless (i.e., out of the labor force). Consequently, I expect that my estimations of deprivation in this dimension will under-represent deprivation related to employment in this regard. Moreover, although I will not (due to data limitations) assess the heterogeneity associated with employment, its worth discussing briefly. Presumably, a person can be employed and also fail to be engaged in such a way that they think, imagine and reason in a "truly-human way." I would want to identify this person as deprived via the capability approach, however my specification fails to do so. Therefore, its important to be aware that multiple sources of error exist for this particular specification wherein my estimates likely under-represent the true deprivation.

Recall, Nussbaum's Bodily Health requires that one be able to have a "good life" in regards to shelter. Notably, Solari and Mare (2012), find that crowded housing conditions have adverse outcomes for children especially in regards to education attainment, behavior problems, and general health. This study supports the inclusion of crowded housing as a dimension in my specification of the MPI on the basis that crowded housing may deprive a person in regards to Bodily Health, Senses, Imagination and Thought, Control Over One's Environment, Practical Reason, etc. Consequently, I will include crowded housing as a dimension for my specification. A challenging point of ambiguity lies with defining crowded. Dhongde and Haveman set this threshold to be any house with more people than total rooms excluding bathrooms or half-rooms. Solari and Mare set the threshold as any household with more people than total livable rooms ex-

cluding the kitchen. I will improve on Dhongde and Haveman by setting the threshold to be any house with more people than total livable rooms as defined by rooms minus one (i.e., the kitchen) whenever households report having a kitchen. Notably, there is some strong reason to believe that this cutoff may understate the prevalence of crowded housing; however, this is the best estimate available given data constraints.

Similarly, the capability of Bodily Health would require that housing does not present severe or moderate financial burdens for a household. Schwartz and Wilson (2008) define these cutoffs to be such that housing costs exceed thirty percent of household income (moderate burden) and fifty percent of household income (severe burden). Although Dhongde and Haveman select the severe burden for their cutoff, Schwartz and Wilson prefer the moderate burden cutoff to establish deprivation. Consequently, I will include housing burden as a dimension of my specification using the preferred moderate cutoff as my threshold for deprivation.

Recall, in section 1 I discussed conversion factors within the capability framework and found the OPM to be inconsistent with capabilities on this basis. Consequently, I have good reason to exclude "poverty" status as measured by the OPM thresholds from my specification. Furthermore, the notion of conversion factors lends itself towards considering other salient resources for inclusion. Specifically, I examine access to a refrigerator, telephone, computer, or the Internet, which cumulatively I define as household technology. Unlike income, these resources have more direct connections to various capabilities, especially Control Over One's Environment, Senses, Imagination, and Thought, Play, Affiliation, Bodily Health, and Life. Although its not entirely clear to what degree each of these converts to these capabilities, presumably the factor is nonzero. Consequently, I define the deprivation threshold to be lack of access to any of these technologies.

In summary, my specification of the MPI will examine dimensions of health insurance coverage, disability status, education attainment, English proficiency, employment status, crowded housing status, housing burden, and household technology. Although Dhongde and Haveman use most of these same dimensions, I have motivated the use of different deprivation thresholds for disability status, education attainment, English proficiency, housing burden, and crowded housing status. Notably, my specification excludes "poverty" status and introduces a new dimension: household technology. Furthermore, I contribute to the literature by providing more thorough motivation for examining each dimension than is present in Dhongde and Haveman's work. It turns out that this is crucial for the selection of the secondary threshold. In their study, Dhongde and Haveman prefer utilizing $k = 2$ for this cutoff, which may be reasonable given

their failure to justify the inclusion of their various dimensions and associated primary thresholds. However, my specification has alleviated this concern such that I can reasonably believe that finding deprivation as I've described in any of the dimensions I've selected is sufficient for identifying poverty. Therefore, I prefer to focus my findings on $k = 1$ as my selection for the secondary threshold, although I think attention to the other thresholds offers valuable information as well. A potential concern with my choice of $k = 1$ is whether this threshold offers the widest scope for examining poverty from a capability approach, but perhaps at the cost of learning about the depth of poverty. Phrased differently, the concern might be that while its worth knowing about poverty described as deprivation in any dimension, maybe I should set the standard for being non-poor lower (thereby focusing on the more "extreme" poverty experienced). I think perhaps that such a concern is rooted in familiarity with a traditional view of poverty, which focuses solely on material deprivation and sets standards for being described as non-poor very low. Certainly I think its vital to examine the prevalence and severity of poverty experienced by persons whom are deprived in many dimensions; however, I maintain that the capability approach lends itself towards $k = 1$ since a person need only be deprived in a single capability to be deprived of their dignity (and thus be considered poor). Consequently, in my empirical assessments I pay particular attention to $k = 1$ as my preferred specification, although examining other thresholds does offer supplemental illumination.

5 Empirical Results

I begin my empirical analysis by precisely replicating Dhongde and Haveman's findings using the one percent sample of the American Community Survey (ACS) for 2011. Notably, I copy their exclusion of persons under the age of eighteen or living in group quarters for every specification I estimate. Thereafter, I provide two initial improvements to their work: first, I utilize sample weights and second, I estimate with my specification of the MPI as described in the previous section. Thereafter, I re-focus my investigation on 2015 (still using ACS one percent sample data). The purpose of this is twofold: first, I expand my household technology dimension to include computer and Internet access, respectively, and second, my findings are the most recently available. I provide estimates at all secondary threshold levels for the various specifications for 2011 and 2015. In addition, I decompose estimates of the headcount ratio, average deprivation share, and MPI for sex, race, and age by state letting $k = 1$. Finally, I estimate national assessments of

these decompositions for all secondary threshold levels.

First, I replicate Dhongde and Haveman's specification using ACS data for 2011. I report my estimates of the proportions of people who are deprived in each dimension in Table 1. In column 1, I repeat Dhongde and Haveman's mistake by treating the sample as unweighted. However, in column 2 I correct this mistake by utilizing sample weights, which produces larger estimates for every dimension except disability status. The severity of the estimation error varies across the dimensions with health insurance coverage seeing the largest increase due to inclusion of sample weights: 0.0288 (twenty percent of the original estimate). Notably, my replication of Dhongde and Haveman's analysis reported in column 1 is somewhat inprecise insofar that I fail to perfectly reproduce their estimates for housing burden. However, I reasonably believe that I have correctly specified this dimension as well as its threshold based on the authors' descriptions of their analysis. In column 3, I re-estimate the various deprived proportions for each dimension associated with my specification again treating the sample as unweighted. That is, I utilize my choices of primary thresholds, exclude poverty status, and include household technology as a dimension. As expected my specification is identical to Dhongde and Haveman's for health insurance coverage and employment status. By lowering the deprivation threshold associated with disability status the deprived proportion doubled from 0.0812 to 0.1624. By changing the deprivation threshold for education attainment from high school graduate to sub-collegiate education at all drove the deprived proportion up from 0.1177 to 0.4996, which is my largest estimate. Similarly, by moving the deprivation threshold for housing burden from severe to moderate burden, the estimate doubled from 0.1430 to 0.3091 (my second largest estimate). My estimate for crowded housing also doubled from 0.0455 to 0.0998. The rest of my estimates increased slightly. Notably, my inclusion of household technology yielded an estimate of just 0.0248, which was the lowest of all my estimates. Finally, I repeat my estimation of the 2011 deprived proportions using my specification while treating the sample as weighted. Similar to the results from the first inclusion of the sample weights, most of my estimates increased. Notably, my estimate for education attainment dropped slightly. This may suggest that persons who graduated high school but received no collegiate education were oversampled in the 2011 ACS.

Next, I estimate the headcount ratio, average deprivation share, and MPI for each secondary threshold level for both Dhongde and Haveman and my specifications treating the sample as unweighted and weighted for each. I report these results in Table 2. Recall, column 1 precisely replicates Dhongde and Haveman's findings (with some exception for housing burden) while col-

umn 2 replicates their specification treating the sample as weighted. With consideration to $k = 1$, the inclusion of sample weights increases the estimated proportion of poor persons from 0.4238 to 0.4521 (6.7 percent increase from the original estimate). That is, the disuse of sample weights resulted in the misidentification of approximately 6.5 million poor people as non-poor. In terms of the MPI, the inclusion of sample weights increased the overall deprivation proportion from 0.095 to 0.1045. Notably, as the secondary threshold level increases (especially for levels 6-8) the difference between the unweighted and weighted estimates decreases. This may suggest either that the most deprived poor persons are well-sampled in the 2011 ACS or perhaps misrepresented in both weighted and unweighted samples. Turning to column 3, which estimates my specification while treating the sample as unweighted, the headcount ratio is nearly twice as high for the first four secondary threshold levels. Selecting $k = 1$ yields an estimate of the poor population proportion of 0.7215. That is, my specification identifies nearly three-quarters of the population as poor such that poverty is defined by deprivation in at least one of the dimensions I assess. Furthermore, the inclusion of sample weights increases my estimates for the first six threshold levels of the headcount ratio. Notably, the difference between estimates for my specification and Dhongde and Haveman's fade when the secondary threshold is set at six or above. Regarding the MPI, my specification increases estimates of the unweighted sample from 0.095 to 0.1685 for $k = 1$. Similar to the headcount ratio, estimates of my specification of the MPI are nearly twice that of Dhongde and Haveman's for secondary thresholds less than five. Similarly, the gap shrinks for thresholds set six and above. However, for the first six thresholds the inclusion of sample weights increases my estimates (up to 0.1771 for $k = 1$). The interpretation of my preferred MPI estimate for the weighted sample is that about 18 percent of all possible deprivations are experienced by those identified as poor in 2011. Notice, estimates of the average deprivation share for my specification were very similar to Dhongde and Haveman's. This would suggest that while my specification produces a much higher MPI, this seems to be driven by counting more people as poor than Dhongde and Haveman rather than counting the same poor people as more deprived. Nevertheless, the consistency of the average deprivation share between our specifications would suggest that the new people who I'm identifying as poor are about as deprived as the people who were previously considered poor. This may suggest that my results are not purely driven by, for example, changing the threshold of education attainment such that almost four times as many people are considered deprived here. To the extent that one might be concerned that mis-specification in just one of my dimensions (i.e., a poorly selected threshold level) would produce error in collaboration with

$k = 1$, then these results might mitigate those concerns.

Thereafter, I repeat my estimations from Table 1 and 2 in Tables 3 and 4, respectively, using ACS data from 2015. Again, I drop any person living in group-quarters or under the age of 18 from my sample. I report results of my specification treating the sample as weighed in column 4 of Table 3. Although all estimates are lower than in 2011, the gap between my weighted estimates and Dhongde and Haveman's is relatively unchanged. For the 2015 sample, my highest estimate is on education attainment (0.4694 compared to Dhongde and Haveman's 0.1086). In other words, I find that about thirty-seven percent more people are deprived in terms of education using my specification than Dhongde and Haveman's. My second highest estimate is housing burden (0.2983 relative to Dhongde and Haveman's 0.1383). That is, I find that more than twice as many people are deprived in terms of housing burden than Dhongde and Haveman. Notably, the household technology dimension now includes whether a household has access to Internet or a computer (in addition to a refrigerator or telephone). Consequently, I now find that about twenty-two percent of people are deprived in terms of household technology compared to my estimate of two-and-a-half percent using 2011 data. My estimates of the headcount ratio, average deprivation share, and MPI using my specification for the 2015 weighted sample are presented in Table 4, column 4. For $k = 1$, I find that the proportion of poor people has decreased since 2011 to 0.7200 (previously 0.7310). Nevertheless, my specification produces estimates that are about twice as high as Dhongde and Haveman's, which would find the headcount ratio to be 0.3995 in 2015 if they treated the sample as weighted. However, I do find that the average deprivation share has increased from 0.2422 in 2011 to 0.2535 in 2015. The interpretation on the 2015 estimate is that the average poor person experiences about twenty-five percent of the deprivations they could experience (i.e., deprivation in about two dimensions). Finally, my estimates of the MPI find that about eighteen percent of the possible deprivations are experienced by the poor, which is slightly greater than my 2011 estimate of 0.1771. The increase of the MPI seems to be driven by poor people experiencing more deprivations than before rather than more people being identified as poor. To the extent that this may be driven by expanding the household technology as I have, then this may suggest that the additional people being identified as deprived in relation to Internet or computer access were already considered deprived in some other dimension. Having established these baseline national estimates of the headcount ratio, average deprivation share, and MPI I will now offer some further analysis by examining these estimates at state levels.

First, I display estimates of my preferred ($k = 1$) specification by state in Figures 1-3. As

seen in Figure 1, estimates of my headcount ratio seem to be higher in southern states, with my highest estimates (binned 0.764-0.780) for Louisiana, Arkansas, Mississippi, West Virginia, and Nevada. In contrast, my lowest estimates (binned 0.622 - 0.650) in Massachusetts, New Hampshire, Minnesota, and North Dakota. Notably, an F test of these estimates reveals that there is statistically significant variation across states; although, in all states my results are alarmingly high (i.e., they indicate that the states with lowest poor proportions still have more than half of their residents identified as poor by my specification). Figure 2 depicts my estimates of the average deprivation share, and like the headcount ratio southern states seem to have higher estimates. In fact, the results suggest that poor persons in southern states experience at least two deprivations on average (with slightly lower estimates in northern states); although New York is a notable outlier relative to its neighbors. My state estimates of the MPI, shown in Figure 3, follow as expected from those in Figures 1 and 2. The higher estimates are generally clustered in southern states especially Texas, Louisiana, Mississippi, etc. where poor persons experience about twenty percent of all possible deprivation. Although an F test finds statistically significant variation across states, the MPI is persistently high in all states given that in states with lowest estimates (e.g., Minnesota) about 14 percent of all possible deprivations are experienced by the poor.

To get a better picture of poverty in the US, I decompose all of my state-level 2015 estimates of my preferred specification by sex, race, and age. In Figures 4-12, I examine decomposition by sex looking at headcount ratios in Figures 4-6, average deprivation share in Figures 7-9, and MPI in Figures 10-12. Figures 4, 7, and 10 reflect my estimates, Figures 5, 7, and 11 reflect my estimates for males, and Figures 6, 9, and 12 display the difference between these estimates (female - male). I'll limit my interpretation to the sex difference of my estimates. From examining Figure 6, it would appear that coastal states seem to have higher headcount ratios for women rather than men (with the greatest difference of these being 0.039). In contrast, states in the center of the US (e.g., Missouri, Kansas, etc.) have differences favoring women such that at their worst men have poor proportions that are 6.8 percent higher than women. Note: I do find that these differences are statistically significant. Interestingly, my estimates of the average deprivation share differences (shown in Figure 9) tell a different story. Although women have greater poor proportions than men in coastal states, the average poor woman experiences more deprivations than the average poor man in central states (with the greatest difference being about 1 percent). Turning attention to Figure 12, my findings suggest that in coastal states poor men experience a greater proportion of all deprivations than poor women. The greatest MPI difference by sex is about 2

percent favoring women.

Next, in Figures 13-21, I similarly decompose my estimates by race. Specifically I compare estimates of black and nonblack persons. In Figure 15, I report my estimates of race differences (black - nonblack) for the headcount ratio. Notably, I find that, especially in Northeast and Midwest states, black poor proportions are 13-31 percent higher than nonblack poor proportions. These are large and statistically significant differences. These results are consistent with racial difference in average deprivation share, shown in Figure 18. Again, Northeast and Midwest states report difference between 33 and about 13 percent of deprivations experienced by the poor for blacks versus nonblacks. Together these results suggest that blacks in Northeast and Midwest states not only experience poverty more often but that poverty involves more deprivation than for nonblacks. In fact, in some states the difference of average deprivation share is about one more dimension. The racial differences in MPI are consistent with these results (shown in Figure 21) with Northeast and Midwest states having blacks experience about 5 to 18 percent of all deprivations more than nonblacks. Recall, I estimate a national MPI of only about 18 percent, which suggests that this racial difference is economically significant.

Finally, I decompose my estimates by age, reporting these results similarly in Figures 22-30. Specifically, I compare persons aged 18-64 and persons aged 65 and older. For simplicity, I'll refer to the former as a "younger" group and the latter as an "older" group. Figure 24 shows the difference in poor proportion between these younger and older group (younger - older). I find that the older group has a higher proportion than the younger group in all states, with coastal states reporting the lowest of these differences (about 3 to 10 percent) and central states reporting the greatest gap (about 12-18 percent). Examining the age difference in average deprivation share (Figure 27)finds that western and southern states seem to have results favoring the older group (difference of about 0 to 2 percent) and Midwest and Northeastern states favoring younger groups (difference of about 11 to 4 percent). In looking at the MPI age differences (shown in 30), I find that older persons in Midwest and Northeast states experience 3 to 7 percent more of all deprivations than younger persons. These results are large and statistically significant. One might be concerned that an age gap may be driven by the household technology variable, particularly due to "older" persons choosing to not use computers or the Internet. This is a credible concern particularly since choosing to not use these technology might suggest that this doesn't perfect proxy for capability. However, finding that the age gap is not the same across states is significant because it seems to suggest that the gap isn't driven by household technology.

My decomposition analysis finds statistically significant gaps by sex, race, and age that vary across states using my preferred specification with $k = 1$. However, one might be concerned that these gaps might only exist for this particular threshold. To mitigate this concern, I estimate national differences of sex, race, and age for the headcount ratio, average deprivation share, and MPI at all eight secondary threshold levels, depicted in Tables 5-7. I find that the gaps in headcount ratio are statistically significant across all threshold levels (except $k = 8$ where $H = 0$). Notably the gaps for sex and race diminish as k increases, although the gap continues to favor females and nonblacks for all thresholds. However, for $k > 3$ the age gap reverses such that the older group is then favored. Notably, the age gap is at most 1 percent when it favors the older group (as opposed to 9 percent when it favors the younger group). This suggest that poverty is less common nationally in older groups than younger groups when poverty constitutes more than three deprivations. Table 6 presents the differences in average deprivation share. I find that the sex gap for average deprivation share is statistically significant for $k < 5$ and it actually increases with k slightly. For race, the gap switches for $k > 2$ such that nationally nonblacks have average deprivation share 1 percent higher than blacks for $k = 4$. For age, the gap in average deprivation share favors the younger group for $k = 1$ but for all other k the gap is greater and favors the older group. Finally, Table 7 report my findings for the MPI. The sex gap for the MPI is fairly consistent across all k and statistically significant. The race gap is large and statistically significant favoring nonblacks for $k \leq 5$ and for other k is very small. The age gap is about 2 percent higher for the older group for $k \leq 2$, although I find statistically significant and small gaps favoring the older group for all other k. My results from examining these gaps for other secondary threshold levels suggest that interpreting the sex or race gap is not very dependent on the selection of k. That is, limiting the identification of poverty to more deprivation does not change the direction of these gaps although it does diminish. Regarding the age gap, it would seem that selection of k is important for the direction of the gap; although, the magnitude of the gap for larger k (when it favors the older group) is fairly small which may suggest it is not economically significant.

6 Conclusion

In this paper, I begin by exploring poverty from the capability perspective established by Amartya Sen and refined by Martha Nussbaum. I utilize the multidimensional measurement framework constructed by Alkire and Foster (2011) and build upon an application of this frame-

work to the US from Dhongde and Haveman (2015). My contributions to the literature include correcting Dhongde and Haveman's disuse of sample weights for the ACS one percent samples, as well as constructing a more robust specification of the MPI. My specification of the MPI explores eight dimensions, which I link to Nussbaum's central capabilities: health insurance coverage, disability status, education attainment, English proficiency, employment, crowded housing, housing burden, and household technology. Notably, I exclude poverty status as defined by the OPM thresholds from my specification unlike Dhongde and Haveman. Furthermore, I provide reasonably sufficient justification for my selection of the primary thresholds associated with each of these dimensions, thereby allowing me to choose $k = 1$ for the secondary threshold level. Consequently, my specification is a preferable alternative to both the Official Poverty Measurement (OPM) as well as Dhongde and Haveman's specification of the MPI.

In addition, I begin the work of describing poverty in the United States in the penultimate section of this paper. In summary, by estimating my preferred specification with $k = 1$, I've found that about 72 percent of Americans are poor (i.e., deprived in at least one of my eight dimensions), the average poor person experiences about 25 percent of the poor's deprivations, and the average poor person experiences about 18 percent of all possible deprivations. My findings offer at least four striking takeaways. First, my estimates suggest that poverty as capability deprivation is drastically more prevalent than traditional poverty measured with a unidimensional approach (e.g., OPM) or a mis-specified multidimensional approach (e.g., Dhonge and Haveman's). Second, my estimates vary significantly across states and suggest that while more severe poverty is clustered in the South, northern states have persistently high poverty measures. Third, I find large and statistically significant sex, race, and age gaps within states that also vary across states. The largest race and age gaps appear to be predominantly clustered in Midwest and Northeast states. Fourth, the sex and race gaps are not particularly sensitive to changes in k; although, the age gap diminishes and even reverses for larger k.

In closing, I'll offer a few notes on future research. Although I believe I've offered the most robust poverty measurement available, it can be improved upon. Several of the dimensions I include have ample room for more refined threshold selection based on further research, especially health insurance coverage, education attainment, disability status, and employment. In addition, future work should seek to expand on my specification by including dimensions that pertain to other capabilities. Furthermore, although my assessment of poverty was limited to the use of ordinal and cardinal data, improvements in data collection could allow for utilizing normalized

deprivation gap and squared gap aggregation methods that preserve information about severity of deprivation. Recall, I weight every dimension of my specification equally (i.e., $\delta = 1$) in my specification; however, more refined qualitative analysis of well-being and dignity might allow for more precisely selecting these weights in the future. Although my empirical findings were descriptive, future work should seek to disentangle the determinants of poverty as capability deprivation, especially the sex, race, and age gaps that I find.

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Appendix

Table 1: Nationally Estimated Dimension-Specific Deprivation Proportions, 2011

Dimension:	Dhongde & Haveman (Unweighted)	Dhongde & Haveman (Weighted)	Juneau (Unweighted)	Juneau (Weighted)
Health Insurance Coverage	0.1466	0.1754	0.1466	0.1754
Disability Status	0.0812	0.0738	0.1624	0.1467
Education Attainment	0.1177	0.1219	0.4996	0.4903
English Proficiency	0.0402	0.0482	0.0463	0.0555
Poverty Status	0.1262	0.1372	N/A	N/A
Employment Status	0.0595	0.0657	0.0595	0.0657
Housing Costs	0.1430	0.1593	0.3091	0.3381
Crowded House	0.0455	0.0547	0.0998	0.1194
Household Technology	N/A	N/A	0.0248	0.0254
N	2,281,496	2,281,496	2,281,496	2,281,496

Table 2: Nationally Estimated Headcount Ratio, Average Deprivation Share, and MPI, 2011

	Dhongde & Haveman (Unweighted)	Dhongde & Haveman (Weighted)	Juneau (Unweighted)	Juneau (Weighted)
Headcount Ratio				
k=1 (Preferred)	0.4238	0.4521	0.7215	0.731
k=2	0.2069	0.2308	0.3929	0.4151
k=3	0.089	0.1035	0.167	0.1884
k=4	0.031	0.0377	0.0532	0.0647
k=5	0.0079	0.0101	0.0121	0.0154
k=6	0.0014	0.0018	0.0013	0.0017
k=7	0.0001	0.0002	0.0001	0.0001
k=8	0	0	0	0
Avg. Dep. Share				
k=1 (Preferred)	0.2241	0.2312	0.2336	0.2422
k=2	0.3281	0.333	0.3244	0.3314
k=3	0.4315	0.4351	0.425	0.4293
k=4	0.5374	0.54	0.5317	0.5333
k=5	0.6487	0.6497	0.6394	0.6394
k=6	0.7599	0.7604	0.7558	0.7558
k=7	0.876	0.876	0.8759	0.8763
k=8	1	1	1	1
MPI				
k=1 (Preferred)	0.095	0.1045	0.1685	0.1771
k=2	0.0679	0.0769	0.1274	0.1376
k=3	0.0384	0.045	0.071	0.0809
k=4	0.0166	0.0203	0.0283	0.0345
k=5	0.0051	0.0065	0.0077	0.0099
k=6	0.001	0.0014	0.001	0.0013
k=7	0.0001	0.0001	0.0001	0.0001
k=8	0	0	0	0
N	2,281,496	2,281,496	2,281,496	2,281,496

Table 3: Nationally Estimated Dimension-Specific Deprivation Proportions, 2015

Dimension:	Dhongde & Haveman (Unweighted)	Dhongde & Haveman (Weighted)	Juneau (Unweighted)	Juneau (Weighted)
Health Insurance Coverage	0.0852	0.1076	0.0852	0.1076
Disability Status	0.0792	0.0748	0.1629	0.1510
Education Attainment	0.0990	0.1086	0.4671	0.4694
English Proficiency	0.0357	0.0440	0.0410	0.0508
Poverty Status	0.1084	0.1212	N/A	N/A
Employment Status	0.0346	0.0395	0.0346	0.0395
Housing Costs	0.1223	0.1383	0.2693	0.2983
Crowded House	0.0456	0.0553	0.1019	0.1233
Household Technology	N/A	N/A	0.2089	0.2202
N	2,348,374	2,348,374	2,348,374	2,348,374

Table 4: Nationally Estimated Headcount Ratio, Average Deprivation Share, and MPI, 2015

	Dhongde & Haveman (Unweighted)	Dhongde & Haveman (Weighted)	Juneau (Unweighted)	Juneau (Weighted)
Headcount Ratio				
k=1 (Preferred)	0.3661	0.3995	0.7038	0.7200
k=2	0.1602	0.1855	0.3961	0.4221
k=3	0.0609	0.0744	0.1846	0.2085
k=4	0.0182	0.0236	0.0663	0.0819
k=5	0.004	0.0055	0.0167	0.0229
k=6	0.0006	0.0008	0.003	0.0044
k=7	0	0	0.0002	0.0003
k=8	0	0	0	0
Avg. Dep. Share				
k=1 (Preferred)	0.2083	0.2157	0.2434	0.2535
k=2	0.3153	0.3203	0.3355	0.3441
k=3	0.4219	0.4254	0.4334	0.4406
k=4	0.5315	0.534	0.5375	0.542
k=5	0.6438	0.6446	0.6485	0.6505
k=6	0.7566	0.7562	0.7583	0.7583
k=7	0.8768	0.8797	0.8795	0.8793
k=8	1	1	1	1
MPI				
k=1 (Preferred)	0.0763	0.0862	0.1713	0.1825
k=2	0.0505	0.0594	0.1329	0.1453
k=3	0.0257	0.0316	0.08	0.0919
k=4	0.0097	0.0126	0.0356	0.0444
k=5	0.0026	0.0036	0.0109	0.0149
k=6	0.0004	0.0006	0.0022	0.0033
k=7	0	0	0.0002	0.0002
k=8	0	0	0	0
N	2,348,374	2,348,374	2,348,374	2,348,374

Table 5: Estimated National Headcount Ratio Decomposed by Sex, Race, and Age at Varying Secondary Thresholds, 2015

Threshold Level	Full Sample	Female	Male	Difference	Black	Nonblack	Difference	18-64	65+	Difference
k=1 (Preferred)	0.7200	0.7173	0.7229	-0.0056***	0.8172	0.7069	0.1103***	0.7032	0.7907	-0.0875***
k=2	0.4221	0.4208	0.4235	-0.0027***	0.5556	0.4040	0.1516***	0.4042	0.4971	-0.0929***
k=3	0.2085	0.2081	0.2090	-0.0009	0.3061	0.1953	0.1108***	0.2027	0.2329	-0.0302***
k=4	0.0819	0.0799	0.0840	-0.0041***	0.1182	0.0769	0.0413***	0.0840	0.0728	0.0112***
k=5	0.0229	0.0212	0.0246	-0.0034***	0.0245	0.0226	0.0019***	0.0254	0.0120	0.0134***
k=6	0.0044	0.0040	0.0047	-0.0007***	0.0030	0.0045	-0.0015***	0.0051	0.0013	0.0038***
k=7	0.0003	0.0003	0.0003	0	0.0002	0.0003	-0.0001*	0.0003	0.0001	0.0002***
k=8	0	0	0	0	0	0	0	0	0	0
N	2,348,374	1,232,499	1,115,875		224,189	2,124,185		1,795,928	552,446	

Table 6: Estimated National Avg. Deprivation Share Decomposed by Sex, Race, and Age at Varying Secondary Thresholds, 2015

Threshold Level	Full Sample	Female	Male	Difference	Black	Nonblack	Difference	18-64	65+	Difference
k=1 (Preferred)	0.2535	0.2529	0.254	-0.0011***	0.2791	0.2495	0.0296***	0.2533	0.2540	-0.0007**
k=2	0.3441	0.3431	0.3452	-0.0021***	0.3519	0.3427	0.0092***	0.3482	0.3302	0.018***
k=3	0.4406	0.4383	0.443	-0.0047***	0.4346	0.4418	-0.0072***	0.4459	0.4213	0.0246***
k=4	0.5420	0.5399	0.5442	-0.0043***	0.5293	0.5447	-0.0154***	0.5459	0.523	0.0229***
k=5	0.6505	0.6502	0.6507	-0.0005	0.6415	0.6517	-0.0102***	0.6517	0.6392	0.0125***
k=6	0.7583	0.7580	0.7585	-0.0005	0.7591	0.7582	0.0009	0.7584	0.756	0.0024**
k=7	0.8793	0.8786	0.8798	-0.0012	0.8794	0.8793	0.0001	0.8795	0.8750	0.0045***
k=8	1	1	1	0	1	1	0	1	0	1
N	2,348,374	1,232,499	1,115,875		224,189	2,124,185		1,795,928	552,446	

Table 7: Estimated National MPI Decomposed by Sex, Race, and Age at Varying Secondary Thresholds, 2015

Threshold Level	Full Sample	Female	Male	Difference	Black	Nonblack	Difference	18-64	65+	Difference
k=1 (Preferred)	0.1825	0.1814	0.1836	-0.0022***	0.2281	0.1763	0.0518***	0.1781	0.2009	-0.0228***
k=2	0.1453	0.1444	0.1462	-0.0018***	0.1954	0.1385	0.0569***	0.1408	0.1641	-0.0233***
k=3	0.0919	0.0912	0.0926	-0.0014***	0.133	0.0863	0.0467***	0.0904	0.0981	-0.0077***
k=4	0.0444	0.0431	0.0457	-0.0026***	0.0626	0.0419	0.0207***	0.0459	0.0381	0.0078***
k=5	0.0149	0.0138	0.0160	-0.0022***	0.0157	0.0148	0.0009***	0.0166	0.0077	0.0089***
k=6	0.0033	0.0030	0.0036	-0.0006***	0.0023	0.0034	-0.0011***	0.0039	0.0010	0.0029***
k=7	0.0002	0.0002	0.0003	-0.0001*	0.0002	0.0003	-0.0001*	0.0003	0.0001	0.0002***
k=8	0	0	0	0	0	0	0	0	0	0
N	2,348,374	1,232,499	1,115,875		224,189	2,124,185		1,795,928	552,446	

Figure 1:
Headcount Ratio by State, 2015

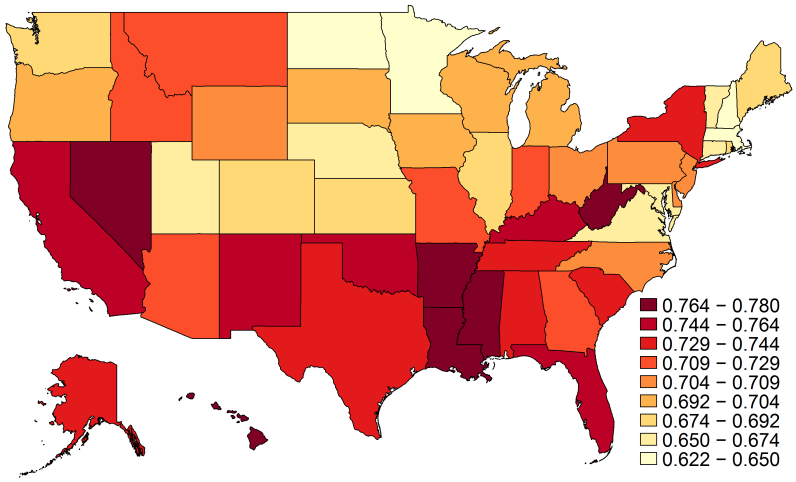

Figure 2:
Average Deprivation Share by State, 2015

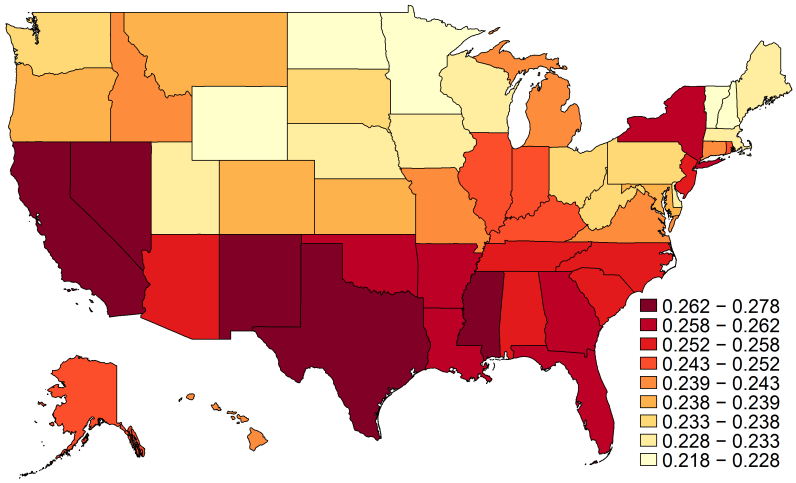

Figure 3:
MPI by State, 2015

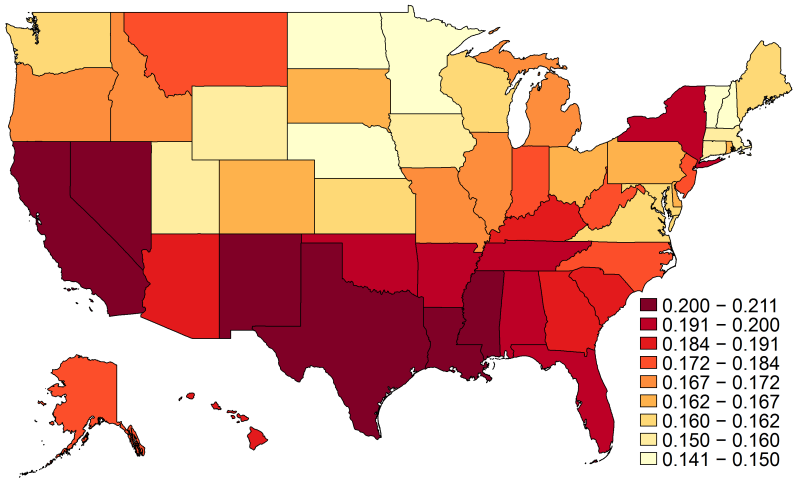

Figure 4:
Headcount Ratio for Females by State, 2015

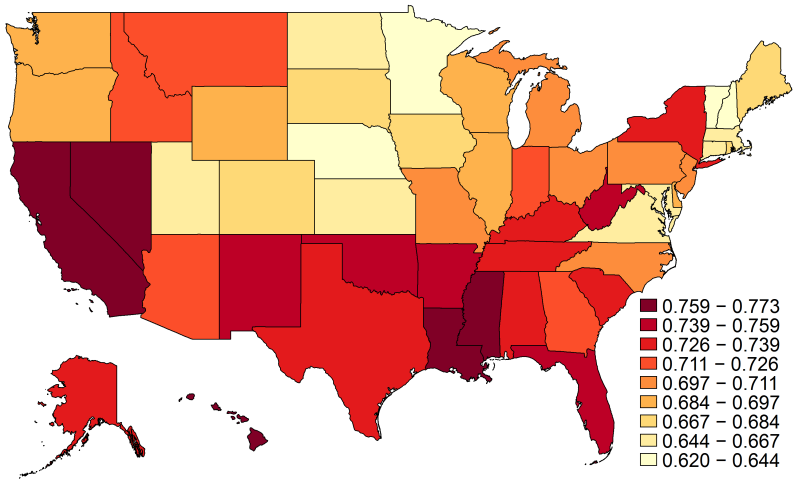

Figure 5:
Headcount Ratio for Males by State, 2015

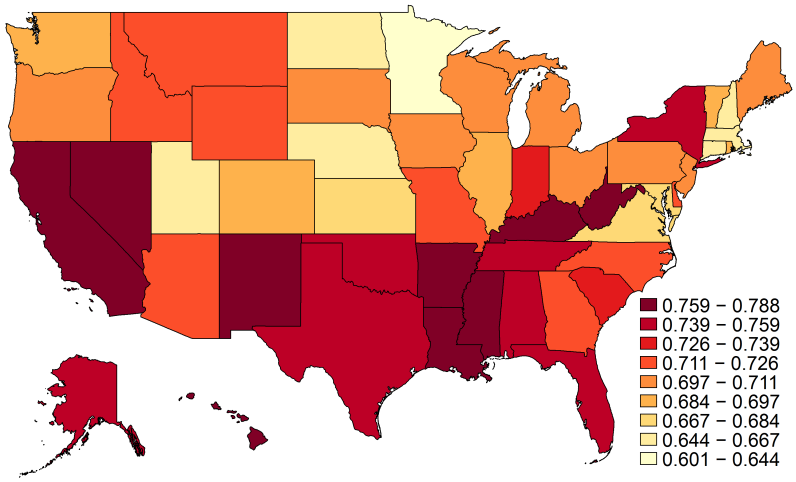

Figure 6:
Headcount Ratio Difference by Sex (Female - Male) and State, 2015

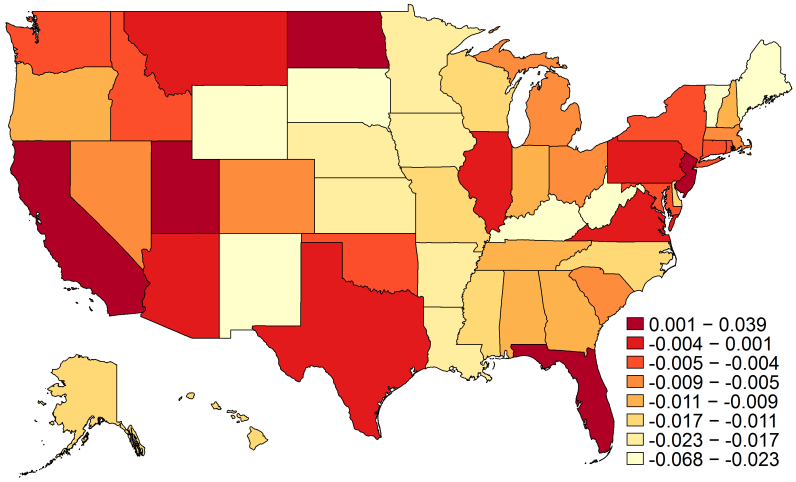

Figure 7:
Average Deprivation Share for Females by State, 2015

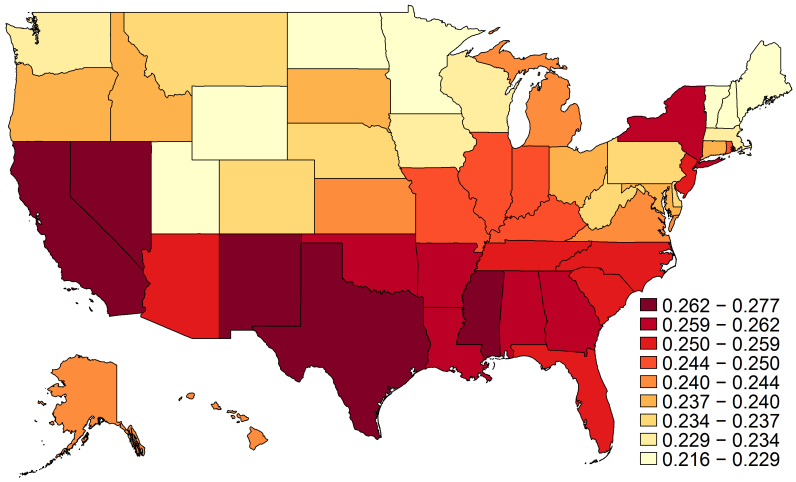

Figure 8:
Average Deprivation Share for Males by State, 2015

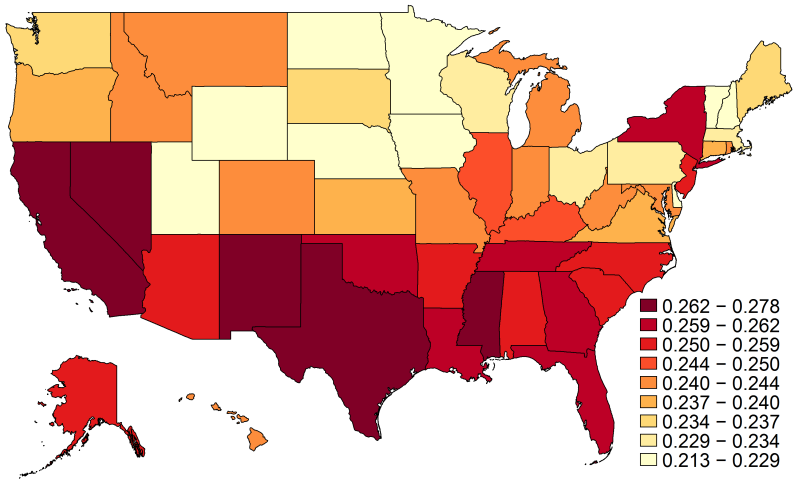

Figure 9:

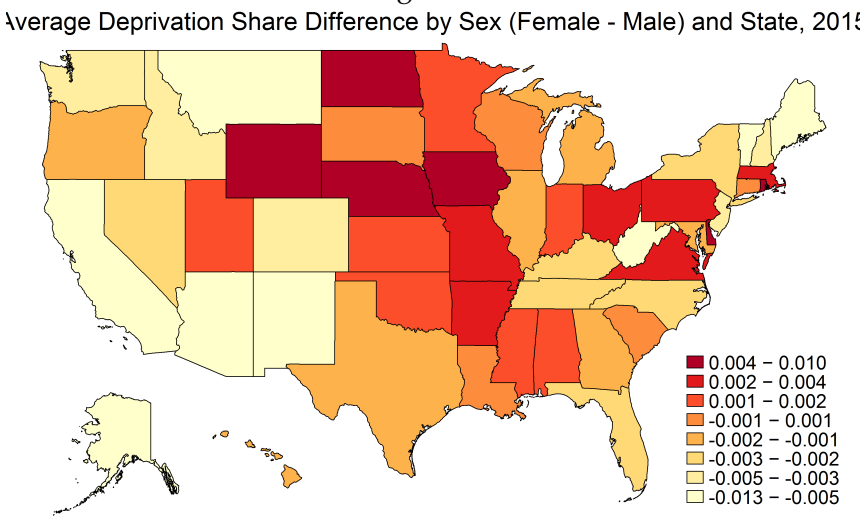

Figure 10:

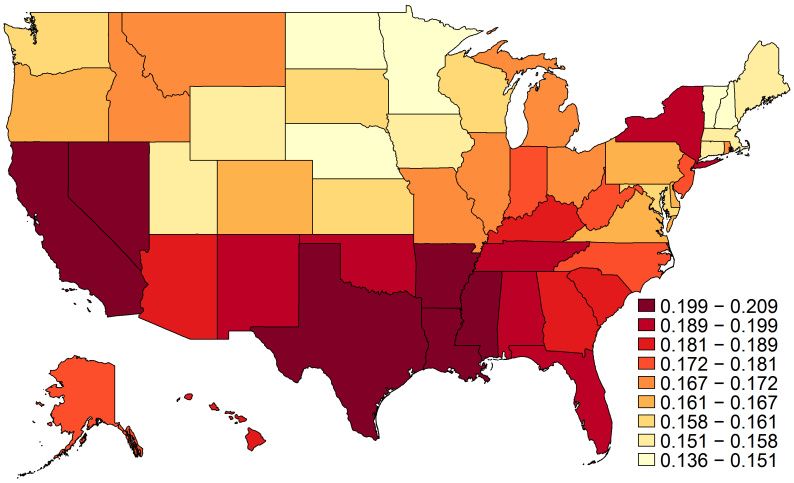

Figure 11:
MPI for Males by State, 2015

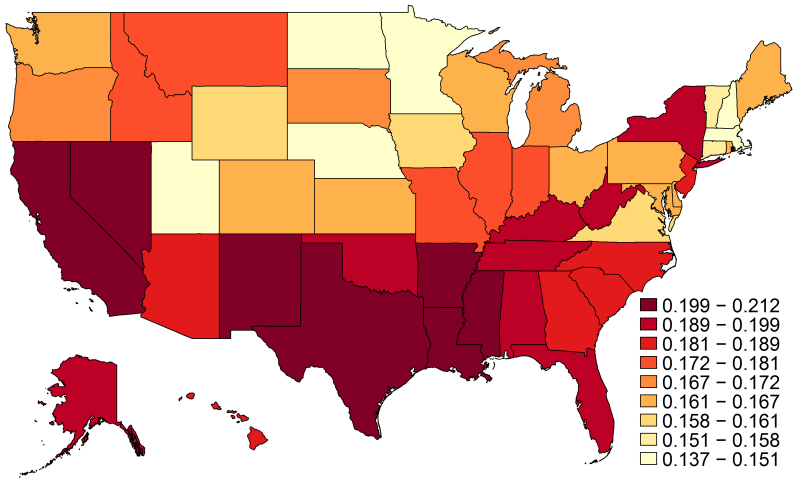

Figure 12:
MPI Difference by Sex (Females - Males) and State, 2015

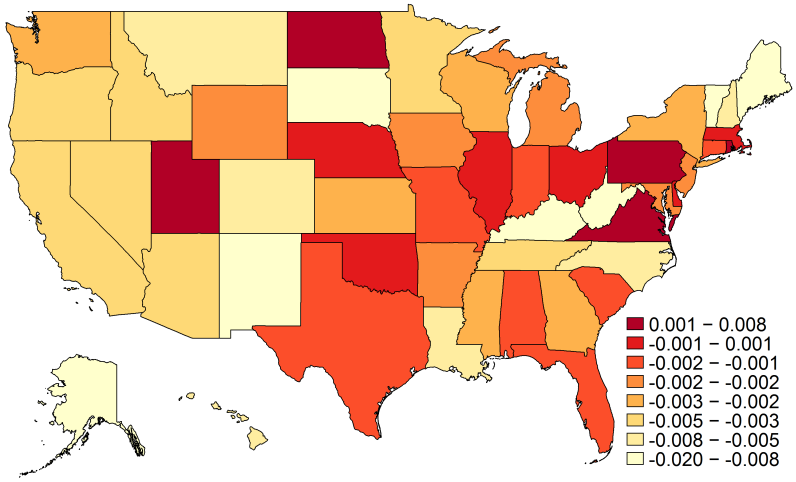

Figure 13:

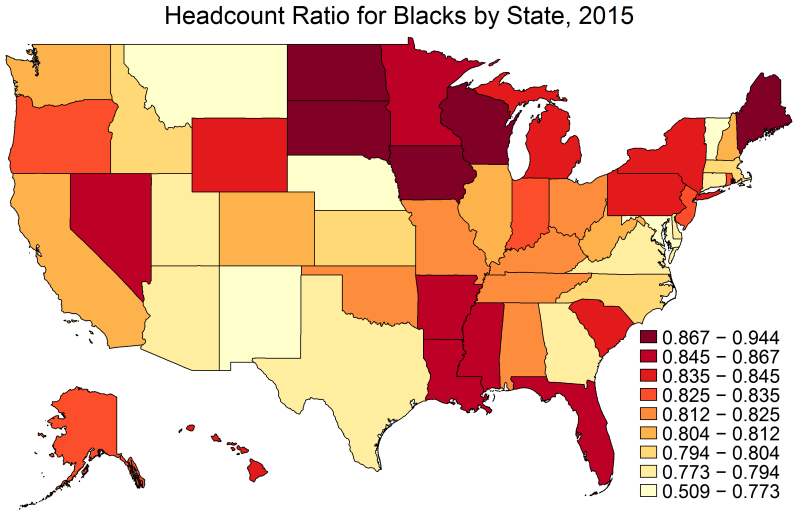

Figure 14:

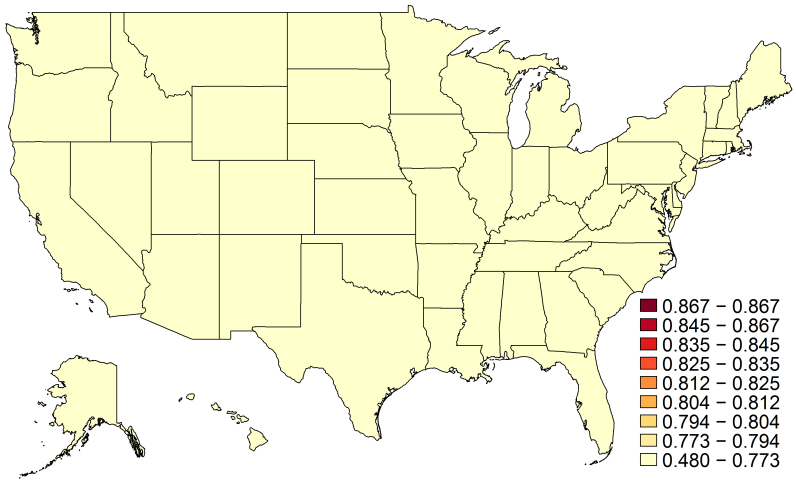

Figure 15:
Headcount Ratio Difference by Race (Blacks - Nonblacks) and State, 2015

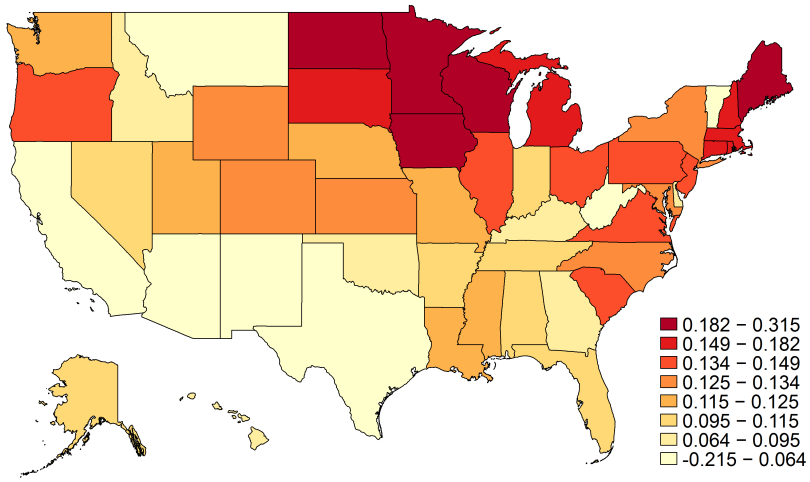

Figure 16:
Average Deprivation Share for Blacks by State, 2015

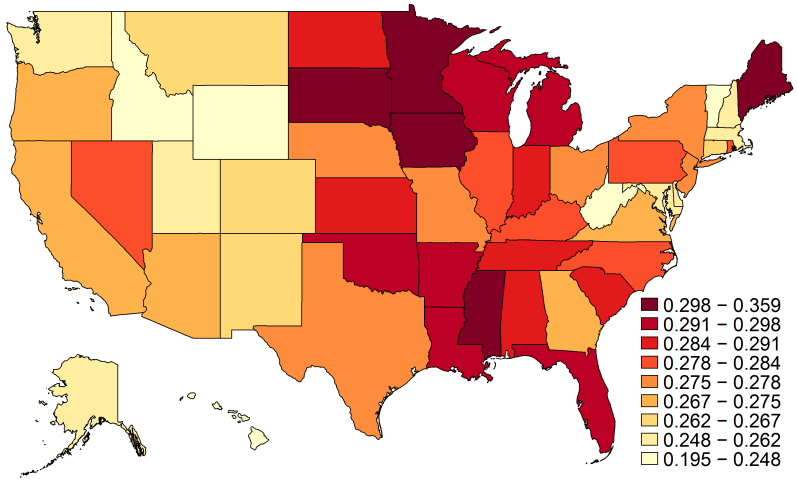

Figure 17:
Average Deprivation Share for Nonblacks by State, 2015

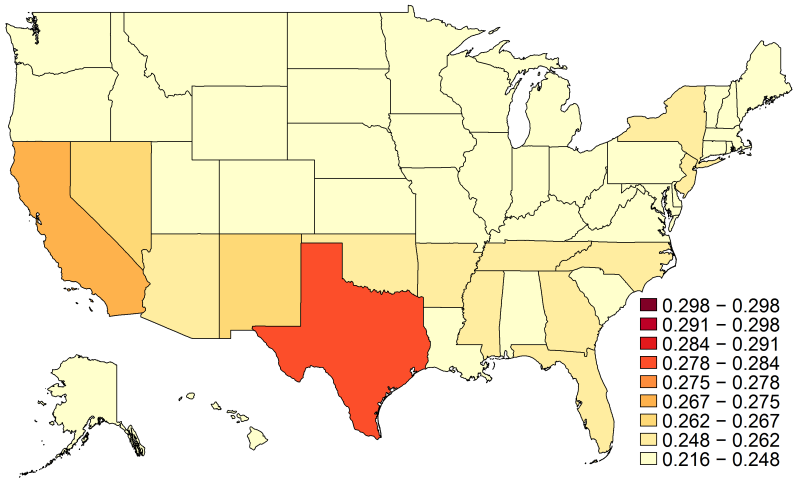

Figure 18:
rage Deprivation Share Difference by Race (Blacks - Nonblacks) and State, 2

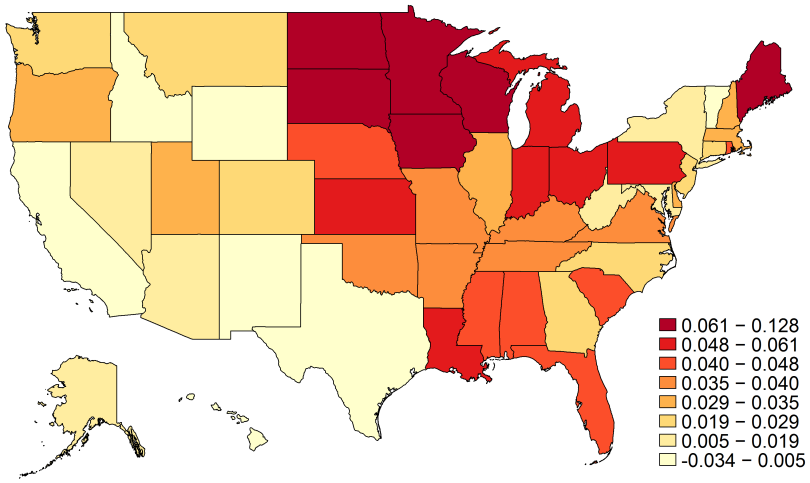

Figure 19:
MPI for Blacks by State, 2015

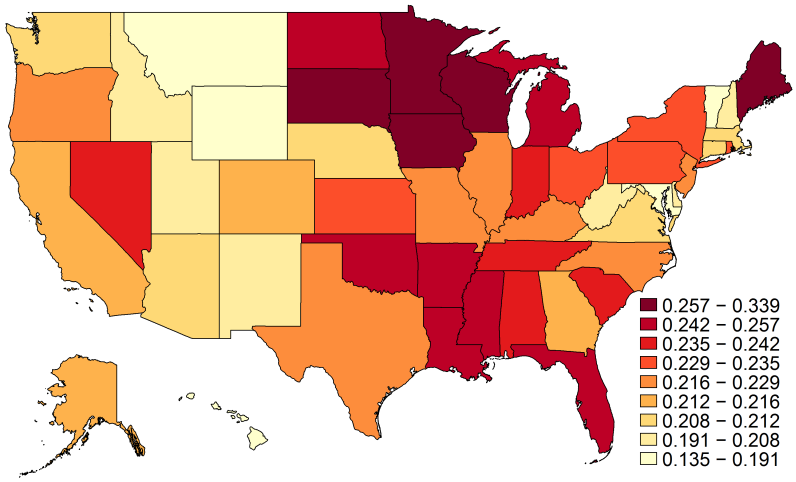

Figure 20:
MPI for Nonblacks by State, 2015

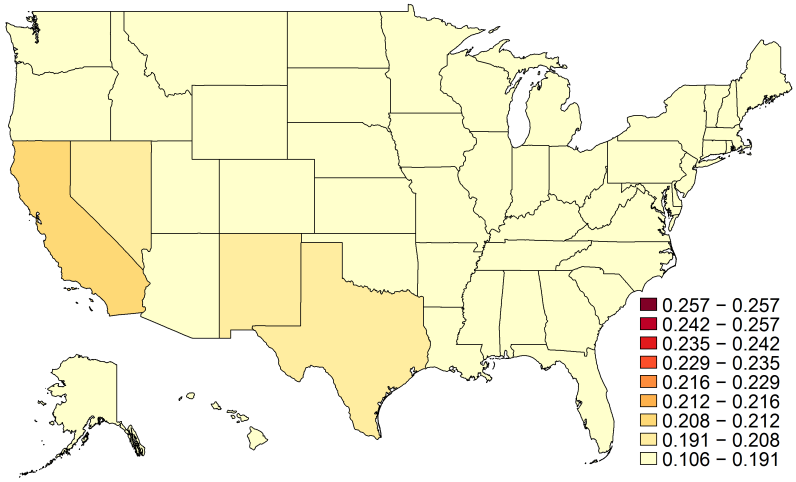

Figure 21:
MPI Difference by Race (Blacks - Nonblacks) and State, 2015

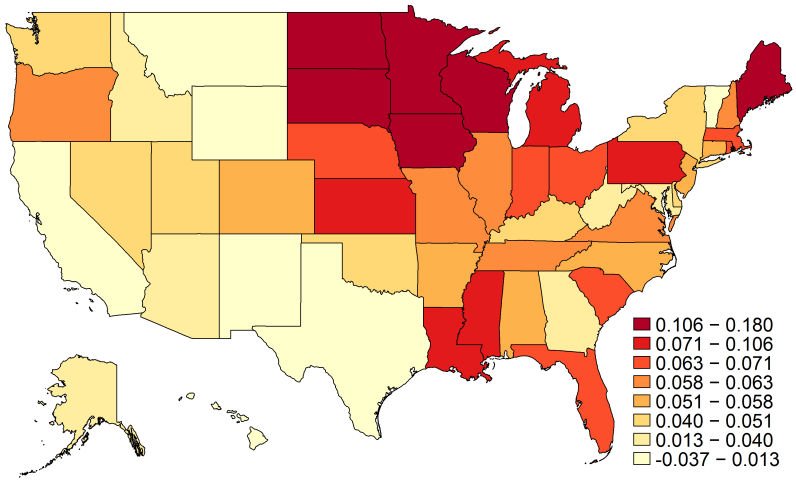

Figure 22:
Headcount Ratio for Persons Aged 18-64 by State, 2015

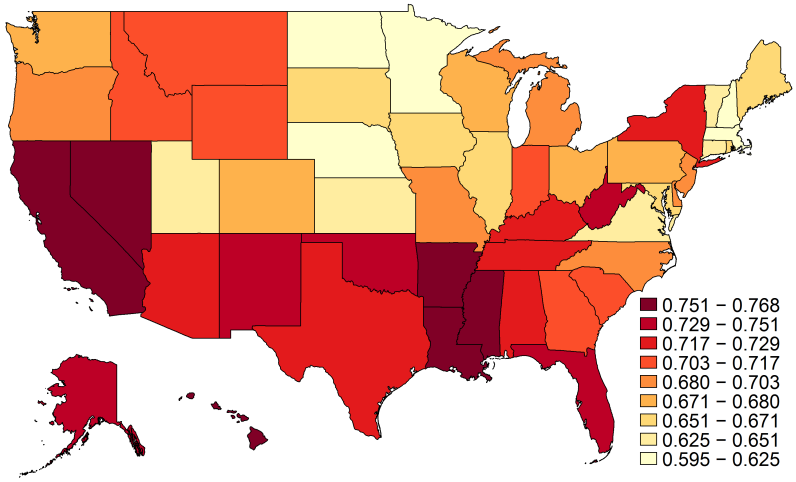

Figure 23:
Headcount Ratio for Persons Aged 65+ by State, 2015

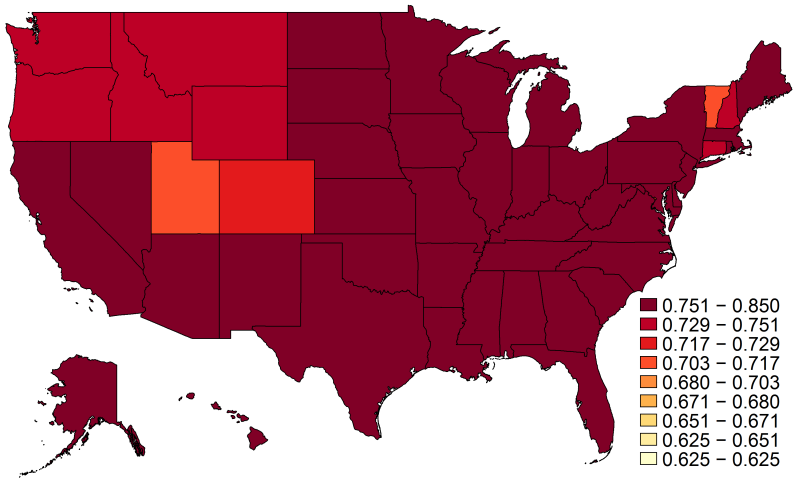

Figure 24:
Headcount Ratio Difference by Age (Young - Old) and State, 2015

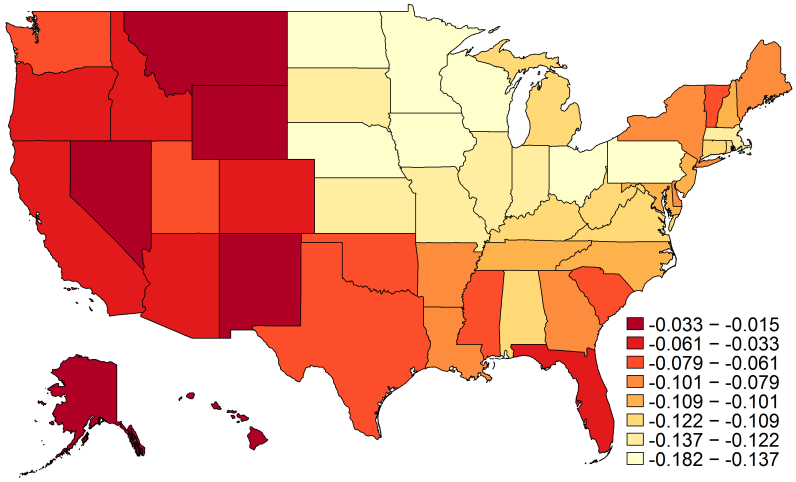

Figure 25:
Average Deprivation Share for Persons Aged 18-64 by State, 2015

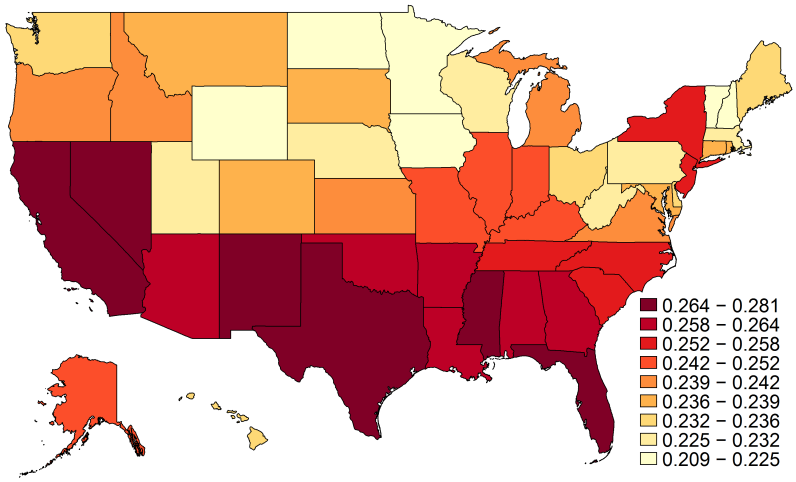

Figure 26:
Average Deprivation Share for Persons Aged 65+ by State, 2015

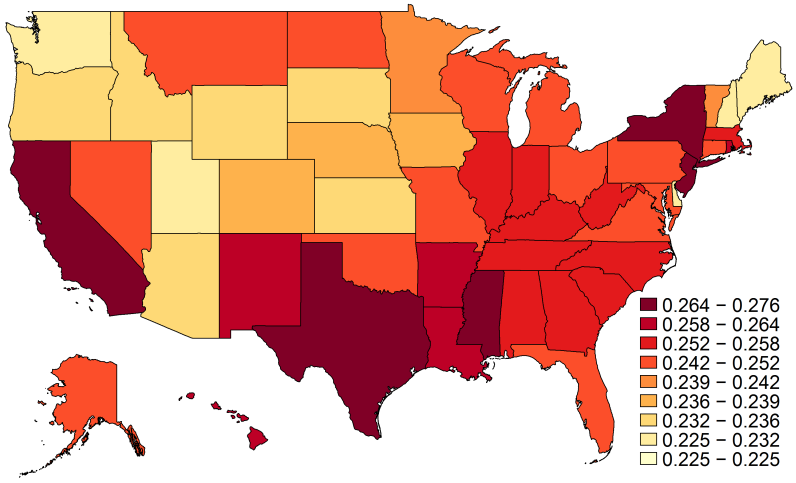

Figure 27:
Average Deprivation Share Difference by Age (Young - Old) and State, 2015

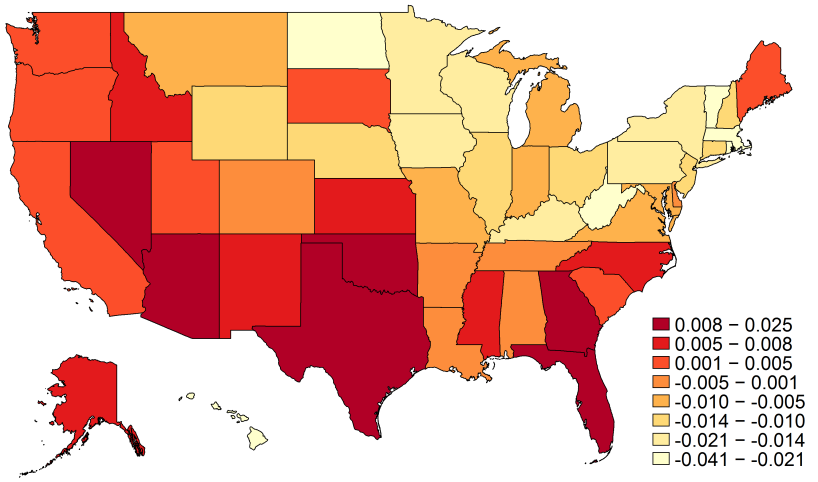

Figure 28:
MPI for Persons Aged 18-64 by State, 2015

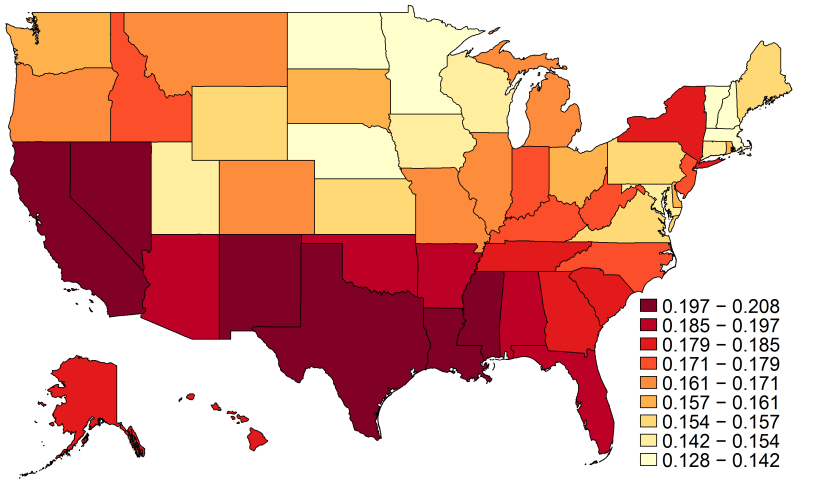

Figure 29:
MPI for Persons Aged 65+ by State, 2015

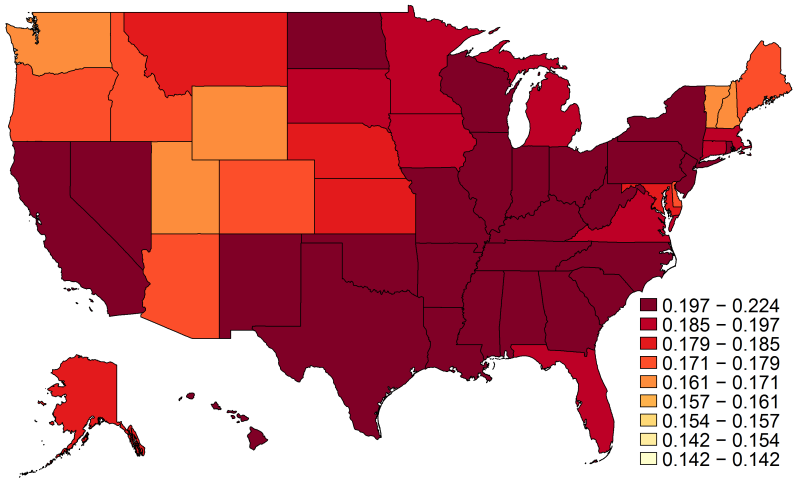

Figure 30:
MPI Difference by Age (Young - Old) and State, 2015