Measuring the Impact of Health Reform on Poverty:
A Pilot Health Inclusive Poverty Measure for Massachusetts

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Abstract

Demographers and other social scientists often investigate relationships among poverty, demographic characteristics and population health, and conduct research on health and social policies. Such research requires a valid measure of poverty. The Affordable Care Act (ACA) brought a major expansion of the US welfare state and holds promise to reduce deprivation. Yet the US Census Bureau's Official Poverty Measure (OPM) and Supplemental Poverty Measure (SPM) cannot show the direct impact of health policies such as the ACA on poverty; Census' poverty measures neither include health care/insurance among the poor's "basic needs" nor count health insurance benefits as resources available to meet those needs. We show that health reforms enable construction of the first valid Health Inclusive Poverty Measure (HIPM). Building on the SPM, we construct a pilot HIPM for the under-65 population of Massachusetts under ACA-like health reform. Unlike the OPM or SPM, the HIPM shows that public health insurance benefits and premium subsidies reduce poverty by one third. Among low-income families who purchased individual insurance, the premium subsidies alone reduce the poverty rate by 9.4 percentage points. A national HIPM should be possible as requisite post-ACA data become available for all states.

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care.
Article 25, The Universal Declaration of Human Rights, 1948

I. Introduction

Demographers and other social scientists often investigate relationships among poverty, demographic characteristics and health, and conduct research on health and social policies (Moffitt 2014; Ben-Shalom, Moffitt and Scholz 2012). Such research requires a construct-valid measure of poverty. The Affordable Care Act (ACA) greatly expands the US welfare state and promises to improve health and reduce deprivation by bringing health insurance to millions, especially millions of low-income households. Yet the Census Bureau's "Official" Poverty Measure (OPM) and Supplemental Poverty Measure (SPM) cannot capture the bulk of the impact of the ACA on poverty. The OPM does not include non-cash benefits as resources available to meet basic needs. And although the SPM does include most in-kind benefits, it excludes health insurance benefits from resources and does not include a basic need for health care/insurance in the poverty threshold. Instead, the SPM addresses health indirectly, by deducting from resources all out-of-pocket expenditures on medical care or insurance (MOOP) (Short 2013; Caswell and O'Hara 2010). The SPM measures whether income net of MOOP expenditures is sufficient to meet non-health "material" needs. Therefore, health insurance and the ACA can impact poverty, as measured by the SPM, only to the extent that they reduce MOOP.

But health insurance is valuable beyond reducing MOOP. First, the insured receive valuable medical care that the uninsured do not: this is the access value of insurance (IOM 2002; Nyman 2003, 2004; Sommers, Long and Baicker 2014). When the uninsured forego medical care, the SPM does not measure their unmet health needs. Second, health insurance is valuable

because it reduces *ex ante* risk, even if in a given year, *ex post*, care was not needed, as in the classic example of fire insurance that is valuable *ex ante* even if *ex post* there was no fire (Blinder 1985).

The SPM has been used to estimate how Medicaid reduces poverty by reducing MOOP. Sommers and Oellerich (2013) find that Medicaid reduces the SPM poverty rate by 0.7 percentage point overall and by one percentage point for children, suggesting that $400 billion spent annually on Medicaid has only a slight impact on poverty. However, these estimates capture Medicaid's value only in reducing MOOP and miss Medicaid's ability to meet unmet health care needs and some risk reduction. As Sommers and Ollerich write: "Beyond the program's *presumed primary benefit of improved access to care and health*, we find that Medicaid has significant poverty-reducing effects of a similar order of magnitude of other dedicated anti-poverty government programs" (p. 829, emphasis added). A more complete assessment of Medicaid's effects on poverty would also capture the "primary benefit" of the program, which requires a poverty measure that includes health insurance as a basic need.

The SPM is based on recommendations of a National Academy of Sciences (NAS) panel that made considerable effort to include health in a revised poverty measure (Moon 1993) but could find no valid and practical way to do so (Citro and Michael 1995). At the time, what US families had to spend to obtain health insurance depended on their health status, employment and other factors. Indeed, health insurance might not be available at any price due to pre-existing conditions. In related work (Author 2013) we analyzed these and other impediments to a valid Health Inclusive Poverty Measure (HIPM)—a measure that includes health needs and counts health insurance benefits as resources available to meet those needs. We showed that a valid HIPM can be constructed if health insurance is considered the basic health need (Burtless and

Siegel 2001) *and* the health system has universally available health insurance with premiums unrelated to health status (community rating) and caps on MOOP expenditures for medical care. Since health insurance is not fungible (i.e., usable for non-health needs), the HIPM must never assign a value to health insurance benefits greater than health insurance needs. These health system requirements are met for citizens and legal residents by a combination of the ACA or Massachusetts Health Reform and Medicare Advantage Prescription Drug Plans. Since ACA-like reforms took effect in Massachusetts in 2008 (Gruber 2011, Long and Massi 2009), we are able implement a HIPM for 2010 Massachusetts. It will be possible to construct a HIPM for the US as requisite data become available.

We describe how to construct a HIPM, building on the SPM and using Current Population Survey data, augmented with data from health insurance exchanges. We then implement a pilot HIPM for 2010 Massachusetts for those under age 65, the primary beneficiaries of health reform. (The treatment of the population aged 65 and older involves different institutional considerations; see Author 2013). We compare poverty rates and poverty gaps (the amount by which resources of the poor fall short of the poverty line) between the HIPM and SPM. We also estimate how health insurance benefits and the subsidies of the Massachusetts reform reduce poverty rates and close poverty gaps.

According to the HIPM, the poverty rate for the under-65 in Massachusetts in 2010 was 12.2%, compared to 13.5% for the SPM. The HIPM rate is modestly lower than the SPM rate because most health insurance needs were met in 2010 Massachusetts, but the HIPM rate could be much higher in states with substantial unmet health insurance needs. Public health insurance programs reduced poverty by 3.9 percentage points, 0.6 percentage points of which is due to Massachusetts's premium subsidies. The "cash income" HIPM poverty gap (as a percent of the

HIPM poverty line) was 43.7%. When we add in-kind benefits to income, the gap falls by 26.5 percentage points: 3.6 points from employer-provided health insurance and 6.9 points from Medicaid and Medicare. Among poor persons covered by individually-purchased insurance, premium subsidies alone reduced the poverty gap by nearly 20 percentage points, from 51.5% to 32.4%. These direct impacts of health insurance transfers on poverty are not captured by the OPM or SPM.

Some have suggested that it is unnecessary to evaluate the impact of health reform on poverty since we can assess its impact on the rate of uninsured (Blank 2008). While uninsurance rates are informative, measuring impacts on poverty is important nonetheless. First, poverty in the US is defined as the inability to afford basic needs. While people may disagree on the precise definition of basic needs, most agree that basic medical care is among them. Second, the current SPM could become a misleading indicator of the effect of health reform. The ACA transfers large subsidies for health insurance to lower income persons, materially affecting the distribution of income (Aaron and Burtless 2014; Burkhauser, Larrimore and Simon 2013). Yet, in subtracting out-of-pocket premium payments from income and excluding the value of health insurance benefits from resources (and needs), the SPM could indicate that the ACA made low-income households poorer. The SPM will not register increased care for the formerly uninsured as meeting health needs or the reduced financial risk as meeting insurance needs. The SPM captures only reductions in MOOP, if they occur. A HIPM, in contrast, captures the role of health insurance in meeting all these health care and insurance needs—access, *ex ante* risk reduction, and MOOP.[1]

[1] A third reason to favor a combined measure is that separate health and material poverty measures can result in people with identical resources and opportunities being classified as either poor or not poor depending on their health and insurance choices. For example, by deducting

Although only illustrative, our estimates demonstrate the feasibility of constructing a poverty measure that incorporates health insurance in both resources and needs thresholds. The estimates suggest that public health insurance programs and subsidies substantially reduce poverty, particularly the intensity of poverty, as indicated by poverty gap measures. As data become available, a HIPM could show the impact on poverty of other heath policies, such as states' expanding—or failing to expand—Medicaid eligibility under the ACA.

II. When a Health Inclusive Poverty Measure Is—and Is Not—Possible

Despite considerable effort, the NAS panel could find no valid and practical way to incorporate health care needs and resources into their recommended poverty measure (Moon, 1993; Citro and Michael 1995). Including health care or insurance in poverty measurement requires putting a dollar value on needs and on resources such as private or public health insurance. The principal barrier to a HIPM was the utter inability to determine the cost of health insurance to a particular family since premiums in the individual market could be related to detailed health status and insurance was sometimes unavailable due to lack of guaranteed issue. Instead, although controversial, the panel recommended subtracting MOOP from resources and excluding health care/insurance from needs, resulting in a measure of ability to meet non-health ("material") needs only (see Cogan 1995; Bavier, 1998; Corbett 1999; Betson 2000). The panel attributed the measurement problem to the prevailing state of US health care and insurance (page 69):

MOOP from resources, the SPM classifies someone who purchases insurance and remains healthy as poorer than the identical person who does not purchase insurance. Because the US health care system has substantial premiums and cost-sharing, when similarly situated people make tradeoffs between spending on health and spending on material needs, it affects their SPM poverty status.

> as changes are made to the US system of health care, it will be important to reevaluate the treatment of medical care expenses in the definition of family resources….if relatively generous health insurance coverage is made available to everyone, the amount of out-of-pocket costs that is subtracted from income should likely be subject to an upper limit or cap.

In Author (2013) we determined health care system attributes necessary to include health in poverty measurement. Since our proposed HIPM includes health insurance in the poverty threshold it requires that health insurance be considered a basic need, *no matter an individual's health status.* Basic health insurance is deemed essential and not wasted even if *ex post* an individual used little or no health care and even for someone with little *ex ante* expected health care usage. We recognize that this condition has philosophical and political implications with which some may disagree. Those who argue that insurance is not a need point out that care can sometimes be obtained through other means. We believe, nonetheless, that health insurance should be considered a need. First, health care is now obtained largely through insurance. Second, for some time, we have recognized and met this need with Medicare for the elderly and with Medicaid for poor children and pregnant women and some other. Third, the NAS panel clearly desired to include health in poverty measurement. Fourth, health care philosophers have noted "Providing universal [health insurance] coverage is a way of assuring equitable or fair… access to a reasonable array of health services" (Daniels, Saloner and Gelpi 2009). Finally, in passing the ACA, Congress recognized this need for all poor adults and for nearly the entire citizenry, though the Supreme Court allowed states to opt out of the Medicaid expansion and many states have chosen to do so (Rasmussen et al. 2013). That decision and continued controversy illustrate disagreement about health insurance as a basic need for adults under the age of 65. Nonetheless, if basic health *insurance* is considered a basic need then the health care and insurance systems under ACA, Medicare, and similar reforms enable the construction of a

valid HIPM because they break the link between health status, on the one hand, and health insurance premiums and availability on the other.

To illustrate these ideas and the construction of a HIPM, consider a health care system in which everyone has available basic insurance, the "Basic Capped Plan" (BCP). The BCP covers all care deemed essential by society, so it is complete in the events, treatments and procedures covered. However, it does not fully pay for all essential care. First, a premium MOOP payment is required. But that premium is not risk-rated: it does not depend on health status. Second, the BCP has nonpremium MOOP (cost sharing) with strict limits, i.e., capped at a moderate level, no matter health status. In such a system, all essential health needs can be met with premium MOOP equal to the BCP premium and nonpremium MOOP less than or equal to the BCP nonpremium MOOP cap. Any premium MOOP payments above the BCP premium and any nonpremium MOOP payments above the BCP cap are discretionary and do not belong in the poverty threshold.

A HIPM based on the BCP adds BCP insurance needs to a family's poverty threshold and adds a value for insurance benefits provided to the family by employers or government to family resources. The value of insurance benefits must never exceed the value of health needs, since health insurance benefits are nonfungible.

III. Implementing a HIPM

Our proposed HIPM builds on the SPM and is conceptually straightforward. Government or employers may pay directly for insurance (partially or fully) or provide subsidies. A HIPM must account for these contributions to health insurance resources and also include plan costs in needs. We use the term "plan full cost" (PFC) to refer to the total cost of the insurance, irrespective of who pays. The PFC consists of the actuarially fair premium—the average cost of all medical care

paid for by insurance—plus essential administrative costs. The actuarially fair premium depends on the health status of the population being pooled. For the HIPM, that population should reflect the distribution of health status of the general population. Under a BCP health care system, the SPM could be modified to create a HIPM:

- Add the PFC for the BCP insurance to the needs threshold for everyone
- For those provided insurance by employers or government, add the PFC of the BCP to resources *less* the actual premium MOOP payment required—the net value of insurance
    - But limit the premium MOOP subtracted from the health insurance value to a maximum of the premium MOOP for the BCP
- For those who receive contributions or subsidies towards insurance purchase, add the contribution or subsidy amount to resources
    - But limit this addition to a maximum of the premium MOOP for the BCP
- Incorporate the need to pay for cost-sharing (nonpremium MOOP). Our preferred approach is an upper bound, the HIPM-U:
    - Deduct actual nonpremium MOOP expenditures from resources, up to the nonpremium MOOP cap (maximum) for the BCP.
- The family unit is poor if resources are less than needs.

Three factors determine whether the likelihood of poverty is higher or lower under a HIPM relative to the SPM. We illustrate with an example—summarized in Table 1—with two families that are identical except one (Family A) has no health insurance benefits (resources) provided, while the other (Family B) has insurance fully provided by the government. First, all else the same, adding health insurance needs (the $10,000 BCP) greatly increases the poverty threshold and therefore the likelihood of HIPM poverty relative to SPM poverty. Second, adding health insurance to resources can meet, fully or partially, the higher needs threshold. According to the SPM, neither family is poor because their material resources of $22,000 exceed the $20,000 SPM threshold. However, under the HIPM, Family A is poor while Family B is not,

because Family A has no health insurance provided while Family B has insurance fully provided. Therefore, Family's B's resources exceed the HIPM threshold while Family A's do not. A third factor, which unambiguously lowers the likelihood of poverty, is the HIPM procedure of limiting MOOP deductions (discussed below). The remainder of this section provides details on implementing the HIPM. Readers interested mainly in results can skip to Section IV.

Both the ACA and Massachusetts health reforms meet conditions for a valid HIPM. Exchange plans cover all care deemed essential and premiums cannot be tied to health status (Focus on Health Reform 2011a). Those with low income receive premium subsidies and nonpremium MOOP is capped. As for universal eligibility, undocumented immigrants are excluded from the exchanges by both laws, and, in principle, should be excluded from HIPM calculations.

Data

We implement the HIPM with the March Current Population Survey (CPS) Annual Social and Economic Supplement (IPUMS-CPS, see King et al. 2010 and NBER n.d.), the data used by the Census Bureau for the OPM and SPM. We provide pilot HIPM estimates for the under-65 population, the main beneficiaries of health reforms. We dropped SPM "resource units" (e.g., families, Short 2013) that contain individuals over age 64, reducing our sample from 3101 to 2582, or by 16.7%. Since the CPS does not allow identification of undocumented individuals, we also dropped SPM units that include one or more non-citizens who is either uninsured or has individually-purchased insurance, further reducing the analysis sample to 2504, for a total sample reduction of 19.3%.[2]

[2] An alternate approach is to impute undocumented status (e.g., Kaiser Family Foundation 2013) and drop units with (imputed) undocumented persons who report individually-purchased insurance or who are uninsured.

Health Insurance Needs: The BCP Determining which exchange plan is "the" BCP involves judgment. Since the ACA legislation uses the second cheapest silver plan as a benchmark for premium and cost-sharing subsidies, we would designate it as the BCP under the ACA. For our pilot HIPM for Massachusetts we chose the cheapest Bronze low plan since it is comparable to the current ACA Silver.

Once the BCP is chosen, each state's exchange database can provide the unsubsidized premium (PFC) for a family. For Massachusetts in 2010, we would like to identify the PFC from the premiums on the unsubsidized exchange (Commonwealth Choice), but unfortunately the data are no longer available. Ericson and Starc (2013) used 2010 Massachusetts unsubsidized premium data, but only for some ages and family sizes and only for the zipcode 02130. Therefore, as described in Appendix 1, we used a regression model to predict Massachusetts 2010 BCP premiums. Appendix 2 describes our calculation of health insurance needs for Medicare beneficiaries under age 65.

Poverty is determined at the SPM-unit level, but health insurance plans may be held by a variety of sub-units. For example, an unmarried couple living together forms an SPM unit but cannot receive health insurance together. We assign people to health insurance units (HIUs) and determine health needs and resources for each HIU. (See Appendix 3 for definition and construction of our HIUs.) Health insurance needs (and resources) are aggregated over the HIUs within a SPM unit to determine HIPM poverty status.

Health Insurance Resources To determine health insurance resources we credit those HIUs provided health insurance by the government or employers the PFC of the BCP but deduct any premium required to obtain that coverage. Those eligible for subsidies are credited with the

subsidies. Those who are not provided insurance or assistance in purchasing insurance have no health insurance resources. Further details are provided below and summarized in Table 2.

No matter how generous a family's employer-provided or government-provided insurance, we credit its resources with only the cost of the BCP. This limitation is essential because health insurance cannot be used to meet other needs. Also, to determine the net value of health insurance benefits provided, we deduct actual out-of-pocket premium payments only up to the amount required for the BCP. We do not allow spending on a more expensive plan to make someone poorer. For low-income HIUs eligible for premium subsidies, the premium MOOP limit is the subsidized premium MOOP that the HIU would be required to pay to obtain the BCP. For those covered by Medicare, we limit the deduction for premiums to the premium of the basic MA-PD plan (including the Part B premium required). For those covered by Medicaid or Veterans Affairs, we deduct no premium MOOP. So for an HIU with employer- or government-provided insurance, health insurance resources are:

HI Resources = Full Plan Cost for BCP – actual premium MOOP (up to BCP premium MOOP net of any subsidies for which they are eligible)

HIUs that purchase insurance or remain uninsured have no health insurance resources; they must purchase insurance to meet their need for basic health insurance. For low-income HIUs eligible for premium subsidies, we add those subsidies to resources. Subsidies equal the difference between the PFC of the BCP and the maximum amount that a household is required to pay for insurance. For those who remain uninsured, we also add a premium subsidy to resources, since subsidies are available to help meet health insurance needs. While some may question this decision, it is highly unlikely to affect our results materially since only 86 (3%) of our 2,504 analysis sample were uninsured, only 25 of whom were poor according to the SPM. While the

HIPM resources, needs, and limits are first applied at the level of the HIUs, the income determination for subsidy eligibility is based on government definitions of family units (see Appendix 3). In summary, for HIUs with individually purchased insurance or who remain uninsured, health insurance resources are:

HI Resources = Subsidy to Premium if eligible for premium subsidies or

= 0 if ineligible

In states not expanding Medicaid eligibility, poor Medicaid-ineligible individuals are not eligible for subsidies for the exchanges (Rasmussen et al., 2013), but because they could purchase unsubsidized plans on the exchanges out of pocket, their HIPM thresholds are defined.

Cost-sharing Needs We have not yet addressed out-of-pocket payments for cost-sharing—nonpremium MOOP. For our preferred HIPM (HIPM-U), we deduct from resources nonpremium MOOP but limit the deduction to the BCP nonpremium MOOP cap. Both the ACA and the Massachusetts health reform employ nonpremium MOOP caps that apply to all exchange plans: under ACA, the maximum was $6,350 for an individual and $12,700 for a family in 2014; in 2010 Massachusetts, $5000 and $10,000, for the individual and family, respectively. Both laws reduce nonpremium MOOP caps further for low-income persons according to a sliding scale, implemented through government subsidies additional to the premium subsidies. Under the ACA, with silver plans, lower nonpremium MOOP caps apply to those with incomes below 400% of poverty (Focus on Health Reform 2011a, 2011b), and in Massachusetts, 300% of poverty (e.g., in Massachusetts, the cap was $2,300 for incomes up to 200% of the OPM poverty line).

The nonpremium MOOP cap for a particular HIU depends on income and insurance-type, as summarized in the final column of Table 2. Nonpremium MOOP subsidies are not available to

those persons (or their families) with "qualified and affordable" (employee only) employer-provided insurance (Brooks 2014). To implement the HIPM, we assume the lower nonpremium MOOP caps are *not* available to anyone with employer-provided insurance or to their families (see Appendix 1); this assumption leads us to understate the impact on poverty of premium subsidies. Finally, we aggregate the limited nonpremium MOOP for each HIU to the SPM unit level and deduct it from resources.

Poverty Status We combine the components of a HIPM to determine poverty status in an example family with employer health insurance, premium MOOP and nonpremium MOOP (Family C Table 3). This example compares the HIPM, OPM and SPM, though for comparability, we used the SPM measure of material needs ($20,000, line 1) for all three measures.

Family C lacks pre-tax cash income (OPM resources) to meet its material needs (line 3 < line 1). SPM resources also include tax credits (net of taxes paid) and in-kind transfers other than health insurance. If the family's only resources were SPM resources before MOOP deductions, it would not be poor since those resources exceed the SPM threshold (line 5 > line 1). However, the SPM deducts all MOOP expenditures (line 8, the sum of line 6 and line 7) from SPM material resources (line 5). According to the SPM, this family is poor since, after subtracting MOOP expenditures, its resources are less than its material needs (line 9 < line 1).

HIPM material (non-health insurance) resources are SPM material resources prior to the deduction for MOOP. Thus,

HIPM-U Resources = SPM resources before MOOP deduction + HI Resources – actual nonpremium MOOP (up to BCP cap).

Family C's health insurance resources are the net value of their employer-provided health insurance: the BCP ($10,000) *minus* a required premium MOOP payment of $3,000, yielding net health insurance resources of $7,000 (line11). The $9,000 cap on the deduction for nonpremium MOOP (line 10) does not bind since it exceeds the actual nonpremium MOOP of $1,500 (line 7).

To determine HIPM-U (hereafter HIPM) poverty status, we compare HIPM resources to the HIPM threshold. The HIPM threshold is simply the SPM threshold plus basic health insurance needs (the BCP), or $30,000 (line 12). HIPM resources ($22,000 + $7,000 – $1,500 = $27,500, line 13) fall short of the HIPM threshold so the family is HIPM-poor. Family C's employer-provided health insurance largely, but not completely, meets their health insurance needs. In this case, the SPM and HIPM poverty status are the same because the HIPM adds the $10,000 BCP to needs, adds something less than $10,000 to resources to reflect required premium payments, and the HIPM caps on MOOP subtractions did not bind. In other cases, those who are not provided health insurance (like Family A in Table 1) will be poorer according to the HIPM than the SPM. But those who have health insurance but high premium or nonpremium MOOP can be poorer according to the SPM than the HIPM if MOOP caps bind.

IV. Implicit Thresholds and Poverty Gaps

Implicit Thresholds The SPM does not attempt to measure whether health insurance/care needs are met; it only aims to measure *material* (food, clothing, shelter and utilities) poverty. But it implicitly treats whatever health insurance and care a family purchases as essential—nondiscretionary—by deducting MOOP expenditures from resources. That approach is equivalent to adding those expenditures to the needs threshold and determining if (pre-deduction) resources are sufficient to meet the expanded needs threshold (e.g., Burtless and Siegel 2001).

We define a poverty measure's Implicit Threshold as the measure's explicit needs threshold plus the measure's deductions from resources that meet essential needs (non-discretionary expenditures). Thus, the HIPM Implicit Threshold includes all cost-sharing expenditures up to the BCP cap and basic health insurance (from the explicit threshold).[3] The HIPM implicitly treats only basic health insurance and actual cost-sharing up to the BCP cap as essential, while the SPM implicitly assumes that all insurance and care expenditures are essential—a lower bound of a family's health needs.

Poverty gaps Researchers have used the OPM and SPM to measure poverty gaps—the amount by which the poor's resources fall below the poverty threshold (e.g., Ben-Shalom, Moffitt and Scholz 2012; Ziliak 2004; Short 2011). We use the HIPM to estimate poverty gaps (intensity) that take into consideration health needs. The proportional poverty gap for each individual equals one minus the ratio of her family's resources to the HIPM Implicit Threshold—how far resources fall short of needs, as a proportion of needs. To calculate the mean poverty gap, individual gaps are averaged over all individuals in SPM units with resources below the poverty line.

Census reports (e.g., US Census 2011; Short 2011) show how government transfer programs individually reduce the SPM poverty rate by recalculating the rate as each transfer is excluded from income. We show the effects of health insurance benefits on the HIPM gap in a

[3] For example, using Family C (Table 3) to illustrate, the SPM Implicit Threshold adds all MOOP expenditures (line 8) to the explicit material SPM threshold (line 1) to get $24,500 (line 14). The family is SPM poor because its (pre-deduction) SPM resources of $22,000 (line 5) are less than its implicit needs of $24,500 (line 14). Similarly, the HIPM Implicit Threshold is the explicit HIPM threshold (for material and health insurance needs) plus the allowed deduction for cost-sharing needs. For Family C, the HIPM Implicit Threshold adds allowed nonpremium MOOP expenditures of $1500 (the minimum line 7 and line 10) to the explicit material HIPM threshold of $30,000 (line 12) to get $31,500 (line 15). Family C is HIPM poor because its pre-deduction resources of $22,000 plus the net value of its employer-provided insurance of $7000 = 29,000 falls short of its HIPM Implicit Threshold of $31,500: $20,000 for material needs, $10,000 of resources for health insurance needs, and $1,500 for cost-sharing needs. We use the implicit thresholds to calculate poverty gaps with the HIPM.

similar way. We begin by including only pre-tax cash income in resources (OPM resources)—referred to as the "cash only" poverty rate and gap. We then add non-health in-kind benefits and net tax credits (the total is SPM resources, before the MOOP deduction) and, finally, health insurance resources to calculate the poverty-reducing effects of each.[4] The HIPM poverty gap calculation shows how health insurance benefits help reduce the intensity of poverty and compares magnitudes of effects among antipoverty programs.

V. Results: HIPM Poverty Rates and Gaps under the Massachusetts Health Reform

Poverty rates For the under-65 population in 2010 Massachusetts the HIPM-U poverty rate of 12.2% (Table 4, row 4), is 1.3 percentage points lower than the 13.5% SPM poverty rate (row 2); for comparison, the OPM rate is 11.9%. The fact that the HIPM rate is lower than the SPM rate should not be surprising since, in Massachusetts, the vast majority of people near the poverty line have their health insurance needs met and the HIPM limits MOOP deductions. (The effect on the SPM of deducting all MOOP is shown in the comparison of row 1 and row 3; it increases the SPM poverty rate by 3.1 percentage points, from 10.4% to 13.5%.)

[4] We again use Family C (Table 3) to illustrate. Their cash-only poverty gap would be 1- (cash income/HIPM Implicit Threshold) or
Cash poverty gap = 1 – [18,500 / 31,500] = 1 - .59 = 0.41 or 41%. Pre-tax cash income fills 59 percent of Family C's basic material, health insurance and cost-sharing needs, leaving a gap of 41 percent. We next add $3,500 of in-kind benefits and tax credits net of taxes paid and recalculate the gap: 1 – [(18,500+3,500) / (31,500)]= 1 - .70 = 0.30, so in-kind transfers close 11 percentage points or more than a quarter of Family C's initial poverty gap. Finally, adding health insurance resources of 7,000, the $10,000 BCP less the $3,000 premium:
1 – [(18,500+3,500+(10,000-3,000)) / (31,500)]= 1 - 0.92 = 0.08. Therefore, together, health insurance, in-kind transfers and net tax credits nearly close Family C's cash-only poverty gap, leaving the family only eight percent below the HIPM Implicit Threshold. If their cash resources fell below, but their after-transfer resources exceeded, the HIPM Implicit Threshold, we would set their post-transfer poverty gap to zero for calculation of the average gap, calculating the average gap over the same baseline population with cash income below the HIPM Implicit Threshold.

Since the HIPM-U, unlike the SPM, does not deduct over-the-counter (OTC) MOOP from resources, we also implement a HIPM-U_OTC by deducting all OTC spending from resources. The HIPM-OTC (row 5) is only 0.3 percentage points higher than the HIPM-U.

Since some care may be discretionary, the HIPM-U may over-estimate poverty by deducting all nonpremium MOOP (up to the BCP cap). Therefore, we also calculated the HIPM-L, which does not deduct any nonpremium MOOP, implicitly assuming there are zero cost-sharing needs, clearly a lower-bound. HIPM-L (row 6) is only 0.8 percentage points lower than HIPM-U. In 2010 Massachusetts, the subsidized system or Medicaid covers nearly all health care expenses for those close to the poverty line.

Although the SPM and HIPM for Massachusetts differ only modestly, the HIPM is unique in its ability to show the direct impact of health transfers on poverty. Table 5 shows how the percentage of families that is poor (i.e., have insufficient resources to meet material and health insurance needs) falls as additional types of income are included in the resource measure (e.g., Ziliak 2004). The first column shows results for the entire analysis sample. We begin by including only cash pre-tax income in resources (OPM resources). If only pre-tax cash income were available, the HIPM poverty rate would be 19.1% (cash income < HIPM Implicit Threshold). When we add in-kind transfers and tax credits net of taxes paid (and make other SPM adjustments to resources, other than the MOOP deduction), 19.2% continue to have material resources below the HIPM Implicit Threshold. (Here the poverty-reducing effects of in-kind transfer programs and tax credits are offset by poverty- increasing effects of taxes and child-care expenses.) When we add the value of employer-provided health insurance to resources, the poverty rate falls by 3.1 percentage points to 16.1%. Public health insurance removes another 3.3 percent from poverty and the health insurance subsidies remove another 0.6

percent. Together, public and private health transfers reduce the poverty rate by seven percentage points.

This exercise is not an estimate of the causal impact of (eliminating) transfer programs, since it does not account for any behavioral adjustments (Ben-Shalom, Moffitt and Scholz 2012). Two other limitations likely lead us to understate the impact of Massachusetts health reform on poverty. While we know whether a household member is covered by a policyholder outside the household, we are not able to determine if they benefit from subsidies. More importantly, in contrast to our treatment of premium subsidies, we are unable to assess the impact on poverty of the cost-sharing subsidies—the income-related reductions in nonpremium MOOP caps.

The remaining columns of Table 5 show the impact of transfers on poverty by types of family and health insurance. Children's health-inclusive poverty is reduced by 2.6 percentage points by in-kind transfers and tax credits, 3.3 percentage points by employer-provided health insurance, 2.4 percentage points by public health insurance, and an additional 0.8 percentage point by premium subsidies (column 2). The relatively large impact on child poverty of in-kind transfers and tax credits reflects, in part, the targeting and greater generosity of these benefits for families with children. Although the impacts of private and public health insurance appear comparable (3.3 and 3.2 percentage points) we should be careful in apportioning credit since employer coverage was stimulated by health reform (Gruber 2011; Long and Fogel 2014). In any case, the HIPM shows that, in Massachusetts, public and private health insurance benefits together account for a huge, one-third reduction in the child poverty rate (from 19.5 to 13.0), a major direct effect that is not detected by either the OPM or the SPM.

Lone-adult (with no children) poverty is high compared to other groups. Yet lone-adults get little or no net poverty reduction from in-kind benefits and tax credits, and only a 1.7-point

reduction from employer-provided health insurance. However, they are major beneficiaries of public health insurance in Massachusetts, which lowers their poverty rate by 6.5 percentage points, and premium subsidies, another 0.5 points, for a total reduction of 7.0 percentage points. This underscores the importance of Medicaid for low-income adults without children under 18 and shows the value of the HIPM, since the SPM and OPM would register little direct poverty-reducing effects of government transfers to this group since transfers come largely as health insurance and subsidies.

In contrast to the experience of lone adults, (non-health) in-kind transfers and net tax credits account for large reductions in poverty rates (8.7 points) of persons in one-parent families (Bitler, Hoynes and Kuka 2014; Ben-Shalom, Moffitt, and Scholz 2012). Employer health insurance reduces the single-parent poverty rate by 2.8 points, reflecting the substantial labor force participation of single mothers (e.g., Meyer and Rosenbaum 2001); public health insurance accounts for another 3.5 point reduction.

Two parent-present families have low rates of "cash income" poverty. Yet their poverty is lowered substantially by government transfers. Non-health in-kind benefits and tax credits reduce their poverty rate by 2.7 percentage points; employer health insurance another 1.9 points, public health insurance 2.2 points, and premium subsidies 0.8 points. The HIPM rate for individuals in two parent families is 10.1%.

Similarly, two-adult (no child present) families also have low poverty rates, yet in-kind benefits and health insurance have substantial effects on their HIPM poverty. In-kind benefits and tax credits account for a 1.2 percentage point reduction, employer health insurance, 1.8 points, and government health insurance, a substantial 4.1 points.

The final three columns of Table 5 show the effects of transfers on HIPM poverty by health insurance coverage type. Poverty is determined at the SPM-unit level, so each SPM unit may contain multiple health insurance units, which may have different insurance types. Column (7) shows poverty rates for persons covered by employer-provided insurance. After in-kind transfers and tax credits net of taxes paid (which, for this group, increase poverty), the poverty rate is 8.5 percent. Employer health insurance cuts their poverty markedly, to 4.8 percent. They benefit slightly (0.1 percentage point) from government health insurance to other HIUs within the SPM unit and from premium subsidies (0.3 percentage points) resulting in a HIPM of 4.4 percent.

Not surprisingly, poverty of Medicaid beneficiaries (column 8) is reduced greatly by public health insurance, 14.3 percentage points, which equals the reduction from (other) in-kind benefits and tax credits. Together, health insurance, in-kind transfers, and tax credits lift nearly 30 percent of this population out of poverty. Premium subsidies reduce poverty most among people covered by privately-purchased insurance (column 9), by 9.4 percentage points. In contrast, they get little net poverty reduction from in-kind transfers and tax credits, most likely because they have few children or their incomes are too high to qualify for substantial tax credits or in-kind transfers.

Poverty gaps We estimate HIPM poverty gaps using the HIPM Implicit Threshold, which includes material needs, health insurance needs, and cost-sharing/nonpremium MOOP needs. We begin by calculating the gap based on pre-tax cash income only and then recalculate the gap as we add back resources. The population over which all average gaps are calculated is persons in families with pre-tax cash income below the HIPM Implicit Threshold. Table 6 presents poverty gaps for the entire sample (first column) and by health insurance type (columns 2 through 4). For

all persons (column 1), the average poverty gap based on cash income alone was 43.7 percent—about half the health-inclusive poverty line. Adding in-kind transfers and tax credits net of taxes paid reduces the gap by 14.3 percentage points to 29.4%; adding employer health insurance benefits reduces it by another 3.5 points; and adding public health insurance reduces the gap by a further 6.9 points, to 18.9%. The greater effect on the poverty gap of public health insurance (6.9 percentage points) compared to private health insurance (3.5 points) stands in contrast to their roughly equal effect on the poverty rate (Table 5), reflecting the more focused targeting by public than private insurance on the poorest persons. Premium subsidies reduce the poverty gap from 18.9 to 17.2 percent. In sum, non-cash transfers including health insurance reduced the cash poverty gap by nearly 2/3 (from 43.7 to 17.2 percent). The two-thirds reduction in the poverty gap considerably exceeds the one-third reduction in the poverty rate because many transfers move families toward but not over the poverty threshold.

On average, poor individuals covered by employer-provided insurance have a small "cash only" health-inclusive poverty gap (34.5%). In-kind transfers and tax credits reduce the gap 5.5 points; employer insurance reduces it by another 12.6 points to 16.5%, and public insurance and premium subsidies reduce it to 16.0%. Medicaid recipients have a large initial HIPM poverty gap (48.6%). In-kind transfers and tax credits reduce the gap by more than twenty points (to 27.2%); public health benefits reduce it by another 12.1 points to 14.9%.

Although few people who buy individual insurance are cash-income poor, among cash-poor individual purchasers of insurance, the poverty gap is large, 50%. After all in-kind transfers and tax credits, their poverty gap remains high, 51.5%. However, premium subsidies reduce their gap by nearly 20 points, from 51.5% to 32.4%. Thus, although poor persons who buy individual insurance have cash incomes sufficient to meet only half their basic material and

health insurance needs, thanks mainly to Massachusetts health insurance reform, they have *resources* (including premium subsidies) sufficient to meet over two-thirds of their needs. Neither the OPM nor SPM can account for these substantial direct impacts of premium subsidies on poverty for this group.

VI: Caveats, Critiques and Practical Difficulties of the HIPM

Although the HIPM has many advantages, we should not overlook its weaknesses. The main practical difficulties stem from two features that make ACA benefits less than universal. First, undocumented persons are ineligible for the exchanges. Since we cannot perfectly identify undocumented persons in our data, we used an approximation to exclude them. Second, those with "qualified and affordable" employer-provided insurance and their families are not eligible for subsidies. Yet in our data we cannot tell whether employer-provided coverage is "qualified and affordable" (especially qualified) and had to assume that all employer-provided plans were qualified and affordable thereby understating the impact of subsidies on poverty. Five conceptual issues require further discussion.

Overvaluation of health insurance A possible concern about the HIPM resource measure is that it can include the full cost of health insurance, which might over-value health insurance. First, low-income individuals could value health insurance at less than its cost (Citro and Michael 1995). Second, the US health care system may be inefficient, raising costs without raising benefits commensurately (e.g., Cutler and Ly 2011). These issues pose challenges for incorporating health insurance benefits in measures of income inequality as in Burkhauser, Larrimore and Simon (2012, 2013), CBO (2012) and Aaron and Burtless (2014); see also Meyer and Sullivan (2012), Blank (2008), Ruggles (1990). However, overvaluation of health insurance

in resources cannot affect the HIPM poverty rate, because health insurance resources are never valued at more than health insurance needs. Therefore, health insurance resources alone can never remove a "materially poor" person from poverty. The cost of health insurance may be unnecessarily high and lower-income individuals may value it at less than cost, but if they need insurance and do not have the resources to meet that need, they have unmet needs and are poor.

Single vs. Multiple Measures One motivation for separate "material" and "health" poverty measures was the lack of fungibility of health insurance benefits—that health insurance cannot be used to meet material needs. Although, as just explained, the HIPM does not suffer from this fungibility problem, multiple measures can potentially provide a more complete picture of each of several dimensions of need (Blank 2008). But simplicity is also a virtue, and political and cognitive realities may limit attention to one poverty measure. As Bernheim (1998) pointed out in discussing problems of poverty measurement:

> I suspect that we have focused on poverty rates primarily to satisfy the demands of politicians and the press, who generally seem to limit their attention to single numbers. To the extent that economists wish to affect the policy process, it may be necessary to cater to the demand for oversimplification; thus one justifies the exercise in this paper by arguing that, if politicians insist on using a single number, we should make sure that it is the best number possible.

On the same point, Meier and Wolfe (2012) argue that a

> … split approach is superior to a combined approach; it allows the capture of both the medical care burden and medical care risk perspectives in poverty measurement. In making this argument, we note the loss of simplicity offered by a single measure and recognize that, for policy purposes, the need for simplicity may dominate the wish for greater accuracy. Even in this view, we still favor the calculation of a separate medical care economic risk index to capture current and changing medical risk as a separate and important indicator of well-being and deprivation.

Thus, the value of multiple measures does not reduce the importance of creating the best possible single measure of poverty. Indeed, Census and the Bureau of Labor Statistics have begun

research on construction of a single poverty measure based on medical care economic risk (Garner, Short and Gudrais 2013).

The BCP, Take-up Failures and Poor Decisions Our HIPM is based on the idea that MOOP expenditures—premium and nonpremium—are discretionary if they result from choosing a plan other than the BCP. This may seem harsh since choosing health insurance is difficult, due to plan and system complexity and the need to consider health and financial circumstances. For example, each year the second cheapest Silver plan (the BCP) may change, reducing subsidies available for last year's plan. Nonetheless, if the BCP is universally available and people have sufficient resources, how can we say that they lack adequate resources to meet their basic health insurance needs? Instead, we advocate policies that directly address the complexity, such as making the low MOOP-risk insurance option (i.e., the BCP) the default plan, at least for lower-income persons.

Similarly, some may object to our counting as resources the premium subsidies for which families are eligible, even when they remain uninsured. Again we disagree: If the BCP is universally available, there is a mandate to purchase insurance, and people have sufficient resources, how can we say that they lack adequate resources to meet their basic health insurance needs? In this respect, our approach is similar to the Census Bureau's procedure for constructing after-tax income for the SPM resource measure; to date, Census imputes net tax liabilities based on family income, though research continues on this issue (Short, Donahue and Lynch, 2012).

Is nonpremium MOOP nondiscretionary? We have not yet addressed the discretionarity of nonpremium MOOP *within* the BCP nonpremium MOOP cap, which depends on the discretionarity of the *care* underlying it. The degree of discretionarity of nonpremium MOOP below the cap affects the merits of different approaches to nonpremium MOOP (Author 2013).

The NAS panel implied that nearly all care is essential in citing as examples of nondiscretionary care "elective cosmetic surgery…extra laboratory tests or ineffective drugs" (pp.232-236). At the other extreme, Cogan (1995) described "health as an economic good, responsive to both income and price changes." We recognize that, even for people with identical health plans, some care is chosen based on preferences, income, wealth and price and thus some nonpremium MOOP within the BCP cap will be discretionary. Since there is little agreement on a conceptual definition of discretionary care and no way to identify it in social surveys such as the CPS, the HIPM-U is a practical compromise, though it overstates poverty to an unknown degree.

Over-the-counter medications. The SPM includes OTC medications in the MOOP deduction (Short 2013). While some OTC drugs may clearly be essential (e.g., children's acetaminophen), others are not (e.g., brand name ibuprofen). Moreover, since spending (in dollars) on OTC drugs is not likely to be skewed or even very high variance, it might be better to incorporate them into the HIPM by expanding the SPM material threshold beyond food, clothing, shelter and utilities.[5]

VII: Conclusions

The NAS Report considered a HIPM desirable but unattainable. It recommended excluding health care from the revised poverty measure despite drawbacks such as "…that it does not explicitly acknowledge a basic necessity, namely, medical care that is just as important as food and housing. Similarly, the approach devalues the benefits of having health insurance, except indirectly" (Citro & Michael, 1995, p. 236). Yet the panel anticipated the day when the

[5] An additional issue concerns treatment of long-term care expenses, which are excluded by both the SPM and HIPM. Due to space constraints and because long-term care is mostly relevant for the population over-65 we refer the interested reader to Author (2013).

US health care system would provide universal health insurance, permitting the construction of a HIPM. That day is here for the US and arrived in Massachusetts several years ago.

The HIPM foundation lies in conceptualizing health *insurance* as the core health need. If instead health needs are conceptualized as health *care*, it would be exceedingly difficult to describe and measure basic health needs. In writing about the development of a health care financial risk measure, Meier and Wolfe (2012) and Meier (2014) describe many of the challenges. The "tails" of health care expenditures are extremely long. Moreover, an individual's expenditure depends on a great deal of clinical detail. Therefore, one needs health care databases with large sample sizes and much detail to measure health care expenditures with any precision. The expenditure distribution and its relationship to clinical and other characteristics change over time as technology changes. The purpose of health insurance, however, is to deal with those tails. If everyone has insurance, their health needs can be met, even if they require large expenditures.

The HIPM has several advantages. Unlike the SPM, the HIPM directly measures unmet health insurance needs—and thus unmet needs for care and risk reduction. Although the SPM can measure the impact of health insurance on poverty through any reductions in MOOP (e.g., Sommers and Oellerich 2013), it cannot measure the risk reduction among the healthy (with little MOOP), nor access to health care provided by health insurance. If a family foregoes health care because it is uninsured, the SPM does not capture the unmet need. If Medicaid expansions or the ACA allow the family to obtain health care, the SPM will register no direct poverty decrease. The SPM also does not show a healthy uninsured family to have unmet insurance needs. If they gain Medicaid coverage, the SPM registers no poverty decrease.

Perhaps most importantly, some uninsured people mandated to purchase even highly subsidized insurance under the ACA will be measured by the SPM as poorer. When they pay

even modest premiums, MOOP increases and SPM resources decrease, but the SPM assigns no value to the highly subsidized insurance they receive. Thus, if basic health insurance and health care are needs, the SPM misses and a HIPM captures important ways that Medicaid, the ACA and employer-provided insurance reduce poverty.

Though based on small samples and several approximations, our pilot HIPM suggests that public health insurance benefits account for a three-percentage point reduction in the poverty rate for the under-65 in Massachusetts and premium subsidies account for another point. Impacts on poverty gaps are even larger. Government health insurance accounts for a 2.4 percentage point reduction in the child poverty rate in Massachusetts and premium subsidies another 0.8 percentage point. Among those with individual insurance, the premium subsidies reduce HIPM poverty from 36.6% to 27.2%. Given the large expenditures on low-income persons through programs such as Medicaid, their substantial impact on poverty should not be surprising. Nonetheless, the result is novel because other poverty measures do not directly value health insurance in resources and needs.[6]

By providing a single measure of poverty that validly incorporates health needs, a HIPM could show the effects of policy variation under the ACA: differences in HIPM poverty between states that expand Medicaid eligibility and those that do not; or the effects on poverty of a future court ruling that residents of states that use the Federal exchange are ineligible for premium subsidies or that invalidates the premium subsidy altogether. A HIPM can show both how far we have come and how far we have to go before we can declare victory in the War on Poverty.

[6] Although we have not attempted to estimate behavioral responses to health insurance transfers as Sommers and Oellerich (2013) do for Medicaid and Ben-Shalom, Moffitt and Scholz (2012) do for a variety transfer programs, eventually data availability will permit estimation of causal impacts of the ACA and other health insurance benefits on HIPM poverty.

On-line Appendixes: Not intended for print publication.

Appendix 1: Premium (Plan Full Cost) Estimates and Other Data for 2010 Massachusetts[7]

Unlike the ACA, the Massachusetts health reform had separate exchanges for subsidized and unsubsidized insurance plans, called Commonwealth Care and Commonwealth Choice, respectively. We did not have any data for the PFCs (unsubsidized premiums = actuarially fair premium + loading) of the subsidized plans; we only had data on what people had to pay for them (premium MOOP). Therefore we assumed that the PFCs for the subsidized plans were the same as for the unsubsidized ones. This would not be a problem under the ACA, where there is one exchange for subsidized and unsubsidized plans.

To the extent that the unsubsidized exchange had a systematically healthier pool than the subsidized exchange, we are underestimating premiums. This biases downward our estimates of health insurance needs.

The HIPM requires identification of the BCP and its premium for all HIUs in the data. The premiums will depend on the number of people in the HIU and their ages, as well as their geographic location. Under the ACA, tobacco use can also affect premiums, but we consider the tobacco-free plan the basic need. The exchanges have this information, which in principle could be used to calculate a HIPM. We did not have access to that information for Massachusetts in 2010. Instead, we used the limited premium information from 2010 Massachusetts that we could obtain and predicted its variation with age and family size to develop estimates of all needed premiums, as we now explain.

[7] We thank [Anonymized Data Contributor] for providing us selected premium data from the 2010 unsubsidized exchange (Commonwealth Choice). We thank [Anonymized Data Contributors] for providing us with data on Commonwealth Care (subsidized exchange) and Medicaid for 2010 Massachusetts, specifically, the nonpremium MOOP caps for Medicaid and schedules relating out-of-pocket premiums and nonpremium MOOP caps to (adjusted) income for 2010.

Specifically, Starc and Ericcson (2013) collected premium data for 2010 Massachusetts for the zipcode 02130 for 35-year old adults and any family members. We selected the cheapest bronze low plan as our BCP since that plan accorded most closely with the ACA second cheapest silver plan in actuarial richness. We extracted information for the cheapest silver plan for a wide variety of ages and family sizes from the 2014 Massachusetts health exchanges for zipcode 02130, and then fit a regression model to predict variation by age and family size.[8] Using the predicted premium regression equation, anchored with the premiums from Ericcson and Starc, for each HIU we predicted 2010 Massachusetts the premium of the cheapest low bronze plan. Note that our prediction model will create more variation by age in premiums than there would have been in 2010, because the ACA regulations in operation in 2014 allowed a 3:1 maximum variation by age, while the 2010 Massachusetts regulations allowed a 2:1 maximum variation by age.

Since the public-use version of the CPS does not include geographic identifiers, we assumed that the 02130 premiums applied to everyone in Massachusetts. Parts of Massachusetts away from the greater Boston area may have lower premiums.

[8] Predictors were the total number of children (20 years old or less) and the total number of adults in 5-year age bands (21-24, 25-29, etc.).

On-line Appendixes: Not intended for print publication.

Appendix 2: Plan Full Cost and MOOP caps for under-65 Medicare beneficiaries

Medicare beneficiaries, even those under 65, are not eligible for the exchanges. However, the Medicare Advantage Prescription Drug (MA-PD) plans meet nearly all the HIPM criteria—and thus qualify for being the BCP for Medicare beneficiaries. These plans cover all necessary care, including prescription drugs, and generally vision and dental. Their premiums are not risk rated. As of 2011, (nonpremium) MOOP for all medical care provided by MA and MA-PD plans is capped at $6700 (the 95th percentile in costs in the traditional Medicare fee-for-service) and CMS encourages plans to make the cap $3400, the 85th percentile in the traditional Medicare program (Biles, Nicholas and Guterman 2006).

The main shortcoming of present MA-PD plans relative to the ideal BCP is the lack of an explicit cap on prescription drug nonpremium MOOP spending. (The Federal government funds and regulates the prescription drug coverage part of MA-PD plans separately, as part of the Part D benefits.) However, several features of the plans and of Federal government reduce prescription drug nonpremium MOOP and create virtual *de facto* caps. First, for all beneficiaries, once the catastrophic level of nonpremium MOOP is reached (currently $4700), cost sharing is substantially reduced (MedPAC, 2012). Second, the Medicare Part D low-income subsidy program reduces or eliminates cost-sharing for Medicare beneficiaries with low income and low assets (Summer, Hoadley and Hargrave, 2010). Third, many MA-PD plans offer "enhanced" prescription drug coverage that eliminates the deductible and substantially reduces co-pays, particularly for generic drugs, meaning high prescription drug expenditures are, to some extent, discretionary. Finally, even conventional Part D plans are reducing the extensive prescription

drug coverage cost-sharing in the "donut-hole," eliminating it by 2020. So we expect MA-PD enhanced coverage could have even less cost-sharing (Focus on Health, 2011).

In Massachusetts in 2010, there was no legally required cap for MA-PD plans for out-of-pocket spending on medical care. Nonetheless, we will apply the exchange caps to the Medicare beneficiaries. We feel this is justified for several reasons. First, our implementation of the HIPM in 2010 Massachusetts is illustrative. Second, there are only 62 Medicare beneficiaries among the under 65 in our analysis sample. Third, as noted, most MA-PD plans have limited cost-sharing. Fourth, poor Medicare beneficiaries are protected through other programs.

As for the exchanges, we must identify a particular MA-PD plan as "the" BCP. The terms and features of MA-PD plans vary considerably. Plans may trade off premium MOOP and nonpremium MOOP. Major metropolitan areas have plans with little or no premium above the Part B premium and little, if any cost-sharing. In 2014, in zipcode 02138 in Massachusetts, the location we use for the exchange premiums, an MA-PD plan with no additional premium above the Part-B premium was available. We assume that the same was true in 2010. Such information can be obtained by searching the CMS interactive Plan Finder Web Site https://www.medicare.gov/find-a-plan/questions/home.aspx). For national implementation, some rural areas have no HMO MA-PD plans, but even in these areas it should be possible to identify a PPO or fee-for-service MA-PD plan as the BCP.

A further complication is that the premiums paid by Medicare beneficiaries for MA-PD plans are far below the PFC, since the government contribution is so large. Unfortunately, we cannot determine the government contribution to Medicare for under-65 beneficiaries alone. Therefore, we cannot calculate the PFC of the MA-PD plan and instead use the exchange BCP as a proxy for it in needs. For those with Medicare, the BCP is an MA-PD plan. In 2010, MA-PD

plans had no nonpremium MOOP caps; those were instituted as part of the ACA legislation. We nonetheless apply the BCP nonpremium MOOP caps For this illustration with the under-65, we treat the BCP PFC as the PFC for under-65 Medicare beneficiaries. This problem is eliminated when the HIPM is implemented for both those over and under 65, because the government contribution can be calculated.

On-line Appendixes: <u>Not intended for print publication</u>.

Appendix 3: Assigning Individuals to Health Insurance Units

In order to calculate health insurance needs and resources, individuals must be put into health insurance units (HIUs). Those who receive health insurance together must be put into the same HIU, while those who do not receive health insurance together must be put into separate HIUs. SHADAC (2012) have constructed such family units for the IPUMS CPS and also refer to them as HIUs; we will refer to them as "IPUMS HIUs." Our HIUs are often identical to IPUMS HIUs but differ when actual health insurance coverage differs among those in the same IPUMS HIU. The income of the *IPUMS* HIU determines our HIU's Medicaid and subsidy eligibility. While this may be confusing, it best captures reality: the entire family (IPUMS HIU) income determines the maximum premium payments (implicit subsidies) but only for those actually purchasing insurance together (our HIU).

We use the following rules to construct our HIUs and to define HIU "types":

- Each person reported as having Medicare is put in his/her own one-person HIU of type "Medicare."
- Employer-provided insurance policyholder and all dependents of that policy are put in the same HIU with health insurance type "employer-provided insurance."
- Individually purchased insurance policyholder and all dependents of that policy are in the same HIU with health insurance type "individually purchased insurance."
- Each person reported as having full-year Medicaid coverage is given health insurance type "full-year Medicaid." Everyone in the same family (i.e., IPUMS HIU) with full-year Medicaid is put in the same HIU. In addition, children (under 18-year-old) with no other health insurance coverage who have a parent with full-year Medicaid are considered to have full-year Medicaid and placed in the same HIU as that parent. The assumption is that they could obtain Medicaid.

- Those who report any type of Veterans Affairs (VA) coverage (either VA Milt or VA Champus) are given health insurance type "VA" and put in their own, one-person, HIU.
- Each person reported as being covered by someone outside the household is considered to have HI type of "covered outside the household." Everyone in the same family (i.e., IPUMS HIU) covered outside the HH is put in the same HIU. For example, a mother and her child both covered outside the household are in the same HIU, but a grandmother or roommate in the same SPM unit, also covered by someone outside the household, would be placed in separate HIUs.
- Those who report being covered by Medicaid for part of the year and report no other insurance are included in the same HIU of type "part-year Medicaid." All those in the same family (i.e., IPUMs HIU) who report being part-year Medicaid are put in the same HIU.
- Everyone who is reported to be uninsured is given HI type "uninsured." All those in the same family (i.e., IPUMs HIU) who report being uninsured are put in the same HIU.

In cases where more than one type of insurance is reported we assigned insurance type in the following order: Medicare, employer-provided, individually purchased, full-year Medicaid, VA, covered by someone outside the household, uninsured, part-year Medicaid.

Finally, premium subsidies may not be available to families of those with employer-provided health insurance if the employer-provided insurance is considered qualified and if coverage for the *employee only* is considered affordable—the "family glitch" (e.g., Brooks 2014). Since the CPS does not collect information about whether an employee plan is qualified and affordable to the employee only, we assume it is qualified and affordable and exclude such family members from premium subsidies.

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Table 1: Illustrative Calculation of the SPM and HIPM for Two Hypothetical Families

Line No.		Family A	Family B
	Needs		
(1)	Material needs (SPM threshold)	20,000	20,000
(2)	Health Insurance Needs (BCP)	10,000	10,000
	Resources		
(3)	Income (SPM resources)	22,000	22,000
(4)	Health insurance resources provided	None	Medicaid policy, no MOOP premium payment required. Value = BCP (10,000).
	SPM Poverty Status (line 3 versus line 1)	Not poor	Not poor
(5)	HIPM Resources (line 3 + line 4)	22,000	32,000
(6)	HIPM Poverty Threshold (line 1 + line 2)	**30,000**	**30,000**
(7)	HIPM Poverty status: line (5) vs. line (6)	Poor	Not Poor

Note: Neither family has any premium or nonpremium MOOP.

Table 2: Health Insurance Resources & Nonpremium MOOP Deductions by Health Insurance Unit Type

HIU Type	Health Insurance Resources	Nonpremium MOOP Deduction
Employer Provided	PFC – Actual Premium (up to BCP premium)	Actual nonpremium MOOP (up to BCP nonpremium MOOP cap, with no income-related reductions)[1]
Individually Purchased	Subsidy to premium (unless family member has employer provided insurance)[2]	Actual nonpremium MOOP (up to BCP nonpremium MOOP cap; income-related reductions apply unless family member has employer-provided insurance)[3]
Covered by Someone Outside SPM Unit	PFC[4]	Actual nonpremium MOOP (up to BCP nonpremium MOOP cap; income-related reductions apply unless family member has employer-provided insurance) [4 3]
Full-year Medicaid	PFC[5]	Actual nonpremium MOOP (up to very low Medicaid nonpremium MOOP cap) [6]
Veterans Affairs	PFC[7]	Actual nonpremium MOOP (up to BCP nonpremium MOOP cap; ; income-related reductions apply unless family member has employer-provided insurance) [8]
Medicare (non-elderly)	PFC – Actual Premium up to MA-PD BCP premium[9]	Actual nonpremium MOOP (up to MA-PD nonpremium MOOP cap)[10]
Part-year Medicaid	PFC pro-rated to number of months covered by Medicaid	Actual nonpremium MOOP (up to BCP nonpremium MOOP cap; income-related reductions apply unless family member has employer-provided insurance) [11]
Uninsured	Subsidy to premium[12, 2]	Actual nonpremium MOOP (up to BCP nonpremium MOOP cap; income-related reductions apply unless family member has employer-provided insurance)[12]

Notes:

[1] Nonpremium MOOP caps set by law.

[2] Subsidy is calculated as the difference between plan full cost (unsubsidized premium) and maximum out-of-pocket premium allowed, based on household income and the sliding scale set by law. Note that these *family* (IPUMS-HIU) income based maximum MOOP premiums apply even if only part of the household actually purchases insurance on the exchange. Also, we assume that those in a family with someone with employer provided insurance are not eligible for subsidized premiums and are therefore capped at the unsubsidized BCP premium. (For these purposes, "family" is defined by the government for health insurance eligibility purposes, as implemented by the IPUMS HIU. See Appendix 3 for details and citations.)

[3] Sliding-scale for nonpremium MOOP caps is determined by family (IPUMS-HIU) income.

[4] For those covered by someone outside the SPM unit, we assume that reported MOOP of any form up to the BCP cap is non-discretionary.

[5] For states that require Medicaid recipients to pay premium MOOP it would be deducted up to the maximum required amount.

[6] Nonpremium MOOP caps for Medicaid are determined by states.

[7] VA eligible do not pay any premiums.

[8] VA cost-sharing depends on priority statuses such as service-related disability and other factors not available in our data. Veterans who are already VA qualified are not eligible for the exchange subsidies, including the income-based nonpremium MOOP reductions. However, since they are eligible for low VA cost-sharing, we cap their MOOP expenditures at the BCP caps.

[9] We assume Medicare recipients' BCP is the cheapest available MA-PD plan. The MA-PD plan premium is the Part-B premium plus the additional MA-PD premium, if any. In this study we assume no additional MA-PD plan beyond Part-B premium is required since that is currently the case.

[10] MA-PD nonpremium MOOP caps did not exist in Massachusetts in 2010. Nationally, they started for medical care in 2011 after the ACA but still do not exist for prescription drug coverage. See Appendix 1. Since we have only non-elderly Medicare recipients, we use the BCP caps.

[11] Those with part-year Medicaid have their nonpremium MOOP capped at the full-year BCP cap.

[12] Although those who are uninsured do not receive premium subsidies, they could have had them and we treat them as government resources available to meet health insurance needs. See text for discussion.

Table 3: HIPM Calculation for a Family with Employer-Provided Insurance Benefits and MOOP Expenses

Line No.		Family C
	Needs	
(1)	Material needs (SPM threshold)	20,000
(2)	Health Insurance Needs (BCP)	10,000
	Resources	
(3)	Cash income, pre-tax (OPM resources)	18,500
(4)	In-kind benefits (non-health) and tax credits net of taxes paid	3,500
(5)	Income (SPM resources before MOOP deductions) (line 3 +line 4)	22,000
(6)	Health insurance resources provided	Employer-provided insurance $3,000 premium MOOP required
(7)	Actual nonpremium MOOP	1,500
(8)	Actual total MOOP (line 6 + line 7 required MOOP)	4,500
(9)	SPM resources after MOOP deduction (line 5 – line 8)	17,500
	SPM Poverty Status (line 9 versus line 1)	Poor
	HIPM	
(10)	BCP nonpremium MOOP cap	9,000
(11)	Net Health Insurance Resources (line 2 – line 6)	7,000
(12)	HIPM Poverty Threshold (line 1 + line 2)	30,000
(13)	HIPM Resources = (line 5 + line 12) - min. of (line 7 and line 11)	27,500
	HIPM Poverty status: line (13) vs. line (14)	Poor
	Implicit Thresholds	
(14)	SPM Implicit Threshold (line 1 + line 8)	24,500
(15)	HIPM Implicit Threshold (line 13 + min. of (line 7 and line 11)	31,500

Table 4: Official, Supplemental and Health Inclusive Poverty Rates, Massachusetts, 2010 SPM Units with All Persons Under Age 65	
Poverty Measure	Poverty Rate (%)
(1) OPM	11.9
(2) SPM	13.5
(3) SPM, no MOOP Deduction	10.4
(4) HIPM-U	12.2
(5) HIPM-U, with OTC deduction	12.5
(6) HIPM-L	11.4

Notes: The unweighted sample count is 2,504
Sample weighted using CPS March Supplement person weights.
OPM: Official Poverty Measure
SPM: Supplemental Poverty Measure
MOOP: Medical Out of Pocket Expenses
HIPM: Health Inclusive Poverty Measure (L – lower bound; U – Upper bound)
OTC: Over-the-counter medicine expenditures

Table 5: Effects of Public and Private Transfers on Health Inclusive Poverty Rates, Massachusetts, 201
Individuals in SPM Units with All Persons Under Age 65, By Family Type and Health Insurance Type

		Family Type					**Heal**
Resources	All	Children	Lone Adult SPMUs	Persons in One-Parent SPMUs	Persons in Two-Parent SPMUs	Persons in Two-Adult SPMUs	Employer
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
"Cash" only (OPM resources)	19.1	22.1	28.2	42.0	17.7	14.2	6.0
Add: in-kind government transfers & tax credits, less taxes, etc.[4] (SPM resources, pre-MOOP deduction)	19.2	19.5	30.2	33.3	15.0	13.0	8.5
Add: employer health insurance	16.1	16.2	28.5	30.5	13.1	11.2	4.8
Add: government health insurance	12.8	13.8	22.0	27.0	10.9	7.1	4.7
Add: MA health insurance subsidies (HIPM)	12.2	13.0	21.5	27.0	10.1	7.1	4.4
Unweighted sample count	**2504**	**819**	**222**	**182**	**1183**	**292**	**1757**

1. The "all" column includes persons covered by types of insurance not shown separately: Medicare (<65), VA and other veterans programs, those covered by individuals outside households and uninsured individuals. Public health insurance benefits or subsidies to persons outside the household to the benefit of the sample member cannot be measured. Poverty is determined at the SPM-Unit level. SPM Units are divided into multiple health insurance units (HIUs) according to members' HI coverage. Our HI units differ from CPS/IPUMS units. See Appendix 3 for details.
2. For Medicaid: the OPM rate is 53, the SPM rate is 41.5;
3. For Employer Provided Insurance: the OPM rate is 2.0; the SPM rate is 5.5.
4. This also includes other SPM adjustments to resources such as deducting necessary childcare expenses.

Table 6: Effects of Public and Private Transfers on Health Inclusive Poverty Gaps, Massachusetts, 2010 Individuals in SPM Units with All Persons Under Age 65 By Health Insurance Type[1, 2]				
Resources	All	Employer	Medicaid	Individual Purchase
	(1)	(2)	(3)	(4)
Cash only (OPM resources)	43.7	35.4	48.6	49.4
Add: in-kind government transfers & tax credits, less taxes, etc.[3] (SPM resources, pre-MOOP deduction)	29.4	29.1	27.2	51.8
Add: employer health insurance	25.8	16.5	27.1	51.8
Add: government health insurance	18.9	16.3	15.0	51.5
Add: MA health insurance subsidies (HIPM)	17.2	16.0	14.9	32.4
Unweighted sample count	**489**	**114**	**251**	**14**

1. Note the "all" column includes persons covered by types of insurance not shown separately: Medicare (<65), VA and other veterans programs, those covered by individuals outside households and uninsured individuals. Public health insurance benefits or subsidies to persons outside the household to the benefit of the sample member cannot be measured.
2. Poverty is determined at the SPM-Unit level. SPM Units are divided into multiple health insurance units (HIUs) according to members' HI coverage. Our HI units differ from CPS/IPUMS units. See Appendix 3 for details.

3. This also includes other SPM adjustments to resources such as deducting necessary childcare expenses.