# Cross-State Variation in Health Care Utilization of the DI Population: Evidence from Medicare Claims

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#### <u>Abstract</u>

Beneficiaries in the Social Security Disability Insurance program are enrolled in Medicare after 24 months on the program. Using 100 percent Medicare Part B claims in 2012 for people under age 65, I examine office and outpatient visits by state and by primary diagnosis for the visit. The per capita number of visits by state, based on the number of Medicare Part B enrollees under age 65 in each state, reveals substantial cross-state variation in the use of health care by DI beneficiaries. Across the United States, the average number of office and outpatient visits per capita was about 24 in 2012, or 2 per month, but it ranged from almost 39 in Vermont to 14 in Hawaii. Visits for musculoskeletal impairments averaged 3.4 per capita, ranging from 5.6 in Delaware to 1.4 in Hawaii. The greatest variation occurred in visits for mental health conditions, averaging 2.4 for the U.S. but ranging from 7.4 in Massachusetts to 1.0 in Arizona. Factors such as the share of a state's population who are obese, the share of a state's Medicare population with Medicare Advantage plans, and drug prescribing rates help to explain a sizable portion of the variation in health care utilization across states. Knowledge of health care utilization could inform policy choices for programs such as return-to-work strategies or early intervention efforts both at the federal level and tailored to particular needs at the state level.

Keywords: Social Security Disability Insurance program, health care, cross-state variation

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**Evidence from Medicare Claims** 

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# I. Introduction

About 10.6 million people in the United States received benefits from the Social Security Disability Insurance (DI) Program at the end of 2016, having qualified based on previous work history as well as serious disabilities that prohibit them from being able to work. Some policy makers would like to implement more effective policies to encourage some of those beneficiaries to return to the workplace, but little is known about their medical and mental health needs. All DI beneficiaries who have been on the program for at least 24 months are eligible for Medicare, however, suggesting that Medicare claims records could be a rich source of information about the kinds of care used. Data on health care visits by state and primary diagnosis offer insights into the health care challenges faced by DI beneficiaries in different parts of the country. Those same data provide a window into how health care differs for DI beneficiaries in different states.

Growth in the DI program since the 1980s has been greater than expected based on changes in the characteristics of the labor force during this period (Autor and Duggan 2003; Liebman 2015). The latest report on the DI Trust Fund suggests it will likely be exhausted by 2028 (Old Age, Survivors, and Disability Insurance Trustees, 2017). As a result of those developments, proposals to reduce the number of workers into the DI program, known as early intervention, have caught the attention of policy makers (for example, Autor and Duggan 2010; Burkhauser and Daly 2012). Those developments have also raised interest in return-to-work programs to encourage DI beneficiaries to more actively explore possibilities for labor force participation, perhaps eventually leading to leaving the DI program.<sup>1</sup> Knowing more about the health care used by the DI beneficiary population in each state could help policy makers target the needs of potential applicants as well as current beneficiaries.

Data from the Social Security Administration show the primary diagnoses at the time of eligibility for DI (see Figure 1), but this paper will show that they do not reflect the types of

<sup>&</sup>lt;sup>1</sup> Some DI beneficiaries currently leave the program to return to work. Liu and Stapleton (2011) found that 10 years after their entry into the DI program, 28 percent of beneficiaries entering in 1996 had returned to work, 6.5 percent had their benefits suspended for work in at least one month, and 3.7 percent had their benefits terminated for work. The corresponding percentages are much higher for those who were younger than age 40 when entering the DI program.

health care actually used. Among all DI beneficiaries in 2010, more than one-third had qualified on the basis of mental health conditions and about one-quarter on the basis of disorders of the musculoskeletal system and connective tissue. Disorders of the nervous system and sense organs or circulatory system, injuries, and disorders of the endocrine, nutritional, and metabolic systems accounted for another quarter of beneficiaries. Using Medicare Part B claims data reveals that actual visits for health care occur in a more diffuse pattern. Moreover, variation across states in the kinds of health care used is surprisingly large in some cases.



The focus of this paper is on office and outpatient visits by primary diagnosis and state. I use the Medicare population under age 65 to avoid conflating health care visits for age 65 seniors who are newly eligible for Medicare with age 65 DI beneficiaries. Using 100 percent Medicare claims for the population under age 65 in 2012, I am able to report a per capita measure of visits for DI beneficiaries because they account for more than 99 percent of all Medicare Part B enrollees under age 65. Comparisons of health care used across states describe per capita office and outpatient visits by primary diagnosis for the visit. Across the country, the top reason for office and outpatient visits is musculoskeletal conditions (14 percent), followed by mental health conditions (10 percent), respiratory conditions (9.6 percent), circulatory conditions (8.6 percent), and endocrine conditions (8.0 percent) (see Figure 2). The divergence between primary diagnosis at time of eligibility and primary diagnosis for health care utilization is apparent. Mental health is the primary diagnosis at the time of eligibility for 36 percent of beneficiaries, but mental health visits account for only 10 percent of the office and outpatient visits, on average; musculoskeletal conditions is the primary diagnosis at the time of eligibility for 26 percent of beneficiaries, but musculoskeletal visits account for only 14 percent of visits.



Those averages hide a great deal of variation in health care used by DI beneficiaries in different states. That variation could arise because the health needs and demographics of the DI population vary across states. Cross-state variation in DI enrollment by age group was the subject of an earlier paper (Manchester and Tweed, 2015). It showed that the New England states have higher proportions of young people on the DI program than most other states, and that eligibility based on mental health conditions was especially high in those states. Questions raised by those findings suggested that investigating the types of health care used across states could help our understanding of characteristics of the DI population. Knowing the health care needs of the DI populations could alert policy makers to possible types of interventions to help DI beneficiaries reenter the workforce or to help potential DI beneficiaries avoid enrolling in the DI program in the first place.

Of course, the number and types of health care visits observed reflect not only the needs of the DI population in each state but also the patterns of treatment for various diagnoses that could vary geographically. Protocols for treating back pain could differ significantly across states, ranging from using drugs alone to relying primarily on pain management intervention, requiring more or fewer visits. Similarly, using medication assisted therapy rather than only drugs to treat substance abuse may be more common in some parts of the country than others, again leading to differences in the observed number of visits.

Much previous literature points to differences in both the demand for health care as measured by characteristics of the population and the supply of health care across geographic areas. The Dartmouth Atlas project has spotlighted geographic variation in health care spending using Medicare claims data for people age 65 and over to examine issues ranging from possible inefficiencies in the health care system to the care of chronic illness in the last two years of life (Dartmouth Atlas 2017). Sheiner (2014) argued that socioeconomic factors, as well as interactions between the Medicare systems and other parts of the health care system, can account for most of the geographic variation in spending. A study of Medicare beneficiaries who move (Finkelstein, Gentzkow, and Williams, 2014) found that 40 percent to 50 percent of geographic variation in utilization is attributable to demand-side factors such as health status and preferences, and the remainder comes from place-specific supply factors. The relatively low income of DI beneficiaries prior to eligibility for the program may place even more emphasis on individual characteristics in influencing health care needs.<sup>2</sup> In a recent paper looking at longevity rather than health care per se, Chetty and Cutler (2016) found that geographic differences in life expectancy for individuals in the lowest income quartile were significantly correlated with health behaviors such as smoking, but they were not significantly correlated with access to medical care, physical environmental factors, income inequality, or labor market conditions.

Recognizing the interplay of supply and demand factors that determines who is seen for what diagnosis, the results here represent a first look at the cross-state variation in health care used by the DI population through Medicare Part B. A number of limitations pertain to the picture of health care utilization that emerges. The absence of data on the secondary or tertiary reason for the visit and on the cost of care leaves a big hole,<sup>3</sup> as does the inability to track health care visits of individual DI beneficiaries according to their primary diagnosis for eligibility. Visits reported here do not include health care financed outside of Medicare Part B. I have no information on prescription drugs covered by Part D of Medicare or on the

<sup>&</sup>lt;sup>2</sup> For evidence of relatively low earnings levels prior to participating in the DI program, see von Wachter, Song, and Manchester (2011), Figure 4.

<sup>&</sup>lt;sup>3</sup> One of the earliest analyses of Medicare utilization by DI beneficiaries looked at Medicare reimbursements for a 1-in-20 sample of the 1972 cohort of newly eligible beneficiaries under age 62 for years 1974 to 1981 (Bye Riley Lubitz, 1987). The study found that 82 percent of the 1972 cohort continued to receive DI benefits for two years or more and became eligible for Medicare. The highest *spending* (including hospital costs) occurred for beneficiaries with genitourinary diagnoses (largely ESRD cases). Women's reimbursements were about 40 percent greater than men's, and the average reimbursement rate at that time dropped as age increased. About 70 percent of the beneficiaries were men. At that time, the largest diagnostic groups were circulatory (28 percent), musculoskeletal (15 percent), mental disorders (9 percent), and neoplasms (8 percent).

share of DI beneficiaries under age 65 who receive health care through Medicare Advantage, Part C. Some DI beneficiaries are eligible as well for the Supplemental Security Income (SSI) program, meaning that they are also eligible for Medicaid, but I have no data on health care provided through Medicaid alone. In addition, data on hospital stays for DI beneficiaries are not incorporated into the analysis. Nevertheless, the variation in frequency of visits for different diagnosis types in office and outpatient visits points to differing needs of the DI population and perhaps differences in supports offered that could affect early intervention or return to work.

The prominence of opioid addiction suggests that health care visits for substance abuse are an important aspect of health care to track across states. Moreover, growing opioid addiction could have implications for disability insurance programs and the types of health care sought by disability insurance beneficiaries. Cutler, Meara, and Stewart (2017) found that areas with more rapid increases in opioid shipments have greater increases in Disability Insurance enrollment. In addition, the share of disability insurance beneficiaries who receive high doses of opioid drugs varies widely across states. That information is useful below in explaining why some states show high levels of office and outpatient visits even after accounting for various characteristics of the population and health care system.

The desire to include health care visits for substance abuse dictates the year for which data are examined in this paper. Starting in 2013, Medicare data on visits related to substance abuse were redacted from various data sets to protect confidentiality. Data from 2012 are not affected by the redaction and provide the basis for analysis here.

# II. Data and Methodology

Analysis of health care utilization by Disability Insurance beneficiaries across states in this paper rests on Medicare claims data for people under age 65. Medicare claims data for people under age 65 overwhelmingly represent health care used by Disability Insurance beneficiaries, as only 0.7 percent of Medicare enrollees under age 65 are eligible for other reasons. Non-DI Medicare enrollees under age 65 fall into one of three groups. Patients with end-stage renal disease who are not receiving DI benefits (0.20 percent) and children under age 19 (0.03 percent) account for 0.23 percent of the non-DI Medicare enrollees (see Table 1). In addition, Railroad Retirement Board beneficiaries with disabilities are approximately 0.45 percent. In 2007, about 84,000 Railroad Retirement Board beneficiaries were disability beneficiaries or occupational disability beneficiaries, about half of whom were eligible for Medicare.<sup>4</sup> In all, about 0.7 percent of Medicare enrollees under age 65 are not DI beneficiaries.

<sup>&</sup>lt;sup>4</sup> See Whitman (2008). Medicare coverage is available for disabled employee annuitants under age 65 who have been entitled to monthly benefits based on total disability for at least 24 months and to annuitants entitled to

Table 1. Medicare beneficiaries onder Age 05 in 2012				
	Total	Disabled	Disabled	ESRD
		w/out ESRD	with ESRD	Only
Under 65 Years	8,624,192	8,382,541	224,301	17,350
Share of All < 65		97.20%	2.60%	0.20%
Under 19 Years	2,531	215	2,145	171
Share of All < 65	0.03%			
Share of < 19		8.49%	84.75%	6.76%

# Table 1. Medicare Beneficiaries Under Age 65 in 2012

Source: Based on Medicare & Medicaid Statistical Supplement, Research Review/ 2013 Statistical Supplement, Table 2.3; available at

https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareMedicaidStatSupp/Downloads/2013\_Section2.pdf

Disability Insurance beneficiaries who have been on the program for at least 24 months are eligible for Medicare Part A (hospital insurance) and Medicare Part B (office and outpatient visits). In addition, DI beneficiaries with amyotrophic lateral sclerosis (ALS or Lou Gehrig's disease) are automatically enrolled in Medicare Part A in the first month they receive Social Security disability benefits. Medicare Part A is available at no charge, but enrollees must pay the premium for Part B services if they choose to enroll. Medicare enrollees with Parts A and B can join a Medicare Advantage plan. In 2012, 27 percent of Medicare beneficiaries under age 65 in the U.S. were enrolled in Medicare Advantage (Part C) compared with 31 percent of Medicare beneficiaries age 65 or above (Cubanski, et al., 2016). Health care visits for Medicare Advantage enrollees are not reported in the Part B data, and I have no information on enrollment in Medicare Advantage for those under 65 by state. In the analysis below, I use shares of all Medicare beneficiaries in Medicare Advantage in each state as an indicator of the availability of private networks to Medicare enrollees under age 65 by state.

The Dartmouth Institute for Health Policy and Clinical Practice provided files for Part B enrollees under age 65 from the Dartmouth Atlas of Health Care. The data show the total counts of visits for office and outpatient services by ICD-9 diagnosis code and state of patient residence in 2012, 2013, and 2014. I received two files for each of the 50 states plus the District of Columbia:

• One set of files reports the number of office visits by primary diagnosis code for care provided by physicians and other health care providers

monthly benefits based on an occupational disability 30 months after being granted a disability freeze based on standards similar to those for total disability. See "Medicare for Railroad Families," U.S. Railroad Retirement Board, April 2017; available at <a href="https://www.rrb.gov/sites/default/files/2017-05/QA1704.pdf">https://www.rrb.gov/sites/default/files/2017-05/QA1704.pdf</a>.

• The other set of files reports the number of outpatient visits by primary diagnosis code

The numbers of visits for diagnosis codes related to substance abuse are redacted in the 2013 and 2014 files, as was required by federal law, leading to my focus on 2012.<sup>5</sup> I have aggregated the 3-digit ICD-9 codes into the major diagnosis types used by the Social Security Administration for DI eligibility.<sup>6</sup> Data for all Dartmouth Atlas regional data reflect the experience of Medicare patients living in the region, regardless of where the care was actually delivered.

To protect the confidentiality of the data, the exact number of visits in a state for a particular ICD-9 code is not reported when the number of visits for that diagnosis code is less than 15 but greater than zero. The total number of visits per state for each of the two provider types is known, however. I have inserted the average number of unreported visits into each of those diagnosis types with missing data. The average number of unreported office visits is about 7, and the average number of unreported outpatient visits is about 6.9. Total unreported visits make up no more than 0.46 percent of total office visits in any state in 2012 (Wyoming) and no more than 2.39 percent of total outpatient visits (Hawaii).

The ICD-9 code V13 appears frequently in a few states but does not convey information about the specific purpose of the visit. The V13 code means "personal and family history of other diseases" and represents less than 1 percent of office visits on average across the United States in 2012. As of 2015, CMS no longer allowed the use of the code because it conveys so little information. In a few states, however, it was used frequently in 2012: Vermont (38 percent of all visits), Michigan (10 percent), Maine (9 percent), and Rhode Island (7 percent). Cursory inspection of other types of visits for those four states relative to the national averages suggests that some providers used the V13 code for follow-up treatment such as physical therapy or aftercare. I have not allocated those V13 visits to any particular diagnosis, but results by diagnosis for those four states should be viewed with caution in light of the data issue.

To compare utilization of health care by DI beneficiaries across states, I use a "per capita" measure of office and outpatient visits. The number of office and outpatient visits overall or

<sup>&</sup>lt;sup>5</sup> Under the previous regulations, the Center for Medicare and Medicaid Services (CMS) was required to redact all substance use disorder claims from the Research Identifiable Files (RIFs). At some point in the future, data on those visits will become available again. On January 17, 2017, the Substance Abuse and Mental Health Services Administration (SAMHSA) finalized changes to the Confidentiality of Alcohol and Drug Abuse Patient Records Regulations, 42 CFR Part 2. Under those changes to the Part 2 regulations, CMS is now permitted to include substance use disorder claims data in the Research Identifiable Files (RIFs). Research Identifiable Files shipped or extracted after 05/22/2017 are no longer subject to the redaction.

<sup>&</sup>lt;sup>6</sup> The statistics group at the Social Security Administration provided the crosswalk between DI eligibility types and the ICD-9 codes. Note that one 4-digit ICD-9 code does not fit neatly into the SSA eligibility types. The code 3195 is included in SSA's "intellectual disability disorders" in the 3-digit classification but technically should fall under "other mental disability disorders."

for specific diagnosis groups is the numerator, and the number of Medicare beneficiaries under age 65 on Part B in each state is the denominator. The Centers for Medicare & Medicaid Services (CMS) reports the number of people under age 65 enrolled in Medicare Part B by state in 2013.<sup>7</sup> To obtain the number of enrollees in the United States for 2012, I multiply by the ratio of DI beneficiaries in June 2012 to DI beneficiaries in June 2013, or 0.9806, to find 7,699,557 Medicare Part B enrollees for all of the United States in 2012. I apply the same method to enrollees in each state. California has 8.4 percent of all Part B enrollees under age 65 in 2012, for example, and Wyoming has just 0.1 percent.

Many beneficiaries from the DI beneficiary population in 2010 would have survived to be eligible for Medicare benefits in 2012. Based on experience from 2006 to 2010, about 5.6 percent of male DI beneficiaries died in the first year following entitlement, and about 3.8 percent died in the second year following entitlement.<sup>8</sup> The percentages are slightly smaller for women. The probability of death drops to about 3 percent for men and about 2 percent for women after 2 or 3 years on the program before rising slightly as duration increases. On average, beneficiaries with musculoskeletal and mental disorders exhibit lower mortality than most other diagnostic groups, whereas beneficiaries with circulatory disorder have among the highest mortality.

After presenting results on office and outpatient visits per capita for the 50 states and Washington D.C. for all diagnoses and the five most prevalent diagnoses, I will also try to explain some of the cross-state variation using regression analysis. Explanatory variables include factors on the demand side and the supply side as well as some socioeconomic characteristics of populations.

#### IV. Results

# A. Cross-State Variation in Office and Outpatient Visits

In addition to looking at all office and outpatient visits (ALL), I focus on visits with primary diagnosis in five major groups that account for about half of all visits nationwide: diseases and symptoms related to the musculoskeletal system and connective tissue (MSK); mental health (MENT); diseases and symptoms related to the respiratory system (RESP), diseases and symptoms related to the circulatory system (CIRC); and endocrine, nutritional and metabolic

<sup>&</sup>lt;sup>7</sup> CMS, Office of Enterprise Data and Analytics, CMS Chronic Conditions Data Warehouse. MDCR Enroll AB 7, Total Medicare Enrollment: Part A and/or Part B Total, Aged, and Disabled Enrollees, by Area of Residence, Calendar Year 2013.

<sup>&</sup>lt;sup>8</sup> See Tim Zayatz, "Social Security Disability Insurance Program Worker Experience," Actuarial Study No. 123, August 2015, Table 13; available at <u>https://www.ssa.gov/OACT/NOTES/pdf\_studies/study123.pdf</u>

diseases and immunity disorders (ENDOC). Maps of the United States showing how the states fall into quintiles of visits per capita for all office and outpatient visits and for the five major diagnosis groups appear in Appendix A.

<u>ALL Visits.</u> The total number of visits to offices of physicians and other health care providers in 2012 among the Medicare population under age 65 (hereafter, DI beneficiaries) was 149.3 million. Divided among the 7.7 million people under age 65 who had Part B coverage in 2012 (over 99 percent of whom were DI beneficiaries), the number of office visits per capita was 19.4. In addition, there were 34 million outpatient visits, or 4.4 per capita. For most purposes in this paper, I consolidate office and outpatient visits because many services can be provided at either location. Summing office visits and outpatient visits leads to 23.8 visits per capita in 2012, or about 2 visits per month. At the state level, total office and outpatient visits per capita in Ramael from 38.8 visits per year in Vermont to 14.0 visits per capita in Hawaii (see Figure 1). The New England states are highlighted in various colors in many figures because they often tend to be among the states with higher numbers of visits per capita. The United States average appears red. All of the New England states except Rhode Island are in the top ten states for total visits per capita. They are joined by Delaware, Maryland, Washington DC, Illinois, and Michigan. Hawaii, Arizona, and Oregon are the three states with the lowest number of visits per capita.



<u>Musculoskeletal visits.</u> Visits for diseases and symptoms of the musculoskeletal system and connective tissue comprise 14 percent of all office and outpatient visits in the U.S., the largest

share of visits for a major diagnosis group. That result is not surprising given that musculoskeletal conditions are the most common reason for DI eligibility. The U.S. average number of visits per capita for musculoskeletal diagnoses was 3.4 in 2012. The highest number of visits occurred in Delaware at 5.6 visits per capita, and the lowest number of visits occurred in Hawaii at 1.4 visits per capita. Four of the six New England states are in the top ten states; Connecticut and Rhode Island fall below the national average. Again, Hawaii, Oregon, and Arizona are the states with the lowest number of visits per capita.



<u>Mental health visits.</u> Across the U.S. as a whole, office and outpatient visits for mental health diagnoses and symptoms occurred 2.4 times per capita in 2012, the second largest major diagnosis category. Relative to the population of all Part B enrollees under age 65 in each state, per capita visits for mental health conditions ranged from 7.4 visits per year in Massachusetts to 1.0 visit per year in Arizona (see Figure 3). As was the case for visits for all diagnoses, all the New England states are in the top ten states. Alabama, Arizona, and Mississippi are the states with the smallest number of visits for mental health diagnoses.



To explore more deeply the types of mental health diagnoses that lead to office and outpatient visits, I looked at the visits in the top five states for three mental health diagnosis types that account for 95 percent of all mental health visits: mood disorders (43 percent of all mental health visits), schizophrenic and other psychotic disorders (27 percent), and "other mental disorders" (25 percent) that includes alcohol or drug dependence or psychoses, anxiety or personality disorders, sleep disorders, and post-traumatic stress disorder. All of the top five states are in New England and have more than double the U.S. average number of visits per capita for all mental health diagnoses together (see Figure 4). They also have double or more the number of visits for mood disorders and other mental health disorders, including anxiety disorders and drug or alcohol abuse disorders. Massachusetts stands out in visits for all mental health, mood disorders, and schizophrenia. Massachusetts and Vermont stand out in visits for other mental health disorders. One wonders whether people in Massachusetts in particular and New England more generally are under more stress than others, recognize mental health issues more readily than others, or are offered different treatment regimens that involve more provider visits. Further exploration of factors that might explain the varying number of visits per capita can be found in the following section.



<u>Respiratory visits.</u> Visits per capita for respiratory diseases and symptoms were the third most frequent, accounting for 9.6 percent of all visits. The U.S. average number of visits per capita was 2.3 in 2012. Kentucky had the largest number at 3.2, and Hawaii had the smallest number at 1.1.



<u>Circulatory visits.</u> Visits per capita for circulatory diseases and symptoms were the fourth most frequent, accounting for 8.6 percent of all visits. The U.S. average number of visits per capita was 2.0 in 2012. Washington DC had the largest number at 3.2, and Oregon had the smallest number at 1.1.



<u>Endocrine visits.</u> Endocrine, nutritional and metabolic diseases and symptoms and immunity disorders including diabetes account for 8.1 percent of visits, the fifth largest category. The U.S. average number of visits per capita was 1.9 in 2012. Massachusetts again had the highest number at 2.5 visits per capita, and Utah had the lowest number at 1.2 visits per capita.



### B. Explaining Cross-State Variation in Office and Outpatient Visits

To explain the variation in per capita office or outpatient visits across states, I use regression analysis with explanatory variables that reflect both the supply of health care from the provider community and characteristics of the population that influence the demand for health care from the DI population with Medicare Part B. A short discussion of the variables appears below, and the regression statistics appear in Table 3. Sources for the explanatory variables appear in the Appendix B Table.

In addition to variables commonly used, I use a few others. First, the share of all Medicare enrollees on Medicare Advantage (Part C) by state is a proxy for the share of Medicare Part B enrollees under age 65 who choose Medicare Advantage. Part B Medicare claims data include only visits covered by Part B, but enrollment in Part B by state seems to include people on Medicare Advantage.<sup>9</sup> As a result, the higher the share of Medicare Advantage enrollees, the lower will be the number of visits per capita for all Part B enrollees, other things equal. Second, two prescribing rates have significant effects on various types of visits per capita: prescribing rates per 100 people for drugs frequently used to treat pain (opioids) and anxiety or insomnia (benzodiazepines). Lower prescribing rates for opioids are associated with more health care

<sup>&</sup>lt;sup>9</sup> The number of Part B enrollees by state is approximately equal to the number of 2010 DI beneficiaries by state reduced by the average mortality rate over the next two years.

visits per capita for several of the major diagnoses types, perhaps because some methods for pain management that replace or reduce opioids require more health care visits. Nonpharmacological pain management interventions include relaxation therapies, cutaneous stimulation, guided imagery, hypnosis, or biofeedback (Adams and Arminio 2008). At the same time, higher prescribing rates for benzodiazepines are associated with more visits per capita, perhaps because prescriptions typically last no more than 4 weeks. Third, a measure of solar radiation in December for each state may indicate the general need of humans to enjoy sunlight; I find that states with more solar radiation tend to have fewer musculoskeletal, mental health, and endocrine visits per capita.

<u>ALL.</u> About 71 percent of the cross-state variation in total office and outpatient visits per capita can be explained by just a few factors: positive but statistically not significant effects come from the share of the state's population that does not live in an urban area, and positive and significant effects come from the number of health care professionals per 100,000 in each state; negative and significant effects stem from the share of Medicare enrollees in Medicare Advantage and the number of community hospital beds per 1000.

<u>MSK.</u> About 61 percent of the cross-state variation in musculoskeletal visits per capita can be explained. Factors with a positive and significant effect on musculoskeletal visits include the share of residents who are obese, and a dummy variable that identifies Nevada, Delaware, Oregon, Florida, and Tennessee as states with the largest share of disability insurance beneficiaries on a high dose of opioids (Cutler, Meara, Stewart 2017).<sup>10</sup> Factors with a negative and significant effect include a measure of the solar radiation in each state and the share of Medicare enrollees in Medicare Advantage. The share of DI beneficiaries age 50 or older has a negative but not significant effect after controlling for the other factors.

<u>MENT.</u> About 82 percent of the variation in office and outpatient visits per capita with primary diagnosis mental health conditions across states can be explained using nine explanatory variables. Factors with a positive effect include:

- Share of DI beneficiaries under age 50
- Share of population that lives in rural or suburban areas
- Number of psychiatrists per 100,000 residents (MA has 17.9, ID has 5.1); not significant
- Prescribing rate for benzodiazepines per 100 residents
- Dummy variable for absence of Kendra's Law; Kendra's law mandates that people who have serious mental health issues and are a danger to themselves or others must regularly undergo psychiatric treatment;

<sup>&</sup>lt;sup>10</sup> Using Medicare Part D data for 2006 to 2012, Cutler, Meara, and Stewart found that 5.8% of disabled beneficiaries received a high dose of opioid drugs, with a range of 1.6 percent to 11.5 percent across states.

Factors with a negative effect on mental health visits per capita include:

- Number of residents incarcerated per 1000; not significant
- A measure of solar radiation
- Share of all Medicare enrollees in Medicare Advantage
- The prescribing rate for opioids per 100 residents

It is interesting to note that the state share of DI beneficiaries with mental impairments as the primary diagnosis does not help to explain per capita visits for mental conditions after controlling for the share of beneficiaries under age 50. The role of the incarceration rate is worth a mention as well. Because about 70 percent of inmates have psychiatric conditions but are not eligible to receive DI or Medicare benefits, a higher rate of incarceration removes people with mental health conditions from the DI population, thereby reducing the number of mental health visits needed.

Finding a negative relationship between the opioid prescription rate and the number of mental health visits may seem counterintuitive. Krueger (2017) recently found that higher rates of opioid prescriptions by county were associated with higher percentages of prime age men and women (ages 25 to 54) not in the labor force. Moreover, he estimates that between 25 percent and 35 percent of men who were not in the labor force were DI beneficiaries. Logic seems to suggest that more opioids lead to more people on the DI program who need medical assistance. However, I am looking at people who were already on the DI program in 2010 or earlier and who were managing their chronic pain or substance abuse issue in 2012. Health care providers who treated chronic pain and/or substance abuse by prescribing more drugs may have reduced the need for those patients to visit health care providers more frequently. On the other hand, health care providers with lower prescribing rates may have encouraged other treatments such as relaxation therapies, cutaneous stimulation, guided imagery, hypnosis, or biofeedback that involve behavioral or physical therapists. As a result, higher opioid prescribing rates may have been associated with more people on the DI program but fewer health care visits per capita for those already on the program.

<u>RESP.</u> About 56 percent of the variation across states in office and outpatient visits per capita with primary diagnosis or symptoms respiratory conditions can be explained using six explanatory variables. Factors with a positive, significant effect include the share of the population that smokes, the share of the population with a bachelor's degree or more, the share of the population that is obese, and the prescribing rate for benzodiazepines per 100 residents. Again, the share of all Medicare enrollees on Medicare Advantage has a negative and

significant effect. The prescribing rate for opioids per 100 residents has a negative effect but is not significant.

<u>CIRC.</u> About 68 percent of the variation across states in office and outpatient visits per capita with primary diagnosis or symptoms circulatory conditions can be explained using eight explanatory variables. The same factors have positive and negative effects as in the case of respiratory conditions. In addition, the share of the population that is African-American has a positive and significant effect, plus the share of the population that does not live in urban areas has a negative and significant effect.

<u>ENDOC.</u> Only about 39 percent of the variation across states in office and outpatient visits per capita with primary diagnosis or symptoms endocrine conditions can be explained using six explanatory variables. Some portion of the endocrine visits likely reflects the needs of end-stage renal disease patients rather than non-ESRD DI beneficiaries, but the data do not allow us to differentiate between the two groups. Factors with a positive and significant effect include the share of the population that is African-American, the share of the population that is obese, and the prescribing rate for benzodiazepines. Factors with a negative and significant effect include the amount of solar radiation, the share of all Medicare enrollees on Medicare Advantage, and the prescribing rate for opioids per 100 residents.

Table 2. Factors that Help Explain the Cross-State Variation in Health Care Visits Per Capita							
		Effect on Number of Office and Outpatient Visits Per Capita					а
	OLS regression coefficients; t-Statistics in Parentheses					FNDOC	
	Adjusted R-squared	0.71	0.61	0.82	0.56	0.68	0.39
1	% DI Population under Age 50		3.98 (1.3)	20.17 (4.6)			
2	% Population Who Smoke				3.99 (1.7)	4.23 (1.9)	
3	% Population Who are Obese		0.03 (1.6)		0.05 (1.8)	0.07 (2.8)	0.03 (1.6)
4	% Population African-American					1.74 (3.4)	0.69 (2.0)
5	% Population with Bachelor's degree				0.03 (2.6)	0.02 (1.8)	
6	% Population not Urban	0.02 (0.8)		0.01 (1.6)		-0.01 (-3.1)	
7	% Incarcerated per 1,000			-0.08 (-1.5)			
8	Solar Radiation in December		-0.38 (-3.4)	-0.26 (-1.6)			-0.11 (-1.7)
9	Share of Medicare Population on Medicare Advantage Plans	-0.25 (-6.5)	-0.04 (-5.9)	-0.02 (-1.9)	-0.02 (-3.6)	-0.02 (-3.4)	-0.01 (-2.7)
10	# Healthcare Professionals per 10,000	0.05 (7.7)					
11	# Psychiatrists per 100,000			0.03 (1.1)			
12	# Community Hospital Beds per 1,000	-2.81 (-4.7)					
13	Opioid Rx Rate per 100			-0.03 (-3.7)	-0.01 (1.0)	-0.01 (-2.2)	-0.01 (-3.5)
14	Benzodiazepine Rx Rate per 100			0.04 (3.0)	0.02 (2.5)	0.02 (2.7)	0.02 (3.4)
15	Dummy for NV, DE, OR, FL, TN		0.68 (3.0)				
16	Dummy for no Kendra's Law			1.20 (3.6)			

Source: Author's analysis; see Appendix B for sources of explanatory variables

Having explained some portion of the cross-state variation in the number of office and outpatient visits per capita, we can compare the states with the highest number of visits per capita in the Medicare data with the conditional number of visits per capita after controlling for the factors identified above (see Table 3). Some states have higher visits per capita both before and after controlling for those factors. For example, Vermont has higher numbers of total visits per capita both before and after controlling for the factors identified. Michigan and Maine have higher numbers of musculoskeletal visits per capita both before and after controlling for the factors identified. Massachusetts has higher numbers of mental health visits per capita in both cases. Either the health care protocols offered in those states are significantly different from those in most states, or some other factor not yet identified could help to explain why those states have higher numbers of visits per capita even after controlling for a number of factors.

Table 3. States with High Numbers of Visits per Capita, Medicare Data and After Controlling for Various Factors						
	Total	MSK	MENT	RESP	CIRC	ENDOC
States with large numbers of office and outpatient visits per capita in Medicare data	VT, MA, DE, ME, MD	DE, AK, ME, ND, MI	MA, VT, ME, CT, NH	KY, DE, MA, MD, DC	DC, DE, IL, MD, NJ	MA, IL, DC, ME, NJ
States with large number of visits per capita after controlling for various factors*	<b>VT</b> , NV, MI, CA, FL	<b>DE, MI,</b> MN, NV, <b>ME</b>	MA, OK, NV, MN, IN	<b>DE</b> , OH, NV, <b>KY</b> , IN	MI, VT, <b>DE</b> , ME, TX	MI, <b>MA,</b> OK, <b>ME</b> , KS
*Note: States in bold also have large numbers of visits per capita in the Medicare claims data						

# C. An Alternative Way to Allocate Visits per Capita

In the analysis described thus far, I have allocated visits for any primary diagnosis to the entire population of Part B enrollees under age 65 in each state. An alternative way to allocate visits is to assign visits with a major primary diagnosis type only to the share of Part B enrollees under age 65 in the state corresponding to the share of DI enrollees with that primary diagnosis type at the time of eligibility. For example, 19.4 percent of DI beneficiaries in Massachusetts in 2010 were eligible on the basis of musculoskeletal conditions. If I assign all musculoskeletal visits only to those DI beneficiaries, I find 22.4 musculoskeletal visits per musculoskeletal beneficiary in 2012 (see Table 4). That number represents the maximum number of visits, on average, for beneficiaries who were eligible on the basis of musculoskeletal problems as well, and the measure

is highly imprecise. Nevertheless, it does recognize that the primary reason for eligibility may point to primary users of health care in a particular diagnosis group.

The two major diagnosis groups examined in the alternative way represent more than threefifths of the beneficiaries on the DI program: their primary diagnosis at the time of eligibility was either musculoskeletal conditions or mental health conditions. In fact, given the low mortality rates of beneficiaries in those two groups, they represent an even greater share of the 2012 population of DI beneficiaries on Medicare. If all the musculoskeletal visits in Massachusetts were used only by the share of DI beneficiaries who qualified at the time of eligibility on the basis of musculoskeletal conditions, those beneficiaries on average would have had 22.2 visits over the year, almost every other week. In Hawaii, however, those musculoskeletal beneficiaries on average would have had 8.2 visits over the year, or about one visit every 6 weeks. For results on all states, see Appendix C, Figure 1.

If all the mental health visits were used only by DI beneficiaries who qualified on the basis of mental health in the U.S. as a whole, those beneficiaries would have had 6.6 visits on average in 2012, or slightly more than one visit every two months. In Massachusetts in 2012, those beneficiaries would have had 14.6 visits on average over the year, or more than 2 visits per month. In Arizona, those mental health beneficiaries would have had an average of 2.4 visits over the year, or one visit every 5 months. For results on all states, see Appendix C, Figure 2.

Table 4. Visits per Capita Allocated in Two Ways, 2012					
	U.S.	Highest state Lowest state		t state	
	Avg.	# visits	State	# visits	State
If allocate visits to all DI beneficiaries					
Musculoskeletal	3.4	5.6	DE	1.4	HI
Mental health	2.4	7.4	MA	1.0	AZ
If allocate visits only to DI beneficiaries with the same					
primary diagnosis					
Musculoskeletal	13.4	22.2	MA	8.2	HI
Mental health	6.6	14.6	MA	2.4	AZ

Source: Author's analysis of Medicare Part B claims data, under age 65, 2012; CMS Part B population; SSA Disability Insurance Program eligibility data

#### Discussion and Conclusion

The wide variation in office and outpatient visits by DI beneficiaries across states raises a number of questions about why beneficiaries in different parts of the country use health care differently. Even after controlling for various characteristics of each state's population, selected characteristics of each state's DI population, and rough measures of the supply of health care in each state, differences remain. It is beyond the scope of this paper to identify whether states with higher or lower visits per capita for mental health, for example, are using "best practices." One way to address that issue might be to examine return-to-work statistics by state to discover any association between more or less health care support and the propensity to return to the labor force.

Of course, relying on health care alone to improve the lives and the employability of DI beneficiaries may not be the best strategy. For example, medical treatment of mental health outcomes in isolation can be expensive and inefficient (Alegria and Drake, 2017; Milstein, Briss, Burton, and Pechacek, 2011). A more holistic approach that includes community and workforce supports may be required to help people with disabilities overcome their challenges and integrate into the labor force.

An obvious question is whether the findings here for the Medicare Part B population under age 65 would carry over to the rest of the Medicare population, Medicaid enrollees, and people covered by private insurance. Some evidence of common treatment of all patients by health care providers does exist. Colla, et al. (2017) looked at the rates at which Medicare and private health plans provided seven low-value services and concluded that doctors tend to treat all patients similarly, regardless of who is paying the bill. They found that how much low-value care was offered was related to the history and organization of local health care markets, not the source of insurance. In particular, a higher ratio of specialists to primary care physicians led to higher provision of low-value services. Applying their findings to results in this paper suggests that states that stand out with higher or lower office and outpatient visits per capita for the Medicare Part B population under age 65 may also provide more care in the form of visits for the rest of the state's population, including others covered by Medicare, those covered by Medicaid, and those covered by private insurance. Further analysis of other data is needed to confirm that speculation.

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Appendix A. Maps Showing Office and Outpatient Visits Per Capita

for the Disability Insurance Population on Medicare Part B, 2012

Figure A1: All Office and Outpatient Visits per Capita, 2012







Figure A3: Mental Health Office and Outpatient Visits per Capita, 2012







Figure A5: Circulatory Office and Outpatient Visits per Capita, 2012







	Appendix B, Table 1. Source of Explanatory Variables for Regressions		
1	% DI Population under Age 50	SSA, Annual Statistical Report on the Disability Insurance Program, 2012. Table 27. Disabled Workers by Age and State	
2	% Population Who Smoke	Kaiser Family Foundation, Percent of Adults Who Smoke, 2013; Data based on the Behavioral Risk Factor Surveillance System (BRFSS)	
3	% Population Who are Obese	BRFSS, Prevalence of Self-Reported Obesity Among U.S. Adults, 2012	
4	% Population that is African-American	U.S. Census, Decennial Census, 2010; as reported by Wikipedia	
5	% Population 25+ with Bachelor's degree or higher	U.S. Census, American Community Survey, 2008-2012	
6	% Population not Urban	U.S. Census Bureau, U.S. Decennial Census, 2010; (1 - percentage of the population that lives in urban areas)	

7	Number Incarcerated per 1,000 Adults	U.S. Bureau of Justice Statistics, "Correctional Populations in the United States, 2013," reported per 100,000 adults by Wikipedia
8	Measure of Solar Radiation in December	<i>The Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors</i> , 1961-1990, state tables, use December, Tilt = 0
9	Share of the Medicare Population on Medicare Advantage Plans	Centers for Medicare & Medicaid Services, Center for Drug and Health Plan Choice: Plan Penetration, 2013
10	# Healthcare Professionals per 10,000	The Henry J. Kaiser Family Foundation, Total Health Care Employment, data for 2015; U.S. Census, Population by State in 2015
11	# Psychiatrists per 100,000	Staff Care, AMN Healthcare, <i>Psychiatry: The Silent Shortage</i> , 2015; data for 2013
12	# Community Hospital Beds per 1,000	Staffed Community Hospital Beds per 1,000 Population by Ownership Type, 2012; The Henry J. Kaiser Family Foundation
13	Opioid Prescribing Rate per 100	Prescribing rates per 100 persons, by state and drug type; IMS Health, United States, 2012
14	Benzodiazepine Prescribing Rate per 100	Prescribing rates per 100 persons, by state and drug type; IMS Health, United States, 2012
15	Dummy for NV, DE, OR, FL, TN	Cutler, Meara, Stewart (2017) identify the five states with the highest rate of high-dose opioids using Part D data and the HRS [permission to cite pending]
16	Dummy for absence of Kendra's Law	Kendra's Law grants judges the authority to issue orders that require people who meet certain criteria to regularly undergo psychiatric treatment;
		Four states do NOT impose Kendra's Law: CT, MD, MA, TN; See Treatment Advocacy Center, Assisted Outpatient Treatment Laws, available at <u>http://www.treatmentadvocacycenter.org/component/content/articl</u>
		<u>e/39</u>



