Longitudinal patterns of Medicaid and Medicare coverage among participants in the Supplemental Security Income and Social Security Disability Insurance disability programs[1]

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ABSTRACT

In this paper we analyze complex interactions between four public programs affecting adults with severe disabilities: Disability Insurance (DI), Supplemental Security Income (SSI), Medicare, and Medicaid. We used administrative records covering 12 months preceding and 72 months following the first-ever month of disability benefit eligibility. Our focus is on the association of longitudinal patterns of disability program participation among disability cash benefit (SSI and DI) awardees with Medicare and Medicaid public health insurance coverage. Sixty percent of a cohort of 68,798 first-ever disability program awardees in the year 2000 received only DI benefits during a 5-year follow-up period. However, the remaining 40 percent received SSI benefits at some time during that period, most with some involvement with both DI and SSI. Both program design and implementation variables affect public health insurance coverage. Three major conclusions emerge. (1) Key program design features affecting Medicaid coverage among disability awardees include the categorical eligibility of most SSI awardees for Medicaid, the 5-month waiting period in the DI program, and the offsetting of DI benefits in the SSI benefit formula. Medicare coverage follows directly from DI eligibility, but only after a 5-month DI and a subsequent 24-month Medicare waiting period. These factors produce distinct patterns of health insurance coverage for subgroups of disability awardees characterized by five longitudinal patterns of SSI and DI participation. (2) The principal proximate reason for Medicaid coverage among disability awardees (including SSI-only and those with concurrent involvement in both DI and SSI) over time is entry to the SSI program, although some acquire Medicaid coverage without SSI involvement. Only a small fraction of DI-only participants ever received Medicaid during the 6 year period starting with first award. Medicare coverage is minimal for all disability awardees regardless of the pattern of DI and SSI involvement for at least 2 years after first award, but is principally responsible for essentially complete coverage among awardees with DI involvement for the following 4 years. Overall public health insurance coverage during the first two years following initial disability award is substantially better for those with SSI involvement. In contrast, it is better for those with DI involvement during the subsequent 4 years – albeit the differences in degree of overall coverage by Medicare and Medicaid are much less dramatic for these later years. (3) Implementation factors substantially affect Medicaid, but not Medicare coverage. We assess empirical evidence concerning the relationship between the timing of initial disability payments, the presence or absence of automatic Medicaid enrollment, and the relative restrictiveness of Medicaid eligibility rules for SSI beneficiaries in some states. All affect Medicaid coverage. The evidence is consistent with the hypotheses that lags in initial cash benefit payments and the relative tightness of Medicaid enrollment rules in a few states are associated with relatively low Medicaid coverage. In contrast, the evidence suggests that auto-enrollment used by most States increases Medicaid coverage.

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I. Introduction

Four public programs form the pillars of the safety net for working-aged people with severe disabilities:

Social Security Disability Insurance (DI), Supplemental Security Income (SSI), Medicare and Medicaid.

The interactions among the four programs are complex, and little understood. They are also important

both because access to cash benefits and health insurance coverage are essential to the well-being of

people with severe disabilities, and because the availability of these benefits – or lack thereof -- creates

complex economic incentives with implications for labor markets, government budgets and the

functioning of the overall economy.[2] DI is a major component of Social Security. It is a social insurance

program available to people who have not reached the Social Security Full Retirement Age (FRA,

currently 66 years of age), meet the program's categorical eligibility criteria as disabled, and have

sufficient recent work experience to qualify as "DI-insured" prior to the start of cash benefits. SSI is a

means-tested Federal cash welfare program with optional State supplements that provides cash benefits

for the elderly aged 65 and over, and nonelderly people deemed disabled based on categorical eligibility

criteria that are identical to the rules used in administering the DI program. Unlike DI, SSI does not

require prior work experience to qualify. In addition to qualifying adults with disabilities, SSI also

provides benefits to categorically disabled children using somewhat different program rules. DI does not

have a similar program component for children because DI insured status requires work experience,

although children may receive Social Security as dependents or survivors. In this paper our focus is

limited to adults aged 18 to 64. DI and SSI are administered by the Social Security Administration (SSA)

with substantial State involvement in the disability determination process and the administration of SSI

State supplements in some states.

Medicare is a federal social insurance program that provides health insurance coverage for most elderly

people aged 65 and over, for DI beneficiaries after a 24-month waiting period, and for individuals with

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[2] For instance Cogan et al (2008) is concerned about the effect of Medicare for the disabled on the market for private insurance. Yelowitz (1998) addresses the effect of Medicaid on SSI participation.

end-stage renal disease (ESRD). Medicaid is jointly funded by the federal and state governments and provides health insurance coverage for several target populations with low income and assets, including elderly people aged 65 and over, people under age 65 with disabilities, and recipients of Temporary Assistance for Needy Families (TANF) cash welfare benefits.[3] Categories of people covered by Medicaid vary from state to state. The Medicaid means test is similar, but not identical to the SSI means test. It may vary by state, in many cases with less restrictive financial eligibility criteria than SSI, but a few states have more restrictive rules. In all but a few states, SSI beneficiaries are categorically eligible for Medicaid, some providing automatic Medicaid enrollment and others requiring a separate application. Medicare is administered by the Centers for Medicare and Medicaid Services (CMS), while Medicaid is State administered with some Federal oversight by CMS.

The focus of this paper is on the interactions between SSA's two disability programs – DI and SSI – and the two public health insurance programs – Medicare and Medicaid. In a companion paper (Rupp and Riley, forthcoming) we focused on longitudinal interactions between SSA's two disability programs, but did not explicitly consider the public health insurance connection. In the current paper we focus on how the complex interactions between the two disability cash benefits programs affect Medicaid coverage, especially during the 24-month Medicare waiting period[4] in the DI program (see Riley 2004, 2006, Livermore et al, 2010). We also assess overall public health insurance coverage considering both Medicare and Medicaid. In addition we explore how procedural factors, such as delays in the initial disability determination process, the requirement to file a separate Medicaid application in some states among categorically eligible SSI beneficiaries, and the use of more restrictive Medicaid eligibility criteria, affect Medicaid coverage among SSI beneficiaries. We use administrative record data for the four programs from SSA and CMS, for cohorts of disability awardees first awarded disability benefits in

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[3] Schwartz (2008) reviews the evolution of American attitudes and policy towards public health insurance for the poor. Dorn (2008) demonstrates the high prevalence of uninsured status among poor and near-poor nondisabled adults who are neither pregnant, nor caring for dependent children.

[4] The Social Security Administration is sufficiently concerned about health insurance coverage during the Medicare waiting period to have initiated the Accelerated Benefits Demonstration. For early results see Weathers et al (2010).

calendar year 2000. We follow a 10 percent random sample of DI and SSI awardees for 12 months prior to first disability award and for the 72 subsequent months. We analyze relevant outcomes at the person level on a monthly basis using multivariate statistical techniques.

The rest of the paper is organized as follows:

- Section II outlines the key research questions;

- Section III discusses data and methodology;

- Section IV presents the empirical results; and

- Section V concludes.

II.   Research questions

In this paper we address three sets of questions that are important in understanding the role of longitudinal patterns of participation in the SSI and DI disability programs in providing access to health insurance coverage among working-age people with disabilities:

- What are the major longitudinal patterns of disability benefit eligibility[5] and how they are relevant in providing access to health insurance coverage among the disabled?

- What is the relationship between longitudinal patterns of disability benefit eligibility and patterns of public health insurance coverage?

- What are the effects of implementation factors on Medicaid coverage?

We briefly address each of these questions below.

Relevance of the major longitudinal patterns of disability benefit payment eligibility. Whether severely disabled individuals are eligible for SSI or DI benefits or both is important because the two programs

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[5] Disability benefit eligibility means that the person is entitled to receive DI and/or SSI cash benefits for a given month. Benefit eligibility is a program design concept. This is defined by the enabling legislation and detailed regulations. This concept is different from the receipt of actual payments during a given month which is affected by the disability determination process in addition to entitlement. In the paper we first focus on the role of disability program design, hence we focus on benefit eligibility. Later we assess the role of delays between the first month of payment eligibility and the first month of actual payments.

provide dramatically different paths toward public health insurance coverage. DI provides Medicare coverage after a 24-month waiting period, which is in addition to the 5-month waiting period for DI benefit eligibility. SSI usually provides access to Medicaid, but not Medicare coverage. Since SSI is a welfare program of last resort, if the person is found disabled onset is presumed to be the month immediately prior to application. In this sense there is no waiting period for SSI. In sharp contrast to Medicare, Medicaid eligibility can be retroactive up to three months prior to application if the applicant is deemed to have been eligible at the time. While the DI and SSI rules with respect to the timing of public health insurance coverage are clearly very different, people may be eligible for both DI and SSI cash benefits on a monthly basis, resulting in dual eligibility for both Medicare and Medicaid in many cases. In such situations, Medicare is the primary health insurer and Medicaid covers beneficiary cost sharing and certain services (primarily nursing home care and other long term care services) that Medicare does not cover. Consequently, eligibility for Medicaid and Medicare benefits depends on the timing and sequence of eligibility for SSI and/or DI benefits. Rupp et al (2008) has shown that Medicaid and Medicare participation is very low in the working-age nonbeneficiary population. According to self-reported survey data from the Survey of Income and Program Participation (SIPP) for November 1996, of those who are DI-insured but would not qualify for SSI regardless of disability because of the means test and who do not receive disability benefits, only 0.2 percent are eligible for Medicare, 0.6 percent for Medicaid. Medicaid coverage is higher (20 percent) among those nondisabled working-aged who meet the income and resource test of SSI, but are not DI-insured. Coupled with the lack of private health insurance coverage in this group of low-income non-beneficiaries (36.3 percent uninsured) this means that disability-conditioned public health insurance may become an important source of health insurance coverage as a result of a gradual or sudden disablement severe enough to cause categorical disability according to SSA rules.

There are some clear longitudinal patterns of SSI and DI program participation as a result of interactions between SSI and DI benefit eligibility rules, particularly the 5-month waiting period in the DI program

and the counting of Social Security as unearned income in the SSI program. In previous research (Rupp and Riley, forthcoming) we have identified five such patterns that are responsible for about 98 percent of all first-ever disability awards for DI, SSI or both – DI only; SSI only; DI only transitioning to joint DI/SSI benefit eligibility; SSI only transitioning to DI only serial benefit eligibility; and SSI only transitioning to joint DI/SSI benefit. The classification is based on the longitudinal patterns of payment eligibility[6]. DI-only payment eligibility means that the person first became eligible to receive DI benefits, and never gained SSI benefit eligibility over the postaward observation window starting with the first month of DI benefit eligibility. SSI-only benefit eligibility means that the person first became eligible to receive SSI benefits, and never gained DI benefit eligibility over the postaward observation window. DI only transitioning to joint DI/SSI benefit eligibility means that the person started as DI-only during the month of award, and became SSI benefit eligible at least for one of the postaward months observed. SSI only transitioning to DI only serial benefit eligibility means that the person started as SSI-only eligible during the first month, lost SSI benefit eligibility when DI benefit eligibility began after the 5-month DI waiting period, and never regained SSI benefit eligibility up to the last month of the postaward observation window. SSI only transitioning to joint DI/SSI benefit eligibility is similar to serial eligibility in that DI kicks in after the 5-month waiting period, but differs because the beneficiary keeps SSI payment eligibility afterwards at least for one month. In these situations DI does not completely offset the SSI benefit the person was entitled to prior to the first month of DI benefit eligibility. These 5 patterns provide different pathways to Medicaid and Medicare access.

Relationship between longitudinal patterns of disability benefit eligibility and public health insurance coverage. Next we look at the empirical pattern of public health insurance coverage among the five major longitudinal patterns of SSI/DI program participation. What are the longitudinal patterns of Medicaid and

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[6] The classification considers a 60-month window starting with the first-ever month of payment eligibility for either SSI or DI in the year 2000 (Rupp and Riley, forthcoming). Note that we retain the 60-month window for purposes of classifying disability benefit eligibility patterns in the current paper so that the classification of longitudinal patterns is identical for the two papers. However, in the analysis to be presented in this paper we utilize information on Medicaid and Medicare coverage for a longer, 72-month follow-up period, as well as the 12 month period prior to the first month of disability benefit eligibility.

Medicare coverage among groups of awardees[7] with different patterns of disability benefit eligibility during a 12-month period before and a 72-month period after first-ever disability benefit eligibility? How common is Medicaid coverage among those not eligible for SSI? What beneficiary characteristics are associated with Medicaid coverage? What is the role of Medicaid in providing health insurance during the 24-month Medicare waiting period? What is the combined role of Medicaid and Medicare in providing health insurance coverage for various subgroups of the disabled? These questions are relevant to a number of policy concerns, such as access to health care for the severely disabled population; incentives to apply for and remain on SSI; and potential elimination of the 24-month waiting period for Medicare.

Relationship between program implementation and Medicaid coverage. Finally we are interested in the effect of specific implementation features of the disability programs and Medicaid on the extent of Medicaid coverage. We look at three implementation variables. The first is variations in the timing of actual receipt of first disability benefits relative to the first month of payment eligibility. This mainly arises from the lengthy disability determination process in many cases. Our hypothesis is that such delays reduce access to Medicaid coverage between the time of the (retroactively established) first month of payment eligibility and the first month of actual payment because they create uncertainty with respect to categorical eligibility among SSI disability awardees. The second factor is the requirement in seven states that SSI recipients must submit a separate application for Medicaid benefits (so-called "Criteria States"). We hypothesize that this requirement (compared to automatic Medicaid enrollment in most states) reduces Medicaid coverage for several related reasons. First, it imposes a burden of additional time and effort on the applicant. Second, recent evidence from behavioral economics suggests that default enrollment options substantially affect behavior (Knoll, 2010). Third, the requirement for separate Medicaid application increases administrative complexity and may result in delays and uncertainty concerning Medicaid coverage. Finally, the third implementation factor is the more restrictive criteria that SSI beneficiaries must meet to be eligible for Medicaid in eleven states (referred to as "209b" states). Our

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[7] Livermore et al (2010) analyzes health insurance coverage before and after DI entry.

hypothesis is that the more restrictive rules applied in "209b" states result in lower levels of participation in the Medicaid program among newly entitled SSI beneficiaries, at least initially. We are particularly interested in the temporary versus long-term effect of more restrictive rules on Medicaid coverage[8].

We do not expect implementation to be a major issue with respect to Medicare coverage for several reasons. First, the combined DI and Medicare waiting period (29 months) provides ample lead time. Second, the Medicare waiting period is uniformly applied across the United States and is simple compared to the complexity and variability of State Medicaid eligibility rules. Finally, only two historically related Federal agencies (SSA and CMS) need to collaborate to establish the first month for Medicare eligibility for those who qualified for DI.

III.   Data and methods

Data sources.   Our study is based on administrative records from SSA covering the universe of DI and SSI beneficiaries and CMS records covering the universe of Medicare and Medicaid enrollees. We first created a 10 percent sample of all disability beneficiaries from March 1996 to December 2008 from SSA's Ticket Research File (TRF), which is compiled from a variety of SSA records systems on disability program applicants and awardees. The TRF currently contains roughly 20 million observations. The description of the TRF and the SSA source files is detailed in Rupp and Riley (forthcoming). We created a "finder file" of Social Security numbers (SSN's) and basic identifying information from the TRF.   CMS used this finder file to pull enrollment records from the Medicare Enrollment Data Base (EDB) and the Medicaid Analytic Extract (MAX) record systems. The CMS extract files then were merged with the SSA records extract.

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[8] In her study of optional state Medicaid programs to improve access to health care for people with disabilities, Irvin (2006a) looks at the effects of the second and third implementation variables (living in "Criteria" or "209b" states) on health insurance coverage six months after SSI benefits end.

The study sample consisted of first-ever disability program entrants who were alive and aged 18-64 during the first-ever month of payment eligibility for either DI or SSI disability or both sometime in the year 2000. Notable features of the sample are that it does not include any adults who received SSI disability benefits as a child,[9] and it does not include any first-ever awardees for either DI or SSI who had a previous enrollment spell in the other program. We note that our definition of an awardee cohort is more restrictive than the definitions used in past awardee cohort based studies or in statistical publications that usually do not exclude people with previous awards in the other SSA disability program, and typically include repeat entries to the same program.[10] These restrictions assured that the awardee cohort we followed had their first benefit eligibility involvement with the SSA disability system in 2000. This sample restriction provides a more precise picture of how disability benefit awards strategically affect Medicaid and Medicare eligibility. Our sample of 68,798 observations is identical to the sample used in our previous analysis of DI and SSI awardees (Rupp and Riley, forthcoming). The only difference is the addition of Medicaid and Medicare files for the present analysis.

Note that our sample design is based on the concept of *benefit or payment eligibility* during a given month. This is a program design concept reflecting entitlement to receive DI or SSI benefits during that month according to statute. However, benefit eligibility does not necessarily imply the *receipt of actual payments* during that month for practical reasons that have to do with endogenous processes of program implementation. The timing difference between the month of *benefit eligibility* and the month of the *actual payment* can be especially important with respect to the very first month of benefit eligibility (month of first-ever award) due to the time it takes to make the final disability determination. Thus, the

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[9] Health insurance coverage among young adults with childhood SSI experience is important, but outside the scope of our current paper. Hemmeter and DeCesaro (2009) analyze health insurance coverage among SSI children. Irvin (2006b) addresses Medicaid coverage for youth with disabilities transitioning to adulthood.

[10] Another area requiring care in interpretation is the comparison of our "flow" [new awardees between (t) and (t+1)] based longitudinal analysis with "stock" measures of beneficiaries in current pay status at t which is usually measured with cross-sectional data.

award date is typically retroactively established and actual payments are received later, in some cases substantially so[11].

In the current study we primarily use benefit eligibility because it reflects program design. For example, the 5-month DI waiting period is based on benefit eligibility. Medicaid and Medicare eligibility also depend on disability benefit eligibility and not on actual payments. However, we also analyze actual disability benefit payments to address endogenous processes of program implementation, such as the effect of the timing of the actual receipt of initial SSI payments on Medicaid coverage.

In this study, we measure Medicare coverage by a variable denoting Part A coverage. All Medicare beneficiaries are automatically eligible for Part A, while Part B is a matter of choice and comes with a monthly premium for beneficiaries who do not qualify for Medicaid. Approximately 90 percent of Medicare DI beneficiaries are enrolled in Part B. Our Medicaid enrollment figures refer to "full Medicaid" only and do not include less than full coverage situations, such as qualified Medicare beneficiaries (QMB)-only and specified low-income Medicare beneficiaries (SLMB)-only programs for dual eligibles. This decision was partially motivated by the evolving nature of these other program components that may result in temporal patterns that follow from recent changes in program design, rather than the key issues of interest in this paper.

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[11] In the past only benefit eligibility based statistics were produced for DI: no data based on actual payments were available for analysis. More recently, data on actual DI payments were made available to researchers from SSA's Payment History Update System (PHUS), and we use these data in the current paper. In contrast, SSI data extracts routinely include items reflecting both benefit eligibility and actual payments. SSI program statistics are based on actual payments, a practice more than a decade old by now. Pickett and Scott (1996) discuss the evolution of SSI statistics that followed a path from exclusive use of data on actual payments to the use of both in sharp contrast to the evolution of DI statistics. Rupp and Davies (2000) discuss the two kinds of benefit measures and their appropriate use. For example, if the interest is in assessing the effect of policy on labor supply the relevant concept is receipt of actual payments during a given month. In contrast, if the interest is in simulating the effect of various SSI policy options, benefit eligibility is the appropriate concept (Rupp, Strand and Davies, 2003; Davies, Strand and Rupp 2004). Sears and Rupp (2003) and Huynh et al (2002) cross-classified benefit eligibility status and actual receipt for the same month, and found nontrivial differences.

Methods. Our analysis is based on monthly person level records containing individual characteristics measured at the month of first award, and time-varying data on cash benefit receipt and Medicaid/Medicare coverage. We use health insurance coverage data for 12 months prior to first disability award and the subsequent 72 months period. Our key technique is logistic regression applied to (repeated) cross-sections of Medicaid/ Medicare coverage status. Most models include controls for state effects; some include indicators of state program implementation regime. We use a quasi-experimental approach, and rely on a difference-in-differences framework for assessing implementation effects.

IV.   Results

In this section we address results on the:

- Characteristics of first-ever new disability program (DI and/or SSI) awardees;

- Extent of public health insurance coverage by longitudinal patterns of disability benefit eligibility;

- Relationship of disability program design and personal characteristics with Medicaid coverage; and

- Relationship of program process and implementation with Medicaid coverage.

Characteristics of first-ever new disability program (DI and/or SSI) awardees. Disability program awardees are a heterogeneous group both in terms of pattern of DI and SSI involvement and in other characteristics. Table 1 shows that roughly 60 percent of first awardees in 2000 start a DI benefit eligibility spell without any SSI involvement (at least for a period of 60 months). The remaining 40 percent has some SSI involvement, most being involved with both SSI and DI at some point. Overall, the bulk of new entrants are in the 46-64 years of age group, most are white, and males slightly outnumber females. The top three diagnostic categories are musculoskeletal, mental, and circulatory. The three together comprise about 60 percent. In terms of similarities and differences between the longitudinal pattern groups, our main observation is that there is a clear contrast between the characteristics of the DI-only and SSI-only groups. DI-only tends to be skewed towards the older age-groups, more likely to be male, white, and musculoskeletal impairment is the largest primary diagnosis category. In contrast, SSI-

only tends to be much younger, more likely to be female and minority, with mental impairments (other than intellectual disabilities) as the largest diagnostic category.

The extent of public health insurance coverage by longitudinal patterns of disability benefit eligibility. In this section we discuss the relationship between longitudinal patterns of disability benefit eligibility and trends in public health insurance coverage, focusing on the 5 major pattern groups. We start the discussion with the two extremes: DI-only and SSI-only, and follow by three longitudinal pattern groups with both DI and SSI involvement. Chart 1 shows trends of health insurance coverage for the DI-only group. The chart displays the percent *with Medicaid* coverage and *overall public health insurance* coverage (as defined by full Medicaid and/or Medicare Part A coverage) by month. The trend lines cover an 84 month period, including a 12-month period prior to disability benefit award. For each month after the first month of benefit eligibility the sample is limited to those still alive and less than 65 years of age during any given month. The same type of information is provided for the other four pattern groups in subsequent charts. Four particular points in time are highlighted in the chart: month 1, month 6, month 24, and month 30. Month 1 is relevant as an anchoring point at the beginning of the first disability benefit eligibility spell. This is the first month after the 5-month DI waiting period for those who are DI benefit eligible during Month 1. For those who are eligible for SSI during this month it is the month immediately following the month of presumed onset of categorical disability. Month 6 is relevant because it is the first month that is clearly beyond the DI waiting period for all with DI involvement regardless of SSI involvement.[12] Month 24 is the last month of the Medicare waiting period for those entering DI during Month 1. Month 30 represents a time point that is clearly beyond the 24 month Medicare waiting period, regardless of program of first entry. We highlighted the same time points for each of the four charts

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[12] Note that the anchoring point for our cohort on new disability entitlements is the first month of payment eligibility, not the month of onset. The 5-month DI waiting period is a five month period which is to the left of our anchoring point on the chart for those with a DI entry first (or simultaneously with SSI entry). But for those serial or joint entrants who entered SSI first, all or part of the 5-month waiting period is subsequent to the first month of SSI benefit eligibility.

describing the experience of the other pattern groups to assure comparability, although the interpretation may vary slightly depending on disability program of first (or only) entry.

Chart 1 focuses on the *DI-only group*. It corresponds to the stereotypical view of health insurance for DI awardees dominated by the 24-month Medicare waiting period and without any substantial Medicaid involvement. Medicaid coverage is in the single digits throughout the year prior to the month of first DI benefit entitlement, gradually inches upward, but never tops 10 percent. Thus Medicaid does not help much in terms of providing *public* health insurance during the 5-month DI waiting period (which is on the left side from the anchoring point of first month of DI eligibility) and during the 24 month Medicare waiting period. About 86 percent of the DI-only group is *not* covered by either public program in month 24. How much of this gap is filled by private health insurance is beyond the scope of our current paper.[13] Note that at Month 25 there is a sharp upturn to what should be essentially 100 percent of public health insurance coverage, clearly because of the end of the 24-month Medicare waiting period[14]. Note that each month close to 10 percent is covered by Medicaid as well up to Month 72, thus providing access to services that are not available to Medicare-only beneficiaries.

Chart 2 shows trends in health insurance coverage for the *SSI-only group*, clearly a very different picture dominated by substantial and increasing access to Medicaid. The trend lines for *Medicaid* and for *overall* public health insurance coverage suggest little role for Medicare coverage. This is not surprising since 100 percent of the SSI-only group did not enter DI for at least 60 months from first award. Medicare

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[13] Riley (2006) found that 74 percent of DI beneficiaries had health insurance in the Medicare waiting period, of whom 63 percent had private health insurance.

[14] Our data indicates 97.2 percent Medicare coverage during month 25. The corresponding figure is 99.1 percent for month 30. Since one should expect exactly 100 percent coverage during month 25 among those who have been continuously on DI for the first 25 months we conducted some investigation of the reasons for the less than 100 percent observed Medicare coverage during months 25 and beyond. We sequentially excluded observations with any period of non-participation for months x<=t, and observations that were still in nonbenefit status during month t. These exclusions made little difference for month 25, but there was a continuous upward trend peaking at 99.9 percent during months 37 to 64 after both exclusions were applied. Thus, it appears that there is some kind of timing mismatch as the primary reason for the anomaly. We could not establish whether this reflects administrative error or pure measurement error.

coverage should be limited to people with end-stage renal disease who qualify for the SSI means test. The chart suggests that SSI benefit eligibility is not the proximate reason for Medicaid coverage for about 25-30 percent (who are covered by Medicaid for at least 4 months before first SSI payment eligibility, possibly much earlier), albeit some may have been involved with SSI previously as denied applicants. (Note that SSI awardees can be covered by Medicaid up to three months prior to the first month of SSI payment eligibility.)   Importantly, there is a sharp upturn in Medicaid coverage around the month of first SSI award, strongly suggesting that SSI is indeed a vehicle towards Medicaid coverage for the bulk of the SSI-only subgroup. Medicaid is clearly very important for the SSI-only pattern group. Compared to DI-only entrants, access to public health insurance is clearly more substantial in the first two years after initial eligibility for disability benefits. Still, Medicaid coverage reaches only 67 percent during Month 1, increases afterwards at a slower pace, and peaks at 88 percent during Month 30. Some of the reasons for less than complete Medicaid coverage include implementation issues, as discussed later in this paper. However, exits from SSI (other than death or reaching age 65 that are not reflected in these charts) may also play a role, a subject we will also address later.

Recognizing the important role of SSI in Medicaid coverage, the next three charts focus on SSI to DI serial and joint transitions, and on the DI to SSI joint transition. The trends for the three pattern groups are in-between the DI-only and SSI-only trend lines for Medicaid coverage, but each displays a distinct shape reflecting longitudinal interactions between DI and SSI. All three of these groups start at low levels of Medicaid coverage (roughly 10 percent or less) 12 months prior to disability entry. Medicaid coverage substantially increases during the months immediately preceding SSI entry and afterwards. In contrast to SSI-only, Medicare coverage jumps to 100 percent for all after the end of the Medicare waiting period. Thus all three groups share relatively high public health insurance coverage before the end of the Medicare waiting period (thanks to Medicaid) and full coverage afterward (thanks to Medicare). But the shape of the trend lines of coverage substantially differ as the charts to follow will show.

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Serial entrants (Chart 3) show a very sharp increase in Medicaid coverage during the three months prior to SSI entry (period of Medicaid coverage retroactivity) and shortly afterward, peaking at month 5 with 70 percent coverage. But Medicaid coverage of serial entrants sharply declines during the months immediately following the peak -- when DI kicks in and SSI benefit eligibility ceases. Thus SSI coverage during the DI waiting period is clearly very important for this group, but for many Medicaid coverage is temporary. Nevertheless, the level of Medicaid coverage is at least 30 percent for this group until month 72, suggesting a more permanent role of Medicaid coverage for some who lose SSI eligibility when DI eligibility begins. In contrast, the sharp rise in health insurance coverage between Month 24 and Month 30 is attributable to DI eligibility. Note that for this group Medicare coverage does not reach 100 percent until Month 30, a clear contrast with the experience of the DI-only group. This is an apparent anomaly, but actually it properly reflects program design interactions between SSI and DI and reflects a 29 month combined DI and Medicare waiting period. The reason has to do with the alignment of the data relative to the anchoring point of month of first disability benefit eligibility and onset[15]. In Chart 1 the 5-month DI waiting period is on the left side from Month 1. In contrast, in Chart 3 the DI waiting period is at least partially to the right of Month 1, which reflects the first month of SSI benefit eligibility. All in all for serial SSI/DI awardees, involvement in both SSI and DI results in an enhancement of the public health insurance safety net capitalizing on sequential and contemporaneous complementarities. Up till the last month of the DI waiting period Medicaid coverage is complementary to Medicare coverage. After the Medicare waiting period (from Month 30) it enhances the bundle of coverage.

SSI/DI joint entrants show a sharp, but somewhat less spectacular increase in Medicaid coverage around the time SSI benefit eligibility begins until a peak of about 57 percent during Month 6 (Chart 4). This is somewhat lower than the peak for the serial entrant group. However, the decline of Medicaid coverage

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[15] There is no perfect solution here; one or the other anchoring point needs to be chosen. We decided to use month of first eligibility partly because the date of onset information in the source data set is analytically problematic in many cases. What we do know is that for DI true onset must be at least 5 month prior to the first month of DI benefit eligibility and for SSI it must be at least prior to the first month of SSI benefit eligibility. But true onset can be much earlier, such as may be the case with congenital impairments. For details see Rupp and Riley (forthcoming).

thereafter is more muted, and over 40 percent are covered by Medicaid even at the end of the observation period. This is presumably primarily because of the continuation of SSI benefit eligibility after DI eligibility begins. While the shape of Medicaid coverage differs for the two pattern groups represented by Chart 3 and 4 during the period between Month 1 and Month 24, the overall level of public health insurance trends are similar for the two pattern groups. Note that Medicare coverage starts at Month 30 for both groups, with continued dual coverage for many.

Finally, *DI entrants with subsequent SSI involvement* peaks at 56 percent Medicaid coverage around month 24, and stays above 50 percent Medicaid coverage for all but the last couple of months of the 72 month follow-up period (Chart 5). Note that there is an increase in Medicaid coverage beginning in month (-5), which corresponds to the beginning of the DI waiting period, despite the fact that SSI eligibility does not begin until after DI eligibility. Thus some of this group of awardees is able to access Medicaid outside of SSI. These people are categorically disabled during month (-6) according to criteria that are common to both programs, and may have incomes low enough to meet the Medicaid means test.

All of these patterns are consistent with the importance of longitudinal patterns of SSI participation in providing Medicaid coverage for a substantial fraction of first-time disability program entrants. In summary we highlight three points. (1) SSI involvement (or the lack of) is the principal determinant of the level of public health insurance coverage during a roughly 2 year period after the first month of first disability benefit coverage for all subgroups. For all who entered DI during "Month 1" ("DI-only" and "DI-only entry with subsequent SSI involvement") and a few who entered both DI and SSI during the same month, overall public health insurance coverage jumps to essentially 100 percent during a single month after the end of the Medicare waiting period. For the SSI-only group there is no jump anywhere near or after Month 24, and unlike the effective saturation of public health insurance coverage for the other groups, combined Medicaid and Medicare coverage never passes 88 percent. (2) The lead of the SSI-only group in *public* health coverage disappears after the first 24 months of disability benefit coverage, and in contrast to all of the other longitudinal pattern groups, a small, but nontrivial portion

stays without either Medicaid or Medicare coverage thereafter. (3) Those who are involved both with the SSI and DI programs at some point, have more access to public health insurance compared to the DI-only group for two distinct reasons: (a) much higher levels of Medicaid coverage prior to the end of the Medicare waiting period; and (b) many continue to benefit from dual Medicare and Medicaid coverage after Medicare begins.

Reasons for Medicaid coverage. There are a lot of reasons for Medicaid coverage. The categories vary from state to state and include people who receive TANF benefits, are unemployed, and are disabled or blind. The reasons for Medicaid coverage are especially important for the period prior to the first disability award for our year 2000 cohort of entrants because it sheds light on the various potential paths towards Medicaid coverage. In particular, we ask whether SSI awardees had prior involvement with Medicaid for other reasons, especially prior to the 3-month window of potential retroactive coverage. This is relevant in assessing the hypothesis that categorical eligibility among SSI awardees is a principal reason for Medicaid entry. There is one caveat here, and that concerns issues related to childhood coverage. Many children are covered under Medicaid and CHIP. Childhood Medicaid coverage among *adult* awardees is relevant for our analysis, but we have no access to retrospective Medicaid coverage data for years prior to 1999. This is relevant, because TANF is an important reason for childhood Medicaid coverage. Thus some 2000 awardees in our sample may have had an unmeasured Medicaid eligibility spell prior to 2000, during their childhood years. In that case adult receipt of SSI would not be the ultimate reason for Medicaid involvement even if there was no Medicaid engagement for a full year prior to SSI award. Nevertheless the relevance of childhood Medicaid coverage is limited by the fact that our sample does not include childhood SSI awardees. SSI is a major reason for Medicaid coverage among children (Hemmeter and DeCesaro, 2009). All in all our analysis of the path towards Medicaid coverage below applies with the caveat that strictly speaking we can make conclusions only about SSI awards in 2000 as a proximate cause of Medicaid coverage in our sample.

We looked at detailed longitudinal tabulations (available from the authors), and the following major conclusions emerge. Only 7 percent of our whole awardee sample was covered by Medicaid 12 months prior to first disability award and 6 of the 7 percent had Medicaid eligibility for a reason *other than disability (or blindness)*. Among SSI-only disability awardees, 24 percent were Medicaid-eligible 12 months prior to SSI eligibility and 86 percent of these had Medicaid for a reason *other* than disability – accounting for about 20 percent of the SSI-only group. Thus even for SSI-only awardees very few (about 4 percent of these awardees) had Medicaid 12 months prior to first disability award on account of being "disabled or blind" and the corresponding percent of all awardees combined is less than 1 percent. However, in conjunction with the sharp upturn of *overall* Medicaid coverage around the time of first award, disability as a *reason* for Medicaid coverage dramatically increases around that time, and continues to increase thereafter. Among those with Medicaid coverage about 70 percent of all, and 80 percent of SSI-only is Medicaid-covered due to being "Disabled, including blind" at Month 3. These percentages continue to rise, reaching close to 100 percent by month 72. Overall, these findings on reasons for Medicaid coverage are consistent with our previous results pointing to the SSI-Medicaid link as the primary proximate cause of Medicaid coverage.

The relationship of personal characteristics and longitudinal pattern of participation among awardees with Medicaid coverage. Table 2 addresses the role of demographic characteristics, diagnosis and longitudinal patterns of disability benefit eligibility as correlates of Medicaid coverage at three time points before and after first disability award. We present estimates from logistic models of Medicaid coverage. We assess the association between various groups of variables and Medicaid coverage after adjustments for other factors. In addition to these three groups of independent variables of substantive interest, we include state dummies to control for heterogeneity related to state-level variables. The table presents odds ratios and their estimated precision.

First we address the role of demographic variables. Members of the younger age groups, females, and nonwhites have relatively large regression-adjusted odds of Medicaid coverage compared with older

awardees, males and whites. We note that the unadjusted odds (not presented in the table) tend to show similar, but larger differences. This is most striking for the relative odds for the 18-30 age group, where the unadjusted relative odds compared to members of the 46-64 age group hover between 4.5 and about 6.0. This appears to be primarily the result of the fact that DI-only is underrepresented in the youngest age group, and access to Medicaid is by far the lowest among DI-only awardees.

Next we discuss diagnostic variables. We have chosen "musculoskeletal" as the reference category. This is the largest diagnostic group, tends to be characterized by gradual onset, and is believed to be fairly common among the near-elderly with a history of physical occupations. While the regression-adjusted diagnostic differences are not dramatic, for all but one of the other categories the relative odds of Medicaid coverage are significantly higher compared to musculoskeletal. Awardees with genitourinary, infectious and circulatory impairments tend to have the highest relative odds. While the regression-adjusted relative odds for mental impairments and intellectual disabilities tend to be significantly higher than 1, the point estimates are substantially lower than the unadjusted relative odds (not presented in the table).The unadjusted odds ratios for the three months selected for Table 2 are roughly around 3 for mental impairments and are between 4 and 8 for intellectual disabilities/mental retardation. The difference between regression-adjusted and unadjusted odds ratios for these two diagnostic categories suggests that the unadjusted odds ratios may partly reflect associations with other variables such as relatively young age and SSI-only involvement.

The relationship between program design   and Medicaid coverage. Table 2 also provides estimates of the regression-adjusted relative odds associated with the various patterns of disability benefit entry. The key finding from the bottom section with the heading "Program Pattern" is that any involvement with the SSI program substantially increases the odds of Medicaid coverage. This pattern is consistent with the unadjusted differences we observed in Charts 1 to 5, and suggests that the striking differences presented in those charts are not artifacts of the association between coverage pattern and demographic, diagnostic or state effects. The results suggest that the institutional link between SSI and Medicaid coverage is an

important aspect of access to Medicaid on its own right. The results in Table 2 also show that the contrast in Medicaid access compared to DI-only is strongest for SSI-only for all three time points.

Coverage and transitions to nonparticipant status. While a full-blown analysis of exits from SSA's disability programs and health insurance coverage is to await further study, a few words are in order here. The analysis thus far has focused on the role of longitudinal patterns of disability program entry and did not explicitly consider return to nonparticipant status. Nonparticipation for reasons other than death or reaching age 65 is relatively rare in the DI program, but exits (and re-entries) are more common in SSI because of changes in income and assets. In our recent paper on longitudinal participation patterns we reported that among those who entered DI first, less than 4 percent of survivors less than 65 years of age were in nonpayment status 5 years after entry (Rupp and Riley, forthcoming). In contrast, about 13 percent of those who first entered SSI were in nonpayment status 5 years after, the difference reflecting exits due to the SSI means test. Potential loss of health insurance coverage after exits has been a serious topic of discussion among policy makers for many years, partly out of concern about negative incentive effects hampering exits from the disability benefit rolls. Both DI and SSI have work incentive provisions that directly address continuation of health insurance issues. According to current law Medicare benefits are to continue for 93 months after DI benefits stop for work-related reasons. Medicaid coverage for previous SSI beneficiaries continues if the cash benefit stops due to earnings that result in income that is too high for eligibility for benefits, as long as the person continues to be categorically disabled, needs Medicaid for work, and meets some other requirements. Table 3 shows that almost half of surviving nonparticipants at Month 6 are covered by Medicaid, and the same is true for a quarter of nonparticipants at Month 60. The table includes both nonparticipants with SSI involvement and nonparticipants who are DI-only. We also looked at monthly tabulations (not shown) displaying Medicaid and Medicare coverage trends. These data show that Medicare plays only a minimal role in providing coverage for all nonparticipants up to the end of the Medicare waiting period, but it covers over half afterwards. In contrast, Medicaid provides substantial coverage during the first year peaking around Month 9 at 51 percent; coverage continuously declines afterwards, reaching a low of 25 percent at Month 72. The

findings presented in Table 3 need to be interpreted with caution since the table includes nonparticipants with DI-only previous involvement. Medicaid involvement is fairly low among DI-only, and DI work incentive provisions focus on continued Medicare rather than Medicaid coverage. Thus a more disaggregated query should be helpful. Compared to the nonparticipant series in Table 3 which does not disaggregate nonparticipants by previous involvement with the two disability programs the picture becomes clearer and sharper after disaggregation by previous involvement with SSI or DI. Medicaid coverage among nonparticipants is higher when DI-only is excluded (data available from the authors). Likewise, when SSI-only is excluded Medicare coverage is practically 100 percent after the end of the Medicare waiting period among nonparticipants. When both Medicaid and Medicare coverage are considered, the overall level of public health insurance coverage among nonparticipants is higher both during the first two years from award and for the subsequent 4 years. The gist of these results is that while the relationship between exits and health insurance coverage is an important topic worthy of further study, our preliminary findings suggest that the major qualitative conclusions about the relationship between longitudinal patterns of disability program participation and coverage by the two public health insurance programs seem fairly robust.

The relationship between implementation variables and Medicaid coverage.

The preceding discussion highlighted the importance of programmatic *design* arising from the interaction of eligibility for disability benefits and health insurance coverage. Here we address the potential effect of program implementation variables as factors influencing Medicaid coverage. We address three implementation issues with potential effects on coverage. These are the timing of initial disability payments, the presence or absence of automatic Medicaid enrollment, and the relative restrictiveness of Medicaid eligibility rules for SSI awardees in some states.

Since it is practically impossible to make a final decision of eligibility for disability benefit payments instantaneously, there is typically a lag between the first month of benefit eligibility (which is typically established retroactively) and the actual receipt of the first cash payment. Actually, lags can be substantial. Recognizing the importance of these lags, SSA implemented a "Compassionate Allowances" policy and other administrative innovations during recent years designed to make very quick allowance decisions in cases where based on the information provided by the applicant there should be very little uncertainty whether an "allowance" or "denial" decision is warranted. However, in many other cases there is substantial uncertainty whether the applicant meets SSA's strict and complex categorical disability test. Due to this complexity and the social value placed on the objective of avoiding incorrect denials, the disability determination process involves multiple steps of reconsideration and appeals of denials. See Hu et al (2001) for a description of the sequential disability determination process. This is not the place to analyze the details of this process, but one of the important results – substantial variation in the time elapsing before an actual first payment is made – is very relevant for the link between disability awards and Medicaid. Chart 6 addresses the relationship between the actual receipt of cash payments and Medicaid coverage. Our hypothesis is that lags in SSI disability determination may lead to administrative challenges in the Medicaid eligibility determination process, and this in turn might reduce access to Medicaid in a predictable manner. We should anticipate no effect prior to the third month preceding first SSI eligibility, since eligibility for Medicaid should occur for a reason other than SSI eligibility during this period. (Medicaid coverage can be granted for up to 3-months prior to the month of SSI award.) We also should anticipate a sharp increase in the odds of Medicaid coverage associated with the actual receipt of SSI benefits, since the actual receipt of benefits signifies SSI payment eligibility with certainty, while during the period starting from the date of SSI application, SSI payment eligibility itself is uncertain, implying uncertainty of status as categorically eligible for Medicaid. Specifically, we hypothesize that although Medicaid eligibility can be made effective up to three months before the date of application, some states may not award Medicaid benefits for long retroactive periods if there is a substantial lag in SSI disability determination.

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To obtain the clearest test for our hypotheses, the sample frame for Chart 6 and Table 4 was restricted to SSI-only awardees. Chart 6 shows Medicaid coverage at selected time points after the first month of SSI benefit for two subgroups: (a) those who have actually received their first benefit payment by the given month; and (b) those who did not. The result show a difference of roughly 25-30 percentage points between the two groups in the expected direction. To further explore this association we performed multiple regression analysis. The key results from 8 logistic regressions are summarized in Table 4. In Table 4 our dependent variable of interest is Medicaid coverage at selected months prior to or after the first month of SSI benefit eligibility. The key independent variable is the number of months elapsing between first month of benefit eligibility and first month of actual payment. We categorized this independent variable to capture the potential effect of first payment on Medicaid coverage and to allow for nonlinearities. The independent and dependent variables were constructed in a manner to allow for a comparison of differences in odds ratios associated with neighboring cells representing people who did and others who did not receive their first disability payment by the month for which Medicaid coverage was measured. In effect, we performed a form of interrupted time series analysis. The relevant cell-pairs are highlighted in the table. For instance in the month 12 Medicaid coverage regression we should expect a higher odds ratio for the cell associated with actual payment receipt during the 7-12 month category than for the neighboring cell in the same row representing first payment between 13 and 18 months. The numeric estimates are an odds ratio of 1.0 (no difference from the reference group receiving actual payments within 6 months) for the first cell and an odds ratio of 0.4, a substantial drop as expected. The empirical data are consistent with our hypothesis of a positive relationship between Medicaid coverage during Month T and actual cash payment during Month $t \leq T$. The adjusted relative odds are close to 1 and are in most cases not significantly different from 1 in the Month (-12) and Month (-3) regressions. This is consistent with our hypothesis that duration of time between first month of eligibility and actual payment should have no effect on Medicaid coverage prior to the first month of benefit eligibility (T<1) at all.

The data clearly show a substantial drop in the odds ratio across this transition from nonpayment to payment status in all 6 postaward regressions. The drop is from odds ratios ranging from 0.9 to 1.7 for the "actual SSI payment" cells to about 0.3 to 0.4 in the "no payment yet" cells. In effect the actual receipt of SSI benefit is associated with at least a threefold increase in relative odds of Medicaid coverage. The bottom line is that the data support the hypothesis of a negative association between lags in adjudication of SSI claims and the extent of Medicaid coverage.

Next we focus on two state level Medicaid program features: (a) the requirement for a special Medicaid application for SSI awardees in some states ("Criteria states"); and (b) more restrictive Medicaid eligibility requirements for SSI awardees in some other states ("209b states"). Most states fall into a third category of *automatic Medicaid enrollment* for SSI awardees, and thus provide a natural comparison group. The unadjusted differences between the three groups are shown in Chart 7. As seen from the chart people living in "209b" states tend to have the lowest level of Medicaid coverage, while people living in "Auto enrollment" states have the highest coverage rates across the board. But the temporal patterns are also worth noting. First, both "Criteria" and "209b" states have lower pre-award Medicaid enrollment coverage rates, suggesting some selection effect. However, the differences are much smaller than the differences for the first post-award period displayed in Chart 7; this difference in differences suggests that the findings are consistent with our hypothesis. Finally, we observe a tendency for the post-award differences to diminish through time. This suggests that only part of the Medicaid coverage effect is relatively permanent. The data suggest that some of the effect of both "209b" and "Criteria" state policies are temporary. This seems to imply delays in Medicaid coverage associated with these policies compared to auto-enrollment. Because of concerns about the potential effects of selectivity and heterogeneity on these unadjusted differences we also looked at regression-adjusted differences in odds ratios using a difference-in-differences (DD) conceptual framework. We estimated the regression-adjusted effect of living in a state that requires a separate SSI application ("Criteria" states) or in a state with a more restrictive Medicaid eligibility regime for SSI awardees ("209b" states). In both cases the reference group

is comprised of states with automatic Medicaid enrollment for SSI awardees. (We use a single regression model including dummy variables for the two sets of special-rule states.) In both cases the policies specifically focus on SSI awardees representing the most straightforward pattern of SSI program involvement. We also include similar regressions for a comparison group of DI-only awardees following a difference-in-differences-in-differences (DDD) logic. Such a comparison group can be useful for causal inference since neither requiring a separate SSI application nor more restrictive Medicaid eligibility for SSI awardees should have an effect on Medicaid coverage among DI-only awardees unless the policies themselves are endogenous to broader attitudes towards providing services to the disabled. For example the cultural predisposition in the given state for limited or pro-active government may be such a broader factor. Thus the DI-only comparison group may be helpful in sorting out various aspects of state policies.

First we look at the estimated effect of requiring a separate SSI application. We hypothesize that requiring a separate application (a) should have no effect on Medicaid coverage prior to first SSI-only or DI-only award; (b) it should have a negative effect on Medicaid coverage for SSI-only after first award; and (c) it should have no effect on Medicaid coverage for DI-only after first award. The empirical results are consistent with the first two hypotheses, but only partially with the third. None of the pre-award odds ratios are statistically significantly different from 1 for either the SSI-only or the DI-only groups (Table 5). There is a clear drop in the odds ratio for the SSI-only group after the month of SSI award. The estimated odds ratios are highly significant and remarkably stable over time around 0.6-0.7, suggesting a 30-40 percent permanent drop in the relative odds of Medicaid coverage associated with the requirement of a separate Medicaid application. All but two postaward odds ratio estimates are consistent with our hypothesis of no-difference for the DI-only group, but the Month 24 and Month 72 odds ratios are statistically significantly lower than 1 and virtually identical with the SSI-only odds ratios. A possible interpretation is that SSI "Criteria" states may have more restrictive Medicaid enrollment practices in general; the effect of requiring a separate Medicaid application itself may be temporary. Note however that Medicaid enrollment has limited relevance for DI-only subsequent to the end of the Medicare waiting

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period. More detailed process information on differences between the two groups of states in terms of enrollment practices concerning DI-only would help to understand our findings.

Table 5 also gives information on the role of the more restrictive policy regime of "209b" states. The two significant odds ratios for months (-12) and (-6) for the SSI-only group suggest that "209b" states may be somewhat less lenient towards the SSI-only target population than auto enrollment states, regardless of the SSI-related specific Medicaid eligibility criteria. We do find, however, a stronger effect arising from a pretty consistent drop in the odds ratios of 0.8-0.9 for the pre-SSI-award period to the 0.4-0.6 range for the post-award period, which is consistent with the hypothesis of a negative effect of more restrictive Medicaid eligibility criteria for the SSI target population. Our interpretation is further supported by the fact that the odds ratios for the DI-only group are generally very close to and not statistically significantly different from 1 without any noticeable break in the time series. The single statistically significant coefficient (for Month 72) is greater than 1. Thus we find no evidence suggesting that tighter Medicaid eligibility standards in "209b" states negatively affect Medicaid enrollment among DI-only beneficiaries. Clearly, the estimates suggest that the more restrictive Medicaid eligibility policies of "209b" states substantially reduce the odds of Medicaid coverage for the SSI-only target population. In sum we find evidence supporting the hypothesis that auto-enrollment increases Medicaid coverage, while the relative tightness of "209b" states has the opposite effect.

V. Conclusions

The SSI and DI disability programs share an identical definition and process of determining categorical eligibility as disabled and thus are closely related. But they have other program eligibility rules reflecting means testing (SSI) and social insurance principles (DI) that are responsible for substantial longitudinal interactions between these programs. In particular, the DI program has a 5-month waiting period, while SSI does not. Except for a $20 general income exclusion, SSI benefits are reduced $1 for $1 for DI benefits received. The result of these program design features is a distinct set of longitudinal patterns of

participation in the two programs. These patterns in turn affect Medicaid and Medicare coverage of the different subgroups of disability benefit awardees.

While about 60 percent of first-ever disability program awardees are eligible to receive only DI benefits over a 60 month follow-up period, the remaining 40 percent is eligible for SSI-only or concurrently for both SSI and DI for at least some of this follow-up period. In a previous paper, we classified 98 percent of all first-ever disability program awardees into 5 longitudinal disability program entry groups: DI-only, SSI-only, and 3 distinct patterns with concurrent involvement. These five groups form the basis of our investigation of public health insurance coverage over a period including 12 months prior to first disability award, and the following 72 months. These patterns in turn affect Medicaid and Medicare coverage of the different subgroups of disability benefit awardees due to interactions between the four programs.

Medicare and Medicaid provide important and complementary roles for the working age population with severe disabilities. Medicare is the primary source of health insurance coverage for persons eligible for DI benefits. Its main limitation is the fact that coverage does not begin until a 24-month Medicare waiting period has elapsed, following a 5-month waiting period for DI. Medicaid coverage plays a more complicated role. For DI beneficiaries, Medicaid often provides a source of health insurance coverage during the DI and Medicare waiting periods. Frequently this coverage follows from eligibility for SSI benefits, but a substantial number of DI beneficiaries have Medicaid coverage without being eligible for SSI. Once Medicare coverage begins many beneficiaries are able to retain Medicaid eligibility as a secondary source of health insurance. For these beneficiaries, Medicaid can help with Medicare cost-sharing expenses and provides coverage for nursing home care and other long term care services not covered by Medicare. For persons not eligible for DI, the SSI program frequently provides a source of health insurance through Medicaid, although some SSI eligibles do not become eligible for Medicaid.

Despite the significant roles played by Medicare and Medicaid, there are still some gaps in public health insurance coverage for beneficiaries in the SSI and DI programs. DI-only beneficiaries (who are not eligible for SSI) seldom have Medicaid or Medicare coverage during the 29 months that comprise the DI and Medicare waiting periods. Among those with SSI eligibility during the DI waiting period, some lose their Medicaid benefits when SSI eligibility is terminated due to the initiation of DI benefits. Lastly, SSI eligibility does not guarantee Medicaid eligibility, leaving some without a public source of health insurance if they are not eligible for DI or are in the Medicare waiting period. Some disabled beneficiaries have other sources of health insurance, but for those that do not, a lack of health insurance can severely impair access to health care (Riley, 2006).

The time between first month of SSI eligibility and first month of actual payment usually represents the time required to adjudicate a claim for SSI benefits. When the claim is approved eligibility for SSI is often established retroactively. We found that longer lapses between initial eligibility and first payment were associated with lower rates of Medicaid eligibility during the intervening time. This finding is remarkable given that applications for SSI and Medicaid are often submitted at the same time; Medicaid eligibility is to be established as of the date of application or up to three months before if the date of disability onset precedes the date of application. It is possible that program implementation or state policies could explain the lower rates of Medicaid participation found in our empirical analysis. The relationship between the various dates of eligibility, lags in actual payment, and rates of Medicaid eligibility deserves further study.

We observed lower rates of Medicaid participation among SSI eligibles in "criteria" states where SSI beneficiaries must submit a separate application for Medicaid benefits. The additional application requirement may pose a barrier to some SSI beneficiaries that prevents them from obtaining Medicaid coverage they would otherwise be entitled to. An alternative explanation could be that some beneficiaries prefer not to apply for Medicaid, perhaps because they already have a source of health insurance. We

could not determine from our data the reasons that SSI beneficiaries in "Criteria" states did not apply for Medicaid.

Several important issues remain for further analysis. One of these is the question how these patterns of Medicaid and Medicare coverage translate into utilization and program cost patterns. In addition, there is a need to reassess the patterns of overall health insurance coverage among the disabled in light of the patterns identified in this paper, but also considering information on private sources of health insurance that were unobserved in the administrative data sets used for this study. Finally, the ongoing reforms to increase overall health insurance, and particularly Medicaid, coverage and other important changes will require the reassessment of implications for future links between disability cash benefits and public health insurance coverage; expanding coverage among nondisabled adults may weaken the role of SSI in providing access to health insurance in the future.

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Table 1 Sample characteristics by longitudinal pattern of first-ever disability program benefit eligibility in year 2000[1]

Characteristics[2]	Longitudinal pattern of disability program benefit eligibility during 5 years from first award						Total
	DI-only	DI-only entry, SSI involvement later	SSI-only	SSI only entry serial to DI only after 5-month waiting period	SSI-only to joint SSI and DI after 5-month waiting period [3]	Any other longitudinal pattern	
Total number	**41,636**	**6,420**	**10,813**	**3,056**	**5,595**	**1,278**	**68,798**
Percentage distribution	**60.5%**	**9.3%**	**15.7%**	**4.4%**	**8.1%**	**1.9%**	**100.0%**
Age group	*Percentage distribution*						
18-30	3.6	17.0	22.9	11.9	15.1	27.6	9.6
	0.1	*0.5*	*0.4*	*0.6*	*0.5*	*1.3*	*0.1*
30-45	23.4	39.4	28.8	32.3	37.0	29.9	27.4
	0.2	*0.6*	*0.4*	*0.8*	*0.6*	*1.3*	*0.2*
46-64	73.0	43.6	48.3	55.8	47.9	42.5	63.0
	0.2	*0.6*	*0.5*	*0.9*	*0.7*	*1.4*	*0.2*
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Sex	*Percentage distribution*						
Women	46.8	50.4	56.0	36.6	46.9	46.2	48.1
	0.2	*0.6*	*0.5*	*0.9*	*0.7*	*1.4*	*0.2*
Men	52.8	49.5	42.5	62.8	53.0	53.7	51.3
	0.2	*0.6*	*0.5*	*0.9*	*0.7*	*1.4*	*0.2*
Missing	0.4	0.0	1.6	0.6	n.a.[4]	n.a.	0.5
	0.0	*0.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.0*
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Race/ethnicity	*Percentage distribution*						
White	77.8	65.7	54.7	63.2	60.9	64.7	70.8
	0.2	*0.6*	*0.5*	*0.9*	*0.7*	*1.3*	*0.2*
Nonwhite	20.8	33.2	43.1	36.1	38.4	33.9	27.8
	0.2	*0.6*	*0.5*	*0.9*	*0.7*	*1.3*	*0.2*
Missing	1.4	1.0	2.2	0.7	0.8	1.4	1.4
	0.1	*0.1*	*0.1*	*0.2*	*0.1*	*0.3*	*0.0*
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
SSA primary diagnosis	*Percentage distribution*						
Congenital	0.1	n.a.	0.4	n.a.	n.a.	n.a.	0.1
	0.0	*0.0*	*0.1*	*0.1*	*0.0*	*0.1*	*0.0*
Endocrine	2.8	3.7	2.9	2.2	4.2	3.7	3.0
	0.1	*0.2*	*0.2*	*0.3*	*0.3*	*0.5*	*0.1*
Infectious and parasitic	1.1	2.1	2.9	5.3	2.4	2.3	1.8
	0.1	*0.2*	*0.2*	*0.4*	*0.2*	*0.4*	*0.1*
Injuries	3.7	3.6	3.3	4.7	5.0	3.2	3.8
	0.1	*0.2*	*0.2*	*0.4*	*0.3*	*0.5*	*0.1*
Intellectual Disability/Mental Retardation	0.7	3.5	8.7	2.0	2.4	8.9	2.5
	0.0	*0.2*	*0.3*	*0.3*	*0.2*	*0.8*	*0.1*
Mental[5]	17.8	34.5	31.1	18.2	28.7	30.2	22.6
	0.2	*0.6*	*0.4*	*0.7*	*0.6*	*1.3*	*0.2*
Neoplasms	10.2	4.3	9.2	15.0	4.8	6.6	9.2
	0.1	*0.3*	*0.3*	*0.6*	*0.3*	*0.7*	*0.1*
Circulatory	13.0	8.6	9.0	16.3	14.6	10.0	12.2
	0.2	*0.3*	*0.3*	*0.7*	*0.5*	*0.8*	*0.1*
Digestive	2.0	2.7	2.2	2.0	2.8	2.5	2.2
	0.1	*0.2*	*0.1*	*0.3*	*0.2*	*0.4*	*0.1*
Genitourinary	2.1	1.5	2.0	6.6	2.1	2.3	2.2
	0.1	*0.2*	*0.1*	*0.5*	*0.2*	*0.4*	*0.1*
Musculoskeletal	31.0	24.5	13.0	11.6	19.3	16.5	25.5
	0.2	*0.5*	*0.3*	*0.6*	*0.5*	*1.0*	*0.2*
Nervous	8.9	5.6	6.3	8.2	6.0	6.8	7.9
	0.1	*0.3*	*0.2*	*0.5*	*0.3*	*0.7*	*0.1*
Respiratory	4.5	3.3	3.6	6.0	4.7	3.4	4.3
	0.1	*0.2*	*0.2*	*0.4*	*0.3*	*0.5*	*0.1*
Other	0.7	0.8	0.6	0.4	0.8	1.3	0.7
	0.0	*0.1*	*0.1*	*0.1*	*0.1*	*0.3*	*0.0*
Unknown	1.5	1.2	4.8	1.2	2.1	2.0	2.0
	0.1	*0.1*	*0.2*	*0.2*	*0.2*	*0.4*	*0.1*
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

[1]Persons aged 18-64 first-awarded disability (DI or SSI) benefits in 2000. Classification of benefit eligibility pattern is based on monthly DI and/or SSI payment eligibility during a 60-month period starting with the month of award.

[2]Standard errors in italics.

[3]May revert to DI-only status during subsequent months. Includes 215 observations who were in SSI-only status during at least one month of the 59-month follow-up observation period, possibly as a result of DI suspension. No more than 0.3% of the entry cohort was in SSI-only status during any given month.

[4]Not available: less than 10 obervations in cell.

[5]Not including intellectual disability/mental retardation.

Table 2 Results of logistic regressions on factors affecting Medicaid coverage month (-3) before and months 3 and 24 after 2000 disability (SSI and/or DI) award[1]

Independent variables	Model #								
	Model 1			Model 2			Model 3		
	Medicaid coverage at:								
	Month (-3)			Month +3			Month +24		
	Odds ratio	Std. error	P>z	Odds ratio	Std. error	P>z	Odds ratio	Std. error	P>z
Demographic									
age1830	2.05	0.09	0.00	1.91	0.07	0.00	2.27	0.09	0.00
age3145	1.91	0.06	0.00	1.56	0.04	0.00	1.62	0.04	0.00
age4664	<reference category>								
female	1.61	0.04	0.00	1.17	0.03	0.00	1.47	0.03	0.00
male	<reference category>								
miss_sex	1.38	0.22	0.04	1.26	0.19	0.13	1.77	0.56	0.07
white	<reference category>								
nonwhite	1.42	0.04	0.00	1.30	0.03	0.00	1.47	0.04	0.00
miss_race	0.78	0.09	0.03	0.94	0.10	0.56	0.94	0.10	0.60
Diagnostic									
circulatory	1.57	0.08	0.00	1.69	0.07	0.00	1.38	0.06	0.00
congenital	0.52	0.18	0.07	0.96	0.25	0.88	0.81	0.23	0.45
digestive	1.47	0.13	0.00	1.73	0.13	0.00	1.47	0.12	0.00
endocrine	1.45	0.12	0.00	1.44	0.10	0.00	1.52	0.10	0.00
genitourinary	1.58	0.14	0.00	2.79	0.21	0.00	1.49	0.12	0.00
infectious	1.53	0.14	0.00	2.56	0.21	0.00	1.91	0.16	0.00
injuries	1.32	0.10	0.00	1.46	0.09	0.00	1.14	0.07	0.04
musculosceletal	<reference category>								
neoplasms	1.22	0.07	0.00	1.98	0.09	0.00	1.07	0.07	0.28
nervous	1.02	0.06	0.71	1.24	0.06	0.00	0.98	0.05	0.67
other	1.35	0.21	0.06	1.11	0.16	0.49	0.99	0.14	0.96
mental[2]	1.35	0.06	0.00	1.40	0.05	0.00	1.34	0.05	0.00
respiratory	1.42	0.11	0.00	1.64	0.10	0.00	1.39	0.08	0.00
id/mr[3]	1.07	0.08	0.34	1.25	0.08	0.00	1.36	0.10	0.00
miss_diagnosis	1.31	0.11	0.00	1.01	0.08	0.95	0.76	0.06	0.00
Program pattern									
di-only[4]	<reference category>								
di_later_ssi	3.81	0.16	0.00	5.44	0.20	0.00	10.33	0.35	0.00
ssi_only	8.44	0.30	0.00	37.21	1.23	0.00	50.45	1.90	0.00
serial	2.77	0.17	0.00	34.31	1.62	0.00	5.23	0.25	0.00
joint	3.62	0.17	0.00	15.42	0.57	0.00	10.68	0.39	0.00
state dummies[5]	< New York state is reference category>								
Number of obs	67690			67254			62316		
LR chi2(77)[6]	10678.33			28392.11			29192.76		
Prob > chi2	0.0000			0.0000			0.0000		
Pseudo R2	0.2139			0.3652			0.3782		
Log likelihood	-19612.649			-24676.063			-23997.919		

[1] Sample of year 2000 first-ever disability (DI and/or SSI) program entrants aged 18-64 during first month of payment eligibility. "State-only" SSI first awardees not included. At Month +3 and Month +24 sample is limited to survivors less than 65 years of age. "Month 1" is defined as first-ever month of positive payment eligibility for program of first award. Immediately preceding month is "Month (-1)".

[2] Not including intellectual disability/mental retardation.

[3] Intellectual disability/mental retardation.

[4] DI-only is the reference group. "SSI/DI simultaneous" entrants and "Other" awardees are included in the multinomial logit model, but results are not presented here.

[5] All states and the District of Columbia except New York is included. Puerto Rico may be omitted from some models. A residual category represents U.S. territories.

[6] Except Model 3 where LR chi2(78) is applicable.

Table 3 Percent with Medicaid full coverage at selected time points after first month of benefit eligibility by disability program status at selected time points

Month	Disability payment eligibility status during given month				
(first disability award = month 1)	DI only	SSI only	Both DI and SSI	Neither	Total[1]
	percent				
3	9.0	67.3	52.9	42.2	26.1
6	12.4	78.4	58.1	49.6	27.9
12	14.2	84.1	62.6	43.3	28.9
24	16.5	90.1	78.4	33.4	31.0
36	16.4	92.4	88.7	29.6	30.6
48	16.4	92.6	90.7	26.3	30.3
60	16.6	93.5	91.8	25.0	30.5

[1] Total includes survivors aged less than 65 during given month.

Table 4 Odds ratios and statistical significance from logistic regressions on effect of delays in actual benefit receipt on Medicaid coverage months (-12), (-3) before and months 12, 18, 24, 36 and 60 after 2000 first-ever award, SSI -only awardees[1]

Dependent variable: Medicaid coverage during…[2]	Statistics[3]	First payment during month (month 1 = first month of SSI benefit eligibility)						
		1 to6	7-12	13-18	19-24	25-36	37-60	61 or more
month (-12)	Odds Ratio	<reference category>	1.0	1.1	**1.3**	**1.3**	1.0	0.9
	P>z		0.85	0.46	0.01	0.03	0.87	0.83
month (-3)	Odds Ratio	<reference category>	**0.8**	0.9	1.1	1.1	0.9	0.7
	P>z		0.01	0.37	0.57	0.59	0.48	0.33
month 6	Odds Ratio	<reference category>	**0.4**	**0.2**	**0.1**	**0.1**	**0.1**	**0.2**
	P>z		0.00	0.00	0.00	0.00	0.00	0.00
month 12	Odds Ratio	<reference category>	1.0	**0.4**	**0.2**	**0.1**	**0.1**	**0.2**
	P>z		0.68	0.00	0.00	0.00	0.00	0.00
month 18	Odds Ratio	<reference category>	1.0	1.3	**0.4**	**0.2**	**0.1**	**0.2**
	P>z		0.89	0.10	0.00	0.00	0.00	0.00
month 24	Odds Ratio	<reference category>	1.0	**1.5**	**1.4**	**0.4**	**0.2**	**0.2**
	P>z		0.67	0.01	0.02	0.00	0.00	0.00
month 36	Odds Ratio	<reference category>	0.9	1.2	1.3	**1.6**	**0.4**	**0.1**
	P>z		0.24	0.23	0.08	0.00	0.00	0.00
month 60	Odds Ratio	<reference category>	0.9	**1.3**	**1.4**	1.8	**1.7**	**0.3**
	P>z		0.15	0.05	0.01	0.00	0.04	0.01

[1] Subsample of 2000 first ever SSI program entrants aged 18-64 during first month of payment eligibility. Subsample is limited to "SSI-only" longitudinal pattern. "State-only" SSI first awardees not included. Sample is limited to survivors less than 65 years of age during the month Medicaid coverage is measured. "Month 1" is defined as month of first positive payment eligibility for program of first entry. Immediately preceding month is "Month (-1)".

[2] The value of "1" indicates full Medicaid coverage during the given month. "0" indicates lack of such coverage.

[3] Odds ratios and P-values are estimated from logistic regressions. In addition to the month of first actual payment the models include demographic characteristics, diagnostic category and state dummies as independent variables. P-value of 0.05 or less is commonly regarded as an indicator of an odds ratio that is statistically significantly different from 1.

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Table 5 Estimated relationship between state policy regime and Medicaid coverage at selected time points prior to and after first disability program entry for SSI-only and DI-only entrants during 2000[1]
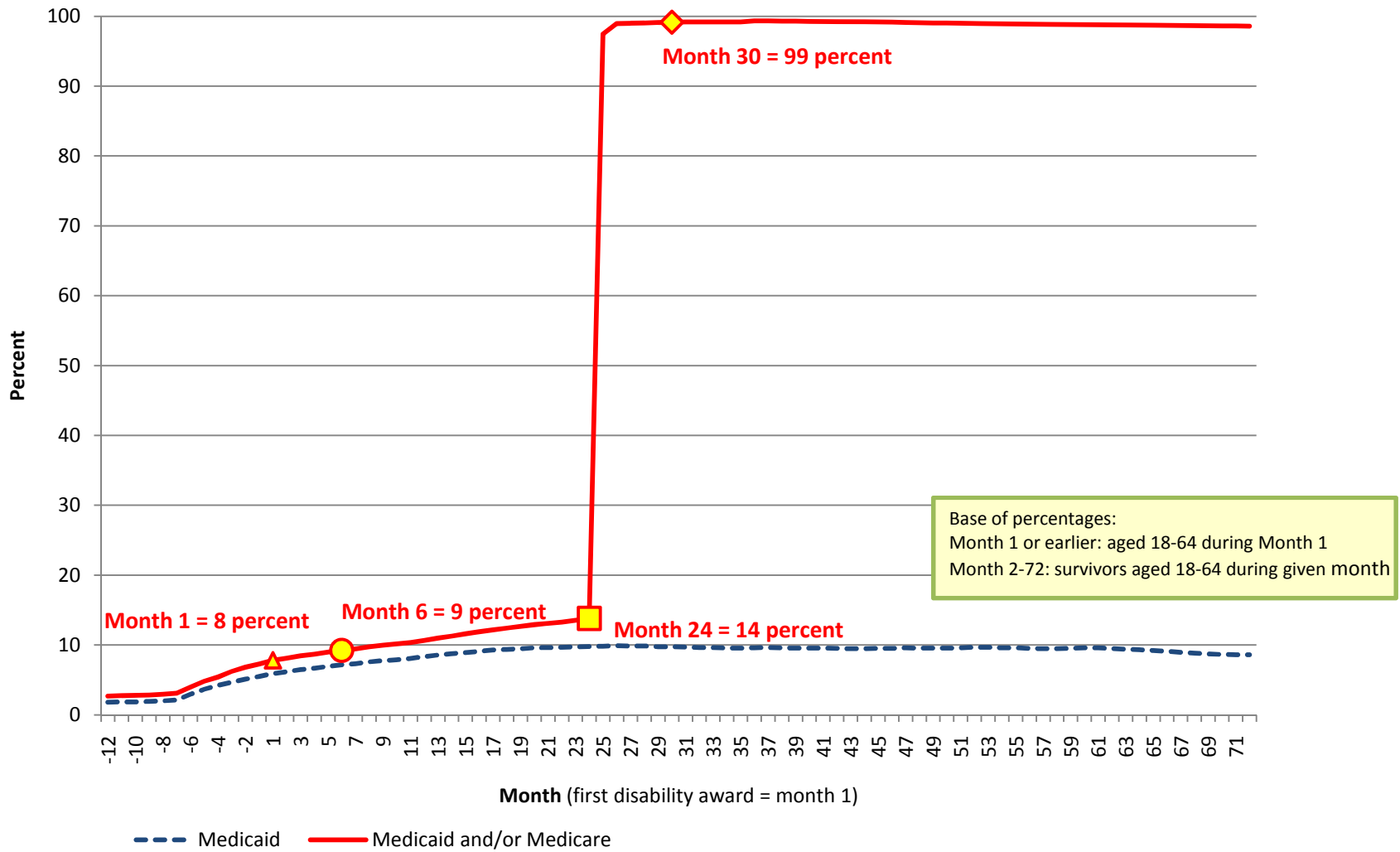
Dependent variable: Medicaid coverage during…[2]	Statistics[3]	SSI criteria state: separate application		209B state: more restrictive	
		Longitudinal disability pattern group			
		SSI-only	DI-only	SSI-only	DI-only
month (-12)	Odds Ratio	0.9	1.0	**0.8**	0.9
	P>z	*0.21*	*0.96*	*0.00*	*0.47*
month (-6)	Odds Ratio	0.9	1.0	**0.8**	1.2
	P>z	*0.61*	*0.78*	*0.00*	*0.02*
month (-3)	Odds Ratio	0.9	1.2	0.9	1.1
	P>z	*0.35*	*0.17*	*0.22*	*0.20*
month 3	Odds Ratio	**0.6**	1.1	**0.4**	1.1
	P>z	*0.00*	*0.31*	*0.00*	*0.04*
month 6	Odds Ratio	**0.6**	1.0	**0.4**	1.1
	P>z	*0.00*	*0.89*	*0.00*	*0.02*
month 12	Odds Ratio	**0.6**	1.0	**0.4**	1.1
	P>z	*0.00*	*0.78*	*0.00*	*0.19*
month 24	Odds Ratio	**0.6**	**0.7**	**0.4**	1.0
	P>z	*0.00*	*0.00*	*0.00*	*0.34*
month 72	Odds Ratio	**0.7**	**0.6**	**0.6**	**1.2**
	P>z	*0.00*	*0.00*	*0.00*	*0.01*

[1] Subsample of year 2000 first ever SSI-only or DI-only program awardees aged 18-64. "SSI-only" and "DI-only" status is defined based on longitudinal pattern during 60 months period starting with first month of program entry. "State-only" SSI first awardees not included. Sample is limited to survivors less than 65 years of age during the month Medicaid coverage is measured. "Month 1" is defined as month of first positive payment eligibility for program of first entry. Immediately preceding month is "Month (-1)".

[2] The value of "1" indicates full Medicaid coverage during the given month. "0" indicates lack of such coverage.

[3] Odds ratios and P-values are estimated from logistic regressions. Odds ratios and P-values are estimated from logistic regressions. The dependent variable is Medicaid coverage. The independent variables include indicators of "209b" and "Criteria" policy regime in state, with auto-enrollment as the reference policy regime. The models include controls for demographic and diagnostic variables. A P-value of 0.05 or less is commonly regarded as an indicator of an odds ratio that is statistically significantly different from 1.

Chart 1 Medicaid and combined Medicaid and Medicare coverage among DI-only year 2000 first-ever disability awardees

Month 30 = 99 percent

Month 1 = 8 percent

Month 6 = 9 percent

Month 24 = 14 percent

Base of percentages:
Month 1 or earlier: aged 18-64 during Month 1
Month 2-72: survivors aged 18-64 during given month

Percent

Month (first disability award = month 1)

- - - Medicaid   —— Medicaid and/or Medicare

Chart 2 Medicaid and combined Medicaid and Medicare coverage among SSI-only year 2000 first-ever disability awardees

Month 30 = 88 percent

Month 24 = 87 percent

Month 6 = 78 percent

Month 1 = 67 percent

Percent

Base of percentages:
Month 1 or earlier: aged 18-64 during month 1
Months 2-72: survivors aged 18-64 during given month

Month (first disability award = month 1)

- - - Medicaid   —— Medicaid and/or Medicare
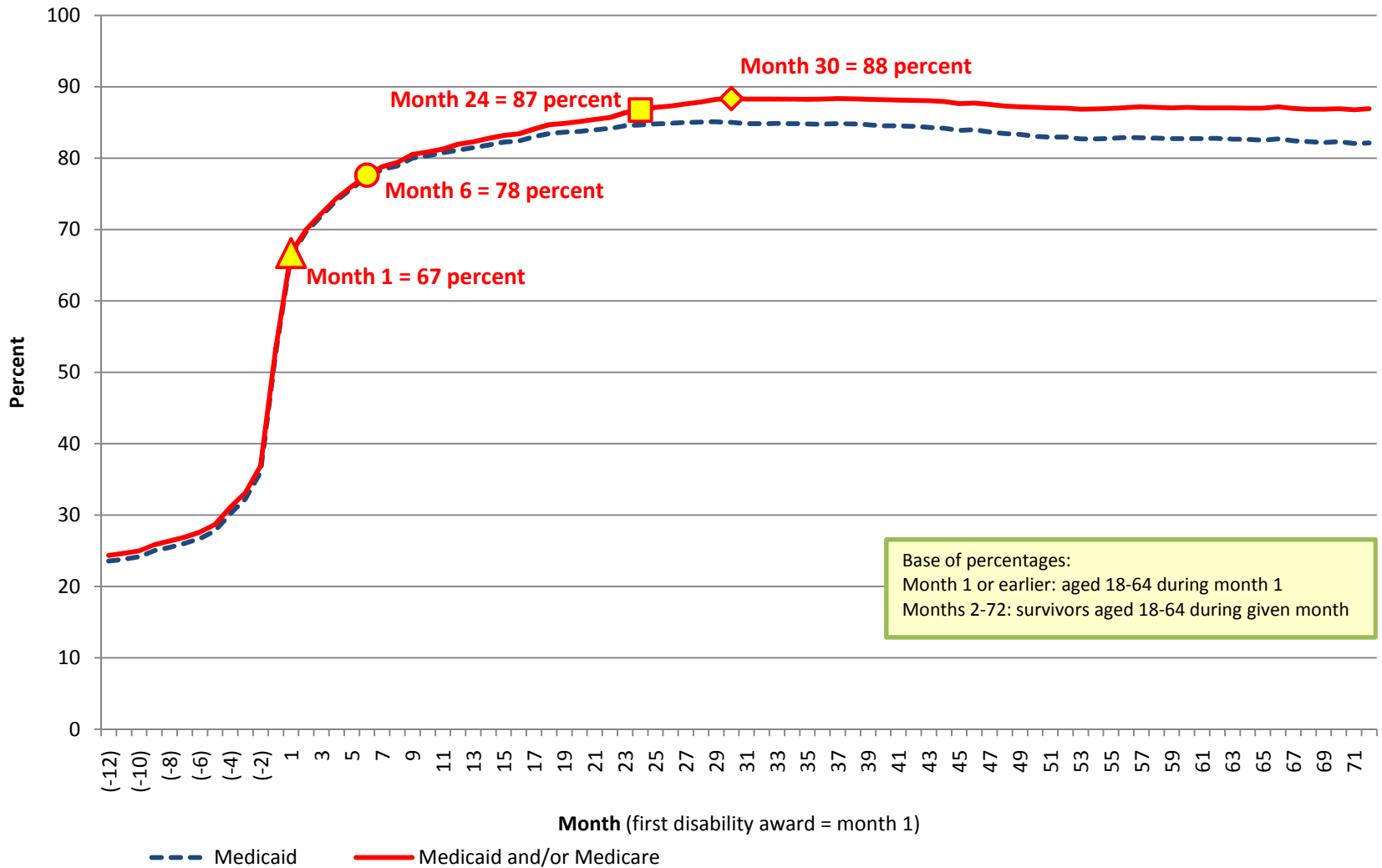
Chart 3 Medicaid and combined Medicaid and Medicare coverage among SSI/DI serial year 2000 first-ever disability awardees

Month 1 = 64 percent

Month 6 = 62 percent

Month 24 = 41 percent

Month 30 = 100 percent

Base of percentages:
Month 1 or earlier: aged 18-64 during month 1
Months 2-72: survivors aged 18-64 during given month

Percent

Month (first disability award =month 1)

- - - Medicaid   —— Medicaid and/or Medicare
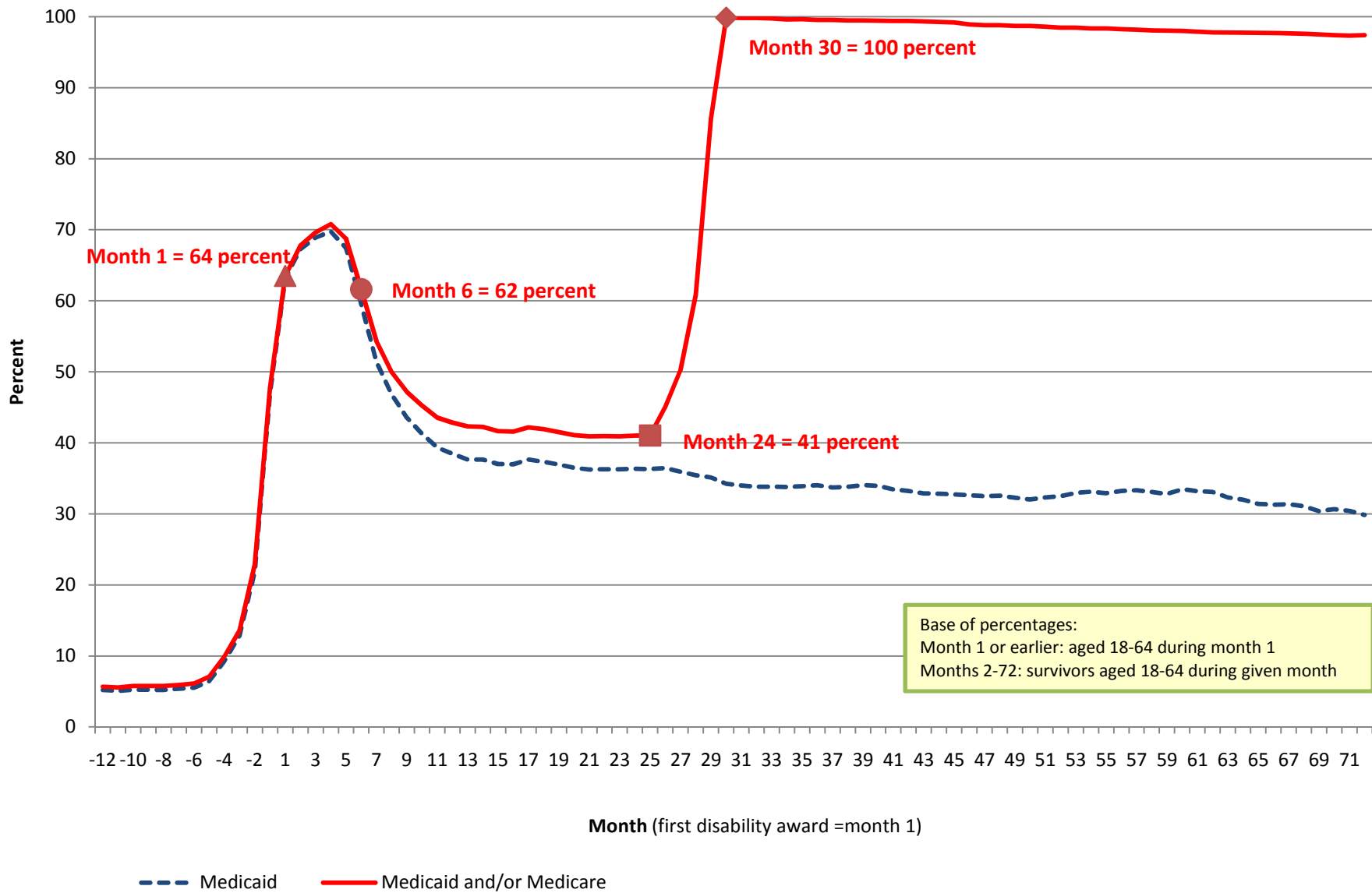
Chart 4 Medicaid and combined Medicaid and Medicare coverage among SSI-only to joint SSI/DI year 2000 first-ever disability awardees

Percent

Month 30 = 100 percent

Month 6 = 57 percent

Month 24 = 53 percent

Month 1 = 44 percent

Base of percentages:
Month 1 or earlier: aged 18-64 during month 1
Months 2-72: survivors aged 18-64 during given month

Month (first disability award = month 1)

- - - Medicaid   —— Medicaid and/or Medicare
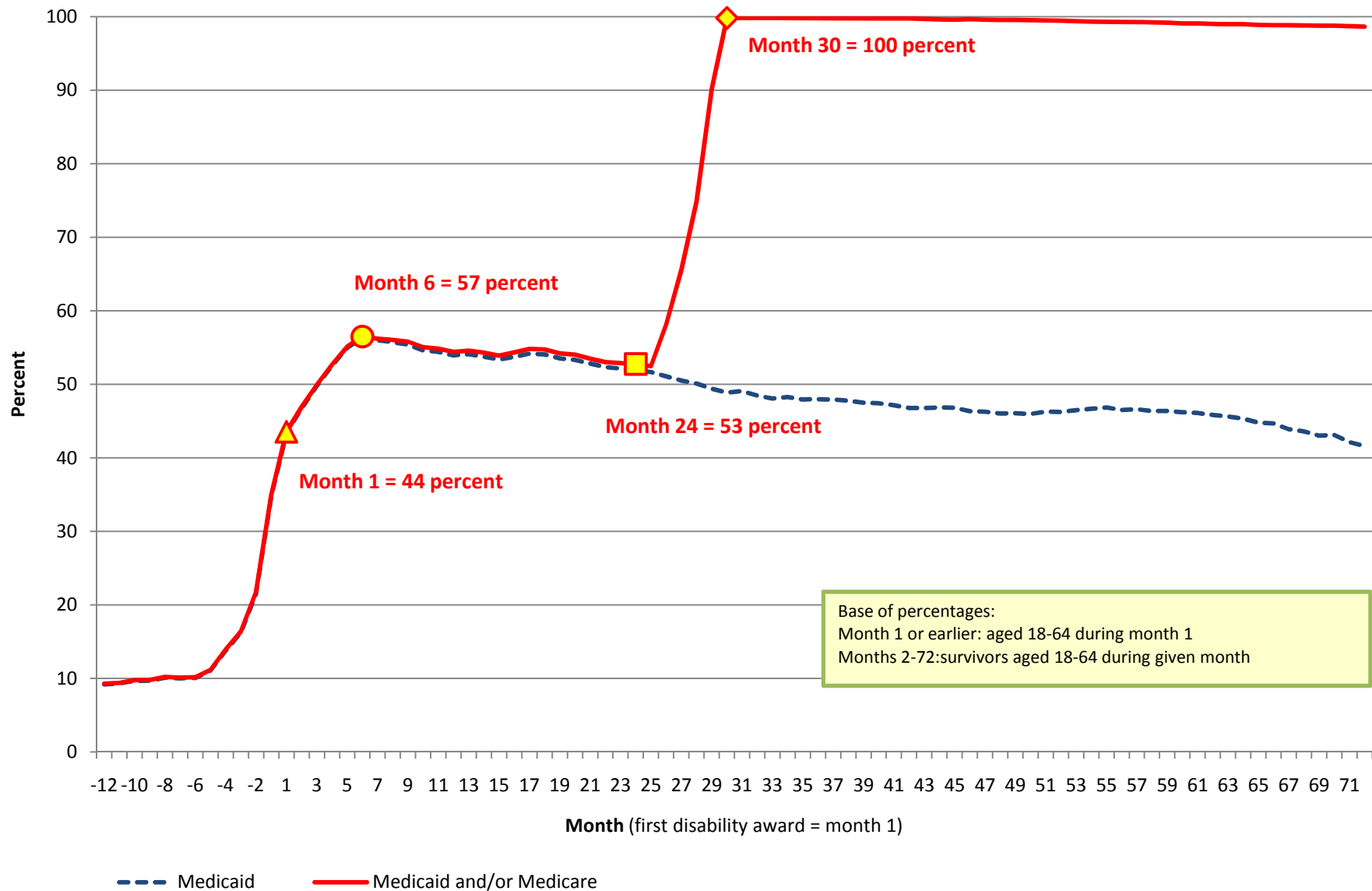
Chart 5 Medicaid and combined Medicaid and Medicare coverage among DI-only to joint DI/SSI year 2000 first-ever disability awardees

Month 30 = 100 percent

Month 24 = 56 percent

Month 6 = 37 percent

Month 1 = 24 percent

Base of percentages:
Month 1 or earlier: aged 18-64 during month 1
Months 2-72: survivors aged 18-64 during given month

Month (first disability award = month 1)

- - - Medicaid   ——— Medicaid and/or Medicare

Percent
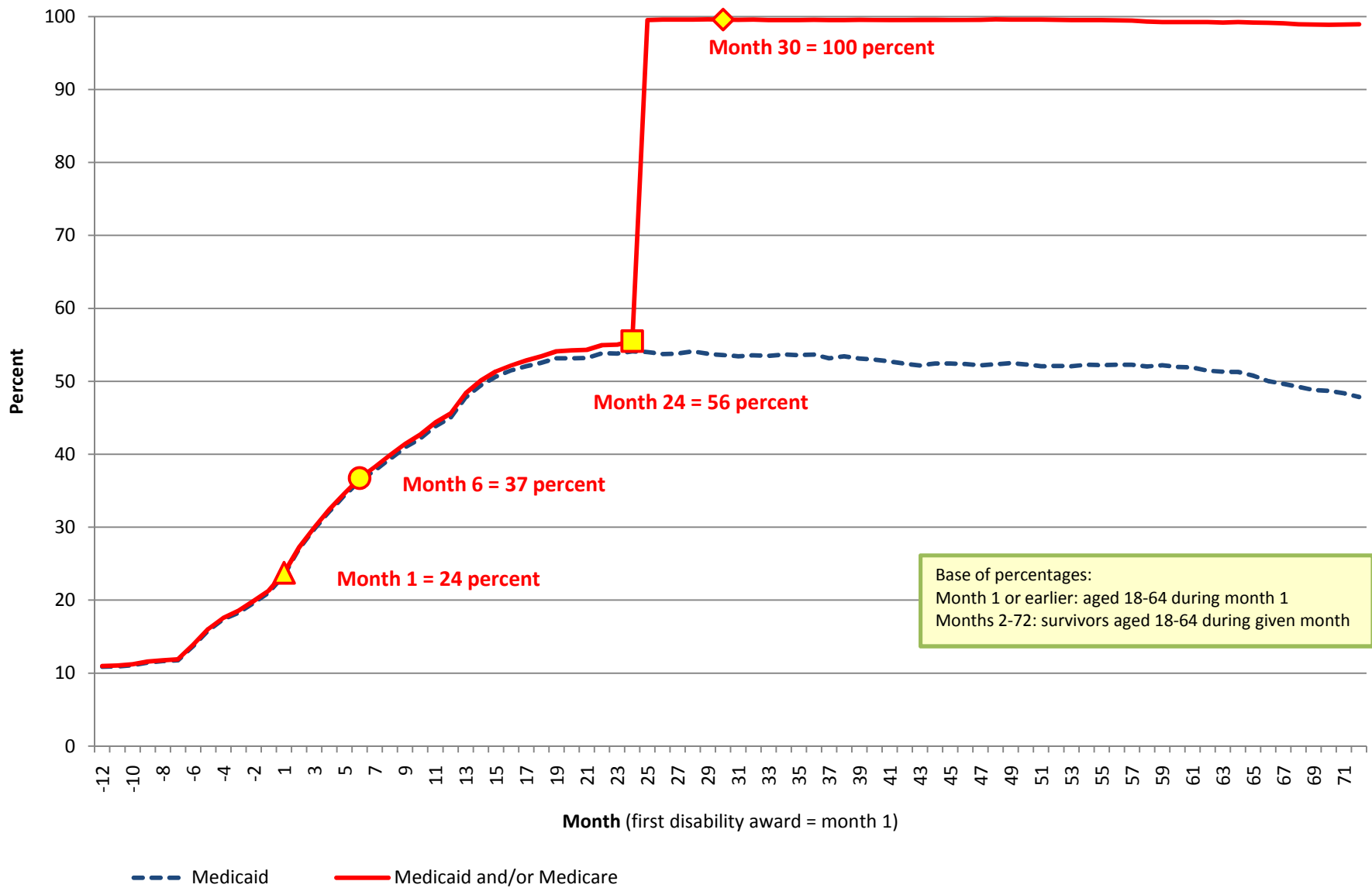
Chart 6 Medicaid coverage during selected months after first-ever month of SSI payment eligibility by receipt of actual SSI payment by given month[1]

Percent covered by Medicaid

	Month 6	Month 12	Month 18	Month 24	Month 36	Month 60
Received disability benefit by month	86	86	87	86	85	83
Did not receive disability benefit by month	60	60	64	66	63	56

Medicaid coverage during month (Month 1 = disability program entry)
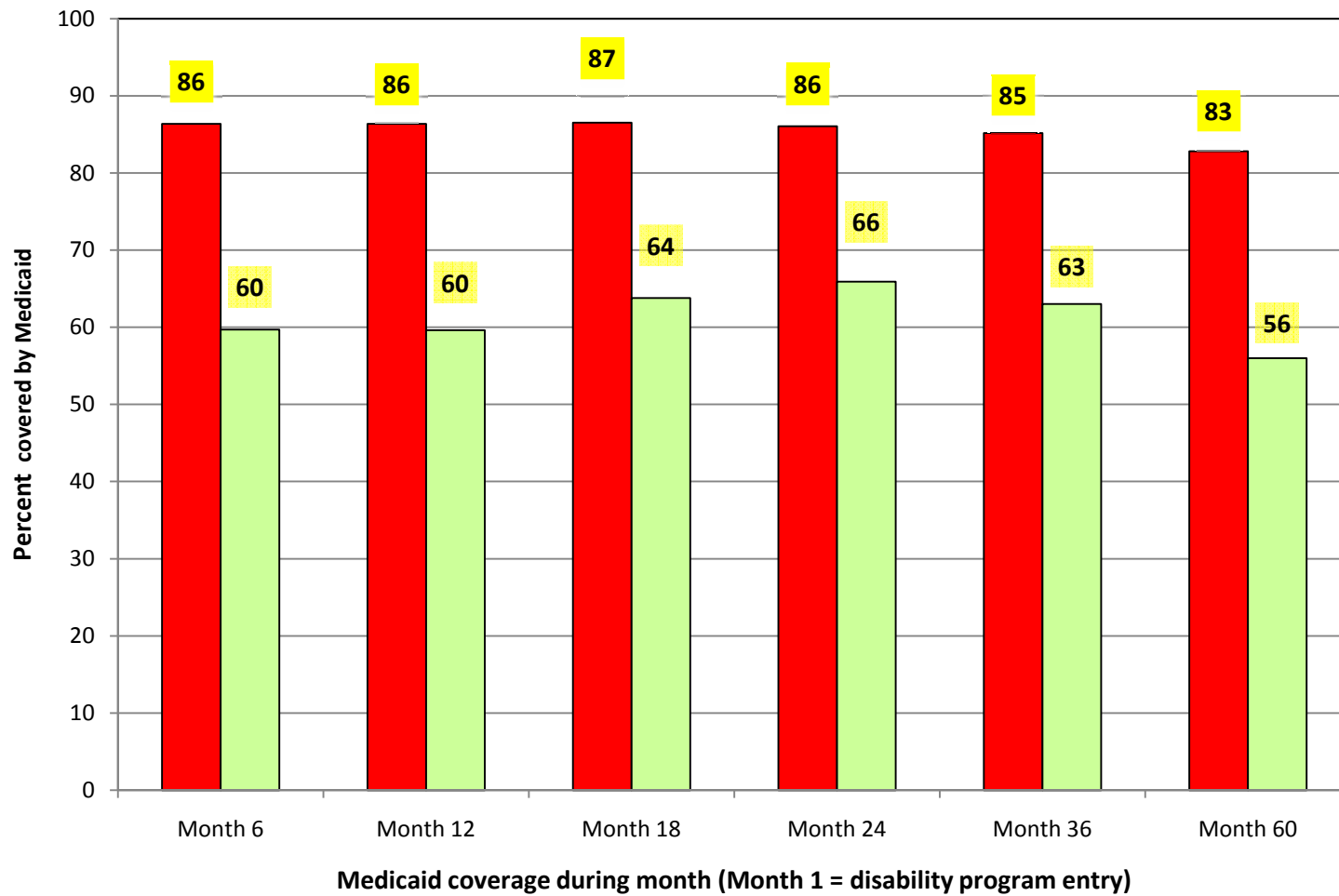
[1]First-ever SSI year 2000 awardees alive and less than 65 years of age during given month.

■ Received disability benefit by month   □ Did not receive disability benefit by month

Chart 7 Medicaid coverage by type of state at selected time points before and after first month of SSI benefit eligibility, SSI-only awardees

Legend:
- Auto-enrollment
- Criteria
- 209b

Data labels visible:
- Month (-12): 24, 20, 21
- Month +3: 76, 64, 55
- Month 72: 84, 77, 76

Y-axis: Percent (0 to 100)

X-axis categories: Month (-12), Month (-6), Month (-3), Month +3, Month +6, Month +12, Month +24, Month 60, Month 72