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Labor Force Participation, Disability, and Implications for Healthcare Utilization and Employment

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Labor Force Participation, Disability, and Implications for Healthcare Utilization and Employment

A Dissertation Presented

by

LAWRENCE CRESCENZO PELLEGRINI

Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of

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Health Policy and Management
Labor Force Participation, Disability, and Implications for Healthcare Utilization and Employment

A Dissertation Presented

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DEDICATION

To my family and friends, advisor and committee members, and to Paula Stamps Duston, graduate program director; I appreciate the unconditional support and patience each one of you provided to me throughout this process. Last, to my nonno Crescenzo whose name has found its way onto all of my degrees, and to my nonna Sylvia who would, if she were still alive, never stop talking about them.
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I also want to express my gratitude to Springer for allowing me to include a previously published manuscript (i.e., The US healthcare workforce and the labor market effect on healthcare spending and health outcomes) as part of this dissertation.

Last, I want to thank my mother, Josephine Pellegrini, and all my family and friends for supporting me throughout this process as I juggled the demands of working, learning, teaching, and writing. For that, I will be forever grateful.
LABOR FORCE PARTICIPATION, DISABILITY, AND IMPLICATIONS FOR HEALTHCARE UTILIZATION AND EMPLOYMENT

FEBRUARY 2017

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The study period (i.e., 1999-2014) is characterized by declining labor force participation rates, rising disability enrollment, varying healthcare utilization, and increasing and changing composition of healthcare provider employment. However, little is known about the effect labor force participation and disability enrollment both have on the US healthcare system (i.e., healthcare utilization and employment). This dissertation is comprised of three manuscripts answering questions related to these relationships.

Results show that labor force participation is a more robust indicator than the unemployment rate for exploring the effect of the labor market on healthcare spending and health outcomes, with healthcare spending itself exhibiting a unique relationship with healthcare provider employment. In addition, results show that rising disability
enrollment is also related with healthcare provider employment with a unique effect for mental and physical disability enrollment. Last, results show that the effect of disability programs on healthcare utilization and access extends beyond those receiving benefits to also include those applying for benefits. Collectively, this research demonstrates relationships between declining labor force participation, rising disability enrollment, and healthcare utilization and employment. Study findings may be used to support healthcare utilization and employment projections.
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CHAPTER 1
INTRODUCTION

The US healthcare industry represents a large share of economic output. From 1995 to 2014, the World Bank estimates that US health expenditures, as a share of overall gross domestic product, grew from 13.1 to 17.1% (World Bank, 2016). Economic contractions often amplify the importance of the healthcare industry as a driver of US economic growth; during recent recessionary periods, including the 2008 financial crisis, the healthcare industry expanded while other sectors contracted (Bureau of Economic Analysis, 2016).

The US healthcare industry employs a large and wide variety of professionals. Further, healthcare employment represents a large share of overall employment; from 2000 through 2014, healthcare and social assistance employment increased 44.1% from 13 to 18 million jobs (Bureau of Labor Statistics, 2016a). Growth in the sector is consistent across the time period, with few employment contractions even as the broader economy exhibited cyclical fluctuations (i.e., financial crisis of 2008) (Bureau of Labor Statistics, 2016b). The Bureau of Labor Statistics projects similar, and stable, employment growth at least through 2022 (Bureau of Labor Statistics, 2014).

Causes of US healthcare industry expansions

Historical data from the 2000-2014 period suggests that the healthcare industry will remain a dominant force in economic output and related employment. However, healthcare services demand is unlike other commodities. A physical and/or behavioral health condition, or a preventative healthcare need, often precipitates healthcare
utilization. Further, worsening health status is associated with demographic characteristics, notably advancing age, and socioeconomic factors, including unemployment and associated poverty status (Catalano, 2009; Idler & Benyamini, 1997; Jin et al., 1995; Roelfs et al., 2011). However, worsening health status and associated demographic and socioeconomic characteristics, themselves, do not induce healthcare utilization. In the US, health insurance coverage characteristics are related with healthcare utilization (Finklestein, 2007; Finklestein et al., 2012) and associated increases in employment (Pellegrini & Rodriguez-Monguio, 2014).

Models predicting healthcare utilization and employment growth consider demographic and socioeconomic factors, health insurance coverage characteristics, and health and behavioral health conditions as confounders in examined relationships. Policy measures implemented over the past twenty years influence many of these factors. For example, socioeconomic measures (i.e., unemployment and associated poverty status) exhibited significant volatility throughout the study period, partially attributable to the 2008 financial crisis. The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWOA), implemented in 1997, which served to make access to welfare-based cash-assistance more restrictive, impacted persons/families’ abilities to withstand associated hardships (Library of Congress, 2016a). To the contrary, unemployment-related cash assistance, after the 2008 financial crisis, improved due to associated State Unemployment Insurance (SUI) benefit extensions (Library of Congress, 2016b). The Patient Protection and Affordable Care Act (ACA), implemented in 2010, impacted health insurance coverage characteristics; for example, the act expanded Medicaid coverage and reduced the numbers of uninsured (Library of Congress, 2016c). Likewise,
the Mental Health Parity and Addiction Equity Act of 1996, implemented in 1997 and reauthorized in 2010, improved access to mental healthcare services to be on-par with that of physical healthcare services (Library of Congress, 2016d). Last, elders represent an increasingly larger share of the US population eligible for the Federal Medicare program due to a now retiring baby boomer generation.

Research examines the effect of unemployment on healthcare utilization and worsening health status (Catalano, 2009; Idler & Benyamini, 1997; Jin et al., 1995; Roelfs et al., 2011). Research also considers the moderating effect of social welfare policies, in general (Bambra & Eikemo, 2008); this includes research related with PRWOA (Kullgren, 2003) and SUI (Pellegrini, 2013). More recent health services research also includes an examination of the effect of ACA (Antwi et al., 2015; Chen, Bustamante, & Tom, 2015) and Mental Health Parity and Addiction Equity Act (Beronio, Glied, & Frank, 2014; Ettner et al., 2016) policy measures on healthcare utilization.

Research examines a range of factors and policies that affect healthcare utilization and related employment; however, gaps in the literature still exist.

Dissertation research

Unemployment is the predominant labor market statistic used to examine the effect of economic conditions on healthcare utilization and health status. However, unemployment is correlated with labor force participation and this measure, in itself, may exhibit its own effect on the relationship with healthcare utilization and health status. In addition, labor force participation may be better associated with other cash assistance measures, notably disability program enrollment, which may also influence healthcare utilization and employment. Further, disability-related cash assistance programs
specifically require exposure to the healthcare system. Labor force participation and disability enrollment, including both disability-related application and receipt processes, are not fully explored in the current literature.

This research seeks to expand upon our understanding of factors that influence healthcare utilization and employment by more fully exploring the role of labor force participation and disability enrollment. As such, this dissertation research is comprised of three related papers.

The US healthcare workforce and the labor market effect on healthcare spending and health outcomes

While previous research explores the relationship between unemployment and health status, mortality rates, and public and private health insurance coverage, no research considers the effect of labor force participation on each of these measures. Further, previous research does not consider the relationship between private and public healthcare spending and select healthcare occupational employment. The first paper (i.e., The US healthcare workforce and the labor market effect on healthcare spending and health outcomes) uses dynamic panel data analysis to model these associations. To complete this study, I use state-year level data for all fifty states and the District of Columbia for the 1999-2009 time period. Data measures include state-year level unemployment and labor force participation rates, health status measures and mortality rates, share of healthcare spending represented by public (i.e., Medicare and Medicaid) and private payer sources, and occupational employment rates for twelve healthcare occupations.
Disability enrollment and US healthcare employment

Declining labor force participation is correlated with rising disability enrollment. Disability enrollment often requires exposure to the healthcare system, which may have implications for employment of healthcare providers. However, little is known about the relationship between disability enrollment and healthcare employment. The second paper (i.e., Disability enrollment and US healthcare employment) uses population-weighted state fixed effects regression analysis, with linear and quadratic time trends, to model these associations. To complete this study, I use state-year level data for all fifty states for the 2000-2014 time period. Dependent variables include healthcare employment rates for three healthcare occupational groupings and nine healthcare provider types; main independent variables include overall – and mental and physical health-related – Social Security Disability Insurance (SSDI) enrollment rates. In my models, I control for the potentially mitigating effect of social welfare and labor market protection programs, as research suggests that these programs may offset demand for disability programs themselves, specifically in the context of worsening economic conditions. Model covariates also include state-year level Medicare and Medicaid beneficiary rates, age-adjusted adult mortality rates, and demographic and socioeconomic characteristics.

Disability enrollment and healthcare services utilization and access

While disability enrollment often requires exposure to the healthcare system, so too does the application process. However, little is known about the relationship between disability application and/or receipt and healthcare utilization. Further, limited research exploring these relationships is available since passage of the Affordable Care Act (ACA). The third paper (i.e., Disability enrollment and healthcare services utilization
and access) uses population-weighted logistic regression analyses to model these associations. To complete this study, I use individual-level National Health Interview Survey (NHIS) data for the 2014 time period. Dependent variables include healthcare utilization measures for a range of primary and specialty care, mid-level, and mental health providers; main independent variables include disability program (i.e., SSI, SSDI, and other disability pension) application and/or receipt measures. In my models, I control for other factors that affect healthcare utilization including health insurance coverage type, serious psychological distress, health status, fifteen co-morbid health conditions, and socio-demographic characteristics.

**Policy implications**

Collectively, this dissertation research provides policymakers with evidence of the relationship between rising disability enrollment and healthcare utilization and employment. It is important to understand these relationships as the Social Security Administration is in the process of redesigning the occupational classification information that is used to decide the disability adjudication process. The manual revision, available in 2019, is expected to have an impact on the number of disability claims, particularly those associated with mental health and cognitive impairments. Further, as disability enrollment expands/contracts accordingly, there will be associated impacts to healthcare employment as disability enrollment requires healthcare utilization to both receive and, in some cases, maintain benefits. Presently, little is known about these relationships and this research fills the gap in the current literature.
References


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Abstract

Background

The healthcare sector was one of the few sectors of the US economy that created new positions in spite of the recent economic downturn. Economic contractions are associated with worsening morbidity and mortality, declining private health insurance coverage, and budgetary pressure on public health programs. This study examines the causes of healthcare employment growth and workforce composition in the US and evaluates the labor market’s impact on healthcare spending and health outcomes.

Data and Methods

Data are collected for fifty states and the District of Columbia from 1999-2009. Labor market and healthcare workforce data are obtained from the Bureau of Labor Statistics. Mortality and health status data are collected from the Center for Disease Control and Prevention’s Vital Statistics program and the Behavioral Risk Factor Surveillance System. Healthcare spending data are derived from the Centers for
Medicare and Medicaid Services. Dynamic panel data regression models, with
instrumental variables, are used to examine the effect of the labor market on healthcare
spending, morbidity, and mortality. Regression analysis is also performed to model the
effects of healthcare spending on the healthcare workforce composition. All statistical
tests are based on a two-sided $\alpha$ significance of $p<.05$. Analyses are performed with
STATA and SAS.

Results

The labor force participation rate shows a more robust effect on healthcare
spending, morbidity, and mortality than the unemployment rate. Study results also show
that declining labor force participation negatively impacts overall health status ($p<.01$),
and mortality for males ($p<.05$) and females ($p<.001$), aged 16-64. Further, the Medicaid
and Medicare share of total healthcare spending increases as labor force participation
declines ($p<.001$); whereas, the private healthcare spending share decreases ($p<.001$).
Public and private healthcare spending also has a differing effect on healthcare
occupational employment per 100,000 people. Private healthcare spending positively
impacts primary care physician employment ($p<.001$); whereas, Medicare spending
drives up employment of physician assistants, registered nurses, and personal care
attendants ($p<.001$). Medicaid and Medicare spending has a negative effect on surgeon
employment ($p<.05$); the effect of private healthcare spending is positive but not
statistically significant.

Conclusion

Labor force participation, as opposed to unemployment, is a better proxy for
measuring the effect of the economic environment on healthcare spending and health
outcomes. Further, during economic contractions, Medicaid and Medicare’s share of overall healthcare spending increases with meaningful effects on the configuration of state healthcare workforces and thus, provision of care for populations at-risk for worsening morbidity and mortality.

Key words

Labor market, Unemployment, Labor force participation, Medicaid, Medicare, Health outcomes, Healthcare spending

Introduction

The labor market, health outcomes, and health insurance

As unemployment increases, effected individuals might confront an increased risk for developing or aggravating mental and physical health problems (Catalano, 2009; Idler & Benyamini, 1997; Jin et al., 1995; Roelfs et al., 2011). There is conflicting evidence concerning the relationship between unemployment, health status, and all-cause mortality. Studies show a countercyclical relationship between economic conditions, health status, and death rates (Brenner & Mooney, 1983; Browning et al., 2006; Catalano, 1991; Catalano et al., 2011; Dooley et al., 1996; Franks et al., 2003; Frey, 1982; Kasl et al., 1975; Moser et al., 1987; Neumayer, 2004; Tapia Granados, 2005). Some studies show that unemployment duration impacts health most (Garcy & Vagaro, 2012; Janlert, 1997; Wadsworth et al., 1999); other studies evidence that individuals may be selected into unemployment as a result of declining health status (Bockerman & Ilmakunnas, 2009).

Studies also evidence morbidity and mortality are pro-cyclical, increasing during periods of economic growth (Gerdtham & Ruhm, 2006; Gerdtham & Johannesson, 2003;
Ruhm, 2000, 2003, 2005). This relationship is more detrimental for educated, working age males when compared to the general population (Edwards, 2008). During economic expansions, individuals may engage in fewer positive health behaviors, such as preventative healthcare utilization, maintaining a healthy diet, and regular physical activity, due to increased opportunity costs (Ruhm, 2000). Self-reported health is a strong and independent predictor of morbidity and mortality (Connelly et al., 1989; Idler & Benyamini, 1997; McCallum, Shadbolt, & Wang 1994).

Health insurance in the United States (US) is predominantly employment-based. As the economy deteriorates, unemployed individuals may lose their private insurance coverage and experience an increased risk of developing or aggravating adverse health conditions. Previous research identifies a pro-cyclical relationship between employment and employer-provided health insurance coverage; economic contractions may negatively impact employers’ decision to provide health insurance (Marquis & Long, 2001); to the contrary, economic expansions are associated with higher quality private health insurance schemes (Marquis & Long, 2001).

Unemployed and uninsured individuals may become eligible for publicly funded health insurance schemes, including poverty and asset tested Medicaid coverage, and age or disability tested Medicare coverage. Medicaid is a state administered program, jointly funded by the Federal government through income taxes. Covered services are for individuals who meet means and asset-based testing criteria, including Temporary Assistance for Needy Families (TANF) and Supplemental Security Income (SSI) (Centers for Medicaid and Medicare Services, 2013a). Medicare is a Federal administered program funded through payroll taxes. Covered services are for individuals
aged 65 and older, or for those who have qualifying disabilities, including end-stage renal
disease (Centers for Medicaid and Medicare Services, 2013b). Studies show a
countercyclical relationship between Medicaid coverage and unemployment (Cawley &
Simon, 2005; Perreira, 2006).

Health insurance and healthcare workforce composition

In the US, health insurance is associated with high healthcare utilization and
spending. In the 1950s through 1990s period, fifty percent of the increase in per-capita
healthcare spending in the US is related with expanded health insurance. Medicare
provisions have a large effect on hospital services growth (Finklestein, 2007); whereas,
expanded state Medicaid coverage increases access to outpatient and hospital services
and pharmaceuticals (Finklestein et al., 2012). Likewise, healthcare provider supply is
associated with reimbursement fees and risk pooling opportunities (Newhouse, 1996).
Medicaid provisions are associated with increased employment of mid-level mental
health professionals (Pellegrini & Rodriguez-Monguio, 2013). However, no research has
examined the effect of healthcare spending on the configuration of the US healthcare
industry.

Conceptual framework and objectives

Previous research uses the unemployment rate to evaluate the relationship
between labor market conditions and health outcomes. An alternative approach is to use
the labor force participation rate to proxy the economic environment. The labor force
participation rate captures two segments of the population potentially at risk for
worsening health status and increased risk of mortality: long-term unemployed who have
withdrawn efforts to search actively for work, and other non-participating members of the
labor force potentially reliant on public health insurance programs. This study utilizes both labor market related measures to evaluate the impact of economic conditions on morbidity and mortality. Study hypothesis are: 1) the labor force participation rate is a better predictor of health outcomes than the unemployment rate, and 2) the labor force participation rate is related with the share of health insurance payer sources (i.e., Medicare, Medicaid, and private health insurance) funding provision of care. Last, the conceptual model illustrates health insurance payers’ impact on the healthcare workforce.

Hence, study objectives are to assess whether the labor market affects healthcare spending and health outcomes, and to examine the effect of healthcare spending on the healthcare workforce composition (Figure 1).

**Data**

Annual, state level data are collected for all states and the District of Columbia for the period 1999-2009. Unemployment and labor force participation rates are obtained from the Bureau of Labor Statistics’ Current Population Survey (CPS) (Bureau of Labor Statistics, 2013b). The unemployment rate reflects the percentage of the labor force that is unemployed and looking for a job. The labor force participation rate reflects the percentage of working age individuals (aged 16-64) who are either employed or unemployed, and looking for a job.

Adult all-cause mortality rates and self-reported health status data are obtained from the Centers for Disease Control and Prevention’s Vital Statistics program and the Behavioral Risk Factor Surveillance System, respectively (Centers for Disease Control and Prevention, 2013b, 2013a). Adult all-cause mortality rates are for the population aged 16-64. This group aligns with the Bureau of Labor Statistics examined age group for
its labor force measures (aged 16 and older), while considering eligibility for Medicare (aged 65 and older). Self-reported health status, a measure of personal well-being, is broken down into five groups: excellent, very good, good, fair, and poor.

Medicaid, Medicare, and overall healthcare expenditures data are derived from the Centers for Medicaid and Medicare Services’ (CMMS) Medicaid Statistical Information System (CMMS, 2013c). The difference between Medicaid and Medicare expenditures and overall healthcare expenditures serves as a proxy for private sector healthcare expenditures. Medicaid, Medicare, and the private sector’s share of state healthcare expenditures equals the ratio between Medicaid, Medicare, and private sector healthcare spending and overall state healthcare expenditures.

Healthcare workforce (i.e., occupational employment and average hourly wage) data are obtained from the Bureau of Labor Statistics’ Occupational Employment Statistics program. Occupations and their corresponding 2011 average hourly rates included in the analysis are: (1) primary care physicians ($85.26) (i.e., family and general practitioners), (2) general internists ($90.97), (3) surgeons ($111.32), (4) physician assistants ($43.01), (5) registered nurses ($33.23), (6) personal care attendants ($9.88), (7) occupational therapists ($36.05), (8) physical therapists ($38.38), (9) physical therapy assistants ($24.57), (10) respiratory therapists ($27.05), (11) pharmacists ($53.92), and (12) pharmacy technicians ($14.43) (Bureau of Labor Statistics, 2013c).

Healthcare occupational employment data are converted to rates per 100,000 people. Population data are obtained from the Centers for Disease Control and Prevention’s Bridged Race Population Statistics program (Centers for Disease Control and Prevention, 2013c).
Methods

This study seeks to isolate two pathways: 1) effect of labor market conditions on healthcare spending and health outcomes; and 2) effect of healthcare spending on occupational employment per 100,000 people. Dynamic panel data analysis is used to model relationships between the labor market (i.e., unemployment and labor force participation rates) and health outcomes (i.e., self-reported health status, and all-cause mortality rates for males and females, aged 16-64), and healthcare spending (i.e., Medicaid, Medicare, and private sector share of state healthcare spending).

\[ Y_{it} = \beta_0 + \gamma Y_{it-1} + \beta_1 X_{it} + \alpha_i + \mu_{it}, \ i=1,\ldots,n \]

where \( Y_{it} \) represents either the mortality rate, health status, or healthcare spending, \( X_{it} \) represents labor market indicators, \( \alpha_i \) is the cross-sectional fixed effect, and \( \mu_{it} \) represents the error term.

Analysis is also performed to model the effect of healthcare spending on occupational employment per 100,000 people. For these models, \( Y_{it} \) represents healthcare occupational employment per 100,000 people, \( X_{it} \) represents healthcare spending, \( \alpha_i \) is the cross-sectional fixed effect, and \( \mu_{it} \) represents the error term.

Four instrumental variables are included in the analysis to isolate variation that is plausibly exogenous: (1) State Unemployment Insurance (SUI) recipiency rate, (2) SUI average annual benefit, (3) food stamp expenditures (i.e., Supplemental Nutritional Assistance Program -SNAP), (4) Social Security expenditures, and (5) average disposable income. The SUI recipiency rate represents the percentage of each state’s unemployed receiving cash assistance. The SUI average annual benefit is the average annualized payment received per beneficiary enrolled in the program. SUI data are obtained from
the Employment and Training Administration through the US Department of Labor (US Department of Labor, 2013). Food stamp and Social Security expenditures and average disposable income data are obtained from the Bureau of Economic Analysis’ US economic accounts (Bureau of Economic Analysis, 2013). Monetary values (i.e., expenditures and income data) are converted to 2011 dollars using the consumer price index for all urban consumers (CPI-U) as obtained from the Bureau of Labor Statistics (Bureau of Labor Statistics, 2013a). Count data are converted to per-capita rates.

The labor market and healthcare spending models include the SUI recipiency rate and SUI average annual payment as instrumental variables for unemployment and labor force participation, respectively. Unemployment is the enrollment criteria for the SUI program (SUI recipiency rate), whereas labor force participation is related to the program’s funding mechanisms (SUI average annual benefit). However, both health status and healthcare spending are independent of SUI coverage. Further, per-capita food stamp expenditures serve as the instrumental variable for Medicaid spending; poverty is the enrollment criteria for both programs. Likewise, per-capita Social Security and Medicare spending are related through age and/or disability testing criteria. Last, average state disposable income serves as the instrumental variable for private healthcare spending; higher income levels are correlated with increasing private insurance coverage, and vice versa. However, food stamp and Social Security expenditures, and average disposable income do not impact healthcare occupational employment. Main sources of payment for healthcare professionals’ fees are third party payers (Medicaid, Medicare, and private sources). All p-values of statistical tests are two-sided and are considered statistically significant if <.05. Analyses are performed with STATA and SAS.
Results

Descriptive statistics

During the study period, the average unemployment rate for 50 states and DC was 5.1%; increasing from 4.1% in 1999 to 8.5% in 2009. The study period average labor force participation rate was 67.2%; declining from 68.0% in 1999 to 66.2% in 2009 (Table 1). The overall health status worsened and the mortality rate increased. The average percentage of individuals reporting their health status as excellent declined by 8.9% over the study period, while more individuals reported fair (6.3% increase) or poor (8.4% increase) health. In 1999, the all-cause mortality rate for males and females, aged 16-64, was 228.9 and 391.8, respectively, increasing to 245.6 and 408.9 in 2009, respectively.

Public health insurance programs increased their share of average state healthcare spending. In 1999, the average Medicaid, Medicare, and private sector share of state healthcare spending was 14.8%, 17.7%, and 67.6%, respectively. By 2009, Medicaid and Medicare increased their share of average state healthcare spending by 8.0% and 20.3%, respectively, while the private sector share decreased by 7.1% (Table 1).

There were also changes in healthcare workforce employment in the study period. For example, state average employment of primary care physicians, internists, and surgeons per 100,000 people declined by 16.8%, 12.9%, and 12.4%, respectively. To the contrary, employment of physician assistants per 100,000 people increased by 32.7%. Further, in 1999, there were an average of 83.5 pharmacists and 72.1 pharmacy technicians per 100,000 people. In 2009, pharmacy technician employment was greater
than that of pharmacists; pharmacy technicians’ employment growth exceeded that of pharmacists by 500%.

Effect of labor market conditions on healthcare spending and health outcomes

Scatter plots show a linear relationship between the labor force participation rate and healthcare spending, and health outcomes. As labor force participation increases, health status worsens and the mortality rate increases for males and females, aged 16-64. Further, as labor force participation increases, Medicaid and Medicare’s share of state healthcare spending declines while private healthcare spending increases (Figure 2).

Unemployment, healthcare spending, and health status measures exhibit similar relationships. Nevertheless, unemployment associations display greater variation when compared to the labor force participation rate (Figure 3).

Study results show that states experiencing declines in labor force participation have lower overall self-reported health status and increased risk of death for both males and females aged 16-64 years old. A one percentage point increase in the labor force participation rate is associated with an 8.1 (p<.001) and 5.6 percent (p<.05) decrease in the female and male mortality rates, respectively. Further, a one percentage point increase in the labor force participation rate is associated with a .55 percent increase in the percentage of the population rating their health as excellent (p<.001). Increasing labor force participation rate is also associated with decreasing percentage of the population rating their health as good or fair (p<.01) (Table 2). Similar to the labor force participation rate, unemployment is also associated with increased mortality rates for males and females aged 16-64 years old (p<.01) and deteriorating self-reported health status, although not statistically significant.
As the state labor force participation rate increases, Medicaid and Medicare spending (p<.001) as a share of total state healthcare spending decreases, and the private healthcare spending share increases (p<.001). A one percentage point increase in the labor force participation rate is associated with a 1.1 and .61 (p<.001) percent decrease in Medicaid and Medicare’s share of total state healthcare spending, respectively, and a 1.7 percent (p<.001) increase in the private healthcare spending share. As expected, unemployment exhibits a similar effect on state spending share when compared to labor force participation.

Effect of healthcare spending on the healthcare workforce

Study results show that Medicaid, Medicare, and private healthcare spending have differing effects on healthcare occupational employment. As Medicaid and Medicare’s share of total healthcare spending increases, surgeon employment decreases (p<.05). To the contrary, as the share of private sector spending increases, primary care physician employment increases (p<.001); the effect on surgeon employment is also positive, but not statistically significant (Table 3).

Both Medicaid and Medicare have a statistically significant and positive effect on employment of mid-level providers. As the share of Medicare spending increases, employment of physician assistants also increases (p<.001). Further, increasing public health programs spending share leads to increases in employment of registered nurses (p<.001), personal care attendants (p<.001), occupational therapists (p<.05), physical therapists (p<.001) and assistants (p<.05), respiratory therapists (p<.001), and pharmacy techs (p<.001). To the contrary, an increase in the private healthcare spending share is negatively related with employment for these providers. Medicare spending drives up
pharmacist employment (p<.001); to the contrary, Medicaid and private healthcare spending both have the opposite effect (Table 3).

**Discussion**

This study adds to the literature by estimating a dynamic panel data model to examine the relationship between the labor market and healthcare spending, and health outcomes, and to provide empirical evidence of the effect of healthcare spending on occupational employment.

Study results provide further empirical evidence of the countercyclical relationship between economic conditions, health status, and all-cause mortality; health status worsens and mortality rates increase during economic downturns (Brenner & Mooney, 1983; Browning et al., 2006; Catalano, 1991; Catalano et al., 2011; Dooley et al., 1996; Franks et al., 2003; Frey, 1982; Kasl et al., 1975; Moser et al., 1987; Neumayer, 2004; Tapia Granados, 2005).

Most previous research uses the unemployment rate to evaluate associations between economic recessions and health (Catalano, 2009; Idler & Benyamini, 1997; Jin et al., 1995; Roelfs et al., 2011). This study employs both unemployment and labor force participation measures to proxy economic conditions. Study results provide empirical evidence of more robust associations between the labor force participation rate and measures of well-being and mortality and healthcare spending compared to unemployment. During periods of recession, long-term unemployed may become discouraged and ultimately withdraw efforts to search actively for work. As a result, such individuals are no longer considered unemployed nor are they part of the participating labor force. Long-term unemployed often lack access to healthcare
increasing risk for health status depreciation and premature death. This may occur through less access to employment-based health insurance or an inability to afford consumer-driven private insurance schemes. Furthermore, the non-participating component of the labor force participation reveals the level of each state’s population potentially reliant on employed individuals to support their care as paid for through taxes (i.e., public health insurance programs).

This study shows that during economic downturns, public payer sources comprise an increasingly larger component of the multi-payer insurance system; as labor force participation declines the share of public healthcare funding increases, and the private healthcare spending share decreases. There are several challenges associated with the provision of Medicaid and Medicare coverage during periods of economic contraction. As the state labor force participation rate decreases, income tax revenue to support state Medicaid programs comes under pressure during times when more individuals qualify for coverage. Further, state benefit cuts to Medicaid programs may result in a loss of Federal matching funds (Centers for Medicaid and Medicare Services, 2013a) potentially further constraining healthcare provisions.

This study finds that during economic contractions, characterized by increased unemployment/decreased labor force participation, individuals experience worsening self-reported health status and increased risk of mortality. At the same time, the Medicaid safety net significantly weakens for most financially and clinically vulnerable population groups potentially jeopardizing access to cost-effective prevention services, and health care promotion, and indirectly inducing costly utilization of emergency care as primary source of care. Furthermore, as the nationwide labor force participation declines,
payroll tax revenues to support the Medicare program funding decreases. Similar to Medicaid, during economic contractions, Medicare is also challenged with the demands of providing services for increasing numbers of disabled enrollees and retirees with strained revenue sources.

Public health programs shape the composition of the US healthcare workforce as a main source of payment for professionals and services. Novel study findings relate to the effects of public and private healthcare spending on occupational employment. Public healthcare spending is associated with employment growth for registered nurses, personal care attendants, physical therapists and assistants, and occupational and recreational therapists. Medicare spending, in particular, is linked to physician assistant employment; whereas, private healthcare spending is positively associated with primary care physician employment. Differing impacts on the healthcare workforce relate with underlying reimbursement rates differences between the public and private systems. Thus, financing mechanisms lead to recruitment of mid-level, lower cost healthcare professionals for publicly funded provision of services. Literature shows that reduced access to healthcare services in general, and primary care in particular, negatively affects health outcomes (Fihn & Wicher, 1988; Fisher, 2003; Starfield et al., 2005).

Last, Medicare Part D program enacted as part of the Medicare Modernization Act of 2003, which went into effect on January 1, 2006, likely affects pharmacists and pharmacy technician employment. In addition to differences in pharmaceutical coverage and state reimbursement rates between both public health programs, the Medicaid pharmaceutical spending share for dual eligible population (i.e., Medicaid-Medicare patients) shifted towards Medicare Part D program.
Limitations

Some limitations must be taken into account in the interpretation of study results. First, our proxy variable for healthcare spending does not account for Veteran Affairs (VA) related healthcare services. However, VA administration is less dependent upon labor market conditions.

Second, Behavioral Risk Factor Surveillance System (BRFSS) health status measure is a self-reported survey. Survey respondents are selected in accordance to CDC sampling methodologies and data are aggregated to create a statewide representative average. Response reliability may be related to age, income, or occupation (Crossley & Kennedy, 2002). However, BRFSS weighting adjustments minimize the impact of differences in non-coverage, under-coverage, and non-response at the state level.

Third, regression models may be subject to reverse causality. Attainment of public health insurance coverage may affect an individual’s labor market participation much like public healthcare financing is dependent upon healthy labor markets (i.e., low unemployment and high labor force participation) for revenue generation. Likewise, healthcare professional services supply may influence healthcare spending, similarly as health insurance provisions shape workforce supply. Last, health may be endogenous to labor supply; health status may affect an individual’s decision to participate in the labor market much like unemployment and labor force participation may influence an individual’s health status (Bartley, 1987; Berkowitz & Johnson, 1974; Bockerman & Ilmakunnas, 2009; Cai, 2006; Chirikos, 1993). Nevertheless, the literature examining the sources of endogeneity of health is scarce (Cai, 2010). Regression models may also be subject to omitted variable bias; both the labor market and health insurance expenditures
models may be correlated with other time varying confounders that influence the mortality rate, health status, healthcare spending, and healthcare professionals employment. Nevertheless, causality among these relationships is ambiguous (Levy & Meltzer, 2008). Instrumental variables approach is used to deal with endogeneity so that consistent estimates for the labor market effect are obtained. The validity of the study instrumental variables relies on the arguments based on economic theory. Correlation tests between the instrumental variables and the error term is not methodologically sound in the regression models performed.

**Conclusion**

Recessions are characterized by increased unemployment, declining labor force participation, and worsening health status. Economic contractions are additionally associated with declining private healthcare spending, and strain on the public health safety net. Labor force participation, as opposed to unemployment, is a stronger predictor of morbidity, mortality, and healthcare spending. As labor force participation declines, measures of well-being deteriorate while Medicare and Medicaid programs take a larger share of state healthcare budgets.

Public health insurance provisions have differing effects on the configuration of the healthcare workforce. In the study period, increasing Medicaid and Medicare share of state healthcare expenditures is significantly related with employment growth of mid-level providers; whereas, private healthcare spending is associated with employment of primary care physicians per 100,000 people. During economic contractions, Medicaid and Medicare’s share of overall state healthcare spending increases with meaningful
effects on the configuration of state healthcare workforces and thus, provision of care for populations at-risk for worsening morbidity and mortality.
References


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Neumayer, E. (2004). Recessions lower (some) mortality rates: Evidence from Germany. Social Science and Medicine, 58, 1037–47.


### Table 1: Descriptive statistics and trends

<table>
<thead>
<tr>
<th></th>
<th>No. of obs.</th>
<th>1999-2009 time period</th>
<th>Trends</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Std dev.</td>
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<tr>
<td><strong>Labor market</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>561</td>
<td>5.10</td>
<td>1.65</td>
</tr>
<tr>
<td>Labor force participation rate</td>
<td>561</td>
<td>67.25</td>
<td>3.85</td>
</tr>
<tr>
<td><strong>Mortality rate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females, aged 16-64</td>
<td>561</td>
<td>239.67</td>
<td>45.41</td>
</tr>
<tr>
<td>Males, aged 16-64</td>
<td>561</td>
<td>404.56</td>
<td>84.57</td>
</tr>
<tr>
<td><strong>Health status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>560</td>
<td>21.47</td>
<td>2.87</td>
</tr>
<tr>
<td>Very good</td>
<td>560</td>
<td>33.93</td>
<td>2.85</td>
</tr>
<tr>
<td>Good</td>
<td>560</td>
<td>29.55</td>
<td>2.16</td>
</tr>
<tr>
<td>Fair</td>
<td>560</td>
<td>10.85</td>
<td>1.97</td>
</tr>
<tr>
<td>Poor</td>
<td>560</td>
<td>4.21</td>
<td>1.56</td>
</tr>
<tr>
<td><strong>Healthcare spending</strong></td>
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<td></td>
</tr>
<tr>
<td>Medicaid spending share</td>
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<td>15.66</td>
<td>3.85</td>
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<tr>
<td>Medicare spending share</td>
<td>561</td>
<td>18.77</td>
<td>3.45</td>
</tr>
<tr>
<td>Private spending share</td>
<td>561</td>
<td>65.57</td>
<td>5.13</td>
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<tr>
<td><strong>Healthcare workforce</strong></td>
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<td></td>
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<tr>
<td>Primary care physicians</td>
<td>537</td>
<td>47.14</td>
<td>47.40</td>
</tr>
<tr>
<td>Internists</td>
<td>468</td>
<td>17.31</td>
<td>9.42</td>
</tr>
<tr>
<td>Surgeons</td>
<td>485</td>
<td>19.80</td>
<td>13.47</td>
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<tr>
<td>Physician assistants</td>
<td>534</td>
<td>24.82</td>
<td>13.92</td>
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<td>Registered nurses</td>
<td>561</td>
<td>844.51</td>
<td>175.81</td>
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<tr>
<td>Personal care attendants</td>
<td>537</td>
<td>174.32</td>
<td>123.80</td>
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<td>Occupational therapists</td>
<td>559</td>
<td>30.62</td>
<td>10.12</td>
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<td>Physical therapists (PT)</td>
<td>560</td>
<td>53.08</td>
<td>14.69</td>
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<tr>
<td>PT assistants</td>
<td>547</td>
<td>18.84</td>
<td>6.59</td>
</tr>
<tr>
<td>Respiratory therapists</td>
<td>543</td>
<td>31.93</td>
<td>8.40</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>560</td>
<td>83.62</td>
<td>14.76</td>
</tr>
<tr>
<td>Pharmacy technicians</td>
<td>560</td>
<td>87.44</td>
<td>24.79</td>
</tr>
</tbody>
</table>

Table 2. Labor market, healthcare spending, and health outcomes, United States, 1999–2009

<table>
<thead>
<tr>
<th>Self-reported health status</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate</td>
<td>0.031</td>
<td>0.055</td>
<td>-0.031</td>
<td>-0.023</td>
<td>0.001</td>
</tr>
<tr>
<td>Standard error</td>
<td>0.044</td>
<td>0.037</td>
<td>0.040</td>
<td>0.024</td>
<td>0.012</td>
</tr>
<tr>
<td>t-value</td>
<td>0.71</td>
<td>1.50</td>
<td>-0.77</td>
<td>-0.99</td>
<td>0.10</td>
</tr>
<tr>
<td>Pr&gt;</td>
<td>t</td>
<td></td>
<td>0.480</td>
<td>0.136</td>
<td>0.442</td>
</tr>
<tr>
<td>Sample size</td>
<td>560</td>
<td>560</td>
<td>560</td>
<td>560</td>
<td>560</td>
</tr>
</tbody>
</table>

| Labor force participation rate | 0.546*** | -0.085 | -0.247** | -0.395** | -0.077 |
| Standard error              | 0.153     | 0.246     | 0.092 | 0.127 | 0.054 |
| t-value                     | 5.31      | -0.34     | -2.68 | -3.11 | -1.42 |
| Pr>|t|                        | 0.0004    | 0.730     | 0.008 | 0.002 | 0.156 |
| Sample size                 | 560       | 560       | 560   | 560   | 560   |

<table>
<thead>
<tr>
<th>Mortality rate</th>
<th>Healthcare spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females 16-64 years old</td>
<td>Males 16-64 years old</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>1.502***</td>
</tr>
<tr>
<td>Standard error</td>
<td>0.275</td>
</tr>
<tr>
<td>t-value</td>
<td>5.47</td>
</tr>
<tr>
<td>Pr&gt;</td>
<td>t</td>
</tr>
<tr>
<td>Sample size</td>
<td>561</td>
</tr>
</tbody>
</table>

| Labor force participation rate | -8.121*** | -5.585* | -1.086*** | -0.608*** | 1.681*** |
| Standard error              | 1.632     | 2.376     | 0.101                  | 0.064                  | 0.113                 |
| t-value                     | -4.98     | -2.35     | -10.79                 | -9.57                  | 14.95                 |
| Pr>|t|                        | <.0001    | 0.019                   | <.0001                  | <.0001                 | <.0001                |
| Sample size                 | 561       | 561       | 561                     | 561                    | 561                   |

Notes: Standard errors in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001.
| Healthcare spending and healthcare workforce per 100,000 people, United States, 1999–2009 |
|-------------------------------------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| Medicaid spending share                   | Primary care physicians | Internists | Surgeons | Physician assistants | Registered nurses | Personal care attendants |
|                                        | -0.784 | 0.088 | -0.927* | -0.041 | 12.150*** | 25.792*** |
| Standard error                          | 0.8294 | 0.465 | 0.457 | 0.516 | 2.827 | 4.484 |
| t-value                                  | -0.95 | 0.19 | -2.03 | -0.08 | 4.30 | 5.75 |
| Pr>|t|                                     | 0.345 | 0.850 | 0.043 | 0.937 | <0.001 | <0.001 |
| Sample size                              | 537 | 468 | 485 | 534 | 561 | 537 |
| Medicare spending share                  | -0.909 | 0.090 | -1.151* | 1.287*** | 10.949*** | 9.016*** |
| Standard error                          | 0.499 | 0.184 | 0.494 | 0.373 | 2.074 | 2.535 |
| t-value                                  | -1.82 | 0.49 | -2.33 | 3.45 | 5.28 | 3.56 |
| Pr>|t|                                     | 0.069 | 0.626 | 0.020 | 0.001 | <0.001 | <0.0004 |
| Sample size                              | 537 | 468 | 485 | 534 | 561 | 537 |
| Private spending share                   | 3.121*** | 0.046 | 0.143 | -2.008* | -13.37*** | -21.74*** |
| Standard error                          | 0.620 | 0.181 | 0.172 | 0.881 | 1.461 | 4.035 |
| t-value                                  | 5.04 | 0.25 | 0.84 | -2.28 | -9.15 | -5.39 |
| Pr>|t|                                     | <0.001 | 0.801 | 0.404 | 0.023 | <0.001 | <0.0001 |
| Sample size                              | 537 | 468 | 485 | 534 | 561 | 537 |
| Occupational therapists                  | Medicaid spending share       | 1.111*** | 1.966*** | 1.275*** | 1.811*** | -2.077*** | 6.342*** |
| Standard error                          | 0.427 | 0.502 | 0.253 | 0.342 | 0.575 | 1.306 |
| t-value                                  | 2.61 | 3.92 | 5.03 | 5.30 | -3.61 | 4.86 |
| Pr>|t|                                     | 0.009 | 0.0001 | <0.0001 | <0.0001 | 0.0003 | <0.0001 |
| Sample size                              | 559 | 560 | 547 | 547 | 560 | 560 |
| Respiratory therapists                   | Medicaid spending share       | 0.467* | 1.818*** | 0.290* | 1.222*** | 2.992*** | 7.571*** |
| Standard error                          | 0.198 | 0.325 | 0.136 | 0.272 | 0.308 | 0.651 |
| t-value                                  | 2.36 | 5.60 | 2.13 | 4.49 | 9.71 | 11.63 |
| Pr>|t|                                     | 0.019 | <0.0001 | 0.034 | <0.0001 | <0.0001 | <0.0001 |
| Sample size                              | 559 | 560 | 547 | 547 | 560 | 560 |
| Pharmacy techs                          | Medicaid spending share       | -0.700*** | -3.155*** | -1.030*** | -0.845*** | -2.120 | -5.112*** |
| Standard error                          | 0.197 | 0.275 | 0.159 | 0.177 | 0.464 | 0.972 |
| t-value                                  | -3.54 | -11.45 | -6.48 | -4.77 | -4.57 | -5.26 |
| Pr>|t|                                     | 0.0004 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Sample size                              | 559 | 560 | 547 | 543 | 560 | 560 |

**Notes:** Standard errors in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001.

**Source:** Healthcare spending data derived from the Centers for Medicaid and Medicare Services. Healthcare workforce data derived from the Bureau of Labor Statistics.
Figure 1. Conceptual model

Labor market (i.e. unemployment and labor force participation rates)

Healthcare spending

Medicaid spending share

Medicare spending share

Private spending share

Health status
(excellent, very good, good, fair, poor)

Health outcomes

All cause mortality (males and females, aged 16-64)

Professionals
Primary care physicians
Internists
Surgeons
Physician assistants
Registered nurses
Personal care attendants
Occupational therapists
Physical therapists
Physical therapy assistants
Respiratory therapists
Pharmacists
Pharmacy technicians

Healthcare workforce
Figure 2. Labor force participation, health outcomes, and healthcare spending, United States, 1999-2009

Figure 3. Unemployment, health outcomes, and healthcare spending, United States, 1999-2009

CHAPTER 3
DISABILITY ENROLLMENT AND US HEALTHCARE EMPLOYMENT

Abstract

Background

The healthcare industry is an increasingly important driver of the US economy. However, little is known about the relationship between increasing healthcare employment and rising Social Security Disability Insurance (SSDI) enrollment. Understanding this relationship is important as healthcare utilization is required to qualify for and, in some cases, maintain disability benefits.

Methods

State-year level data are collected from a number of government sources for the 2000-2014 time period. Population-weighted regression analyses with state dummy variables, linear and quadratic time trends, and robust standard errors are used to model the associations between select state-year level healthcare employment rates and SSDI enrollment rates (i.e., overall, and mental and physical health related), controlling for Medicare and Medicaid enrollment rates, age-adjusted adult mortality rates, State Unemployment Insurance (SUI) and TANF enrollment rates, and socioeconomic and demographic characteristics.

Results

SSDI mental (MH) and physical health (PH) enrollment rate increases are identified; concurrently, occupational employment rate increases are also identified for a range of healthcare occupations including physician assistants, home health aides, and
mental health counselors. SSDI-MH enrollment per 100,000 is positively, and significantly, related with physician assistant and mental health counselor employment per 100,000. SSDI-PH enrollment per 100,000 is positively, and significantly, related with home health aide employment per 100,000.

Conclusion

Healthcare occupational employment is associated with disability enrollment. Further, the nature of this association varies based upon disability type (i.e., physical versus mental health disability). Study results may be used to support healthcare workforce projections.

Key words

Healthcare occupational employment, Disability enrollment, SSDI

Introduction

The US healthcare industry has been a recent driver of the nation’s economy; from 2000 through 2014, private healthcare and social assistance employment increased from 13 to 18 million jobs, a net gain of almost 6 million jobs (44% increase) (Bureau of Labor Statistics, 2015a). Further, the Bureau of Labor Statistics (2014) projects that healthcare will continue to be among the fastest growing industries in the economy, creating an additional four million new jobs between 2012 and 2022.

Growth in healthcare occupational employment is often attributed to an aging population (Bureau of Labor Statistics, 2014), but may be substantially impacted by other trends such as demographic (Bertakis et al., 2000), socioeconomic (Åhs & Westerling, 2006), and geographic (Arcury et al., 2005) characteristics, health insurance coverage
(Card, Dobkin, & Maestas, 2004), and local (Chen, Scheffler, & Chandra, 2011; Sturm & Pacula, 1999) and national (Hofer, Abraham, & Moscovice, 2011) policy trends. Disability enrollment (i.e., Social Security Disability Insurance [SSDI]) may also be related with healthcare occupational employment. However, no previous research considers the relationship between increasing SSDI enrollment and employment rates for a range of healthcare providers.

SSDI is a federal employment-tested disability program that requires twenty calendar quarters of work history in the most recent 10 years to qualify for benefits (Social Security Administration, 2015a). Further, program enrollees must have a physical and/or mental health disabling condition that precludes them from engaging in existing employment or pursuing new work opportunities (Social Security Administration, 2015a).

From 2000 to 2014, SSDI enrollment increased from 5 to 9 million persons, a 78% increase (Social Security Administration, 2015b). The cause of disability enrollment expansions is not well understood (Cutler, Meara, & Richards-Shubik, 2012). Worsening economic conditions (i.e., increasing unemployment rates) may be related with rising disability applications (Autor & Duggan, 2003; David, 2011; Schmidt & Sevak, 2004) and associated program enrollment (Autor & Duggan, 2003; David, 2011). However, this effect may be moderated by availability of labor market protection (Mueller, Rothstein, & von Wachter, 2013) and welfare-based cash assistance (Hansen et al., 2014; Schmidt & Sevak, 2004) programs.

Research shows that SSDI recipients exhibit lower health insurance coverage rates than similar non-elderly adult populations (Livermore et al., 2009; Riley, 2006;
Sommers, 2006). However, recent studies suggest that expanded health insurance coverage is unrelated with disability program enrollment expansions (Baicker et al., 2014; Maestas et al., 2014). Nevertheless, SSDI recipients may receive Federal Medicare benefits, after a two year waiting period, and may also receive state Medicaid benefits should they meet income and asset guidelines (Centers for Medicare and Medicaid Services, 2015a, 2015b).

While research explores the causes of disability enrollment expansions, no previous research examines the association between rising disability enrollment and healthcare provider employment. SSDI enrollment requires initial and ongoing exposure to the healthcare system to apply for and, in some cases, maintain benefits (Social Security Administration, 2015a). For example, healthcare providers are required to diagnose a qualifying physical or mental health condition (Social Security Administration, 2015a). Further, depending on the specific physical or mental health diagnosis, disabled persons may also be eligible for other types of healthcare services such as rehabilitative and continuing care (Social Security Administration, 2015a).

Given increasing disability enrollment rates and the relationship between SSDI enrollment and healthcare use, rising disability enrollment may be associated with growth in the healthcare workforce. As such, the objective of this study is to examine associations between state-year level SSDI enrollment rates and state-year level healthcare occupational employment rates. In these models, I control for other factors that influence healthcare occupational employment including state-year level Medicaid and Medicare beneficiary rates, age-adjusted mortality rates, demographic and socioeconomic characteristics, and availability of alternative cash assistance.
arrangements. Better understanding this relationship will allow policymakers to more appropriately forecast future healthcare workforce demand.

**Methods**

**Data**

Annual statewide average data are collected from a variety of administrative sources for all fifty states for the period 2000-2014. Employment, enrollment, socio-demographic, and mortality data are converted to rates per 100,000 population using population data from the Centers for Disease Control and Prevention’s Bridged Race Population Statistics program (Centers for Disease Control and Prevention, 2015a).

Occupational employment data are obtained from the Bureau of Labor Statistics’ Occupational Employment Statistics (OES) program (Bureau of Labor Statistics, 2015b). Healthcare practitioner and technical occupations include a range of occupations such as physicians (i.e., family and general practitioners), physician assistants, and psychiatrists. Healthcare support occupations include a range of occupations such as home health aides, occupational therapy assistants, and physical therapy assistants. Community support occupations include a range of occupations such as substance abuse and behavioral health disorder counselors, mental health counselors, and mental health and substance abuse social workers.

Social Security Disability Insurance (SSDI) enrollment data are obtained from the Social Security Administration (Social Security Administration, 2015a). Three disability measures include total disability, and disability associated with either physical (PH) or mental health (MH) disorders.
Health insurance coverage measures include state-year level Medicaid and Medicare enrollment; data are obtained from the Centers for Medicare and Medicaid Services and the Kaiser Family Foundation (Centers for Medicare and Medicaid Services, 2015c; Kaiser Family Foundation, 2016). Social welfare and labor market protection program information include state-year level SUI and TANF enrollment; data are obtained from the US Department of Labor’s Employment and Training Administration and US Department of Health and Human Services’ Agency for Children and Families, respectively (US Department of Labor, 2015a, 2015b; US Department of Health and Human Services, 2015a, 2015b). Unemployment and poverty rates data are obtained from the Bureau of Labor Statistics’ Local Area Unemployment Statistics program and US Census Bureau, respectively (Bureau of Labor Statistics, 2015c; US Census Bureau, 2015). Age-adjusted mortality rates data for persons aged 25-64 serve as a proxy for statewide health status; data are obtained from the Centers for Disease Control and Prevention’s Vital Statistics program (Centers for Disease Control and Prevention, 2015b). Last, demographic controls include race (i.e., White, Black, other races), ethnicity (i.e., Hispanic, non-Hispanic), sex, and age group (i.e., <18, 18-64, 65+); these measures are obtained from the Centers for Disease Control and Prevention’s Bridged Race Population Statistics program (Centers for Disease Control and Prevention, 2015a).

Statistical analyses

Population-weighted descriptive statistics analyses are performed to analyze trends in study measures over the 2000-2014 study period. The Hausman test is performed to determine appropriateness of fixed effects model. Population-weighted regression analyses with state dummy variables, linear and quadratic time trends, and
robust standard errors are used to model associations between each healthcare
occupational employment measure and the disability measures, controlling for health
insurance coverage, social welfare and labor market protection programs enrollment, age-
adjusted mortality rates, and socio-economic and demographic characteristics.
Regression analyses are population-weighted by the size of each state’s population. The
following represents the model:

$$\text{OCCUPATIONS}_{it} = \beta_0 + \beta_1 \text{SSDI}_{it} + \beta_2 \text{INSURANCE}_{it} + \beta_3 \text{ASSISTANCE}_{it} + \beta_4 \text{HEALTH}_{it}$$
$$+ \beta_5 \text{SOCIOECON}_{it} + \beta_6 \text{DEMOGRAPHICS}_{it} + \alpha_i + \text{Year} + \text{Year}^2 + e_{it}$$

Where OCCUPATIONS\(_{it}\) represents select healthcare occupational employment
rates per 100,000; SSDI\(_{it}\) represent either SSDI overall or SSDI physical (PH) and mental
health (MH) enrollment per 100,000, depending on the model; INSURANCE\(_{it}\) represents
total Medicaid and Medicare enrollment per 100,000; ASSISTANCE\(_{it}\) represents adult
TANF and SUI enrollment per 100,000; HEALTH\(_{it}\) represents age-adjusted mortality rate
per 100,000; SOCIOECON\(_{it}\) represents socio-economic characteristics (i.e., state level
unemployment and poverty rates); and DEMOGRAPHICS\(_{it}\) represents demographic
characteristics (i.e., Whites, Blacks, other races, Hispanics, non-Hispanics, females,
males, <18, 18-64, and 65+ age groups). \(\alpha_i\) is a state fixed effects measure to control for
omitted variables that vary across states but not over time. YEAR and YEAR\(^2\) are linear
and quadratic time trends, and \(e_{it}\) represents the error term. All statistical analyses were
performed using Stata 13 (StatCorp. College Station, TX, USA). An alpha of 0.05 was
considered statistically significant.
Results

Descriptive statistics

Results show increasing trends in employment rates per 100,000 population for healthcare practitioner and technical occupations (15.1% increase), healthcare support occupations (14.7%), and community support occupations (16.1%) over the 2000-2014 period (Table 4). Physician assistants and occupational therapy assistants have the largest increases amongst examined healthcare practitioner and technical occupations and healthcare support occupations, respectively. Likewise, mental health counselors show the largest increase amongst examined community support occupations. Disability enrollment also shows increasing trends. SSDI enrollment per 100,000 increased 52.1% between 2000 and 2014. Differences exist between SSDI mental health (MH) and physical health (PH) enrollment; in 2000, there were 1,135 and 2,187 SSDI-MH and SSDI-PH enrollees per 100,000, respectively, increasing to 1,752 and 3,301 per 100,000, respectively, in 2014.

Regression analyses

Using the Hausman specification test, I examine the null hypothesis for each model that fixed and random effects models yield consistent estimation results. Results show, for example, that the null hypothesis is rejected for the SSDI and healthcare practitioner and technical occupations model (F=165.59, p<.001). Further, with the exception of home health aides, the fixed effects estimator exhibits consistent results across all model specifications compared to random effects. Thus, fixed effects models are used in subsequent study analyses. Results show that SSDI enrollment is positively, and significantly, associated with occupational employment for healthcare practitioner
and technical occupations and healthcare support occupations (Table 5). A one percentage point increase in SSDI enrollment per 100,000 is associated with a .07 percent increase in the employment rate per 100,000 population for healthcare practitioner and technical occupations and healthcare support occupations, respectively. To place into context, a one standard deviation increase in SSDI enrollment per 100,000 would result in a 4.2 and 7.9 percent increase in the mean outcome for both of these measures, respectively.

The relationship between SSDI enrollment and healthcare occupational employment differs for SSDI physical (PH) and mental health (MH) disability. SSDI-MH disability enrollment per 100,000 is positively, and significantly, associated with the occupational employment rate per 100,000 for healthcare practitioner and technical occupations, healthcare support occupations, and community support occupations. SSDI-PH disability enrollment per 100,000 is positively, and significantly, associated with the occupational employment rate per 100,000 for healthcare support occupations, and negatively, and significantly, associated with the occupational employment rate per 100,000 for community support occupations.

SSDI enrollment per 100,000 is positively, and significantly, associated with the occupational employment rate per 100,000 for home health aides and physical therapy assistants (Table 6). Results vary between each disability measure and healthcare occupations. SSDI-MH enrollment per 100,000 is positively, and significantly, related with physician assistant, mental health counselor, and mental health and substance abuse social worker employment per 100,000. A one percentage point increase in SSDI-MH enrollment per 100,000 is associated with a .01, .02, and .01 percent increase in the
employment rate per 100,000 population for physician assistants, mental health counselors, and mental health and substance abuse social workers, respectively. To place into context, a one standard deviation increase in SSDI-MH enrollment per 100,000 would result in an 18.3, 29.9, and 14.3 percent increase in the mean outcome for each of these measures, respectively. SSDI-PH enrollment per 100,000 is positively, and significantly, related with home health aide and physical therapy assistant employment per 100,000, and negatively, and significantly, related with primary care physician (i.e., family and general practitioner), mental health counselor, and mental health and substance abuse social worker employment per 100,000.

**Discussion**

Results show that rising disability enrollment is associated with healthcare employment for a range of healthcare providers. There are differences in these associations by disability type (i.e., mental versus physical health disability). Further, models are significant even when considering the confounding effects of employment status (Autor & Duggan, 2003; David, 2011; Schmidt & Sevak, 2004), health insurance coverage (Centers for Medicare and Medicaid Services, 2015a, 2015b; Livermore et al., 2009; Riley, 2006; Sommers, 2006), and cash assistance beneficiary status (Mueller, Rothstein, & von Wachter, 2013; Schmidt & Sevak, 2004).

Healthcare practitioner and technical occupations able to diagnose and treat both physical and mental health disorders include primary care physicians (i.e., family and general practitioners) and mid-level providers (i.e., physician assistants). However, results suggest that rising disability enrollment, specifically SSDI-MH enrollment, is positively related with employment of physician assistants. SSDI-MH is unrelated with
primary care physician employment whereas there is a negative association between SSDI-PH and employment for these providers. Given that training duration for physician assistants is shorter than that of physicians, I would expect physician assistant supply to more readily increase in response to rising healthcare demand. Research suggests that rising healthcare services utilization may require an additional 52,000 primary care physicians by 2025 (Petterson et al., 2012); however, increasing the numbers of primary care physician providers will be constrained by availability of physician residency programs and related training opportunities. To the contrary, based upon existing training availability and anticipated program expansions, evidence suggests that employment of physician assistants is expected to increase by 72% from 2010-2015 (Hooker, Cawley, & Everett, 2011). Disability enrollment expansions/contractions should be more fully considered when developing associated employment projections.

Physician assistants are expected to serve an increasingly important role in diagnosis and treatment of both physical and mental health disorders.

Mental health providers able to treat and diagnose mental health conditions include psychiatrists and community support occupations such as mental health counselors and mental health and substance abuse social workers. However, SSDI-MH enrollment is only associated with employment rates for mental health counselors and mental health and substance abuse social workers with no statistically significant association with psychiatrist employment rates. Evidence suggests that psychiatrist employment, in general, has not been keeping up with the overall pace of population growth in the US (Bishop et al., 2016) whereas non-physician mental health providers (i.e., mental health counselors and mental health and substance abuse social workers)
represent an increasing share of the mental health workforce (Pellegrini & Rodriguez-Monguio, 2014). My results show that rising SSDI-MH enrollment may serve to further increase employment of non-physician mental health providers. These employment increases are possible due to increasing training opportunities for these professionals. However, disproportionate occupational employment increases may further serve to exacerbate existing mental health workforce imbalances; research suggests that current mental health workforce imbalances may be serving as a barrier to optimal mental health disorder treatment, in general (Bishop et al., 2016; Pellegrini & Rodriguez-Monguio, 2014).

Healthcare support occupations associated with rising disability enrollment include physical therapy assistants (SSDI) and home health aides (SSDI-PH). Disabling physical health conditions may require continuing and/or rehabilitative care. Low barriers-to-entry may encourage employment increases for these providers. Further, service availability for continuing and rehabilitative care may increase as SSDI beneficiaries possibly become eligible for state Medicaid programs due to Medicaid expansion efforts, and the federal Medicare program, once the two year waiting period is exhausted (Centers for Medicare and Medicaid Services, 2015a, 2015b). Research suggests that increasing Medicaid and Medicare spending, as a share of overall healthcare spending, is significantly associated with employment growth for these types of providers (Pellegrini, Rodriguez-Monguio, & Qian, 2014).

This study has several limitations. First, data represent statewide, annualized, population averages which may mask relationships within states. Second, there may be state specific factors that influence healthcare employment such as licensing regulations.
and training opportunities. To account for this limitation, I utilize state fixed effects models to control for omitted variables that vary across states but not over time.

In conclusion, healthcare occupational employment is associated with Social Security Disability Insurance (SSDI) enrollment at the state level. Further, the relationship between SSDI enrollment rates and the US healthcare workforce varies based upon physical as opposed to mental health disability. Better understanding these relationships will allow policymakers to more appropriately forecast future demand for healthcare services with changes in disability enrollment.
References:


Table 4: Descriptive statistics and trends for all fifty states

<table>
<thead>
<tr>
<th>Variable name</th>
<th>2000-2014 time period</th>
<th>Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of obs.</td>
<td>Mean</td>
</tr>
<tr>
<td>Healthcare practitioner &amp; technical occupations per 100,000</td>
<td>Healthcare practitioner &amp; tech. occupations</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Primary care physicians</td>
<td>733</td>
</tr>
<tr>
<td></td>
<td>Physician assistants</td>
<td>732</td>
</tr>
<tr>
<td></td>
<td>Psychiatrists</td>
<td>664</td>
</tr>
<tr>
<td>Healthcare support occupations per 100,000</td>
<td>Healthcare support occupations</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Home health aides</td>
<td>738</td>
</tr>
<tr>
<td></td>
<td>Occupational therapy assistants</td>
<td>713</td>
</tr>
<tr>
<td></td>
<td>Physical therapy assistants</td>
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</tr>
<tr>
<td>Community support occupations per 100,000</td>
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</tr>
<tr>
<td></td>
<td>SA and BH disorder counselors</td>
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<td>Mental health counselors</td>
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</tr>
<tr>
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<td>MH and SA social workers</td>
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<tr>
<td>Disability enrollment per 100,000</td>
<td>SSDI</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>SSDI-MH</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>SSDI-PH</td>
<td>750</td>
</tr>
<tr>
<td>Social welfare and labor market protection program enrollment rate per 100,000</td>
<td>Adult TANF</td>
<td>749</td>
</tr>
<tr>
<td></td>
<td>SSI</td>
<td>750</td>
</tr>
<tr>
<td>Health insurance enrollment per 100,000</td>
<td>Medicaid</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Medicare</td>
<td>750</td>
</tr>
<tr>
<td>Mortality rate per 100,000</td>
<td>Adults, aged 16-64</td>
<td>750</td>
</tr>
<tr>
<td>Socioeconomic characteristics in percent</td>
<td>Unemployment rate</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Poverty rate</td>
<td>750</td>
</tr>
<tr>
<td>Socio-demographic characteristics in percent</td>
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<tr>
<td></td>
<td>Blacks</td>
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</tr>
<tr>
<td></td>
<td>Other races</td>
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<tr>
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</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Male gender</td>
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</tr>
<tr>
<td></td>
<td>&lt;18 age group</td>
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</tr>
<tr>
<td></td>
<td>18-64 age group</td>
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</tr>
<tr>
<td></td>
<td>65+ age group</td>
<td>750</td>
</tr>
</tbody>
</table>


Note: Data are population weighted.
### Table 5: Disability enrollment and US healthcare employment

<table>
<thead>
<tr>
<th>Healthcare practitioner and technical occupations per 100,000</th>
<th>Healthcare support occupations per 100,000</th>
<th>Community support occupations per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SSDI recipient rate</strong></td>
<td><strong>SSDI-MH recipient rate</strong></td>
<td><strong>SSDI-PH recipient rate</strong></td>
</tr>
<tr>
<td><strong>Standard error</strong></td>
<td><strong>Standard error</strong></td>
<td><strong>Standard error</strong></td>
</tr>
<tr>
<td>0.0736 (0.0147)</td>
<td>0.225 (0.0399)</td>
<td>0.0026 (0.0184)</td>
</tr>
<tr>
<td>0.0718*** (0.0184)</td>
<td>0.0866 (0.0372)</td>
<td>0.0649*** (0.0239)</td>
</tr>
<tr>
<td>0.0107 (0.0109)</td>
<td>-0.0319 (0.0258)</td>
<td>-0.0319 (0.0144)</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>N</strong></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td>749</td>
<td>749</td>
<td>746</td>
</tr>
<tr>
<td><strong>R^2</strong></td>
<td><strong>R^2</strong></td>
<td><strong>R^2</strong></td>
</tr>
<tr>
<td>0.983</td>
<td>0.984</td>
<td>0.949</td>
</tr>
</tbody>
</table>

**Note:** Models represent population-weighted regression analyses with state dummy variables, linear and quadratic time trends, and robust standard errors for 50 states for the 2000-2014 time period. All data are in rates per 100,000 population. Models control for state-year level social welfare (i.e., TANF), labor market protection (i.e., SUI), and Medicaid and Medicare enrollment rates, adult mortality rate, and socioeconomic (i.e., unemployment and poverty) and socio-demographic (i.e., Black and other races, Hispanic ethnicity, female gender, and <18 and 65+ age groups) characteristics.

**Note:** *, **, and *** indicate statistically significant at the 0.05, 0.01 and 0.001 levels.
Table 6: Disability enrollment and US healthcare employment

<table>
<thead>
<tr>
<th>Healthcare practitioner and technical occupations…</th>
<th>Healthcare support occupations…</th>
<th>Community support occupations…</th>
</tr>
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<tbody>
<tr>
<td>Primary care physicians per 100,000</td>
<td>Home health aides per 100,000</td>
<td>SA and BH disorder counselors per 100,000</td>
</tr>
<tr>
<td>Physician assistants per 100,000</td>
<td>Occupational therapy assistants per 100,000</td>
<td>Mental health counselors per 100,000</td>
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<tr>
<td>Psychiatrists per 100,000</td>
<td>Physical therapy assistants per 100,000</td>
<td>MH and SA social workers per 100,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SSDI recipient rate</th>
<th>Standard error</th>
<th>N</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care physicians per 100,000</td>
<td>(0.0025)</td>
<td>732</td>
<td>0.677</td>
</tr>
<tr>
<td>Physician assistants per 100,000</td>
<td>(0.0012)</td>
<td>731</td>
<td>0.797</td>
</tr>
<tr>
<td>Psychiatrists per 100,000</td>
<td>(0.0005)</td>
<td>664</td>
<td>0.805</td>
</tr>
<tr>
<td>Home health aides per 100,000</td>
<td>(0.0159)</td>
<td>737</td>
<td>0.890</td>
</tr>
<tr>
<td>Occupational therapy assistants per 100,000</td>
<td>(0.0005)</td>
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<td>0.861</td>
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<tr>
<td>Physical therapy assistants per 100,000</td>
<td>(0.0008)</td>
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<td>0.899</td>
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<tr>
<td>SA and BH disorder counselors per 100,000</td>
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<td>Mental health counselors per 100,000</td>
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<tr>
<td>MH and SA social workers per 100,000</td>
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<td>0.803</td>
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</table>

<table>
<thead>
<tr>
<th>SSDI-MH recipient rate</th>
<th>Standard error</th>
<th>N</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care physicians per 100,000</td>
<td>(0.0058)</td>
<td>732</td>
<td>0.678</td>
</tr>
<tr>
<td>Physician assistants per 100,000</td>
<td>(0.0026)</td>
<td>731</td>
<td>0.799</td>
</tr>
<tr>
<td>Psychiatrists per 100,000</td>
<td>(0.0012)</td>
<td>664</td>
<td>0.805</td>
</tr>
<tr>
<td>Home health aides per 100,000</td>
<td>(0.0367)</td>
<td>737</td>
<td>0.890</td>
</tr>
<tr>
<td>Occupational therapy assistants per 100,000</td>
<td>(0.0009)</td>
<td>712</td>
<td>0.863</td>
</tr>
<tr>
<td>Physical therapy assistants per 100,000</td>
<td>(0.0015)</td>
<td>741</td>
<td>0.899</td>
</tr>
<tr>
<td>SA and BH disorder counselors per 100,000</td>
<td>(0.0033)</td>
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<td>0.777</td>
</tr>
<tr>
<td>Mental health counselors per 100,000</td>
<td>(0.0052)</td>
<td>733</td>
<td>0.852</td>
</tr>
<tr>
<td>MH and SA social workers per 100,000</td>
<td>(0.0047)</td>
<td>727</td>
<td>0.805</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SSDI-PH recipient rate</th>
<th>Standard error</th>
<th>N</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care physicians per 100,000</td>
<td>(0.0034)</td>
<td>732</td>
<td>0.678</td>
</tr>
<tr>
<td>Physician assistants per 100,000</td>
<td>(0.0015)</td>
<td>731</td>
<td>0.799</td>
</tr>
<tr>
<td>Psychiatrists per 100,000</td>
<td>(0.0008)</td>
<td>664</td>
<td>0.805</td>
</tr>
<tr>
<td>Home health aides per 100,000</td>
<td>(0.0219)</td>
<td>737</td>
<td>0.890</td>
</tr>
<tr>
<td>Occupational therapy assistants per 100,000</td>
<td>(0.0007)</td>
<td>712</td>
<td>0.863</td>
</tr>
<tr>
<td>Physical therapy assistants per 100,000</td>
<td>(0.0010)</td>
<td>741</td>
<td>0.899</td>
</tr>
<tr>
<td>SA and BH disorder counselors per 100,000</td>
<td>(0.0021)</td>
<td>739</td>
<td>0.777</td>
</tr>
<tr>
<td>Mental health counselors per 100,000</td>
<td>(0.0034)</td>
<td>733</td>
<td>0.852</td>
</tr>
<tr>
<td>MH and SA social workers per 100,000</td>
<td>(0.0030)</td>
<td>727</td>
<td>0.805</td>
</tr>
</tbody>
</table>

Note: Models represent population-weighted regression analyses with state dummy variables, linear and quadratic time trends, and robust standard errors for 50 states for the 2000-2014 time period. All data are in rates per 100,000 population. Models control for state-year level social welfare (i.e., TANF), labor market protection (i.e., SUI), and Medicaid and Medicare enrollment rates, adult mortality rate, and socioeconomic (i.e., unemployment and poverty) and socio-demographic (i.e., Black and other races, Hispanic ethnicity, female gender, and <18 and 65+ age groups) characteristics.

Note: *, **, and *** indicate statistically significant at the 0.05, 0.01 and 0.001 levels.
Figure 4: Average annual percent change in SSDI beneficiaries per 100,000, 2000-2014

SSDI beneficiaries per 100,000, average annual percent change, 2000-2014

SSDI-MH beneficiaries per 100,000, average annual percent change, 2000-2014

SSDI-PH beneficiaries per 100,000, average annual percent change, 2000-2014
CHAPTER 4

DISABILITY ENROLLMENT AND HEALTHCARE SERVICES

UTILIZATION AND ACCESS

Abstract

Background

Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) program application and receipt require healthcare services utilization to receive and maintain benefits (Social Security Administration, 2016a, 2016b). Past research suggests that disabled persons face greater healthcare access barriers than the general population (Dejong, Palsbo, & Beatty, 2002). Due to recent health policy changes, further research is necessary to understand disabled persons’ current healthcare services utilization and access barriers.

Methods

Using the 2014 National Health Interview Survey (NHIS), I estimate logistic regression analyses to model the associations between SSDI and SSI application and/or receipt and healthcare services utilization and access. Model covariates include health insurance coverage type, serious psychological distress, health status, fifteen co-morbid health conditions, and socio-demographic characteristics.

Results

SSDI applicants exhibit greater odds of having seen all examined providers in the past year (p<.05); whereas, SSI applicants and recipients exhibit greater odds of having seen a mental health provider (p<.05). SSDI applicants exhibit greater odds of needing
and delaying medical care due to costs (p<.001) with the inverse being true for SSDI (p<.05) and SSI (p<.001) recipients.

Conclusion

Variation exists in healthcare services utilization and access across disability programs and by applicant versus recipient status. SSDI applicants exhibit greater healthcare services utilization and worse healthcare access compared to non-applicants. However, healthcare access measures improve for disability recipients, compared to non-recipients, with no statistically significant difference in healthcare services utilization. Policy interventions to enhance SSDI applicants’ access to healthcare services should be considered.

Key words

SSDI, SSI, Disability, Healthcare services utilization, Healthcare affordability

Introduction

Recent health policy changes through the Affordable Care Act have served to improve access to health insurance coverage (Blumenthal & Collins, 2014) with anticipated and realized effects for utilization of primary (Hofer et al., 2011) and behavioral (Ali et al., 2016) healthcare services. However, recent research has not considered whether the current health policy environment has served to affect healthcare services utilization and access for disabled persons applying for and/or receiving benefits through Federal disability programs. Historically, disability has been associated with greater healthcare services utilization (Anderson et al., 2010) and access barriers (Dejong, Palsbo, & Beatty, 2002; Livermore et al., 2009) with health insurance coverage serving as a principle access barrier (Livermore et al., 2009; Riley, 2006; Sommers, 2006).
Utilizing 2014 NHIS data, I estimate the relationship between disability application and/or receipt and healthcare services utilization and access, controlling for health insurance coverage type and other measures that have been shown to affect healthcare services utilization and access.

A disability may include a physical and/or mental impairment that substantially limits one or more major life activities including participation in the labor market (Americans with Disability Act, 2016). In 2014, 12.1 million persons were unable to participate in the labor market due to disability (American Community Survey, 2016). Federal disability programs may serve to replace income for disabled persons. Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) are two federal income replacement programs available to qualifying disabled who meet employment (SSDI) and means-based (SSI) criteria (Social Security Administration, 2016a, 2016b). In 2014, SSDI and SSI beneficiaries represented 4.8% and 2.3% of the US population, respectively (Kaiser Family Foundation, 2016).

Disability program enrollment requires healthcare services utilization to receive and maintain benefits (Social Security Administration, 2016a, 2016b). However, research shows that disabled persons face greater healthcare access barriers than the general population (Dejong, Palsbo, & Beatty, 2002; Livermore et al., 2009). Health insurance coverage is a well cited access barrier (Livermore et al., 2009; Riley, 2006; Sommers, 2006). In most states, due to associated means-test, anyone who receives SSI benefits is automatically eligible for Medicaid (Centers for Medicare and Medicaid Services, 2016a). SSDI recipients qualify for Medicare benefits; however, Medicare requires a 24 month waiting period before benefits commence (Centers for Medicare and Medicaid Services, 2016a).
Medicaid Services, 2016b). Recent estimates suggest that 21% of Medicare enrollees also receive Medicaid coverage (Kaiser Family Foundation, 2016). However, the associated means-test often precludes SSDI recipients from receiving Medicaid coverage (Centers for Medicare and Medicaid Services, 2016a). As such, uninsured rates for SSDI recipients are high in the time period preceding Medicare eligibility (Livermore et al., 2009), declining markedly after the 24 month Medicare waiting period is exhausted (Livermore et al., 2009; Riley, 2006).

The Affordable Care Act has resulted in increasing numbers of Medicaid recipients and declining uninsured rates (Blumenthal & Collins, 2014). Research suggests that improving health insurance coverage for previously uninsured SSDI recipients would serve to increase healthcare services utilization (Michalopoulos et al., 2012). While health insurance expansion efforts may enhance health insurance coverage options and healthcare services utilization for already disabled persons (Michalopoulos et al., 2012); having Medicaid and/or private health insurance coverage in itself would not serve to increase enrollment in disability programs themselves (Baicker et al., 2014; Maestas et al., 2014).

In 2014, approximately 9 and 5 million persons were enrolled in SSDI or SSI programs, respectively. This is an increase of 83% and 33.1%, respectively, since 1999 (Social Security Administration, 2016c, 2016d). A range of healthcare providers may diagnose and treat disabling conditions including primary and specialty care physicians, mid-level providers, and mental health professionals. However, little is known about the association between disability application and/or receipt and health services utilization and access in the Affordable Care Act era.
The 2014 National Health Interview Survey (NHIS) provides an opportunity to explore these associations as NHIS contains measures related with SSDI and SSI application and receipt, healthcare services utilization and access, as well as other measures that may serve to affect healthcare services utilization including health insurance coverage type, serious psychological distress, health status, co-morbid conditions, and socio-demographic characteristics (National Center for Health Statistics, 2014). The objectives of this study are to (1) examine associations between healthcare services utilization and SSDI and SSI application and/or receipt, and (2) identify differences in healthcare access for individuals who applied for and/or received SSDI and SSI.

Methods

Data were from the 2014 National Health Interview Survey (NHIS). NHIS is a nationally representative health survey regarding a broad range of health topics such as medical, substance abuse, and mental health conditions, as well as behavioral risk factors and health insurance coverage (National Center for Health Statistics, 2014). Inclusion criteria for study analyses included persons aged 18-64 who had full information for all outcome measures and study covariates. This includes having provided complete responses to all six mental health questions necessary to calculate a measure of serious psychological distress.

Outcome measures

Healthcare services utilization measures include five bivariate variables indicating whether a survey respondent has, in the most recent 12 month period, seen/talked to a (1) primary care physician (PCP), (2) medical specialist, (3) mid-level provider (i.e., nurse
practitioner [NP, physician assistant [PA], or midwife), (4) mental health professional, or (5) no provider at all. Measures of facility specific utilization include a bivariate variable indicating whether a survey respondent, in the most recent 12 month period, had at least one emergency room (ER) visit.

Healthcare access measures include three bivariate variables indicating whether a survey respondent (1) could not afford mental health counseling, (2) needed medical care and delayed it due to costs, or (3) worried about the medical costs of healthcare.

Independent variables

Three measures of disability insurance are used in this analysis. The first measure considers whether a survey respondent applied for and/or receives any disability benefit such as SSDI, SSI, or other disability pension. The second measure differentiates between application and receipt regardless of disability type (i.e., applied for SSDI or SSI, and receives SSDI, SSI, or other disability pension). Last, the third measure considers application and receipt broken down by disability type (i.e., applied for SSDI, applied for SSI, receives SSDI, receives SSI, and receives other disability pension).

Health insurance coverage measure includes one categorical variable indicating whether an individual has (1) a private low deductible health plan (LDHP), (2) Medicare, (3) Medicaid, (4) a private high deductible health plan (HDHP), or (5) no insurance. Privately insured plans are distinguished by whether the insured’s deductible is less than $1,250 (LDHP) or $1,250 or greater (HDHP). Individuals with multiple insurance plans were re-classified in accordance to their presumed primary payer for healthcare services (i.e., Medicare, Medicaid, then private insurance).
Model covariates

Model covariates include bivariate and categorical health-related and socio-demographic measures. Health-related measures include serious psychological distress (i.e., not depressed, severely depressed) based on the K6 scale (Kessler et al., 2002), health status (i.e., excellent/very good/good, fair, or poor health), and fifteen co-morbid medical conditions (i.e., high cholesterol, hypertension, coronary heart disease, angina, myocardial infarction, heart disease, stroke, emphysema, chronic obstructive pulmonary disease [COPD], asthma, ulcer, cancer, diabetes, arthritis, and liver disease). Socio-demographic measures include respondent race (i.e., White Hispanic, White non-Hispanic, Black Hispanic, Black non-Hispanic, other Hispanic, and other non-Hispanic), sex, age group (i.e., less than 35, 35 to 49, 50 to 64), marital status (i.e., widowed, divorced, separated, or single, or; member of a married or unmarried couple), region of residence (i.e., Northeast, Midwest, Southeast, or West), employment status (i.e., never worked or did not have a job in the most recent survey week, had job in the most recent survey week), and educational attainment (i.e., less than high school, GED/high school graduate, some college, college graduate, and advanced degree).

Descriptive statistics

Wald chi-square tests were conducted to assess whether there are statistically significant differences between persons who did/did not apply for and/or receive disability benefits and measures representing healthcare services utilization and access, health insurance coverage type, serious psychological distress, health status, fifteen co-morbid medical conditions, and socio-demographic characteristics.
**Regression analysis**

Population-weighted logistic regression analyses were performed to model the associations between healthcare services utilization and access measures and disability application and/or receipt measures, controlling for health insurance coverage type, serious psychological distress, health status, co-morbid medical conditions, and socio-demographic characteristics. Sensitivity analyses were also performed by specific disability application (i.e., applied for SSDI, applied for SSI) and receipt (i.e., receives SSDI, receives SSI, receives other disability pension).

Disability application and/or receipt may have a differing effect on healthcare services utilization and access measures based upon varying health insurance coverage. As such, an interaction term was created between disability application and/or receipt and health insurance coverage. For this analysis, population-weighted logistic regression analyses were also performed, and linear combination of estimators was used to identify the relevant marginal effects.

Logistic regression models were population-weighted using NHIS sample weights to support generalizability of study results to US population. Statistical analyses were performed using STATA 13 (StataCorp. College Station, TX). An alpha of 0.05 was used.

**Results**

**Descriptive statistics**

The sample size includes 21,848 persons, aged 18-64, which represented a US population of 151,496,908 persons (Table 7). Socio-demographic differences exist for persons applying for and/or receiving disability benefits. Results show that persons
applying for and/or receiving disability benefits are older, less educated, and more likely to be unemployed when compared to the overall sample.

Serious psychological distress and poor health status are both associated with application and/or receipt of disability benefits. Persons with serious psychological distress represent 12.6% of the sample and 40% of persons applying for and/or receiving disability benefits. Likewise, persons reporting poor health status represent 2.5% of the sample and 19.4% of persons applying for and/or receiving disability benefits.

Healthcare services utilization and perceived access barriers are also related with application and/or receipt of disability benefits. For all measures, persons applying for and/or receiving disability benefits report higher healthcare services utilization rates and perceived access barriers. For example, 7.7% of the sample reported seeing a mental health provider in the past year as compared to 25% of persons applying for and/or receiving disability benefits. However, persons applying for and/or receiving disability benefits also report higher rates of not being able to afford mental health counseling (7.7%) than the overall sample (2.3%).

Disability application and/or receipt and healthcare services utilization

Persons who applied for and/or received any disability benefit had significantly greater odds of utilizing a range of healthcare services in the past year after controlling for health insurance coverage, serious psychological distress, health status, fifteen co-morbid health conditions, and socio-demographic characteristics (Table 8). Individuals who applied for and/or received any disability benefit have 1.7 (p<.001), 1.4 (p<.01), and 3.7 (p<.001) greater odds of having seen a specialist, mid-level, or mental health provider
in the past twelve months compared to those who did not apply for and/or receive any disability benefit, respectively.

However, differences exist between application and receipt of disability benefits. Persons applying for any disability benefit, compared to those not applying, still exhibit significantly increased odds of having seen all provider types in the past twelve months. However, persons receiving any disability benefit only have significantly greater odds of having seen a mental health provider (odds ratio 2.1, p<.001). Differences in the association between disability benefit application and receipt and healthcare utilization exist by benefit type (Table 10). Sensitivity analyses show that SSDI applicants, compared to those not applying for SSDI, exhibit significantly greater odds of having seen all provider types in the past twelve months whereas SSI applicants only exhibit significantly greater odds of having seen a mental health provider. The association between disability receipt and mental health services utilization is statistically significant for SSI and other disability program recipients.

Disability application and/or receipt and healthcare access

Persons who applied for and/or receive any disability benefit do not exhibit significantly greater odds of needing and delaying medical care due to costs (Table 9). However, differences exist between application and receipt of disability benefits. Results show that persons applying for any disability benefit, compared to those not applying, have significantly greater odds of needing and delaying medical care due to costs in the past twelve months. The inverse is true for those receiving benefits; persons receiving any disability benefit, compared to those not receiving benefits, have significantly lower odds of needing and delaying medical care due to costs.
Sensitivity analysis shows that SSDI applicants, compared to those not applying for SSDI, exhibit significantly greater odds of needing and delaying medical care due to costs in the past twelve months (Table 10). To the contrary, persons receiving SSDI and SSI benefits exhibit significantly reduced odds of needing and delaying medical care due to costs. The effect size is strongest for individuals receiving SSI. Persons receiving SSDI, compared to those not receiving SSDI, exhibit 41% reduced odds of needing and delaying medical care due to costs in the past twelve months (p<.05) whereas persons receiving SSI, compared to those not receiving SSI, exhibit 76% reduced odds of needing and delaying medical care due to costs (p<.001). Similar effect sizes are identified across a range of healthcare access measures.

Disability application and/or receipt have a differing relationship with healthcare services utilization and access measures based upon varying health insurance coverage (Table 11). Persons with Medicare coverage who applied for and/or receive any disability benefit, compared to those with Medicare coverage who are not applicants/recipients, exhibit 71 and 44% reduced odds of having no provider (p<.01) and needing and delaying medical care due to costs in the past twelve months (p<.01). To the contrary, uninsured persons who applied for and/or receive any disability benefit, compared to uninsured non-applicants/recipients, have 2.1 greater odds of needing and delaying medical care due to costs in the past twelve months (p<.001).

Discussion

Disabled persons utilize healthcare services more than the general population (Anderson et al., 2010). I also find that persons who have applied for and/or receive disability benefits exhibit greater healthcare services utilization compared to those who...
have not applied for and/or receive similar benefits, controlling for measures that affect healthcare services utilization including health insurance coverage type, serious psychological distress, health status, fifteen co-morbid health conditions, and socio-demographic characteristics.

I identify differences between persons who have applied for and/or receive disability benefits. Study results suggest that disability applicants, compared to non-applicants, exhibit greater healthcare services utilization across a range of healthcare providers including specialist physicians and mid-level and mental health providers. However, this effect varies across disability program with the strongest association for SSDI applicants.

Livermore and colleagues (2009) also found that persons applying for SSDI exhibit greater healthcare services utilization than non-applicants; however, their research used 1997-1998 Medical Expenditure Survey (MEPS) and only considered physician visits and short-stay hospital stays (Livermore et al., 2009). My study utilizes 2014 NHIS data and also includes previously unexamined healthcare services utilization and access measures.

Study results suggest that SSDI applicants appear to be utilizing a range of healthcare providers to diagnose and treat associated disabling conditions. This finding is expected due to the fact that successful SSDI claims require documented medical evidence to support a disability determination.

I do not identify statistically significant relationships for persons receiving disability benefits, compared to non-recipients, and any of my healthcare services utilization measures excluding mental health providers. This finding suggests that the
disability application process may require increased healthcare services utilization to support a disability determination. However, qualifying disabled persons’ healthcare services utilization after disability benefit receipt may not be any different than non-recipients with similar physical health conditions.

While I find that disability applicants utilize healthcare services more than those who do not apply, study results also suggest that they face more healthcare access barriers. Historically, health insurance coverage has been cited as a main access barrier for disabled persons (Livermore et al., 2009; Riley, 2006; Sommers, 2006). However, since publication of these prior studies, health insurance coverage has improved due to provisions in the Affordable Care Act (Blumenthal & Collins, 2014). Nevertheless, little is known about whether there are associated changes in healthcare access for disability applicants and recipients, controlling for health insurance coverage type.

Study results show that healthcare access remains significantly worse for persons applying for disability benefits compared to those not applying, with the inverse being true for disability recipients. Further, this difference remains most significant for SSDI applicants and recipients. It is possible that healthcare access is worse for this group due to healthcare services utilization requirements related with the disability application process. Once the application process ceases, healthcare services utilization may decline in accordance with underlying physical and mental health diagnosis. As such, disabled persons in receipt of disability benefits may experience significant improvement to their healthcare access. Further, I find that disability recipients, including those receiving SSI and SSDI benefits, exhibit fewer concerns related with healthcare affordability when compared to non-recipients.
This study has several limitations. First, my measure of healthcare services utilization is a self-reported measure indicating whether an individual saw a specific provider in the past year; this measure does not provide information on the number of visits. Second, my disability program application and receipt measures do not provide information regarding underlying disability type and associated severity. However, I use serious psychological distress, overall health status, and fifteen co-morbid medical conditions measures as covariates to proxy disability severity. Third, my disability program application and receipt measures do not contain time components indicating length of disability application period and/or duration of receipt of disability benefits. In general, the disability application and receipt period is variable; nevertheless, upon approval, there is a five month waiting period before benefits commence (Social Security Administration, 2016a, 2016b).

In conclusion, study findings show variation in healthcare services utilization and access across disability programs and by applicant and receipt status. Disability applicants, notably SSDI applicants, exhibit greater healthcare services utilization and worse healthcare access compared to non-applicants. However, healthcare services utilization is no different between disability recipients and non-recipients with similar physical health conditions and other associated factors that may affect healthcare services utilization. Policy interventions to enhance SSDI applicants’ access to healthcare services should be considered.
References


Table 7: Descriptive statistics

Applied for and/or receives any disability pension
(n=21,848; N=151,496,908)

<table>
<thead>
<tr>
<th>Applied for…</th>
<th>All</th>
<th>No (n=19,171)</th>
<th>Yes (n=2,677)</th>
<th>Stat. Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any disability pension</td>
<td>8.9</td>
<td>0</td>
<td>89.6</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>SSDI</td>
<td>7.4</td>
<td>0</td>
<td>74.4</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>SSI</td>
<td>4.8</td>
<td>0</td>
<td>48.0</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Receives…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any disability pension</td>
<td>6.7</td>
<td>0</td>
<td>67.4</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>SSDI</td>
<td>3.9</td>
<td>0</td>
<td>39.6</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>SSI</td>
<td>2.4</td>
<td>0</td>
<td>24.3</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Other disability pension</td>
<td>1.7</td>
<td>0</td>
<td>17.2</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Healthcare services utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the past 12 months,…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>saw a primary care physician</td>
<td>65.5</td>
<td>63.9</td>
<td>79.7</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>saw a specialist physician</td>
<td>21.4</td>
<td>18.7</td>
<td>45.7</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>saw a mid-level provider</td>
<td>20.8</td>
<td>19.4</td>
<td>32.7</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>saw a mental health provider</td>
<td>7.7</td>
<td>5.7</td>
<td>25.0</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>saw no provider</td>
<td>27.7</td>
<td>29.4</td>
<td>13.0</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>had at least one ER visit</td>
<td>17.6</td>
<td>15.1</td>
<td>40.2</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Healthcare access</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couldn’t afford mental MH counseling</td>
<td>2.3</td>
<td>1.7</td>
<td>7.7</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Needed &amp; delayed medical care due to costs</td>
<td>8.4</td>
<td>7.5</td>
<td>17.1</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Worried about the costs of healthcare</td>
<td>34.4</td>
<td>33.3</td>
<td>44.1</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Health insurance coverage type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low deductible health plan (LDHP)</td>
<td>40.9</td>
<td>44.0</td>
<td>12.8</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Medicare</td>
<td>4.1</td>
<td>0.4</td>
<td>37.5</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>11.5</td>
<td>9.3</td>
<td>31.8</td>
<td></td>
</tr>
<tr>
<td>High deductible health plan (HDHP)</td>
<td>24.5</td>
<td>26.5</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>19.0</td>
<td>19.8</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Serious psychological distress</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>87.4</td>
<td>90.2</td>
<td>62.0</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Yes</td>
<td>12.6</td>
<td>9.8</td>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td>Health status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent, very good, good</td>
<td>89.3</td>
<td>94.1</td>
<td>45.7</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Fair</td>
<td>8.3</td>
<td>5.3</td>
<td>34.9</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>2.5</td>
<td>0.6</td>
<td>19.4</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Hispanic</td>
<td>15.9</td>
<td>16.6</td>
<td>9.8</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>White Non-Hispanic</td>
<td>64.1</td>
<td>64.3</td>
<td>62.6</td>
<td></td>
</tr>
<tr>
<td>Black Hispanic</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Black Non-Hispanic</td>
<td>12.2</td>
<td>11.1</td>
<td>22.6</td>
<td></td>
</tr>
<tr>
<td>Other Hispanic</td>
<td>0.8</td>
<td>0.8</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Other Non-Hispanic</td>
<td>6.2</td>
<td>6.4</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48.9</td>
<td>49.2</td>
<td>45.9</td>
<td>P&lt;.05</td>
</tr>
<tr>
<td>Female</td>
<td>51.1</td>
<td>50.8</td>
<td>54.0</td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34</td>
<td>35.9</td>
<td>37.8</td>
<td>18.4</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>35-49</td>
<td>32.2</td>
<td>33.0</td>
<td>24.9</td>
<td></td>
</tr>
<tr>
<td>50-64</td>
<td>31.9</td>
<td>29.2</td>
<td>56.6</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married or partnered</td>
<td>37.8</td>
<td>35.9</td>
<td>55.5</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Widowed, divorced, separated, never married</td>
<td>62.2</td>
<td>64.1</td>
<td>44.5</td>
<td></td>
</tr>
<tr>
<td>Work status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never worked, or did not have a job in the most recent survey week</td>
<td>28.6</td>
<td>22.7</td>
<td>81.9</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>Had job in the most recent survey week</td>
<td>71.4</td>
<td>77.3</td>
<td>18.1</td>
<td></td>
</tr>
<tr>
<td>Educational attainment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>12.8</td>
<td>11.5</td>
<td>24.7</td>
<td>P&lt;.001</td>
</tr>
<tr>
<td>GED/high school graduate</td>
<td>25.2</td>
<td>24.2</td>
<td>34.3</td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>31.2</td>
<td>31.3</td>
<td>30.4</td>
<td></td>
</tr>
<tr>
<td>College graduate</td>
<td>20.0</td>
<td>21.4</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>Advanced degree</td>
<td>10.7</td>
<td>11.6</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>16.6</td>
<td>16.8</td>
<td>15.4</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>Midwest</td>
<td>23.4</td>
<td>23.3</td>
<td>23.6</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>37.1</td>
<td>36.6</td>
<td>42.1</td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>22.9</td>
<td>23.3</td>
<td>18.8</td>
<td></td>
</tr>
</tbody>
</table>

Note: Data are population weighted.
Table 8: Disability and healthcare services utilization

<table>
<thead>
<tr>
<th>Disability application and/or receipt</th>
<th>In the past 12 months, saw a…</th>
<th>had at least…</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ref group: no)</td>
<td>Primary care physician</td>
<td>Specialist physician</td>
</tr>
<tr>
<td></td>
<td>1.09 (0.89-1.34)</td>
<td>1.68*** (1.36-2.07)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability application (ref group: no)</th>
<th>In the past 12 months, saw a…</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary care physician</td>
<td>Specialist physician</td>
</tr>
<tr>
<td></td>
<td>1.13 (0.89-1.42)</td>
<td>1.43** (1.14-1.80)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability receipt (ref group: no)</th>
<th>Receives any disability pension</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.11 (0.81- 1.52)</td>
<td>1.21 (0.90-1.60)</td>
</tr>
</tbody>
</table>

Note: Models control for health insurance coverage type (i.e., LDHP, Medicare, Medicaid, HDHP, and uninsured), serious psychological distress (i.e., not depressed, and severely depressed), health status (i.e., excellent/very good/good, fair, and poor), fifteen co-morbid conditions (i.e., high cholesterol, hypertension, coronary heart disease, angina, myocardial infarction, heart disease, stroke, emphysema, COPD, asthma, ulcer, cancer, diabetes, arthritis, and liver disease), and socio-demographic characteristics (i.e., race, sex, age group, marital status, region, work status, and educational attainment).

Note: *, **, and *** indicate statistically significant at the 0.05, 0.01 and 0.001 levels.

Note: Data are population weighted: n=21,848, N=151,496,908.
Table 9: Disability and healthcare access

<table>
<thead>
<tr>
<th>Disability application and/or receipt (ref group: no)</th>
<th>Couldn’t afford mental health counseling</th>
<th>Needed and delayed medical care due to costs</th>
<th>Worried about the costs of healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied for and/or receives any disability pension</td>
<td>2.09***</td>
<td>1.16</td>
<td>0.78**</td>
</tr>
<tr>
<td>95% CI</td>
<td>(1.41-3.09)</td>
<td>(0.89-1.52)</td>
<td>(0.66-0.94)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability application (ref group: no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied for any disability pension</td>
</tr>
<tr>
<td>95% CI</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability receipt (ref group: no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receives any disability pension</td>
</tr>
<tr>
<td>95% CI</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Note:** Models control for health insurance coverage type (i.e., LDHP, Medicare, Medicaid, HDHP, and uninsured), serious psychological distress (i.e., not depressed, and severely depressed), health status (i.e., excellent/very good/good, fair, and poor), fifteen co-morbid conditions (i.e., high cholesterol, hypertension, coronary heart disease, angina, myocardial infarction, heart disease, stroke, emphysema, COPD, asthma, ulcer, cancer, diabetes, arthritis, and liver disease), and socio-demographic characteristics (i.e., race, sex, age group, marital status, region, work status, and educational attainment).

**Note:** *, **, and *** indicate statistically significant at the 0.05, 0.01 and 0.001 levels.

**Note:** Data are population weighted: n=21,848, N=151,496,908.
### Table 10: Disability and healthcare services utilization and access

<table>
<thead>
<tr>
<th>Disability Type</th>
<th>In the past 12 months, saw a...</th>
<th>Mid-level Provider</th>
<th>Mental health provider</th>
<th>No provider</th>
<th>had at least One ER visit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary care physician</td>
<td>Specialist physician</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social security disability</td>
<td>Applied for SSDI</td>
<td>1.33* (1.01-1.75)</td>
<td>1.69*** (1.31-2.18)</td>
<td>1.37* (1.07-1.76)</td>
<td>2.03*** (1.45-2.85)</td>
</tr>
<tr>
<td>(SSDI)</td>
<td>95% CI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ref group: No)</td>
<td>Receives SSDI</td>
<td>0.93 (0.64-1.36)</td>
<td>0.82 (0.59-1.14)</td>
<td>0.96 (0.72-1.28)</td>
<td>1.20 (0.84-1.69)</td>
</tr>
<tr>
<td>Supp. security income</td>
<td>Applied for SSI</td>
<td>0.95 (0.69-1.31)</td>
<td>0.95 (0.72-1.25)</td>
<td>1.24 (0.98-1.58)</td>
<td>1.55** (1.13-2.11)</td>
</tr>
<tr>
<td>(SSI)</td>
<td>95% CI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ref group: No)</td>
<td>Receives SSI</td>
<td>1.02 (0.69-1.51)</td>
<td>0.91 (0.62-1.35)</td>
<td>1.01 (0.74-1.38)</td>
<td>1.54* (1.07-2.22)</td>
</tr>
<tr>
<td>Other disability pension</td>
<td>Receives other disability</td>
<td>1.03 (0.69-1.54)</td>
<td>1.37 (0.97-1.94)</td>
<td>1.15 (0.81-1.64)</td>
<td>2.08*** (1.39-3.11)</td>
</tr>
<tr>
<td>(ref group: No)</td>
<td>95% CI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Couldn’t afford mental health counseling</th>
<th>Needed and delayed medical care due to costs</th>
<th>Worried about the costs of healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social security disability (SSDI)</td>
<td>2.41*** (1.62-3.58)</td>
<td>1.50** (1.12-2.01)</td>
<td>1.11 (0.88-1.40)</td>
</tr>
<tr>
<td>(ref group: no)</td>
<td>Receives SSDI</td>
<td>0.52* (0.31-0.88)</td>
<td>0.59* (0.38-0.91)</td>
</tr>
<tr>
<td>Supp. security income (SSI)</td>
<td>1.20 (0.77-1.87)</td>
<td>1.28 (0.92-1.76)</td>
<td>1.07 (0.83-1.38)</td>
</tr>
<tr>
<td>(ref group: no)</td>
<td>Receives SSI</td>
<td>0.68 (0.38-1.23)</td>
<td>0.24*** (0.16-0.37)</td>
</tr>
<tr>
<td>Other disability pension (ref group: no)</td>
<td>0.74 (0.41-1.33)</td>
<td>0.92 (0.62-1.38)</td>
<td>0.81 (0.61-1.09)</td>
</tr>
</tbody>
</table>

**Note:** Models control for health insurance coverage type (i.e., LDHP, Medicare, Medicaid, HDHP, and uninsured), serious psychological distress (i.e., not depressed, and severely depressed), health status (i.e., excellent/very good/good, fair, and poor), fifteen co-morbid conditions (i.e., high cholesterol, hypertension, coronary heart disease, angina, myocardial infarction, heart disease, stroke, emphysema, COPD, asthma, ulcer, cancer, diabetes, arthritis, and liver disease), and socio-demographic characteristics (i.e., race, sex, age group, marital status, region, work status, and educational attainment).

**Note:** *, **, and *** indicate statistically significant at the 0.05, 0.01 and 0.001 levels.

**Note:** Data are population weighted: n=21,848, N=151,496,908.
Table 11: Effect of disability on healthcare services utilization and access w/health insurance interaction

<table>
<thead>
<tr>
<th>Applied for and/or receives any disability pension and has…</th>
<th>In the past 12 months, saw a…</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>had at least…</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDHP</td>
<td>1.29</td>
<td>2.11***</td>
<td>1.31</td>
<td>2.41**</td>
<td>0.78</td>
<td>1.07</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.83-2.00)</td>
<td>(1.51-2.96)</td>
<td>(0.90-1.89)</td>
<td>(1.36-4.27)</td>
<td>(0.46-1.31)</td>
<td>(0.69-1.65)</td>
</tr>
<tr>
<td>Medicare</td>
<td>2.04*</td>
<td>1.03</td>
<td>1.80</td>
<td>2.48*</td>
<td>0.29**</td>
<td>0.91</td>
</tr>
<tr>
<td>95% CI</td>
<td>(1.07-3.89)</td>
<td>(0.56-1.91)</td>
<td>(0.90-3.61)</td>
<td>(1.02-6.01)</td>
<td>(0.13-0.64)</td>
<td>(0.49-1.67)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>1.16</td>
<td>1.36</td>
<td>1.22</td>
<td>4.04***</td>
<td>0.75</td>
<td>1.13</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.87-1.55)</td>
<td>(0.96-1.94)</td>
<td>(0.90-1.65)</td>
<td>(2.80-5.82)</td>
<td>(0.53-1.06)</td>
<td>(0.88-1.46)</td>
</tr>
<tr>
<td>HDHP</td>
<td>0.83</td>
<td>2.38**</td>
<td>1.82*</td>
<td>5.57***</td>
<td>0.61</td>
<td>2.36**</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.48-1.44)</td>
<td>(1.47-3.88)</td>
<td>(1.12-2.96)</td>
<td>(3.09-10.01)</td>
<td>(0.27-1.38)</td>
<td>(1.42-3.92)</td>
</tr>
<tr>
<td>No insurance (uninsured)</td>
<td>0.84</td>
<td>1.60*</td>
<td>1.69*</td>
<td>4.09***</td>
<td>1.22</td>
<td>1.26</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.58-1.20)</td>
<td>(1.00-2.56)</td>
<td>(1.11-2.58)</td>
<td>(2.41-6.93)</td>
<td>(0.84-1.76)</td>
<td>(0.85-1.87)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Couldn’t afford mental health counseling</th>
<th>Needed and delayed medical care due to costs</th>
<th>Worried about the costs of healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDHP</td>
<td>1.52</td>
<td>1.47</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.52-4.42)</td>
<td>(0.84-2.58)</td>
</tr>
<tr>
<td>Medicare</td>
<td>1.97</td>
<td>0.43</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.36-10.97)</td>
<td>(0.18-1.05)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>1.27</td>
<td>0.56**</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.69-2.34)</td>
<td>(0.36-0.86)</td>
</tr>
<tr>
<td>HDHP</td>
<td>2.06</td>
<td>1.29</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.71-5.98)</td>
<td>(0.70-2.39)</td>
</tr>
<tr>
<td>No insurance (uninsured)</td>
<td>3.30***</td>
<td>2.05***</td>
</tr>
<tr>
<td>95% CI</td>
<td>(1.98-5.52)</td>
<td>(1.40-2.98)</td>
</tr>
</tbody>
</table>

Note: Models control for health insurance coverage type (i.e., LDHP, Medicare, Medicaid, HDHP, and uninsured), serious psychological distress (i.e., not depressed, and severely depressed), health status (i.e., excellent/very good/good, fair, and poor), fifteen co-morbid conditions (i.e., high cholesterol, hypertension, coronary heart disease, angina, myocardial infarction, heart disease, stroke, emphysema, COPD, asthma, ulcer, cancer, diabetes, arthritis, and liver disease), and socio-demographic characteristics (i.e., race, sex, age group, marital status, region, work status, and educational attainment).

Note: *, **, and *** indicate statistically significant at the 0.05, 0.01 and 0.001 levels.

Note: Data are population weighted: n=21,848, N=151,496,908.
CHAPTER 6

CONCLUSION

Fluctuating economic conditions (Bureau of Labor Statistics, 2016b) and worsening health status measures (Centers for Disease Control and Prevention, 2016a, 2016b) characterize the study period (i.e., 1999-2009, and 2000-2014). This period is also characterized by weakening social welfare and labor market protections (US Department of Health and Human Services, 2016; US Department of Labor, 2016), increasing disability enrollment (Social Security Administration, 2016c, 2016d), and changing composition of state level healthcare spending (Centers for Medicare and Medicaid Services, 2016c) and employment (Bureau of Labor Statistics, 2016c) and utilization (National Center for Health Statistics, 2016) of healthcare providers. This dissertation research is comprised of three papers related to these themes.

Unemployment, labor force participation, and healthcare employment

Figure 5 illustrates trends in unemployment and labor force participation for the 2000-2014 time period; in 2010, the unemployment and labor force participation rates were 9.9 and 65.2%, both declining to 5.8 and 62.7% in 2014, respectively, in 2014 (Figure 5). The unemployment rate exhibited volatility during this time period; whereas, the labor force participation rate declined (Bureau of Labor Statistics, 2016b).

Employment levels within many economic sectors exhibit volatility akin to that of the unemployment rate. However, healthcare and social assistance employment shows less volatility over time (Figure 6). In fact, healthcare and social assistance employment has often expanded even in the context of recession (Bureau of Labor Statistics, 2016a).
As such, the unemployment rate itself may not be the most appropriate measure for understanding the effect of business cycles on issues related with healthcare.

In the first dissertation paper (i.e., The US healthcare workforce and the labor market effect on healthcare spending and health outcomes), I show how labor force participation serves as a better measure for understanding these effects as it is both associated with unemployment and exhibits trends similar to those for health outcomes (i.e., health status and all-cause mortality rates), and healthcare spending and employment. This finding is contrary to current research which utilizes the unemployment rate to assess similar relationships (Catalano, 2009; Idler & Benyamini, 1997; Jin et al., 1995; Roelfs et al., 2011).

Labor force participation may be associated with other factors that are related with worsening health outcomes and rising healthcare employment. First, increasing disability enrollment is associated with declining labor force participation (Figure 5; Figure 6) as disability recipients are not working and are no longer looking actively for employment due to their disability. Second, disability enrollment is associated with worsening health outcomes as a disabling medical and/or behavioral health condition is required to become eligible for disability benefits themselves. Last, disability program applicants/recipients are required to utilize healthcare services in order to qualify for and receive benefits (Social Security Administration, 2016a, 2016b).

Disability enrollment and healthcare utilization and employment

Dissertation papers two and three specifically seek to examine the relationships between disability enrollment and healthcare utilization and employment. The second dissertation (i.e., Disability enrollment and US healthcare employment) identifies a
relationship between rising Social Security Disability Insurance (SSDI) enrollment rates and healthcare employment rates. This relationship differs for physical (PH) and mental health (MH) disability enrollment rates. I show that SSDI-PH disability enrollment rates are associated with healthcare support occupational employment rates whereas SSDI-MH disability enrollment rates are positively related with employment rates for community support providers.

The third dissertation paper (i.e., Disability enrollment and healthcare services utilization and access) evidences a relationship between the disability application process and healthcare utilization, even when controlling for other factors that affect utilization of healthcare services. I find that disability applicants, compared to non-applicants, exhibit higher odds of utilizing healthcare services controlling for other factors that affect healthcare utilization including health insurance coverage type, serious psychological distress, health status, fifteen co-morbid health conditions, and socio-demographic characteristics. Further, I identify no difference in healthcare utilization between disability recipients and non-recipients. I explore these effects for Supplemental Security Income (SSI), SSDI, and other disability pensions.

**Policy implications**

Understanding the effect of disability enrollment, including both the application and receipt processes, on healthcare utilization and employment is important for several reasons. First, the Social Security Administration (SSA) is currently in the process of redesigning the occupational classification information that is used to decide the disability adjudication process. This manual has not been updated since 1991. Historically, SSA data has provided an appropriate assessment of physical demands of
individual occupations but not mental and cognitive demands. The new dataset, available in 2019, will not only provide an updated sample of jobs reflecting the 21st century economy, but it will also include an assessment of the physical, cognitive, and mental demands associated with those jobs (Social Security Administration, 2016e). Since the data assessing physical disability is already well developed within the SSA adjudication system and mental and cognitive data is not; the effect of this change is likely to have a disproportionate impact on persons qualifying for disability for mental and cognitive impairment reasons. Second, the first year that SSA disability payments (including interest payments) will exceed revenue was expected to be 2014. The SSA disability trust fund is anticipated to be exhausted by 2027 (Social Security Administration, 2016f). However, insolvency will be influenced by the effect of the associated occupational classification manual revisions on the number of individuals qualifying for benefits.

Both the financial health of the disability trust fund and the numbers of persons qualifying for benefits will affect healthcare utilization and employment. Disability enrollment requires healthcare utilization to receive and maintain benefits. Any associated change to Federal disability programs, including both SSI and SSDI programs, will have a measurable impact on healthcare utilization and employment. This dissertation is the first study that assesses the extent that disability enrollment is affecting the US healthcare system. Current healthcare employment projections must not only consider this population group in its assessment of future growth, but must also consider the forthcoming changes to Federal disability programs as there will be alterations to anticipated effects given evolving disability policy and program solvency.
Disability policy will likely influence employment in the healthcare and social assistance sector. The impact will vary depending on the nature of the underlying disability itself (i.e., physical as opposed to mental health and cognitive disability). The effect of this impact will be further impacted by the nature of associated health insurance coverage as healthcare spending itself has a differing effect on healthcare provider employment. Nevertheless, regardless of health insurance coverage type, expansions and contractions to disability enrollment may be an increasingly important force driving healthcare and social assistance employment.

Last, forthcoming disability program changes will also have larger economic effects. Should more individuals qualify for benefits under the new guidelines, there will be additional declines to labor force participation. As more individuals stop pursuing work in the labor market, there will also be declines in the unemployment rate. However, if the inverse were to occur, and disability qualifiers become more restrictive, especially related with mental and cognitive impairments, more persons may now attempt to enter the labor market to seek work, placing upward pressure on both the unemployment and labor force participation rates. In either scenario, disability policy will extend beyond the healthcare system itself and also affect larger macroeconomic fundamentals.
References


Figure 5: Unemployment versus labor force participation trends

Figure 6: Healthcare and social assistance and disability trends

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Neumayer, E. (2004). Recessions lower (some) mortality rates: Evidence from Germany. Social Science and Medicine, 58, 1037–47.


