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The Aggregate and Relative Economic Effects of Medicaid and Medicare Expansions*

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Abstract

Government-financed health care (GFHC) expenditures, through Medicare and Medicaid, have grown from roughly zero to over 7.5 percent of national income over the past 50 years. Recently, some advocates (e.g., the Council of Economic Advisers (2014)) have argued that an expansion of GFHC (in particular Medicaid) has large positive employment effects. Using quarterly data between 1976 and 2016, this paper estimates the impact of GFHC spending on the unemployment rate by using an instrumental variables strategy that exploits exogenous variation in Medicare spending. We find that an exogenous GFHC expansion either increases or has no effect on the unemployment rate. Although the unemployment rate responses using aggregate data are estimated imprecisely, they are considerably sharper when estimated using state-level data. We also show the so-called relative (or local) multiplier approach based on the state-level panel provides similar estimates to those based on aggregate data. Finally, we show how the absence of a negative effect of GFHC expansions on the unemployment rate may be due to the implications these policies have for taxes across states.

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1 Introduction

Government-financed health care (GFHC), through Medicare and Medicaid, has grown from roughly zero to over 7.5 percent of national income from 1966 to 2015.[1] National defense, by comparison, equals 3.6 percent of national income. In 2015, 44 percent of all medical care was financed by the federal and state governments.

The question of how GFHC spending affects the economy has come to the forefront as a policy issue as states have chosen whether or not to expand Medicaid as part of the Affordable Care Act (ACA). Some observers view the taxes used to finance the expansions as discouraging investment and work, and in turn, slowing the job creation rate. Others, such as the Council of Economic Advisers under former President Obama, claim that the Medicaid expansions would cause employment booms in states that undertook them.[2] Other channels that either positively or negatively affect employment are imaginable.

This paper answers two questions: (1) how do changes in GFHC spending influence the national unemployment rate; (2) what can be learned about the first question using a disaggregate analysis?

Although Medicaid and Medicare are typically thought of as transfer programs, we argue that the questions this paper answers are more closely related to the literature on government spending multipliers than to the literature on transfer payments multipliers. Government spending is traditionally defined as the national income and product accounts' government consumption and investment, whereas Medicaid and Medicare are categorized as government transfers. Yet the distinction between government purchases and transfers is notably blurred for GFHC. Medicaid and Medicare dollars are not paid to individuals, who in turn have broad latitude for using those payments. Rather, the payments are made by the government directly to medical care providers. While benefits are recorded as personal income in the form of transfer receipts by persons, the spending by the government for Medicaid and Medicare is counted towards personal consumption expenditures. See Mandel (2014) for greater detail. The stimulative effect of government spending may differ from that of transfer payments because in the latter case individuals have the possibility of saving a portion of these payments.[3]

Fortunately, for the sake of empirical work, there are 50 years of data on the start-and-stop growth in GFHC spending coming from Medicare and Medicaid. Using macroeconomic data, we estimate the causal impact of an exogenous change in GFHC spending on the unemployment rate. There are several reasons that this type of spending varies over time, including variation in the

[1] The importance of GFHC to the economies of particular states is even more striking. Mississippi, New Mexico and West Virginia each have a GFHC-spending-to-income ratio of nearly 0.12.

[2] The Council of Economic Advisers (2014) concluded, at that time, that one impact of the ACA Medicaid expansions would have been to increase employment by 520 thousand job-years in 2014 and 2015 had every state chosen to expand its program. Along those same lines, Weller and Gelzinis (2017) project that the repeal of the ACA Medicaid expansions would result in a loss of 1.7 million jobs through 2022.

[3] Romer and Romer (2016) study the macroeconomic effects of transfer payments by looking at changes in Social Security benefits. They find a positive response of consumption and no evidence of an employment response.

generosity provided by these programs, changes in enrollment requirements, and changes in the price of health care. Some changes in GFHC spending are endogenous to the business cycle.

The fundamental source of endogeneity is enrollment in (and thus spending on) Medicaid. Medicaid is a means-tested social health care program that is jointly administered by the federal and state governments. Medicaid spending tends to be countercyclical. As newly unemployed persons fall below the program's income cutoffs, they are able to replace lost employer-provided health care with Medicaid. Failing to account for this endogeneity would upwardly bias the estimated effect of the program on the unemployment rate.

To correct for endogeneity implicit in using total GFHC spending as a treatment variable, we instrument using a component that is plausibly exogenous to the business cycle: Medicare spending. Medicare is a federal-government administered social insurance program for Americans 65 years of age or older as well as some younger people. Unlike Medicaid, program participation is largely determined by age.[4]

Medicare spending represents a commitment by the government to provide a certain amount and quality of health care to a set of individuals, in contrast to unemployment insurance benefits, for example, which give specified dollar transfers. Because of the qualitative nature of this social contract, overall Medicare spending fluctuates for a number of reasons. For example, as technological innovations, such as open-heart surgery, are covered by Medicare because they are considered medical necessities for some patients, government expenditure increases.

Our econometric approach, stated succinctly, is to regress changes in the unemployment rate on changes in GFHC spending, using changes in Medicare spending as an instrument.[5] Our first result is that there is no statistically significant causal effect of GFHC spending on the unemployment rate. More specifically, our baseline point estimate is that a GFHC spending increase equal to 1 percent of national income accumulated over a two-year horizon causes the unemployment rate to increase by 56 basis points (accumulated over that same horizon). Throughout the paper, we define the cumulative unemployment rate multiplier as the percentage point difference in the unemployment rate accumulated over a δ-quarter horizon in response to an increase in GFHC spending equal to 1 percent of national income accumulated over the same horizon.

While our estimate is not statistically different from zero, it is precise enough that we can reject large negative unemployment rate multipliers.

Using Medicare as an instrument for total GFHC spending implicitly assumes that the effect of Medicare spending influences the economy in a similar manner as Medicaid spending. While the populations served by Medicare and Medicaid spending are somewhat different, both forms of spending feed dollars into the medical care industry. Moreover, second round "Keynesian" effects

[4]Medicare spending does fluctuate for demographic reasons, which might affect the unemployment rate; we include demographic controls in our regressions for this reason.

[5]In this paper, we focus on labor market variables as our measure of economic activity. First, much of the debate around Medicaid expansion has been related to job creation. Second, while we initially attempted to also estimate aggregate income and output multipliers, these estimates lacked sufficient precision to be informative.

of the spending are likely to be the same across the two spending types.[6]

Our second question asks what the estimated effect of the program would be if one uses disaggregate data to address the same issue. This question is interesting because a number of recent studies have used cross-sectional variation in fiscal policy to estimate the effect of policy on economic activity.[7] The estimates resulting from these studies are known as "relative multipliers" or "local multipliers." See Chodorow-Reich (2017) for a thorough review of the expanding literature on relative fiscal multipliers.

While looking at disaggregate (such as state-level) variation at first may seem to dominate an aggregate approach because it provides additional data points, importantly, it informs policymakers about the relative effects of a policy across regions, but not necessarily the policy's aggregate effect. Suppose, for example, that the government makes additional purchases in state X, but not in state Z. The relative multiplier approach would interpret the effect of the purchases as the difference in outcomes, in terms of employment or output, between state X and Z. If, however, spending in state X were financed with taxes on both states' populations, then the distortionary impact of the taxes might induce a negative effect on state Z. The resulting relative multiplier would be an upwardly biased estimate of the aggregate multiplier because it would not account for the negative spillover on state Z.[8]

Alternatively, this spillover might be positive. Suppose that government purchases in state X increase that state's residents' income. If, in turn, state X residents use some of their additional income to purchases more state Z goods, then this would induce a positive spillover. The resulting relative-effects estimate would be an upwardly biased estimate of the aggregate multiplier.

One might conclude that, while aggregate multipliers are useful for macroeconomic questions, a regional or state policymaker would be satisfied to look at relative (or local) multipliers to answer a question of how the policy intervention will affect his or her own region or state. This would be incorrect. Going back to the above interstate-trade example, suppose that government purchases in state X rise by \$1 and result in a \$2 increase in state X income. Further assume that state X residents use 25 cents of their additional income to purchase goods from state Z. Then the disaggregate data would show that state X income and state Z income increase by \$1.75 and \$0.25, respectively. Note that government purchases in state Z have remained unchanged. Thus, the relative multiplier would imply that a state's income rises by \$1.50 (= \$1.75-\$0.25) in response to a \$1 increase in government purchases in that state, understating the benefit of additional

[6]While imperfect, the external validity assumption is more plausible here than in other places in the economics literature, e.g., that defense spending influences an economy in the same manner as government purchases more generally.

[7]See, for example, Chodorow-Reich et al. (2012), Clemens and Miran (2012), Conley and Dupor (2013), Mian and Sufi (2012), Nakamura and Steinsson (2014), Suárez Serrato and Wingender (2014) and Shoag (2012).

[8]The issue of relative versus aggregate multipliers is related to the violation of the Stable Unit Treatment Value Assumption in statistics. Cox (1958) states this as a requirement that "the [potential outcome] observation on one unit should be unaffected by the particular assignment of treatments to the other units." We do not pursue that connection in the current paper.

government spending there. Clearly, the presence of spillovers raises challenges for applying the relative/local approach for both macroeconomic and regional questions.

Papers that estimate relative multipliers usually include a caveat that relative multipliers cannot necessarily be interpreted as aggregate multipliers. Unfortunately, in public policy discussions, commentators often disregard this caveat and interpret estimated relative-multipliers evidence as an indicator of aggregate effects of fiscal policy.[9]

Whether and/or when this leap is OK or not is an open research question. We address this question by using an identical data set to estimate both relative multipliers and aggregate multipliers.[10] A primary reason that this type of analysis has rarely been undertaken may be because, without sufficient time-series variation, it is unclear how one might identify the spillover (and therefore the full aggregate) effect of fiscal policy without bringing significantly more economic structure to the problem.[11]

Note that looking at aggregate data subsumes (positive and/or negative) cross-region spillovers and thus avoids the relative multiplier problem. The effect on the unemployment rate, estimated from aggregate data, provides a useful benchmark with which to compare the estimates from state-level data. This second approach uses both cross-state as well as cross-time variation to compute the unemployment rate multiplier.

Our second key finding is that the state-level, panel-based estimates, i.e., relative multiplier estimates, are similar in magnitude to the aggregate ones. In our benchmark specification, the multiplier equals 0.28 (SE = 0.21). Because of increased precision using the state-level data, we are able to reject a negative moderate effect on the unemployment rate. The similarity across the two approaches suggests that, at least in this instance, the relative multiplier approach may be informative about the aggregate multiplier. Finally, we provide results that suggest that the contractionary effects of GFHC expansions are stronger in states that pay a higher per capita share of the payroll taxes used to finance the Medicare Hospital Insurance trust fund.

The outline of the remainder of the paper is as follows. Section 2 presents the econometric model and discusses the Medicare spending instrument. Section 3 gives the empirical results. Second 4 discusses related research, and the final section concludes.

[9]See, for example, Boushey (2011), Greenstone and Looney (2012) and Romer (2012).

[10]The only similar empirical paper in this regard is Dupor and Guerrero (2017).

[11]Acemoglu and Restrepo (2017), in a study of the effect of robots on jobs, handle the distinction between relative-versus-aggregate effects by augmenting a traditional cross-region comparison with an economic model that accounts for general equilibrium spillover effects.

2 Econometric Model and Medicare Instrument

2.1 Aggregate Model

Let $U_{i,t}$ denote the unemployment rate in state i during quarter t, reported by the Bureau of Labor Statistics (BLS). Let $Y_{i,t}$ and $G_{i,t}$ denote the real per capita quarter t, state i income and GFHC spending, respectively. We use the core CPI to construct real values of their nominal counterparts. GFHC consists of payments made in the form of Medicare and Medicaid and are available from the state personal income data published on a quarterly basis by the Bureau of Economic Analysis. The Medicare data consists of payments from the Hospital Insurance (HI) trust fund (Medicare Part A) and the Supplementary Medical Insurance (SMI) trust fund (Medicare Part B and D). Greater detail on the components of Medicare and their financing sources appear in the next subsection. The Medicaid data consist of payments made to vendors for care provided to individuals under the Medicaid program. Define $\bar{Y}_{i,t}$ to be the fitted value from a regression of real per capita income on a linear and quadratic trend. Let aggregate income equal $Y_t = \sum_i Y_{i,t}$. Other aggregate variables are defined similarly. Finally, let U_t denote the national unemployment rate.

Next, define the following aggregate variables: Let $U^c_{t,\delta}$ be the cumulative increase in the national unemployment rate over a δ-quarter horizon relative to a quarter $t-1$ baseline:

$$U^c_{t,\delta} = \left(\sum_{j=1}^{\delta} U_{t+j-1} - \delta U_{t-1} \right) \tag{2.1}$$

Ramey and Zubairy (2017) argue compellingly that cumulative multipliers are more useful from a policy perspective than other (sometimes reported) statistics, such as peak multipliers and impact multipliers. Cumulative multipliers take into account both the full response of the unemployment rate and full cost of government spending across time.

Similarly, let $G^c_{t,\delta}$ be the cumulative increase in GFHC spending over a δ-quarter horizon relative to a quarter $t-1$ baseline, all of which are scaled by trend income $\bar{Y}_{t-1}$:

$$G^c_{t,\delta} = \left(\sum_{j=1}^{\delta} G_{t+j-1} - \delta G_{t-1} \right) / \bar{Y}_{t-1} \tag{2.2}$$

Thus, at the aggregate level, the second-stage equation is

$$U^c_{t,\delta} = \alpha_\delta + \phi_\delta G^c_{t,\delta} + \beta'_\delta X_t + \gamma'_\delta S_t + \eta_\delta R_t + v_{t,\delta}, \tag{2.3}$$

where X_t consists of four lags of the change in Shiller's cyclically adjusted price-earnings ratio. S_t is a vector of changes in the share of the resident population that is 65 years old or older at various leads.[12] R_t is the Ramey defense-spending news variable scaled by last-period's trend income. In our baseline specification, we set $\delta = 8$. In every case, we examine $\delta \geq 4$. By the form it takes, equation (2.3) implements the Jorda (2005) local projections approach.

We choose the unemployment rate, rather than say the employment-to-population ratio, as our dependent variable because the latter is more likely to be correlated with demographic changes that simultaneously drive Medicare expenditures.

The coefficient ϕ_δ is then the cumulative percentage-point increase in the unemployment rate through horizon δ in response to an increase in national GFHC spending (cumulative through horizon δ) equal to 1 percent of national income.

We include the change in the share of the U.S. population that is 65 or older in our baseline estimation to control for the confounding effects of demographic shifts on Medicare spending and the unemployment rate. Note that the over-65 population is precisely the Medicare-eligible population; thus, changes in demographic composition will likely result in changes to Medicare spending. Moreover, the U.S. unemployment rate varies across different age groups; hence, changes in the age distribution could lead to changes in the unemployment rate.

We also include lags in the change of the price-earnings ratio because it is often viewed as a leading economic indicator for the business cycle. Including the Ramey news variable controls for any budgetary pressure that increases in defense spending might have on spending on social programs, such as Medicare and Medicaid.

GFHC spending changes are likely correlated with the error term because one of its components is Medicaid. Failing to account for the likely endogeneity of Medicaid spending would lead to a upwardly biased estimate of GFHC's effect on the unemployment rate. As such, we seek an instrument that is correlated with this endogenous variable and that is uncorrelated with the error term. We use the accumulated change in Medicare spending through quarter eight, $Z^c_{t,8}$, as an instrument for cumulative changes in the sum of Medicare and Medicaid spending, $G^c_{t,8}$.

Note that the cumulative horizon over the dependent variable, endogenous variable and the instrument are identical. Having the dependent variable and endogenous variable so aligned is standard in this line of research (see, for example, Ramey and Zubairy (2017)). It eases the interpretation of the corresponding regression coefficient as a cumulative response. Having the instrument share the same horizon as the endogenous variable is slightly less standard, although the approach is taken by Nakamura and Steinsson (2014). Using a forward-looking variable for the instrument ($Z^c_{t,8}$) is akin to assuming perfect foresight for the instrument. That is, there is no need to introduce a forecasting procedure for the instrument as part of the identification.

[12] Specifically, $S_t = [s_t, s_{t+7}]$, where s_t is the change in the share of the population 65 years or older between quarters t and $t-8$.

2.2 The Medicare Spending Instrument

This section provides background information regarding the composition of the Medicare program and its financing sources with the endi goal of justifying its use as an instrument. We also identify and address points of potential concern regarding the satisfaction of the exclusion restriction.

Second, we describe the historical drivers of Medicare spending since its inception. The analysis will show that Medicare spending changes have been caused mainly by factors that are plausibly exogenous to the business cycle. These include increased utilization of services, legislated expansions of provisions and cost control measures, and fluctuations in the price of medical care.

2.2.1 Medicare Composition and Financing

The Medicare program originally consisted of two subprograms: Medicare Part A and Medicare Part B. Part A, also known as Hospital Insurance, provides beneficiaries with coverage of inpatient hospital services, skilled nursing facility services, home-health visits and hospice services. Medicare Part A is offered without a premium to individuals over 65 (or under that age for people with certain disabilities) that have worked at least 10 years in a Medicare-covered employment and that have paid the respective taxes. That is, enrollment in Part A of Medicare is largely determined by age and not by business cycle conditions.

Part B of Medicare, on the other hand, covers medical services, such as physician services, laboratory services, durable medical equipment, and outpatient hospital services. Though enrollment is voluntary and requires a monthly premium, most beneficiaries with Part A also enroll in Part B.[13] In 2016, 92.3 percent of Part A beneficiaries were enrolled in Part B (The Boards of Trustees, 2017). The fact that Medicare Part B has a premium component could potentially result in enrollment (and spending) being procyclical. In Section 3.2 we argue this is not the case.

In an attempt to expand beneficiaries' choices of health insurance plans beyond traditional Medicare and to benefit from the efficiencies and cost saving of the private sector, private insurance plans were introduced into the Medicare program in 1985. This initiative, which would be known as Part C or Medicare Advantage, provided private-plan options to individuals that were already enrolled in both Part A and Part B. In 2016, 32.4 percent of Medicare beneficiaries chose to obtain their benefits from a Medicare Advantage Plan (The Boards of Trustees, 2017). Note that these individuals still get complete Part A and Part B coverage through the plan.

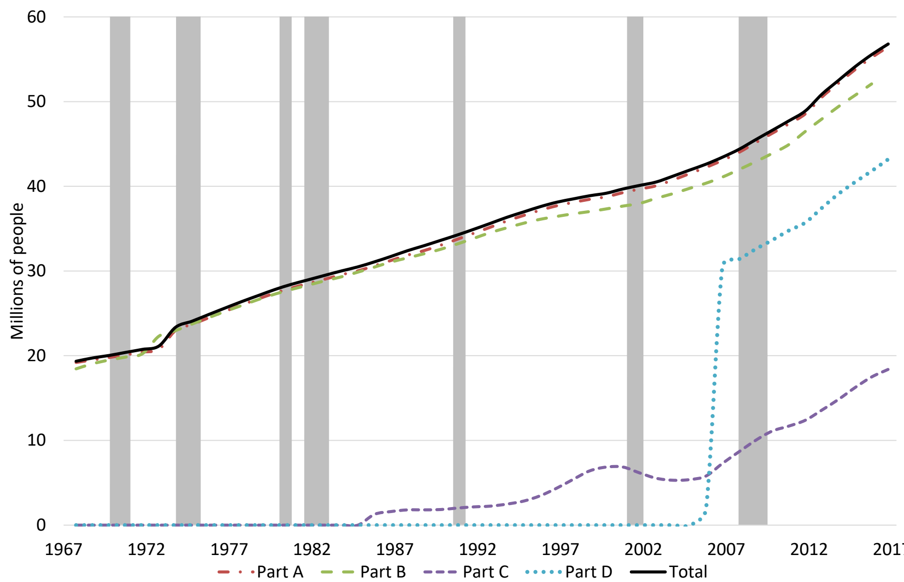
Finally, Medicare Part D began operating in 2006. This program finances outpatient prescription drugs. In 2016, 76.0 percent of all Medicare beneficiaries were enrolled in Medicare Part D (The Boards of Trustees, 2017).

Figure 1 shows the national enrollment in each Part of Medicare since the program's inception in 1966. It is important, for the purpose of this paper, to identify and understand the different

[13] In 2017, the standard Part B monthly premium was $134; starting in 2007, higher-income beneficiaries pay higher premiums.

Parts that make up the Medicare program because each Part is financed differently. As explained in Section 3.2, the source of financing may play a role in evaluating the exogeneity of Medicare spending as an instrument for GFHC.

Figure 1: Medicare enrollment by parts



Source: Annual Reports of Trustees of the Federal Insurance Supplementary Medical Insurance Trust Fund; Medicare Managed Care Contract Plans Monthly Summary Report.

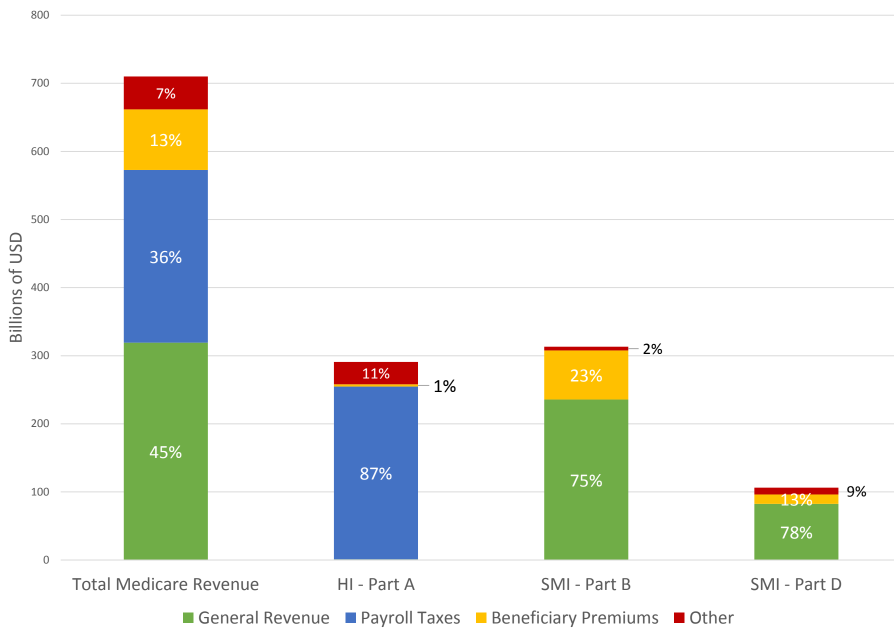
The Medicare program is funded through two trust funds: the Hospital Insurance trust fund and the Supplementary Medical Insurance trust fund. The Boards of Trustees for Medicare oversees the financial operations of these funds. The Hospital Insurance trust fund finances Medicare Part A, whereas the Supplementary Medical Insurance trust fund finances Medicare Parts B and D. Before we discuss how Part C is financed, we describe the revenue sources of these two trust funds.

The Hospital Insurance trust fund is designed to be self-supporting, and its main source of revenue consists of payroll taxes paid by employees and employers. Specifically, each pays 1.45 percent of an employee's taxable earnings and self-employed individuals pay 2.9 percent (2017 rates). Additional revenue sources include a portion of the federal income taxes paid on Social Security benefits, interest on federal securities held by the trust fund, and premiums paid by voluntary enrollees who are not eligible for the premium-free Medicare Part A.

The Supplementary Medical Insurance trust fund, on the other hand, is not self-supporting and it is mainly financed by a combination of general revenues and monthly premiums. The Supplementary Medical Insurance fund is divided in two accounts for Part B and Part D. The Part D account additionally receives payments from state governments. These payments represent a portion of the amounts states would have been expected to pay for drugs under Medicaid if drug coverage for individuals eligible for Medicare and Medicaid had not been transferred to Part D. Beginning in 2011, high-income Part D beneficiaries are required to pay higher premiums.

Figure 2 shows the revenue sources of the Hospital Insurance trust fund and the Supplementary Medical Insurance trust fund.

Figure 2: Sources of Medicare revenue, 2016



Notes: HI refers to the Hospital Insurance trust fund and SMI refers to the Supplementary Medical Insurance trust fund.

Source: 2017 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds.

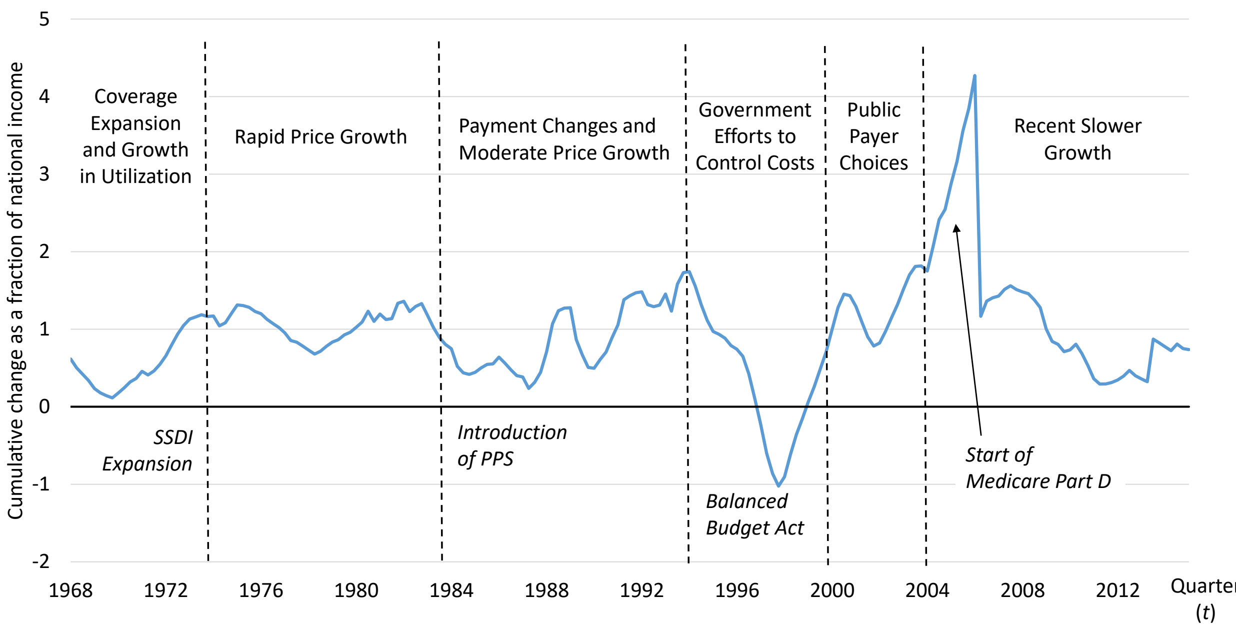
Medicare Part C is provided privately and is financed as follows: private insurance plans receive a fixed, monthly, risk-adjusted subsidy per enrollee from the Hospital Insurance trust fund and the Supplementary Medical Insurance trust fund in appropriate parts. This amount is specific to each county and is primarily determined by a benchmark/bidding process that uses that county's average per-beneficiary cost of Medicare Parts A and B. In addition, beneficiaries typically pay a premium to the private plans. Recall that Part C beneficiaries are enrolled in Part A and B as well, so they are required to pay the Part B premium and, if they choose it, the Part D premium.

Given that Medicare spending is partially financed with beneficiaries' premiums, one may wonder how much of our data is actual government spending. Premiums account for a small share of our Medicare spending variable; in 2016, approximately 12.3 percent of Medicare spending was financed by premiums.

2.2.2 Historical Drivers of Medicare Spending

We divide the history of Medicare into six periods, roughly following the demarcations used by Catlin and Cowan (2015) in their detailed history of health spending in the U.S.[14] Figure 3 contains the time series for our instrument: the eight-quarter accumulated change in Medicare spending between quarters $t-1$ and $t+7$ as a percentage of trend income at quarter $t-1$.

Figure 3: Accumulated two-year change in Medicare spending as a fraction of national income



Notes: Figure plots $Z^c_{t,8}$, the accumulated change in Medicare spending between quarters $t-1$ and $t+7$ as a fraction of trend national income. Units are basis points. SSDI is Social Security Disability Insurance and PPS is Prospective Payment System.

Coverage Expansion and Growth in Utilization (1966–1973)

The Medicare program, along with Medicaid, went into effect in July of 1966. The passage of the enabling legislation was motivated by public concerns that a significant fraction of those over 65 lacked health insurance. The lack of coverage for many aged, in the pre-Medicare period, was likely due to the high premiums private insurers charged to this group. Since inception, Medicare covers these individuals without regard to medical history, income or health status. Nowhere in discussions of the beginning of Medicare did we find evidence that it was in response to an economic downturn or a way to increase employment.

[14]We do not use exactly those authors' period definitions because their divisions correspond to national health care spending rather than Medicare in particular.

For the years between 1966 and 1969, Catlin and Cowan (2015) cite increased utilization of services, increases in hospital costs and wider use of skilled nursing facilities as primary sources of the rapid growth in program spending. In the following three years, Medicare expenditures continued to increase at a great rate, particularly because of the cost of providing outpatient hospital services.

In 1973, Medicare was expanded to cover people with permanent disabilities who are younger than 65. Through this expansion, Social Security Disability Insurance (SSDI) beneficiaries become eligible for Medicare coverage two years after they begin receiving SSDI payments.[15]

Rapid Price Growth (1974–1982)

The consumer price index (CPI) for medical care outpaced overall CPI for most of this period, which largely accounts for the Medicare spending growth over this period.[16] Besides medical care price growth, expanded coverage for the disabled (in late 1973) and expansion of Intermediate Care Facilities for the Intellectually Disabled also caused increased spending on Medicare, according to Catlin and Cowan (2015).

Non-price factors also contributed to growth of medical care spending in general. Gibson (1980, p.4) writes, of the time, that "increased concern over liability for malpractice has contributed to the number and complexity of diagnostic series performed, adding to the cost of physicians' services." In addition, influenza epidemics between 1979 and 1981 along with a 1980 heat wave contributed to increased use of medical services.

Another factor contributing to fast Medicare spending growth was the relatively rapid increase in enrollment of the disabled and end-stage renal disease patients, whom are intense users of health care.[17]

Payment Changes and Moderate Price Growth (1983–1992)

Between 1966 and 1982, Medicare expenditures became a larger and larger fraction of federal government spending and of the economy overall. Gornick et al. (1985, p.16) cites a host of reasons for increased costs of health care during the first 20 years of Medicare: "the rise in wages and price levels in the health care industry; increases in the number of certain customary services such as laboratory tests; the development of new and costly medical technologies such as open-heart surgery; changes in the organization of care, such as the growth of intensive care units in hospitals and increases in personnel; and the growth of institutions for long-term care."

Concern about this growth led to the Tax Equality and Fiscal Responsibility Act of 1982. One outcome of the legislation was the implementation of a new Medicare payment system (PPS), in which payments for services were made according to predetermined costs for treatment depending

[15] Eventually, exceptions to the two-year waiting rule were enacted for a few diseases: end-stage renal disease and amyotrophic lateral sclerosis (Cubanski, Neuman and Damico (2016)).

[16] Because the data in Figure 3 are detrended by the overall CPI, the high economy-wide inflation does not contribute to the Medicare spending growth exhibited in the figure.

[17] See Gibson and Fisher (1978).

on specific diagnoses.[18] While the law's passage was associated with an attempt to reduce spending growth, it was not undertaken in response to a recession or fluctuations in employment.

Davis and Burner (1995) explain that, before PPS, hospital payments from Medicare grew at over 18 percent per year. The effect of introducing PPS was dramatic. Inpatient hospital spending slowed to 5.7 percent per year in the six years that followed. The authors state that "These changes were prompted by concerns about trust fund solvency and about equity in compensation" (p. 233). Moreover, in the next section, we show that the changes in deficits and the debt are generally poor predictors of future values of our Medicare instrument.

Between 1983 and 1985, there were temporary freezes on physician fees and changes in laboratory fee schedules to reimburse at 60 percent of prevailing charges.[19] Taken together, these policy shocks had a substantial effect on the rate of Medicare expansion in the mid-1980s.

Besides Medicare program changes, technological developments shifted treatments from more-expensive inpatient to outpatient procedures. These included new less-invasive procedures and improved diagnostic tools, such as MRIs. These changes are evident in our instrument series, plotted in Figure 3.

Government Efforts to Control Costs (1993–1999)

Figure 3 shows a sharp decline in $Z^c_{t,8}$ starting at $t = 1997$. This is the only period when the variable becomes negative for a sustained number of quarters. The change was largely due to government cost-control efforts implemented through the Balanced Budget Act (BBA) of 1997. It reduced or fixed payment amounts for most services including a freeze on Medicare payments for inpatient hospital admissions (see Catlin and Cowan (2015)). Levit et al. (2003, p.160) explain that a "mandated conversion from a cost-based reimbursement system to a prospectively determined payment system *precipitated* a decline of $19 billion in Medicare payments in 1999." Note that the BBA was enacted at a time when neither federal deficits were abnormally high nor when the economy was in a recession. Thus, it would be difficult to argue that this effectively negative spending shock was an endogenous response to macroeconomic conditions.

According to Savord (1999), efforts in the late 1990s to reduce fraud and abuse also contributed significantly to lower expenditure growth in the home-health category and inpatient hospital costs.[20]

Public Payer Changes (2000–2002)

As discussed above, the BBA was intended to limit Medicare (and Medicaid) spending growth. The effect of the law was so severe that it led to changes in some of the law's provisions through new legislation, passed in 1999 and 2000.[21] The laws stopped or delayed some of the BBA's payment

[18] Using around 400 diagnostic categories, Gibson et al. (1984, p.22) write that, beginning in 1983, "hospitals will be paid based on the diagnosis group into which a patient falls, regardless of services provided or of length of stay."

[19] See Gibson et al. (1984).

[20] See also Foster (2000).

[21] These were the Balanced Budget Refinement Act of 1999 and the Benefits Improvements and Protection Act of 2000.

reductions. According to Catlin and Cowan (2015, p.21), the severity of parts of the BBA "coupled with expanding Federal budget surpluses, led to the passage of these two laws."

Since this evidence suggests the possibility that this backlash period was in part due to expanding budget surpluses, and thus the state of the business cycle, we will investigate the influence of this period. We show that the addition of the deficit-to-income ratio as a control does not affect our qualitative results. Finally, even if there was a residual endogeneity bias, the direction of that bias is the opposite of our primary finding—that there is either no or a positive response of the unemployment rate to a GFHC expansion. In other words, the presence of the bias would only work to strengthen our conclusions.

Recent Slower Growth (2003–2016)

Generally, Medicare spending growth slowed over this period. In part, this was due to slower increases in retail prescription drug expenditures as a larger percentage of dispensed drugs became generic and thus much less costly. Moreover, the number of new-product introductions (which tend to be expensive initially) slowed during these years. We contend that these features are exogenous to the business cycle.

One source of a dramatic expenditure increase that affected $Z^c_{t,8}$ is the implementation of Medicare Part D. The program, enabled by the Medicare Modernization Act of 2003, subsidized the cost of prescription drugs and prescription drug insurance premiums for most Medicare participants. Unlike the Medicaid program, there were no major changes in federal Medicare funding as a response to the 2007-2009 recession.

2.2.3 Participation in Medicare through Disability

In addition to the elderly, individuals receiving SSDI are permitted to receive Medicare benefits. This could potentially introduce endogeneity of Medicare spending. The conceivable chain of events would be as follows. The economy enters into recession, and SSDI participation increases from younger individuals who lose their jobs or have poorer employment prospects. New SSDI recipients in turn join Medicare.

There are two reasons this channel is unlikely to be relevant for our results. First, the fraction of Medicare participants under 65 is small (especially early in the sample). Cubanski, Neuman and Damico (2016) report that this share made up only 7 percent of Medicare in 1973 and 16 percent in 2016. Second, for almost all participants under 65 there is a two-year waiting period between first receiving SSDI and the later Medicare coverage. Since we primarily examine the two-year cumulative multiplier, alternative shocks that drive the business cycle would not move Medicare spending, through an SSDI channel, until beyond our primary multiplier horizon.[22]

[22]The two-year waiting period is, effectively, actually 29 months because there is a five-month waiting period between applying for and first receiving SSDI benefits.

2.3 Medicaid

Medicaid plans are administered at the state-level, although each state must meet guidelines set out by the federal government. The burden of Medicaid is born almost entirely through cost sharing by the federal and state governments. Currently, some states charge premiums for Medicaid coverage or require cost-sharing payments for particular services. These are capped; for example, premiums may not exceed 5 percent of family income.[23] Nonetheless, Medicaid spending is almost entirely federal and state government expenditures.[24]

Also, whether or not Medicaid spending responds endogenously to the business cycle as a result of households dropping coverage (because of premiums) or foregoing particular services (because of copayments) during recessions is not relevant since we are instrumenting for Medicaid spending with our instrumental variables strategy.

2.4 Disaggregate Model

Note that all the national-level variables defined above are constructed from state-level variables aggregated across states. Thus, we are able to also estimate the model at the state level.

At the state-level, the second-stage estimation equation is

$$U^c_{i,t,\delta} = \varphi_\delta + \xi_{i,\delta} + \psi_\delta G^c_{i,t,\delta} + \pi_{i,\delta} X_t + \gamma_\delta S_t + \eta_\delta R_t + w_{i,t,\delta} \tag{2.4}$$

Next, we construct an instrument to estimate equation (2.4). Though Medicare spending is arguably exogenous at the national level, the exclusion restriction may not be satisfied at the state level. First, richer states tend to be healthier and spend less on Medicare. According to a report by the Kaiser Family Foundation (2015), the 20 counties with the highest Medicare per capita spending have much sicker and poorer beneficiary populations. Second, although Medicare Part A is premium-free for everyone over 65 who has paid Medicare taxes for at least 10 years, Parts B and D charge a premium. Moreover, this premium depends on income.

Thus, to address the endogeneity in the geographic distribution of Medicare spending, we construct a Bartik-style instrument. We operationalize this by multiplying our national instrument $Z^c_{t,\delta}$ by a state-specific scaling factor. This factor is the ratio of a state's share of national Medicare plus Medicaid spending, $s^G_{i,t}$, divided by the state's share of national income, $s^Y_{i,t}$. Both shares are computed as the state's averages in quarters $t-8$ through $t-1$:

$$Z^c_{i,t,\delta} = (s^G_{i,t}/s^Y_{i,t}) Z^c_{t,\delta} \tag{2.5}$$

[23] The federal government prohibits states from charging Medicaid premiums on families earning less than 150 percent of the federal poverty level (see Kaiser Family Foundation (2013)). For families below the federal poverty level, any out-of-pocket costs are tightly capped.

[24] According to the Department of Health and Human Services (2015, p.3), "Beneficiary cost sharing, such as deductibles or co-payments, and beneficiary premiums are very limited in Medicaid and do not represent a significant share of the total cost of health care goods and services for Medicaid enrollees."

3 Results

The models outlined above are estimated using the generalized method of moments, which in this case has a two-stage least-squares (2SLS) interpretation.[25]

Throughout our analysis, we exclude the 2007-2009 recession period, specifically 2007Q4 through 2009Q2, because changes in unemployment were driven largely by financial factors upon which we do not condition our regressions. Also, our sample starts in 1976 because this is the first year where state-level quarterly BLS unemployment rates are available. In addition, note that at each successive horizon we lose one observation from the most-recent quarters due to the construction of the cumulative variables. Thus, to make the estimates comparable across horizons, we fixed the sample to that available at $\delta = 16$, the largest horizon considered in the paper.

To interpret the results, we first answer the question of what might be a moderately sized negative unemployment rate response. Consider the following instructive calculation. Suppose that GFHC spending transfers one-to-one as national income. Suppose further that wages are fixed and all additional wage income is paid at the extensive margin (i.e., with new workers hired from the ranks of the unemployed). Then, since labor's share is approximately two-thirds, the above assumptions would imply an estimate for the employment multiplier of two-thirds. The average labor force participation rate in the U.S. over the past 60 years has been 63 percent. If we assume a constant labor force that is 63 percent of the population, then this 0.66 percentage-point increase in the employment-to-population ratio is equivalent to a 1.05 percentage-point decline in the unemployment rate. We are not able to reject an unemployment rate multiplier of -1.05 with 90 percent confidence.

Table 1 contains the instrumental variables estimate. Column (1) reports the aggregate multiplier. First, observe that Medicare spending is a strong instrument for GFHC spending, with a partial F statistic equal to 44.88. Next, the second-stage estimate equals 0.56 (SE = 1.27). This implies that a GFHC spending increase equal to 1 percent of national income accumulated over a two-year horizon causes the unemployment rate to increase by 56 basis points (accumulated over the same two-year horizon). Note that this effect is estimated imprecisely and one cannot reject a large positive or moderate negative response.

Note that the coefficient on the share of the over-65 population is positive, while the coefficient on this variable's lead is negative. To make sense out of these results, first note that the U.S. unemployment rate decreases with age.[26] Now, for simplicity, consider an economy in which the age distribution of individuals is solely determined by the birth rate. A temporary positive shock to the birth rate would cause an increase in the unemployment rate when this cohort enters the labor force, because the unemployment rate is high among young people. As this cohort moves over the

[25]Heteroskedasticity and autocorrelation corrected standard errors are reported throughout the paper. The estimates are computed using Stata V.14 and the *ivreg2* command with the options *robust* and *bw*.

[26]In August 2017, the unemployment rate for the age groups 16-19, 20-24, 25-54, and over 55 were, respectively, 13.6 percent, 7.1 percent, 4.0 percent, and 3.2 percent.

Table 1: Aggregate and relative unemployment rate multipliers at an eight-quarter horizon, instrumental variables

	Aggregate data	State-level panel data
	(1)	(2)
	Coef./SE	Coef./SE
Unemployment multiplier	0.56	0.28
	(1.27)	(0.21)
Change in over-65 share	3.66	1.95
	(9.01)	(1.58)
Change in over-65 share$_{t+7}$	-9.65	-7.42***
	(6.38)	(1.19)
Ramey news shock	0.37	0.34***
	(0.64)	(0.09)
Change PE ratio$_{t-1}$	-1.25***	-0.84***
	(0.46)	(0.07)
Change in PE ratio$_{t-2}$	-0.52	-0.66***
	(0.37)	(0.06)
Change PE ratio$_{t-3}$	-0.68**	-0.62***
	(0.30)	(0.05)
Change PE ratio$_{t-4}$	0.08	-0.37***
	(0.34)	(0.06)
Partial F statistic	44.88	207.79
N	120	5856

Notes: SEs are robust with respect to heteroskedasticity and autocorrelation. * $p < .1$, ** $p < .05$, *** $p < .01$.

age distribution, the total unemployment rate declines. In particular, an increase in the share of the population right before retirement age (s_{t+7} increases) would decrease the unemployment rate. Next, consider what would happen when this cohort retires (s_t increases). As this large number of low-unemployment individuals leave the labor force at 65, the unemployment rate increases.

Increases in the price-earnings ratio have a negative effect on the accumulated change in the unemployment rate, as expected. We include Valerie Ramey's news defense shock scaled by trend income as an additional control; its effect on the dependent variable is not statistically different from zero. Moreover, the point estimates and standard errors do not vary much when this control is excluded (see Table 5).

Column (2) of Table 1, the relative multiplier estimated using the model described in Section 2.4. These estimates are interesting, not because they are necessarily informative about the aggregate effects of GFHC, but because they will speak to the methodology used in other studies on the impact of fiscal policy. These studies attempt to use geographic variation either in a panel or a cross-section to infer the relative (or local) impact of government spending.[27] This issue has been discussed in Cochrane (2012), Furth (2013), Nakamura and Steinsson (2014) and Ramey (2011).

In the presence of cross-border spillovers, using cross-sectional variation identifies the relative differences in outcomes across states rather than the aggregate outcomes. Spillovers might arise, for example, through interstate trade in goods, movements of labor or common fiscal and monetary policies.

As shown in Column (2), the coefficient equals 0.28 (SE = 0.21), implying that the cumulative unemployment rate rises by 28 basis points in response to a GFHC increase equal to 1 percent of national income accumulated over a two-year horizon. The effect is precisely estimated, and we can reject a moderate negative unemployment rate response.

The results presented in Table 1 summarize two of the main conclusions of the paper: the relative multiplier approach provides a similar estimate to that based on aggregate data, and we can reject a moderate-to-large negative unemployment rate response to increases in GFHC spending.

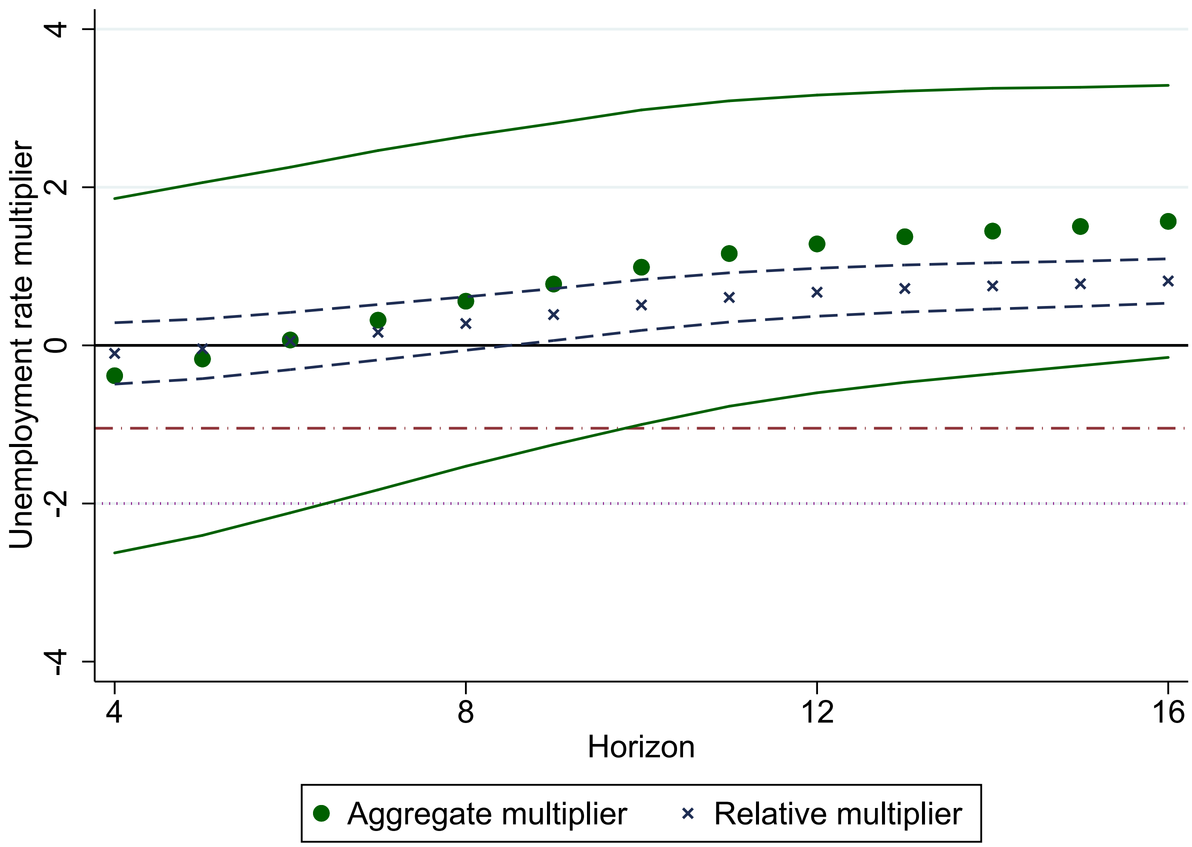
3.1 Dynamic Employment Response

In this section, we explore the dynamic path of the multiplier. Figure 4 plots the multiplier as one varies the horizon δ; the circles represent the point estimates and the lines show the 90 percent confidence interval (robust to heteroskedasticity and autocorrelation). The "x" marks correspond to the panel-based estimates of the multiplier. We let the dependent variable, endogenous variable and instrument vary with each horizon. The controls are the same as those reported in Table 1.

Figure 4 additionally plots two horizontal lines at -1.05 and -2. As argued in the previous section, an unemployment rate multiplier of -1.05 would imply a moderate stimulative response to accumulated changes in GFHC, while a multiplier of -2 would indicate a strong stimulative

[27] Examples of these types of studies appear in the paper's introduction.

Figure 4: The cumulative unemployment rate response to cumulative changes in GFHC spending at various horizons



Notes: The controls are the same as those reported in Table 1. The line at -1.05 represents a moderate stimulative unemployment rate response (see text). The lines that envelope the dots and "x" marks indicate pointwise robust 90% confidence intervals.

response. For the panel-based estimates, we are able to reject this moderate stimulative effect at all horizons. At horizons beyond $\delta = 10$, we can reject a negative unemployment rate multiplier entirely.

The cumulative multiplier path is smooth and the point estimates stabilize around 0.75 for the panel-based estimate and 1.5 for the aggregate-based estimate.

3.2 Examining the Instrument

This section examines the robustness of our instrument choice. Table 2 shows the first-stage results used in the estimation of equations (2.3) and (2.4), which indicate a strong first stage. The point estimate on the Medicare instrument in the aggregate regression (column (1)) implies that each dollar of additional Medicare spending is associated with 21 cents of additional GFHC spending. Since GFHC is made up of Medicare and Medicaid, the first stage results suggest that additional Medicare spending crowds in Medicaid spending. One channel that explains this result lies in the nature of the dual eligible Medicare-Medicaid beneficiaries, who may exhibit chronic conditions and require costly care that is above the average for non-dual eligible individuals. One might then be concerned that this channel also operates in the opposite direction: because of the dual-eligible, Medicare spending may be affected by changes in Medicaid that are endogenous to the business cycle. However, dual eligible individuals mainly consist of retirees and so their income is relatively immune to business cycle fluctuations. Thus, this result should not be interpreted as evidence of a violation of the exclusion restriction.

Figure 5 shows the dynamic path of the first-stage point estimate. By the 12-quarter horizon, the coefficient stabilizes at 1.3.

Table 2: Aggregate and relative unemployment rate multipliers at an eight-quarter horizon, first-stage estimates

	Aggregate data	State-level panel data
	(1)	(2)
	Coef./SE	Coef./SE
Medicare instrument	1.21***	1.23***
	(0.18)	(0.09)
Partial F statistic	44.88	207.79
N	120	5856

Notes: SEs are robust with respect to heteroskedasticity and autocorrelation. * $p < .1$, ** $p < .05$, *** $p < .01$.

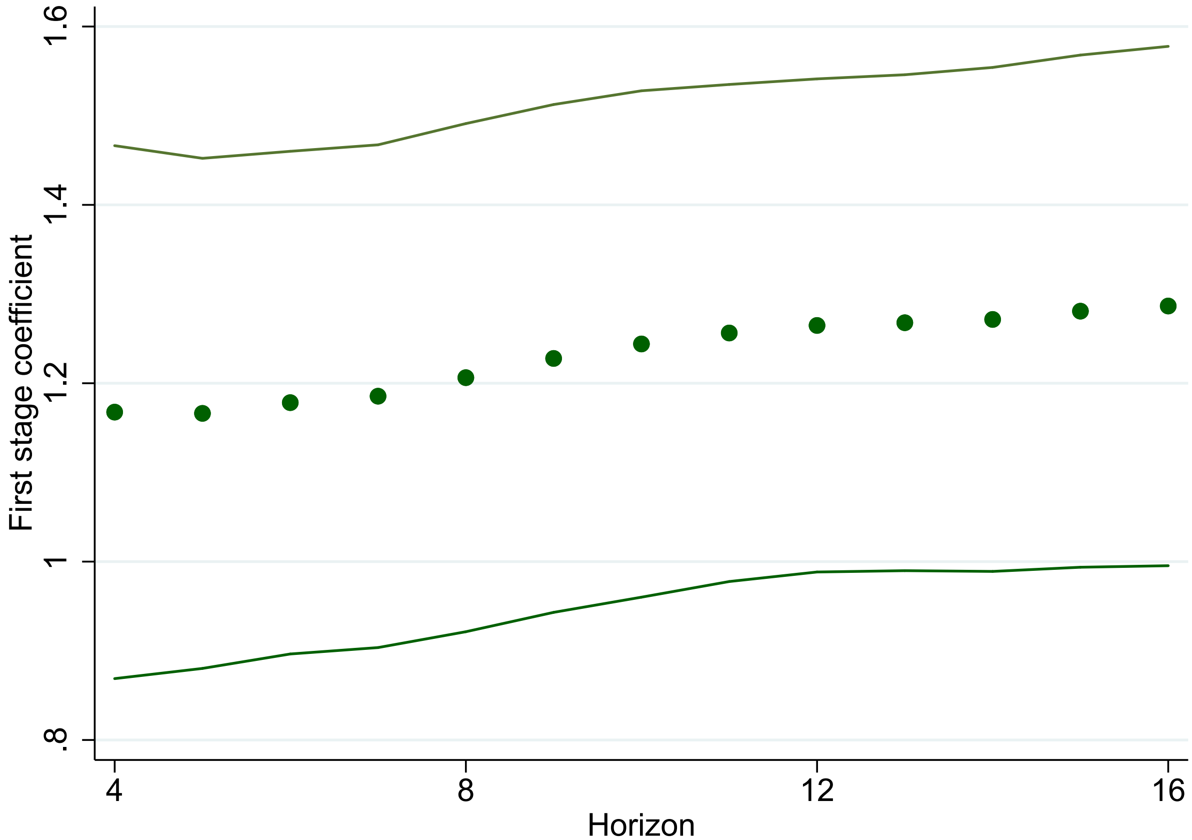
Next, we ask if Medicare spending responds to overall federal budget stress. If, for example, a recession causes federal tax revenues to fall, then that could potentially cause a reduction in Medicare spending. In this case, our instrument might suffer from endogeneity.[28]

Table 3 contains estimates in which our Medicare variable $Z^c_{t,8}$ is the dependent variable and our independent variable is one of several different measures of budget stress. In each regression, we include the baseline controls. To ease interpretation, we standardize each variable to have unit variance; therefore, the coefficient of interest can be interpreted as the number of standard deviations response to a 1 standard deviation change in the right-hand-side variable.

Column (1) contains the coefficient on the Romer-Romer exogenous tax shock. Column (2) regresses the instrument on the $t-1$ deficit-to-income ratio. Column (3) uses the change in the $t-1$ deficit-to-income ratio. The coefficients in columns (1) and (3) are less than 0.10 in absolute

[28]Note, importantly, that this would bias our results towards finding a strong negative (or stimulative) unemployment rate multiplier.

Figure 5: Cumulative GFHC response to cumulative changes in Medicare spending



Notes: The controls are the same as those reported in Table 1. The lines indicate the pointwise robust 90% confidence interval.

value and not statistically different from zero. Column (4) uses the lagged debt-to-income ratio. The coefficient is negative, which implies high debt correlates with slow Medicare spending growth. The effect is not statistically different from zero.

It is worth noting that we do not claim that Medicare spending does not respond to any budget considerations. In our discussion of Medicare's history, a few episodes of past rapid growth in Medicare spending motivated policymakers to adjust program parameters (e.g., reimbursement rates to providers) to curtail current spending growth. These kind of adjustments induce mean reversion, or alternatively revision to trend growth, in the shock process rather than macroeconomic endogeneity of the instrument itself.

For the components of Medicare that require some enrollee premiums, such as Part B, one might be concerned that instrument exogeneity could be violated according to the following reasoning.

Table 3: Effect of various measures of fiscal stress on Medicare spending, aggregate regressions with standardized coefficients

	(1) Coef./t-stat	(2) Coef./t-stat	(3) Coef./t-stat	(4) Coef./t-stat
(a) Romer-Romer tax shock	-0.02	-	-	-
	[-0.23]			
(b) Deficit-to-income ratio$_{t-1}$	-	0.29**	-	-
		[2.44]		
(c) Change in deficit-to-income ratio$_{t-1}$	-	-	0.07	-
			[0.88]	
(d) Debt-to-income ratio	-	-	-	-0.13
				[-1.57]
N	109	120	120	120

Notes: t-statistics appear in brackets beneath the standardized coefficient and are robust with respect to heteroskedasticity and autocorrelation. Each regression includes the benchmark controls.
* $p < .1$, ** $p < .05$, *** $p < .01$.

Suppose if, during an economic downturn, enrollees decide to drop Part B coverage. Because 25 percent of Part B revenue (in 2014) was from premiums and 75 from general federal revenue, if an enrollee were to drop out of Part B, federal funding of Medicare would automatically contract. By this potential channel, macroeconomic conditions could cause a decrease in one component of Medicare spending.

There is good reason, however, to think that this channel is not operative. First, the parts of Medicare that involve premiums are highly subsidized; thus, it is unlikely that many enrollees would give up the subsidy by unenrolling. Second, the majority of Medicare recipients are retirees; thus, their income is somewhat insensitive to economic conditions.

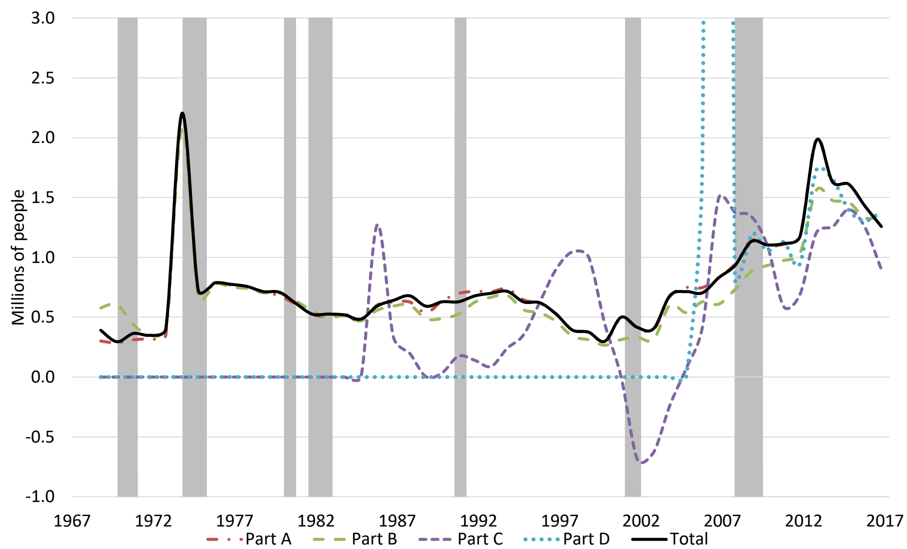
To directly check this possibility, Figure 6 plots historical enrollment data. The lines give the year-over-year changes in enrollments by Part and the shaded regions indicate NBER-dated recessions. There is no systematic tendency for enrollments in any part to decline (or increase) during recessions in ways that differ from slow-moving trends.

There is one decline in enrollments in Part C (the dashed purple line) around the 2001-2002 recession. This was the result of involuntary unenrollments caused by the Balanced Budget Act of 1997. As explained in Section 2.2.2, the more drastic aspects of that act were rescinded by later legislation. Part B enrollments eventually began increasing, as evidenced by the figure.

Table 4 presents several alternative specifications that reflect a robust conclusion of this section: failing to correct for the countercyclicality of total GFHC results in downwardly-biased estimates that suggest strongly contractionary responses.

For comparison purposes, row (a) reproduces the multiplier estimates obtained from the bench-

Figure 6: Change in Medicare enrollment by parts



Notes: In 2006, Part C enrollment increased by 28.7 million.

Sources: Annual Reports of Trustees of the Federal Insurance and Federal Supplementary Medical Insurance Trust Funds; Medicare Managed Care Contract (MMCC) Plans Monthly Summary Report.

Table 4: Aggregate and relative unemployment rate multipliers at an eight-quarter horizon, alternative instrument specifications

	Aggregate data	State-level panel data
	(1)	(2)
	Coef./SE.	Coef./SE.
(a) Benchmark	0.56	0.28
	(1.27)	(0.21)
(b) Least squares	1.51***	0.67***
	(0.39)	(0.05)
(c) Medicaid instrument	1.89**	1.30***
	(0.85)	(0.16)
(d) No Bartik correction	-	0.57***
		(0.15)
(e) 1-quarter change instrument	-2.22	-2.00***
	(2.98)	(0.60)

Notes: SEs are robust with respect to heteroskedasticity and autocorrelation. * $p < .1$, ** $p < .05$, *** $p < .01$.

mark model, first reported in Table 1. Row (b) contains the least-squares estimate corresponding to the benchmark specification. As one might expect, the coefficient falls. This is consistent with our conjecture that government Medicaid spending is countercyclical to the business cycle, because enrollments tend to increase during economic downturns. Thus, moving from least-squares to instrumental variables, the unemployment rate response goes from being positive to not statistically different from zero.

Our identification assumption—that Medicare spending is orthogonal to the equation's error term—attempts to control for the contaminating effect that Medicaid might have on treating GFHC as exogenous to the error term. To stress the endogeneity in GFHC from the Medicaid component, row (c) presents the benchmark specification, except that changes in Medicaid, not Medicare, are used as the instrument. In this case, the positive unemployment rate response is even stronger than that it was for the least-squares estimation.

Section 2.4 discusses the potential endogeneity in the geographic distribution of Medicare spending and addresses it by constructing a Bartik-style instrument. Now, we examine how the relative multiplier estimates change if one ignores such concerns and uses the accumulated change in state Medicare spending (scaled by state income) as an instrument. Row (d) shows the results of this exercise. As expected, failing to account for the potential cross-state endogenity of Medicare spending biases the estimates upwards. The relative multiplier increases and becomes statistically different from zero.

Finally, row (e) replaces the benchmark instrument with the period t one-quarter change in the Medicare spending scaled by $t-1$ income. This might be important if there was a dynamic feedback from Medicare spending to the real economy and then back again to future values of Medicare. Not surprisingly, the partial F statistic falls for both specifications (not reported). In this case, the aggregate and relative multiplier is approximately -2. This may be evidence of fiscal foresight, of the type studied by Leeper, Traum and Walker (2017).

3.3 Robustness Checks

Table 5 shows variations to our benchmark specification (reproduced in row (a)). Row (b) extends the sample to include the Great Recession years (2007Q4–2009Q2). Rows (c) through (e) drop the three controls one by one, and row (f) drops all controls. This exercise shows that the inclusion of the over-65 population share variables and Ramey's defense news series have a negligible impact on the estimation of the aggregate and relative multipliers. On the other hand, dropping the lagged price-earning controls from the specification has a large effect on the aggregate multiplier. It increases to 1.82 (SE = 0.96). The change also affects the relative multiplier.

Row (g) of Table 5 adds health care spending from the Department of Defense and Department of Veterans Affairs to the spending from programs used in the benchmark case (i.e., Medicare and Medicaid). These additional data come from the National Health Expenditure survey and

Table 5: Aggregate and relative unemployment rate multipliers at a eight-quarter horizon, robustness checks

	Aggregate data	State-level panel data
	(1)	(2)
	Coef./SE.	Coef./SE.
(a) Benchmark	0.56	0.28
	(1.27)	(0.21)
(b) Including 2007-2009	-0.20	-0.21
	(1.08)	(0.16)
(c) Drop PE controls	1.82*	1.56***
	(0.96)	(0.17)
(d) Drop demographic controls	0.81	0.50**
	(1.25)	(0.20)
(e) Drop Ramey control	0.59	0.29
	(1.29)	(0.21)
(f) Drop all controls	2.00**	1.73***
	(1.01)	(0.18)
(g) Defense medical spending	0.57	-
	(1.30)	
(h) Add deficit-income ratio	1.55	-
	(1.15)	

Notes: SEs are robust with respect to heteroskedasticity and autocorrelation. * $p < .1$, ** $p < .05$, *** $p < .01$.

are available only at the national level. Thus, we cannot estimate the corresponding state-level specification. Also, the data are annual, so we construct quarterly data by dividing this additional spending within each year evenly across the four calendar quarters. The addition of these types of GFHC spending induces a negligible change in the aggregate multiplier, most likely because Defense and Veterans Affairs spending are small compared to Medicaid and Medicare, especially later in the sample.

One concern may be that one of the factors driving Medicare spending—the price of health care—itself has a direct influence on employment. One could then misassign a shock to health care prices as causing unemployment to change solely through the effect of Medicare. To address this possibility, we modify our benchmark specification to control for several alternative measures of medical care price inflation. We use the change (computed various ways) in the natural log of the ratio of the medical care price index to the overall core CPI.

Table 6: Aggregate eight-quarter multiplier, adding medical price inflation controls

	Benchmark	Future inflation	Past inflation	2 lags of inflation
	(1)	(2)	(3)	(4)
	Coef./SE	Coef./SE	Coef./SE	Coef./SE
Unemployment	0.56	-0.24	2.29**	2.46**
multiplier	(1.27)	(1.37)	(1.06)	(1.16)
2-year change in log	-	0.87	-	-
of relative CPI_{t+7}		(0.64)		
2-year change in log	-	-	-1.86***	-
relative CPI_{t-1}			(0.37)	
1-year change in log	-	-	-	-2.31***
relative CPI_{t-1}				(0.77)
1-year change in log	-	-	-	-1.45***
relative CPI_{t-5}				(0.56)
Partial F statistic	44.88	35.65	37.91	33.00
N	120	120	120	120

Notes: SEs are robust with respect to heteroskedasticity and autocorrelation. Each regression includes the benchmark controls. * $p < .1$, ** $p < .05$, *** $p < .01$.

These results are presented in Table 6. Column (1) contains the benchmark specification (i.e., no medical care price inflation control) and the remaining three columns control for medical care price inflation using various measures. There are two things to note. First, controlling for medical care prices does not substantially reduce the power of the instrument, as indicated by the partial F statistics. That is, there is plenty of Medicare spending variation not attributable to changes in the price of medical care. Second, the point estimate for the multiplier remains above or very close to zero for each of the specifications. In fact, in columns (3) and (4), the effect is strongly contractionary and statistically different from zero.

3.4 Response of Other Macroeconomic Variables

In this section, we study the response of other macroeconomic variables to changes in GFHC spending. Table 7 replaces the dependent variable in the benchmark specification with several alternatives.

Table 7: Response of macroeconomic variables to changes in GFHC spending

	Aggregate data
	(1)
	Coef./SE.
(a) Employment	-1.05
	(0.79)
(b) Edu. & health employment	0.00
	(0.07)
(c) Accumulated deficit	2.06**
	(0.82)
(d) Cumulative chg in core CPI	3.11
	(3.47)
(e) Change in core CPI	0.54
	(0.90)

Notes: SEs are robust with respect to heteroskedasticity and autocorrelation. * $p < .1$, ** $p < .05$, *** $p < .01$.

In row (a), the cumulative change in the unemployment rate is replaced with the cumulative change in total employment (scaled by population). The negative, yet not statistically different from zero, employment multiplier is consistent with our estimated unemployment rate response. In particular, we are able to reject a moderate or large positive employment effect.

In row (b) the cumulative change in the total employment (scaled by population) is replaced with the corresponding variable for employment in the health and education sector.[29] The aggregate multiplier for employment in this sector is not statistically different from zero. The quantitative magnitude of the coefficient is small, most likely because only a small fraction of the population work in this sector.

Row (c) uses the eight-quarter accumulated change in the deficit (as a fraction of trend income)

[29]We report only the aggregate multiplier for this specification because much of the sample does not contain state-level sectoral employment data.

as the dependent variable.[30] The estimate equals 2.06 (SE = 0.82). A coefficient of 1 would imply that the identified changes in GFHC transfer one-for-one to create a larger deficit. This suggests that exogenous GFHC changes have been mainly deficit-financed rather than financed with higher current aggregate taxes.

Rows (d) and (e) report the response of inflation to changes in GFHC. Row (d) shows the effect on the cumulative change in core CPI. The estimate equals 3.11 (SE = 3.47). Similarly, row (e) presents the response of the two-year percentage change in core CPI. The point estimate is 0.54 (SE = 0.90). It implies that if GFHC spending goes up by 1 percent of national income, then inflation over that two-year period will increase at an annualized rate of 54 basis points.[31]

Figure 7 contains the impulse responses of other macroeconomic variables, based on the aggregate data, to a GFHC-shock equal to 1 percent of trend national income. Each panel contains a cumulative response except the federal debt panel. Commonalities across each panel are that each response function converges by the end of the horizon and each is estimated with substantial imprecision.

Panel (a) contains the employment rate response relative to the population level. The point estimate is close to zero at horizon 4 and then declines to approximately -2. One can reject a positive employment rate response after approximately horizon 10. This is consistent with our finding of an increase in the unemployment rate in response to a GFHC shock. Panel (b) plots the response of the employment rate in the health and education sectors relative to the population. The function begins beneath but close to zero and then rises above zero by horizon 8; however, the estimates are sufficiently imprecise, so one cannot reject either a positive or negative response at any horizon.

Panel (c) contains the response of the cyclical unemployment rate. This is defined in a manner analogous to our benchmark unemployment rate, except that we create the cyclical unemployment variable by subtracting the Congressional Budget Office measure of the natural unemployment rate from the actual unemployment rate. The dynamic path of the cyclical unemployment rate is very similar to that of the actual unemployment rate. Panel (d) plots the real wage response, which falls in response to the increased government spending. One possible explanation would be that, in the presence of sticky nominal wages, if increased government spending drives up inflation, then the real wage would fall. Alternatively, recall that employers pay a percentage of workers' wage income in the form of taxes (up to legal caps) for the Hospital Insurance trust fund. If increased Medicare spending drives up taxes, then employers might put the burden of these higher taxes on workers by reducing their wage.

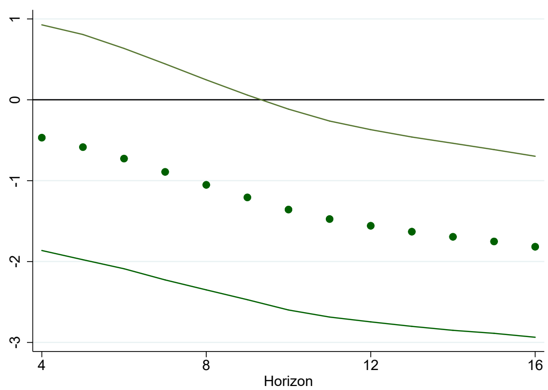
Finally, panel (e) plots the response of the level of the federal debt to the trend income ratio. As one might expect, higher Medicare spending increases the federal debt. The coefficient is greater

[30] We report only the aggregate multiplier because state-level deficit data is not available for most of the sample.

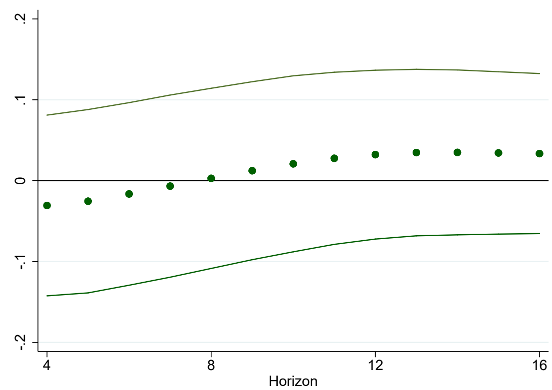
[31] See Dupor and Li (2015) for a discussion of the inflation responses to several government spending shocks identified using other approaches.

Figure 7: Response of other macro variables

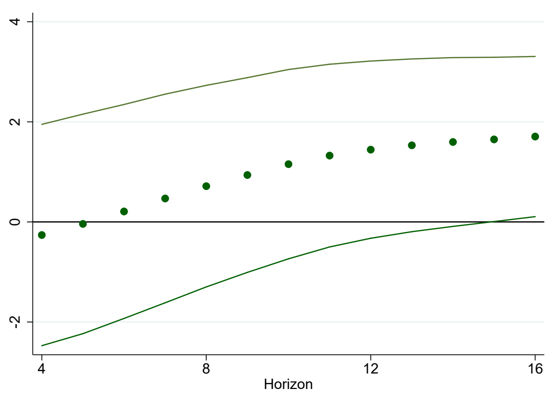
(a) Employment



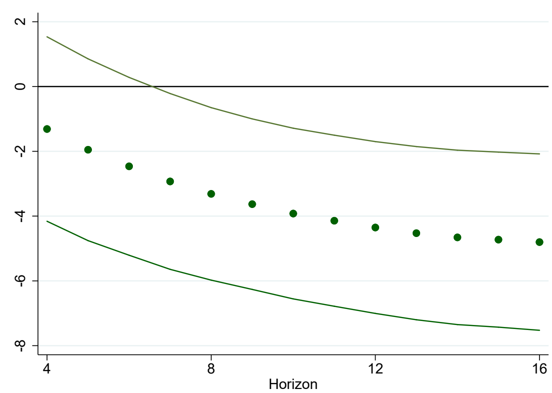
(b) Employment in education and health



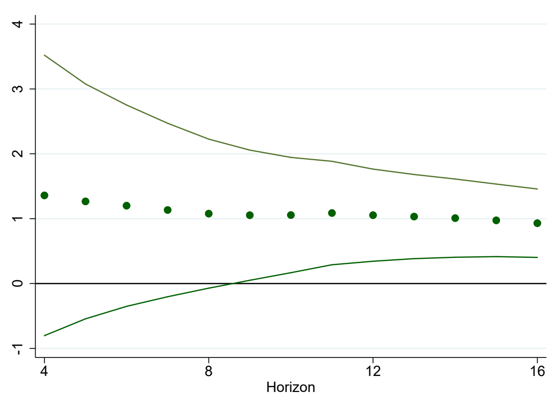
(c) Cyclical unemployment rate



(d) Wage



(e) Federal debt



Notes: Each panel contains a cumulative response except for the federal debt panel. The lines indicate the pointwise robust 90% confidence intervals.

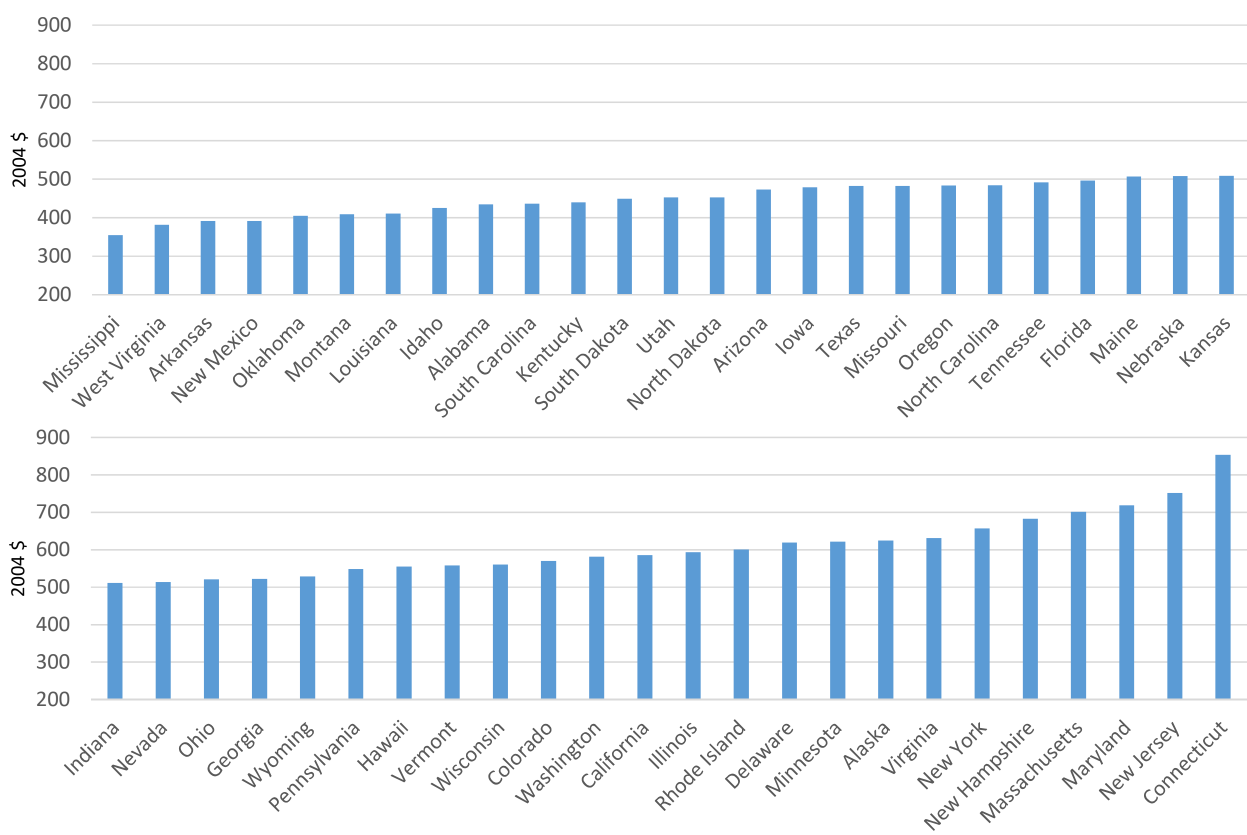
than 1 at short horizons and then converges to 1 eventually.

3.5 Possible Channels

A natural question is: Through which channel might increases in Medicare spending drive up unemployment? A natural candidate explanation is that taxes that accompany increased GFHC discourage economic activity.

We note that one primary source of funding for Medicare is payroll tax contributions to the HI trust fund. Employers and employees each pay 1.45 percent of an employees' taxable earnings up to given cap. Starting in 2013, an additional HI tax of 0.9 percent has been assessed on higher-income filers.

Figure 8: Medicare Hospital Insurance trust fund payroll taxes per capita by state, 2004



Notes: Source is Office of Policy, Social Security Administration.

The distribution of taxes paid across states varies dramatically. Figure 8 gives a histogram of these contributions per capita by state in 2004.

If higher taxes discourage economic activity, then we might expect that the contractionary effect of GFHC expansions would be stronger in high HI payroll tax states than in other states. To assess this possibility, we estimate the panel model on the sample of states across four quantiles, depending on the 2004 average HI payroll tax per capita in each state. All of the baseline controls are included in the regression. The results appear in Table 8. The positive impact on the unemployment rate of GFHC expansions is substantially stronger among states that pay a larger per capita amount of HI payroll taxes, although the sizes of the standard errors are substantial.

Table 8: Unemployment rate multiplier from state-level panel, stratified by Hospital Insurance payroll taxes paid per capita

	Relative multiplier
	(1)
	Coef./SE.
(a) Lowest quantile	-0.09
	(0.28)
(b) Second quantile	0.46
	(0.35)
(c) Third quantile	1.23*
	(0.64)
(d) Highest quantile	0.31
	(0.61)

Notes: Each state-year observation is placed into one of four quantiles depending on the per capita Hospital Insurance payroll taxes paid in 2004. SEs are robust with respect to heteroskedasticity and autocorrelation. * $p < .1$, ** $p < .05$, *** $p < .01$.

Alternatively, GFHC could affect the unemployment rate through a labor supply channel. Changes in Medicaid benefits could affect the decision of whether to continue searching for a job, and changes in Medicare benefits could affect the decision of whether to drop out of the labor force after turning sixty-five. As explained below, both effects would work in the same direction.

Although Medicaid is not just for the unemployed, we could think of it as a type of unemployment benefit program in the sense that it could affect employment decisions through a similar channel. That is, an increase in Medicaid benefits (and thus spending) could allow unemployed individuals to be more selective in their job search, leading to an increase in the unemployment rate. If this is the case, our finding of a small positive (contractionary) unemployment rate response is consistent with the results from the literature on the impact of unemployment benefits on unemployment. See, for example, Chodorow-Reich et al. (2017) and Marinescu (2017).

An increase in Medicare benefits could incentivize people to retire at 65(which, as argued above, would increase the unemployment rate); a decrease in Medicare benefits could encourage people to continue working past 65 to use employment income and employer-sponsored health insurance to compensate for the decline in benefits. Consider the following example. Assume the age distribution of individuals is constant over time. At 65, everyone is entitled to Medicare benefits. Individuals choose a retirement age R, and from that point on they no longer receive wages or employer-sponsored health insurance. If Medicare benefits are lowered (a negative income effect), then individuals would choose a higher R. This choice would increases the labor force participation rate in the age group with the lowest unemployment rate, causing a decline in the national unemployment rate.

4 Related Research

Other papers have identified the macroeconomic effects of government spending shocks by focusing on particular components of government spending. The defense spending component is particularly compelling because it is unlikely to suffer from endogeneity issues, since these spending decisions are driven by international geopolitical factors. Examples include Ramey (2011) and Ramey (2012). These papers find broadly similar results to ours—that there is no statistically significant positive effect on private economic activity for the given components of government spending studied.[32]

Second, there is a line of research on the differences between relative and aggregate multipliers. Dupor and Guerrero (2017) follow a similar strategy to the one taken in the current paper. They use state-level defense spending to estimate an aggregate multiplier (based on their aggregated data). That paper finds no or small effects on employment, which is broadly consistent with the results of the current paper. Then, they estimate the relative multiplier based on the state-level panel.[33] They find that the relative multiplier is in the same range as the aggregate multiplier, which is consistent with the results of the current paper. In a survey paper, Ramey (2011) catalogues estimates from many macroeconomic time-series studies (i.e., aggregate multipliers) and cross-sectional studies (i.e., relative multipliers). She finds a general tendency of aggregate multiplier estimates to be smaller than local multiplier estimates.

Third, Nakamura and Steinsson (2014) address the relative versus aggregate multiplier question using a different approach. First, they estimate relative multipliers using a defense spending state-level panel. However, they do not estimate the aggregate multiplier using this data set. Instead, they proceed by building a two-region dynamic equilibrium model with regional government spending shocks. They consider alternative calibrations (e.g., varying the degree of price rigidity and the stance of monetary policy). Using model-generated data, they estimate both aggregate and relative multipliers and show that relative and aggregate multipliers can differ dramatically across parameterizations. Thus, while Nakamura and Steinsson (2014) demonstrate a potential importance of distinguishing between the two types of multipliers, they do not estimate both using

[32] Other papers on defense spending and economic activity include Barro and Redlick (2011) and Hall (2009).

[33] They use the term local multiplier throughout their paper.

real-world data.

Next, there has been almost no academic work on the short-run labor market effects of Medicare purchases. This speaks to exogeneity of the instruments: policymakers and economists have not used Medicare as a counter-cyclical fiscal tool and therefore have not conducted research from this perspective. As the government currently spends more on GFHC than on defense, there is now a Medicare/Medicaid gap in the literature on government spending and economic activity. The need to fill the gap is particularly timely as proponents of the ACA Medicaid expansion have used economic stimulus as one justification for new GFHC spending (see Council of Economic Advisers (2014)).

Very recently, a few studies have addressed the economic impact of Medicaid expansions under the ACA. Since some states have adopted Medicaid expansion while others have not, one approach has been to compare the outcomes across the two sets of states, in effect generating a control and treatment group.[34] While the findings of these studies vary, most suffer from the potential methodological problem that motivates our work. These papers estimate relative effects of the difference in spending amounts rather than the total effect. Without additional time-series variation in GFHC spending, these *diff-in-diff* approaches may be biased in the presence of cross-state spillovers.

5 Conclusion

This paper make three contributions. First, we overcome the potential endogeneity in GFHC expenditures by using Medicare spending as an instrument. Medicare expenditures are highly correlated with total GFHC spending; moreover, by examining the history of the Medicare program, we explain that changes in its expenditures have not been causally impacted by the business cycle.

Second, we use the new instrument to estimate the effect of GFHC spending on the national unemployment rate. Across a wide variety of specifications, exogenous changes in this spending have a positive effect (that is, at the point estimate) on the unemployment rate that is not statistically different from zero. We do find that the federal debt increases in response to GFHC spending expansions. Moreover, the instrument corrects the bias in the direction one would expect. Using least squares, i.e., failing to instrument, leads to a significantly positive effect on the unemployment rate.

Our result is likely to be important as the push by some for further expansion of government provided medical care, e.g., movement to a single payer system, is likely to continue. While there may or may not be socially desirable reasons for expanding GFHC, doing so as part of a powerful "jobs agenda" is not supported by the data.

Third, we repeat our analysis using the panel of state-level data on GFHC spending and unem-

[34]These include Garrett and Kaestner (2015), Gooptu et al. (2016) and Leung and Mas (2016).

ployment. Instead of using aggregate time-series variation, using cross-sectional variation generates estimates of the relative (or local) effect of spending.

Our results provide an empirical example in which relative multipliers may be a reliable indicator of the aggregate effects of fiscal policy. Finally, we provide results that suggest that the contractionary effects of GFHC expansions are stronger in states that pay higher per capita payroll taxes to finance the Medicare Hospital Insurance trust fund.

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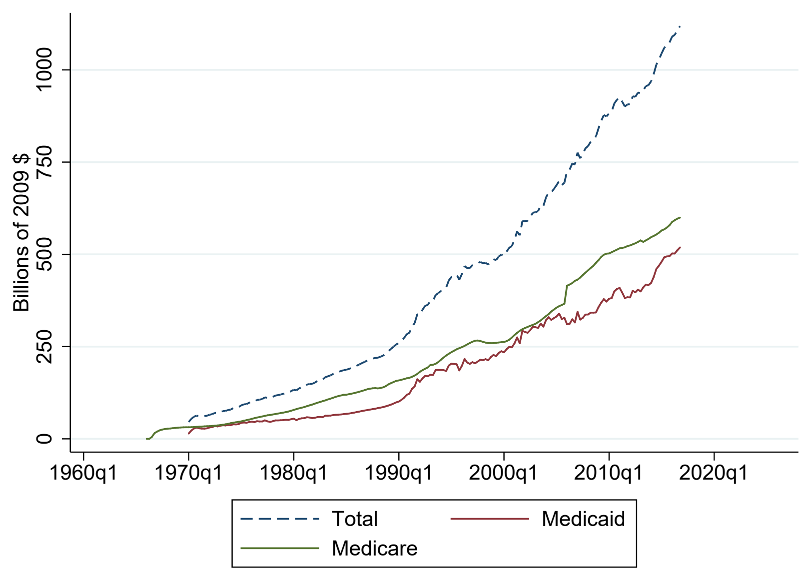
A The Data

Our GFHC data are from Bureau of Economic Analysis (BEA) state personal income reports. The BEA obtains the data from the Centers for Medicare and Medicaid Services (CMS).[35] Specifically, we use two state-level quarterly series from these reports: Medicare benefits and Medicaid benefits. Figure 9 plots Medicaid and Medicare spending at the national level, as well as the sum of the two.

Figure 9: Government spending, national measure and aggregated state-level data



Notes: Annualized rate.

A.1 Medicare Benefits

The BEA series on Medicare benefits consists of federal government payments made directly or through intermediaries to vendors for care provided to individuals under the Medicare program (Bureau of Economic Analysis, 2016). The state-level figures are estimated by the Centers for Medicare and Medicaid Services. The BEA constructs quarterly estimates of Medicare benefits at the state level by extrapolating annual trends in state shares of the nation. Furthermore, due to lag in availability, the data for 2010 forward have been extrapolated by the BEA using Medicare enrollment.

These data cover all expenditures (with the exception of administrative expenses) from the Hospital Insurance trust fund and the Supplementary Medical Insurance trust fund. Hence, the

[35]We accessed the data via Haver Analytics.

data we use provide a comprehensive measure of the benefits provided by Parts A through D of the Medicare program.

The Medicare benefits panel is available at a quarterly frequency beginning in the third quarter of 1966, soon after the program was established. Our last observations correspond to the first quarter of 2017. Note that while Medicare Part A and Part B were instituted in 1966, Medicare Part C—which subsidized privately managed plans—began operating in 1985, albeit with a different name. Similarly, Medicare Part D—which covered outpatient prescription drugs—started in 2006. The BEA allocated the national estimate for Part D benefits to states using the enrollment counts reported by the Centers for Medicare and Medicaid Services (BEA, 2016).

Table 9 decomposes the national data into the four parts that currently make up the Medicare program. The table shows the 2016 figures. In 2016, Parts A, B and, D represented, respectively, 41.9 percent, 43.2 percent, and 14.9 percent of the national Medicare data. Note that Part C beneficiaries must also be enrolled in Part A and B, and payments are made in appropriate parts from the HI and SMI trust funds to the private health insurance plans. When considered separately, 28.2 percent of total benefits paid in 2016 consisted of subsidies to private plans via Medicare Part C.

Table 9: Medicare Data for Calendar Year 2016 (Billions of USD)

	HI Trust Fund	SMI Trust Fund		Total
	Part A	Part B	Part C	
Total Benefits	$280.5	$289.5	$99.5	$669.5
Part C	$85.2	$103.4	-	$188.6
Other benefits	$195.3	$186.1	$99.5	$480.9

Source: Authors' calculations based on the 2017 Boards of Trustees for Medicare Report.

It should be noted that the Medicare state panel we use reflects expenditures on benefits irrespective of the source of financing of these expenses. As explained in Section 2.2.1, the Hospital Insurance trust fund and the Supplementary Medical Insurance trust fund receive their revenue from multiple sources, including payroll taxes, general revenue funds, premiums, and transfers from states.

A.2 Medicaid Benefits

The BEA series on Medicaid benefits consists of payments made directly or through intermediaries to vendors for care provided to individuals under the federally assisted, state-administered Medicaid program, and the Title XIX Medicaid expansion portion of the Children's Health Insurance Program (BEA, 2016).

The BEA distributes the annual estimates of Medicaid benefits to the quarters and extrapolates using quarterly data from the CMS-64 Quarterly Expense Report. The state-level estimates of these benefits are also constructed by the BEA based on data from the Centers for Medicare and Medicaid (BEA, 2016).