Pass-through to Patients: What Matters to Public Managers in the Veterans Health Administration

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Abstract

This paper investigates how public health care managers allocate marginal resources under capitated payment and how this affects clinical utilization and outcomes. When U.S. Veterans Affairs hospital systems receive a windfall of funding, they increase spending on direct care cost centers and increase physician and nurse hours. Spending on major overhead cost centers did not increase, nor did spending on the offices of the health care system directors. This is accompanied by an increase in care utilization. A one percent increase in funding leads to a one percent increase in inpatient stays, some of which is driven by an increase in unique patients, and a one percent increase in outpatient visits. The spending increase does not cause a change in rates of death after acute myocardial infarction or rates of hospital readmissions. I find suggestive evidence that VA-Medicare dual-eligible beneficiaries use less Medicare-covered outpatient care in the private sector when their VA region receives a greater funding increase, suggesting that at least some of the increase in VA-provided care is substitution from the other sector, financed by another government program.

JEL Classifications: H1, H4, H5, I1, J4, L2, L3

Keywords: health care financing, capitation, management of public firms, provider decision-making, health care productivity

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1 Introduction

A central question in health economics is how to pay providers for health care services. Paying on the margin of the number of services – "fee-for-service" – may encourage overproduction (Laffont and Tirole, 1986). An alternative contractual arrangement – "capitation" pays agents a lump sum to care for a certain patient population for a fixed set of time. This arrangement provides "high-powered incentives" for the agents to produce efficiently, since their revenue under capitation is not increasing retrospectively proportionately to their hours and material inputs.[1] Much of the literature investigates how providers change their volume or treatment choices under contracts that reimburse on the basis of volume (e.g., Dafny (2005); Clemens and Gottlieb (2014)). There are many integrated health care systems in which patients are cared for on the basis of an annual prospective appropriation, as in the public provision cases of the U.S. Veterans Health Administration or the U.K. National Health Service, or premia as in the case of the private U.S. firm Kaiser Permanente, but there is little evidence on how providers behave under such capitated arrangements.[2] Understanding how providers respond to changes in the captation level is important for determining the optimal cap level.

I study whether health care providers under capitated payment provide more care or improve the quality of their care when their resource constraint is loosened. I study a natural experiment in which the U.S. Veterans Health Administration increased the funding of its care "networks" – managerial hierarchies overseeing multiple VHA health care systems within a contiguous geographic region – in a way that was unrelated to managerial effort, physician effort, or skill in those networks. I find that receiving greater proportional increases in funds resulted in networks using more physician hours and nurse hours, and I estimate that the number of hours increased gradually over several fiscal years. I also estimate that a percentage point increase in funds resulted in an increase in spending on direct care cost centers by the VA health care systems. The funding increase does not lead to increases in spending on major overhead cost centers. This increase in inputs coincided with an increase in outputs. A one percentage point increase in funding resulted in a one percent increase in inpatient stays and a one percent increase in outpatient visits. The magnitude of this effect of an increase in *overall allocations* on services performed is similar to the estimate in Clemens and Gottlieb (2014) of the effect of an increase in *marginal reimbursement incentives* on services performed, a three percent increase in services for a two percent increase in reimbursement. I find suggestive evidence

[1] See Newhouse (1996) for a review of theoretical treatments of different provider reimbursement contract types.

[2] Some physicians in the U.S., particularly those in managed care firms, and in France are paid at least in part on the basis of capitation. Gaynor, Rebitzer and Taylor (2004) and Ho and Pakes (2014) provide some evidence on provider responses to capitation arrangement in similar settings.

Additionally, Eastern European counties under socialism had publicly-owned and centrally directed health care delivery systems that bear resemblances to capitated arrangements. See Kornai and Eggleston (2001) for a review of those countries' health care sectors and discussion of the consequences of health care under soft budget constraints.

that VA-Medicare dual-eligible beneficiaries use less Medicare-covered outpatient care in the private sector when their VA region receives a greater funding increase, suggesting that at least some of the increase in VA-provided care is substitution from providers in the private sector who are financed by another government program. While this funding increase likely increased utilization, I do not see evidence that it improved quality, as measured by 10-day hospital readmissions rates or rates of 30-day mortality after admission for an acute myocardial infarction.

I provide evidence on the effect of changing a health care system's capitated amount on provision of care. Much of the existing literature on providers responses to revenue changes focus on changing the rate at which providers are paid for seeing more patients.[3] Reimbursing agents through a capitation, a lump sum unrelated to the quantity of services provided, is understudied. Increasing the resources cap for providers to take care of a given population can provide more resources for health care managers to provide care to patients, but it could also provide managers with fiscal room to slack off from finding efficiencies or to feather their own nests. The balance of the evidence suggests that VA systems use the increased funds to provide more services to beneficiaries and not to feather their own nests: direct care cost center spending increases while overhead cost center spending remains constant, and the increased spending in medical care providers coincides with increases in the quantity of inpatient and outpatient care. My findings have implications for large capitated health care providers like the U.K. National Health Service in the public sector and Kaiser Permanente in the American private sector. In the U.K., there are debates about funding levels and their implications for medical service provision (The Economist, 2023). I show how increasing capitated funding levels can increase the quantity of care provided. To be sure, there are some reasons to believe VHA hospitals may be different than other capitated providers. VHA administrators are employed on condition of meeting performance contracts, and VHA systems are also subject to political accountability. I provide rare evidence on the behavior of capitated hospital systems when their funding level changes.

This paper exploits a windfall in funding to understand the priorities of VHA hospital system managers. Prior work has exploited windfalls to firms to better understand manager priorities (Blanchard, Lopez-de-Silanes and Shleifer, 1994). Hospital responses to financial shocks have revealed their tendencies to act like insurers of last resort (Garthwaite, Graves, Gross, Karaca, Marone and Notowidigdo, 2019); private hospitals' value on paying shareholders and executives (Gupta, La Forgia and Sacarny, 2023); and Critical Access Hospitals' (CAHs) objectives to expand quality (Carroll, 2023). I exploit a change in the way the Veterans Health Administration's Central Office divvies up annual funds to the VHA hospital networks

[3]Increasing FFS and episode-based reimbursements have been found to increase investment in quality (Garthwaite, Ody and Starc, 2020; Cooper, Doyle, Graves and Gruber, 2022), reduce physicians turning away patients (Alexander and Schnell, 2019), affect discharge timing (Einav, Finkelstein and Mahoney, 2022; Eliason, Grieco, McDevitt and Roberts, 2018), and affect whether delivery is vaginal or by Cesarean section (Alexander, 2017).

around the county. In Fiscal Year 2003, the Central Office granularized its risk adjustment of its annual fundings, similar to how Medicare granularized its Diagnosis-Related Group classifications, as exploited by Gross, Sacarny, Shi and Silver (2021). As a result of this granularization, some patient types suddenly resulted in greater funding per VHA enrollee than they did before the reform, and so networks with more of the differentially expensive patient types received greater increases in funds from Fiscal Year 2002 to Fiscal Year 2003 than other networks. In FY 2003, networks received an increased in funds from 5 percent to 13 percent. (The Central Office imposed a floor of a 5 percent increase as part of the implementation of this reform.) I exploit this change in a similar methodological fashion as Clemens and Gottlieb (2014): I run event studies with the percent change in funds as a continuous treatment variable and in order to estimate an elasticity-like object, the percentage point change in clinical inputs and outputs as a result of a one percent increase in funds from Fiscal Year 2002 to 2003. This variation in funding increases is generated by the risk adjustment change and is unrelated to the altruism, objective, or competence of the managers or providers.

First, I find that VA networks use their increase in funds to increase direct medical care. I don't see evidence of increases in overhead cost centers, which could go towards laundering hospital linens, beautifying the grounds, or improving administrative support for employees, among other functions. I don't see increases in the specific cost center for the hospital system director. I don't see evidence of bureaucrats feathering their own nests.[4] This is early evidence of what health care managers under capitated systems choose to spend their money on when they receive a funding windfall. There are some reasons to believe these hospitals are different. Capitated systems like the U.K. NHS and Kaiser Permanente may face patient populations with different preferences and disease profiles. Hospitals not integrated with a payer may be different still. The VHA may be different from Kaiser and non-integrated hospitals in that the managers and providers may be more mission-oriented. Duggan (2000) does not find evidence among public hospitals responding a way that suggests public managers are more mission-oriented, but it is conceivable that the managers and employees in the VHA, serving U.S. veterans, are more mission-oriented than other public employees. Still, I am unaware of prior literature estimating the effect of a windfall of funds on capitated provider choices. This paper provides important early evidence on an understudied but important provider reimbursement and funding arrangement.

Second, I find that increases in funds lead to increases in utilization. Part of the motivation of paying agents with capitation is to discourage slack. An open question is whether raising a cap would lead agents to slack off or to use the increase in resources to perform more services. In this setting, VHA managers and providers use the funds to perform more services and to do so for additional unique patients.

[4]See Gandhi, Olenski, Ruffini and Shen (2024) on other public attempts to increase staffing, by tying staffing ratios to Medicaid reimbursement to nursing homes.

This leads to the question of whether this new care at the VA is care that would not have been provided in the absence of the funding boost, or if this care is substitution from another sector. I study beneficiaries dual with VHA and Medicare and find that an increase in VHA funds in a region leads to a decline in the number of Medicare outpatient claims per dual enrollee, but not in a change in inpatient claims. First, this suggests that some of the new VHA care is substitution from care provided by (likely, mostly) privately employed providers to public provided providers. Thus, some of this additional care is crowd-out (Cutler and Gruber, 1996). However, it remains an open question whether this substitution is welfare-enhancing or not. Chan, Card and Taylor (2023) find that these dual-eligible patients have experience higher quality emergency department care in the VHA than in the private sector. It's possible that the mechanisms behind the VA advantage in emergency care are also present in outpatient care, but this remains a question for future analysis. Second, it means that this increase in VHA care constitutes substitution from financing from one public program, Medicare, to another, VHA. Because VHA care poses almost no cost sharing to patients while Medicare poses substantial cost-sharing, this substitution likely reduces patient out-of-pocket spending. Chan, Card and Taylor (2023) find that VHA emergency care incurs less spending than private sector care. Given that some of the mechanisms behind this difference, such as the use of integrated electronic records, are likely present in the outpatient and inpatient settings as well as the emergency department, it is conceivable that at least some of the types of care I study also experience a VA advantage in quality or spending. The overall impact on federal government finances is not yet determined, but I plan to investigate VHA'e relative effect on clinical quality and expenditures and costs in the context of this sector switching. Crowd-out of one type of public financing of hospitals by another has been observed in the case of Medicaid Disporportionate Share program (Duggan, 2000; Baicker and Staiger, 2005), but the situation I document differs from that setting in that crowd-out of Medicare by VHA is not driven by an expropriation of another agency's funds.

Third, I don't find evidence of changes in quality as a result of an increase in funding for these VA systems, where quality is measured by 10-day readmission rates and 30-day mortality rates after acute myocardial infarctions. The VHA's response to increased funds bears some resemblance to hospitals' responses to the introduction of Medicare, which constituted a large increase in hospital revenue: hospital admissions increased (Finkelstein, 2007) but did not reduce mortality rates (Finkelstein and McKnight, 2008). One potential explanation in the VHA setting is that the VHA admits patients conditional on VHA believing that they have the resources to provide a certain ideal or professional level of care for the patient, and they dismiss them otherwise. If that's so, one might expect an increase in funding to result in an increase in volume but not in quality. Whether the VA prioritizes costlier patients and so less costly patients are on the margin, or vice versa, is a subject of future investigation. I do not see increases in non-capitalized equipment

purchases resulting from the funding increase, but whether the a VHA system makes larger investments or brings services in-house after contracting it out in an attempt to better coordinate care are, also, subjects of future inquiry. Again, capitated systems facing patients with different preferences and health profiles may choose between increasing access and improving quality differently, but I provider important first pieces of evidence here.

Section 2 describes how funds are allocated within the Veterans Health Administration and the policy shock that I exploit to estimate the VHA's elasticity of supply. Section 3 describes the data. Section 4 describes the empirical methods to estimate the elasticities. Section 5.1 presents the estimated elasticities on inputs chosen with respect to a shock in funds. Section 5.3 analyses spillover effects of this VA policy on veterans' use of Medicare-covered care by private providers. Section 6 concludes with a discussion of the results and ongoing work.

2 Resource Allocation within the Veterans Health Administration

[5]

The Veterans Health Administration runs hospital systems and clinics across the country, serving over 9 million beneficiaries. With few exceptions, beneficiaries must have been veterans of the U.S. military. They must sign up to be qualified for VHA benefits. In this section, I describe a policy change in how funds are allocated to VHA's health "super" systems, managed collections of health care systems that VHA refers to as networks.

Congress makes annual appropriations to the Veterans Health Administration. This pot of money is divvied up by the VHA central office to the 21 - 22 networks. (In 2002, two networks were combined into the Minneapolis network.) These networks oversee the hospital systems within geographically continuous regions, as depicted in Figure 1. Prior to FY 1999, the central office divvied up annual allocations to networks in a somewhat ad hoc process that took strongly into consideration how many inpatient bed-days of care a network had. This was seen as inducing substitution from outpatient care for some conditions to inpatient care. A new formulaic system called the Veterans Equitable Resource Allocation (VERA) was implemented in FY 1999 that made risk-adjusted capitated payments to the networks. Each network j in fiscal year y was allocated funds according to

[5]Thank you to numerous physicians, administrators, and researchers at the VA, including Dallas Chambers, Robert Chang, Mary Goldstein, Laura Graham, Mel Niese, Lisa Knowlton, Diana Saw Mills, Michael Moreland, and more, for their insights into the institution.

$$Allocation_{jt} = \underbrace{\sum_{i} (N_{i,j,t-2} \cdot P_{i,t})}_{\substack{\text{“VERA payment”} \\ \text{Risk-adjusted capitation}}} + \nu_{j,t} \tag{1}$$

where patient group i's "price," $P_{i,t}$ reflects i's share of total costs across networks as observed two years prior:

$$P_{i,t} = \frac{\sum_j MCAOCost_{i,j,t-2}}{\sum_j \sum_{i' \in \mathcal{I}} MCAOCost_{i'jt-2}} \cdot Author_t \tag{2}$$

and where $N_{i,j,t-2}$ is the number of patient type i receiving care in network j in year $t-2$, $MCAOCost_{i,j,t-2}$ is the managerial accounting cost of taking care of patient type i nationally in year $t-2$, $Author_t$ is Congressional authorization for total VHA funding, and ν are all other allocations – including special purpose funds, equipment and facility maintenance, research – which typically represent about 15% of a network's allocations in a year. $MCAOCost_{i,j,t-2}$ is determined by the central office by calculating the average cost of taking care of a patient for a year for each of the price group types, i. In sum, the allocation reflects the numbers of each type of patient in that network j's region of operation and how costly each patient type was relative to the other types on a national basis two years prior. This point makes it impossible for the VHA systems to game the risk adjustment scheme in its first year of implementation by changing the resource-intensiveness by which they treat patients: the cost measurements that feed into the FY 2003 risk adjustment algorithm were taken before the new scheme was announced.

Note the importance of shares in this public, capitated organization. All of VHA receives a lump sum of funds from Congress, and that amount is divided up among the networks. This is implemented by setting the annual capitated "price" for each patient type to be that patient type's *share* of overall spending the prior year, times the Congressional authorized sum. The "price" of each patient type does not reflect how costly that type was in a prior year but rather how costly that type was *relative to the other types*. This bares some resemblance to yardstick competition (Baiman and Demski, 1980; Holmstrom, 1982; Shleifer, 1985), in that the VHA central office uses information on how costly each patient type is *across networks* in order to learn about the technology of caring for patients and allocate funding appropriately. This makes gaming the risk adjustment system difficult for VHA systems for multiple reasons. First, the overall pie is set by Congress. Even if VHA providers had a way to increase the price for one patient type, it would come at the expense of reducing the price for other types. Second, the prices are set according to the relative cost of one patient type relative to another *across the country*, so increasing a price would require coordination across systems. Since different systems have different shares of different types of patients, many systems

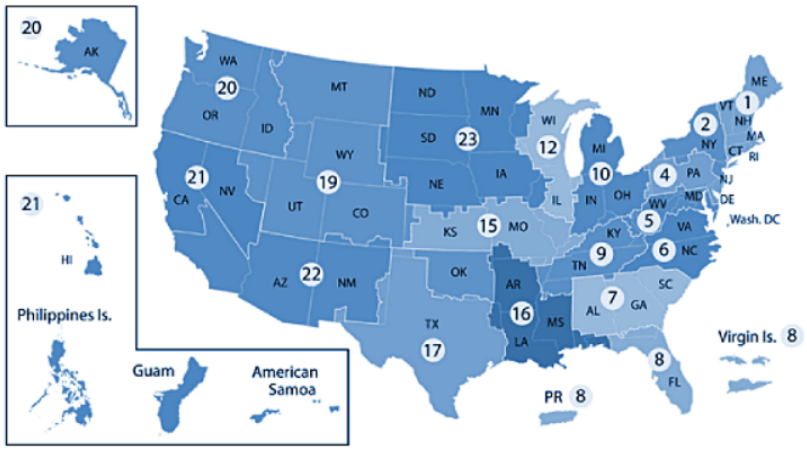


Figure 1: Map showing the geographic regions managed by each of VHA's Veterans Integrated Services Networks (VISNs) after FY 2002. Source: VHA Human Resources.

would not have an incentive to coordinate to raise one price.

Individual patients are classified into a price group using based on encounter records two years prior to an allocation's implementation, and they are classified heirarchically: patients are placed into the highest priced category they qualify for. The original VERA policy had three patient types or "price groups" with respect to which the allocations were risk adjusted. Non-vested basic care patients were not part of a VHA primary care physician's panel of patients and visited VHA for care only occasionally. Vested patients were part of a primary care provider's panel and regularly used VHA's services, and complex care patients made substantial use of VHA services like long term care or inpatient mental health or substance use care services.

The policy I exploit in order to observe VHA responses exogenous variation in capitated allocations is the introduction of a more granularized form of risk adjustment for this allocation system. Starting in FY 2003, networks' allocations were risk adjusted with respect to ten patient types, rather than just three (Table 1). This was in response to complaints from networks that they were taking care of patients whose cost of care far exceeded the capitated amount (Wasserman et al., 2001; Bascetta, 2002). Networks do not have the same distributions of patients across risk adjustment types. Networks who had more patients in the higher-allocated categories received greater increases in funding from FY 2002 to FY 2003 than other networks. Table 2 list each of the networks and their general purpose VERA funds in FY 2002 under the old three-group risk adjustment regime, funds in FY 2003 under the new ten-group risk adjustment regime, the level change from one year to the next, and the percent change. The percent change in general purpose funds from the old regime to the new regime is the treatment variable in my analysis. As part of the new policy, VHA imposed a floor for the percentage increase in funds of 5%. After this there was still substantial variation in the percentage increase in funds under the new risk adjustment policy. Some networks received increases as great as 12% while some others received the minimum increase limit of 5%. (Wasserman et al.,

VERA-3	VERA-10	Yearly Patient Allocation (in dollars)	
		VERA-3	VERA-10
Basic Non-Vested	Non-reliant care	197	263
Basic Vested	Minor medical	3,121	2,413
Basic Vested	Mental health	3,121	3,562
Basic Vested	Heart and lung	3,121	3,722
Basic Vested	Oncology, etc.	3,121	8,337
Basic Vested or Complex Care	Multiple problems		7,935
Complex Care	Specialized care	41,667	18,751
Complex Care	Supportive care	41,667	29,780
Complex Care	Chronically mentally ill	41,667	39,448
Complex Care	Critically ill	41,667	61,117

Table 1: Veterans Equitable Resource Allocation price groups under VERA-3 (FY1999 - 2002) and under VERA-10 (beginning in FY 2002). Numbers describe the VERA "price" assigned to a particular group. Patients are classified into the highest-price group they qualify for. Source: RAND Corporation (Wasserman et al., 2004).

2004)

This system persists more or less to today. The risk adjustment is revised from year to year by the Allocation Resource Center, an office within the U.S. Department of Veterans Affairs' budget office, which at a minimum updates the cost and regional adjustments for the allocation system. Occasionally it adds conditions to VERA price groups and, more rarely, combines groups, but today's VERA system with 11 price groups looks very similar to that of FY 2003. Thus, large shocks in FY 2003 increases resulted in persistently increased levels over years. Therefore, while I primarily exploit the shock in FY 2003 funds to estimate elasticities in that fiscal year, I also use an event study-like approach to trace out the VERA-10 introduction's impact over time.

I treat a network's increase in FY2003 funding as unrelated to networks' objectives, efficiency, quality of management, and altruism. It is driven purely by how many of different kinds of VHA beneficiaries are in a networks' catchment area. Patients are classified into classes which in turn belong to a price group (Appendix Table 3). They are classified into the highest class that they qualify for. This classification is based on the VHA's Patient Treatment File, which is compiled from the details that VHA providers on patient encounters, including patient movement across stops and wards, patient diagnoses, drugs administered, procedures performed, and, in the case of long-term care, patient function. Upcoding (Dafny, 2005; Geruso and Layton, 2020) would be difficult in this setting. Classification is based on a patient's utilization at least two years prior to an allocation's implementation. Most price classes are based on coarse diagnoses. Those in the highest classification – largely long-term care patients – are placed additionally there based on reported daily function and bed days of care.

Network	FY 2002 General Purpose ($ million)	FY 2003 General Purpose ($ million)	Increase ($ million)	% Increase (p.p.)
1 Boston	943	1,012	69	7.31
2 Albany	507	556	49	9.66
3 Bronx	1,059	1,112	53	5
4 Pittsburgh	956	1,077	121	12.63
5 Baltimore	576	618	42	7.28
6 Durham	882	991	109	12.37
7 Atlanta	1,072	1,159	87	8.09
8 Bay Pines	1,470	1,656	186	12.63
9 Nashville	849	927	78	9.21
10 Cincinnati	698	771	74	10.57
11 Ann Arbor	766	849	83	10.82
12 Chicago	899	978	79	8.84
15 Kansas City	718	761	44	6.09
16 Jackson	1,499	1,689	189	12.63
17 Dallas	850	937	87	10.19
18 Phoenix	732	803	71	9.77
19 Denver	483	528	45	9.36
20 Portland	840	903	63	7.46
21 San Francisco	948	1,062	114	12.07
22 Long Beach	1,083	1,220	137	12.63
23 Minneapolis	874	918	44	5
VHA Total	18,702	20,526	1,823	9.75

Table 2: Changes in Veterans Equitable Resource Allocation (VERA) funds to Veterans Integrated Networks (VISNs) from fiscal year 2002, when the old three-type risk adjustment regime was used, to fiscal year 2003, when the new ten-type risk adjustment regime was introduced. Source: VHA.

The prices for each group of a new year's VERA system is calculated by the Allocation Resource Center thusly. Each group's share of costs two fiscal years ago is calculated. That share is multiplied against the total Congressional authorization for the VHA network. That product is the price for the group. Costs, in turn, are calculated so: managerial cost accountants in each VHA health system from time to time survey care departments to assess how many hours of work by different staff types are performed for a given procedure, e.g., 30-minute orthopedic visit, 45-minute orthopedic visit. These input units are combined with input quasi-prices determined by observing accounting records on the dollars that a clinic spent on a staff type's budget line item. The cost for a price group is aggregated across health care systems by the Allocation Resource Center. Because a group's price is determined by its relative cost across health care systems, it would be very difficult for an individual network to manipulate the groups' prices.

3 Data

This paper estimates the effect of changes in funding of Veterans Health Administration (VHA) networks on changes in networks' spending and input choices as well as changes in equilibrium quantity and quality of care provided. The treatment variable is the percent change in Veterans Equitable Resource Allocation (VERA) funds – a general purpose allocation of funds – authorized to each network from fiscal year 2002 to fiscal year 2003, as already presented in the rightmost column of Table 2. This information is provided in briefing books by the VHA's Allocation Resource Center (ARC).

The input choices I observed are the dollars spent on cost centers and budget objects and, for labor budget objects, hours worked. Spending and hours are observed at the level of observation of budget object by cost center by fiscal period (month) by VHA substation, and this is recorded in the VHA's Account-Level Budget Cost Center (ALBCC) accounting data.[6]

I measure utilization of VHA care and adverse outcomes related to readmissions using records of patient encounters in the VHA's corporate data warehouse (CDW). These records contain procedure codes, diagnosis codes, and patient demographics for every VHA patient encounter. If a patient is transferred between different care settings in VHA, a new patient encounter is recorded in the data. Every outpatient encounter is assigned a stop code, and every inpatient encounter is assigned a treatment specialty. These codes reflects the type of care provided and can roughly be thought of as coarse observations of the "department" or care setting where the care took place. The CDW also records episodes of care performed by other health care providers outside VHA such as community (i.e., non-VHA) hospitals or community nursing homes – and claimed for VHA reimbursement.

An important part of my analysis investigates to what extent changes in VHA funding in a region affects use of Medicare-covered private providers by VHA-Medicare dually enrolled beneficiaries. To that end, I analyze Medicare claims of VHA enrollees who are dually enrolled with traditional Medicare. Most enrollees become eligible for Medicare at age 65. To avoid drawing conclusions from patterns affected by an aging dual beneficiary population and to avoid picking up behaviors beneficiaries who are newly enrolled in Medicare and thus may be making new choices about their care unrelated to the policy change I study, I condition my Medicare claims data set on beneficiaries who were both aged 70-75 and enrolled in VHA in 2000. I observe all Medicare inpatient facility and outpatient physician claims for those individuals.

To avoid identifying off of anomalous patterns in input and output trends from VHA networks that underwent organizational changes during my period of observation, I drop networks 1, 13, 14, 15, and 23 from my difference-in-differences analyses. VHA combined networks 13 and 14 into network 23. VHA also

[6] VHA–Palo Alto's Health Economics Resource Center has guides on best research practices for using and interpreting this data.

consolidated systems within networks 1 and 15.

4 Methods

My goal is to estimate how care inputs, such as dollars spent on direct care cost centers and physician hours, and of care outputs, such as numbers of inpatient stays and outpatient visits, change with respect to funding changes. I implement a difference-in-differences (Card and Krueger, 1994) approach in which I compare changes in VHA network inputs and outputs from before the risk adjustment reform to after it, between networks that received differently sized increases in funding from right before the reform to right after, i.e., from FY 2002 to FY 2003. This difference in differences represents the change inputs or outputs for an increase in capitation funding as long as the networks would have had parallel trends in inputs or outputs in the absence of the funding policy reform.

I implement the difference-in-differences strategy with an event study design (Jacobson, LaLonde and Sullivan, 1993) for two thoroughly familiar reasons. The dynamic difference-in-differences estimation procedures facilities examining evidence that the networks of different policy exposure followed parallel trends before the reform. It also facilities uncovering evidence that the policy may have had an impact of a differing magnitude across time. Following Clemens and Gottlieb (2014), who study the effect of a change in the Medicare physician fee schedule on physician services performed, and Finkelstein (2007), my workhorse estimating equation is

$$\ln(y_{q,n}) = \sum_{q \neq \text{Q3 } 2002} \beta_q VERAIncrease_n \times I_q + \alpha_n + \gamma_q + \epsilon_{q,n} \tag{3}$$

where y alternatingly takes on several health care inputs, utilization measures, and quality measures that I will detail later; q is the calendar quarter of the observation; n is the network, or VISN, of the observation; α_n is an indicator that the observation is of network n; and γ_q is an indicator for quarter q. β_q for $q >$ Q3 2002 is interpreted to reflect the proportional change in y from Q2 2002 to quarter q that results from a one percent increase in annual VERA funding from FY 2002 to FY 2003, $VERAIncrease_n$, reported in the rightmost column of Table 2. Because the size of federal budgets including VHA's are largely dependent on the prior fiscal year's and because the VERA allocation formula changed in relatively minute ways from year to year after VERA FY 2003 – in order to reflect changes in relative costliness of the patient types in the risk adjustment formula and changes in the population of the (very large) geographic reaches of the health care system networks – and because, to the best of my knowledge, there are no other changes in VHA policy that differentially affect networks more or less affected by the 2003 funding reform, β_q for $q >$ Q3

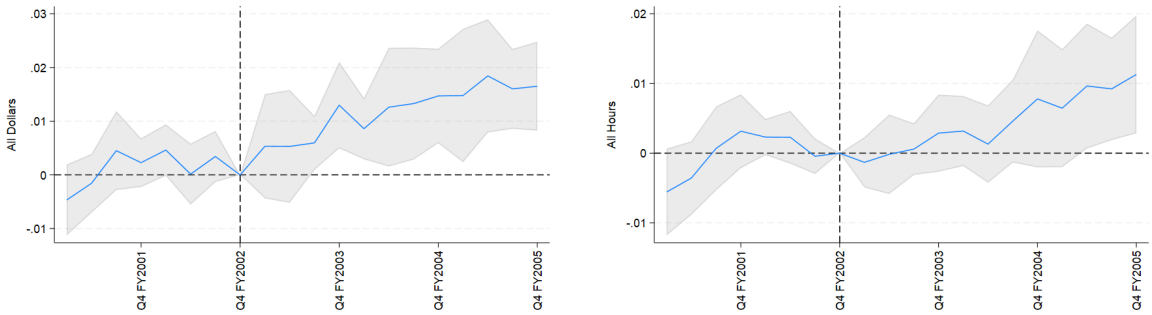
2003 are informative about the longer run decisions that followed from the VERA 2003 design even and thus are still of interest even though they do not reflect deep parameters. I include β_q for $q <$ Q3 2002 to probe the validity of my approach by testing for systematically different trends in $\ln(y)$ between networks that receive different funding shocks in 2002. I estimate this using fixed effects estimators, and I model standard errors under the assumption that the errors $\epsilon_{q,n}$ are clustered at the network level, which is also the level of "treatment" or policy change.[7]

I aggregate utilization and spending data to the calendar quarter because Congressional authorizations for the new fiscal year are not always on time. In those cases, VHA and other agency appropriations may change throughout the fiscal year until the final appropriations for that fiscal year are approved by Congress and the president.

5 Results

5.1 Passthrough to Patients: What Do VHA Networks Fund When They Have a Windfall?

This section shows that VHA network managers proportionately increase their spending on direct care and largely not on overhead when they receive a windfall. This direct care spending is largely on staff and not equipment.



(a) All Actual Dollars **(b)** All Actual Staff Hours

Figure 2: Estimates of elasticity of VHA budget authorization on overall spending and hours of staff. The left panel is included to look for evidence of differential pretrends and as an estimation of the first stage of the policy shock. The point estimates are coefficients from a two-way fixed effects regression implementing an event study where the continuous treatment is how much a VHA network's funding changed during the reform of FY 2003.

[7]Note that the policy that exposes networks to different levels of funding changes – different "treatment levels" – happens in one period. Thus, concerns in the new difference-in-differences literature on the identification dangers in estimating two-way fixed effects models in the presence of staggered treatment timing (Goodman-Bacon, 2021; Sun and Abraham, 2020; Callaway and Sant'Anna, 2021; de Chaisemartin and D'Haultfœuille, 2020; Borusyak, Jaravel and Spiess, 2024) do not apply in this setting.

I first run event study equation Equation (3) on dollars spent and hours worked. I find evidence consistent with networks that eventually received different funding increases under the 2003 policy reform following parallel trends of spending and labor inputs in the lead up to the reform. I cannot reject that there were no systematic differences in spending *before VERA 2003* across networks that received different FY 2003 windfall amounts. I also cannot reject that there were no such pre-period differences in staff hours (Figure 2). This lends credence to the empirical strategy of comparing networks with greater increases to those with lesser funding increases to estimate the degree to which increasing capitation amount leads to increases in different care inputs and outputs.

A one percent increase in VERA funds in FY 2003, the first fiscal year affected by the granularization of the capitation risk adjustment, resulted in a one percent increase in spending on direct care in-house within VHA. I cannot detect any statistically significant increases in care contracted out to non-VHA providers and facilities. Networks also did not increase spending on overhead cost centers, the major classifications of which are administrative support, engineering and the environment, and miscellaneous benefit services (Figure 3).

The effect of a funding increase on spending on non-capitalized equipment is noisily estimated but appears to be zero (Figure 3). In more detailed results, this appears true for medical and scientific equipment, and for IT and communication equipment (Figure 6). The increase in direct care dollars is largely going to staff. Physician and nurse hours increase by one percent in response to a one percent increase in VERA dollars (Figures 3 and 4).

There do appear to be differential pretrends for hours of psychologists, social workers, and medical technicians. So far I have only performed informal analysis and have not yet performed honest diff-in-diff methods from Rambachan and Roth (2023), but such analysis might lead to the conclusion that the VERA-10-induced windfall led networks to decrease their use of psychologists and social workers. A greater increase in VERA funds did lead to greater increases in some overhead line items, specifically clerks and computer programmers and operators. The VHA is well known for its large electronic medical records system, which may play a role in its care quality advantage over other settings in at least some types of care (Chan, Card and Taylor, 2023). Spending on care coordination cost centers did increase with the VERA-10 windfall. However, spending on the office of the director of the network did not increase with VERA funds. Managers did not take the opportunity to spend more on their own office (Figure 4).

5.2 Do Health Care Managers Increase Access or Quality?

In this section, we see that the increased labor inputs induced by the VERA reform do translate into increased medical care activity, as measured in numbers of inpatient stays and outpatient visits. This new labor could be used to see patients more often, see patients who would not have come into VHA before, or spend more care on patients who are seen. I see evidence for at least the first two. A one percent increase in VERA funds results in a one percent increase in inpatient stays and a one percent increase in outpatient visits (Figure 5). The Appendix shows that the increase in inpatient visits is the same across major ICD-9 categories of patient diagnoses (Appendix Figure 7). I also see an increase in the number of unique patients seen in a given quarter. This means that VHAs are increasing on both their extensive and intensive margins across patients. I do not see an increase in admissions to VHA nursing homes (Figure 5).

The third margin on which VHA networks could adjust is to spend more resources on individual patient encounters. One potential consequence of such resource expenditure could be to improve quality of care, perhaps by being more attendant to patients in critical conditions or spending more time communicating with the patient. I do not yet see evidence of an increase in quality. Specifically, I do not see a change in survival after heart attacks (acute myocardial infarctions, AMIs) or in hospital readmissions after initial admission (Figure 5). I see similar evidence on the effect of *per enrollee* spending on quality. In lieu of direct evidence on whether hospitals are expending more resources per episode of care or visit, it is hard to pin down the story. It could be that hospitals are using more resources for each visit but those resources are not effective. Alternatively, it could be that hospitals are not expending more resources per visit. This could be due to the weights that hospitals put on volume expansion relative to quality improvement, or it could be that quality only improves with larger increases in resources than the VERA-10 introduction offered. Finally, it could alternatively be that hospitals improved quality on dimensions that I have not yet observed. For example, if staffing in VHA hospitals increased, there could have been a resulting decrease in ambulatory-sensitive conditions, which I do not observe in my current data set.

5.3 Substitution between Private Care and VA Care, and between Medicare Coverage and VHA Coverage

This paper has shown that a one percent increase in funding for a VA health care "network" (the hierarchy above a health care system) results in a one percent increase in inpatient visits, partially driven by an increase in unique patients coming in for inpatient care, and a one percent increase in outpatient visits. I analyze Medicare inpatient and outpatient claims of dual eligible VHA–Medicare beneficiaries and estimate the effect of VA resource changes on utilization at private provision of care covered by Medicare, in order

to understand how much of the care increase that I observe is "new care" that would not have occurred in the absence of the VA funding increase and how much of it is substitution from private care. The primary way to become eligible for Medicare is to turn age 65. To avoid picking up changes in demographics among VHA beneficiaries, I condition this analysis on a chort of beneficiaries who were enrolled in VHA in 2000. To avoid beneficiaries who are just transitioning into Medicare eligibility, I select a cohort of beneficiaries who were aged 70-75 year-old in 2000, and thus were also dually-eligible during my entire window of analysis.

I find point estimates suggestive that VHA funding increases do not increase the number of Medicare inpatient encounters per beneficiary (Figure 5, bottom row, left). On the other hand, I do find evidence that increasing VHA funding causes a decrease in Medicare-covered outpatient encounters. I estimate that an increase in VHA funding causes a decline of about 0.01 outpatient encounters per beneficiary (Figure 5, bottom row, right). Inpatient visits may largely be for emergent conditions, in which physical proximity may be an important determinant of a patient's choice of hospital, whereas outpatient visits are largely scheduled examinations, procedures, and tests. Therefore, one might expect patients to be more likely to change their choices over health care provider in response to a change in VHA staffing in the outpatient setting than in the inpatient setting.

This suggests that some of the new VHA care is substitution from care provided by (likely, mostly) privately employed providers to public provided providers. Thus, some of the increase in outpatient care that the VHA performs as a result of the reform-induced funding increase is crowd-out (Cutler and Gruber, 1996). Second, it means that this increase in VHA care constitutes substitution from financing from one public program, Medicare, to another, VHA. Because VHA care poses almost no cost sharing to patients while Medicare poses substantial cost-sharing, this substitution likely reduces patient out-of-pocket spending. However, it remains an open question whether this substitution is welfare-enhancing or not. Estiamting the welfare effects require estimating the fiscal effect of shifting from Medicare-covered private provision to VHA coverage and provision as well as the difference in care quality between those two settings. Chan, Card and Taylor (2023) find that these dual-eligible patients have experience higher quality emergency department care in the VHA than in the private sector and that VHA emergency care incurs less spending than private sector care. It's possible that the mechanisms behind the VA advantage in emergency care are also present in outpatient care, but this remains a question for future analysis. Given that some of the mechanisms behind this difference, such as the use of integrated electronic records, are likely present in the outpatient and inpatient settings as well as the emergency department, it is conceivable that at least some of the types of care I study also experience a VA advantage in quality or spending. I plan to investigate VHA'e relative effect on clinical quality and expenditures and costs in the context of this sector switching.

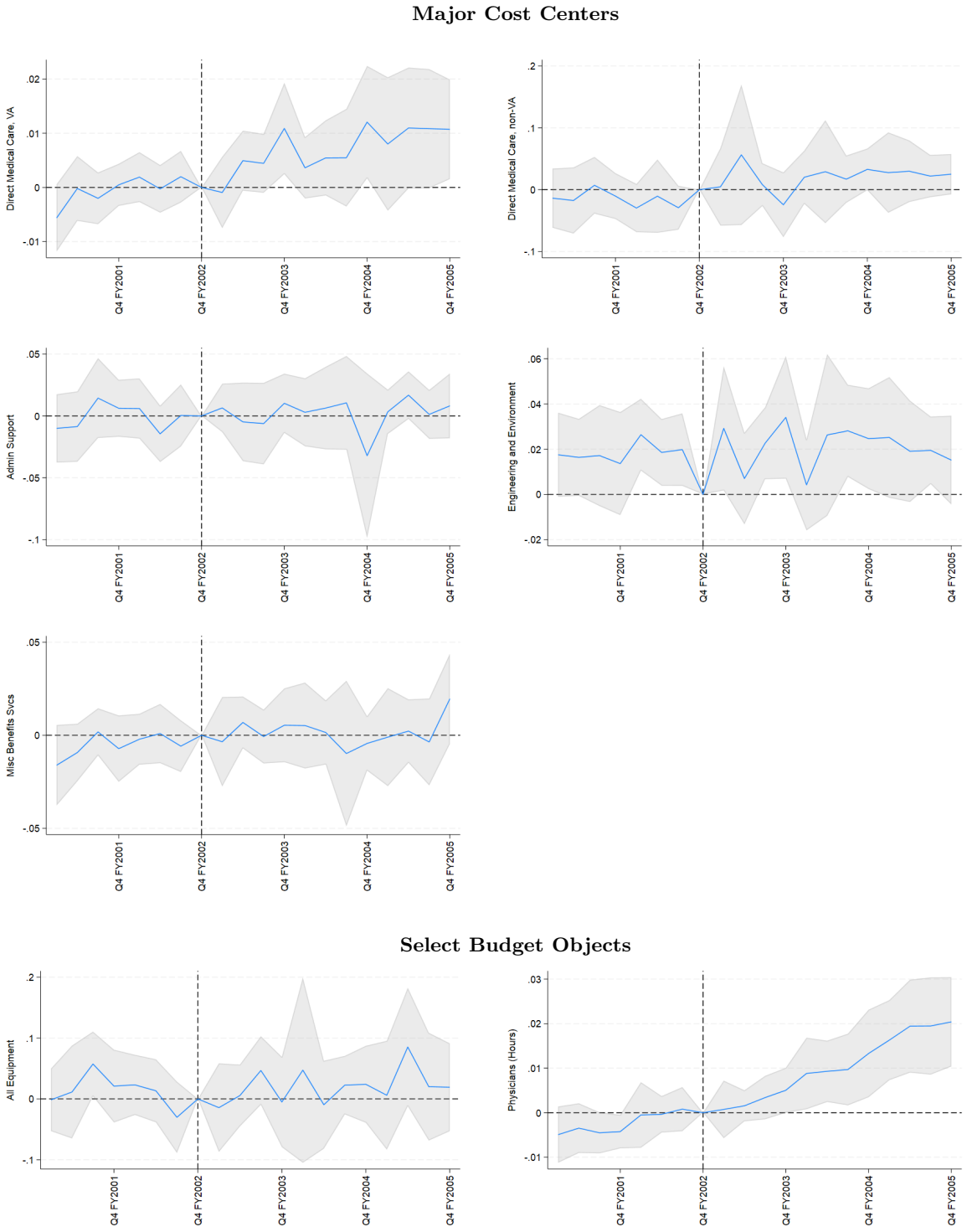


Figure 3: Estimates of elasticity of VHA spending (and in case of physicians and nurses, hours) with respect to the funding shock induced by the granularization of the allocation formula beginning in FY 2003. The point estimates are coefficients from a two-way fixed effects regression implementing an event study where the continuous treatment is how much a VHA network's funding changed during the reform of FY 2003.

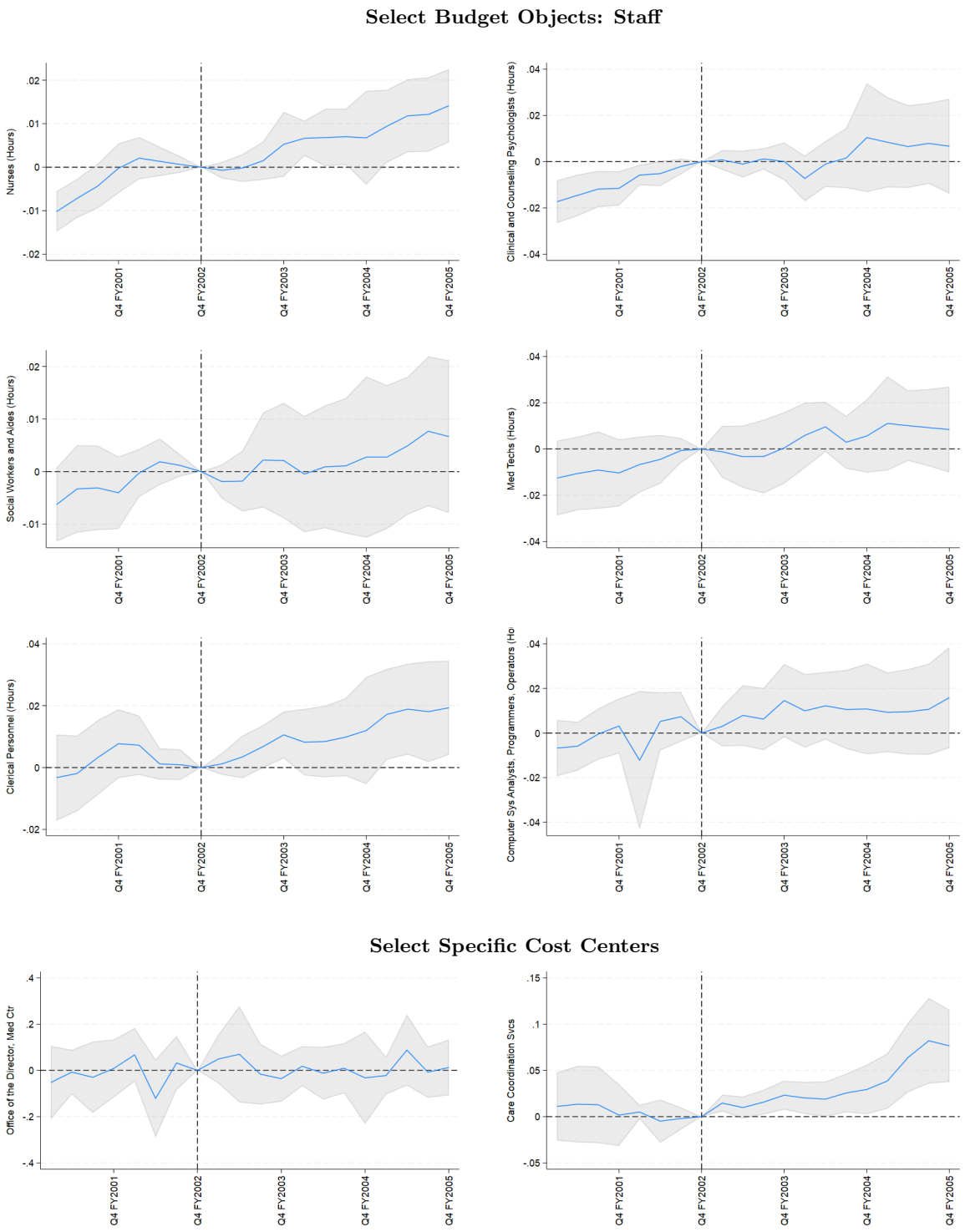


Figure 4: Estimates of elasticity of VHA spending (and in case of staff, hours) with respect to the funding shock induced by the granularization of the allocation formula beginning in FY 2003. The point estimates are coefficients from a two-way fixed effects regression implementing an event study where the continuous treatment is how much a VHA network's funding changed during the reform of FY 2003.

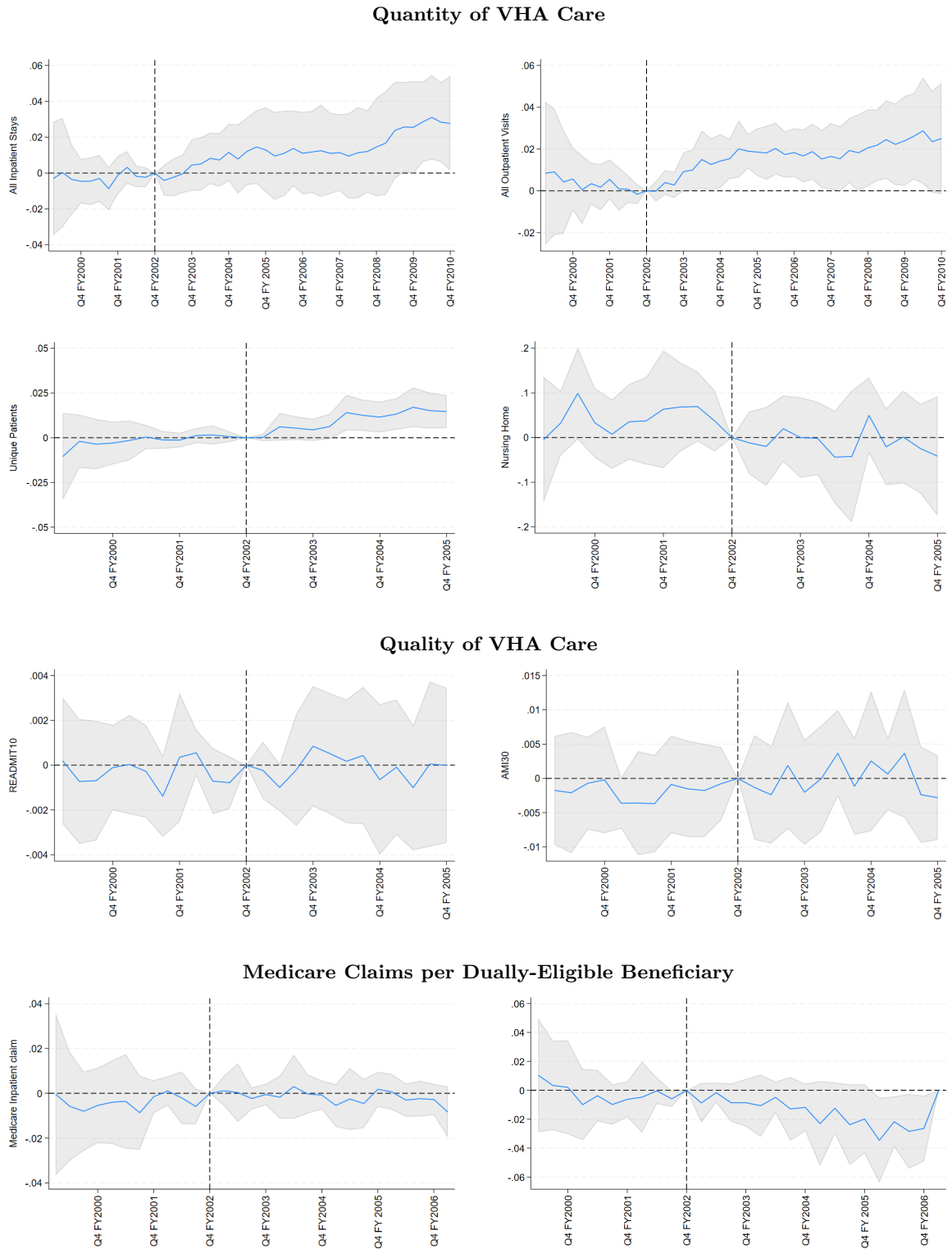


Figure 5: Estimates of elasticity of VHA spending (and in case of staff, hours) on quantity and quality of care with respect to the funding shock induced by the granularization of the allocation formula beginning in FY 2003. The point estimates are coefficients from a two-way fixed effects regression implementing an event study where the continuous treatment is how much a VHA network's funding changed during the reform of FY 2003. The bottom row presents stimates of the effect of increased VHA funding on numbers of Medicare-covered inpatient encounters per beneficiary (left) and outpatient encounters per beneficiary (right).

6 Discussion and Future Work

This paper has investigated an understudied setting in the regulation of health care. Much of the prior literature documents health care provision under fee-for-serice or episode-based reimbursement. Here I study health care management and provision under prospective capitated payment, in which health care systems are allocated funding for a certain number of patients for an entire year. Exploiting a natural experiment where health care managers were given funding increases of different magnitudes unrelated to characteristics of health care managers or providers, I find that VHA networks spend windfalls on direct care, increasing physician and nurse hours, as well as care coordination dollars. I do not find increases in major overhead cost centers or in the cost center of Office of the Medical Center Director. VHA health care systems appear to spend marginal dollars on inputs to direct medical care, and this leads to increases in the quantity of care. Numbers of inpatient stays and outpatient visits increases, partially driven by increasing the number of unique patients seen. Greater funding increases to a network are also associated with greater decreases in Medicare-cvered outpatient visits, suggesting some of the increase in VHA care may be substitution from care performed by private providers financed by Medicare. So far, I do not detect any increase in quality that results from increased funding. Future work will investigate whether patients dual-eligible with VHA and Medicare experience more or fewer adverse outcomes due to their substitution to VHA. This paper provides important first evidence on the effect that raising the level of a hosptial system's capitation has on health care manager choices of inputs and on equilibrium utilization and quality.

An important task underway is to understand the nature of marginal care, particularly whether it is care whose demand is elastic, as in Clemens and Gottlieb, or inelastic, and whether it is preventive, diagnostic, care of chronic conditions, or acute care. Additionally, I am investigating the relative acuity or complexity of marginal patients. I am also seeking evidence on how the risk adjustment granularizaiton, which provides the experimental variation in fudned exploited by this paper, potentially leads to differential increases in volume acorss patients in different risk adjustment categories, depending on whether their risk adjustment allocation increased or decreased after the reform.

References

Alexander, Diane, "Does Physician Pay Affect Procedure Choice and Patient Health? Evidence from Medicaid C-Section Use by Diane Alexander," July 2017.

_ **and Molly Schnell**, "The Impacts of Physician Payments on Patient Access, Use, and Health," July 2019.

Baicker, Katherine and Douglas Staiger, "Fiscal Shenanigans, Targeted Federal Health Care Funds, and Patient Mortality," *The Quarterly Journal of Economics*, February 2005, *120* (1), 345–386.

Baiman, Stanley and Joel S. Demski, "Economically Optimal Performance Evaluation and Control Systems," *Journal of Accounting Research*, 1980, *18*, 184–220.

Bascetta, Cynthia, "Changes Needed to Improve Resource Allocation to Health Care Networks; Statement of Cynthia A. Bascetta to the Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform, House of Representatives," Technical Report, Government Accountability Office May 2002.

Blanchard, Olivier Jean, Florencio Lopez-de-Silanes, and Andrei Shleifer, "What Do Firms Do with Cash Windfalls?," *Journal of Financial Economics*, December 1994, *36* (3), 337–360.

Borusyak, Kirill, Xavier Jaravel, and Jann Spiess, "Revisiting Event-Study Designs: Robust and Efficient Estimation," *The Review of Economic Studies*, February 2024, p. rdae007.

Callaway, Brantly and Pedro H.C. Sant'Anna, "Did: Difference in Differences," 2021.

Card, David and Alan B. Krueger, "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," *The American Economic Review*, 1994, *84* (4), 772–793.

Carroll, Caitlin, "Public Investment and Health Care Quality: Evidence from Rural Hospital Subsidies," 2023.

Chan, David C., David Card, and Lowell Taylor, "Is There a VA Advantage? Evidence from Dually Eligible Veterans," *American Economic Review*, November 2023, *113* (11), 3003–3043.

Clemens, Jeffrey and Joshua D. Gottlieb, "Do Physicians' Financial Incentives Affect Medical Treatment and Patient Health?," *American Economic Review*, April 2014, *104* (4), 1320–1349.

Cooper, Zack, Joseph Doyle, John Graves, and Jonathan Gruber, "Do Higher-Priced Hospitals Deliver Higher-Quality Care?," Technical Report w29809, National Bureau of Economic Research, Cambridge, MA February 2022.

Cutler, David M. and Jonathan Gruber, "Does Public Insurance Crowd out Private Insurance?*," *The Quarterly Journal of Economics*, May 1996, *111* (2), 391–430.

Dafny, Leemore S., "How Do Hospitals Respond to Price Changes?," *American Economic Review*, December 2005, *95* (5), 1525–1547.

de Chaisemartin, Clément and Xavier D'Haultfœuille, "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects," *American Economic Review*, September 2020, *110* (9), 2964–2996.

Duggan, Mark G., "Hospital Ownership and Public Medical Spending," *The Quarterly Journal of Economics*, November 2000, *115* (4), 1343–1373.

Einav, Liran, Amy Finkelstein, and Neale Mahoney, "Producing Health: Measuring Value Added of Nursing Homes," August 2022.

Eliason, Paul J., Paul L. E. Grieco, Ryan C. McDevitt, and James W. Roberts, "Strategic Patient Discharge: The Case of Long-Term Care Hospitals," *American Economic Review*, November 2018, *108* (11), 3232–3265.

Finkelstein, Amy, "The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare," *The Quarterly Journal of Economics*, February 2007, *122* (1), 1–37.

_ **and Robin McKnight**, "What Did Medicare Do? The Initial Impact of Medicare on Mortality and out of Pocket Medical Spending," *Journal of Public Economics*, July 2008, *92* (7), 1644–1668.

Gandhi, Ashvin, Andrew Olenski, Krista J. Ruffini, and Karen Shen, "Alleviating Worker Shortages Through Targeted Subsidies: Evidence from Incentive Payments in Healthcare," May 2024.

Garthwaite, Craig, Christopher Ody, and Amanda Starc, "Endogenous Quality Investments in the U.S. Hospital Market," June 2020.

_ **, John Graves, Tal Gross, Zeynal Karaca, Victoria Marone, and Matthew J. Notowidigdo**, "All Medicaid Expansions Are Not Created Equal: The Geography and Targeting of the Affordable Care Act," *Brookings Papers on Economic Activity*, 2019, *2019* (2), 1–92.

Gaynor, Martin, James B. Rebitzer, and Lowell J. Taylor, "Physician Incentives in Health Maintenance Organizations," *Journal of Political Economy*, August 2004, *112* (4), 915–931.

Geruso, Michael and Timothy Layton, "Upcoding: Evidence from Medicare on Squishy Risk Adjustment," *Journal of Political Economy*, March 2020, *128* (3), 984–1026.

Goodman-Bacon, Andrew, "Difference-in-Differences with Variation in Treatment Timing," *Journal of Econometrics*, June 2021.

Gross, Tal, Adam Sacarny, Maggie Shi, and David Silver, "Regulated Revenues and Hospital Behavior: Evidence from a Medicare Overhaul," July 2021.

Gupta, Atul, Ambar La Forgia, and Adam Sacarny, "Turbocharging Revenue: What Do Healthcare Providers Do With Windfall Gains?," 2023.

Ho, Kate and Ariel Pakes, "Physician Payment Reform and Hospital Referrals," *American Economic Review*, May 2014, *104* (5), 200–205.

Holmstrom, Bengt, "Moral Hazard in Teams," *The Bell Journal of Economics*, 1982, *13* (2), 324–340.

Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan, "Earnings Losses of Displaced Workers," *The American Economic Review*, 1993, *83* (4), 685–709.

Kornai, János and Karen Eggleston, "Choice and Solidarity: The Health Sector in Eastern Europe and Proposals for Reform," *International Journal of Health Care Finance and Economics*, 2001, *1* (1), 59–84.

Laffont, Jean-Jacques and Jean Tirole, "Using Cost Observation to Regulate Firms," *Journal of Political Economy*, June 1986, *94* (3, Part 1), 614–641.

Newhouse, Joseph P., "Reimbursing Health Plans and Health Providers: Efficiency in Production Versus Selection," *Journal of Economic Literature*, 1996, *34* (3), 1236–1263.

Rambachan, Ashesh and Jonathan Roth, "A More Credible Approach to Parallel Trends," *Review of Economic Studies*, September 2023, *90* (5), 2555–2591.

Shleifer, Andrei, "A Theory of Yardstick Competition," *Rand Journal of Economics*, 1985, *16* (3), 319–327.

Sun, Liyang and Sarah Abraham, "Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects," *Journal of Econometrics*, December 2020.

The Economist, "How Rationing Became the Fashion under the Tories," *The Economist*, October 2023.

Wasserman, Jeffrey, Jeanne S. Ringel, Barbara O. Wynn, Jack Zwanziger, and Karen A. Ricci, "An Analysis of the Veterans Equitable Resource Allocation (VERA) System | RAND," Technical Report 2001.

_ , _ , **Karen A. Ricci, Jesse D. Malkin, Barbara O. Wynn, Jack Zwanziger, Sydne J. Newberry, Marika Booth, and Afshin Rastegar**, "Understanding Potential Changes to the Veterans Equitable Resource Allocation (VERA) System: A Regression-Based Approach," Technical Report, RAND Corporation May 2004.

A Appendix: Additional Information on Resource Allocation

VERA 10 Group No.	VERA Class No.
1. Non-Reliant Care: Basic Non-Vested / Vested	
	1. Employee/Collateral
	2. Pharmacy
	3. Compensation and Pension Exams
	4. Non-Vested
2. Basic Medical: Basic Vested	
	5. Ear, Nose, and Throat
	6. Other Acute Diseases
	7. Endocrine, Nutritional, Metabolic Disorders
	8. Central Nervous System
	9. Musculoskeletal Disorders
3. Mental Health: Basic Vested	
	10. Acute Mental Disease
	11. Addictive Disorders
4. Heart, Lung & GI: Basic Vested	
	12. Cardiovascular
	13. Gastroenterology Disorder
	14. Pulmonary Disease
5. Oncology: Basic Vested	
	15. Hepatitis C without Anti-viral Therapy
	16. HIV without Anti-retroviral Therapy
	17. Oncology
6. Multiple Problem: Basic Vested	
	18. Medical/Psychiatry +Substance Abuse
	19. Psychiatry + Substance Abuse
	20. Multiple Medical
	21. Post Traumatic Stress Disorder (PTSD) Acute
7. Specialized Care	
	22. Hepatitis C With Anti-viral Therapy
	23. HIV With Antiretroviral Therapy
	24. Chronic PTSD
	25. Home Based Primary Care (HBPC)
	26. Traumatic Brain Injury (TBI)
8. Supportive Care: Complex	
	27. Stroke
	28. Domiciliary
	29. Spinal Cord Injury (SCI) Para-old Injury
	30. SCI Quad-old Injury
	31. Blind Rehabilitation Service
	32. Community Nursing Home
	33. Long Term Care: Low Activities of Daily Living (ADL)
9. Chronic Mental Illness: Complex	
	34. Mental Health Intensive Case Management
	35. Other Psychosis
	36. Substance Abuse
	37. Schizophrenia & Dementia
10. Critically Ill: Complex	
	38. End Stage Renal Disease (ESRD)
	39. SCI Para-new Injury
	40. SCI Quad-new Injury
	41. Long Term Care: Clinical Complex
	42. Long Term Care: Behavioral
	43. Long Term Care: Physical
	44. Long Term Care: Rehabilitation
	45. Long Term Care: Specialized Care
	46. Transplants
	47. Ventilator Dependent

Table 3: A more detailed description of the patient classes composing each VERA price group in FY 2003. Patients are classified into the highest class they qualify for. Source: VHA.

B Appendix: Additional Results

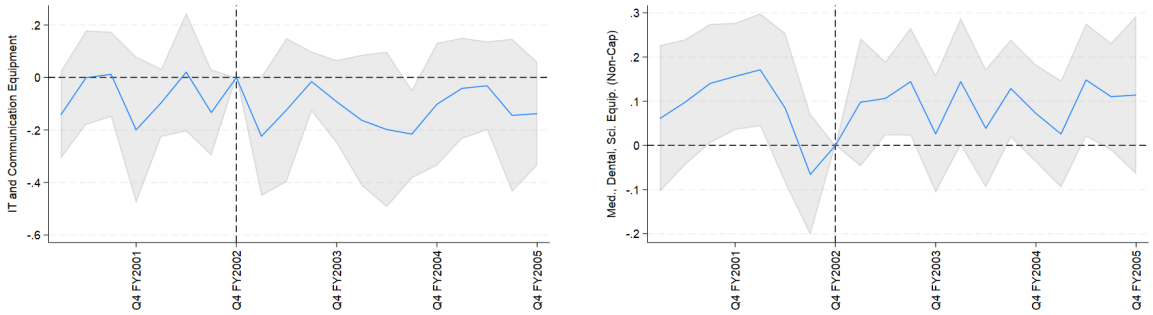
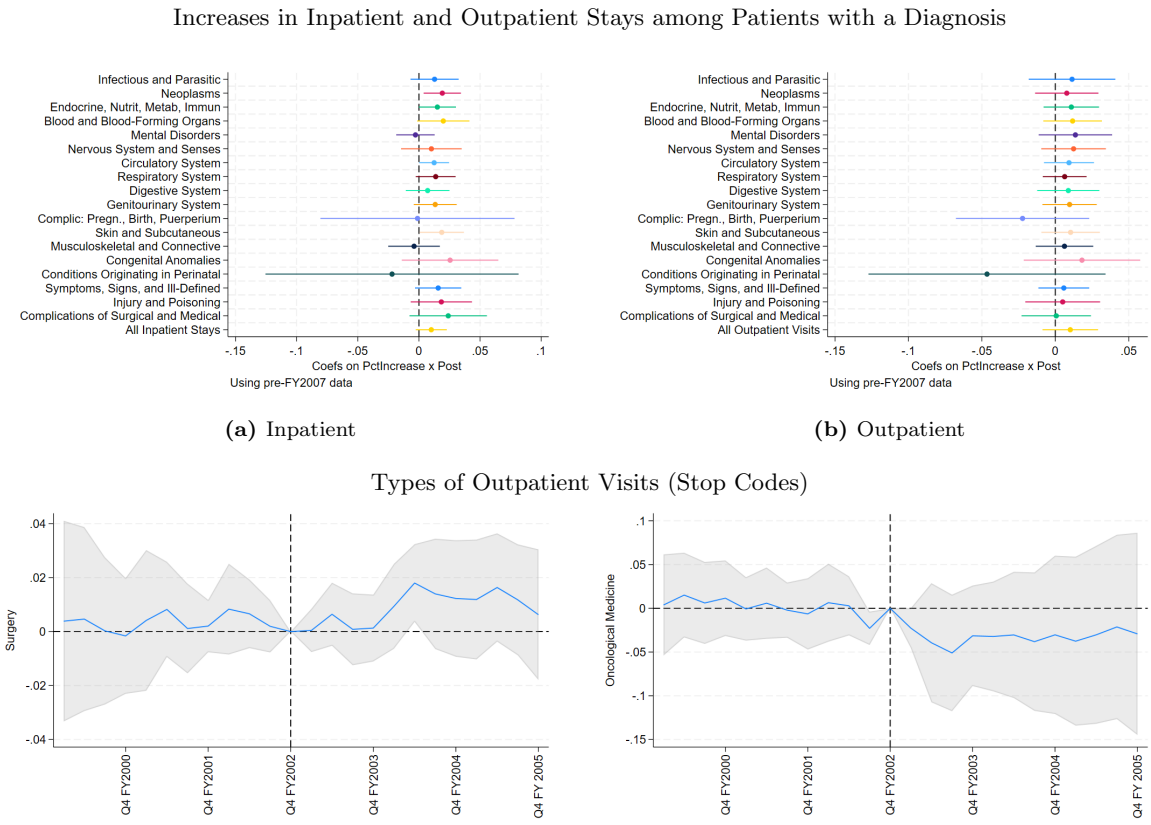


Figure 6: Estimates of elasticity of VHA spending on two categories of non-capitalized equipment with respect to the funding shock induced by the granularization of the allocation formula beginning in FY 2003.



(a) Inpatient **(b)** Outpatient

Figure 7: Estimates of elasticity of VHA spending on quantity and quality of care with respect to the funding shock induced by the granularization of the allocation formula beginning in FY 2003. Top row display estimates of effects of spending shocks on proportional increase in inpatient stays (left, a) and outpatient visits (right, b) among patients with particular diagnoses the previous year. The second row show estimates of effects on proportional changes in number of visits by treatment specialty.