Private Equity in Public-Provider Markets: Operating Efficiency vs. Cream-Skimming*

Abstract

We examine how private equity (PE) firms generate value in markets where prices are regulated and do not reflect costs. Using novel data from Arizona's ambulance industry, we find PE-owned companies increase operating profits by 50% through cream-skimming: strategically exploiting regulations, and avoiding minimum service requirements, to shift unprofitable customers to the government while retaining high-profit customers. In the ambulance industry, they accomplish this by firing paramedics, which, due to nationwide staffing regulations, forces local fire departments to take high-cost runs. This strategic reallocation only occurs where PE firms overlap with fire departments, which allows them to avoid minimum timing requirements. This impacts public health – leading to 200 additional traffic fatalities in Arizona and a 7% increase nationally. Our findings demonstrate how PE profit maximization in mixed public-private markets can create substantial negative externalities for both public balance sheets and public health.

JEL Codes: **G34, H51, I11, L33**
Keywords: **Private Equity, Public Goods, Cream-Skimming, Emergency Medical Services**

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1 Introduction

Private equity (PE) managers, who oversee over $6 trillion in assets in the US, primarily see their role in value creation as increasing operating profits (Gompers et al., 2016).[1] PE managers often target companies in industries where their primary competitors are government-backed firms, like healthcare, which makes up 18% of US GDP and is consistently one of the most targeted industries for PE.[2] However, the consumer impacts of PE involvement in these public-provider markets have largely been found to be negative (e.g., Eaton et al. (2020); Gupta et al. (2021); Liu (2022); Ewens et al. (2022)) as opposed to industries without large government competition, where impacts are largely positive (e.g., Bernstein and Sheen (2016); Johnston-Ross et al. (2021)). One defining characteristic between these two types of markets is how prices are determined. In public-provider markets, prices for different services are typically not determined competitively and thus may not be perfectly aligned with the cost of providing that service. This gives PE firms a unique avenue to increase operating profits in these markets – cream-skimming the best customers away from their public competitors.[3]

In this paper, we explore how PE firms exploit pricing regulations to cream-skim off government providers in the market for ambulance services – a market with significant competition between government-run firms and private equity firms – where, due to regulatory price and demand constraints, the only potential to create value is through cutting costs. We exploit the staggered PE-purchase and entry of the largest and second-largest private ambulance companies (AMR / Life Line and Rural Metro) into the Arizona ambulance market as

[1] Other forms of value creation include financial engineering and purchasing companies at an attractive price or in growing markets (Gompers et al., 2016).

[2] For background on private equity sector investments, see Baird Investment Banking's report, "Which Sectors Are Private Equity Investing In?" (July 2023), available at: https://www.rwbaird.com/corporations-and-institutions/investment-banking/insights/2023/07/which-sectors-are-private-equity-investing-in/.

[3] Cream-skimming refers to the practice of structuring the business to provide service primarily to low-cost/high profit-margin consumers while leaving high-cost/low profit-margin consumers for competitors.

identifying variation in a difference-in-differences estimation.[4] We find that ambulance operations purchased by private equity increased their operating profit by 48%. This increase was entirely driven by shifting high-cost, unprofitable, ambulance encounters – Advanced Life Support (ALS) runs – onto local fire departments. We find no evidence of more efficient production. We also examine the health spillovers of this PE investment and find that it led to 200 additional traffic fatalities in Arizona over our sample period (2010-2017) and a 7% increase nationally.[5]

We next identify the exact mechanism PE ambulance companies use to shift ALS runs onto fire departments. The cream-skimming works as follows: (1) PE firms enter and fire paramedics, who are higher-skilled (and more costly) EMS employees; (2) because paramedics are a legal requirement for ALS runs across the US, PE firms can deem themselves "unavailable"[6] when an ALS call comes in; (3) the ALS call is then transferred to the next closest ambulance provider with paramedics available, which is typically a fire department.[7] Because there are minimum timing requirements, this strategy only works in areas where there is a public competitor to shift the ALS run on to. We exploit this in a heterogeneous treatment effects model and find that PE firms only fire paramedics in service areas that overlap with fire departments, and that these overlapping service areas are entirely responsible for the growth in operating profits and increased traffic fatalities.[8]

[4]Importantly, we only explore these firms' behavior and do not make value judgments. While the behavior and outcomes we document have negative connotations, we do not know the counterfactual of PE not purchasing these companies. Like many PE involvements in the health space, both companies were in financial difficulty prior to purchase and it is possible they would have closed entirely, which could have had even larger negative effects.

[5]We use traffic fatalities as our proxy for health effects because small differences in time-to-scene can have large health impacts and because we can exactly geo-locate which ambulance service area(s) the accident occurred in.

[6]This is referred to in dispatch code as the ambulance provider being "Level Zero." As an example, AMR / Life Line Ambulance (jointly owned by private equity funds) in Arizona went to Level Zero (and turned down emergency calls) 760 times in a single operating area from July 2nd through Dec 31st in 2021 (Central Arizona Fire and Medical Authority, 2024).

[7]If there is no alternate ambulance, the patient must wait until a paramedic is available.

[8]The timing requirements are based on the ultimate time it takes the patient to reach the hospital, so they will only be triggered if there is not a public competitor to shift the run on to and the patient is forced to wait for the PE firm to find a paramedic.

We focus on the ambulance market as a laboratory for isolating how PE firms compete with public firms. Unlike some other public-provider markets that PE has entered, ambulance firms do not compete at all on price or quality, as customers have no choice in the firm that responds to a 911 call, and regulators largely set prices. We focus on Arizona because the state requires detailed cost reports for all ambulance operators (public and private). Additionally, we are able to observe the exact geographic operating areas for each firm, which are legally defined and do not change during our sample period, of all Arizona ambulance companies, which lets us observe variation in the ability of PE firms to cream-skim. While Arizona is unique in its data availability, the state's other regulations are in line with the majority of the country.

Cream-skimming requires that some customers be observably more profitable than others. In the ambulance industry, this is simple: every ambulance run is considered either Basic Life Support (BLS) or Advanced Life Support (ALS), and firms tend to lose money on ALS runs and make money on BLS runs (United States Government Accountability Office, 2012). BLS runs occur when the patient's condition does not immediately threaten their life and does not require advanced interventions. Emergency Medical Technicians (EMTs), who are paid a relatively low salary, largely handle these calls. In contrast, an Advanced Life Support (ALS) ambulance run involves responding to calls where the patient's condition potentially threatens their life and requires more complex interventions than BLS can provide. These interventions often include intravenous (IV) therapy, advanced airway management, electrocardiogram (ECG) interpretation, or the administration of medications. ALS teams are comprised of at least one paramedic, who has extensive training in these advanced procedures and is paid a commensurately higher salary.[9] While the regulated prices

[9]The median wage for an EMT in 2022 was $35,000 while the median wage for a paramedic was $49,000 (Bureau of Labor Statistics, U.S. Department of Labor, 2022). This reflects the paramedics higher training. While it varies by state, EMTs generally receive 120-150 hours of training while paramedics receive an additional 1,200-1,800 hours of training (see https://www.ems1.com/ems-products/education/articles/what-is-the-job-of-a-paramedic-and-what-are-the-requirements-for-certification-SoHHGkJ2os1h1FiH/).

are technically set by type of run, regulators usually set the prices equally in practice (United States Government Accountability Office, 2012).

We first look at how firm profit changes when firms are bought out by private equity. We exploit the staggered acquisition of the two largest national private ambulance companies, which is plausibly exogenous to Arizona-specific operations. We adopt the modern difference-in-differences framework of Borusyak et al. (2024) and find that operating profit nearly doubles for PE firms.[10] We next exploit the differential potential for cream-skimming by estimating a heterogeneous difference-in-differences model based on the number of fire departments that operate in the same service area.[11] Under Arizona law, ambulance companies have response time requirements that they must meet to avoid financial penalties (and potential loss of license). However, these requirements do not apply to runs that PE firms are able to shift to fire departments.[12] We find the increase in operating profit is entirely driven by PE-owned firms operating in areas with more government competitors to cream-skim from.

Next, we identify the specific mechanism of cream-skimming. Using detailed operations and staffing data, we show that PE firms achieve an increase in profits by firing paramedics, which reduces their capacity to take the less profitable ALS runs. These less profitable ALS runs are instead taken by ambulances run by fire departments, which prevents them from taking as many of the more profitable BLS runs. These more profitable runs are then taken by the original PE company since they have an ambulance (with an EMT) ready.

We next examine the potential health spillovers of this cream-skimming behavior. Using data on fatal traffic accidents, we find that fatal traffic accidents increased by 15% in operating areas run by private equity firms after the buyout. This effect is also entirely driven by

[10]Interestingly, we find that accounting profit does not change nearly as much. This is because PE firms immediately report outstanding accounts receivable as bad debt and send it to collections, which allows them to write it off immediately.

[11]For conciseness, we just refer to fire departments. In the analysis, we do include non-profit firms, but they make up roughly 8% of our sample, which is small compared to fire departments, which make up over 30% of the sample.

[12]For more detailed information, please see Sections 2.1 and 2.2.

PE-owned areas with significant overlap with fire departments, with no statistical increase for CONs with only PE firms. We estimate that PE ownership of ambulance companies led to over 200 incremental fatalities from traffic accidents in Arizona in the years following PE involvement (i.e., 2011-2017). A county-level national analysis, exploiting the buyout of the second largest ambulance company (Rural/Metro), finds that PE involvement increased fatalities from traffic accidents by 7%. These findings highlight how the operational changes implemented by PE firms to boost profits can have consequential negative impacts on public health outcomes.

We contribute to three rapidly growing literatures. The first explores how private equity ownership extracts value for shareholders across a diverse set of industries. Private equity ownership is well-known to be associated with powerful incentives to increase firm value (Kaplan and Strömberg, 2009; Boucly et al., 2011). These incentives can drive operational changes such as the implementation of better management strategies, allowing PE firms to better handle crises and add to firm value (Davis et al., 2014; Bloom et al., 2015; Bernstein et al., 2018; Hotchkiss et al., 2021). However, other work has noted that private equity managers may also utilize financial engineering techniques, such as optimizing leverage and tax strategies, to generate returns (Axelson et al., 2013). Additionally, private equity managers may possess skills in identifying target companies that are already on a path towards improved outcomes (Guo et al., 2011; Acharya et al., 2013; Smith, 2015).

A substantial body of evidence suggests that private equity managers take an active role in shaping company operations, which aligns with our findings. Existing research has generally identified positive impacts of private equity ownership on product quality, employees, and consumers across various industries.[13] However, sectors characterized by direct competition with government-run entities, such as education (Eaton et al., 2020), nursing homes (Gupta et al., 2021), hospital (Liu, 2022), and local journalism (Ewens et al., 2022) (local journalism),

[13]For example: Bernstein and Sheen (2016) with restaurants; Fracassi et al. (2022) with retail stores; Johnston-Ross et al. (2021) with distressed banks; and Olbert and Severin (2023) with local public finances.

there are negative effects on consumer outcomes following private equity buyouts.[14] Our primary contribution to this literature lies in our novel evidence on cream-skimming as a specific mechanism employed by private equity firms to boost profits in public-private markets. Our detailed data and unique characteristics of the ambulance industry enables us to identify the precise operational change that facilitates this cream-skimming behavior and isolate it from general operating efficiency gains. While the exact staffing mechanism is perhaps unique to ambulances, the underlying friction – regulators setting prices that do not represent costs – is pervasive.

Second, we contribute to the literature on the operations of healthcare firms. Previous research has highlighted concerns about cream-skimming in various healthcare settings, such as hospitals and nursing homes (Barros, 2003; Hackmann, 2019; Werbeck et al., 2021). Our work extends these findings by demonstrating that cream-skimming can also occur in the pre-hospital setting, leading to significant impacts on patient outcomes.

Finally, we contribute to the literature on ambulance company operations. While there is extensive work examining the impact of ambulance response times on health outcomes (e.g., Mayer, 1979; Blackwell and Kaufman, 2002; Pons et al., 2005; Vukmir, 2006; Blackwell et al., 2009; Byrne et al., 2019; Lucchese, 2024), little work has been done directly on the operations of the ambulance companies themselves. What literature does exist has focused on the supply-side response of the industry to regulatory changes (e.g., Courtemanche et al., 2019), fraud/overbilling in the industry (e.g., Sanghavi et al., 2021; Esson, 2021; Eliason et al., 2021), or has utilized the ambulance industry for identifying variation to study a separate industry (e.g., Doyle et al., 2019).

[14]Notably, Gao et al. (2021) does not find evidence of adverse patient outcomes for hospitals.

2 Institutional Details

2.1 Ambulance Regulation and Definitions

The ambulance industry is comprised of both public and private companies. Figure 1 highlights this, showing that the largest providers of ambulance services in 2011 were fire departments, but the second largest were private non-hospital-based companies.

EMS Agency Numbers by Organizational Type, 2011

EMS Agency Organizational Type	States With Org. Type	Mean	Median	Min	Max	Sum
Fire-Department-Based	46	138.9	61.5	1	581	6,388 (40%)
Governmental, Non-Fire-Based	44	74.0	30	1	800	3,255 (21%)
Hospital-Based	43	21.0	14	1	100	901 (6%)
Private Non-Hospital-Based	45	86.9	40	1	823	3,910 (25%)
Tribal	19	4.4	3	1	25	84 (1%)
Emergency Medical Dispatch	11	33.9	27	1	81	339 (2%)
Other EMS Agency	7	139.7	63	1	683	978 (6%)
Total						**15,865**

Figure 1: National EMS Assessment: Organizational Breakdown - 2011

Note: This figure comes from the 2011 National EMS Assessment Research Note from the National Highway Traffic Safety Administration (National Highway Traffic Safety Administration, 2011).

Ambulance regulation varies by state; however, there are certain elements that are common across states. EMS agencies must be licensed in each state, and the license allows the agencies to provide service to a particular area. The size of the licensed operating areas varies across states and can range from county, city, municipality, or a small local service area of a single EMS Agency station. As of 2011, the majority (54%) of states set their licensure level at the local EMS Agency's response area, with the second closest level of service being the township/municipality level (20%) (Federal Interagency Committee on Emergency Medical Services, 2012). The organization that oversees this regulation also varies by state and can be an EMS office, some other state agency, multiple state agencies, some other entity, or no regulation. For 911 services, 93% of states rely on EMS offices. The exceptions are Colorado and California, which use county-level regulation; Delaware, which has different agencies to regulate based on the level of service provided; and Ohio, which uses the EMS office to

regulate private firms, but public firms are regulated locally (National Association of State EMS Officials, 2020). Besides licensing requirements to determine allowable operating areas, many EMS regulatory bodies also strictly regulate the allowable base rate that patients can be charged.[15]

Ambulance providers responding to 911 calls face additional federal regulation under the Emergency Medical Treatment and Labor Act (EMTALA). Under EMTALA, ambulance providers responding to 911 calls are required to treat (and transport if necessary) a patient regardless of their ability to pay. However, which ambulance provider gets sent to a specific 911 call will depend on which regulated ambulance provider for the specific area is (1) closest to the call, and (2) available to take the call. Ambulance provider availability depends both on the availability of the correct type of ambulance (i.e., is there an appropriate level ambulance currently without a patient) as well as the ability to meet regulated staffing requirements. The type of ambulance needed, and the staffing requirements depend on the type of ambulance call.

There are two different types of ambulance transports: Basic Life Support (BLS) and Advanced Life Support (ALS).[16] BLS runs are generally for providing lower-acuity care while ALS runs are for moderate to high acuity care. BLS runs will provide medically necessary supplies and services but cannot perform invasive procedures and are limited in the medications that they can administer. ALS runs are able to perform the same level of care as BLS runs but are also able to perform more invasive procedures and provide more types of medications. Specifically, the Center for Medicare and Medicaid Services (CMS) defines an ALS run as one that requires an ALS assessment by ALS personnel or at

[15]For example, Hawaii, Los Angeles County, California, Miami-Dade County, Florida, Utah, Connecticut, and Arizona.

[16]There are subcategories of each type of ambulance transports. Specifically, there are BLS runs, BLS-Emergency runs, ALS-Level 1, ALS-Level 1 Emergency, ALS-Level 2, and paramedic intercept (PI). PIs are ALS services provided by an entity that does not provide the ambulance transport. This will occur if a BLS ambulance is dispatched but the patient needs a higher level of care. Ambulance transports can also fall under two other broad categories: interfacility transports and specialty care transport (SCT). Interfacility transports are non-emergency transports of patients between facilities (e.g., hospital to a nursing home). SCTs are interfacility transports of critically ill patients that require care beyond the level of a basic paramedic.

least one ALS intervention (Centers for Medicare and Medicaid Services, 2018). An ALS assessment is a determination at dispatch that an ALS personnel is required for care. An ALS personnel is an individual trained as either an EMT-Intermediate or EMT-Paramedic (Centers for Medicare and Medicaid Services, 2018). An ALS intervention is a procedure that requires more advanced medical training with examples including intravenous (IV) administration of fluids or medication, patient intubation, chest decompression, and manual defibrillation/cardioversion (i.e., electrically shocking heart). Given the higher complexity of ALS runs, the ambulance sent on an ALS run must be of a higher standard than a basic ambulance.[17] Figure 2 provides an illustration of some of the differences between BLS and ALS ambulances and the types of calls supported.

Figure 2: BLS vs. ALS:

Note: This figure provides a very general overview of the differences between ALS and BLS ambulance runs. This figure comes from UI Health.

[17] See CMS manual for the exact specifications between an ALS and BLS ambulance. It should be noted that an ALS ambulance can always be used for a BLS run but the reverse is not true.

To qualify for Medicare reimbursement, BLS ambulances are required to be staffed by two personnel, where one of the personnel must be certified at a minimum as an emergency medical technician-basic (EMT-Basic) and the other provider must be legally authorized to operate all lifesaving and life-sustaining equipment on the ambulance (Centers for Medicare and Medicaid Services, 2018). ALS ambulances also must be staffed by two personnel but one of the personnel must be certified at a minimum as an EMT-Intermediate/EMT-Paramedic (Centers for Medicare and Medicaid Services, 2018). The majority of state ambulance regulatory bodies follow CMS guidelines for staffing requirements for ALS and BLS runs (Shotwell et al., 2018). Specifically, the majority of states require that an ALS run requires a paramedic (Shotwell et al., 2018). The states that do not follow this guideline generally have in place more stringent restrictions. For example, New Jersey and Delaware require that ALS runs are staffed with two paramedics (Shotwell et al., 2018). The requirement for a paramedic over a basic EMT on ALS calls is due to the difference in their level of training. On average, the education requirement to be licensed as an EMT is 150-190 hours of training whereas for paramedics it is 1,000-1,800 hours of training. Consequently, paramedics receive a higher pay than EMTs with the median annual wage in 2022 for an EMT of $35,350 compared to a median paramedic salary of $48,790 (Bureau of Labor Statistics, U.S. Department of Labor, 2022).

These staffing requirements will factor into the dispatch decisions of an ambulance as described above. For example, if there is a patient who requires intubation, which is an ALS intervention, but the closest ALS ambulance does not have a paramedic onboard, then that ambulance will not be available to take the ALS-level call. That call will either (1) be sent to a farther away ALS ambulance within the operating area that meets the staffing requirement, or (2) if there are none available, the patient will need to wait until a paramedic becomes available.[18] Staffing is therefore an important consideration for ambulance companies as

[18]In some cases, if there is no paramedic available and will not become available, other ambulances outside the operating area may be called in (if the ambulance company has a mutual aid agreement) or an air ambulance will be notified. In that case, a BLS ambulance will take the patient to the air ambulance pickup point.

many EMS regulatory bodies have timing requirements that ambulance companies must meet in order to maintain their license and/or avoid financial penalties.[19] Specifically, if an ambulance company consistently does not meet required response times, the EMS regulatory body will impose financial penalties, allow competitors to enter into the area, or remove the operating license of the ambulance company. This response time requirement penalty does not apply to those runs where the closest ambulance company does not meet the staffing requirement, but another ambulance company in the operating area is able to provide service.

2.2 Arizona Ambulance Regulation

Arizona ambulance companies are regulated by the Arizona Department of Health Services Bureau of Emergency Medical Services and Trauma System. Arizona licenses their ambulances at the small local service area of a single EMS Agency station. To operate a ground ambulance in Arizona, an ambulance company must be issued a Certificate of Necessity (CON) by the director of the department. A CON outlines the ambulance service area, level of service (e.g., ALS, BLS, both, etc.), type of service (e.g., immediate response, interfacility, both, etc.), hours of operation, response times, effective date, expiration date, legal name and address of the ambulance service, and any restrictions.[20] After being awarded a CON, an ambulance company is able to operate within their designated service providing their licensed level of service. To maintain the CON, the ambulance companies must ad-

[19]For example, see Oregon's regulation based on County Ambulance Service Areas, Connecticut, Wyoming, Independence, Missouri, Washington, New York City, and Arizona

[20]The initial application process is quite extensive. For specifics on what is required, please see https://www.azdhs.gov/documents/preparedness/emergency-medical-services-trauma-system/ambulance/ground/CONGeneralInformation.pdf

ditionally (1) submit an annual revenue and cost report; (2) meet their regulated response times; and (3) submit a CON renewal every three years.[21,22]

If an ambulance company changes ownership, the company must notify the Director of the Bureau of Emergency Medical Services and Trauma System and submit an application showing that the requirements of the CON will be maintained. The Director will then approve or deny the request for the CON to be maintained. In practice, the new ownership inherits the CON. Throughout our sample period (2007-2017), the CON was always maintained after a change in ownership with no changes to the CON. Figure 3 shows an example of a CON in Arizona; specifically, CON 65, which is for Rural Metro operating in Yuma, AZ. Rural Metro was bought out by private equity in 2011. Panel (a) presents the CON prior to this PE buyout and Panel (b) shows the renewal CON after the PE buyout, which was required earlier than the three year period as there was a change in ownership. As Figure 3 shows, these CONs are identical.

Figure 4 illustrates the service area for Rural Metro-Yuma described in their CON in Figure 3. The dashed area in Figure 4 depicts the operating area of Rural Metro-Yuma (i.e., CON 65) and the colored regions depict other ambulance company CONs that overlap with CON 65. As Figure 4 illustrates, CONs are not standard shapes and competition with other ambulance companies can occur.

Arizona ambulance companies are strictly rate regulated. The Bureau of Emergency Medical Services and Trauma System sets reimbursement rates for (1) mileage, (2) BLS,

[21] Under Arizona Statue 36-2232, 36-2241, 36-2246, to maintain a CON, "A certificate holder shall submit to the Department, no later than 180 days after the certificate holder's fiscal year end, the appropriate Ambulance Revenue and Cost Report." There are two different types of cost reports: (1) Fire District and Small Rural Company (i.e., short report) and (2) Long Report. All privately held for-profit companies, large ambulance companies (e.g., making more than $1,000,000 or completing more than 10,000 runs), and all applicants for a general base rate increase must submit the long report. All other companies are able to submit the short report but can always submit the long report. These cost reports are quite detailed. See Online Appendix A for an example of a long cost report and Online Appendix B for an example of a short cost report.

[22] A CON renewal is a less intense process than the original application. The company must submit a short application, provide proof of continuous insurance coverage, a list of charges, an affirmation that they have been meeting the conditions of the CON, and a filing fee. For more information, please see https://www.azdhs.gov/documents/preparedness/emergency-medical-services-trauma-system/ambulance/ground/CONGeneralInformation.pdf.

Figure 3: Arizona CON Example:

ARIZONA DEPARTMENT OF HEALTH SERVICES

STATE OF ARIZONA) ss
County of Maricopa

CERTIFICATE NO. - 65 -
DOCKET NO. EMS 3589

THE ARIZONA DEPARTMENT OF HEALTH SERVICES has found, under the authority of A.R.S. § 36-2232 et seq and Pursuant to Department of Health Services rules, that public necessity requires the operation of

RURAL/METRO CORPORATION (YUMA) dba
RURAL/METRO AMBULANCE SERVICE

as a ground ALS and BLS ambulance service in the State of Arizona for the transportation of individuals who are sick, injure wounded or otherwise incapacitated or helpless within the following service area, with the following central operations station and response ti

1. Service Area:
All of Yuma County for unlimited ambulance service except the service areas specifically granted to Ti Valley Ambulance Service, Inc., in Certificate of Necessity, No. 35.
2. Legal Address: *708 West Baseline Road, Mesa, AZ 85210.*
3. Response Times:
   a. *Ten (10) minutes in eighty-five (85) percent of all ambulance calls.*
   b. *Fifteen (15) minutes in ninety (90) percent of all ambulance calls.*
   c. *Twenty (20) minutes in ninety-seven (97) percent of all ambulance calls.*
   d. *Sixty (60) minutes in one hundred (100) percent of all ambulance calls.*

Now, therefore, by virtue of the authority vested in the Arizona Department of Health Services, under the constitution and law of the State of Arizona, does hereby grant this

RENEWAL
CERTIFICATE OF NECESSITY

authorizing the operation of the aforesaid ambulance service for a period ending November 30, 2013 unless for cause sooner amended, suspended, revoked or terminated subject to the decisions and orders, and rules of the Depar

PROVIDED, that this certificate shall not be assigned nor transferred unless authorized by the Arizona Department of Health Services.

BY THE ORDER OF THE ARIZONA DEPARTMENT OF HEALTH SERVICES, IN WITNESS WHEREOF, I WILL HUMBLE the Director of the Arizona Department of Health Services, have hereunto my hand and caused the official seal of the Arizona Department of Health Services to be affixed at Phoenix, Arizona on December 3, 2010

DIRECTOR

(a) Pre-Private Equity Buyout

ARIZONA DEPARTMENT OF HEALTH SERVICES

STATE OF ARIZONA) ss
County of Maricopa

CERTIFICATE NO. - 65 -
DOCKET NO. EMS 3934

THE ARIZONA DEPARTMENT OF HEALTH SERVICES has found, under the authority of A.R.S. § 36-2232 et seq and Pursuant to Department of Health Services rules, that public necessity requires the operation of

RURAL/METRO CORPORATION (YUMA) dba
RURAL/METRO AMBULANCE SERVICE

as a ground ALS and BLS ambulance service in the State of Arizona for the transportation of individuals who are sick, injured, wounded or otherwise incapacitated or helpless within the following service area, with the following central operations station and response times:

1. Service Area:
All of Yuma County for unlimited ambulance service except the service areas specifically granted to Tri-Valley Ambulance Service, Inc., in Certificate of Necessity, No. 35.
2. Legal Address: *708 West Baseline Road, Mesa, AZ 85210.*
3. Response Times:
   a. *Ten (10) minutes in eighty-five (85) percent of all ambulance calls.*
   b. *Fifteen (15) minutes in ninety (90) percent of all ambulance calls.*
   c. *Twenty (20) minutes in ninety-seven (97) percent of all ambulance calls.*
   d. *Sixty (60) minutes in one hundred (100) percent of all ambulance calls.*

Now, therefore, by virtue of the authority vested in the Arizona Department of Health Services, under the constitution and laws of the State of Arizona, does hereby grant this

RENEWAL
CERTIFICATE OF NECESSITY

authorizing the operation of the aforesaid ambulance service for a period ending November 30, 2014 unless for cause sooner amended, suspended, revoked or terminated subject to the decisions and orders, and rules of the Department.

PROVIDED, that this certificate shall not be assigned nor transferred unless authorized by the Arizona Department of Health Services.

BY THE ORDER OF THE ARIZONA DEPARTMENT OF HEALTH SERVICES, IN WITNESS WHEREOF, I WILL HUMBLE the Director of the Arizona Department of Health Services, have hereunto set my hand and caused the official seal of the Arizona Department of Health Services to be affixed at Phoenix, Arizona on November 8, 2013

DIRECTOR

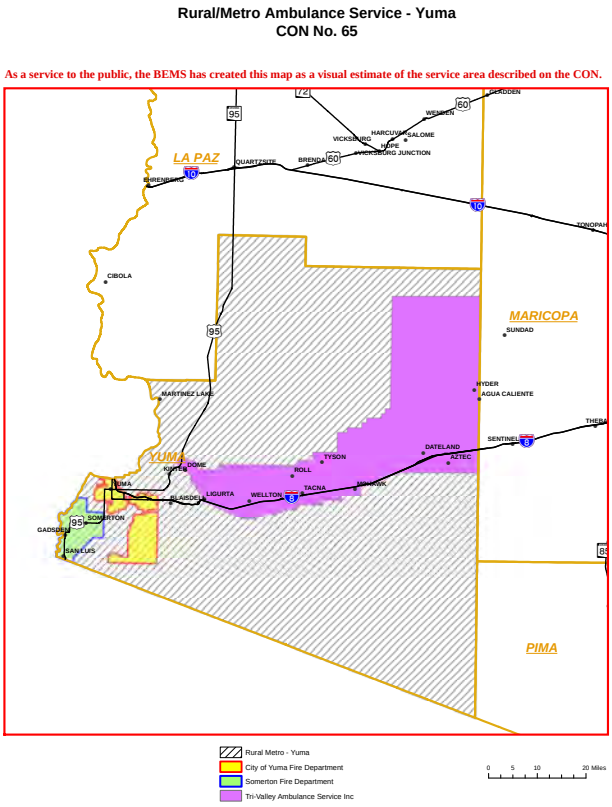
(b) Post-Private Equity Buyout

Note: This figure shows the Certificate of Necessity (CON) for Rural Metro - Yuma in Arizona. This is CON 65 and it outlines (1) the operating area, (2) the main address, and (3) the stipulated response times. These are CON renewals, which are required to be submitted every three years.

and (3) ALS. With the exception of Arizona Medicaid (AHCCCS), ambulance providers *must* use the regulated rates.[23] These rates are provider specific and are set taking into consideration the medical care consumer price index, the rate of return on gross revenue, ambulance response time, and the transportation needs assessment of the medical response system in a political subdivision. Rates are only adjusted at the provider's request and the provider can request a rate adjustment anytime as long as a rate adjustment has not

[23]Uniquely, Arizona Medicaid sets generous reimbursement rates for ambulance companies. Companies are reimbursed 69%-80% of the regulated rates for Medicaid patients, which is higher than many other states. For example, the Arizona Medicaid rate for a BLS Emergency run in 2013 was between $321 and $1,407 depending on the location. Colorado in the same year was $89, Montana was $201, Nevada was $160, and Washington was $115.

Figure 4: CON Operating Area Example:



Note: This figure shows the operating area of CON 65. The dashed region is CON 65. The colored regions outline other CONs that overlap.

been made in the past 6 months. There are two types of rate increases: an automatic rate adjustment and a general rate adjustment. An automatic rate adjustment is $\frac{1}{2}$ the annual growth in the transportation consumer price index plus $\frac{1}{2}$ the annual growth in the medical care consumer price index. An automatic rate adjustment is granted as long as the rate adjustment has not been made in the past 6 months. A general rate increase is when the ambulance company proposes new rates. These requests require an application packet that includes recent financial statements, the ARCR Long Report, projected income and cash flows for the next 12 months, as well as other documentation.[24] These general rate increases can only be submitted if a rate increase has not been requested in the past 6 months and

[24]See Article 11 of Arizona Department of Health Services (2023) for a more detailed description on general rate increases.

can be approved or denied. The majority of firms choose the automatic rate increase. For example, in 2011 of the 85 providers, 56 requested an automatic rate increase and 8 requested a general rate increase.[25]

Arizona follows the CMS guidelines outlined in Section 2.1 for ALS runs and BLS runs. Specifically, the appropriate level ambulance must be sent for the appropriate run level and two personnel must be present for each run. For BLS runs, one of these personnel must be at the level of EMT-Basic and for ALS runs one of these personnel must be at least an EMT-Intermediate or EMT-paramedic.

3 Ambulance Company Operations

3.1 Data

There is no comprehensive database of ambulance company costs and operations that covers the whole country. Regulation of ambulance companies is left up to the states and this regulation can vary extensively, as discussed in Section 2.1. The only centralized database of ambulance company costs comes from the Medicare cost reports (HCRIS); however, this data captures *only* hospital-affiliated ambulances, which is only 6% of the market. The U.S. Department of Health and Human Services released a report to Congress detailing the extensive limitations of ambulance cost data in the Medicare cost reports as representative of the ambulance industry as a whole (U.S. Department of Health and Human Services, 2015).

We avoid these data issues by exploiting the regulatory requirements of the Arizona ambulance industry. To operate a ground ambulance in Arizona, the company must hold a Certificate of Necessity (CON) issued by the Arizona Department of Health Services Bureau of Emergency Medical Services. The CON strictly outlines the exact area where an ambulance company can operate, the level of service provided, and regulated response times,

[25]This was not just a 2011 outlier. In 2012, 60 companies submitted an automatic rate increase and 1 company did a general rate increase. In 2013, 53 companies requested an automatic rate increase and 1 requested a general rate increase.

among other information. Each CON is strictly rate-regulated. To maintain the CON, every company must (1) submit an annual cost report (known as ARCR), (2) submit a CON renewal application every three years, and (3) meet all quality/registration regulations.[26] This means that for Arizona, we have data on the costs and exact operating areas for all ambulance companies, regardless of ownership status.

We use the cost report and operating area data of all Arizona ambulance companies from 2007 to 2017.[27,28] The cost report data includes ambulance runs by type, ambulance costs, revenues, employees, and more detailed information.[29] The required cost reports for for-profit firms requires companies to list not only their parent company, but also any affiliated organization that has at least 5% ownership/vesting.[30] We use these names to determine the private equity status of the company using PitchBook. PitchBook is a comprehensive subscription data provider that specializes in providing detailed financial data and other information on the entire lifecycle of private capital markets, including venture capital, private equity, and M&A transactions. We use PitchBook to track the ownership status of all the for-profit ambulance companies in Arizona and private equity involvement.

Figure 5 shows the operating areas (i.e., CONs) of all Arizona ambulance companies and their private equity status for 2010, which is the last year without PE, and 2011 and 2012, which are the years of PE entry. CONs shaded in green are non-PE, and shaded in blue are PE. Figure 5 shows (1) that CONs are usually not traditional shapes, (2) there is substantial variation in CON overlap (or lack thereof), and (3) the staggered rollout of PE that we will be able to exploit (as described in Section 3.2). The variation in CON overlap

[26] For more detailed information on Arizona regulations please refer to Section 2.2.

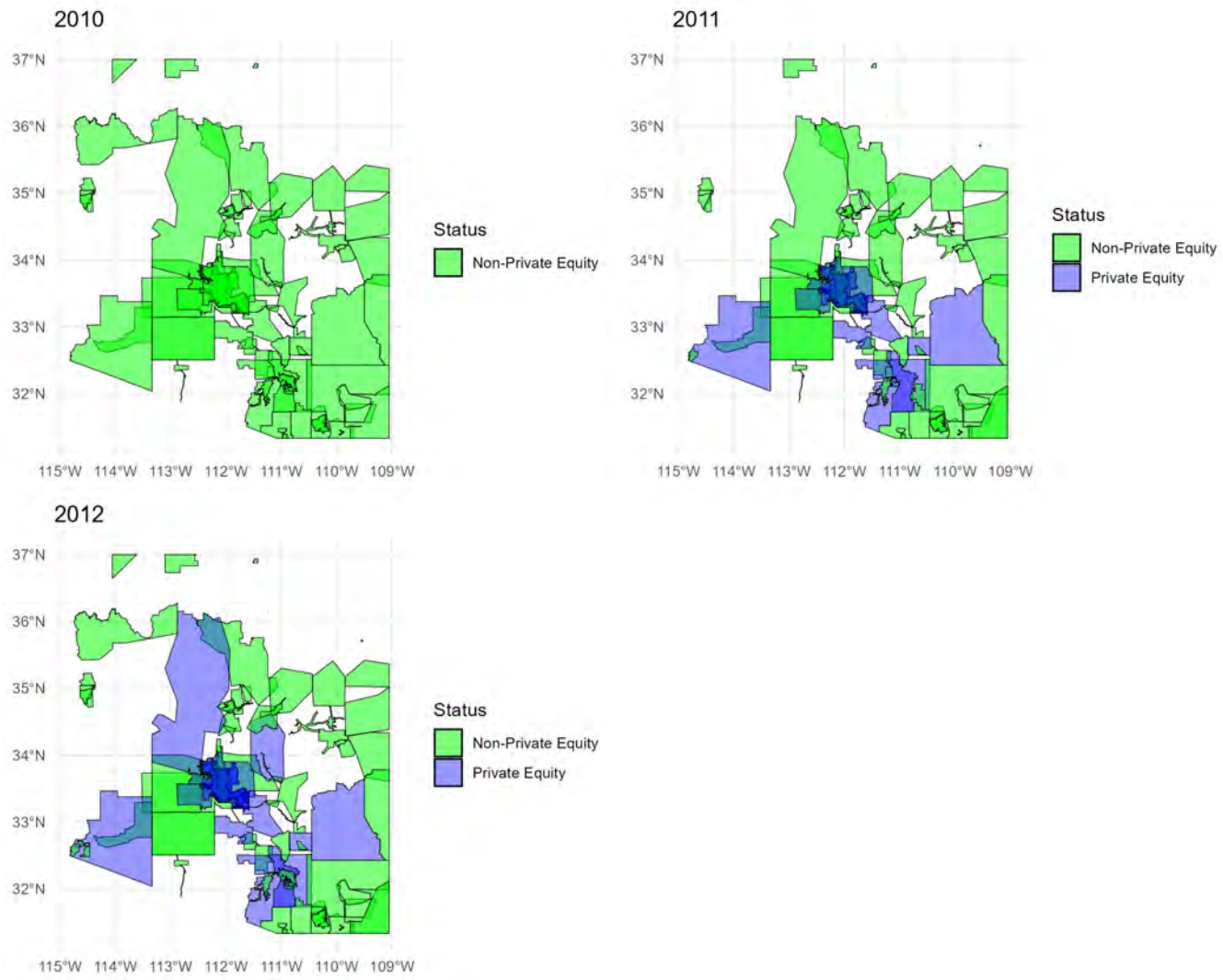
[27] Examples of cost reports can be found in Online Appendix A and Online Appendix B. Cost reports from 2013 onward and the most recent CON are currently publicly available here. We obtained the earlier data from a data request with the AZDHS BEMS and are grateful for their assistance.

[28] We stop our analysis in 2017 as AMR successfully merged the CONs of their owned ambulance companies in 2018.

[29] We have received only partial cost reports from 2007 to 2009. As these partial cost reports do not include the number of employees or as detailed revenue/expense data, we use the 2010 to 2017 sample for detailed expense breakdown and for an examination of personnel. When possible, we use the data from 2007 to 2017.

[30] Please see Online Appendix C for an example of this.

Figure 5: Private Equity Acquisition: Arizona CONs



Note: This figure indicates the private equity buyouts of ambulance companies operating in Arizona from 2010 to 2012, which was the last year in our sample with a buyout. CONs shaded in green are not owned by private equity, and areas in blue are owned by private equity.

will be utilized to determine the potential ability of a PE firm to cream-skim. A CON backed by PE overlaps with a non-profit and/or a fire department CON a median of 6 times.

Table 1 presents the summary statistics for the financials and operations of Arizona ambulance companies for (1) all ambulance companies, (2) private companies that will become private equity pre-buyout, and (3) private ambulance companies post-PE buyout. The final column of Table 1 shows the t-statistic for the difference in means between private equity

Table 1: Summary Statistics: Arizona Ambulance Companies

Variable	Sample Years:	Full Sample:		Pre-Buyout:		Post-Buyout:		Diff. Means:
		Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	t
Ownership (A):								
Fire Department	2007-2017	0.61	0.49	–	–	–	–	–
For-Profit	2007-2017	0.32	0.47	–	–	–	–	–
Non-Profit	2007-2017	0.069	0.25	–	–	–	–	–
Private Equity	2007-2017	0.13	0.33	–	–	–	–	–
Runs (B):								
Total (per 1k)	2007-2017	7.01	18.48	24.16	30.90	24.09	30.99	0.013
ALS (% Total)	2007-2017	0.72	0.23	0.71	0.27	0.63	0.22	1.65
BLS (% Total)	2007-2017	0.27	0.22	0.30	0.27	0.37	0.22	−1.61
Personnel (C):								
Total (FTE)	2010-2017	60.51	97.01	174.28	158.43	154.51	153.98	0.45
Paramedics (% Total)	2010-2017	0.38	0.16	0.44	0.069	0.41	0.11	1.29
EMTs (% Total)	2010-2017	0.43	0.18	0.38	0.071	0.46	0.11	−3.67
Operating Revenues (D):								
Total ($100k)	2007-2017	73.28	165.49	230.96	252.76	283.79	289.68	−1.15
ALS (% Total)	2010-2017	0.56	0.26	0.60	0.11	0.54	0.13	1.80
BLS (% Total)	2010-2017	0.21	0.18	0.19	0.12	0.25	0.12	−1.79
Operating Expenditures (E):								
Total ($100k)	2007-2017	51.25	98.26	144.33	153.29	158.93	169.68	−0.53
Wages (% Total)	2007-2017	0.62	0.16	0.48	0.076	0.43	0.087	3.61
Bad Debt (% Total)	2007-2017	0.12	0.12	0.20	0.063	0.30	0.091	−7.61
Interest (% Total)	2007-2017	0.013	0.024	0.028	0.016	0.038	0.032	−2.42
Other Operating (% Total)	2007-2017	0.16	0.099	0.13	0.042	0.13	0.045	0.77
Rent/Leasing (% Total)	2010-2017	0.018	0.024	0.045	0.023	0.028	0.013	2.75
Building/Station (% Total)	2010-2017	0.018	0.018	0.019	0.0052	0.014	0.006	3.01
Vehicle (% Total)	2010-2017	0.039	0.027	0.051	0.023	0.041	0.022	1.56
Profit (F):								
Total ($100k)	2007-2017	−1.45	12.65	4.10	14.29	6.47	15.46	−0.94
Current Operating Profit ($100k)	2007-2017	5.90	33.58	37.66	39.45	56.40	53.33	−2.40
N	2007-2017	670		56		86		-
N	2010-2017	405		15		81		-

Note: This table provides summary statistics for ambulance company financials and operations from 2007-2017 in Arizona. The data comes from the ARCRs. The summary statistics are provided for (1) the full sample of ambulance companies, (2) private companies that will become private equity pre-buyout, and (3) private ambulance companies post-PE buyout.

ambulance companies pre- and post-buyout. The summary statistics vary by year. When possible, we include all possible years of data (i.e., 2007-2017). However, the 2007-2009 data do not include the number of employees or as detailed expense data, and therefore, we include summary statistics for those variables for that subset of data. Overall, we have 83 unique ambulance companies from 2007-2017, but the number varies by year.

Table 1 indicates that, on average, 60% of ambulance companies are fire departments, 30% are for-profit firms, and 10% are other non-profits. This is comparable to national estimates although the ratio of fire department and for-profit ambulance companies is slightly higher.[31] 15% of ambulance companies, on average, will eventually be associated with private equity. In total, 13 companies will be purchased by private equity: 9 in 2011, and 4 in 2012.

Ambulance companies provide close to 7,000 runs a year on average, with the majority of those runs being ALS runs. Private equity companies are larger on average, with 24,000 runs per year, although an equivalent percent of those runs are ALS runs. The percentage of runs made up by ALS decreases, and those made up by BLS increase following the private equity buyout.

On average, ambulance companies employ 60 full-time equivalent workers, with 22 FTE paramedics and 26 FTE EMTs. Ambulance companies bring in an average of $8.7 million in revenue, incur an average of $5.6 million in expenses (excluding taxes), have an average operating loss of $145,000, and a current operating profit, which excludes bad debt and interest, of $590,000. Columns (3)-(6) of Panel (F) indicate that operating losses, on average, are not incurred by private equity companies. Panel (E) shows that, on average, wages make up 61% of operating expenses for Arizona ambulance companies, which aligns with the national estimates from the 2012 GAO Survey of Ambulance Services (United States Government Accountability Office, 2012).[32]

The final column of Table 1 indicates that following a private equity buyout, companies decrease the percent of operating revenue generated by ALS runs and the percent of operating expenditure generated by wages, rent/leasing, and buildings/stations. These companies increase the percent of revenue generated by BLS runs, the percent of operating expenditure generated by bad debt and interest, and current operating profit. This provides suggestive evidence that after a private equity buyout, companies switch operations from ALS runs to

[31] See Section 2.1 for more detailed breakdowns on ownership type.

[32] The 2012 GAO Survey of Ambulance Services found that personnel made up 61% of total ambulance costs.

BLS runs, eliminate more costly employees, close substations, and increase their operating profit through these cost-cutting measures.

3.2 Methods

To identify the impact of private equity ownership on ambulance outcomes, we exploit the staggered investment into private ambulance companies. We exploit this through a difference-in-differences framework. The difference-in-differences estimation strategy relies on the assumption that, in the absence of the treatment, all unobserved differences between the treatment and control groups are the same over time (i.e., treatment and control groups have parallel trends).

Given the phased introduction of private equity (PE) investments, the temporal aspects of the treatment effects are critical. If the assumption of stable treatment effects is compromised by varying timing of treatment across units, the conventional two-way fixed effects approach in difference-in-differences analyses will suffer from bias. This bias arises from relying on comparisons between units that transition into treatment and those already treated.[33] Recent advances have proposed various solutions to this issue.[34] A shared strategy among these approaches is to eliminate the comparisons of transitioning units with those already treated.[35]

We employ the imputed difference-in-differences strategy as developed in Borusyak et al. (2024) because this approach allows us to also explore heterogeneous treatment effects based on firms' differential ability to cream skim. The method has four stages. First, estimate a model for the outcome variable using data from units not yet treated.[36] Next, predict the counterfactual outcomes for treated units ($\widehat{y_{it}^0}$) using the model from the first step. Next,

[33]Refer to Goodman-Bacon (2021) for a critique of two-way fixed effects in the context of varying treatment timing.

[34]See, for instance, Callaway and Sant'Anna (2020), Athey et al. (2021), Borusyak et al. (2024), Gardner (2021), and Jakiela (2021) for these methodological innovations.

[35]We additionally drop observations from fire departments and non-profits operating in areas that overlap with PE firms. This is to prevent "double-counting" the cream-skimming effect. In other words, if a PE firm shifts one ALS run onto a fire department, the difference-in-differences estimator would return a treatment effect of 2 since the control group drops by one and the treatment group increases by one.

[36]Our adoption of two-way fixed effects for imputation purposes also follows Gardner (2021)'s approach, under the broader framework of Borusyak et al. (2024).

calculate the difference between the actual outcomes and these predicted counterfactuals to get unit-time=specific treatment effect estimates. Finally, regress these individual treatment effects against the treatment variables. Specifically, we estimate:

$$y_{it}^0 = x_{it}'\alpha + \theta_i + \tau_t + \epsilon_{it} \tag{1}$$

$$y_{it}^1 - \widehat{y_{it}^0} = \beta_1 Private\_Equity_{it} + \nu_{it} \tag{2}$$

where equation (1) leverages data exclusively from untreated units, and equation (2) utilizes the entire dataset. Here, y_{it} represents various ambulance operational variables; x_{it} represents a set of company-specific control variables; and θ_i and τ_t denote fixed effects for CONs and years, respectively. The variable $Private\_Equity_{it}$ is a binary indicator for whether company i is under private equity ownership in year t. Finally, both ϵ_{it} and ν_{it} denote error terms with an expected value of zero.

The imputed difference-in-differences strategy allows us to explore heterogeneous treatment effects based on firms' differential ability to cream-skim. This is particularly important in our context, as the potential for cream-skimming varies across ambulance companies depending on their geographic overlap with government-operated ambulance services. To capture this heterogeneity, we extend the baseline model by interacting the private equity treatment indicator with a measure of cream-skimming ability. Specifically, we estimate the following model:

$$y_{it}^0 = x_{it}'\alpha + \theta_i + \tau_t + \epsilon_{it} \tag{3}$$

$$y_{it}^1 - \widehat{y_{it}^0} = \beta_1 Private\_Equity_{it} + \beta_2 Private\_Equity_{it} \times Cream\_Skim_{it} + \nu_{it} \tag{4}$$

where equation (5) is the same as equation (1), and equation (7) extends equation (2) by including an interaction term between $Private\_Equity_{it}$ and $Cream\_Skim_{it}$, which measures the extent to which firm i can cream-skim in year t. We construct $Cream\_Skim_{it}$ by counting the number of non-profit and government-operated ambulance companies that overlap with

the geographic service area of each private ambulance company. This captures the potential for private equity-owned ambulance companies to strategically redirect high-cost patients to these alternative providers.

The coefficient β_1 captures the base treatment effect of private equity ownership, isolating the impact for ambulance companies with no ability to cream-skim (i.e., when $Cream\_Skim_{it} = 0$). The coefficient β_2 represents the additional impact of private equity ownership for firms with greater cream-skimming ability. This coefficient is of particular interest, as it allows us to assess whether the effects of private equity ownership are more pronounced among ambulance companies with greater scope for cream-skimming.

We also estimate the model in an "event study" framework where we allow both the base treatment effect and the cream-skim effect to vary over time. Formally, we estimate

$$y_{it}^0 = x_{it}'\alpha + \theta_i + \tau_t + \epsilon_{it} \tag{5}$$

$$y_{it}^1 - \widehat{y_{it}^0} = \sum_{\tau \neq -1} \beta_{1,\tau} Private\_Equity_{i,t-\tau} \tag{6}$$

$$+ \sum_{\tau \neq -1} \beta_{2,\tau} Private\_Equity_{i,t-\tau} \times Cream\_Skim_{i,t-\tau} + \nu_{it} \tag{7}$$

This model serves two purposes. First, we can use coefficients with $\tau < 0$ to test our parallel post-trends assumption by examining if the pre-trends are parallel. For example, if private equity companies were strategically buying locations in Arizona that had just suffered a negative shock, then the pre-trends would be different and simple mean reversion could explain our results. The second benefit of this model is that it allows us to explore dynamics in the treatment effects.

3.3 Results

Tables 2-4 present our primary difference-in-difference results for the impact of private equity buyouts on ambulance company operations. Odd columns present the overall impact

of private equity buyouts on ambulance company operations, while even columns account for the heterogeneity in the PE firms' ability to strategically reallocate high-cost patients to public firms (i.e., cream-skim). A PE firm's cream-skimming potential is determined by the geographic overlap of its Certificate of Neccessity (CON) operating area with those of non-profit and/or fire department-based ambulance companies. This overlap can create opportunities for PE firms to strategically defer certain calls to public providers operating in the same service area. We formally measure the cream-skimming potential as the count of public ambulance providers that share operating territory with the PE firm.[37] The base treatment effect represents the impact on PE firms with no geographic overlap with public providers (and thus no cream-skimming ability), while the cream-skimming treatment effect captures the additional impact for each overlapping public provider (i.e., is additive to the base treatment effect). The standard errors for all results are block-bootstrapped at the CON-level, following Abadie et al. (2023), as this is the level of treatment assignment.

We begin our analysis by examining the impact of private equity (PE) buyouts on ambulance company profits in Table 2. Following PE buyout, overall profits increased by $340,000 per firm (column 1), with this effect entirely driven by those firms with the ability to shift high-cost/low-profit margin operations onto fire departments (column 2). To understand the source of these gains, we decompose profits into operating and non-operating components. Operating profits show a stark increase of $1.8 million (column 3), representing a 48% increase from the pre-buyout mean of $3.8 million. This increase is again concentrated among firms that can cream-skim, which see an additional $410,000 increase per overlapping public provider (column 4). In contrast to these operating profit gains, PE firms simultaneously manage to reduce their non-operating profits, which were already negative pre-buyout- by roughly 50% (column 5), effectively minimizing their taxable income.[38] In Online Appendix B, we break down costs into more granular categories and show that this reduction in non-

[37] The median number of firms that the private equity firms can cream-skim from is 6.

[38] Non-operating profit consists almost entirely of non-operating costs, which is why the average is negative, but some firms do have a small amount of non-operating revenue.

Table 2: Ambulance Operations: Profit

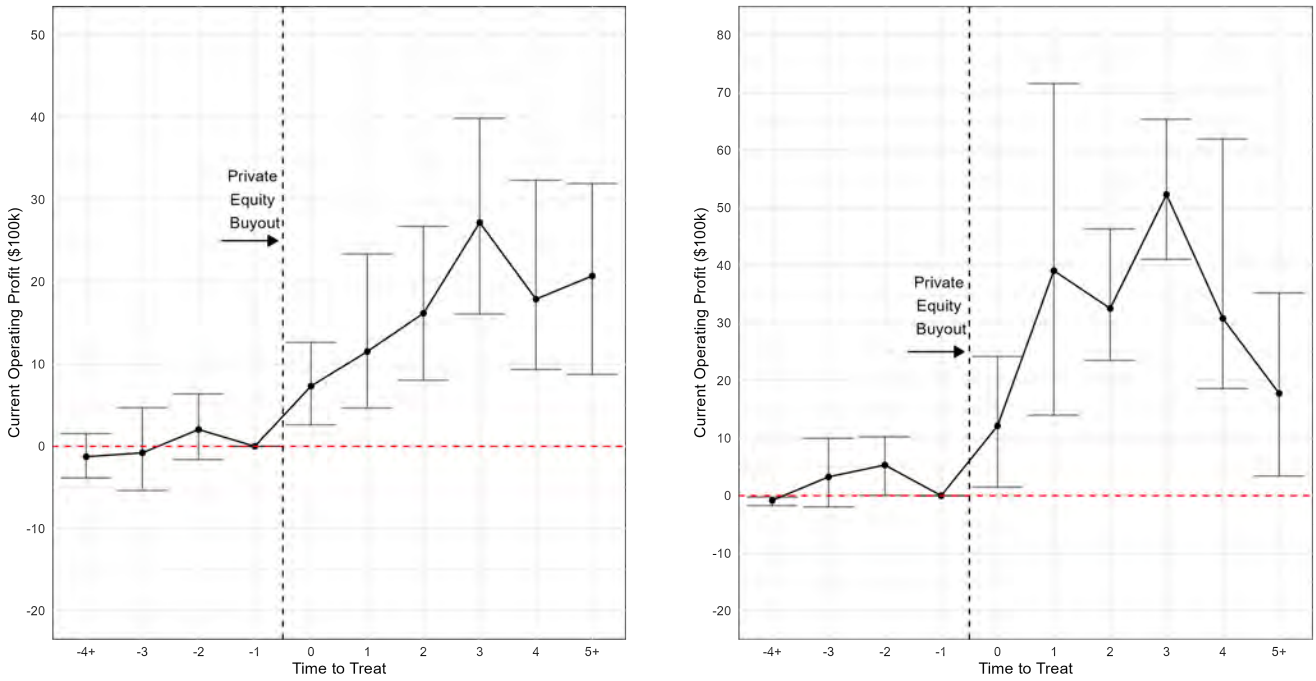
	Profit ($100k)		Current Operating Profit ($100k)		Current Non-Operating Profit ($100k)	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	3.4***	-	18.32***	-	−15.69***	-
	[1.6, 5.37]	-	[10.05, 27.1]	-	[-25.15, -7.99]	-
Base Treatment Effect	-	−1.01	-	−7.2	-	6.5
	-	[-4.79, 1.65]	-	[-21.57, 0.79]	-	[-0.99, 17.4]
Cream-Skim Treatment Effect	-	0.71**	-	4.1***	-	−3.56***
	-	[0.22, 1.47]	-	[2.26, 6.43]	-	[-5.43, -1.92]
Pre-Buyout Mean	4.1	4.1	38	38	-33	-33
Pre-Buyout Std. Dev.	14	14	39	39	42	42
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
CON Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	670	670	670	670	670	670

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for ambulance company profit (per $100k) following PE-buyout for 2007-2017 in Arizona. The odd columns present the overall results, and the even columns separate out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

operating profits stems primarily from increased interest expenses and PE firms' strategic decision to send existing bad debt to collections, writing it off as an expense.

To validate our findings about firm profits, we next examine the dynamic effects of PE buyouts on operating profits in Figure 6. Panel (a) presents the overall treatment effect, while panel (b) shows the cream-skimming effect weighted by average cream-skimming potential. Both panels support our identifying assumption of parallel pre-trends, with coefficients statistically indistinguishable from zero in the pre-buyout period and no obvious trends. Following PE acquisition, operating profits show an immediate and sustained increase, reaching approximately $2.5-3 million by year 3 in the overall effect and $4-5 million for firms with the average cream-skimming potential. The similar temporal patterns between panels (a) and (b) reinforce our findings in Table 2 that profit improvements are primarily driven by PE firms' ability to cream-skim. To understand how PE firms achieve these profit improvements, we next examine their impact on ambulance service operations.

Figure 6: Event Study: Operating Profit



(a) Overall Effect

(b) Cream-Skimming Effect

Note: This figure plots the coefficients and 90% confidence intervals for the imputed difference-in-difference estimates for ambulance operating profit from 2007-2017. Panel (a) presents the event study for the overall effect, and Panel (b) shows the event study for the cream-skimming effect weighted by the average cream-skimming potential. The regression includes CON and year fixed effects. Year "0" refers to the year of PE buyout. Year "-1" is the omitted category. Standard errors are block bootstrapped at the CON level (Abadie et al., 2023).

Table 3 shows that we do not see a statistically significant change in total run volume (columns 1-2); however, the remaining columns show substantial shifts in the service composition between Advanced Life Support (ALS) and Basic Life Support (BLS) runs. Following PE acquisition, PE firms conduct roughly 1,900 fewer ALS runs (column 3) relative to non-PE firms, which represents a 12% decrease from the pre-buyout mean of 16,000 ALS runs. This reduction only occurs among firms with cream-skimming ability, which decrease ALS runs by an additional 477 runs per overlapping public provider (column 4). While overall BLS runs show no significant change, firms with the ability to cream-skim increase their BLS runs by approximately 450 per overlapping provider (column 6), suggesting a nearly

Table 3: Ambulance Operations: Runs

	Total		Advanced Life Support		Basic Life Support	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	−639.9	-	−1922.07***	-	1190.29	-
	[-3568.31, 2362.72]	-	[-3414.92, -777.76]	-	[-514.87, 3590.12]	-
Base Treatment Effect	-	−698.76	-	1051.61	-	−1623.7
	-	[-5346.45, 2143.19]	-	[-1814.19, 3031.84]	-	[-4139.49, 3.44]
Cream-Skim Treatment Effect	-	9.44	-	−477.12*	-	451.5**
	-	[-431.85, 796.03]	-	[-811.86, -23.99]	-	[90.34, 1089.57]
Pre-Buyout Mean	24000	24000	16000	16000	8300	8300
Pre-Buyout Std. Dev.	31000	31000	21000	21000	12000	12000
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
CON Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	670	670	670	670	670	670

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for ambulance company runs following PE-buyout for 2007-2017 in Arizona. The odd columns present the overall results, and the even columns separate out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

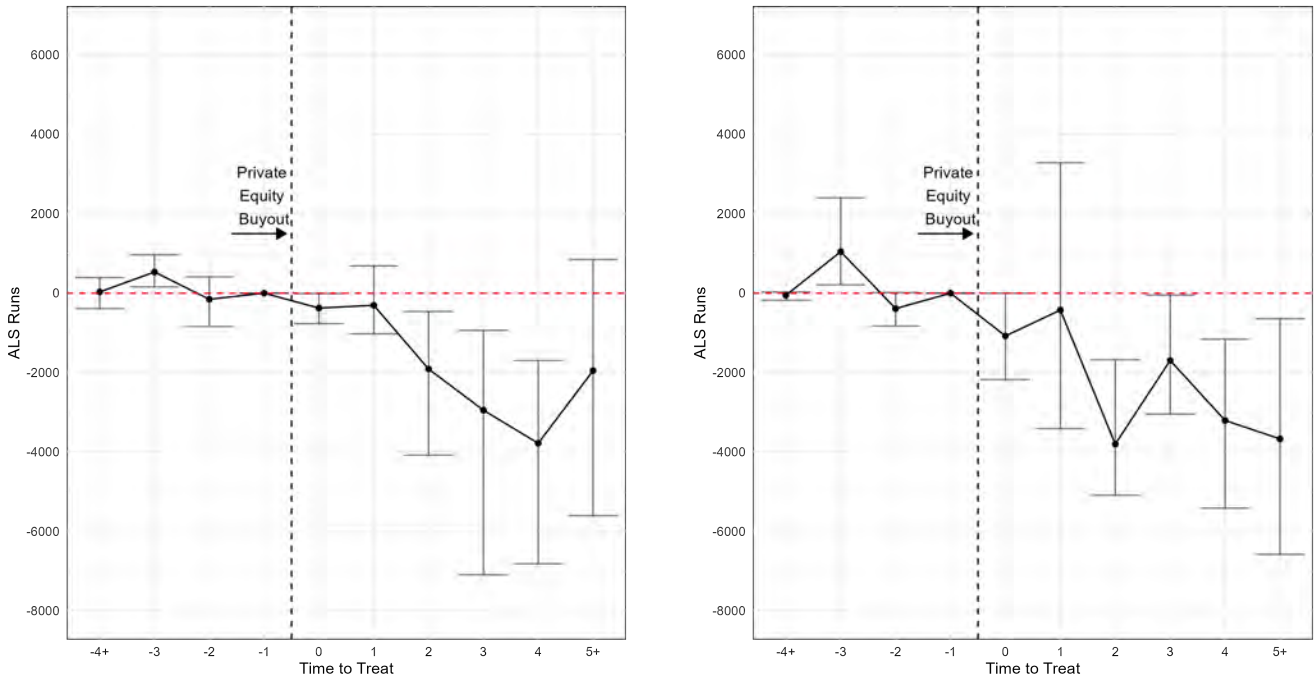
one-to-one substitution from ALS to BLS runs. This pattern suggests a strategic reallocation of services away from high-cost/low-profit margin encounters to low-cost/high-profit margin calls.

We next examine the dynamic effects of PE buyouts on ALS runs in Figure 7.[39] Both panels show generally flat pre-trends, with only one marginally significant pre-period coefficient. Following PE acquisition, we see a gradual decline in ALS runs, which persists to the end of the sample period. These dynamic patterns reinforce our conclusion that PE firms strategically reallocate services away from ALS runs, with this behavior concentrated among firms that can shift these runs to public providers. While these results demonstrate a clear strategic reallocation of services, they raise an important question: aren't ambulance runs supposed to be random?

Ambulance runs are covered under the Emergency Medical Treatment and Labor Act, meaning firms cannot turn them down due to lack of ability to pay. It is not readily apparent how a PE company that overlaps with a fire department is able to strategically shift ALS

[39]The event study for BLS runs can be found in Online Appendix D. We find no evidence of pre-trends for BLS runs and find no statistically significant change in BLS operations overall. However, the dynamics for the cream-skimming effect indicate a statistically significant increase in BLS runs 3-4 years after PE involvement.

Figure 7: Event Study: ALS Runs



(a) Overall Effect

(b) Cream-Skimming Effect

Note: This figure plots the coefficients and 90% confidence intervals for the imputed difference-in-difference estimates for ALS runs from 2007-2017. Panel (a) presents the event study for the overall effect, and Panel (b) shows the event study for the cream-skimming effect weighted by the average cream-skimming potential. The regression includes CON and year fixed effects. Year "0" refers to the year of PE buyout. Year "-1" is the omitted category. Standard errors are block bootstrapped at the CON level (Abadie et al., 2023).

runs onto fire department balance sheets.[40] We next explore the mechanism that makes this possible.

In Table 4, we show how PE firms accomplish this strategic reallocation: through targeted changes in workforce composition. Following PE buyout, firms reduce their workforce by 17 full-time-equivalent (FTE) workers relative to non-PE companies (column 1), representing a 10% decrease from the pre-buyout mean of 170 employees.[41] This reduction in the overall

[40] Please refer to Section 2.1 for more information about ambulance regulation.

[41] Due to availability constraints, we do not as have detailed breakdowns in staffing levels from 2007-2009, so the results in Table 4 are from a smaller time frame. We show the full sample results for 2 and 3 in this section to align with the event study estimates that we present in the next section. In Online Appendix C, we present versions of Tables 2 and 3 that align with the same time frame as Table 4 and nearly all of our results are qualitatively similar. The only meaningful change is that the cream-skim effect of BLS runs loses statistical significance, though the point estimates are similar.

Table 4: Ambulance Operations: Personnel

	Total		Paramedics		Emergency Medical Technicians	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	-16.8^{***}	-	-13.78^{***}	-	5.41	-
	[-26.68, -9.71]	-	[-22, -7.78]	-	[-1.67, 13.88]	-
Base Treatment Effect	-	1.56	-	0.98	-	-4.06
	-	[-13.1, 15.88]	-	[-8.52, 10.93]	-	[-10.63, 0.87]
Cream-Skim Treatment Effect	-	-2.92^{***}	-	-2.35^{***}	-	1.51^{***}
	-	[-4.14, -1.34]	-	[-3.96, -1.04]	-	[0.3, 3.44]
Pre-Buyout Mean	170	170	72	72	71	71
Pre-Buyout Std. Dev.	160	160	64	64	77	77
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
CON Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	405	405	405	405	405	405

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for staffing following PE-buyout for 2010-2017 in Arizona. The odd columns present the overall results, and the even columns separate out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

workforce occurs only by firms with cream-skimming capabilities (column 2). Crucially, the reduction in the workforce is concentrated among more expensive, highly trained paramedics, whose numbers decrease by 14 FTEs (column 3), or roughly 20% of the pre-buyout paramedic workforce. Again, the decline in paramedics only occurs by firms with the ability to cream-skim (column 4). Simultaneously, cream-skimming PE firms increase their EMT staffing (column 6), indicating a deliberate substitution of more expensive paramedics with cheaper EMTs. In Online Appendix B, we check for changes in the average wages of paramedics and EMTs and find no effect. This implies that there are minimal "labor market equilibrium" effects caused by PE firms firing paramedics. However, this null result is noisy, and we only look at the relatively near term.

The substitution away from more expensive paramedics towards cheaper EMTs directly factors into increasing current operating profit by decreasing wage expenditures. However, the larger impact is through allowing PE companies to shift high-cost and low-profit margin ALS runs onto other companies (i.e., cream-skim). Legally, an ambulance can only respond to an ALS run if there is a paramedic onboard the ambulance. If the closest ALS-capable

ambulance does not have a paramedic onboard, then that ambulance will not be able to take the ALS-level call. That call will either (1) be sent to a farther away ALS ambulance within the operating area that meets the staffing requirement, or (2) if there are none available, the patient will need to wait until a paramedic becomes available.[42] If (2) occurs, this will count against the timing requirements of the CON, which comes with fines and the potential removal of the license.[43] However, if there are other ambulance companies in the operating area, such as non-profits and fire departments, then (1) is more likely. Therefore, PE companies that overlap with non-profit and/or fire department ambulance companies are able to shift high-cost and low-profit margin runs onto public firms (i.e., cream-skim) by exploiting staffing requirements and firing paramedics. This leaves the PE company available to take the lower-cost/higher-profit margin runs, which we see in the increased BLS runs in Column (6) of Table 3.

Supporting evidence in Online Appendix B reveals that PE firms not only reduce staffing costs but also decrease infrastructure expenditures (rent/leasing, building, and vehicles), and that these reductions are concentrated among firms with cream-skimming capabilities. This suggests a comprehensive strategy: PE firms both reduce paramedic staffing and close substations, further limiting their ability to service ALS calls. In Online Appendix B, we also examine if there is any indication of increased operating efficiency for PE firms that is *not* driven by the shifting of ALS and BLS runs. For this analysis, we estimate how marginal costs for each type of run change following PE buyout. Notably, we find no evidence of improved operating efficiency in terms of marginal costs per run type, indicating that profit improvements stem primarily from this strategic reallocation rather than operational improvements.

These profit-maximizing strategies have potentially significant implications. Fire departments, which often rely on public aid to make up funding shortfalls, must absorb the

[42]The patient can also decide to reach the hospital via other means. However, if that occurs, then the response time delay does not count against timing requirements.

[43]Please refer to Section 2.1 for a detailed discussion of the laws and overall regulation and Section 2.2 for how this regulation specifically works in Arizona.

redirected, and more costly, ALS runs, which has important implications for their balance sheets. In addition, if the reduced service of ALS runs meaningfully increases response times, then patient health will also be negatively impacted (e.g., Mayer, 1979; Blackwell and Kaufman, 2002; Pons et al., 2005; Vukmir, 2006; Blackwell et al., 2009; Byrne et al., 2019). We explore this in the next section.

4 Health Spillovers

Section 3 provided evidence that following buyout, PE companies fire paramedics, which allows them to shift high-cost/low-profit ALS runs onto other firms (i.e., cream-skim).[44] While profitable for the PE company, this could also lower the quality of patient care. In this section, we explore how PE buyouts of ambulance companies could lower the quality of care patients receive by looking at how fatal traffic accidents change following PE buyout. We focus on fatal traffic accidents as proxy for public health effects because (1) traffic accidents are random, and therefore, ambulance companies cannot plan their response in advance and ambulance company ownership should not influence the total number of traffic accidents; (2) traffic accidents that result in fatalities are severe and should require a response by an ALS ambulance, which are the type of calls that PE shifts to other providers; (3) fatalities provide a clear way to measure adverse quality; and (4) we have access to geolocated accident data that we can perfectly map to (potentially overlapping) CONs.

4.1 Data

We use data from the Fatality Analysis Reporting System (FARS). The FARS is a national dataset covering injuries suffered in motor vehicle accidents. To appear in the FARS, the accident had to occur on a public road, and at least one individual involved in the crash had to perish within 30 days of the accident. The data include the injury severity

[44] Online Appendix B shows that they also close substations.

of all participants, detailed location of the accident, and EMS involvement, including the determined death location of the individual(s). We first match the 2010-2017 FARS data to ambulance company CONs, aligning with our operation analysis in Section 3. We then use the 2008-2017 FARS across US counties.

Figure 8 shows (1) the ambulance operating areas of Arizona CONs, (2) the PE status of the CON, and (3) the location of fatal traffic accidents for 2010, 2011, and 2012. 2010 is the year prior to the first PE acquisition, and 2011, and 2012 are years with new PE involvement. PE-backed CONs are shaded in blue, and non-PE-affiliated CONs are shaded in green. Figure 8 highlights the heterogeneity in the overlap between CONs, with the median number of non-profit and/or fire department CONs (i.e., potential firms to cream-skim from) overlapping with PE CONs being 6. Figure 8 shows that fatal traffic accidents are spread out across the state but with higher density in urban areas.[45] Figure 8 shows that fatalities occur in overlapping CONs. For these fatalities, since we cannot observe which ambulance company responded in the FARS, we equally assign the fatalities amongst the overlapping CONs. For example, if a traffic accident that resulted in 2 fatalities occurred in an area where 3 CONs overlapped, we label each of those 3 CONs as having $\frac{2}{3}$ of a fatality.

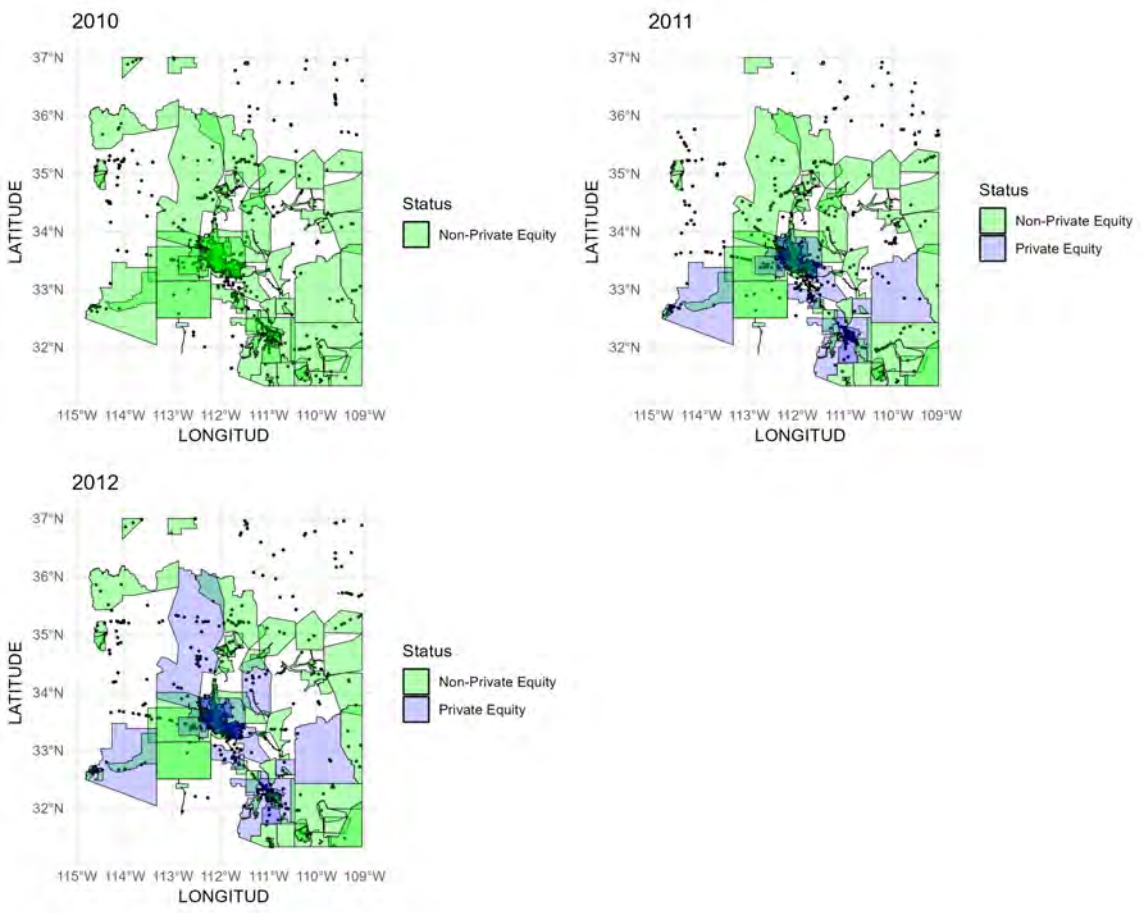
Table 5 shows the summary statistics for select ambulance company operations and fatal traffic accidents that occur in Arizona CONs, which are the same CONs utilized in Section 3. Table 5 shows that, on average, there were 8 fatalities in a CON in a given year. The selected operations data matches the data presented in Table 1.

We also extend the analysis of health spillovers nationally.[46] For heterogeneity in PE ownership, we rely on the buyout of Rural/Metro, the second largest private ambulance company in the US, by Warburg Pincus on June 30th, 2011. To determine national operating areas, we hand collected them from from Rural/Metro's website location page for each year.

[45]Figure 8 shows fatal accidents occurring outside of CON coverage areas. This is due to a number of reasons: (1) Arizona has tribal land that is not subject to the same regulation, (2) air ambulance coverage areas are not depicted, and (3) areas without a CON could be covered by a mutual aid agreement with the surrounding CONs. For our analysis, we only use fatalities that occurred within a CON operating area.

[46]We utilize a slightly different timeframe in this analysis as we have data on the states where Rural/Metro operated in from 2008 onward. This longer timeframe also allows us to examine parallel trends.

Figure 8: Private Equity Acquisition: Arizona CONs and Fatalities



Note: This figure indicates the private equity buyouts of ambulance companies operating and fatal traffic accidents in Arizona from 2010 to 2012, which was the last year in our sample with a buyout. CONs shaded in green are not owned by private equity and areas in blue are private equity owned. Black dots indicate the location of a traffic accident where at least one fatality was reported.

We accessed the website location page for each year using Wayback Machine, which is a digital archive of various websites.[47]

Figure 9 shows the states where Rural/Metro operated in by year from 2008 to 2017. States shaded blue, pink, or green indicate a Rural/Metro presence in 2008 (or prior), 2009, and 2013, respectively. States in white are states where Rural/Metro never operated, and states in grey indicate that Rural/Metro exited after the PE buyout in 2011 and are therefore excluded from the analysis. States shaded in blue and pink will receive PE treatment in

[47]Please see Online Appendix A for a detailed description of how the data was gathered.

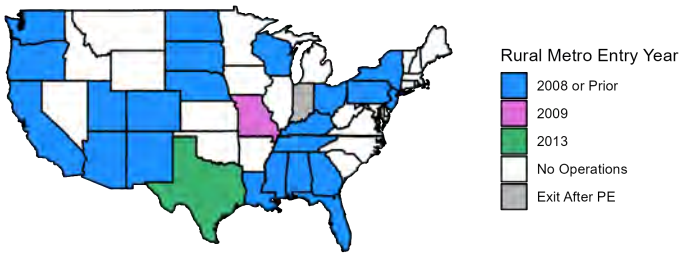
Table 5: Summary Statistics: Traffic Accident Fatalities Arizona CONs

Variable	Full Sample:		Pre-Buyout:		Post-Buyout:		Diff. Means:
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	t
Fatalities	7.60	12.35	22.40	13.17	23.83	15.68	−0.39
Fire Department	0.58	0.49	–	–	–	–	–
For-Profit	0.35	0.48	–	–	–	–	–
Non-Profit	0.077	0.27	–	–	–	–	–
Total Runs (per 1k)	7.80	19.89	25.46	30.40	25.62	31.76	−0.019
ALS Runs (% Total)	0.72	0.19	0.77	0.15	0.67	0.16	2.55
BLS Runs (% Total)	0.28	0.18	0.23	0.15	0.33	0.16	−2.51
Total Personnel (FTE)	59.78	96.25	175.01	148.30	153.85	155.87	0.53
Paramedics (% Total)	0.38	0.16	0.43	0.067	0.41	0.11	1.07
EMTs (% Total)	0.43	0.18	0.38	0.066	0.47	0.11	−4.21
N	413		17		79		-

Note: This table provides summary statistics for fatal traffic accidents from the Fatality Analysis Reporting System (FARS). The summary statistics are provided for (1) the full sample of ambulance companies, (2) private companies that will become private equity pre-buyout, and (3) private ambulance companies post-PE buyout.

2011, and states in green will be treated in 2013. Figure 9 highlights that Rural/Metro had a national operating presence, with operations across the US.

Figure 9: Rural Metro National Operations



Note: This figure shows the state-level operation of Rural Metro from 2008 to 2017. Colored states indicate Rural Metro operated in that state. White states will act as control states. Grey states indicate that Rural Metro exited after being acquired by private equity. These states are excluded from the analysis. Rural Metro was acquired by private equity in 2011.

Table 6 shows national summary statistics for fatal traffic accidents across the US. We start off with a balanced panel of all US counties. We then exclude fatalities that occurred in Alaska, Hawaii, the District of Columbia, and Indiana (due to RM exit). To better interpret the results, we population weight our estimates using 2010 population data. We

Table 6: Summary Statistics: Traffic Accident Fatalities US Counties

Variable	Full Sample:		Pre-Buyout:		Post-Buyout:		Diff. Means:
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	t
Fatalities	84.1	133.83	105.68	147.19	112.18	164.98	−2.54
Death Location At Scene	40.96	67.26	53.58	74.16	56.58	84.47	−2.31
Death Location En Route	0.94	4.76	1.4	6.1	0.57	1.6	9.80
N	30,400		5,359		10,811		-

Note: This table provides the population-weighted summary statistics for fatal traffic accidents from the 2008-2017 Fatality Analysis Reporting System (FARS). The summary statistics are provided for (1) the full sample of US counties, (2) US counties that will become private equity pre-buyout, and (3) US counties post-PE buyout.

therefore exclude counties without population data. This left us with a balanced panel of 3,040 counties from 2008 to 2017, which is 96% of all US counties. There are on average 85 fatalities in a county in a given year. Of these fatalities, about half occur at the scene of the accident.

4.2 Results

Similar to the analysis in Section 3, we exploit the staggered investment by PE through the imputed difference-in-differences framework (Borusyak et al., 2024). Table 7 presents the results for this estimation for traffic fatalities in Arizona CONs from 2010 to 2017. Column (1) presents the results overall impact of PE buyout on traffic fatalities relative to non-PE firms. Column (2) presents the results taking into account the ability of the ambulance company to serve the lowest-cost/highest profit patients while moving high-cost/lowest profit patients to public firms (i.e., cream-skim), which is measured as the amount of overlap with non-profit and/or fire department-based ambulance companies. The total number of fatalities due to traffic accidents increases by roughly 3 following PE buyout relative to non-PE firms. This increase is roughly 15% of the pre-PE buyout mean or 0.2 of a standard deviation. Column (2) shows that this increase in fatalities comes entirely from PE areas where cream-skimming (i.e., moving ALS runs to non-profit/fire-department based ambulance companies) is possible.

Table 7: Fatal Traffic Accidents: Arizona CONs

	Total Fatalities	
	(1)	(2)
Overall ATT	2.68***	-
	[0.85, 4.87]	-
Base Treatment Effect	-	−0.65
	-	[-4.41, 1.88]
Cream-Skim Treatment Effect	-	0.53*
	-	[0.03, 1.32]
Pre-Buyout Mean	22	22
Pre-Buyout Std. Dev.	13	13
Year Fixed Effects?	Yes	Yes
CON Fixed Effects?	Yes	Yes
Observations	413	413

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for traffic fatalities in Arizona CONs following PE-buyout for 2010-2017. Column (1) presents the overall results, and column (2) separates out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

We calculate back-of-the-envelope estimates by year for the total increase in traffic fatalities in Arizona due to the cream-skimming activities of PE companies, which are found in Table 8. The first column presents the total increase in fatalities as a result of PE involvement. The second column indicates the percent the increase in fatalities from Column (1) represents for traffic fatalities in PE owned CONs. The third column indicates the percent the increase in fatalities in Column (1) represents for all traffic fatalities in Arizona CONs. On average, fatalities due to traffic accidents increased by 30 for each year from 2011-2017. The increase in fatalities was between 7%-11% of all fatalities due to traffic accidents in all Arizona CONs and between 10%-13% of total fatalities in CONs operated by PE. In total, the cream-skimming activities of PE companies resulted in an additional 211 fatalities in Arizona from 2011-2017.

We next examine if our local analysis expands nationally. Table 9 shows the national results for the imputed difference-in-differences estimation for (population weighted) fatal

Table 8: Back-of-the-Envelope Estimates: Arizona Traffic Accident Fatalities

	Total:	Percent: PE CONs	Percent: All CONs
	(1)	(2)	(3)
2011	24	0.12	0.07
2012	29	0.12	0.08
2013	29	0.12	0.08
2014	32	0.13	0.11
2015	32	0.11	0.09
2016	32	0.10	0.09
2017	32	0.10	0.08
Total	211	0.11	0.07

Note: This table shows the back of the envelope estimates for the increase in fatalities due to traffic accidents by year as a result of PE cream-skimming activities. The first column presents the total increase in fatalities. The second column indicates the percent the increase in fatalities represents for traffic fatalities in PE owned CONs. The third column indicates the percent the increase in fatalities in Column (1) represents for all traffic fatalities in Arizona CONs. The increase in traffic fatalities in Column (1) is calculated by taking the number of PE-owned CONs by year times the coefficient estimate in Column (1) of Table 7. In 2011, there were 9 PE-CONs, in 2012-2013 there were 12 PE-CONs, and from 2014 onward there were 13 PE-CONs.

traffic accidents from 2008 to 2017. Column (1) shows the impact of PE buyout on total traffic fatalities relative to areas without PE firms. Columns (2) and (3) separate fatalities by location: at the scene of the accident or en route to a hospital, respectively. The location of the fatalities allows us to better assess the potential mechanism for the increase in traffic fatalities: lower quality to arrive at the scene, on the way to the hospital, or both. An increase in fatalities at the scene would be indicative of increased response times and consistent with (1) the closure of substations and (2) the ALS call being sent to a further ambulance company. An increase in fatalities en route to the hospital would also indicate a potential increase in response time to the scene but could also be an indicator for an increase in transport time to the hospital, a decrease in the quality of care provided on the ambulance, or both.

Table 9 shows that there are an additional 7 traffic fatalities following the PE acquisition of Rural/Metro relative to non-PE involvement. This is roughly a 7% increase or 0.05

Table 9: Fatal Traffic Accidents: National

	Total Fatalities	Death Location: At Scene	Death Location: En Route
	(1)	(2)	(3)
Overall ATT	7.32***	4.03**	1.21***
	[1.75, 11.31]	[0.51, 7.24]	[0.38, 2.24]
Pre-Buyout Mean	105.68	53.58	1.4
Pre-Buyout Std. Dev.	147.19	74.16	6.1
Year Fixed Effects?	Yes	Yes	Yes
County Fixed Effects?	Yes	Yes	Yes
Observations	30,400	30,400	30,400

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for traffic fatalities following the PE-buyout of Rural/Metro for 2008-2017. Column (1) presents the results for total traffic fatalities, column (2) the results for fatalities that occurred at the scene of the accident, and column (3) the results for fatalities en route to the hospital. Standard errors are block-bootstrapped at the state-level (Abadie et al., 2023). All estimates are population-weighted based on 2010 population data.

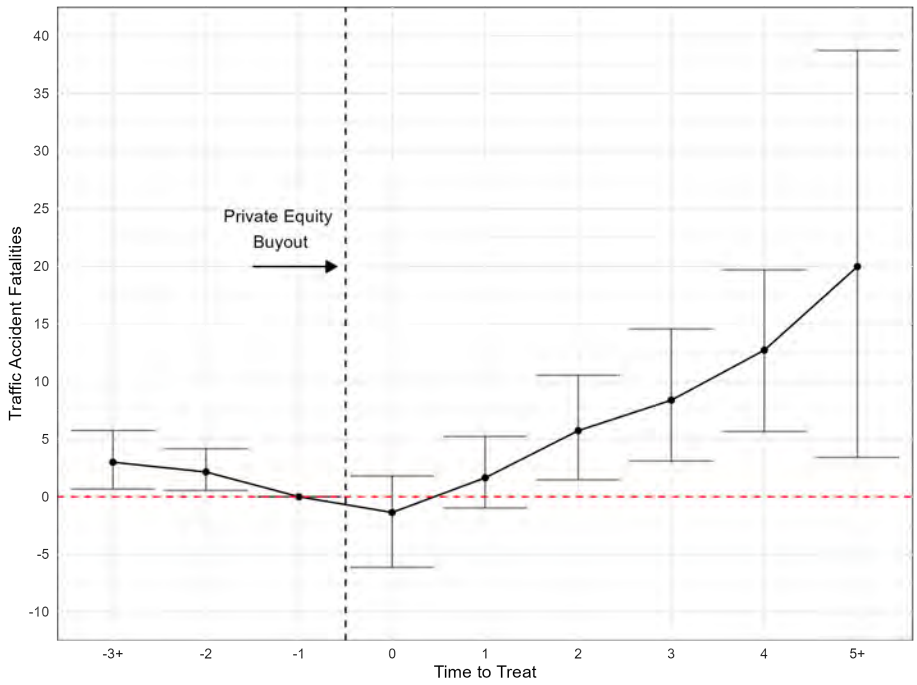
of a standard deviation. A back-of-the-envelope calculation suggests that this resulted in approximately 9,900 additional traffic fatalities from 2011-2017.[48]

Columns (2) and (3) show that the increase in fatalities comes both at the scene of the accident and en route to the hospital. The increase in fatalities occurring at the scene indicates that following PE involvement, there was an increase in the response time to these severe traffic accidents. This could occur due to substation closure, ambulances being further away (or on a delay), or both. In Section 3 we showed that PE firms shift ALS runs, which increases the time to scene for other providers. Column (2) shows that these actions are not just occurring in Arizona, but nationally as well. The increase in fatalities occurring en route could be due to an increase in response time to the scene, an increase in the time to the hospital, a decrease in the quality of care provided on the ambulance, or some combination of these things. We cannot disentangle these potential mechanisms. However, when comparing the estimates in Columns (2) and (3) with Column (1), we see that the majority of the increase in total fatalities comes from an increase in fatalities at the scene of the accident. This provides suggestive evidence that our mechanism is externally valid.

[48]There were roughly 142,000 traffic fatalities in counties where Rural/Metro operated from 2011-2017. A 7% increase yields roughly 9,900 additional traffic fatalities. The full table with yearly breakdowns can be found in Table E1 in Online Appendix E.

We also provide an event study for the national analysis, which is shown in Figure 10. Prior to PE involvement with Rural/Metro, we see that the difference in fatalities in counties with Rural/Metro vs counties without Rural/Metro is close to zero, which indicates that counties where Rural/Metro did not operate are a good control group for counties where Rural/Metro operated. Additionally, we see that prior to PE involvement (i.e., year 0) the trend is flat, which indicates that there are no pre-trends. After the PE buyout of Rural/Metro, we see a noticeable increase in fatalities due to traffic accidents. This increase becomes statistically significant at the 5% level 2 years after the PE buyout, and this statistically significant positive increase persists for over 5 years after the buyout. Notably, in Figure 7, we showed that the decline in ALS runs only became statistically significant two years after PE involvement, which aligns with the timing of the increase in traffic fatalities, providing further evidence that the mechanism for the change in traffic fatalities is the strategic operations of PE ambulance companies.

Figure 10: Event Study for US County Traffic Accident Fatalities



Note: This figure plots the coefficients and 90% confidence intervals for the imputed difference-in-difference estimates for traffic fatalities from the 2008-2017 Fatality Analysis Report System (FARS) data. The regression includes state and year fixed effects. Year "0" refers to the year Rural/Metro was bought out by private equity or entered into a county after being purchased by private equity. Year "-1" is the omitted category. Standard errors are block bootstrapped at the state level (Abadie et al., 2023).

5 Conclusions

We provide novel evidence on the specific cost-cutting strategies employed by private equity firms operating in mixed public-private markets. We leverage the staggered acquisition of the two largest private ambulance companies and detailed operations data from Arizona and find that private equity-owned firms boost profits by 50% entirely through cream-skimming – selectively serving lower-cost patients while shifting high-cost patients to public providers. We also identify the precise mechanism: private equity firms dismiss paramedics required for high-cost runs, forcing these runs onto fire departments.

Our primary contribution is to disentangle operating efficiency from cream-skimming through our access to uniquely granular data on ambulance financial statements and op-

erations reports. The data and setting enable us to pinpoint the exact staffing changes that facilitate cream-skimming. However, our analysis is not without limitations. We lack the data to fully assess potential improvements in BLS care that could partially offset welfare losses from increased ALS delays and fatalities. We also do not examine any "reverse spillovers" coming from PE profits returning to Arizona via investments by pension plans, etc. Additionally, while we present suggestive evidence of negative effects nationally, data constraints prevent a full replication of the Arizona analysis in other states.

Nonetheless, we make an important contribution to the understanding of how private equity firms operating in mixed public-private markets extract rents through strategic cream-skimming rather than efficiency improvements. These findings highlight the complex welfare implications of private equity investments in public goods provision, where cost-cutting measures to boost profits may impose substantial negative externalities on public health. As private equity's role in the healthcare sector continues to grow, we provide a cautionary note and motivation for further research into the societal impact of profit-maximizing strategies.

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Online Appendix A Long Report Example

The following provide examples of the long cost report. that are required to be filled out annually in the state For-profit companies, large ambulance organizations, and any applicant for a general rate increase is required to submit the long report annually to maintain their CON. All other companies have the option between submitting the short report or the long report annually to maintain their CON.

Figure A1: ARCR Long Report Example: This is the 2011 cost report for CON 65.

AMBULANCE REVENUE AND COST REPORT

GENERAL INFORMATION AND CERTIFICATION

Legal Name of Company:	Rural/Metro Corporation (Yuma)	CON No.: 65
DBA (Doing Business As):	Rural/Metro Ambulance Service - Yuma	Phone: (480) 655-9686
Financial Records Address:	708 West Baseline Road	City: Mesa Zip Code: 85210
Mailing Address (If Different):		
Owner/Manager:	Publicly Held Company	
Report Contact Person:	Roy Ryals	Phone: (480) 655-7213 Ext.
Report for Period:	From: January 1, 2011	To: December 31, 2011
Method of Valuing Inventory:	LIFO ( ) FIFO (X) Other (Explain):	

Please attach a list of all affiliated organizations (parent/subsidiaries) that exhibit at least 5% ownership/vesting.

Rural/Metro Corporation

I hereby vertify that I have directed the preparation of the enclosed annual report in accordance with the reporting requirements of the State of Arizona.

I have read this report and hereby vertify that the information provided is true and correct to the best of my knowledge.

This report has been prepared using the accrual basis of accounting.

Authorized Signature: _____

Title: Senior Vice President, Director of EMS Date: 8-31-12

Mail to:

Arizona Department of Health Services
Bureau of Emergency Medical Services
Certificate of Necessity and Rates Section
150 North 18th Avenue, Suite 540
Phoenix AZ 85007-3248
Telephone: (602) 364-3150
Fax: (602) 364-3567

6/22/2004

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BEMSTS - CON & RATES

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

STATISTICAL SUPPORT DATA

Line No.	DESCRIPTION	(1) SUBSCRIPTION SERVICE TRANSPORTS (EST.)	(2)** TRANSPORTS UNDER CONTRACT	(3) TRANSPORTS NOT UNDER CONTRACT	(4) TOTALS
01	Number of ALS Billable Transports:	421	117	11,438	11,976
02	Number of BLS Billable Transports:	104	29	2,827	2,960
03	Number of Loaded Billable Miles:	6,599	1,835	179,297	187,731
04	Waiting Time (Hr. & Min.):	0.7	0.2	18.1	18.9
05	Cancelled (Non-billable) Runs:				7,473 * Number

	Volunteer Services: (OPTIONAL)	Donated Hours
06	Paramedic and IEMT	0
07	Emergency Medical Technician - B	0
08	Other Ambulance Attendants	0
09	Total Volunteer Hours	0

**This column reports only those runs where a contracted discount rate was applied. See page 7 to provide additional information regarding discounted contract runs.

* Number shown is total number of calls minus number of transports

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

STATEMENT OF INCOME

Line No.	DESCRIPTION	FROM		
	Operating Revenue:			
01	Ambulance Service Routine Operating Revenue	Pg 3 Ln 10		$21,882,570
	Less:			
02	AHCCCS Settlement		($1,530,788)	
03	Medicare Settlement		($7,050,521)	
04	Contractual Discounts	Pg 7 Ln 22	($122,287)	
05	Subscription Service Settlement	Pg 8 Ln 4	$0	
06	Other (Attach Schedule)			
07	Total			($8,703,597)
08	Net Revenue from Ambulance Runs			$13,178,973
09	Sales of Subscription Service Contracts	Pg 8 Ln 8		$157,244
10	Total Operating Revenue			$13,336,218
	Ambulance Operating Expenses:			
11	Bad Debt (Includes Subscription Services Bad Debt)		$2,483,304	
12	Wages, Payroll Taxes and Employee Benefits	Pg 4 Ln 22	$4,208,346	
13	General and Administrative Expenses	Pg 5 Ln 20	$1,620,781	
14	Cost of Goods Sold	Pg 3 Ln 15	$299,531	
15	Other Operating Expenses	Pg 6 Ln 28	$1,626,094	
16	Interest Expense (Attach Schedule IV)	Pg 14 CL 4 & 5 Ln 15	$862,351	
17	Subscription Service Direct Selling	Pg 8 Ln 23	$0	
18	Total Operating Expenses			$11,100,407
19	Ambulance Service Income (Loss) (Ln 10 minus Ln 18)			$2,235,810
	Other Revenues/Expenses:			
20	Other Operating Revenue and (Expenses)	Pg 9 Ln 17	$11,388	
21	Non-Operating Revenue and (Expenses)		$0	
22	Non-Deductible Expenses (Attach Schedule)		$3,631	
23	Total Other Revenue/Expenses			$11,388
24	Ambulance Service Income (Loss) - Before Income taxes			$2,247,198
	Provision for Income Taxes:			
25	Federal Income Taxes		$764,047	
26	State Income Tax		$157,304	
27	Total Income Tax			$921,351
28	Ambulance service - Net income (Loss)			$1,325,847

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

	Non-Deductible Expenses:		
22.1	Contributions	$3,631	
22.2			
22.3			
22.4			
22.5			
22.6			
22.7			
22	Total.....Page 2, Non-Deductible Expenses		**$3,631**

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

ROUTINE OPERATING REVENUE

Line No.	DESCRIPTION							
	Ambulance Service Routine Operating Revenue:							
1	ALS Base Rate Amount	Rate	$ (a)	x No. of Runs		=	$	13,675,027
		Rate		x No. of Runs		=		
2	BLS Base Rate Amount	Rate	(a)	x No. of Runs		=	$	3,387,603
		Rate		x No. of Runs		=		
3	Mileage Rate Amount	Rate	(a)	x No. of Billable Miles		=	$	3,711,272
		Rate		x No. of Billable Miles		=		
4	Waiting Charge Amount	Rate	(a)	x No. of Hours		=	$	5,417
		Rate		x No. of Hours		=		
	(a) Ambulance Service Rates and Charges In Effect During The Year							
5	Medical Supplies (Gross Charges To Patients)						$	1,096,663
6	Nurses Charges						$	$0
7	Total						$	21,875,983
8	Standby Revenue (Attach Schedule)						$	6,588
9	Other Ambulance Service Revenue (Attach Schedule)						$	$0
10	**Total Ambulance Service Routine Operating Revenue (To Page 2, Line 1)**						$	**21,882,570**
	Cost of Goods Sold: (Medical Supplies)							
11	Inventory at Beginning of Year				N/A			
12	Plus Purchases							
13	Plus Other Costs							
14	Less Inventory at End of Year				N/A			
15	**Cost of Goods Sold (To Page 2, Line 14)**						$	299,531 *

* The disposable medical supplies are expensed as used and are not inventoried by CON

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

WAGES, PAYROLL TAXES AND EMPLOYEE BENEFITS

Line No.	DESCRIPTION	**Casual Labor	Wages	No. of *F.T.E.	Amount
01	**Gross Wages - OFFICERS/OWNERS (Attach Schedule I, Pg 10, Ln 7)**			0	$0
02	Payroll Taxes				$0
03	Employee Fringe Benefits				$0
04	Total			0	$0
05	**Gross Wages - MANAGEMENT (Attach Schedule II)**			3.06	$329,569
06	Payroll Taxes				$25,445
07	Employee Fringe Benefits				$63,220
08	Total			**3.06**	**$418,234**
	Gross Wages - AMBULANCE PERSONNEL (Attach schedule II):				
09	Paramedics and IEMT	$0		10.74	$425,110
10	Emergency Medical Technician (EMT)			76.63	$1,964,257
11	Nurses			0.72	$46,088
12	Payroll Taxes				$188,035
13	Employee Fringe Benefits				$467,184
14	Total			**88.09**	**$3,090,673**
	Gross Wages - OTHER PERSONNEL (Attach Schedule II):				
15	Dispatch			7.86	$183,602
16	Mechanics			2.36	$63,311
17	Office and Clerical			6.04	$183,954
18	Other			2.83	$120,291
19	Payroll Taxes				$42,553
20	Employee Fringe Benifits				$105,727
21	Total			**19.09**	**$699,439**
22	Total F.T.E.'s Wages, Payroll taxes and Emp. Ben. (To Page 2, Line 12)			**110.24**	**$4,208,346**

* Full-time equivalents (F.T.E.) is the sum of all hours for which employee wages were paid during the year divided by 2,080

** The sum of casual Labor (wages paid on a per run basis) + wages paid is entered in Column 2 by line item. However, when calculating FTE's, do not include casual labor hours worked or expenses incurred.

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

GENERAL AND ADMINISTRATIVE EXPENSES

Line No.	DESCRIPTION			
	Professional Services:			
01	Legal Fees	$321,961		
02	Collection Fees	$9,425		
03	Accounting and Auditing	$43,585		
04	Data Processing Fees	$0		
05	Other (Schedule Attached)	$77,526		
06	Total			**$452,496**
	Travel and Entertainment:			
07	Meals and Entertainment	$10,964		
08	Transportation - Other Company Vehicles	$27,407		
09	Travel	$4,568		
10	Other: Lodging	$2,741		
11	Total			**$45,680**
	Other General and Administrative:			
12	Office Supplies	$19,403		
13	Postage	$12,912		
14	Telephone	$43,697		
15	Advertising	$2,524		
16	General Liability Insurance	$59,539		
17	Dues and Subscriptions	$2,482		
18 a	Other (Schedule Attached)	$23,523		
18 b	Other: Corporate Support Services	$958,525	(a)	
19	Total			**$1,122,604**
20	Total General and Administrative Expenses (To Page 2, Line 13)			**$1,620,781**

(a) Corporate Support Services charges incurred by all Rural/Metro Corporation operations decreased from 2010 to 2011. The decreased Corporate Support Services charges is a result of:
1) prior to the merger with Warburg Pincus a portion of RMC interest expense was reported on the 'Corporate Support Services' line above. That interest expense is now reported on the ARCR page 14 'Interest Expense' line. Also see the footnote at ARCR page 14.
2) RMC Corporate Support Services have been restructured and streamlined; cost cutting measures have been the result.

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

	Other Professional Services:		
5.1	Public Affairs	$12,381	
5.2	Management & Human Resources	$32,655	
5.3	Medical Direction	$17,686	
5.4	Other (did not fit any other line item)	$14,804	
5.5			
5.6			
5.7			
5	Total.....Page 5, Other General & Administrative.		$77,526

	Other General and Administrative:		
18.a.1	Public Relations.....	$6,738	
18.a.2	Printing.....	$7,493	
18.a.3			
18.a.4			
18.a.5			
18.a.6			
18.a.7	Miscellaneous (did not fit any other line item)	$9,292	
18.a	Total.....Page 5, Other General & Administrative.		$23,523

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

OTHER OPERATING EXPENSES

Line No.	DESCRIPTION		
	Depreciation and Amortization:		
01	Depreciation (Attach Schedule III) Ln 20 Col I Pg 13	$307,676	
02	Amortization	$158,278	
03	Total		**$465,954**
04	Rent/Lease (Attach Scedule III Ln 20 Col K Pg 13		**$373,681**
	Building/Station Expense:		
05	Building & Cleaning Supplies	($647)	
06	Utilities	$69,557	
07	Property Taxes	$94,411	
08	Property Insurance		
09	Repairs & Maintenance	$113,749	
10	Other (Attach Schedule)		
11	Total		**$277,069**
	Vehicle Expense - Ambulance Units:		
12	Licenses / Registration	$6,805	
13	Fuel	$193,102	
14	General Vehicle Service & Maintenance	$133,344	
15	Major Repairs	$0	
16	Insurance - Service Vehicles	$46,722	
17	Other: Tires	$40,477	
18	Total		**$420,450**
	Other Expenses:		
19	Dispatch	$0	
20	Education / Training	$8,332	
21	Uniforms & Uniform Cleaning		
22	Meals & Travel for Ambulance Personnel	$4,109	
23	Maintenance Contracts	$21,747	
24	Minor Equipment - Not Capitalized	$54,752	
25	Ambulance Supplies - (Nonchargeable)		
26	Other (Attach Schedule)		
27	Total		**$88,940**
28	Total Other Operating Expenses (To Page 2, Line 15)		**$1,626,094**

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

DETAIL OF CONTRACTUAL ALLOWANCES

Line No.	Name of Contracting Entity	Total Billable Runs	Gross Billing	Percent Discount	Allowance
01	BCBS OF ARIZONA	72	231,469	30%	$69,441
02	AETNA	12	34,706	30%	10,412
03	CIGNA	12	16,921	30%	5,076
04	YUMA REHABILITATION	6	7,407	30%	2,222
05	WESTERN GROWERS ASSURANCE TRUST	2	2,375	30%	712
06	HEALTH NET	4	19,337	30%	5,801
07	UNITED HEALTHCARE	7	19,880	30%	5,964
08	VA MEDICAL CENTER TUCSON	6	12,566	30%	3,770
09	AZ FOUNDATION FOR MEDICAL CARE	8	22,785	30%	6,836
10	YUMA REGIONAL MEDICAL CENTER	8	28,868	30%	8,660
11	AIR EVAC SERVICES INC	6	7,446	30%	2,234
12	ONE CALL MEDICAL TRANSPORT	3	3,864	30%	1,159
13					
14					
15					
16					
17					
18					
19					
20					
21					
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23					
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25					
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32					
33					
34					
35					
36					
37					
	TOTAL To Page 2 Line 4	146	$407,624		$122,287

Page 7

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

SUBSCRIPTION SERVICE REVENUE AND DIRECT SELLING EXPENSES

Line No.	DESCRIPTION		
01	Billings at Fully Established Rate		$769,247
	LESS:		
02	AHCCCS Settlement	($1,985)	
03	Medicare Settlement	($437,861)	
04	Subscription Service Settlements	($20,764)	
05	Subscription Service Bad Debt		
06	Total (Informational Only - Detail Reported On Page 2 Lines 2, 3 and 11)		($460,610)
07	Net Revenue from Subscription Service Runs		$308,636
08	Sales of Subscription Contracts (To Page 2 Line 9)		$157,244
09	Other Revenue (Attach Schedule)		
10	Total Subscription Service Revenue		$465,881
	Direct Expenses Incurred Selling Subscription Contracts:		
11	Salaries/Wages	$1,391	
12	Payroll Taxes	$108	
13	Employee Fringe Benefits	$6	
14	Professional Services	$169	
15	Contract Labor		
16	Travel	$31	
17	Other General & Administrative Expenses	$119	
18	Depreciation/Amortization	$148	
19	Rent/Lease	$270	
20	Building/Station Expenses	$181	
21	Transportation-Vehicles	$13	
22	Other (Not Classified Above and Misc)	$561	
23	Total Subscription Service Expenses (Informational Only - Detail Reported On Page 2, Lines 12 - 16)		$2,996

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

OTHER OPERATING REVENUES AND EXPENSES

Line No.	DESCRIPTION		
	Other Operating Revenues:		
01	Supportive Funding - Local (Attach Schedule)		
02	Grant Funds - State (Attach Schedule)		
03	Grant Funds - Federal (Attach Schedule)		
04	Grant Funds - Other (Attach Schedule)		
05	Patient Finance Charges		
06	Patient Late Payment Charges		
07	Interest Earned - Related Person/Organization		
08	Interest Earned - Other		
09	Interest Income and Miscellaneous Revenue	$2,943	
10	Gain On Sale of Operating Property	8,444	
11	Other:		
12	Total Other Operating Revenues		$11,388
	Other Operating Expenses:		
13	(Loss) On Sale of Operating Property	$0	
14	Other:		
15	Other:		
16	Total Other Operating Expenses		$0
17	Net Other Operating Revenues and Expenses (To Page 2, Line 20)		$11,388

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

SCHEDULE I
DETAIL OF SALARIES / WAGES

Officers / Owners

Line No.	Name	Title	% of Owner-ship	Manage-ment	*FTE	CEP IEMT EMT	*FTE	Office	*FTE	Other	*FTE	Totals Wages Paid To Owners	*FTE
01	N/A			$		$		$		$			
02													
03													
04													
05													
06													
07	Total			$		$		$		$		$	
												N/A [1]	N/A [2]

* Full - time equivalents (F.T.E.) is the sum of all hours for which employee wages were paid during the year divided by 2,080.

1 Total wages paid to owners to Page 4 Col 2 Line 01. 2 Total FTEs to Page 4 Col 1 Line 01.

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

SCHEDULE II
DETAIL OF SALARIES / WAGES

Management, Ambulance Personnel, Other Personnel

Line No.	Detail of Salaries/Wages - Other Than Officers/Owners				
01	MANAGEMENT:		METHOD OF COMPENSATION		
	Certification and/or Title	Scheduled Shifts (i.e. 40 or 60 hours a week)	Hourly Wage	Annual Salary	$'s per Run or Shift
	Various Local Management	40 Hours a week	x	x	N/A
	Various Regional Management	40 Hours a week	x	x	N/A
02	AMBULANCE PERSONNEL:				
	Paramedic	56/50/48/ hours/week	x		N/A
	EMT	56/50/48/ hours/week	x		N/A
	Nurse	56/48/40 hours/week	x		N/A
03	OTHER PERSONNEL				
	Various Support Staff	40 Hours a week	x	x	N/A

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

SCHEDULE III

DEPRECIATION AND / OR RENT / LEASE EXPENSES (AMBULANCE VEHICLES & ACCESSORIAL EQUIPMENT ONLY)

	A	B	C	D	E	F	G	H	I	J	K
Line	Decription of Property	Date Placed in Service	Cost or Other Basis	Business Use Percent	Basis for Depreciation	Method	Recovery Period	Deprec. Prior Years	Current Year Deprec.	Remaining Basis	Rent/Lease Amount*
01	Vehicle Rental			100%							$0
02	Equipment Rental			100%							$12,351
03											
04	Vehicle Fixed Assets	Various	$443,000	100%	$443,000	SL	Various	$0	$123,683	$319,317	
05	Non-Vehicle Fixed Assets	Various	$504,553	100%	$504,553	SL	Various	$0	$92,924	$411,629	
06											
07											
08											
09											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20	SUBTOTAL		$947,553		$947,553				$216,608		$12,351
										To Pg 13 Ln 19, Col I	To Pg 13 Ln 19, Col K

* Complete description of property, date placed in service, and rent/lease amount columns only.

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

SCHEDULE III

DEPRECIATION AND / OR RENT / LEASE EXPENSES (ALL OTHER ITEMS)

	A	B	C	D	E	F	G	H	I	J	K
Line	Decription of Property	Date Placed in Service	Cost or Other Basis	Business Use Percent	Basis for Depreciation	Method	Recovery Period	Deprec. Prior Years	Current Year Deprec.	Remaining Basis	Rent/Lease Amount*
01	Rented Real Estate			100%							$348,182
02	OH Vehicle Rental			100%							$0
03	OH Equipment Rental			100%							$13,149
04											
05	Vehicle Fixed Assets	Various	$2,800	100%	$2,800	SL	Various	$0	$1,400	$1,400	
06	Non-Vehicle Fixed Assets	Various	$74,106	100%	$74,106	SL	Various	$0	$12,169	$61,937	
07											
08	OH Vehicle Fixed Assets	Various		100%		SL	Various		$10,025		
09	OH Non-Vehicle Fixed Assets	Various		100%		SL	Various		$67,474		
10											
11											
12											
13											
14											
15											
16											
17											
18	SUBTOTAL (above)		$76,906		$76,906			$0	$91,068		$361,330
19	SUBTOTAL (from Pg 12 Ln 20)		$947,553		$947,553				$216,608		$12,351
20	SUM of Ln 18 and 19		$1,024,460		$1,024,460			$0	$307,676		$373,681
									To Pg 6, Ln 01		To Pg 6, Ln 04

* Complete description of property, date placed in service, and rent/lease amount columns only.

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

Schedule IV
DETAIL OF INTEREST

Line No.	Description	(1) Interest Rate	(2) Principal Balance Beg. of Period	(3) Principal Balance End of Period	(4) Interest Expense Related Persons or Organizations	(5) Interest Expense Other	
	Service Vehicles & Accessorial Equipment						
	Name of payee:						
01		%	$	$	$	$	
02							
03							
04							
	Communications Equipment						
	Name of Payee:						
05		%	$	$	$	$	
06							
07							
	Other Property & Equipment						
	Name of Payee:						
08		%	$	$	$	$	
09							
10							
	Working Capital						
	Name of Payee:						
11	Various - See Audited Financials	Various	In Corp Balances	$	0	$862,351	(a)
12							
13							
	Other						
	Name of Payee:						
14		%	$	$	$	$	
15	TOTAL		N/A	N/A	0	$862,351	

---- (To Pg 2, Cl 2, Ln 16) ----

(a) Interest expense incurred by all Rural/Metro Corporation operations increased from 2010 to 2011. The increased interest expense is the result of:
1) new debt incurred in the merger with Warburg Pincus to: a) extinguish RMC debt existing prior to the merger, b) purchase RMC stock existing prior to the merger, c) purchase additional fixed assets, d) fund working capital requirements as necessary.
2) prior to the merger with Warburg Pincus a portion of RMC interest expense was reported on the ARCR page 5 'Corporate Support Services' line. That interest expense is now reported on the 'Interest Expense' line above. Also see the footnote at ARCR page 5.
3) Deferred Financing Fees – costs associated with the issuance of the new debt referenced in 1) above amortized and reported as interest expense.

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

BALANCE SHEET Current audited financial statements may be submitted in lieu of the Balance Sheet

ASSETS

	CURRENT ASSETS		
01	Cash	$	
02	Accounts receivable		
03	Less: Allowance for doubtful accounts		
04	Inventory		
05	Prepaid expenses		
06	Other current assets		
07	TOTAL CURRENT ASSETS		
08	PROPERTY & EQUIPMENT		
09	Less: Accumulated depreciation (see ACR p. 12)		
10	OTHER NONCURRENT ASSETS		
11	TOTAL ASSETS		$ *

LIABILITIES & EQUITY

	CURRENT LIABILITIES		
12	Accounts payable	$	
13	Current portion of notes payable		
14	Current portion of long term debt		
15	Deferred subscription income		
16	Accrued expenses and other		
17			
18			
19	TOTAL CURRENT LIABILITIES		
20	NOTES PAYABLE		
21	LONG TERM DEBT OTHER		
22	TOTAL LONG-TERM DEBT		$
	EQUITY AND OTHER CREDITS		
	Paid-in capital:		
23	Common stock	$	
24	Paid-in capital in excess of par value		
25	Contributed capital		
26	Retained Earnings		
27			
28			
29	Fund balances		
30	TOTAL EQUITY		$
31	TOTAL LIABILITIES & EQUITY		$ *

*See enclosed Consolidated Annual Audited Financial Statements

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Rural/Metro Ambulance Service - Yuma

FOR THE PERIOD FROM: 1/1/11 TO: 12/31/11

STATEMENT OF CASH FLOWS

	OPERATING ACTIVITIES		
01	Net (loss) income	$	
	Adjustments to Reconcile Net Income To Net Cash Provided by Operating Activities:		
02	Depreciation expense		
03	Deferred income tax		
04	Loss (gain) on disposal of Property and Equipment		
	(Increase) Decrease in:		
05	Accounts receivable		
06	Inventories		
07	Prepaid expenses		
	(Increase) Decrease in:		
08	Accounts payable		
09	Accrued expenses		
10	Deferred subscription income		
11	NET CASH PROVIDED (USED) BY OPERATING ACTIVITIES		$
	INVESTING ACTIVITIES:		
12	Purchases of property and equipment	$	
13	Proceeds from disposal of property and equipment		
14	Purchases of Investments		
15	Proceeds from disposal of Investments		
16	Loans made		
17	Collections on loans		
18	Other _____		
19	NET CASH PROVIDED (USED) BY INVESTING ACTIVITIES		$
	FINANCING ACTIVITIES:		
	New borrowings:		
20	Long-term	$	
21	Short-term		
	Debt reduction:		
22	Long-term		
23	Short-term		
24	Capital contributions		
25	Dividends paid		
26	NET CASH PROVIDED (USED) BY FINANCING ACTIVITIES		$
27	NET INCREASE (DECREASE) IN CASH		$ *
28	CASH AT THE BEGINNING OF YEAR		$
29	CASH AT END OF YEAR		$
	SUPPLEMENTAL DISCLOSURES:		
	Noncash investing and financing transactions:		
30	_____		$
31	_____		$
32	_____		$
33	Interest paid (net of amounts capitalized)		$
34	Income taxes paid		$

*See enclosed Consolidated Annual Audited Financial Statements

Online Appendix B Short Report Example

The following provide examples of the short cost report. that are required to be filled out annually in the state For-profit companies, large ambulance organizations, and any applicant for a general rate increase is required to submit the long report annually to maintain their CON. All other companies have the option between submitting the short report or the long report annually to maintain their CON.

Figure B1: ARCR Short Report Example: This is the 2011 cost report for CON 105.

AMBULANCE REVENUE and COST REPORT
FIRE DISTRICT and SMALL RURAL COMPANY

Arizona Department of Health Services
Annual Ambulance Financial Report

Daisy Mountain Fire District CON # 105
Reporting Ambulance Service

Address: 43814 N New River Rd

City: Phoenix Zip: 85087

Report Fiscal Year

From: July 1, 2010 (Mo. Day Year) To: June 30, 2011 (Mo. Day Year)

I hereby verify that I have directed the preparation of the enclosed annual report in accordance with the reporting requirements of the State of Arizona.

I have read this report and hereby verify that the information provided is true and correct to the best of my knowledge.

This report has been prepared using the accrual basis of accounting.

Authorized Signature: Mark Nichols Date: 3/20/2012

Print Name and Title: Mark Nichols, Fire Chief

Phone: 623-465-7400

Mail to:

Department of Health Services
Bureau of Emergency Medical Services
Certificate of Necessity and Rates Section
150 North 18th Avenue, Suite 540
Phoenix, AZ 85007-3248
Telephone: (602) 364-3150
Fax: (602) 364-3567

06/22/2004 Formula's Excluded

Page 1

AMBULANCE REVENUE AND COST REPORT

FIRE DISTRICT and SMALL RURAL COMPANY

AMBULANCE SERVICE ENTITY: Daisy Mountain Fire District

FOR THE PERIOD **FROM:** July 1, 2010 **TO:** June 30, 2011

STATISTICAL SUPPORT DATA

Line No.	DESCRIPTION	(1) SUBSCRIPTION SERVICE TRANSPORTS	*(2) TRANSPORTS UNDER CONTRACT	(3) TRANSPORTS NOT UNDER CONTRACT	(4) TOTALS
1	Number of ALS Billable Transports:	-	# -	1,294	1,294
2	Number of BLS Billable Transports:	-	-	117	-
3	Number of Loaded Billable Miles:	-	-	25,072	25,072
4	Waiting Time (Hr. & Min.):	-	-	-	-
5	Canceled (Non-Billable) Runs:				431

AMBULANCE SERVICE ROUTINE OPERATING REVENUE

6	ALS Base Rate Revenue		$ 902,487
7	BLS Base Rate Revenue		81,600
8	Mileage Charge Revenue		292,917
9	Waiting Charge Revenue		-
10	Medical Supplies Charge Revenue		-
11	Nurses Charge Revenue		-
12	Standby Charge Revenue (Attach Schedule)		-
13	TOTAL AMBULANCE SERVICE ROUTINE OPERATING REVENUE	(Post to Page 3, Line 1)	$ 1,277,004

SALARY AND WAGE EXPENSE DETAIL

GROSS WAGES:

Line No.			** No. of FTE's
14	Management	$ 142,702	1.9
15	Paramedics and IEMTs	$ 517,602	8.4
16	Emergency Medical Technician (EMT)	$ 435,531	8.4
17	Other Personnel	$ 100,667	1.9
18	Payroll Taxes and Fringe Benefits - All Personnel	$ 251,286	-
19	Total Wages, Taxes & Benefits (Sum Lines 14 through 18; Post to Page 3, Line 10)	$ 1,447,788	20.7

* This column reports only those runs where a contracted discount rate was applied.
** Full-time equivalents (F.T.E.) is the sum of all hours for which employees wages were paid during the year divided by 2080.

AMBULANCE REVENUE AND COST REPORT

FIRE DISTRICT and SMALL RURAL COMPANY

AMBULANCE SERVICE ENTITY: Daisy Mountain Fire District

FOR THE PERIOD FROM: July 1, 2010 TO: June 30, 2011

SCHEDULE OF REVENUES AND EXPENSES

Line No.	DESCRIPTION		
	Operating Revenues:		
1	Total Ambulance Service Operating Revenue	(From: Page 2, Line 13)	$ 1,277,004
	Settlement Amounts:		
2	AHCCCS		53,012
3	Medicare		197,315
4	Subscription Service		-
5	Contractual		-
6	Other		-
7	Total	(Sum of Lines 2 through 6)	250,327
8	Total Operating Revenue	(Line 1 minus Line 7)	$ 1,026,677
	Operating Expenses:		
9	Bad Debt		$ 142,655
10	Total Salaries, Wages, and Employee-Related Expenses	(From: Page 2, Line 19)	1,447,788
11	Professional Services		22,116
12	Travel and Entertainment		830
13	Other General Administrative		21,567
14	Depreciation		73,326
15	Rent / Leasing		-
16	Building / Station		26,400
17	Vehicle Expense		45,223
18	Other Operating Expense		183,601
19	Cost of Medical Supplies Charged to Patients		-
20	Interest		11,989
21	Subscription Service Sales Expense		-
22	Total Operating Expense	(Sum of Lines 9 through 21)	1,975,495
23	Total Operating Income or (Loss)	(Line 8 minus Line 22)	$ (948,818)
24	Subscription Contract Sales		
25	Other Operating Revenue		
26	Local Supportive Funding		948,818
27	Other Non-Operating Income (Attach Schedule)		
28	Other Non-Operating Expense (Attach Schedule)		
29	NET INCOME or (LOSS) Before Income Taxes	(Sum of Lines 23 through 27, minus Line 28)	$ -
	Provision for Income Taxes:		
30	Federal Income Tax		
31	State Income Tax		
32	Total Income Tax	(Line 30, plus Line 31)	
33	**Ambulance Service Net Income (Loss)**	(Line 29, minus Line 32)	-

AMBULANCE REVENUE AND COST REPORT

FIRE DISTRICT and SMALL RURAL COMPANY

AMBULANCE SERVICE ENTITY: Daisy Mountain Fire District

FOR THE PERIOD **FROM:** July 1, 2010 **TO:** June 30, 2011

BALANCE SHEET See Attached Audited Financials

ASSETS

	CURRENT ASSETS		
1	Cash	$	
2	Accounts Receivable		
3	Less: Allowance for Doubtful Accounts		
4	Inventory		
5	Prepaid Expen		
6	Other Current Assets		
7	TOTAL CURRENT ASSETS		$
9	PROPERTY & EQUIPMENT		
10	Less: Accumulated Depreciation		
11	OTHER NON CURRENT ASSETS		
12	TOTAL ASSETS		$

LIABILITIES & EQUITY

	CURRENT LIABILITIES		
13	Accounts Payable	$	
14	Current Portion of Notes Payable		
15	Current Portion of Long-Term Debt		
16	Deferred Subscription Income		
17	Accrued Expenses and Other		
18			
19			
20	TOTAL CURRENT LIABILITIES		$
21	NOTES PAYABLE		
22	LONG-TERM DEBT, OTHER		
23	TOTAL LONG-TERM DEBT		
	EQUITY & OTHER CREDITS		
	Paid-In Capital:		
24	Common Stock		
25	Paid-In Capital in Excess of Par Value		
26	Contributed Capital		
27	Retained Earnings		
28			-
29			-
30	Fund Balance		-
31	TOTAL EQUITY		
32	TOTAL LIABILITIES & EQUITY		$

AMBULANCE REVENUE AND COST REPORT

AMBULANCE SERVICE ENTITY: Daisy Mountain Fire District

FOR THE PERIOD **FROM:** July 1, 2010 **TO:** June 30, 2011

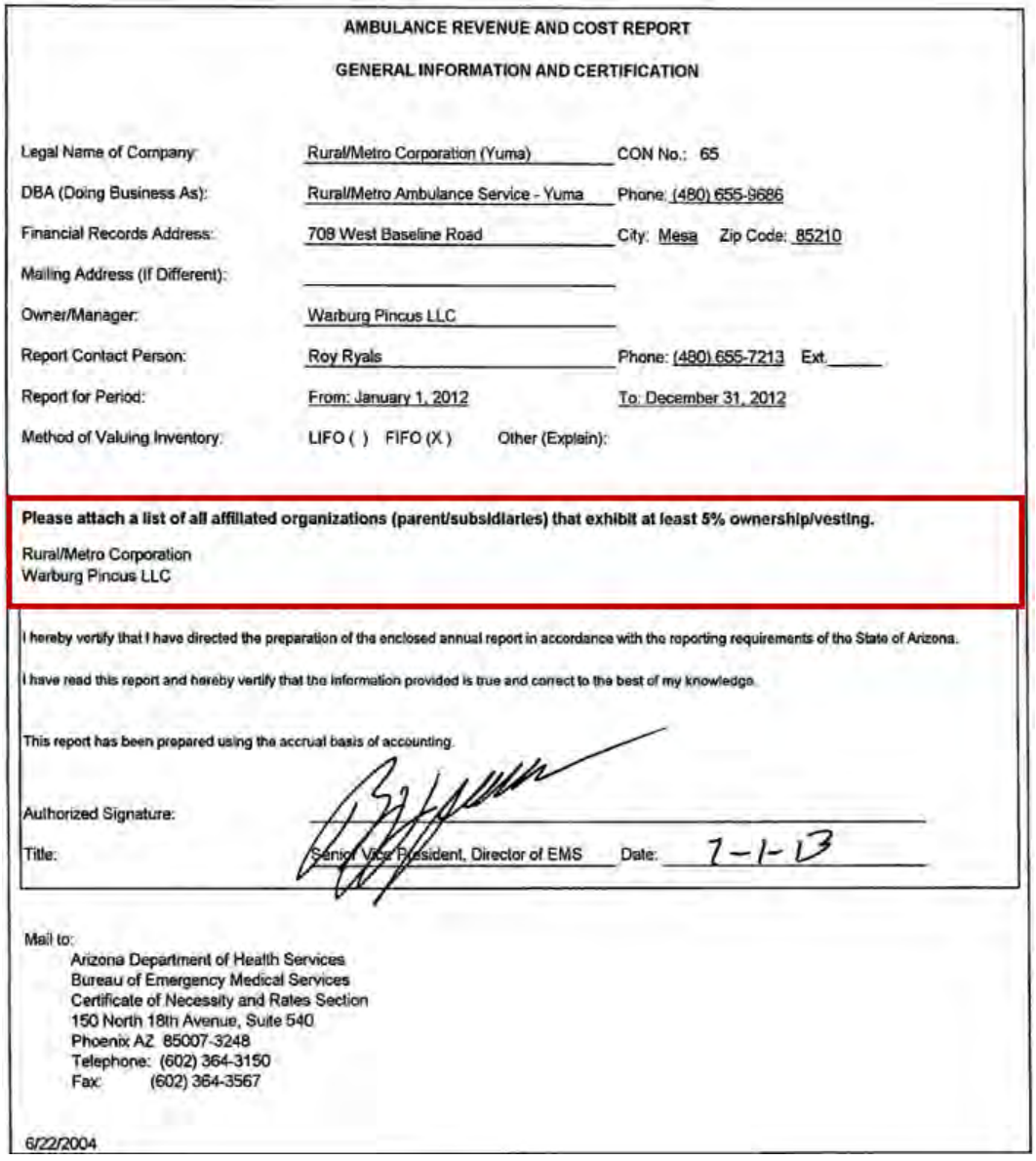
STATEMENT OF CASH FLOW See Attached Audited Financials

	OPERATING ACTIVITIES:		
1	Net (loss) Income	$	
	Adjustments to Reconcile Net Income to Net Cash Provided by Operating Activities: Note: a increase in these accounts improves cash flow		
2	Depreciation Expense		
3	Deferred Income Tax		
4	Loss (gain) on Disposal of Property & Equipment		
	(Increase) Decrease in: Note: a decrease in these accounts improves cash flow		
5	Accounts Receivable		
6	Inventories		
7	Prepaid Expenses		
	Increase (Decrease) in: Note: a increase in these accounts improves cash flow		
8	Accounts Payable		
9	Accrued Expenses		
10	Deferred Subscription Income		
11	NET CASH PROVIDED (Used) BY OPERATING ACTIVITIES		$
	INVESTING ACTIVITIES:		
12	Purchases of Property & Equipment		
13	Proceeds from Disposal of Property & Equipment		
14	Purchases of Investments		
15	Proceeds from Disposal of Investments		
16	Loans Made		
17	Collections on Loans		
18	Other		
19	NET CASH PROVIDED (Used) BY INVESTING ACTIVITIES		
	FINANCING ACTIVITIES:		
	New Borrowings:		
20	Long-Term		
21	Short-Term		
	Debt Reduction:		
22	Long-Term		
23	Short-Term		
24	Capital Contributions		
25	Dividends Paid	$	
26	NET CASH PROVIDED (Used) BY FINANCING ACTIVITIES		
27	NET INCREASE (Decrease) IN CASH		
28	CASH AT BEGINNING OF YEAR		
29	CASH AT END OF YEAR		
	SUPPLEMENTAL DISCLOSURES:		
	Non-cash Investing and Financing Transactions:		
30			
31			
32			
33	Interest Paid (Net of Amounts Capitalized)		
34	Income Taxes Paid		$

Page 5

Online Appendix C PitchBook Data Procedure

Figure C1: PitchBook Data Procedure:



AMBULANCE REVENUE AND COST REPORT

GENERAL INFORMATION AND CERTIFICATION

Legal Name of Company: Rural/Metro Corporation (Yuma) CON No.: 65

DBA (Doing Business As): Rural/Metro Ambulance Service - Yuma Phone: (480) 655-9686

Financial Records Address: 709 West Baseline Road City: Mesa Zip Code: 85210

Mailing Address (If Different):

Owner/Manager: Warburg Pincus LLC

Report Contact Person: Roy Ryals Phone: (480) 655-7213 Ext.

Report for Period: From: January 1, 2012 To: December 31, 2012

Method of Valuing Inventory: LIFO ( ) FIFO (X) Other (Explain):

Please attach a list of all affiliated organizations (parent/subsidiaries) that exhibit at least 5% ownership/vesting.

Rural/Metro Corporation
Warburg Pincus LLC

I hereby verify that I have directed the preparation of the enclosed annual report in accordance with the reporting requirements of the State of Arizona.

I have read this report and hereby verify that the information provided is true and correct to the best of my knowledge.

This report has been prepared using the accrual basis of accounting.

Authorized Signature:

Title: Senior Vice President, Director of EMS Date: 7-1-13

Mail to:
Arizona Department of Health Services
Bureau of Emergency Medical Services
Certificate of Necessity and Rates Section
150 North 18th Avenue, Suite 540
Phoenix AZ 85007-3248
Telephone: (602) 364-3150
Fax: (602) 364-3567

6/22/2004

Note: This figure shows an example of the matching of ambulance company owners in Arizona to the names of companies in PitchBook to determine private equity status.

Online Appendix A Description of Operating Area Data Collection

Wayback Machine is a digital archive of websites, run by Internet Archive, which is a nonprofit organization. Wayback Machine works via their software that crawls websites and will download the publicly accessible information. In essence, Wayback Machine will allow a user to enter in a specific url and then view a snapshot of that webpage based on when the "crawling" occurred.

To determine Rural/Metro's operating areas, the url http://www.ruralmetro.com/about_communitiesserved.asp or http://www.ruralmetro.com/locations.html was entered into Wayback Machine. For each year of data available (which was back to 2008), the latest date in the year where the appropriate data was scrapped was utilized.

Figure A1: Wayback Machine: Rural/Metro – 2008

Note: This picture presents a visualization of the hand-collected operating area data for Rural-Metro using Wayback Machine for 2008.

Figure A1 shows the process for the url http://www.ruralmetro.com/about_communitiesserved.asp. The top of Figure A1 displays all the points in time that this url was captured via crawling as the black bars. Figure A1 also shows the communities served by Rural/Metro in that year both at the state-level and individual community level. Figure A2 shows the process for the url http://www.ruralmetro.com/locations.html. Again, the black bars at the top of Figure A2 display the number of times the website was captured in the given time-frame. Figure A2 also shows the states that Rural/Metro operated in; however, individual community operations were removed from the later version of the website.

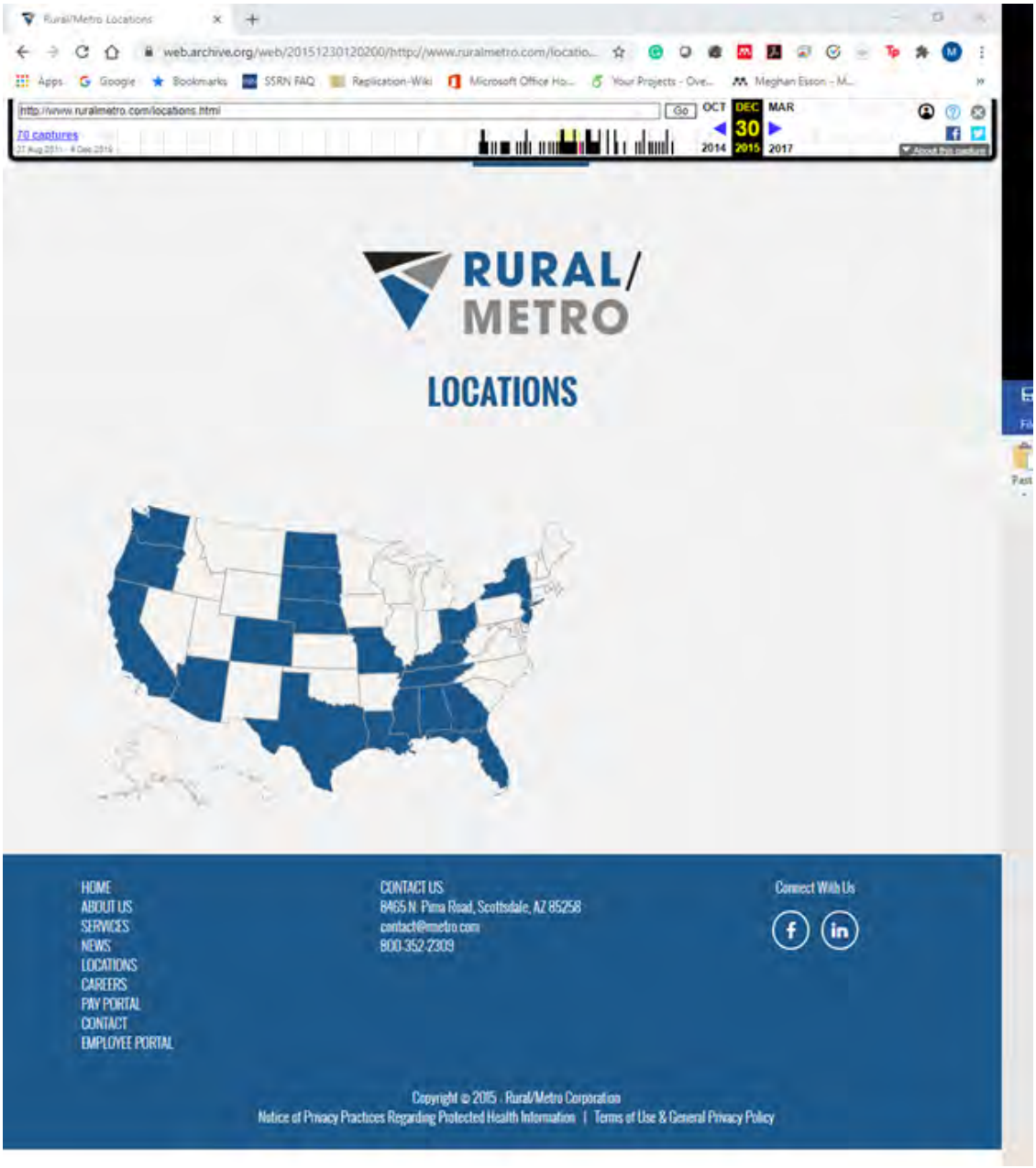


Figure A2: Wayback Machine: Rural/Metro – 2015

Note: This picture presents a visualization of the hand-collected operating area data for Rural-Metro using Wayback Machine for 2015.

Online Appendix B Breakdown of Cost Changes for PE

Table B1: Ambulance Operations: Wages

	Paramedics	Emergency Medical Technicians
	(1)	(2)
Overall ATT	1091.41	−661.28
	[-4268.59, 7276.09]	[-4030.52, 2240.5]
Pre-Buyout Mean	39000	30000
Pre-Buyout Std. Dev.	5500	4600
Year Fixed Effects?	Yes	Yes
CON Fixed Effects?	Yes	Yes
Observations	405	405

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.This table shows the difference-in-difference results and the pre-PE buyout mean and standard deviation for ambulance company paramedic and EMT wages following PE buyout for 2010-2017. Standard errors are block-bootstrapped at the CON level (Abadie et al., 2023).

Table B2 presents the results for the difference-in-differences estimates for the impact on ambulance company expenses following PE buyout. Panel (A) presents the results for total general expenditures, wages, and medical supplies. Panel (B) presents the results for infrastructure: rent/leasing, building, and vehicle expenses. Panel (C) presents the results for capital expenses: bad debt, interest, and depreciation. Overall, Columns (1) and (2) in Panel (A) indicate that total expenses are not statistically different between PE firms and non-PE firms, and this holds regardless of the ability of the PE firm to shift costs. This is indicative of the current operating profit increase in Table C1 coming, not from efficiency (i.e., decrease cost) gains, but purely from cream-skimming.

Table B2 does provide evidence of expenditure decreases for PE firms relative to non-PE firms following PE buyout. Columns (3) and (4) of Panel (A) show that wages for PE firms are statistically significantly lower than non-PE firms following PE buyout and that this is driven by PE firms with cream-skimming ability, which are the areas that saw paramedic layoffs in Table 4. Additionally, Panel (B) shows that expenditures on infrastructure are decreasing. Overall, the expenditures for rent/leasing, building, and vehicles decrease for PE companies relative to non-PE companies, and these decreases are entirely driven by PE companies that can cream-skim. These results suggest that PE companies not only fire

Table B2: Ambulance Operations: Expenses - 2010-2017

General ($100k) (A):	Total		Wages		Medical Supplies	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	8.24	-	−5.08***	-	−0.3	-
	[-3.03, 18.76]	-	[-8.34, -2.29]	-	[-0.8, 0.11]	-
Base Treatment Effect	-	−0.74	-	5.72*	-	0.33
	-	[-12.24, 14.95]	-	[0.29, 12.99]	-	[-0.65, 1.22]
Cream-Skim Treatment Effect	-	1.43	-	−1.72***	-	−0.1
	-	[-0.67, 3.41]	-	[-2.5, -1.08]	-	[-0.27, 0.07]
Pre-Buyout Mean	170	170	79	79	5.5	5.5
Pre-Buyout Std. Dev.	160	160	77	77	6.8	6.8
Infrastructure ($100k) (B):	Rent/Leasing		Building		Vehicle	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	−0.97***	-	−0.53***	-	−0.86**	-
	[-1.46, -0.53]	-	[-0.9, -0.27]	-	[-1.92, -0.12]	-
Base Treatment Effect	-	0.83***	-	0.52	-	0.38
	-	[0.32, 1.59]	-	[-0.09, 1.11]	-	[-0.62, 1.66]
Cream-Skim Treatment Effect	-	−0.29***	-	−0.17***	-	−0.2
	-	[-0.45, -0.16]	-	[-0.25, -0.07]	-	[-0.47, 0]
Pre-Buyout Mean	6.9	6.9	3	3	8.2	8.2
Pre-Buyout Std. Dev.	6.3	6.3	2.7	2.7	9.4	9.4
Capital ($100k) (C):	Bad Debt		Interest		Depreciation	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	23.02***	-	2.88***	-	2.72***	-
	[11.73, 33.16]	-	[1.24, 4.95]	-	[1.17, 5.01]	-
Base Treatment Effect	-	−2.56	-	4.66***	-	−1.02
	-	[-11.51, 15.02]	-	[1.73, 10.6]	-	[-2.53, 0.21]
Cream-Skim Treatment Effect	-	4.07**	-	−0.28	-	0.59***
	-	[1.86, 5.47]	-	[-0.95, 0.08]	-	[0.25, 1.1]
Pre-Buyout Mean	28	28	4.2	4.2	2.2	2.2
Pre-Buyout Std. Dev.	31	31	5.6	5.6	3	3
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
CON Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	405	405	405	405	405	405

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for ambulance company expenses (per $100k) following PE-buyout for 2010-2017 in Arizona. Panel (A) presents the results for total general expenditures, wages, and medical supplies. Panel (B) presents the results for infrastructure: rent/leasing, building, and vehicle expenses. Panel (C) presents the results for capital expenses: bad debt, interest, and depreciation. The odd columns present the overall results, and the even columns separate out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

paramedics to decrease their ability to service low-profit margin ALS calls, but they also close substations.

While Section 3.3 provides evidence that private equity companies extract rents in the ambulance industry through cream-skimming, we must also examine whether PE companies also provide companies with efficiency gains. Using the cost data from the ARCR for Arizona

ambulance companies, we can simply check for efficiency gains by examining how operating expenses and profit are attributed to the services ambulance companies provide (i.e., estimate marginal costs and marginal profits) both prior to the PE buyout and post-PE buyout. We can then compare the estimates to determine if the marginal costs/profits changed for the services provided pre- and post-PE intervention. If profits are statistically significantly higher and costs are statistically significantly lower for ambulance services following PE involvement, this would be evidence of efficiency gains.

Formally, we estimate:

$$\begin{aligned} y_{pt} = \beta_1 ALS_{pt} + \beta_2 BLS_{pt} + \beta_3 Miles_{pt} \\ + \beta_4 Wait\_Time_{pt} + \beta_5 Canceled\_Run_{pt} + \tau_t + \epsilon_{pt} \end{aligned} \tag{B1}$$

where p denotes CONs that are or will be associated with private equity, t denotes year, y_{pt} are our variables of interest (i.e., operating expenses and profit), τ_t are year fixed effects, and ϵ_{pt} is an error term. Standard errors are clustered at the CON level. We estimate B1 for the sample of private equity companies both prior to the PE buyout and post-PE buyout. We then compare the coefficient estimates from pre- and post-PE buyout to determine if the estimates are statistically different from each other.

In equation B1, we include ALS runs, BLS runs, the total number of miles traveled throughout the year, the amount of time ambulances were being staffed but waiting between calls, and the number of runs for which an ambulance was called out but was canceled en route. This allows us to determine the marginal expense/profit for the services where an ambulance company can earn/lose money. ALS and BLS runs make up the vast majority of ambulance expenses and revenue and are the focus. Table B3 presents the coefficient estimates for operating expense and profit for ALS runs (Panel (A)) and BLS runs (Panel (B) prior to PE-buyout (column (1)) and after PE-buyout (column (2)). Columns (3) and (4) of Table B3 show the difference in the coefficient estimate from pre-PE and post-PE and the p-value testing whether that difference is statistically significant, respectively.

Panel (A) of Table B3 shows that ALS runs are overall unprofitable or do not contribute to operating profit for ambulance companies both prior to PE buyout and after PE buyout. This is in contrast to BLS runs, which positively impact ambulance operating profit pre- and post-PE buyout and positively contribute to overall profit following PE involvement. Additionally, Columns (1) and (2) of Table B3 indicate that ALS runs are more costly for ambulance companies than BLS runs, both prior to and after PE involvement. Table B3 therefore provides evidence that in our sample of Arizona ambulance companies (1) ALS runs are more costly than BLS runs, and (2) BLS runs are the profitable runs. These results

Table B3: Ambulance Operations: Cost and Profit by Run Type

Advanced Life Support Runs (A):

	(1) Pre-PE:	(2) Post-PE:	(3) Diff. Coef.:	(4) P-Value:
Operating Expense	511.01***	632.13***	−121.12	(0.64)
	(24.87)	(71.26)	(254.9)	–
Profit	−93.46***	−135.09***	41.63	(0.71)
	(27.19)	(42.23)	(110.09)	–
Operating Profit	38.19	9.79	28.4	(0.89)
	(29.77)	(77.16)	(213.98)	–

Basic Life Support Runs (B):

	(1) Pre-PE:	(2) Post-PE:	(3) Diff. Coef.:	(4) P-Value:
Operating Expense	315.66***	471.25***	−155.59	(0.15)
	(30.83)	(37.62)	(106.58)	–
Profit	30.39	152.06***	−121.67	(0.47)
	(48.55)	(40.23)	(169.4)	–
Operating Profit	125.52***	246.48***	−120.96	(0.33)
	(38.15)	(45.07)	(123.84)	–
Year Fixed Effects?	Yes	Yes	Yes	Yes
N	58	84	-	-

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the fixed effect regression results for operating expenses and profit pre- and post-private equity buyout and the difference in coefficients for Arizona ambulance companies from 2007 to 2017. Panel (A) presents the results for ALS runs. Panel (B) presents the results for BLS runs. Standard errors are clustered at the CON-level (Abadie et al., 2023).

align with national cost and profitability analyses performed by the GAO (United States Government Accountability Office, 2012).

Columns (3) and (4) of Table B3 indicate that there are no efficiency gains for ALS or BLS runs following PE involvement. Specifically, Columns (3) and (4) indicate that marginal cost/marginal profit is not statistically different after PE involvement than before PE involvement for either type of run. Taken together, the results from Section 3.3 and Table B3 show that PE companies that compete with government-backed firms earn profit in these industries by serving the low-cost/high-profit consumers while moving the high-cost/low-profit consumers to government-backed firms rather than through efficiency gains.

Table C1: Ambulance Operations: Profit - 2010-2017

	Profit ($100k)		Current Operating Profit ($100k)		Current Non-Operating Profit ($100k)	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	−1.73	-	18.54***	-	−20.37***	-
	[-4.68, 0.23]	-	[8.68, 26.77]	-	[-30.26, -11.46]	-
Base Treatment Effect	-	1.22	-	0.1	-	3.13
	-	[-4.47, 5.82]	-	[-10.64, 13]	-	[-9.25, 10.84]
Cream-Skim Treatment Effect	-	−0.47	-	2.93**	-	−3.74***
	-	[-1.21, 0.55]	-	[1.2, 4.85]	-	[-5.22, -1.65]
Pre-Buyout Mean	9.3	9.3	40	40	-31	-31
Pre-Buyout Std. Dev.	13	13	40	40	37	37
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
CON Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	405	405	405	405	405	405

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for ambulance company profit (per $100k) following PE-buyout for 2010-2017 in Arizona. The odd columns present the overall results, and the even columns separate out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

Online Appendix C Further Tables

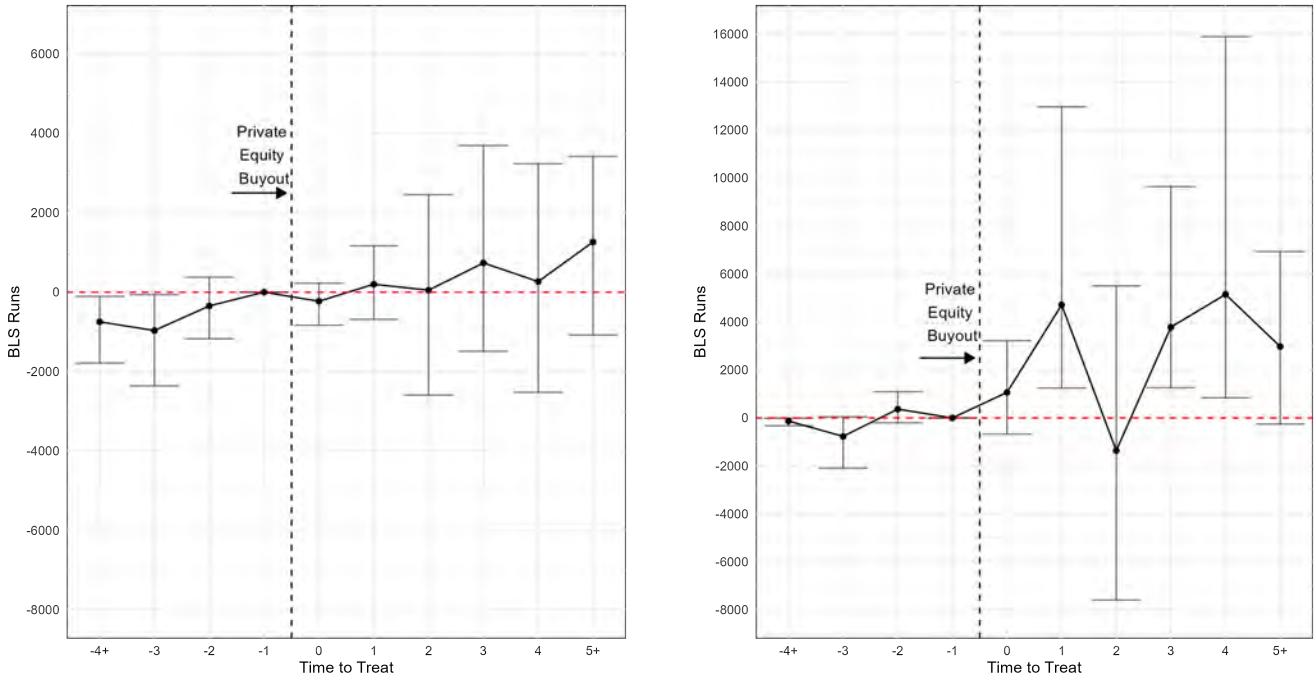
Table C2: Ambulance Operations: Runs - 2010-2017

	Total		Advanced Life Support		Basic Life Support	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall ATT	−1604.07	-	−2294.5***	-	621	-
	[-4715.94, 899.06]	-	[-4272.67, -947.43]	-	[-802.88, 2338.14]	-
Base Treatment Effect	-	−172.06	-	956.38	-	−989.77
	-	[-3267.6, 3019.69]	-	[-1139.32, 3913.92]	-	[-2228.91, 338.06]
Cream-Skim Treatment Effect	-	−227.76	-	−517.04***	-	256.19
	-	[-714.29, 94.44]	-	[-869.64, -243.6]	-	[-172.23, 590.91]
Pre-Buyout Mean	27000	27000	18000	18000	8900	8900
Pre-Buyout Std. Dev.	32000	32000	21000	21000	13000	13000
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
CON Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	405	405	405	405	405	405

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the difference-in-difference results and the pre-PE buyout mean and standard deviation for ambulance company runs following PE-buyout for 2010-2017 in Arizona. The odd columns present the overall results, and the even columns separate out the results based on the ability of the PE company to cream-skim, which is measured as the overlap with non-profit and/or fire department-based ambulance companies. The median number of firms that the private equity firms can cream-skim from is 6. Standard errors are block-bootstrapped at the CON-level (Abadie et al., 2023).

Online Appendix D Event Studies

Figure D1: Event Study: BLS Runs



(a) Overall Effect

(b) Cream-Skimming Effect

Note: This figure plots the coefficients and 90% confidence intervals for the imputed difference-in-difference estimates for BLS runs from 2007-2017. Panel (a) presents the event study for the overall effect, and Panel (b) shows the event study for the cream-skimming effect weighted by the average cream-skimming potential. The regression includes CON and year fixed effects. Year "0" refers to the year of PE buyout. Year "-1" is the omitted category. Standard errors are block bootstrapped at the CON level (Abadie et al., 2023).

Online Appendix E Back of the Envelope Calculations

Table E1: Back of the Envelope Estimates: National Traffic Accident Fatalities

	Total:	Percent: PE Counties	Percent: All Counties
	(1)	(2)	(3)
2011	1,136	0.07	0.04
2012	1,165	0.07	0.04
2013	1,381	0.07	0.04
2014	1,388	0.07	0.04
2015	1,522	0.07	0.04
2016	1,629	0.07	0.04
2017	1,617	0.07	0.04
Total	9,838	0.07	0.03

Note: This table shows the back of the envelope estimates for the increase in fatalities due to traffic accidents by year as a result of the PE buyout of Rural/Metro. The first column presents the total increase in fatalities. The second column indicates the percent the increase in fatalities represents for traffic fatalities in counties where Rural/Metro operated after PE buyout. The third column indicates the percent the increase in fatalities in Column (1) represents for all traffic fatalities nationally. The increase in traffic fatalities in Column (1) is calculated by taking the total number of traffic fatalities in Rural/Metro counties post-PE buyout by year times the ratio of the coefficient estimate in Column (1) of Table 9 and the 2010 population-weighted average of traffic fatalities for counties post-treatment.