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A hidden cost of war: the impact of mobilizing reserve troops on emergency response times

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Abstract This paper analyzes a hidden cost of war: the effect of the mass mobilization of reserve troops on the response times of domestic emergency services to accidents. We provide a statistical examination of this linkage following the US invasion of Iraq in 2003 and find that mobilization significantly increases response times to accidents in the United States. These mobilization-related costs are exacerbated by both legal restrictions and issues of replacing highly specialized human capital.

Keywords Military reserves · Mobilization · First responders · Unintended costs of war

Jel Classificaion C20 · H56 · I19 · J29

1 Introduction

In 2001, more than 1.3 million individuals were part of the active US military reserves, accounting for nearly half of the nation's armed forces. Following September 11, 2001, 50,000 reservists were activated as part of the Global War on Terror (Axtman 2001). By January 2002, 80,000 reserves were overseas and providing support to American cities.

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(McLaughlin 2002). In all, since 2001, more than 815,000 reservists have been deployed globally around the globe (Moulton 2011).

The overall cost of the war in Iraq has been well documented. The US federal government has spent approximately $1.7 trillion on the war in Iraq. Payments for veterans' healthcare are estimated to cost US taxpayers over $590 billion. It is estimated the Iraq war may cost the United States over $4 trillion (Costs of War 2013). As of August 2013, nearly 4,500 servicemen have been killed in Iraq. Over 32,000 have been wounded (Griffis 2013).

These statistics represent the *direct* costs of war, those expenses and consequences that can be attributed entirely to military actions abroad. While these direct costs speak to many of the consequences generated by such conflicts, they fail to capture the full impact of these interventions. *Indirect costs* are costs incurred as a result of a particular action, but may not be easily observed or accounted for in monetary terms. These indirect costs, such as the impact of service on servicemen's mental health, family, and community, while typically not included in calculating the cost of war, may have substantial impacts on the welfare of the domestic citizenry. In order to fully appreciate the consequences of military action, it is imperative that these indirect costs are also appreciated.

One area where these indirect costs may be observed is in the ability of domestic emergency responders to react to domestic emergencies, as a significant portion of first responders are also members of the military reserves. Steel (2004) finds that male reservists are more than twice as likely to work in public service (i.e., police, fire, and emergency medical services (EMS)) than they are to work in private businesses. One survey of nearly 300 fire departments found that 63.8 % of departments had seen one to six of their members deployed in reserve military service for more than 30 days since 2001. Nearly 9 % of the departments polled stated they had lost more than six members to reserve deployment, with some departments reporting losses of 100 workers (Chlapek 2009, p. 37). Fifty-four percent of departments had personnel who were deployed more than once (*Ibid*, p. 38). Another survey of over 1,250 members of the International Association of Fire Chiefs (IAFC) found similar results.[1] More than 6 % of departments had 10 %, or more, of their personnel deployed in military service. Another 15 % had between 5 and 10 % of their personnel deployed (International Association of Fire Chiefs (IAFC) 2003, p. 3).

This linkage between military reserves and emergency responders has important implications. If many reserve troops are deployed, and a significant portion of these reserves hold public positions as police, fire, and EMS, then deployments may strain the capacities of first responders and diminish the quality of domestic emergency services. This implies that a large mobilization of reserves may generate additional costs to first responders and the general public which are typically neglected in the overall costs of war.

The purpose of this paper is to offer a quantitative analysis of the impact of reserve deployment on first responders. Utilizing data from the National Highway Traffic Safety Administration Fatality Analysis Reporting System and the Department of Defense's monthly press releases, we correlate emergency response times to fatal accidents with reserve mobilization data following the start of the war in Iraq in March 2003. We find that reserve mobilization increased response times by 27 s on average. This may seem trivial, but when one appreciates that even a slight increase in response times may make the difference between life and death, this increase may have dire consequences.

Pell et al. (2001) found that a reduction in response times to individuals suffering from cardiac arrest led to a sharp increase in survival rates. Decreasing response times for victims of a fire from seven to six min means a sharp increase in survival rates (Congress

[1] The survey was sent to 8,500 member departments with 1,271 responding.

for New Urbanism 2009, p. 9). Response time is frequently used as a measure of EMS quality and has been shown repeatedly to impact health outcomes (Bailey and Sweeney 2003; Pons et al. 2005). The National Fire Protection Association suggests that for at least 90 % of EMS calls, basic life support and advanced life support services should be on scene within 4 and 8 min, respectively (Pons and Markovchick 2002; Pons et al. 2005). In a study of 285 patients who suffered cardiac arrest, Weaver et al. (1986) found that the 111 who survived received emergency care by first responders at 3.6 min. In comparison, the 174 who died received care at 4.3 min. In a study of EMS response time over a six-month period, Blackwell and Kaufman (2002, p. 288) found that "mortality risk was 1.58 % for patients whose RT [response time] exceeded 5 min, and 0.51 % for those whose RT was under 5 min." Taken together, this evidence suggests that an increase in response times as a result of troop deployment may lead to costly health outcomes.

Our analysis contributes to two strands of literature. The first is the economic study of the impact of military service. The impact of war on veterans and their families has attracted a great deal of research (see Drummet et al. 2004). Lyle (2006) finds that military deployment may result in perverse educational effects on the children of military personnel. Hendershott (1989) argues that the frequent relocation of military families may have perverse psychological impacts on adolescents. Further, the separation of servicemen and women from their families may lead to difficulties in relationship maintenance (Jacobs and Hicks 1987; Vormbrock 1993). The return of military personnel following deployment may involve complicated and uneasy adjustments for both returning personnel and their families (Wood et al. 1995). Our analysis extends this existing literature by taking into account the domestic spillover effects of deployment on the provision of local emergency services.

Second, we contribute to the literature on the overlooked costs of war. As early as World War I, scholars recognized that when discussing the total effect of military engagement, narrow monetary calculations are insufficient. Bogart (1920), Hunter (1921) emphasized that when determining the cost of the First World War, one must consider the loss of life, spread of disease, disturbed production, the cost of mobilizing personnel and materials, and the costs of relief efforts. More recently, Stiglitz and Bilmes (2008) argue that the true costs of war have been grossly underestimated. They find that once the indirect costs of the conflict have been taken into account, the war in Iraq may cost over $3 trillion. Coyne and Duncan (2013) describe how the emergence of the "permanent war economy" has resulted in an unaccounted for transfers of resources from the private sector to the military during times of both war and peace. We add to this literature by showing a correlation between deployment and substantially longer domestic response time.

2 How deployment effects domestic emergency response services

What is the connection between reserve deployment and first responders? While the Department of Defense does not report data regarding the civilian occupations of the reserve armed forces, we are able to establish a strong link between the military reserves and emergency responders. Evidence suggests that reservists comprise a non-trivial part of those providing emergency services. The Congressional Budget Office (CBO), for example, reports that an estimated 36 % of reservists are employed by state, local, or federal governments (CBO 2005, p. 8). The link between military reserves and emergency responders has been acknowledged by both elected officials and the military. In September

2004, then-Senator Hillary Clinton commented on the potential issues regarding reserve deployment and first responders, saying,

> [L]ong gone are the days when Guard and Reserve service meant one weekend a month and two weeks a year…[I]t should not be a surprise to you, your family, or your employer, if you are called up for perhaps a year or longer….[Y]our community [and] place of work is faced with the prospect that you may be gone for an extended, unpredictable, period of time…[W]e need to be sure that the pattern of Guard and reserve deployments do not actually end up hindering homeland security. In many communities throughout our nation, *a significant number of police officers, fire-fighters, and EMTs, who are first responders in case of attack, are also members of the Guard or reserves. And in a time of large-scale activations and extended deployments, many communities are being left short-handed.* (Clinton 2004, emphasis added).

The Department of Defense (DoD) may issue waivers to reservists or defer their deployment if such actions would result in serious problems for their community or for their employer in providing needed community service (defense, healthcare, public safety, and so on). Between September 2001 and August 2005, the DoD issued 116 delays to reservists, many of whom were state and local emergency responders (Loughran et al. 2006, pp. 15–16).

Despite these deferments, the mobilization of reserve forces clearly has impacted many of the nation's first responders. One survey of nearly 300 fire departments found that almost 64 % had seen one to six of their members deployed in reserve military service for more than 30 days since 2001. Nearly 9 % of departments polled stated that they had lost more than six members to reserve deployment. Other departments reported losing more forces, with losses ranging from 10 to 100 workers (Chlapek 2009, p. 37). Fifty-four percent of departments had personnel deploy more than once (Chlapek 2009, p. 38). The International Association of Fire Chiefs (IAFC) reported similar results. In a survey of more than 1,250 responding fire departments, more than 6 % had ten or more percent of their personnel deployed. Another 15 % saw between 5 and 10 % of their personnel mobilized in a military capacity (IAFC 2003, p. 3). The impact of mobilization can be especially significant on local governments where public safety staffs are often small.

In addition to this initial hardship to local police, fire, and EMS associated with reserve deployment, the costs surrounding reserve call-ups are exacerbated by two distinct factors. First, certain laws make it difficult and, in some cases impossible, to replace, even temporarily, those workers lost to reserve mobilization. Second, even if such restrictions were not in place, the loss of highly specialized human capital in the form of police, fire, and EMS, with context-specific training and experience makes it difficult to fill these vacant positions upon reserve deployment.

The difficulties faced by the employers of emergency responders are complicated by the existence of extensive legal restrictions regarding military deployment and reemployment. The Uniformed Services Employment and Reemployment Rights Act (USERRA) (43 USC 38) sets strict guidelines for employers of military reservists. If a reservist is mobilized, or volunteers for deployment, the code entitles reservists to reemployment rights upon deactivation as long as their absence has not exceeded five years. Further, the law imposes sanctions on employers who discriminate against those who may be called to service in a military capacity. Specifically,

> Any person whose absence from a position of employment is necessitated by reason of service in the uniformed services shall be entitled to the reemployment rights and benefits and other employment benefits if…the cumulative length of the absence…from a position of employment does not exceed five years….[This law] shall apply to a person who is absent from a position of employment by reason of service in the uniformed services….[including] active duty…[and service in] the National Guard [and other reserves]. (43 USC 38).

Although the law states that an employer is not required to reemploy a person if the employer's circumstances change such that reemployment is impossible or in the event reemployment would place an "undue burden" on the employer, the burden is on the employer to prove "the impossibility or unreasonableness, undue hardship, or the brief or nonrecurring nature of the employment" (*Ibid*).[2] While the provision appears to offer employers a way to alleviate the problem of a mobilized workforce, these laws have a history of litigation and rulings that favor deployed reservists.

The law has two distinct implications for the employers of first responders. First, it imposes a monetary hardship on employers who must incur the costs of holding positions open and continuing to provide benefits without receiving the services of their employees. Perhaps the two most obvious ways in which these costs may be observed are in overtime payments to remaining employees and other payments by employers to and for reservists. For example, for many employers of first responders, the deployment of reservists means they will pay the employee's share of family health premiums (Steel 2004, p. 175). The respondents to one survey of fire departments indicated that over 39 % of reporting departments estimated that the total cost of a single deployment would range from $50,001 and $100,000 in overtime coverage and benefits. Over 10 % reported that the total cost of one deployment would range from $100,001 to $200,000. And close to 4 % stated the deployment of an individual in their department would cost over $200,000 (Chlapek 2009, pp. 30–31).

Second, the law provides strong disincentives for employers of first responders to train replacement employees. Since employers are bound to reemploy reservists who have been deployed in military service, there is less incentive to incur the costs of finding and training new employees only to release them once former workers return. This is reflected in the responses to the IAFC survey. While some departments indicated they would be able to fill gaps created by call-ups with temporary employees, other respondents reported that their means of coping with such changes were limited due to existing laws. For example, one stated that, "Our only choice is to backfill using overtime when our staff is reduced below minimum." Others replied that, "it will cost us money because the city holds the position open for the individual" and "[We will] cover our staffing shortages with overtime that [is] not budgeted. The downside, as you know, is that to meet our budget bottom line, other programs, projects, and purchases were deferred…[T]he impact is certainly felt in our organization" (AIFC 2003, pp. 3–4).

Overtime pay to remaining first responders is not always an option owing to fiscal constraints on government budgets. This is especially relevant during economic downturns as is currently being experienced throughout the United States. A 2010 survey by the National League of Cities (NLC 2010), National Association of Counties (NACo), and the

[2] To provide some sense of magnitude, Steel (2004), p. 181 reports that between 2000 and 2003, nearly 3,800 complaints were filed by reservists against their employers. Approximately 90 % of these cases were related specifically to job benefit reinstatement. Between 2006 and 2011, more than 8,600 USERRA cases were filed (US Department of Labor 2012, p. 8).

U.S. Conference of Mayors (USCM) found that 63 % of the responding cities and 39 % of the responding counties reported cuts in public safety personnel (police, fire, EMS) caused by budget pressures. In such cases, overtime pay for the remaining employees may not be feasible.

The second problem faced by employers of first responders upon reserve call-ups is the loss of human capital. While USERRA makes it costly for police, fire, and EMS departments to hire temporary employees, in many cases, even *if* temporary employees could be hired, departments would still lose critical personnel with context-specific knowledge and experience. The IAFC survey responses reflect this concern among multiple fire departments. One responder stated that he would "recruit for temporary firefighters to fill the void. Although this put a 'body in the space,' I lose valuable experience." Another stated that, "the officer most likely to be called up cannot be replaced due to his training and assignment, so we can only put up with it" (*Ibid*, p. 5). Other departments echoed these sentiments saying, "We are attempting to get the budget office to allow us to over hire to cover the losses. However, this brings in new people to recruit school and does not truly fill the void left in the stations. We lose rank, experience, specialty skills and capabilities with the activation of reservists" and "our department has already had our Assistant Chief and Captain called…a loss…of a combined 45 years of experience" (*Ibid*, p. 5).

In addition to those specific examples of experience lost because of reserve call-ups, the broader survey found that first responders may lose a great deal of highly skilled labor in a variety of areas. When asked what duties potential call-ups performed in their civilian employment, 82 % of departments reported the loss of firefighters, 46 % indicated the loss of a paramedic or EMS provider, and 11 % reported the loss of a chief fire officer. In addition, 27 % of departments stated that reserve activation would mean the loss of, HazMat specialists, senior fire inspectors, dispatchers, training officers, CPR and first aid coordinators, and arson investigators. Safety officers, special teams (dive/ice rescue, rope rescue), paramedic and health directors, mechanics, and other non-uniformed support staff would also be lost (*Ibid*, p. 3).

Taken together, reserve mobilization is likely to have a non-trivial impact on both the employers of first responders and the first responders remaining after reservists are deployed. Many departments will run short-handed, be forced to cut services, and employ remaining workers beyond their usual hours. Ultimately these costs are borne by the citizens who are customers of these emergency service providers.

3 Data and specification

We hypothesize that one of the hidden costs of reserve mobilization is an increase in response times of emergency service providers, caused by legal barriers to employee replacement and the loss of human capital associated with reserve call-ups. To examine this empirically, we utilize two types of data to estimate the impact of reserve mobilization on the response times of emergency service providers following the invasion of Iraq in March 2003. First, we utilize information on emergency response from the Fatality Analysis Reporting System's (FARS's) web-based encyclopedia on emergency response times to fatal accidents.[3] These data are collected by the US Department of Transportation and

[3] To be counted as a fatal accident, the death has to be the result of the accident and it has to occur within 30 days of the incident.

the National Highway Traffic Safety Administration. Second, we employ data on reserve mobilization from the US Department of Defense.

Following the work of Lambert and Meyer (2006, 2008), we define the dependent variable in our analysis (LN[RESPONSE]) as the natural log of the emergency response time, measured in minutes, to each accident in the dataset.[4] The main variable of interest is reserve density (RESDENS). Reserve density is the monthly number of reserves mobilized from a state, divided by the state's population and scaled by 1,000. This measure captures how many reservists are mobilized with respect to the population of the state. We hypothesize that as reserve density increases, that is, as larger percentages of a state population are mobilized, the impact on emergency responders will be greater. It follows that, as reserve density increases, we expect to see an increase in accident response times.

Figure 1 shows a scatter plot of state reserve densities for all time periods included in our data.

The impact of the Iraq war is evident in the figure, as reserve densities increase markedly just before, and especially after, the invasion of Iraq in March 2003. Figure 1 also differentiates between states with relatively low and high total population densities, i.e. population. The figure separates states into two groups, states with total population densities below the median US population density ("States with Low Population per Square Mile"), and states with population densities greater than or equal to the median ("States with High Population per Square Mile"). As Fig. 1 illustrates, states with low total population densities tended to experience relatively larger increases in reserve density after the beginning of the Iraq war.

Previous statistical studies (Keeler 1994; American Farmland Trust 1998; Ewing et al. 2003; Felder and Brinkmann 2002; Lambert and Meyer 2006) have found that a variety of factors may contribute to an accident. We include these variables to control for some confounding conditions emergency response crews may encounter while responding to accidents. CLEAR, SNOW, and RAIN, for example, are dummy variables indicating inclement weather. Other controls seek to account for location and other road conditions (highway versus local road, wet or dry road), road surface (asphalt or concrete), speed limit, whether the accident occurred on a weekend or during the week, as well as whether the accident occurred within city limits or in a rural area. Table 1 reports summary statistics of each of our included variables.

We limit the data to accidents with response times of less than one hour.[5] Given limited information regarding reservists prior to October 2001, our analysis covers the period between October 2001 and December 2005. Table 2 shows the summary statistics for all observations included in this state-level analysis.

The mean response time is about 9.8 min. According to the FARS statistics, most fatal accidents happen in the early morning hours of Saturdays and Sundays; thus it is not surprising that this sample has about half of all wrecks occurring on the weekend. The speed limit ranges between five and 90 miles per hour. We combine the observations that have speed limits greater than 60 miles per hour into one category. The low minimum speed limit is a result of the inclusion of wrecks that happen in parks and other special jurisdictions.

[4] Log-transforming the dependent variable leads to ease of interpretation, since coefficient estimates in a log-linear specification roughly correspond to elasticities, i.e., percent changes in the dependent variable from a one-unit change in the variable of interest.

[5] We exclude 629 cases because the emergency call was canceled, but response times were reported as more than an hour. In some cases, response times were recorded as more than 24 h.

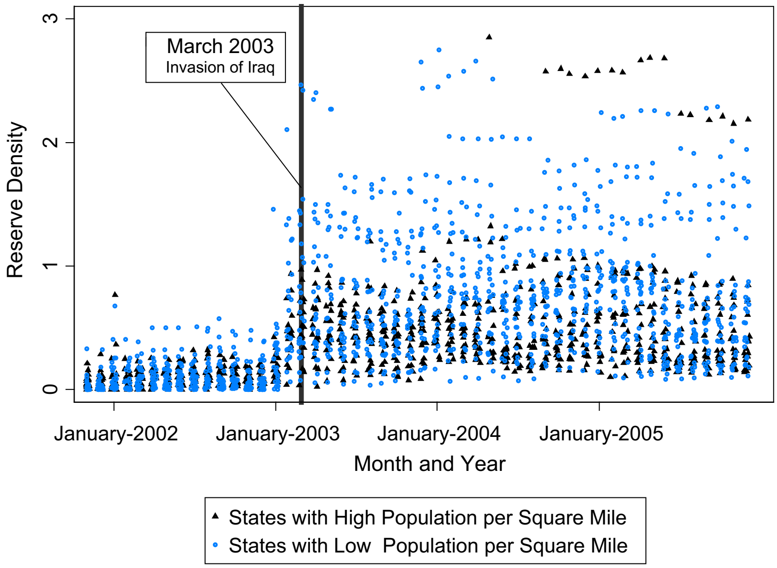

Fig. 1 State reserve densities, monthly, from November 2002 to December 2005

Table 1 Included variables and their definitions

LN(RESPONSE)	Logged number of minutes for response crews to arrive
RESDENS	Number of mobilized reservists divided by population (in 1,000 s), scaled by 1,000
SPEEDX	Speed limit is X miles per hour at the accident site
LANEX	X number of lanes at the accident site
HW	Accident occurred on a highway
SURF	Accident occurred on asphalt or concrete
DRY	Accident occurred on a dry surface
DAY	Accident occurred during daylight hours
DARK	Accident occurred during night hours
RAIN	Accident took place in the rain
SNOW	Accident took place in the snow
CLEAR	Accident occurred with clear skies
WEEKEND	Accident occurred on Friday, Saturday, or Sunday
CITY	Accident occurred within city limits
RESPONSE	The raw response time
RESERVES	The raw number of mobilized reserves

About 95 % of accidents occur on asphalt or concrete roads and 28 % occur on state or national highways. The accidents that happen within one hour of sunrise or sunset are categorized as "twilight" wrecks, and account for <5 % of the sample. The dummy variable DRY indicates whether the road is dry. Approximately 8 % of the wrecks happen in the rain, but almost 20 % of accidents happen on wet roads. About 2 % of wrecks happen in the snow.

Table 2 Summary statistics for all observations

Variable	Mean	SD	Min	Max
RESPONSE	9.765	7.333	1	59
RESDEN	0.407	0.371	0.000	2.854
HW	0.284	0.451	0	1
SURF	0.954	0.21	0	1
DRY	0.814	0.389	0	1
DAY	0.514	0.5	0	1
DARK	0.442	0.497	0	1
CLEAR	0.869	0.338	0	1
RAIN	0.081	0.272	0	1
SNOW	0.025	0.156	0	1
WEEKEND	0.501	0.5	0	1
CITY	0.383	0.486	0	1
LANE 1–2	0.793	0.405	0	1
LANE 3–4	0.173	0.378	0	1
LANE 5–6	0.022	0.147	0	1
LANE 7 and greater	0.012	0.110	0	1
SPEED 5–20	0.005	0.068	0	1
SPEED 25–40	0.245	0.430	0	1
SPEED 45–60	0.559	0.496	0	1
SPEED 60 and greater	0.191	0.393	0	1

Number of Obs: 89,220

Sources The fatality analysis reporting system and department of defense news releases

Table 3 shows summary statistics for the subset of accidents that occurred within city limits.

The average response time for this subset of observations is about 7 min. The characteristics of this sub-sample are similar to those of the full sample. For instance, the subset mirrors the total sample with about 50 % of wrecks occurring on weekends. One difference revealed by the city statistics is that city wrecks happen in areas with lower speed limits. About 25 % of all wrecks occur in places where the speed limit is 40 miles per hour or less. Of the subset of wrecks that occur in city limits, more than 45 % happen in low speed areas.

Our initial specification is:

$$\mathrm{LN}(\mathrm{RESPONSE_i}) = \beta_1 + \beta_2\mathbf{X_i} + \beta_3\mathrm{RESDENS_i} + \varepsilon_i, \quad (1)$$

where X_i is an accident-specific vector of control variables discussed above and summarized in Table 1. Our variable of interest, RESDENS, is entered separately. A positive coefficient on β_3 would indicate that as a larger percentage of the state population is mobilized, response times become longer.

We also estimate fixed effects models that take on the basic form:

$$\mathrm{LN}(\mathrm{RESPONSE_i}) = \beta_1 + \beta_2\mathbf{X_i} + \beta_3\mathrm{RESDENS_i} + \mu_i + \varepsilon_i, \quad (2)$$

where μ_i represents either county- or city-level fixed effects. We anticipate the county-level fixed effects will improve our estimates, as existing literature has found county-level sprawl to affect emergency response times (Lambert and Meyer 2006, 2008; Lambert et al. 2009, 2012). We include city-level fixed effects for similar reasons.

Table 3 Summary statistics for observations within city limits

Variable	Mean	SD	Min	Max
RESPONSE	7.079	5.6	0	60
RESDEN	0.378	0.362	0	2.854
HW	0.342	0.474	0	1
SURF	0.975	0.155	0	1
DRY	0.821	0.383	0	1
DAY	0.480	0.500	0	1
DARK	0.479	0.500	0	1
CLEAR	0.879	0.326	0	1
RAIN	0.081	0.273	0	1
SNOW	0.021	0.142	0	1
WEEKEND	0.497	0.500	0	1
LANE 1–2	0.663	0.473	0	1
LANE 3–4	0.276	0.447	0	1
LANE 5–6	0.040	0.197	0	1
LANE 7 and greater	0.021	0.145	0	1
SPEED 5–20	0.008	0.087	0	1
SPEED 25–40	0.455	0.498	0	1
SPEED 45–60	0.422	0.494	0	1
SPEED 60 and greater	0.115	0.320	0	1

Number of Obs: 34,181

Sources The Fatality Analysis Reporting System and Department of Defense News Releases

4 Results and interpretation

Table 4 shows the results of estimations of Eqs. 1 and 2. Column 1 reports OLS results. Column 2 shows OLS with clustered standard errors by county. Column 3 includes county fixed effects, and Column 4 includes city fixed effects.[6] Standard errors are clustered by county in both Columns 3 and 4.

The coefficient estimate on the main variable of interest, reserve density, is positive in all regressions. This indicates that, over the time period under consideration, response times increased as reserve density increased. The magnitudes of the coefficient estimates indicate an economically meaningful effect on response times from changes in reserve density. For example, in the case of the OLS estimates (Column 1 of Table 4), if reserve density goes from zero to the sample mean (0.41), there is a 4.6 % increase in response times. At the average response time, 586.8 s, this indicates that response times rose by approximately 27 s because of the increased reserve density.[7]

As Fig. 1 illustrated, there is reason to believe that the start of the Iraq war in March 2003 is the cause of the mass mobilization of reserves that induced the change in response time. The monthly mean reserve density increased 473 % in the six-month period surrounding the invasion of Iraq, going from 0.10 in December 2002, to 0.59 in May 2003. Our model with county fixed effects (Column 3 of Table 4) predicts that such a change in

[6] For robustness, we also ran a random effects model. However, a Hausman test rejected the random effects model as a consistent estimator.

[7] At the suggestion of a referee, we have also run the regressions reported in Table 4 using the natural log of RESDENS rather than the levels. The results are identical in direction of effect and goodness of fit (R^2), and similar in statistical significance.

Table 4 Results: dependent variable: logged response time (LN(RESPONSE))

	(1) OLS	(2) Clustered	(3) County FE	(4) City FE
RESDENS	0.11	0.11	0.12	0.09
	(18.17)**	(7.64)**	(8.50)**	(4.65)**
HW	−0.14	−0.14	−0.13	−0.03
	(24.86)**	(11.71)**	(11.81)**	(3.04)**
SURF	−0.09	−0.09	−0.10	0.01
	(8.79)**	(4.97)**	(5.38)**	(0.13)
DRY	−0.02	−0.02	−0.03	−0.02
	(2.93)**	(3.15)**	(3.81)**	(1.74)
DAY	−0.03	−0.03	−0.04	−0.03
	(3.02)**	(2.80)**	(3.05)**	(1.35)
DARK	−0.00	−0.00	−0.01	0.01
	(0.39)	(0.35)	(0.40)	(0.52)
CLEAR	−0.07	−0.07	−0.07	−0.05
	(4.81)**	(4.43)**	(4.60)**	(1.78)
RAIN	−0.07	−0.07	−0.07	−0.04
	(4.15)**	(3.79)**	(4.06)**	(1.48)
SNOW	0.06	0.06	0.06	0.10
	(2.85)**	(2.56)*	(2.69)**	(2.62)**
WEEKEND	0.04	0.04	0.04	0.02
	(8.32)**	(8.13)**	(8.02)**	(2.37)*
CITY	−0.34	−0.34	−0.35	
	(65.59)**	(24.30)**	(25.03)**	
LANE 3–4	−0.14	−0.14	−0.14	−0.10
	(22.43)**	(11.34)**	(11.90)**	(10.53)**
LANE 5–6	−0.23	−0.23	−0.23	−0.14
	(14.95)**	(8.23)**	(9.23)**	(5.84)**
LANE 7	−0.09	−0.09	−0.10	−0.07
	(4.62)**	(3.31)**	(3.65)**	(3.03)**
SPEED 25–40	−0.20	−0.20	−0.20	−0.05
	(7.07)**	(5.22)**	(5.52)**	(1.26)
SPEED 45–60	0.04	0.04	0.03	0.17
	(1.59)	(1.12)	(0.85)	(3.83)**
SPEED 60PLUS	0.27	0.27	0.24	0.30
	(9.77)**	(6.65)**	(6.13)**	(6.27)**
Constant	2.34	2.34	2.44	2.41
	(69.74)**	(48.97)**	(58.59)**	(13.46)**
Observations	89,220	89,220	89,220	33,966
R-squared	0.16	0.16	0.18	0.20

Absolute value of t-statistics (robust t-stats in columns (2), (3), and (4)) in parentheses

* Significant at 5 %; ** Significant at 1 %

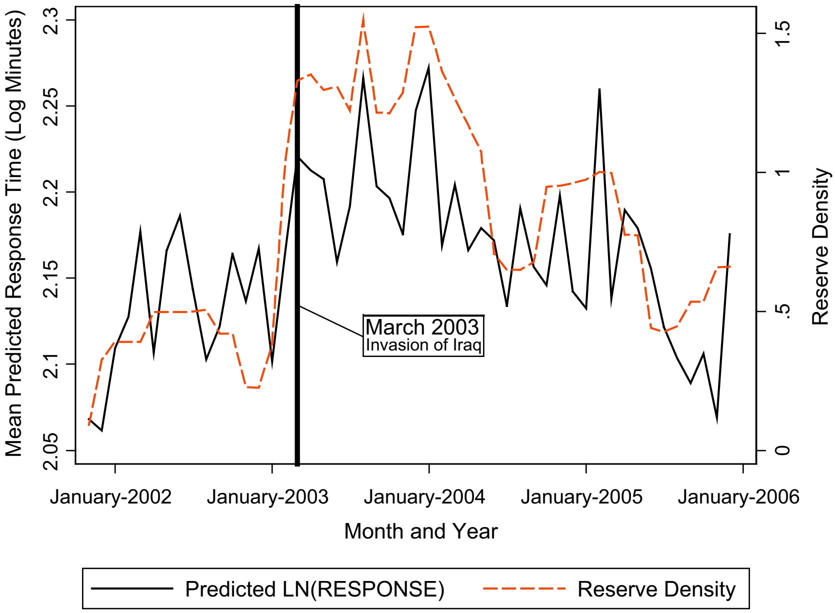

Fig. 2 Response times in west Virginia

reserve density, holding all else constant, would cause a 6.1 % increase in response time—an additional 36 s when evaluated at the mean response time.[8] This delay in response seems likely to have a negative effect on health outcomes, as indicated by the existing literature on response times to potentially fatal accidents (see Bailey and Sweeney 2003; Congress for New Urbanism 2009; Pell et al. 2001; Pons and Markovchick 2002; Pons et al. 2005, p. 9; Weaver et al. 1986).

Many states experienced even more precipitous increases in reserve density around the time of the invasion of Iraq. For example, West Virginia's reserve density increased from 0.22 in December 2002 to 1.30 in May 2003. Figure 2 overlays West Virginia's predicted monthly average logged response time and the changing reserve density, using the model specified in Column 3 of Table 4, which includes county fixed effects.

This model predicts that the monthly average logged response time (log seconds) increased from 2.17 in December 2002 to 2.22 in March 2003 because of the increase in reserve density seen at the beginning of the Iraq War.

The other independent variables enter with the expected signs. Consistent with the existing literature, accidents that happen on the weekend have longer response times than their non-weekend counterparts. Response times are shorter on clear weather days. Accidents on highways have shorter response times than their non-highway counterparts. Emergency crews respond more quickly to accidents that happen on roads with asphalt or

[8] For robustness, we also included monthly fixed effects in the regressions shown in Table 4 (not reported—available upon request). While this causes us to lose all observations wherein only one fatal accident occurred in a month in a given county, the coefficient estimates on RESDENS are remarkably similar in direction, magnitude, and statistical significance for all regressions except the city fixed effects regression. The city fixed effects regression no longer reveals a statistically significant result, although the sign remains positive.

concrete surfaces than on dirt or gravel roads. The "lane" dummy variables all have negative coefficients, indicating that response times are faster on roads with more than two lanes.

The coefficient estimates are smaller in magnitude for nearly all variables for the city fixed effects model (Columns 4, Table 4) compared to Columns 1 and 2 (OLS) and Column 3 (county fixed effects). This can be explained in part by the subset of city wrecks having lower response times in general. For instance, our OLS and county fixed effects estimates indicate that accidents that occur on highways have a 12–13 % slower response time.

For Column 4, we examine only urban data and include city fixed effects. Because more rural states tend to have higher reserve densities, it is possible that our results are merely reflecting the difference in rural and urban response times.[9] Although including county fixed effects should largely control for this possible confounder, we nonetheless estimated the effect of changes in reserve density on urban response times alone. We found a similar, although somewhat smaller, effect. For the city fixed effects estimate, the coefficient estimate on RESDENS drops to 0.09 from 0.12 in the other models, indicating that a one unit increase in RESDENS would lead to a 9 % slower response time in urban environments. The city fixed effects model predicts that an increase of one standard deviation in reserve density—that is an increase of 0.37— would increase the estimated response times by 3.4 %, or about 14.4 s evaluated at the mean of the data for accidents within city limits.

Overall, these estimates suggest a significant indirect cost to the invasion of Iraq in March 2003. The average reserve density across all counties was 0.05 in 2001 and 0.11 in 2002. In 2003 that figure jumped to 0.52, peaking at 0.57 in 2004, and returning to 0.52 in 2005. The Iraq war, therefore, is correlated with an increase in reserve density of at least 0.41 (the difference between the mean reserve densities in 2002 and 2003). Using our estimate from Column 3 of Table 4—the model that includes county fixed effects—a change in reserve density of 0.41 would cause response time to increase by 5 %. At the overall mean response time of 9.78 min, a 5 % increase would add about 29 s to response times.[10]

5 Conclusion

One of the fundamental lessons of economics is the importance of focusing not just on the seen, but also the unseen. Although elementary, this central insight is often neglected. This is unfortunate since in many cases unseen costs can have life or death consequences. Our analysis has focused on one aspect of these unseen costs, the domestic effects of mobilizing reserves. In the case of domestic emergencies, even a few seconds of additional response

[9] We calculated the simple correlation between state-level reserve density and the percentage of the state population living in urban environments as reported in the 2000 Census. For the overall sample, the simple correlation is −0.44, and it is −0.36 in our first year of data (year 2001).

[10] It is possible that larger budgets could lead to shortened response times by increasing response staffing and the capital (i.e., vehicles) available to responders. For the most part, we were able to include variables measuring seasonal factors that might be captured with time dummies, such as snow and wetness of the roads. For robustness, we have estimated the same regressions as reported in Table 4, except including monthly fixed effects. We also ran another set of regressions that included state-and-year fixed effects. The signs and magnitudes of the coefficient estimates on our variable of interest, RESDENS, remains nearly identical to the previous results in regressions in three of the four regressions confirming our previous findings. These results of these robustness checks are available upon request.

time can impose significant costs on ordinary citizens in the form of increased fatalities. There are likely many more unseen costs of war which, if considered, might alter the expected net benefit of foreign interventions. This suggests that economists, policymakers, and citizens would be wise to ensure that they have fully considered both the direct and indirect costs of war prior to endorsing and undertaking such adventures abroad.

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