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Radha Iyengar
Jonathan Monten
Matthew Hanson

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ABSTRACT

Employment growth could reduce violence during civil conflicts. To determine if increased employment affects violence we analyzed varying employment in development programs run by different US military divisions in Iraqi districts. Employment levels vary with funding periods and the military division in charge. Controlling for variability between districts, we find that a 10% increase in labor-related spending generates a 15-20% decline in labor-intensive insurgent violence. Overall the 10% spending increase is associated with a nearly 10% violence reduction, due to reduction in attacks which kill civilians, but increased attacks against the military. These findings indicate that labor-intensive development programs can reduce violence during insurgencies.

Radha Iyengar
London School of Economics
Department of Economics
Houghton St
London WC2A 2AE
UNITED KINGDOM
and NBER
R.Iyengar1@lse.ac.uk

Jonathan Monten
Department of Government
London School of Economics
Houghton St
London WC2A 2AE
United Kingdom
jmonten@gmail.com

Matthew Hanson
NBER
1050 Massachusetts Ave
Cambridge, MA 02138
hansonm@nber.org

An online appendix is available at:
http://www.nber.org/data-appendix/w17297

1. INTRODUCTION

In recent years there has been a renewed interest in understanding the relationship between economic development and violence in the context of terrorism and insurgencies. The United States and its allies have been fighting protracted insurgencies in Iraq and Afghanistan for nearly a decade and every aspect of U.S. strategy, doctrine, and tactics - from calls to "take the gloves off" to increasing reconstruction and steps to win the loyalty of the population – have been the subject of debate. For both the United States and states at risk of civil war, a major security issue is ending insurgent violence and restoring legitimate governmental authority. Given the persistence of civil conflict in many regions and the adverse consequences these conflicts have on economic development and security, a key question is the extent to which external interventions in the form of development and reconstruction programs can reduce insurgent violence.

Despite the importance of better understanding the connection between economic development and civil violence, the existing empirical evidence regarding the efficacy of different counterinsurgency strategies is limited. With few exceptions, research has focused on the military response to an insurgency, with differing views regarding the extent to which the local population should be protected (a "hearts and minds" model) versus treated harshly for any perceived support of insurgent activity (a deterrence model). These models differ in the extent to which insurgency is an entity distinct from existing social and economic conditions. Separately, focus on development has typically studied the feasibility of establishing well-functioning markets or improving the delivery of social services. There are few studies that have evaluated the relationship between changes in legal labor-market conditions and violence during insurgencies. Thus, despite the economic intuition that "boosting the economic returns for staying on the right side of the law, [as a] 'carrot' might dramatically alter the cost-benefit calculation facing potential criminals and rebels," military strategy and economic activity have been largely separate in policy debate and scholarly research.[1]

We begin to determine the relationship between these issues by evaluating the impact of improving economic conditions, and specifically the impact of labor-generating reconstruction activities on the production of violence by insurgent organizations. Using a

[1] Fisman and Miguel (2008, 189-190). The U.S. military has incorporated this view into its revised counterinsurgency strategy. See *The U.S. Army/Marine Corps Counterinsurgency Field Manual* (FM 3-24) and U.S. Army Combined Arms Center (2009).

model of labor supply and violence production, we show that the greater availability of outside options in the legal (i.e., non-violent) labor market may reduce the total person-hours available to the insurgency. The rank-and-file individuals that make up an insurgent organization may choose to participate in insurgent activity for a combination of different reasons, including an intellectual or an emotional (i.e. psychological) commitment to an insurgency and its cause, or by a comparison of economic options. By improving the employment market in the non-violent sector, job creation may create higher opportunity costs for individuals to participate in violent insurgent activities, and thus raise the cost of labor for insurgent groups. We find that improvements in the labor market options in the non-violent sector through reconstruction projects may be associated not only with reduced insurgent recruiting, but also with insurgent groups substituting away from labor-intensive forms of violence and towards more capital-intensive attacks. Insurgent groups may also become more radical, changing the tactics and targets they choose, thus affecting the total levels of violence. This insight, obtained by a combination of theoretical analysis and empirical data, provides a new view into the complex economic impact of the choice between participating in an insurgency or participating in the non-violent work force.

To empirically identify the relationship between labor market conditions and violence levels we used variation in reconstruction generated by the Commander's Emergency Response Program (CERP) in Iraq from between early 2004 and the end of 2008. Due to the decentralized administration of CERP, there has been tremendous variation across military units in how CERP funds have been used.[2] Using variation in spending on CERP projects at the division level of the U.S. Army and Marines, as well as variation in the total amount of funding authorized for CERP itself, we investigate the effect of labor intensive projects on the level and type of insurgent violence in the various parts of Iraq.

Using this variation to estimate the impact of reconstruction projects raises several concerns. Spending on labor-intensive projects is not independent of other factors related to violence and so a linear regression of spending on violence levels will tend to be biased by unobserved factors which drive both spending and violence, as well potential reverse causation. The empirical strategy relies on the fact that from 2004 to 2008, variation in the use of CERP funds was related to both the varying preferences or structures of different military units and the amount of overall funding authorized by Congress. We use a difference-in-differences based instrument which compares divisions in high and low CERP

[2] On the variation in COIN tactics between U.S. military units, see Kahl (2007). For journalistic accounts of the lack of a clear COIN doctrine in the early years of the war, see Gordon and Trainor (2006).

funding periods. The strategy relies on increases in CERP-generated employment by labor-project preferring divisions during periods when more CERP funding available relative to periods when less funding is available. This is compared to employment in capital-project preferring divisions during high and low funding periods. The identifying assumption is that all other differences in the determinants of violence (including other counterinsurgency practices) are fixed between different military divisions over time, when controlling for district fixed effects.

Based on this evidence, we find that a greater fraction of spending devoted to labor-intensive projects (e.g., those projects that create employment opportunities for Iraqis) is associated with a decrease in violence. An additional 10 percent spent on employment is associated with an approximately 10% reduction in violence. This reduction appears to be due to a decrease in attacks on civilian targets, but masks an increase in attacks on more hardened military targets. In addition, we find that, consistent with the labor-capital substitution theory, a 10 percent increase in labor-related spending generates a 15-20 percent decline in labor-intensive forms of insurgent violence, although a small increase in the rate of deaths per attack remains.

The study provides a new conceptual basis for integrating crime economics, insurgency economics, and developmental economics.[3] Consistent with previous work in crime economics on the relationship between unemployment and crime, we find a clear substitution between the legal or nonviolent and illegal or violent sectors. This finding suggests that insurgent groups must rely on individuals with a marginal attachment to their groups to produce a high level of violence. This also provides evidence that in communities with relatively few economic opportunities, the introduction of legal or non-violent labor markets can have dramatic effects on aggregate illegal or violent activity.

This study contributes to a growing literature on the effectiveness of development and reconstruction in conflict settings. A recent paper by Berman, Callen, Felter and Shapiro (2011) finds that the provision of public services can reduce violence by providing an alternative to insurgent-provided public goods and services.[4] That study emphasized the flow of information from civilian groups to the government and the role such information flow plays in affecting violence. This study complements these findings on information flow by

[3] In the economics literature on the social determinants of criminal activity, see Becker (1968) and Glaeser (1998). Arguments about the effect of economic deprivation and grievance in motivating individuals to participate in rebellions are also prominent in the civil war literature. See Miguel and Fisman (2008); Collier (2008); Humphreys and Weinstein (2008); Miguel, Satyanath, and Sergenti (2004); and Fearon and Laitin (2003).

[4] On this "club goods" model, see also Berman and Laitin (2008) and Berman (2009).

focusing on economic choices involved in the production of violence. The labor market mechanism in previous literature is often treated as unidimensional, affecting only the time availability of participants, rather than multi-dimensional, affecting both the input costs and organizational composition of insurgent groups. Analysis integrating these multiple effects indicate that development and reconstruction can be a powerful and cost-effective tool to reduce violence both in the short-term, due to the increasing the opportunity cost to individuals for participating in the insurgency, and in over the long-term, due to the economic and legitimacy benefits that follow from improvements in government-provided public goods.

This paper is organized as follows: Section 2 lays out a theoretical framework for understanding how labor market conditions affect an individual's decision to participate in insurgent activity. Section 3 discusses our data sources on military and civilian casualties in Iraq, CERP disbursements, and U.S. force rotations. Section 4 presents our results and analysis. Section 5 the places the conclusions from this study in the context of the current literature on the economics of crime, conflict, and development.

2. Theoretical Framework

The relationship between legal labor markets and crime is intuitively plausible and has formed the basis of much of the economics of crime research, beginning with Becker (1968) and Ehrlich (1973). Despite the long history of research on this question, empirical evidence supporting a causal effect of employment rates, legal sector wages, or other measures of legal markets on criminal activity has been difficult to isolate. This is because there is complex set of personal, social, and economic factors that influence the propensity to engage in criminal activities, making it difficult to identify the effect of labor market conditions. As a result, existing empirical evidence on this question is mixed. Some sociological studies suggest a weak relationship between unemployment and crime (Chirico 1987; Entorf and Spengler 2000). On the other hand, economists have found evidence for a causal relationship between labor market conditions and crime rates (Grogger, 1998; Gould, Weinberg, and Mustard, 2001; Raphael and Winter-Ebmer, 2001).

Some have applied a parallel reasoning relating labor market opportunities to the ability of insurgent or terrorist groups to produce violence (Krueger and Maleckova 2003;

Benmelech, Berrebi, and Klor 2010).[5] Individuals who might be recruited by insurgent groups face a similar choice between participating in violent insurgent activity or seeking employment in the non-violent sector, and may be less likely to participate in violent insurgent activity as the opportunity costs for foregoing employment in the non-violent sector increase. While the empirical evidence for this is limited, many scholars, policymakers, and military officials have accepted this logic. The 2007 U.S. counterinsurgency field manual cites strengthening the local economy and generating employment as an important part of an effective counterinsurgency campaign: "Unemployed males of military age may join the insurgency to provide for their families. Hiring these people for public works projects…can remove the economic incentive to join the insurgency."[6] Others argue that military-led reconstruction programs may have the opposite effect and instead increase insurgent violence, either because the increased presence and visibility of military forces in local communities required to manage reconstruction may further antagonize insurgent forces, or because civilians who are employed in these projects may be subject to increased intimidation and violence because they are more observable to insurgent agents.[7] To our knowledge there is no systematic evidence on the effects of development and reconstruction spending, and its role in improving non-violent sector employment conditions, on the size of the available labor pool for insurgent organizations.[8]

We have developed a theoretical model to identify and characterize the economic factors that affect the impact of development spending on insurgent violence. The theoretical model has three actors: individuals who decide whether to participate or not, insurgent groups who decide how much violence and what the mix of violent acts should be (whether to attack "hard" targets (military forces) or "soft" targets (unprotected civilians)), and the U.S. military who by funding development projects decide how much labor to purchase. The interaction proceeds as follows: The U.S. military acts first leaving a labor supply of individuals for the insurgency, then insurgent groups set the equilibrium wages in the insurgent sector, and then individuals.

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[5] A commonly used definition describes insurgencies as "a protracted political-military activity directed toward completely or partially controlling the resources of the country through the use of irregular military forces and illegal political mobilization" (CIA n.d.).

[6] *The U.S. Army/Marine Corps Counterinsurgency Field Manual* (FM No. 3-24), p. 173..

[7] A different mechanism through which reconstruction may actually increase violence, raised by Berman, Shapiro, and Felter (2009), is that raising employment levels reduces the ability of counterinsurgents to purchase information about illegal activities directly from local community, allowing insurgent networks to operate more freely. See also Wilder and Stuart (2009); Wilder (2009); and Bradbury and Kleinman (2010).

[8] Felter, Shapiro, and Berman (2008) present evidence for a different mechanism by which reconstruction and economic assistance programs might reduce insurgent violence (the provision of public goods).

2.1 Individual Participation in Insurgent Activity

To formalize the effect of the legal labor market on an individual's decision to participate in insurgent activities, we consider a model of labor supply and time allocation based on the Heckman and McCurdy (1980) home production model, and similar to the model of crime participation in Iyengar (2009).

Suppose an individual maximizes a simple utility function $u(C)$ with a simple budget constraint $C = y$. The individual has one unit of time he or she can allocate to the legal sector, L, or insurgent activity, V. The returns from the legal sector are the wages paid, w_L. The returns to individual i from insurgent activity are $w_v - \theta_i$ where w_V is the monetary wage paid to participants in the insurgency and θ_i is the net psychological return for participation in the insurgency (this potentially may include both the positive [sympathy for the political objectives of the insurgent group] and the negative [an aversion to violence]). The individual psychological return θ is an element of [0, 1] and has a distribution $H(\theta)$ which admits a density $h(\theta)$. An individual will participate in insurgent activity if the returns to insurgent activity are higher than those of the non-violent sector. The marginal participant is the individual whose θ equates the returns in the two sectors, that is define $\theta^* = w_L - w_V$. The fraction of the population participating is:

$$\Pr(\theta \leq w_V - w_L) = H(\theta^*) \quad (1)$$

Thus the total labor supply to the insurgency is $L^S(\theta^*) = N * H(\theta^*)$ where N is the population size.

2.2 Insurgent Production of Violence

. Their objective is to produce the most attacks, T. Attacks require some amount of capital and labor such that $T = f(K, L)$. The production function f is increasing in labor and capital and there is some imperfect substitutability between capital and labor. These imply that: $\partial f / \partial L > 0$, $\partial f / \partial K > 0$, and $\partial^2 f / \partial K \partial L > 0$. The labor supply available to groups is $L \leq L^S(\theta^*)$ and the budget constraint is $w_V L + rK \leq M$ where M is the group's initial endowment of resources. Suppose that the insurgent group j chooses to produce some

fraction of hard attacks, denoted γ_j, and the rest soft attacks.[9] The equilibrium number of attacks will therefore be $f(K^*, L^*) = T^*$, where $L^* = L^S$ and $K^* = \frac{m - wL^S}{r}$.

Suppose γ is a choice parameter which measures preference for soft attacks, relative to hard attacks. Suppose that insurgent groups set $\gamma_j^* = Q_k(\gamma_{ij})$, that is they set the fraction of soft attacks equal to the preference of the k^{th} quantile member. The basis for this assumption is that insurgent groups in Iraq operated in a competitive environment in which they compete similar to political parties.[10] In such a framework, we can then consider the relationship between the choice parameter for soft attacks, γ, and the psychological costs of participation, θ. If these preferences are uncorrelated, that is $Cov(\gamma, \theta) = 0$, then we would expect the change in attacks with respect to changes in the legal sector wage to be negative, i.e. $\frac{\partial T}{\partial w_L} = \frac{\partial T}{\partial L}\Big|_{L=L^*} \frac{\partial L}{\partial w_L} < 0$ but the equilibrium proportion of hard attacks to remain fixed, that is $\frac{\partial (H/L)}{\partial w_L} = 0$. If however, $Cov(\gamma, \theta) > 0$, that is the psychological cost of participation is positively correlated with preference for soft attacks, then we would expect the fraction of hard attacks to be increasing in the legal sector wage. The intuition behind this is that as the wage in the legal sector increases, individuals with high overall negative psychological costs exit from the insurgency to the non-violent sector. If these are also the individuals who preferred soft attacks, then the proportion of hard attacks increases. This may arise if more radical individuals (i.e. those with a lower psychological cost) prefer attacking military targets or fear detection and capture less.[11]

To illustrate the competing issues, suppose that $\gamma^* = Q_{50}(\theta_i | i \epsilon j)$ in which case the proportion of hard attacks is set by the median taste for violence by the members of the insurgent group. If this is the case, then under appropriate regularity conditions for the distribution H, we will observe attacks decrease, $\frac{\partial T}{\partial w_L} < 0$, capital intensivity increases $\frac{\partial K^*}{\partial w_L} = -\frac{w}{r}\frac{\partial L}{\partial \theta}\frac{\partial \theta}{\partial w_L} > 0$, and there is an ambiguous overall effect on the absolute number of

[9] For example, al-Qaeda in Iraq (AQI) has become well-known for its large car bomb and suicide vest attacks against civilian populations. AQI also conducts attacks against U.S. and Iraqi security forces, but has devoted much effort to and achieved notoriety for its brutal attacks against civilians. By contrast, rejectionist groups such as the New Ba'ath Party and Jaysh Rajal al-Tariqah al-Naqshbandia (JRTN) minimize their targeting of civilian populations in favor of attacks on security forces in their attempt to precipitate a withdrawal of U.S. and allied forces from Iraq.

[10] For details see Iyengar and Monten (2008) and Blattman and Miguel (2010)

[11] This logic may be less likely to hold for terrorist groups, who have different goals and therefore a different relationship to the civilian population, than for insurgent groups. Some evidence from the Iraq conflict suggests this might be the case. AQI – one of the most violent extremist group operating in Iraq - focused almost entirely on attacks against civilian targets as part of their "Harvest of Prosperity" campaign in 2009, during a period when violence levels were broadly declining and only the most fanatical groups remained.

hard attacks. This ambiguous effect arises because the change in wages in the non-violent sector has two effects: substitution and composition.

$$\frac{\partial H}{\partial w_L} = (1 - \gamma^*(\theta))\frac{\partial T}{\partial w_L} - T^*(w_L, \theta)\frac{\partial \gamma}{\partial \theta}\frac{\partial \theta}{\partial w_L} \quad (2)$$

The first term corresponds to the substitution effect and the second term corresponds to the composition effect. Since the costs of labor are higher, there are fewer attacks produced. However, those left in the insurgent group prefer hard attacks. Thus the net effect of an increase in wages on the total number of hard attacks cannot be theoretically predicted and depends on the relative magnitude of the substitution and composition effects that are empirically determined.

3. Data Description and Estimation Design

3.1 Data

To assess the impact of reconstruction spending in Iraq, we use several different data sets, linked at the district-month level. To measure violent civilian fatalities, we use data compiled by the Iraq Body Count (IBC) organization.[12] The IBC records violent civilian deaths independently confirmed by at least two major new organizations.[13] For each incident the data records the location, the perpetrator (Coalition Forces or insurgents), a description of the method of attack, and the target of the attack (civilians, political leaders, police, or Iraqi police and military forces). For the purposes of addressing our specific questions, we made a series of additional coding changes to the IBC data. First, we dropped all incidents in which U.S. or coalition forces were responsible for the harm to non-combatants, such collateral damage during aerial bombings, accidental shootings, or escalation of force incidents at checkpoints. Second, we excluded observations based on large numbers of unidentified bodies reported by morgues in large cities such as Baghdad, Kirkuk, and Mosul. These bodies could not be linked to any specific attacks or causes, but represented incidents with the highest reported deaths in the dataset.[14] After these exclusions, based on the description given

[12] The principal researchers are Hamit Dardagan and John Sloboda.
[13] For a complete description of the IBC's methodology, see http://www.iraqbodycount.org/about/methods/. Once there are two news sources reporting an incident, the IBC constructs two measures, *reportedminimum* and *reportedmaximum*. If multiple numbers are reported, the lowest is entered as *reportedminimum*. This can be zero if "zero deaths" is reported. However, wording like "unable to confirm any violent civilian deaths" is not a report of zero deaths and thus is not entered in either column. Moreover, when the report does not mention civilians specifically, this number is entered in the *reportedmaximum* variable but zero is entered into the *reportedminimum* variable unless the proportion of violent civilian deaths is given or a similar detail is given.) If a "family" is reported killed, this is entered as three deaths.
[14] The origins of these deaths are often unclear, but media accounts suggest they are frequently the result of interethnic violence and particularly Shia militia responses to Sunni groups.

for each incident, we coded both the province and district where the incident took place.[15] We also re-coded the method of attack employed by insurgent groups using a more consistent set of categories: small arms fire, indirect fire, torture and executions, and explosive bombings. Within the bombing category, we further coded each incident according to several sub-categories[16] reports on the fraction of incidents attributed to each attack type over the period for which data is available.

An important issue for our analysis is the development of a theory of which of the attack methods that appear in the IBC data are likely to be more labor-intensive than others. In particular, we are interested in the degree to which a method of attack requires individuals who participate in both the insurgency and the legal labor market. As the model developed in section 2 suggests, individuals who only participate in either the insurgency or in the non-violent labor market should not be affected by changes in labor market conditions. By determining which positions in insurgent attack cells are likely to be occupied by people who participate in both the insurgency and the legal labor market, we developed predictions about which attack methods should be sensitive or insensitive to variation in the legal labor market.

We base our analysis of the labor-intensiveness of various types of insurgent violence on the skills required to perpetrate a particular attack. Bombings in Iraq are virtually all either improvised explosive devices (IEDs) or roadside landmines. Due to the deployment of advanced Coalition force countermeasures against IEDs, as well as the danger of accidental detonation while assembling a device, bombmakers are assumed to be skilled personnel who have a high opportunity cost of participating in the non-violent labor market.[17] These people are virtually never used in actually placing the devices due to the opportunity cost. Instead, use of IEDs represents a labor-intensive form of attack because of the emplacers required, who are mostly not specialists who assemble the bombs, and are believed to be paid on a per attack basis.[18] Many of the same skills required to emplace an IED are the same as those required for a small arms attack, so we similarly consider these to be labor-intensive attacks. We also include rocket-propelled grenade attacks in the small arms fire category. However, methods of "indirect fire," which include artillery and mortar shells, are considered capital-intensive. Some training and expertise is required in order to hit a target with a rocket or mortar, and the actual act does not require a large number of personnel – one well-trained

[15] A district-level map of Iraq is available from the UN Assistance Mission for Iraq at http://www.uniraq.org/library/maps_geographic.asp.
[16] These include suicide bombings, roadside bombings (including improvised explosive devices or IEDs), vehicular bombings, and other.
[17] On U.S. military countermeasures deployed against IEDs, see Hanson (2008).
[18] See Grant (2006).

individual can conduct an effective indirect fire attack. The main constraint is in the munitions available, since these must be good-quality military-grade munitions (ideally that have not been in storage for a long time). These types of attacks are therefore likely to be relatively insensitive to variation in the non-violent labor market. The final category of attack type, torture and executions, requires groups and can be done by virtually anyone with weapons; these forms of attack should respond to variation in the legal labor market.

The distribution of these attacks is shown in Table 1. In Panel A, these attack categories include bombings that labor intensive (landmines, roadside, and suicide bombing) and capital intensive (car bombs and multiple explosive devices). The other labor intensive categories are small arms fire (accounting for nearly half of total attacks) and torture and execution (accounting for only 5 percent in the early part of the insurgency but growing to nearly 20 percent of all attacks in the later part). The capital intensive category of indirect fire is smaller than either small arms or bombings and account for only 6-8 percent of total attacks, but are more substantial in generating fatalities. Panel B shows fatalities that are uncategorized by type but appear in the IBC data as either hospital or morgue deaths—a higher fraction in early periods but reduced over time as IBC reporting improves. The recoding of these hospital/morgue deaths poses somewhat of a problem since we are uncertain as to the number of incidents generating these deaths but as a fraction of reported incidents these account for a small part of the sample (they account for a much larger fraction of the total fatalities). Coalition generated and Iraqi Security forces generated attacks are excluded because of the complicated issues regarding classifying the attack type and because it is unclear what the predicted effect of reduced insurgent activity on these types of attacks should be.

The IBC data has several advantages. There has been substantial controversy over attempts to measure excess violent civilian deaths in Iraq since the 2003 invasion. Most disagreement, for example over a 2006 study reported in the medical journal *The Lancet* which placed this figure around 601,000, concerns attempts to estimate this number through samples of household surveys administered directly in Iraq.[19] The IBC avoids these sampling and estimation problems by compiling a direct count of violent civilian deaths. It is also important to note that although the organization is partisan in its anti-war views, their methodology is transparent and conservative in seeking to provide an accurate lower bound

[19] Burnham et al (2006). For a discussion of the quality of the estimates produced by these household surveys, see Kahl (2007).

for the number of violent civilian deaths reported.[20] Finally, unlike even U.S. government data, the group has used a consistent methodology since the beginning of the conflict. However, the IBC data also has several weaknesses that may reduce confidence in any findings. There is often ambiguity in the description given for some incidents regarding the target or method of attack. This is particularly true for observations based on new reports of bodies found with gunshot wounds or signs of torture, but where the circumstances of the deaths are unclear.[21]

Thus, in addition to the IBC data, we use attack data based on "significant activity" (SIGACT) reports filed by Coalition forces in Iraq. These reports record any incident or event in which military personnel came into contact with hostile forces. Unclassified data drawn from the Multinational Force-Iraq (MNF-I) SIGACTS III Database were provided by Berman, Felter and Shapiro (2009) from the Empirical Studies of Conflict project. These data provide a count of the number of incidents in a district month-year. They also provide aggregate counts of the number of attacks at night and during the day. The data span incidents from February 2004 and July 2008. The unclassified data do not include any information pertaining to the Coalition Force units involved, Coalition Force casualties, or battle damage incurred as a result of the reported incidents. Moreover, the data do not include successful coalition-initiated events, such as raids where no one returned fire, or coalition-initiated indirect fire attacks not triggered by an initiating insurgent attack. These attacks do not necessarily involve a fatality. The number of casualties resulting from each reported incident is not available.

Summary statistics for both the civilian and military measures of violence are provided in Table 1. The average number of attacks with civilian fatalities is only about 0.4 per 100,000 people, while attacks on coalition forces are substantially higher at 26 per 100,000 people. Much of the violence is from small-arms fire but a sizeable minority are due to explosive devices. There are significantly more attacks on Coalition forces at night time. Most of the violence is concentrated in only a few provinces: Anbar, Basrah, Babil, Baghdad, Diyala, Najaf, and Salah-Din. Much of the Kurdish region in the north and unpopulated areas in the west and south of the country experienced minimal insurgent related violence.

[20] The data can be downloaded from http://www.iraqbodycount.org/database/.
[21] On the ability of insurgent groups to conceal killings from Iraqi authorities, see for example Dehghanpisheh (2007).

To measure reconstruction spending, we use data provided by the U.S. military from the Commander Emergency Response Program (CERP) fund.[22] According to the law authorizing the funds, CERP money can be spent on one of 18 project areas.[23] The project categories span a wide range of infrastructure and social service areas including agriculture, education, health care, transportation, and sanitation. For each project recorded in the dataset, these data report the location (including the province and district), total amount spent, and duration. These data also provide detailed information on project type. We coded each project initiated with CERP funds into four broad categories: construction, refurbishment, procurement, security, and condolence/compliance payoffs. Based on this division, we constructed a count of "labor intensive" projects, or projects that generate local employment and draw on CERP money to pay wages to individuals over the duration of the project. These include construction and refurbishment, and exclude procurement, security, and compliance payments. Specific project sectors such as repairing and reconstruction schools and hospitals or civic cleanup were coded as employing labor, while other funding categories such as condolence payments, detainee release payments, and rule of law/governance programs were coded as not labor intensive.[24] Figure 1 shows the relationship between the start of new projects and funding levels. In general, total funds spent in each fiscal year are highly correlated with both the number of new projects.

These projects initiated some of the only legal employment available in Iraq during this period of time. According to the World Food Survey, during the 2004-2007 period Iraqi Government and Coalition Force initiated-reconstruction programs represented the only substantive employment opportunities. During this period, unemployment estimates range from 25-40% percent for the entire period of the conflict. The employment-population ratio ranged from 30-37 percent (as compared to the UK at 59% and US at 62% during the same period). Because of this, military and contractors were encouraged, though not required, to hire local labor.[25]

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[22] We thank Jacob Shapiro and the Empirical Studies of Conflict (ESOC) project at Princeton University and the United States Military Academy for providing similar data used for an earlier version of this paper.

[23] For a full list of authorized CERP project areas, see Appendix D of Office of the Special Inspector General for Iraq Reconstruction (2007). On the purposes of the CERP program and guidelines for the use of CERP funds, see Tackaberry (2004); Martins (2005); and U.S. Army Combined Arms Center (2009).

[24] Several U.S. agencies have conducted independent audits of CERP program spending; see Office of the Special Inspector General for Iraq Reconstruction (2007); Office of the Special Inspector General for Iraq Reconstruction (2005); and U.S. Government Accountability Office (2007).

[25] Based on estimates from the World Food Program, Comprehensive Food Security and Vulnerability Analysis: Iraq 2004-2007.

CERP program funds were reauthorized by the U.S. Congress in five separate bills, but at different total amounts for each reauthorization. We therefore identified the five dates when the amount of total funds allocated to the Iraq CERP program legislated by Congress changed, corresponding to each fiscal year between 2004 and 2009, with an additional supplemental funding bill in FY 2006.[26] In January 2004, funding levels for the CERP program were relatively low. In the 2005 fiscal year, funding was more than five-fold from $140 million to $718 million. The support was short lived and in 2006 funding was cut back to around $500 million. A supplemental spending bill increasing funds subsequently raised the total available funds by $200 million. That level of funding (approximately $700 million per year) was maintained in the 2007 budget.

Information on division-level unit rotations in Iraq for the period May 2003 to June 2008 was compiled primarily from press releases issued by the Department of Defense (DOD), Multinational Force-Iraq (MNF-I), and Multinational Corps-Iraq (MNC-I) announcing a transfer of command, and supplemented with additional secondary sources.[27] Following the end of the major combat phase of the Iraq war, the U.S. military divided the Iraqi theater into several division-sized areas of operation (AORs), each with an independent divisional command, under a central military command in Baghdad (first the Combined Joint Task Force 7, and later called Multinational Force-Iraq).[28] The data establishes the incoming and outgoing divisional commands and the date of the transfer. For some divisions in some periods, command authority was transferred to a "Task Force" comprised of command elements from several different units, but usually dominated by one brigade-level command. AORs controlled by non-U.S. forces (such as Poland and the United Kingdom) are excluded from the sample.[29]

3.2 Identification Strategy

A key issue in estimating the impact of CERP on violence is that the amount of new projects initiated in a district in a month is most likely related to prior trends in violence.

[26] Dates and amounts from Office of the Special Inspector General for Iraq Reconstruction (2008).
[27] These include McGrath (2006) and Morgan (2009).
[28] These are: MND-Baghdad, MND-Northwest; MND-North Central; MNF-West; MND-Central-South; and MND Southeast. After September 2005, MND-NW and MND-NC were consolidated into MND-North. MND-Central was created around the "belt areas" surrounding Baghdad in conjunction with the surge in April 2007. After August 2009, the military command in Iraq was reorganized into four divisions under Multinational Corps-Iraq: Multinational Division-North, Multinational Division-Baghdad, Multinational Division-South, and Multinational Force-West.
[29] With exceptions, these areas generally experienced lower rates of violence, and in any case represent a small area of the country because the U.S. contributed the overwhelming majority of the manpower for military forces in Iraq.

Commanders may be reluctant to start reconstruction activities when violent conditions threaten local Iraqi laborers and civilian aid workers, and military personnel are occupied with re-establishing security. Alternatively, military commanders may channel reconstruction funds to the least secure areas in an attempt to undermine the insurgency where it is most active.[30] We therefore used the rotation of U.S. military divisions assigned to an area, interacted with the level of total available funding, as instrument. As described, beginning in 2003 the U.S. military divided the Iraqi theater into several division-sized areas of operation.. These divisional-sized forces typically deployed to an area of operation for approximately one year, although deployment times had occasionally been lengthened due to constraints on the availability of forces. Each is under an independent divisional command led by an officer at the rank of major general. Within each division (also known as Major Subordinate Commands, or MSCs), there are several brigades (or, for Marine units, regiments), each commanded by a colonel. While divisions are permanently organized with "organic" units (e.g. the 1st Brigade Combat Team of the 1st Cavalry Division), while deployed they are "task organized" such that the majority of brigades are not organic to the division headquarters they are deployed with.[31]

However, we considered the MSC to be the appropriate unit of analysis for several reasons. The primary reason is that for CERP projects less than $500,000, the MSC commander is the approval authority (projects above $500,000 require the approval of the Multinational Corps-Iraq commander).[32] Although this authority can be -- and for smaller projects was -- delegated to brigade commanders, the MSCs provided key guidance and oversight. Projects may be nominated by commanders down at the company level (captains). However, proposals must not only meet the conditions set by the legal constraints of the CERP program but also fit in to the campaign plans of higher commanders.[33] For this reason, the guidance established at the MSC level had a direct effect on all levels of CERP spending -- and critically for this analysis, the MSC campaign plans influence both the amount of overall spending and the balance between the amount of spending devoted to labor-employing projects and to other, non-labor-employing purposes such as procurement or

[30] See, for example, Wilder (2009).
[31] For example, the 2nd Brigade Combat Team of the 1st Armored Division deployed to Multinational Division-Baghdad under the command of first the 4th Infantry Division headquarters and later the 1st Cavalry Division headquarters during its 2008-2009 deployment, while the 1st Armored Division headquarters was assigned to Multinational Division-North. For a complete listing of the task organization of Coalition forces in Iraq over time, see data compiled by Morgan (2009).
[32] GAO (2008).
[33] The campaign plan is a classified document outlining the initial and desired end states and linking them through planned operations. See, for example, Joint Publication 5-0 (2006)..

condolence payments. Although this guidance varied over time due to friendly, enemy, and civilian considerations, we utilized variation common to MSCs as cross-sectional units. This variation parameter can be interpreted as the overall disposition of each division's commander and staff to labor-intensive and capital-intensive CERP projects.

A related issue for the estimation of the causal effect of spending programs on violence is whether certain types of military units are assigned to an area of responsibility (AOR) based on current or anticipated violence levels. The exclusion restriction for an instrument requires that the assignment of military units to an area is uncorrelated with other determinants of violence. In general, it appears that at the division level this is the case. The most common method by which units (at any level) are assigned to areas based on current or anticipated violence levels is by shifting the geographic boundaries of the units' AORs.[34] AORs at the division level may change slightly during a division's deployment, but these changes are much smaller relative to the size of the unit at the division level rather than at the brigade level or below and therefore are not a major concern.

The second issue regarding our exclusion restriction comes from the possibility that particular division headquarters are moved from one area to another based on current or anticipated violence levels. However, division headquarters movements are planned years in advance with the CENTCOM Force Requirements Enhanced Database (FRED) and it is virtually impossible to change the planned movement of a division headquarters with even a few months' notice.[35]

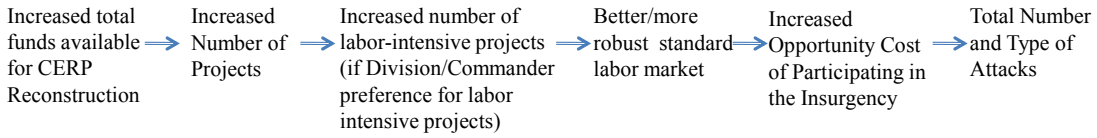
A final concern is that a military unit's preference for specific types of projects is correlated with a set of counterinsurgency tactics and practices other than reconstruction activities, and which also affect violence. We address this in our fixed-effects approach, in which these differences are fixed over time. Identification therefore comes from the change in project spending over time, for a given division. This difference may arise because of changes in the level of funding allocated to the division over time – a result of a nation-level appropriations action. With greater funding, divisional units with labor specific preferences may increase the fraction of labor intensive projects in the areas in which they control. In contrast, divisional units with non-labor specific preferences may reduce (or not change) the

[34] It is logistically difficult to deploy or send home units in response to changes on the ground. Geographic boundaries for units already in the theater can be changed more easily. A notable exception is the 2007 "surge," which still took months to implement.

[35] Appendix Figure 1 shows the autocorrelation in attacks is about 5 months long—not long enough to allow sufficient predictability of violence to assign units based on skills or preferences.

fraction of labor intensive projects in their areas of control, despite an increase in the amount of funds available.

Using changes in the total level of available funds, as well as the rotation patterns of military divisions, we can estimate a first stage of the fraction of labor intensive projects on units. The causal chain can be described as follows.



To estimate the effect of reconstruction spending on violence using this strategy, we construct an interaction instrument interacting the military division, which we assigned to a given AOR, and the funding period:

$$labor_{ujt} = \pi_0 + \pi_1\left(unit_{uj} * funding_t\right) + totalCERP_{ujt} + t + t^2 + \delta_j + \tau_t + \mu_u + \upsilon_{ujt} \quad (3)$$

In the first stage equation (3), the dependent variable *labor* refers to a measure of labor-intensive reconstruction, more precisely: a count of labor-intensive projects which includes construction, refurbishment, employment, and public works projects. The instrument *unit* is an indicator variable that is for unit *u* in *j* which is interacted with funding period *t*. The fixed effects then include a district specific effect (δ_j), a time specific effect (τ_t) and a unit specific effect (μ_u). In addition, we include a nationwide quadratic time-trend and controls for the total number of CERP projects or CERP spending in a district-time period. Using the predicted fraction of labor intensive projects funded by the division, we can then estimate the second stage regression akin to equation (4) but using fixed effects rather than the explicit covariate controls.

$$\ln\left(A_{jt}\right) = \gamma_0 + \gamma_1 \widehat{\text{labor}}_{\text{ujt}} + totalCERP_{ujt} + t + t^2 + \gamma_{\text{j}}^{\text{D}} + \gamma_{\text{t}}^{\text{T}} + \gamma_{\text{u}}^{\text{U}} + \text{u}_{\text{jt}} \quad (4)$$

In equation (4), γ^D, γ^T, γ^U represent fixed effects for district, month, and unit respectively. The estimates of γ_1 and λ_1 provide estimates for the aggregate effect of changes in labor demand in the licit sector on production of violence (measured either as insurgent-initiated attacks or fatalities per attack).

The theoretical framework used to derive these estimating equations leads to an additional set of predictions. If capital is fixed in the short term and insurgent groups cannot instantaneously adjust by substituting more capital intensive types of violence, then estimating equation (4) for labor intensive forms of violence should produce a consistent estimate of the true elasticity of insurgency labor supply with respect to non-violent sector

wages. Estimating equations (6) for capital intensive forms of violence production should produce *no* change in the number of attacks if labor and capital are not substitutes in production and capital is fixed. If labor and capital are substitutes in the production of violence, then capital-intensive attacks may increase. Similarly, if they are complements, capital-intensive attacks may decrease. If the effect operates though a labor supply channel, we should also expect substitution from day to night attacks. This would reflect less manpower being available to insurgents during working hours. On the other hand, if development and reconstruction projects increase the number of available targets for insurgents, we would expect to see an increase in day-time attacks.

Based on this model and identification strategy, we identified five main predictions about the consequences of improvements in the non-violent labor market for insurgent violence:

(1) The overall level of insurgent attacks which kill civilians (rather than attacks on military targets) should unambiguously decline.

(2) Depending on the relative cost of hard vs. soft target attacks, the net effect on attacks on military targets is ambiguous. This is because there is also a shift in group taste for attacks against hard targets which shifts the optimization decisions of insurgent groups.

(3) The number of labor-intensive types of attacks should unambiguously decline.

(4) The number of capital-intensive attacks is ambiguous. It may decline if capital and labor are complements. It may increase if capital and labor are substitutes and capital is available. It may stay the same if capital and labor are substitutes but capital stocks are fixed in the short term.

(5) The number of attacks that occur during working hours should decrease relative to the number of attacks conducted at night if there is reduced labor available for attacks. The number of attacks that occur during daytime will increase if the change in targeting is due to increased exposure of military forces.

4. RESULTS

To identify the causal effect of reconstruction spending on violence through labor market channels, we needed to establish several facts to support our instrumental variables (IV) approach. First, when available funding increases, the total number of projects increases. Figure 1 shows that there has been substantial variation in the total number of new

projects started. This variation occurred in addition to the variation, shown in Figure 1, in the level of total available funds. Between the first year of the program, beginning in January 2004, and 2009 the amount appropriated to the CERP program by Congress stayed between $500 and $700 million per year. Figure 1 shows that the level of total funding available and the number of new projects started appear to coincide: more projects occurred when more funds were available. Second, we assumed that different military units preferred different types of projects. Expenditures on labor-intensive projects are in fact on average higher in certain military divisions relative to others, regardless of funding period. Third, we assumed that military units that preferred labor intensive projects will do even more labor-related projects during higher funding periods relative to military units that prefer non-labor related projects (such as procurement) or prefer to not spend CERP funds. Figure 2 shows labor expenditures in high and low funding periods by military division, confirming this assumption.

We estimated a first stage of labor-intensive projects or labor-related expenditures on a fully interacted set of indicator variables for units and funding periods (equation 3). Table 2 reports the results of first stage estimation. The identifying assumption for this specification is that military units that prefer labor-intensive projects increase the number of projects that are labor-intensive when additional CERP funds are available, but hold fixed all other *unit specific* activities. We find that indeed there is substantial variation in the levels of labor-intensive reconstruction activity by district and that this varies in predictable ways across funding period. Taking FY2005-2006 as the base period (period 3), there are significantly fewer projects in funding period 1(2003-2004) and significantly more projects in periods 2 (2004-2005), 4 (2006-mid-2007), 5 (mid-2007-2008), and 6 (2008-2009). Period 4 experienced the largest increase in projects. Periods 5 and 6 had higher project levels than period 3, but slightly lower levels than period 4. The excluded instrument F-Statistic is 20.91

A. Attack Levels

Table 3 presents the results from both the OLS and IV regressions. Columns (1)-(4) estimate the effect of CERP spending on civilian attacks, civilian fatalities, and military incidents. The OLS estimates in Columns (1) and (3), covering all districts and weeks in the data, indicate that higher violence areas may have slightly higher levels of labor intensive projects, masking the potential security gains to implementing these projects. The IV estimate in Column (2), which more plausibly isolates the causal effect of CERP projects on violence,

indicates that each new labor-intensive project reduces attacks on civilians by 2 percentage points, the equivalent of a 49% decrease in incidents. Attacks on Coalition forces appear to increase significantly as labor-intensive projects increase. Each new labor-intensive project is associated with a 13% increase in military incidents in the IV model. The much smaller increase in attacks on coalition forces should be interpreted as the net effect of decreased attacks from the increased cost of labor and the increase in hard attacks versus soft target attacks.[36]

This combination of results – a reduction in insurgent violence targeted at civilians, but an increase in insurgent incidents involving military forces - could occur for several reasons. First, project oversight itself may increase the exposure of Coalition forces to insurgent activity, providing more opportunities for attacks. Second, the increased presence and visibility of Coalition forces in local communities may further antagonize insurgent forces, increasing the desire to attack perceived occupiers. Third, insurgent groups may no longer have the more marginally attached members who previously conducted untargeted violence, due to the CERP-generated increase in labor demand. The shift to more committed members may result in the unanticipated effect of increasing violence towards Coalition forces. Finally, insurgent groups may strategically substitute away from attacks that cause civilian fatalities and towards attacks on Coalition forces in order to counteract the "hearts and mind" effect of reconstruction projects.[37]

B. Lethality of Attacks

Columns (5) through (8) of Table 3 present the results for total number of civilian fatalities and the number of fatalities per attack. There is a 56 percent reduction in civilian fatalities in Column (6), consistent with the decline in attacks which result in civilian fatalities. However, there is a marginally significant increase in civilians killer per attack. This is consistent the increase in extremism predicted by the model, where lethality increases with CERP spending because those insurgents who have the highest comparative advantage in orchestrating highly lethal attacks are the least likely to leave the group to work in CERP projects. These insurgents will tend to be the more committed and potentially better trained, as opposed to those active in the group primarily for the lack of better options. This shift in

[36] A concern with both these OLS and IV estimates is that the second stage dependent variable - the level of civilian attacks - may not be time stationary. Hence, we also report coefficients using a quadratic time trend in Table 3. These results are also consistent when we use first differences to estimate the effect of changes in net projects on changes in civilian attacks on a week-to-week basis. First difference results available in the appendix.

[37] For additional discussion of this "hearts and minds" effect, see Berman, Felter, and Shapiro (2008).

insurgent personnel thus results in a more complicated substitution of attack types where we observe fewer attacks against civilians but more fatalities. The increase in fatalities per attack is not consistent with insurgent groups strategically substituting away from civilian targeted attacks as the attacks they do produce appear to be more likely to kill civilians. This is consistent with capital intensive attacks producing higher levels of fatalities per attack.

C. Composition of Attack Types

If insurgent organizations were affected by a CERP-induced decrease in the supply of recruits, we might expect changes in the types of attacks they can successfully mobilize. Specifically, we might expect a decrease in labor-intensive types of attacks relative to other non-labor intensive attack types. Figure 3 shows that composition of attack types over time. While small-arms fire (such as gunfire and drive-by shootings) are the primary sources of violence, there is a substantial amount of explosive bombing-related attacks and a growing level of torture and execution over time. Critically, small arms fire and vehicle bombing tend to be very labor intensive as they require at least one individual per attack initiated. Other forms of attack, such as roadside bombing and indirect fire require more skilled and fewer marginally attached laborers.

In Table 4, we divided violent attacks into two broad categories: explosive attacks (Panel A) and non-explosive attacks (Panel B). Explosive attacks include vehicular bombings, roadside bombings (often improvised explosive devices or IEDs), suicide bombings, and other. Non-explosive attacks include small arms fire, indirect fire, and torture and executions. During CERP projects, it appears that the number of vehicular bombs decrease by about 40 percent while other explosives increase by about 30 percent**.** For the non-explosive categories, small arms attacks, especially drive-by shootings, decrease by 9.5%, but there is a significant increase in indirect fire incidents, by about 38 percent. This pattern of results is consistent with the reduced use of low-skilled labor intensive attacks. Suicide attacks and torture and execution, presumably committed by the most attached individuals, are unaffected by labor-intensive CERP spending.

D. Day-Night Substitution

Another testable prediction of the labor market mechanism is that if the reduction of violence is due to higher cost of labor, we would expect to observe insurgent attacks to decline during working hours. If fewer recruits are available during time spent working for CERP-funded wages, insurgent groups might be compelled to conduct a greater proportion of

attacks at night (or during non-working hours). On the other hand, if work projects increase the ability of insurgents to observe collaborators or U.S. forces, attacks might increase during the day. Thus, the timing of attacks provides some information on the underlying mechanism generating the reduction in violence reported in Table 3. The results from this test are mixed. In Table 5, we find that there is a decrease in day time attacks on civilians, consistent with the model. The decline in overall civilian attacks during CERP projects is due to a day time decrease, with no corresponding increase in attacks on civilians at night.[38] However, there is also a corresponding increase in attacks on U.S. forces during the day. We therefore can't separate the possibility that the remaining hard-core of insurgents in a group are more willing to target US forces during the day (a result consistent with the model, due to the shift in the preference of the median member of the group for attacks against hard targets) or because U.S. forces are more exposed due to their greater involvement in local communities via CERP projects.[39]

5. CONCLUSIONS

This study identifies the effect of the labor market activity generated by reconstruction programs on violence levels in Iraq. The opportunity cost theory suggests that improved labor market options in the non-violent sector for potential insurgent recruits increases the cost of labor to the insurgency and reduces the total labor supply available to engage in violent insurgent activity. Using a model of labor supply and violence production, we show that this reduced labor supply can reduce the total number of attacks. The predictions from this theory are validated by empirical observations in the field. From these observations we find that that increasing labor-intensive reconstruction projects reduces insurgent violence by decreasing labor intensive types of attacks targeted at civilians and day time attacks. However, non-intuitively, as the theory predicts, we also find evidence that labor-employing reconstruction projects may also generate several unintended consequences, including an increase in attacks targeted at military forces and in increase in the lethality of attacks due to substitution away from low-skilled, labor-intensive forms of violence. These

[38] These results should be interpreted with caution, since its also plausible that insurgents may observe collaborators and project sites during the day and attack targets at night. We see this as a robustness check that fits with an overall pattern of results supporting the opportunity cost model, rather than conclusive evidence against the view that labor projects increase the risk to civilians by allowing insurgents to observe collaboration.
[39] An additional consideration is that retaliation against U.S. forces during the night may not be a viable alternative for insurgents, given the advantage available to U.S. forces operating at night due to thermal imaging, night-vision equipment, and surveillance and reconnaissance assets. This advantage has inspired informal U.S. military slogans such as "We Own The Night."

results are also consistent with the model's prediction that reducing the recruiting pool available to insurgent groups due to better employment conditions may push insurgent groups in a more radicalized direction, due to a shift in the preferences of the median member.

The causal interpretation of the estimated effects relies on the several assumptions. Force rotations are assumed to be independent of other determinants of violence, including predicted future violence. Military units which prefer labor-intensive projects may differ from other units in other respects, but we assume that these differences are *fixed* over time, and that labor-preferring military units will increase the fraction of projects that are labor-intensive when increased funds are available. Together these assumptions allow us to instrument for project spending using the interaction between military unit, location, and time period. If any one of these assumptions is violated, our instrument will fail the exclusion restriction and the causal relationship can be questioned. Our analysis is also limited by the quality of the available data. While both the IBC and the CERP data have been used in the past, there are likely to be omissions and miscoding which may generate bias. While we were unable to identify systematic bias in the reporting of CERP project data, since the data is collected in a conflict zone there may be some deficiencies. Issues of classical measurement error bias aside, if project data is missing or misreported in correlation with violence, this would produce bias. We also have little information on the quality or management of projects. If differences in project management quality are associated with project type, violence levels, or the timing of rotations, it will bias the estimates. We have found no evidence for such relationships. These limitations notwithstanding, the empirical results are consistent with the predictions from the theory, suggesting that underlying relationship between strengthening the labor market in the non-violent sector and a decrease in insurgent-initiated violence is likely to be robust.

Our findings represent an important step in connecting research on legal sectors and crime to insurgency research. A large research literature has explored the relationship between unemployment and crime. This study contributes an explicit application of this type of research to civil conflict and counterinsurgency policy by integrating theoretical modeling and an analysis of empirical conflict data. Given the difficulty in implementing many reconstruction projects and the concerns about corruption and mismanagement, it is useful to know that the simple labor market effect can produce substantial short-term reductions in violence. Critically, this benefit occurs even if these projects do not result in an improvement in the provision of public goods, the key mechanism underlying previous research on this

question. Given this, the returns to labor-intensive public goods provision are likely to be substantial in both winding down violent civil conflicts and in post-conflict settings.

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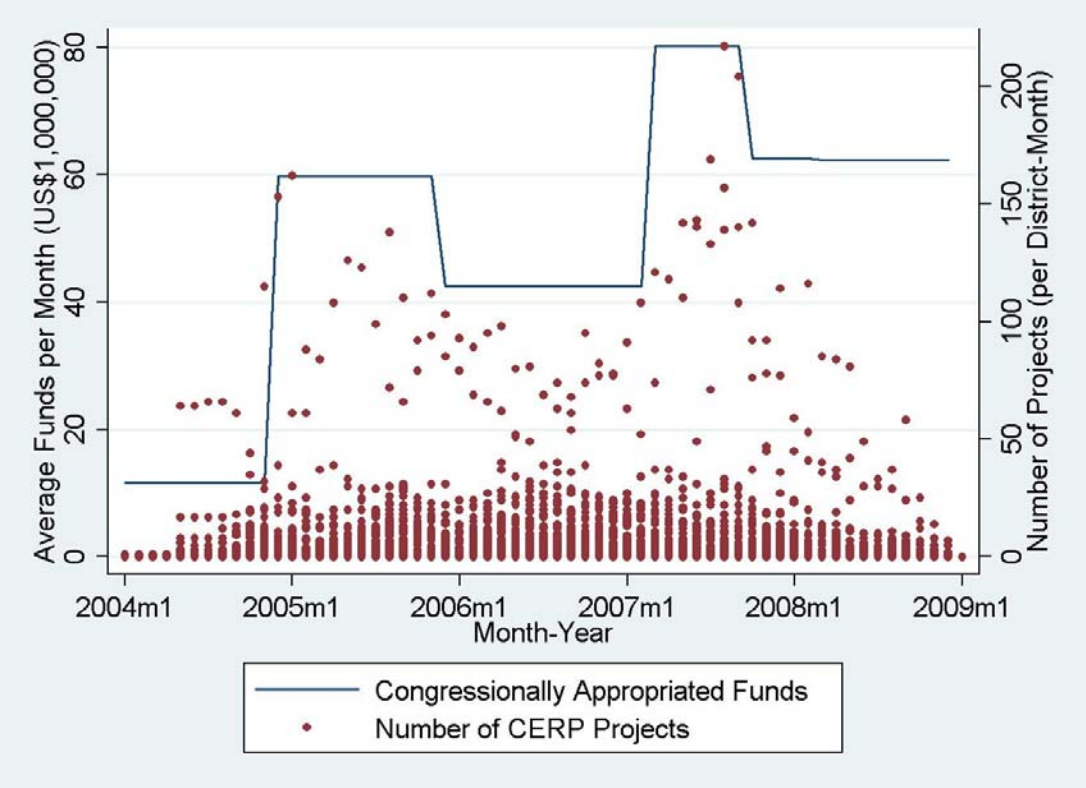

Figure 1. Relationship between Congressional Appropriations and CERP Project Starts

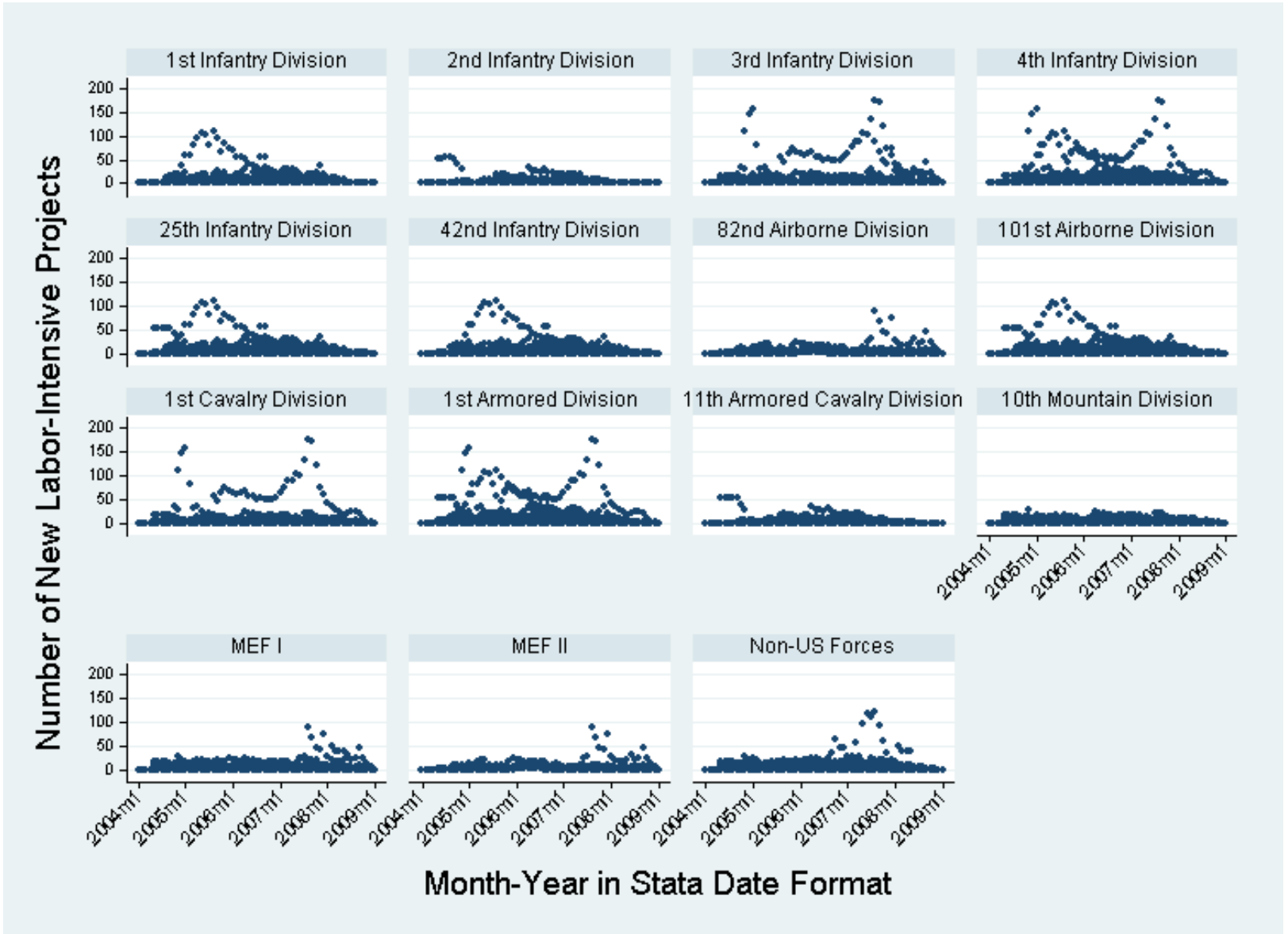

Figure 2. Military Division Labor-Intensive Project Starts

Notes: Labor intensive projects include construction projects, refurbishment projects, employment projects, and public works.

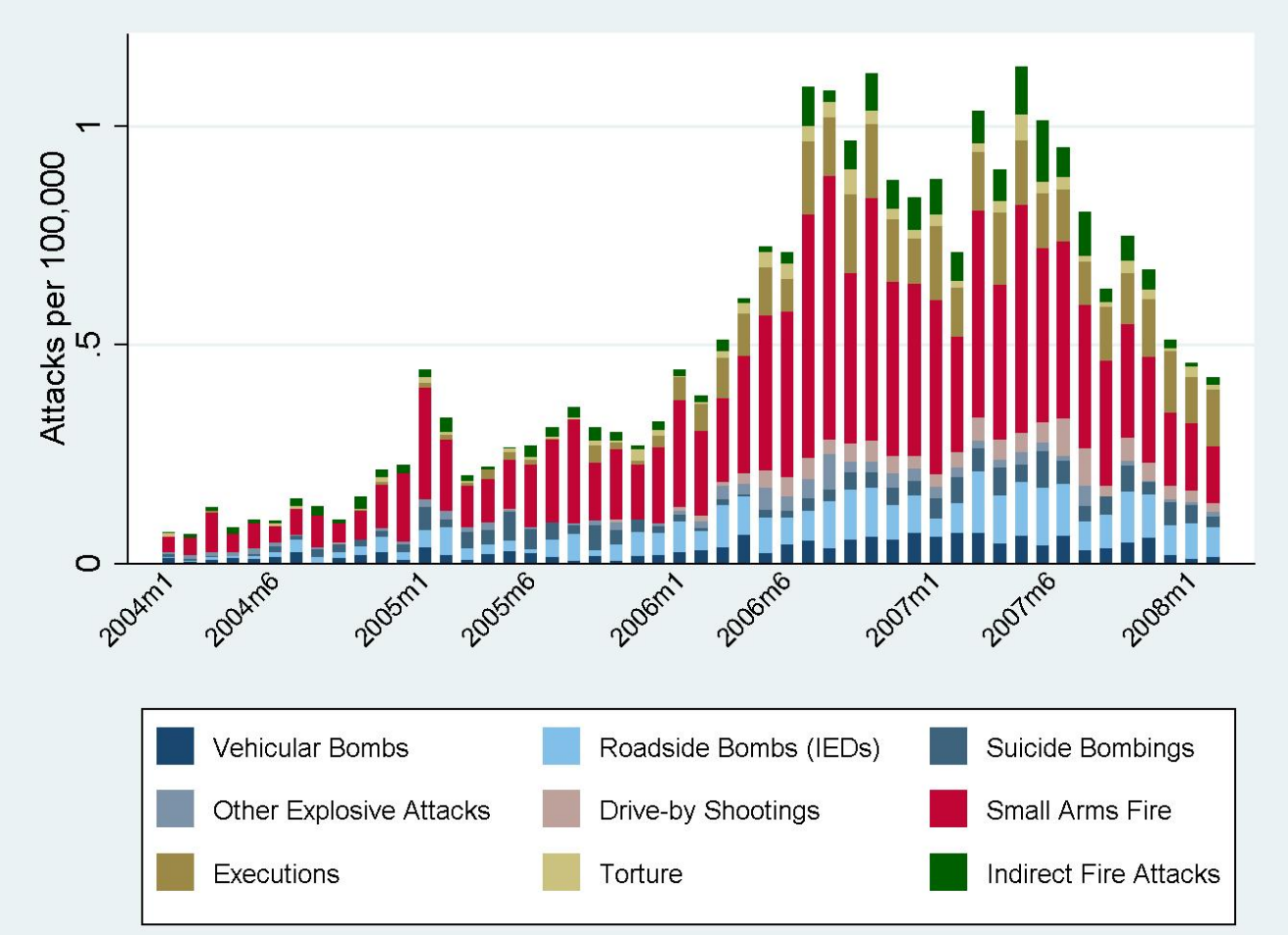

Figure 3. Composition of Violence over Time by Type of Attack

Notes. Civilian attacks are defined as any attack resulting in at least one civilian casualty. Data on civilian attacks based on the Iraqi Body Counts. Military Incidents are defined as any significant action against Coalition Forces. Data on military incidents based on SIGACTS database provided by the Princeton Empirical Study of Conflict Project (Berman, Felter, Shapiro, 2008). Dependent variables are scaled to be per 10,000 inhabitants with population estimates based on World Food Program Household Survey (2007).

Table 1. Summary Statistics for Violence and CERP Projects

		Funding Period					
	over all periods	Period 1 (2003-2004)	Period 2 (2004-2005)	Period 3 (2005-2006)	Period 4 (2006-mid-2007)	Period 5 (mid-2007-2008)	Period 6 (2008-2009)
Total CERP Projects	5.2854	0.79	5.32	7.94	6.51	6.88	2.16
	(14.7398)	(6.04)	(15.74)	(14.82)	(15.34)	(21.18)	(6.50)
Labor-Intensive Projects	3.87	0.66	4.38	5.86	4.68	4.80	1.28
	(11.59)	(4.98)	(14.02)	(11.28)	(11.4)	(16.01)	(4.23)
Total CERP Expenditures	0.3641	0.13	0.35	0.42	0.47	0.60	0.18
(in $100,000)	(1.6462)	(1.16)	(1.54)	(2.00)	(1.82)	(1.93)	(0.73)
Labor-Related Project Expenditures	0.23	0.10	0.24	0.27	0.30	0.37	0.12
(in $100,00)	(0.96)	(0.91)	(0.76)	(1.03)	(1.24)	(1.2)	(0.54)

Notes: Standard deviations reported in parentheses. Labor intensive projects include construction projects, refurbishment projects, employment projects, and public works. Labor-related expenditures include wagebills, subcontractor fees, and any subcontractor or agency markups.

Table 2. First Stage Estimates of Relationship between Funding Period, Division, and Net New Labor Intensive Projects

	Base Category	Change relative to base period				
	Net New Labor Intensive Projects in Funding Period 3 (2005-2006)	Funding Period 1 (2003-2004)	Funding Period 2 (2004-2005)	Funding Period 4 (2006-mid-2007)	Funding Period 5 (mid-2007-2008)	Funding Period 6 (2008-2009)
1st Infantry	7.088	-0.308	0.201	0.965**	0.515	0.514
	(0.218)	(1.05)	(0.362)	(0.478)	(0.419)	(0.465)
2nd Infantry	3.330	-0.884	0.561	0.744**	0.78	0.904
	(0.107)	(0.904)	(0.391)	(0.363)	(1.16)	(1.296)
3rd Infantry	5.875	-0.44	0.377	0.472	2.635**	2.133***
	(0.176)	(1.09)	(0.528)	(0.69)	(1.139)	(0.849)
4th Infantry	8.364	-0.216	0.305	0.437	2.14**	2.314***
	(0.211)	(1.116)	(0.584)	(0.748)	(1.137)	(0.883)
25th Infantry	5.047	-0.427	0.132	0.724**	0.414	0.385
	(0.102)	(1.083)	(0.326)	(0.362)	(0.909)	(0.749)
42nd Infantry	7.088	-0.823	0.308	0.509	0.822	1.223
	(0.241)	(0.462)	(1.05)	(0.954)	(0.818)	(0.913)
82nd Airborne	4.763	-0.944	3.391**	4.409**	1.171	1.207
	(0.173)	(0.713)	(1.532)	(1.357)	(0.946)	(1.025)
101st Airborne	4.806	-0.451	0.12	0.685	0.392	0.359
	(0.102)	(1.097)	(0.332)	(0.568)	(0.914)	(0.752)
1st Cavalry	18.812	-6.285	2.031**	2.318	3.235**	2.612**
	(0.700)	(1.796)	(0.556)	(1.334)	(1.195)	(1.333)
1st Armored	6.774	-0.099	0.671	0.664	1.778*	2.102**
	(0.176)	(1.126)	(0.541)	(0.702)	(1.072)	(0.867)
11th Armored	3.330	-0.884	0.761	2.744**	0.78	0.904
Cavalry	(0.092)	(0.904)	(1.391)	(1.263)	(1.16)	(1.296)
10th Mountain	3.659	-0.632	0.566	0.453	1.765**	0.687
	(0.299)	(0.519)	(1.042)	(0.941)	(0.807)	(0.911)
MEF I	4.488	-0.977	3.06**	3.386***	1.459*	1.217*
	(0.068)	(0.648)	(1.046)	(1.215)	(0.898)	(0.685)
MEF II	4.763	-0.944	4.391*	4.409***	1.571*	1.207
	(0.088)	(0.713)	(2.532)	(1.357)	(0.926)	(1.025)

Notes: Standard errors clustered at the area of responsibility (AOR) level reported in parentheses. Estimates that are significant at the 0.05 (0.10, 0.01) level are denoted with a ** (*, ***). Dependent variables is labor intensive projects which include construction projects, refurbishment projects, employment projects, and public works. All estimates are from a single regression. Also included but not reported are controls for total number of CERP projects, quadratic time trends, and district and month-year fixed effects. The excluded instrument F-Statistic = 20.91

Table 3. Estimates of the Effect of Reconstruction Spending on Attacks, Fatalities, and Attack Lethality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Civilian Attacks levels Per 100,000		Military Incident Levels Per 100,000		Civilian Fatalities Per 100,000		Number of Civilians killed per Attack	
Mean	0.669		9.72		2.89		4.48	
Number of Labor-Intensive Projects	-0.095**	-0.28***	0.18	1.08***	-0.69***	-1.40***	-0.028	0.22*
	(0.043)	(0.068)	(0.23)	(0.28)	(0.24)	(0.46)	(0.11)	(0.12)
Total Number of CERP Projects	0.11***	0.25***	-0.26	-0.95***	0.66***	1.21***	-0.038	-0.23**
	(0.034)	(0.056)	(0.20)	(0.23)	(0.19)	(0.35)	(0.10)	(0.11)
t	0.15***	0.14***	3.14***	3.21***	1.27***	1.21***	-0.23	-0.20
	(0.051)	(0.049)	(0.66)	(0.65)	(0.36)	(0.35)	(0.31)	(0.30)
t^2	-0.0017*	-0.0017**	-0.047***	-0.047***	-0.020***	-0.020***	0.0048	0.0048
	(0.00088)	(0.00086)	(0.011)	(0.011)	(0.0066)	(0.0063)	(0.0064)	(0.0062)
Method of Estimation	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Areas of Responsibility	6	6	6	6	6	6	6	6
Observations	3151	3151	3151	3151	3151	3151	3151	3151
R-Squared	0.635	0.605	0.573	0.569	0.613	0.604	0.033	0.031

Notes: Standard errors clustered at the area of responsibility (AOR) level reported in parentheses. Estimates that are significant at the 0.05 (0.10, 0.01) level are denoted with a ** (*, ***). Civilian attacks are defined as any attack resulting in at least one civilian casualty. Data on civilian attacks based on the Iraqi Body Counts. Military Incidents are defined as any significant action against Coalition Forces. Data on military incidents based on SIGACTS database provided by the Princeton Empirical Study of Conflict Project (Berman, Felter, Shapiro, 2008). Dependent variables are scaled to be per 10,000 inhabitants with population estimates based on World Food Program Household Survey (2007). Labor intensive projects include construction projects, refurbishment projects, employment projects, and public works. All specifications include district and month-year fixed effects. In IV specification, the excluded instrument F-Statistic = 20.91

Table 4. Estimates of the Effect of Reconstruction Spending on Weapon of Attacks which Result in Civilian Fatalities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Explosive Attacks								
	Vehicle Bombings		Roadside Bombings		Suicide Bombs		Other Bombs	
	0.045		0.082		0.043		0.022	
Number of Labor-Intensive Projects	-0.010**	-0.018*	-0.0058	-0.0015	0.0028	0.0016	-0.0042**	0.0069**
	(0.0051)	(0.0093)	(0.0045)	(0.0075)	(0.0046)	(0.0068)	(0.0017)	(0.0033)
Total Number of CERP Projects	0.0087**	0.015**	0.0054	0.0020	-0.0014	-0.00054	0.0030**	0.0051**
	(0.0038)	(0.0070)	(0.0035)	(0.0058)	(0.0034)	(0.0051)	(0.0013)	(0.0025)
Panel B: Non-Explosive Attacks	Small Arms Fire		Indirect Fire		Torture and Execution			
	0.337		0.050		0.109			
Number of Labor-Intensive Projects	-0.022*	-0.032*	0.0087*	0.019**	0.0024	0.016		
	(0.012)	(0.018)	(0.0046)	(0.0091)	(0.0082)	(0.014)		
Total Number of CERP Projects	0.022**	0.030**	0.0074**	0.015**	0.00067	-0.0096		
	(0.0092)	(0.015)	(0.0036)	(0.0073)	(0.0062)	(0.010)		
Method of Estimation	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Areas of Responsibility	6	6	6	6	6	6	6	6

Notes: Standard errors clustered at the area of responsibility (AOR) level reported in parentheses. Estimates that are significant at the 0.05 (0.10, 0.01) level are denoted with a ** (*, ***). Data on civilian attacks based on the Iraqi Body Counts. Dependent variables are scaled to be per 10,000 inhabitants with population estimates based on World Food Program Household Survey (2007). Labor intensive projects include construction projects, refurbishment projects, employment projects, and public works. All specifications include district and month-year fixed effects as well as a quadratic trend variable. The excluded instrument F-Statistic = 20.91

Table 5. Estimates of the Effect of Reconstruction Spending on Time of Day of Attack

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Attacks with Civilian	Attacks Levels		Day time Attacks		Night Time Attacks	
Fatalities	0.669		0.108		0.0144	
Number of Labor-Intensive	-0.033**	-0.092***	-0.029**	-0.085***	-0.0039***	-0.0065**
Projects	(0.014)	(0.026)	(0.014)	(0.025)	(0.0013)	(0.0031)
Total Number of CERP	0.036***	0.082***	0.032***	0.076***	0.0037***	0.0057**
Projects	(0.011)	(0.022)	(0.011)	(0.021)	(0.0011)	(0.0025)
Panel B. Attacks on Coalition	Attacks Levels		Day time Attacks		Night Time Attacks	
Forces	9.71		5.00		2.73	
Number of Labor-Intensive	0.14	0.80***	0.15	0.62***	-0.0058	0.18**
Projects	(0.26)	(0.29)	(0.18)	(0.22)	(0.093)	(0.083)
Total Number of CERP	-0.24	-0.75***	-0.21	-0.58***	-0.022	-0.17**
Projects	(0.22)	(0.25)	(0.15)	(0.19)	(0.078)	(0.071)
Method of Estimation	OLS	IV	OLS	IV	OLS	IV
Areas of Responsibility	6	6	6	6	6	6

Notes: Standard errors clustered at the area of responsibility level (AOR) reported in parentheses. Estimates that are significant at the 0.05 (0.10, 0.01) level are denoted with a ** (*, ***). Civilian attacks are defined as any attack resulting in at least one civilian casualty. Data on civilian attacks based on the Iraqi Body Counts. Military incidents are defined as any significant action against Coalition Forces. Data on military incidents based on SIGACTS database provided by the Princeton Empirical Study of Conflict Project (Berman, Felter, Shapiro, 2008). Dependent variables are scaled to be per 10,000 inhabitants with population estimates based on World Food Program Household Survey (2007). Labor intensive projects include construction projects, refurbishment projects, employment projects, and public works. All specifications include district and month-year fixed effects. In IV specifications, the excluded instrument F-Statistic = 20.91