

# Winning Hearts and Minds through Development?

Evidence from a Field Experiment in Afghanistan

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## Abstract

In areas afflicted by civil conflict, development projects can potentially serve an important counterinsurgency function by redressing grievances of marginalized groups and reducing violence. Using a large-scale randomized field experiment in Afghanistan, this paper explores whether the inclusion of villages in the country's largest development program alters perceptions of well-being, attitudes toward government, and violence in

surrounding areas. The results indicate that the program generally has a positive effect on all three measures, but has no effects in areas with high levels of initial violence. These findings demonstrate that development programs can buttress government support and limit the onset of insurgencies in relatively secure areas, but that their effectiveness is more constrained in areas where insurgents are already active.

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# Winning Hearts and Minds through Development? Evidence from a Field Experiment in Afghanistan<sup>1</sup>

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## I. Introduction

In recent years, the U.S. military has increasingly used development projects as a strategic weapon to fight ongoing counterinsurgency efforts in Afghanistan, Iraq, and other theaters. The approach is predicated on a hypothesis that such projects - which are commonly implemented by the domestic government and allied entities and deliver basic services and infrastructure - can improve economic outcomes, build support for the government, and ultimately reduce violence as sympathies for the insurgency wane. As evidenced by its prominence in the U.S. Army's *Counterinsurgency Field Manual*, the hypothesis now constitutes a major component of current U.S. counterinsurgency doctrine (U.S. Army / Marine Corps, 2006).

Despite the ongoing application of the strategy, there is limited empirical evidence on the effectiveness of development projects in countering insurgencies. In this paper, we use results from a large-scale randomized field experiment involving Afghanistan's largest development program - the National Solidarity Program (NSP) - to test mechanisms by which development projects can potentially affect counterinsurgency outcomes. We find that villagers residing in communities which have received projects are more likely to hold positive perceptions of their economic situation and exhibit positive attitudes towards the government. We also find that the areas around villages which receive NSP become safer, although this effect is limited to regions with moderate levels of initial violence.

Between 1960 and 2010 more than half of the world's countries were affected by civil conflict, 20 percent of which had been at war for at least ten years (Blattman and Miguel, 2010). Insurgencies are a subset of civil conflicts that are largely irregular, asymmetrically-fought, yet prolonged attempts by anti-government elements to overthrow the government or win autonomy for a region or territory (Iyengar and Montem, 2008).<sup>2</sup> Counterinsurgency, in turn, refers to all economic, political, and military steps taken by the government and allied forces to defeat the insurgency.

According to theories of civil conflict, the strength of an insurgency depends primarily on its level of popular support, as this determines the ease by which insurgents can recruit additional members and whether the population is willing to share intelligence with government agents. Development projects can form part of a counterinsurgency strategy if they are successful in increasing support for

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<sup>2</sup> Alternative but closely related definitions of insurgency can be found in Fearon and Laitin (2003) or in the US counterinsurgency manual (U.S. Army/Marine Corps, 2006).

the government and weakening support for insurgents. The effectiveness of this approach will depend on projects delivering perceptible benefits and the concerned population assigning credit to the government for those benefits.

One of the main challenges in identifying the impact of projects on counterinsurgency outcomes is the non-random assignment of projects, which leads to spurious correlations if project placement is dependent on local security conditions, as is often the case. Two recent studies which address the question use different empirical strategies for inference and arrive at different results. Berman, Shapiro, and Felter (2011) examine development projects undertaken by the U.S. military in Iraq and, after controlling for region-specific characteristics and pre-existing trends, find that projects reduced violence, although only after a significant increase in troop strength in 2007. Crost, Felter, and Johnston (2011) employ a regression discontinuity design to examine the effect of development projects in the Philippines and find that projects exacerbated violence in the short run and had no effect in the long run.

Our study differs from these existing works in two important ways. First, we use randomized assignment of projects across villages to eliminate selection bias. Of 500 villages in our sample, half were randomly assigned to receive a development program in 2007, with the other half not receiving it until after 2011. Second, in addition to events data on security incidents, we use survey measures of household-level economic outcomes and of individual perceptions and attitudes. This allows us to test the specific mechanisms through which projects affect security.

We find that projects improve villagers' perceptions of economic well-being and attitudes towards central and sub-national government, NGOs, and U.S. military forces. Projects also improve villagers' perceptions of the local security situation and cause a reduction in the number of security incidents recorded by the International Security Assistance Force (ISAF) a year or more after project implementation. However, there are no effects on incidents occurring within a year of project implementation and no effects on the number of incidents reported by villagers in surveys.

In areas facing high levels of violence, no effects are observed on attitudes to government or on security incidents, despite positive effects on perceptions of economic well-being. These results indicate that, in areas where attitudes to government are unfavorable either due to a failure of the government to ensure security or to broad-based support for the insurgency, even projects that deliver perceptible benefits are insufficient to sway attitudes. Thus, while projects can prevent the

spread of insurgencies in areas with low initial levels of violence, they appear ineffective in containing insurgencies in areas afflicted by high levels of violence.

The findings generally support theories of civil conflict that consider insurgencies to be the product of interactions among rational actors that respond to economic incentives. In this framework, the level of violence is dependent on popular support, which determines the population's willingness to actively fight or provide shelter and/or intelligence to insurgents. Our results indicate that such decisions as to whether to support the government or the insurgents are affected by the provision of public goods. On the other hand, the results are not consistent with theories that view insurgencies as driven by resource contestation or the opportunity cost of participating in an insurgency.

The paper is divided into eight sections: Section II reviews the relevant literature; Section III describes the independent variable and sample for the study; Section IV outlines the hypotheses for the study; Section V introduces the data sources; Section VI presents the methodology and results; Section VII discusses the results; and Section VIII concludes.

## **II. Relevant Literature**

The wars in Afghanistan and Iraq have increased interest in the study of counterinsurgency. Contributions to the growing body of literature have examined levels of mechanization (Lyall and Wilson, 2009), force strength (Friedman, 2010), violence (Lyall, 2009; Kalyvas, 2006), the role of ethnicity (Lyall, 2010), interaction of strategies between state and insurgents (Arreguin-Toft, 2001), government counterinsurgency campaigns (Lalwani, 2010), and foreign military assistance (Dube and Naidu, 2010). Findings suggest that force strength is not a decisive determinant of counterinsurgency outcomes and that mechanization has an adverse effect; that co-ethnics help more than external forces; and that foreign military assistance may strengthen insurgencies. Results diverge on whether the indiscriminate use of violence increases or decreases insurgent attacks.

Current theories of counterinsurgency have been strongly influenced by the U.S. Army's *Counterinsurgency Field Manual* (U.S. Army / Marine Corps, 2006). Informed by doctrines developed to address communist or anti-colonialist revolutions, the manual concludes that the effectiveness of counterinsurgencies are strongly influenced by the nature of interactions between the domestic government, foreign forces, and the civilian population. Specifically, foreign forces can bolster the authority of the government, which is seen as a legitimate actor that represents the well-being of the

state's population, but it is the government's provision of basic security and public goods that primarily determines the population's support for the insurgency (Kalyvas, 2008).

## **II.1. Theories of Civil Conflict**

There are two broad theoretical frameworks of civil conflict (Blattman and Miguel, 2010). The first framework views parties to the conflict as unitary actors, whereas the second looks at the incentives facing individual agents to support the different conflicting parties. The latter framework is the most relevant for the analysis of counterinsurgency, as it directly concerns the factors that affect the willingness of populations to support either the insurgents or the government. Within this framework, several theoretical models explore the micro-foundations of insurgency, each focusing on different sets of motivations for agents and thus providing different predictions on how development projects impact insurgent violence.

The "greed" theory of conflict (e.g. Collier and Hoeffler 1998, 2004; Grossman, 1999) asserts that insurgents are motivated by personal economic gain and seek to appropriate material resources controlled by the government. According to this approach, an increase in the amount of contested resources increases the risk of conflict, since it offers stronger incentives for the insurgents to fight. Thus, the greed theory predicts that an infusion of development projects would worsen violence by increasing the rewards for insurgents of attaining positions of authority.

The "bargaining model" approach (Fearon, 1995; Powell 2004, 2006) builds upon the greed theory by assuming that material gain is the primary motivation for insurgent activity, but contends that violence occurs only when conflicting parties fail to negotiate a peaceful division of resources. Thus, information asymmetries - caused by power shifts among conflicting parties and/or by changes in the value of contested resources - can provoke conflict. Development projects may affect both the balance of power and the value of contested resources and thus, according to the bargaining model, could increase violence. However, the effect is likely to be observed only in the short run while the conflicting parties seek to negotiate an agreement (Croft, Felter, and Johnston, 2011).

"Opportunity-cost" theories of conflict (e.g. Grossman, 1991; Fearon, 2008) also ascribe economic motivations to conflicting agents, but place emphasis on the costs, rather than the benefits, of participation in conflict. According to this approach, an increase in the income of the population raises the opportunity cost of participating in conflict. Development projects that reduce unemployment and increase the income of potential insurgents should thus reduce violence.

The “grievance” approach (Posen, 1993; Gurr 1994; Petersen, 2002) asserts that civil conflict is fueled primarily by a failure to peacefully resolve political grievances, ordinarily caused by ethnic or social cleavages that are held by a sub-section of the population. Economic factors can still have an important effect on insurgency by fueling these grievances, but only indirectly. Grievance theories predict that development projects should not affect violence in so far as they do not affect underlying social or ethnic tensions or contribute to the resolution of the resulting grievances.

Finally, the “hearts and minds” theory (Berman, Shapiro, and Felter, 2011) asserts that the level of violence is, in part, determined by general attitudes towards the government. Increased support for the government makes it more difficult for insurgents to recruit additional members, thereby tightening insurgents’ labor constraints (Condra et. al., 2010), while also making it easier for the government to gather intelligence, locate insurgents, and disrupt insurgent movements. These two effects reduce violence, but differ in timing, with the information-sharing effect almost immediately apparent, with the recruitment effect taking longer. Thus, according to the hearts and minds theory, development projects which increase support for the government can reduce violence.

## **II.2. Empirical Evidence**

Recent research has attempted to empirically test the aforementioned theories of conflict using data on ongoing insurgencies in Afghanistan, Iraq, and the Philippines.<sup>3</sup>

Berman, Felter, and Shapiro (2009) test the “opportunity cost” theory, examining the correlation between unemployment rates and insurgent attacks in Iraq and the Philippine. Contrary to the predictions of the theory, they observe a negative relationship between unemployment and attacks against the government and allied forces and no significant relationship between unemployment and attacks that result in civilian fatalities. On the other hand, Iyengar, Monten, and Hanson (2011)

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<sup>3</sup> A number of studies that draw on data from the Israeli-Palestinian conflict also provide relevant evidence though admittedly more linked to terrorism than insurgency. Berrebi and Klor (2008) and Gould and Klor (2010) find that terrorist attacks have a significant and long-lasting effect on the preferences of the Israeli electorate, whereas Jaeger et. al (2012) show that the effect of local Israeli violence has only a temporary effect on Palestinian civilian political preferences. Benmelech, Berrebi, and Klor (2012) show that high levels of unemployment enable terror organizations to recruit terrorists with higher human capital, leading to more important Israeli targets getting attacked.

provide evidence in favor of the opportunity cost theory by showing that labor-intensive reconstruction projects in Iraq reduced violence.<sup>4</sup>

Condra et al. (2010) provide evidence related to the “grievance” approach by analyzing the effect of civilian casualties on insurgent violence. They find that, in both Afghanistan and Iraq, civilian casualties led to increased insurgent violence. In Afghanistan, the effect occurs only in the long run, indicating that events that cause civilian casualties increase the number of willing combatants, which in turn reinforces insurgent strength. In Iraq, however, the effect is observed only in the short-run, which suggests that civilian casualty events reduce the willingness of the population to share information with the government, which in turn results in increased insurgent violence.

Berman, Shapiro, and Felter (2011) and Crost, Felter, and Johnston (2011) address how development projects affect insurgent violence in Iraq and the Philippines respectively. While Berman, Shapiro, and Felter (2011) provide support for the “hearts and minds” theory, Crost, Felter, and Johnston (2011) reinforce the conclusion of the “bargaining” model. The difference in the results of these two studies could be attributed to differences in the nature of the conflicts and/or the characteristics of the respective projects. While the war in Iraq is relatively recent, engulfing most of the country, and involving large numbers of foreign forces, the civil conflict in the Philippines is over four decades old, localized in nature, with involves only a limited number of foreign forces. The types of projects studied are also different, with those in Iraq consisting of small-scale projects implemented by U.S. forces, while those in the Philippines falling under the aegis of KALAHI-CIDSS, the biggest development program in the country, which is run by the government.

### **III. Description of the Experiment**

#### **III.1. National Solidarity Programme (NSP)**

NSP was devised in 2002 as a means to deliver services and infrastructure to the rural population and to build representative institutions for village governance. NSP has now been implemented in over 29,000 villages across 361 of Afghanistan’s 398 districts at a cost of over \$1 billion, making it the largest single development program in Afghanistan. The program is structured around two major

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<sup>4</sup> In the context of Columbia, Dube and Vargas (2011) examine the effect of variation in coffee and oil prices on violence and show that both “opportunity cost” and “greed”/“bargaining” are at work and which one of them dominates depends on the type of commodity.

interventions at the village level: (i) the creation of a Community Development Council (CDC); and (ii) the disbursement of block grants to support project implementation.<sup>5</sup>

In order to facilitate the creation of representative institutions for village governance, NSP mandates the creation of a gender-balanced CDC through a secret-ballot, universal suffrage election. Once CDCs are formed, NSP disburses block grants - valued at \$200 per household up to a village maximum of \$60,000 - to support the implementation of projects.<sup>6</sup> Projects are selected by the CDC in consultation with the village community.<sup>7</sup> Selected projects are ordinarily focused on the construction or rehabilitation of local infrastructure, such as drinking water facilities, irrigation canals, roads and bridges, or electrical generators, or human capital development, such as training and literacy courses. The program is implemented across districts by a contracted NGO, but is introduced to villages as a government program and all constructed projects have special signs that indicate that the projects were sponsored by the central government.

Although designed predominantly to improve development outcomes and build connections between villagers and the Afghan state, with the growth in the insurgency after 2007, journalists and some representatives of foreign governments and foreign forces became interested in the counterinsurgency potential of NSP and similar programs. A 2009 policy brief by the Center for a New American Security and co-authored by counterinsurgency expert, Dr. John A. Nagl, recommended continued U.S. funding for NSP as a means to improve security “by building an Afghan state through Afghan means” (Nagl, Exum and Humayun, 2009). A 2007 *Washington Monthly* article also trumpeted NSP-funded projects as “the schools the Taliban won’t torch” (Warner, 2007).

### III.2. Sample

The field experiment described in this paper was conducted as part of an impact evaluation of the second stage of NSP that, beginning in 2007, implemented the program in districts not covered

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<sup>5</sup> As NSP implements combines both of these interventions, we cannot isolate the effects of the elected institution versus those of the actual monetary resources and our work rather speaks to their joint effect. However, the variation in the design of the project allowed us to analyze the effect of the method of election of the community development councils on the characteristics of the people elected (Beath, Christia, and Enikolopov, 2011b) and on the effect of the method of project selection on the choice of projects (Beath, Christia, and Enikolopov, 2011a).

<sup>6</sup> The average block grant in the villages included in the sample was roughly \$30,000.

<sup>7</sup> The projects were selected either at a village meeting or through a secret-ballot referendum. The exact method of project selection was randomly assigned as part of a program evaluation. For the purposes of this study, however, we do not separate villages in different groups.

during the first stage of NSP in 2003 - 2006.<sup>8</sup> This evaluation enabled randomization of NSP across 500 villages spanning 10 rural districts that were sufficiently large to allow for a control group in addition to villages mobilized by the program; contained no villages that were previously mobilized by NSP; and possessed security conditions that would safeguard the well-being of enumerators involved in the administration of household surveys, per human subjects protocols.

Although not a random sample of districts in Afghanistan, these 10 districts are representative of the country's geographic, ethnic, and economic diversity and cover the western, central highlands, northern, north-eastern, and eastern regions of the country. Using the 2007–08 National Risk and Vulnerability Assessment (NRVA), it is possible to identify any differences between households sampled for the study and a randomly-selected stratified sample of the population of rural Afghanistan. Although there is no significant difference in the age of respondents or income, evaluation villages are more likely to be engaged in production activities related to agriculture, have slightly worse access to medical services and better access to electricity.<sup>9</sup> The magnitude of these differences, however, is quite small.

Importantly for this study, security conditions in the 10 districts are generally representative of those across Afghanistan, with the exception of the south. As shown in Figure 1, the rate of security incidents between January 2006 (a year and a half before the start of the study) and February 2010 (two years and a half after the start of study) are similar for the area around the evaluation villages and for all of Afghanistan excluding the south. Among the 10 districts, two districts in the eastern province of Nangarhar have significantly higher levels of violence and thus provide a basis for inference over the effects of NSP on the reduction of violence in already insecure regions. The other eight districts represent 'marginal' areas which may be at risk of increased violence. Collectively, the sample thus provides for the estimation of effects for areas which have already succumbed to the insurgency and for areas which are vulnerable.

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<sup>8</sup> Our evaluation assesses the effects of this bundled development treatment - both the creation of the elected gender balanced local institution and the allocation of funds - on an array of outcomes ranging from security to women's rights (Beath, Christia, Enikolopov 2012), economic wellbeing and access to services, governance, and state building. Preliminary results for this analysis in the form of a report are available in Beath et. al. (2010) with additional academic papers presently in progress. Results on security were not considered separately in the report since at that time the data on security incidents was not available.

<sup>9</sup> The differences are likely to be driven by the fact that the villages that are located closer to big cities and provincial centers received NSP between 2003 and 2007, i.e. before the start of the impact evaluation and, are thus, excluded from the analysis.

### III.3. Assignment of Treatment

In each of the 10 districts, 50 villages were selected to be included in the study,<sup>10</sup> 25 of which were then selected as treatment villages using a matched-pair randomization procedure, which also clustered proximate villages to limit potential for spillovers between treated and untreated units. These villages received NSP following the administration of a baseline survey in September 2007, with the remaining 250 control villages assigned to not receive NSP until early 2012. The procedure involved four stages:

1. *Village Clusters.* To minimize potential for spill-overs between treated and untreated units, villages located within one kilometer were grouped in village clusters. Of the 500 sample villages, 107 were assigned to 41 village clusters. The number of villages in each village cluster ranged from two to six.
2. *Matched Pairs.* In each district, the 50 sample villages were paired into 25 groups of two using an optimal greedy matching algorithm (King et. Al. 2007), which matched villages to ensure similarity of background characteristics provided that villages were not in the same cluster. The matching used data available before the baseline survey on characteristics such as village size and geographic variables (distance to river, distance to major road, altitude, and average slope).
3. *Assignment of Treatment.* In each matched pair, one village was randomly assigned to receive NSP, such that the clusters of villages were assigned the same treatment status.<sup>11</sup>
4. *Violations of Clustering Restrictions.* In a few districts, the large number of clustered villages precluded the co-assignment of all villages in the same cluster to the same treatment status. For cases in which assignment of treatment without a violation of the clustering restriction was not possible, the number of violations was minimized through a simulation approach.<sup>12</sup>

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<sup>10</sup> In each district, NGOs chose another 15 communities that received NSP and were not included in the experiment. These villages were usually the ones most easily accessible from the district center, which farther shifts the evaluation sample towards more remote villages.

<sup>11</sup> The assignment was performed after the baseline survey was conducted, but before the data was processed, so that the baseline survey results could not be affected by the assignment, but the results of the survey could not be used in matching.

<sup>12</sup> That is, we generated 1000 random assignments for each district and chose the one with minimum number of cluster restriction violations. In the resulting assignment the clustering restriction was violated in 17 village clusters (covering 44 villages).

As expected, the randomization procedure was successful in ensuring statistical balance between treatment and control groups. Table 1 below presents means, normalized differences,<sup>13</sup> and *t*-statistics for several important variables using baseline survey data. Among the variables listed, mean differences are always smaller than 13 percent of the standard deviation.

#### IV. Hypotheses

The main goal of this paper is to use the aforementioned identification strategy afforded by randomized evaluation of NSP to test the “hearts and minds” theory of counterinsurgency, which posits that development projects will increase economic welfare, improve attitudes to government, and reduce insurgent violence. The three hypotheses below formalize these predictions:

**Hypothesis 1:** Levels of economic well-being will be higher among people living in villages that have received a development project.

The “hearts and minds” theory focuses on attitude-driven behavior. Accordingly, subjective perceptions of one’s economic situation are as important as objective outcomes. To test this hypothesis, we look both at objective measures of economic well-being and at subjective perceptions, such as whether people report that their economic situation has improved in the past year and whether they expect it to improve in the future. The first hypothesis is consistent not only with the “hearts and minds” theory, but also with the “opportunity cost” theory, since an increase in income and in employment raises the cost of participation in the insurgency.

**Hypothesis 2:** Attitudes towards the government and allied entities will be more positive among people in villages that have received a development project.

This hypothesis asserts that economic benefits arising from development projects will improve attitudes toward the government. Since NSP is managed by the government of Afghanistan, but is funded by international donors and implemented by NGOs, we are also interested in the potential effect on levels of support for these other entities. The second hypothesis is important for distinguishing between different theories, since the “hearts and minds” approach is the only one that predicts that projects will result in an improvement in attitudes towards the government.

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<sup>13</sup> Per Imbens and Wooldridge (2009), normalized differences are differences divided by pooled standard errors.

**Hypothesis 3:** The security situation will be better in villages that have received a development program.

According to the “hearts and minds” theory, improved attitudes towards the government should decrease support for insurgents, which should in turn lead to a decrease in security incidents. Hypothesis 3 is also consistent with the “opportunity cost” theory, but is inconsistent with the “greed” theory and the “bargaining” theory, both of which predict that projects should increase insecurity, at least in the short run.

## **V. Data**

Data for the study come from three sources: a baseline survey, a follow-up survey, and events data on security incidents gathered by ISAF. The following sections provide further details on these data sources.

### **V.1. Baseline Survey**

Data from the baseline survey were collected during August and September 2007 and prior to the introduction of the development program in the 250 treatment villages. The survey consisted of four different instruments: (a) a male household questionnaire administered to ten randomly-selected male heads-of household in each village; (b) a male focus group questionnaire administered to a group of village leaders in each village; (c) a female focus group questionnaire administered to a group of important women who tended to overwhelmingly be wives or other relatives of the village leaders; and (d) a female individual questionnaire. In total, the survey covered 13,899 male and female villagers as well as village leaders across the 500 sample villages.

### **V.2. Follow-Up Survey**

Data from the follow-up survey were collected between May and October 2009. The follow-up survey was administered following CDC elections (which occurred between October 2007 and May 2008) and project selection (which occurred between November 2007 and August 2008), but before projects were completed.<sup>14</sup> The timing of the survey following project implementation but prior to the delivery of project benefits enables the isolation of effects of expectations. This is a particularly relevant distinction for the “hearts and minds” theory which is considered to be driven as much by a change in perceptions as by actual change.

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<sup>14</sup> By that time only 18 percent of the projects were fully completed.

The follow-up survey used many questions from the baseline survey, but changed the sample for the female individual questionnaire from female focus group participants to wives of male household respondents. Enumerators administering the male household questionnaire were instructed to locate and interview the same households and, whenever possible, the same villagers who participated in the baseline survey. Enumerators were able to successfully locate such respondents in 65 percent of households in which male respondents were interviewed during the baseline survey.<sup>15</sup>

Due to deterioration in security conditions, 26 villages (11 treatment and 15 control villages) could not be surveyed during the follow-up survey. Since attrition in the sample was related to security, it cannot be treated as random, despite not being related to treatment status. Thus, although the analysis based on the data from the follow-up survey provides internally valid estimates of the average treatment effect for villages that were secure enough to be surveyed, the results cannot be generalized to villages inaccessible due to security.

### **V.3. Security Incidents**

Data on security incidents come from the ISAF Combined Information Data Network Exchange (CIDNE) database which includes the date, time, location, and type of events as reported by ISAF soldiers and affiliates.<sup>16</sup> The data contain information on security incidents in the 10 districts between March 2003 and March 2010. There were 535 security incidents prior to the start of NSP mobilization in October 2007 and 688 incidents after. Almost all the incidents are caused by Improvised Explosive Devices (IED), with 45 percent of incidents being IED explosions and 53 percent being cases where an IED was found and cleared. Only two percent of incidents were related to mine strikes.

The data was used to construct dummy variables that indicate whether there was at least one security incident starting from October 2007 within a certain radius of a particular village. Given that IEDs are usually placed beside roads rather than in villages, incidents are assigned to villages based on varying distances ranging from one to 15 kilometers. To measure the level of violence before the start of the program and to separate between short-run and long-run effects, indicators were

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<sup>15</sup> The predominant reason for enumerators not being able to interview baseline respondents was that the person was away from home on the day that the survey team visited the village as it was the time of harvest. Differences between treatment and control groups in individual-level attrition are not statistically significant.

<sup>16</sup> In general, the data contains four categories for ISAF events and thirteen categories for Taliban events, but the data available to us contains information only on Taliban events with Improvised Explosive Devices and mine strikes, which account for most of the security incidents in the sample districts.

constructed separately for three time periods: between March 2003 and September 2007 (to measure the existing level of violence),<sup>17</sup> between October 2007 and December 2008 (which represents the short run given that project selection had been completed, but implementation has not yet started) and for the period between January 2009 and March 2010 (which represents the longer run, as project implementation has started, but in most cases not completed).

There is a notable difference in the levels of violence in the two eastern districts in Nangarhar province compared to the other eight districts in the sample. The share of villages in these two districts for which at least one security incident occurred within one, three or ten kilometers before the start of the program were 8, 20, and 50 percent respectively, while for the remaining districts, the respective shares were 0, 4 and 13 percent suggesting that the effects on those districts should be examined separately.

## VI. Results

All hypotheses are tested by regressing the measures relevant for each hypothesis on a treatment indicator variable using the following OLS model:

$$Y_{vi} = \alpha + \tau * T_v + \gamma * T_v * East_v + \varphi_p + \varepsilon_{vi} \quad (1)$$

where  $Y_{vi}$  is the outcome of interest for household  $i$  in village  $v$ ,  $T_v$  is the village treatment dummy (i.e. whether an NSP village or not),  $East_v$  is the dummy for villages from the two eastern districts,  $\varphi_p$  is the village-pair fixed effect, and  $\varepsilon_{vi}$  is the error term.

Following Bruhn and McKenzie (2009), we include village-pair fixed effects to account for the pairwise matching. Standard errors are clustered at the village cluster level to account for correlation between residuals within clusters of villages due to the non-independence of treatment assignment. Some indicators are constructed on the village level, rather than the individual level, so that the outcome is captured as  $Y_v$  rather than  $Y_{vi}$ .

To be able to draw general conclusions and to improve statistical power, in addition to individual measures, whenever we have multiple measures for the same concept, we also use a summary index

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<sup>17</sup> Results in Table 1 indicate that there is no difference in security between treatment and control villages before the start of the program.

similar to that of Kling, Leibman and Katz (2007). The summary index is defined to be the equally weighted average of z-scores of the individual measures.<sup>18</sup>

### **VI.1. Hypothesis 1**

To test Hypothesis 1, we examine the effects of NSP on objective and subjective measures of economic well-being. Objective measures are captured by annual household income and consumption; whether the household head is unemployed or involved in subsistence agriculture; and net migration rates. Subjective measures are captured by the proportion of respondents who report that the economic situation of the household has improved in the past year and by the proportion who report that the economic situation of the village will improve in the forthcoming year.

Results in Panel A in **Table 2** show that the general average treatment effect on household income, consumption, and unemployment is not statistically significant, whereas involvement in subsistence agriculture is lower in treatment villages by 3 percent. The effect in the two eastern districts is significantly higher for income, which increases by 9 percentage points, and for unemployment, which decreases by 2 percentage points. The effect of NSP in the two eastern districts on consumption and on the share of villagers involved in subsistence agriculture and husbandry is not statistically different from the average treatment effect. Results in Panel C of **Table 2** indicate that the average effect on net migration is not statistically significant in non-eastern districts, but is significant in the two eastern districts, with average net migration higher by almost 19 families per year as compared to control villages.

As results in Panel B in **Table 2** show, NSP has a strong positive effect on subjective economic outcomes. Both male and female respondents in villages receiving NSP are more likely to report that their economic situation has improved from last year and are more likely to indicate that they expect the economic situation in the village to improve in the next year. For all measures, the proportion of respondents that perceive their economic situation positively is approximately 5 percentage points higher in villages receiving NSP, which corresponds to an increase of 11 to 18 percent depending on the measure. In the two eastern districts, the results are generally the same.

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<sup>18</sup> The z-scores are calculated by subtracting the control group mean from the treatment groups mean, and dividing by the control group standard deviation. Thus, each component of the index has a mean equal to 0 and a standard deviation equal to 1 for the control group.

Overall, NSP has a positive effect on villagers' perceptions of their economic situation and, in the two eastern districts, also a strong effect on objective measures such as income and unemployment. Thus, the results provide support for Hypothesis 1.

## **VI.2. Hypothesis 2**

Hypothesis 2 is tested by estimating the effects of NSP on villagers' attitudes toward different government bodies and allied entities. Results in

**Table 3** indicate that NSP improves attitudes to government figures at almost all levels, including district and provincial governors, central government officials, the President of Afghanistan, Members of Parliament, and government judges. Magnitudes of these effects vary from between 8 percentage points for Members of Parliament to 4 percentage points for the national police. There is also a positive effect of NSP on the attitudes of villagers toward NGOs and ISAF soldiers. The results for the summary measure indicate that NSP improves villagers' attitudes by 13 percent of a standard deviation. Results for the two eastern districts, however, are completely different. There is no positive effect of NSP on attitudes toward any government bodies, ISAF soldiers, or NGOs, and the effect on attitudes towards the president and the police is significantly negative.

Overall, NSP improves attitudes to government and allied entities. This provides strong support for Hypothesis 2. However, the positive effects on attitudes are not observed in areas with high levels of initial violence, with villages receiving NSP in the eastern districts reporting significantly lower approval of the President and of police.

### **VI.3. Hypothesis 3**

Hypothesis 3 is tested using data from the follow-up survey on male and female villagers' security perceptions and data on security incidents from villager surveys and from ISAF data. A summary index is also used here to estimate the aggregate effect of NSP on perceptions of security.

As reported in **Table 4**, NSP improves villagers' perceptions of security. The proportion of male respondents in NSP villages who report an improvement in the security situation in the past two years is 6 percentage points higher, whereas the proportion of respondents who think that security has deteriorated is 3 percentage points lower.<sup>19</sup> Among females, the proportion of female respondents who think that women and girls feel safer compared to two years ago is higher in NSP villages by 5 and 4 percentage points respectively, while the number of respondents who think that women and girls feel less safe is lower in NSP villages by 4 percentage points in both cases. The summary measure indicates that NSP improves villagers' perception of the security situation by 10

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<sup>19</sup> Note that the three pairs of questions on improvement / deterioration of the security situation are not independent, since each pair is based on one question on the changes in the situation with three possible answers – the situation has improved, the situation have not changed, and the situation has deteriorated. We construct two dummy variables for improvement / deterioration of the security situation based on these questions to provide a meaningful comparison of the averages between the treatment and control villages. Since the measures are not independent we do not combine them using summary indices.

percent of a standard deviation. The average treatment effect of NSP on the perception of security in the two eastern districts is not statistically significant from those in the other eight districts.

Despite a strong positive effect of NSP on perceptions of security, the program has no significant effect on security incidents in or around villages as reported by villagers (

**Table 5**). In both treatment and control villages, approximately 3 percent of respondents indicate that their village experienced an attack in the past year and that they themselves were affected by insecurity in the village or on roads around the district. In the two eastern districts, the results are similar.

Objective measures of security, which are not affected by the usual concerns with the survey data (Bertrand and Mullainathan, 2001), are provided by the ISAF dataset. Figure 2 presents estimates of the effect of NSP on these incidents.<sup>20</sup> The results indicate that, in non-eastern districts, NSP reduces the probability of security incidents both in the short-run and in the long-run, but the effect is stronger in the long-run. In the short-run the effect is significant at the 10 percent level for 4 km., 7 km., and 8 km. radii and is the strongest for the 8 km. radius, for which it corresponds to a decrease of 4 percentage points in the probability of a security incident. In the long-run, the effect is significant at 10 percent for radii between 7 km. and 11 km., with effects being significant at 5 percent for 1 km. and 8 km. radii. The effect is the strongest for the 9 km. radius, which it is significant at 1 percent level. In the eastern districts, where the initial levels of violence are high, there is no statistically significant effect on security for any of the radii either in the short run or in the long run.

Overall, there is strong evidence that perceptions of security are better in villages receiving NSP. Although there is no effect of NSP on incidents reported by survey respondents, the number of incidents recorded by ISAF is lower around treatment villages both in the short run and in the long, with a stronger effect in the long run. Thus, the results provide support for Hypothesis 3. The positive effect of the program on security, however, is not observed in the two eastern districts, which are characterized by high levels of initial violence.

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<sup>20</sup> The corresponding regression results are presented in Table A3 in the Online Appendix. We use a dummy variable for the occurrence of an incident as a dependent variable to limit the effect of potential outliers. The results hold if we use the number of incidents as an outcome variable (see Table A4 in the Online Appendix).

#### **VI.4. Robustness of Results**

To check the robustness of results, we include baseline responses to the same (or closely related) questions from the baseline as additional controls to make sure that the results are not driven by imbalances in the starting conditions between treatment and control villages. The results prove to be robust to such controls, although a small number of results lose their significance when individual-level controls are added due to the reduction in the sample size caused by individual-level attrition.

An important characteristic of the two eastern districts is that they are predominantly Pashtun. To check whether the difference in the results for the eastern districts is driven by their ethnic composition, rather than the level of violence, we also examine whether the effect is different in the other two predominantly Pashtun districts in our sample (Balkh and Farsi). The results indicate that there is only a small difference in the effect of the program in Pashtun regions as compared with other districts, suggesting that the divergence of results in the eastern districts are driven by insecurity and/or regional specificity.

#### **VI.V. Heterogeneity of Results**

To examine whether the above effects are affected by progress in implementing projects, we use data from NGOs indicating rates of project completion at the time of the follow-up survey. This data is used to construct a dummy variable which assumes a value of one for the 113 treatment villages in which at least one project was at least 80 percent complete. Estimates of interaction effects between this variable and the treatment effect indicate that for, almost all measures, the effect is stronger in villages that made more progress in project completion.

We also explore potential heterogeneity of effects on economic outcomes and attitudes at the individual level. In particular, we examine whether the effects are driven by respondents' age, education, land ownership, unemployment status or their involvement in subsistence agriculture. The results indicate that the effect of the program is smaller for older respondents, who are more likely to be skeptical of development interventions as they have lived through over three decades of war but also less likely to be themselves actively involved or recruited in the insurgency. However, there is no evidence that any other individual characteristics that we consider have a consistent effect on the effect of the program.

## VII. Discussion of Results

Overall, the results lend support to the “hearts and minds” theory. The presence of a government-sponsored development project in a village positively impacts subjective measures of economic well-being, improves attitudes towards the government and allied entities, and has a positive effect on how both men and women perceive local security. Projects also appear to reduce the number of incidents around villages, an effect which is more pronounced in the long run.<sup>21</sup>

The positive effect of the program on economic and security outcomes is consistent not only with the “hearts and minds” theory, but also with an “opportunity cost” interpretation, although the latter does not predict changes in attitudes toward the government. The results are not consistent with the “grievance” explanation, which would predict no effect on attitudes and security, since NSP does not alter fundamental social or ethnic conflicts in Afghan society. The results are also not consistent with the “greed” or “bargaining” models, both of which predict an increase in violence.

Interestingly, the positive effect on perceptions of economic well-being is not observed in the eastern districts, despite actual changes in objective measures such as household income and unemployment. Similarly, in those two districts, there are no positive effects on attitudes to the government or on security perceptions or actual security incidents. NSP’s effect on attitudes towards the President and national police is actually negative, which suggests - as the president and national police bear most of the responsibility for the security situation - that provision of small-scale infrastructure while simultaneously failing to provide security may backfire, triggering dissatisfaction with the government.

These results are not entirely inconsistent with the “opportunity cost” theory, which predicts that economic improvement should decrease violence. In relatively secure regions, the population is primarily concerned with economic conditions, so that government attempts to improve their material wellbeing are likely to have a strong effect on people’s attitudes toward the government. In regions with high levels of violence, however, security is likely to be the primary concern, so that marginal improvements in economic outcomes will be insufficient to change people’s attitudes toward the government. More broadly, the hierarchy of needs beginning with security as identified

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<sup>21</sup> The fact that we observe no changes on objective measures of economic well being such as household income, consumption and unemployment, is also consistent with the paradigm—and our expectations—since the projects are still getting implemented and are not yet delivering any goods, and no money is being paid to individuals for their labor which is rather a part of the program’s mandated community contribution.

by Maslow (1962) is confirmed in the counterinsurgency context, as is the Weberian notion of a state ensuring monopoly over the means of violence as a prerequisite for the provision of service delivery to become effective.

Thus, these results suggest that development programs are more effective in preventing the spread of violence, rather than in reducing the level of violence. These results are consistent with findings in Berman, Shapiro, and Felter (2011) that development programs in Iraq improved security only after a significant increase in the number of troops in 2007 that ensured a relative level of security. They are also consistent with the general counterinsurgency paradigm of “Clear, Hold, Build” which suggests that areas first have to be cleared from insurgency activity (*clear*) and attain a certain threshold of security (*hold*) before development aid can go in (*build*).

The fact that a reduction in violence occurs mainly in the long run suggests that, in Afghanistan, the level of violence is affected more by people’s willingness to join the insurgency, than by their willingness to share information, which is consistent with findings in Condra et. al. (2010). Unfortunately, we do not have data on whether the villagers actually provide information to counterinsurgency forces, nor do we have the data on who is joining the insurgency. Accordingly, we do not have direct evidence on the mechanisms that link increased government support with a reduction in violence, although indirect evidence suggests that the willingness to join the insurgency plays an important role in Afghanistan.

An important methodological issue on the effect on security incidents pertains to externalities in insurgent violence between villages. An increase in government support in a particular village is likely to reduce violence not only near the village itself, but also in neighboring villages.<sup>22</sup> This is especially true if the project reduces the number of people willing to join the insurgency, since new insurgents do not necessarily operate close to their home village. Such positive spillovers from treatment to control villages will reduce the estimated effect of program violence. The clustering of neighboring villages, which was aimed at reducing such inter-village spillovers, might not be enough to address this issue as long as these positive externalities on security are sufficiently strong. In this case, a single village might not be the proper unit of analysis, and we should be comparing bigger geographical units, such as districts. Unfortunately, we cannot perform such an analysis in the

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<sup>22</sup> Note, however, that the opposite effect can also take place. A decrease in violence in villages that have received development program can increase the violence in the neighboring villages if insurgents move their operations near those places that are more supportive to them.

context of this field experiment, since the choice of the district could not be randomized. However since this problem induces a downward bias in our estimates, it ensures that our estimated treatment effects are conservative, under-estimates.

In generalizing the results, it is important to note that although southern districts were not included in the sample, the results observed in the relatively violent eastern districts are potentially indicative of effects in the even more violent south. It is also important to bear in mind that NSP, although funded by international donors, is executed by the Afghan government and that villages receiving the program are informed that NSP is sponsored by the central government.<sup>23</sup> Thus, the results presented herein cannot be easily extended to projects delivered by foreign military forces (e.g. CERP in Iraq or Afghanistan), which may be perceived differently by the local population and thus have different effects on attitudes to government.

## **VIII. Conclusion**

In this paper we analyze the effect of the National Solidarity Program (NSP) - the largest development program in Afghanistan - on counterinsurgency outcomes. In particular, we test the strategy of “winning hearts and minds” by looking at the effect of the program on economic welfare, attitudes to government, and security. Random assignment of the development program across 500 villages allows us to estimate causal effects. Our results indicate that NSP has a significant positive effect on economic well-being and attitudes toward all levels of government, NGOs, and possibly also to foreign forces. We also identify a positive effect on violence in the long run, although only in regions with moderate levels of violence. In areas with heightened levels of violence, however, no effect on attitudes toward government or security is observed, despite a stronger positive effect on economic outcomes.

Overall, the findings provide general support for the strategy of winning “hearts and minds” through development projects. The provision of projects appears to make non-combatants more inclined to view government actors as working in their best interest, which in turn seems to make them less likely to support the insurgency. That the effect on violent incidents is apparent only in the long run suggests that the effect comes mainly through reducing the number of people willing to

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<sup>23</sup> Results of the follow-up survey indicate that more than 70 percent of respondent indicate central government as the sponsor of the projects, about 22 percent indicating that they are provided by NGOs and about 2 percent of villagers indicating that they are provided by either sub-national governments, local leaders, foreigners or villagers themselves.

join the insurgency, rather than by increasing the population's willingness to share information with the government. The results, however, indicate that development projects can prevent the spread of violence in relatively secure regions, but they are not effective in reducing violence in regions already experiencing significant security problems. Finally, the results are particularly important in demonstrating that the benefits of development projects are not limited to the provision of direct economic and social benefits, but can also contribute to preventing the spread of violent civil conflicts.

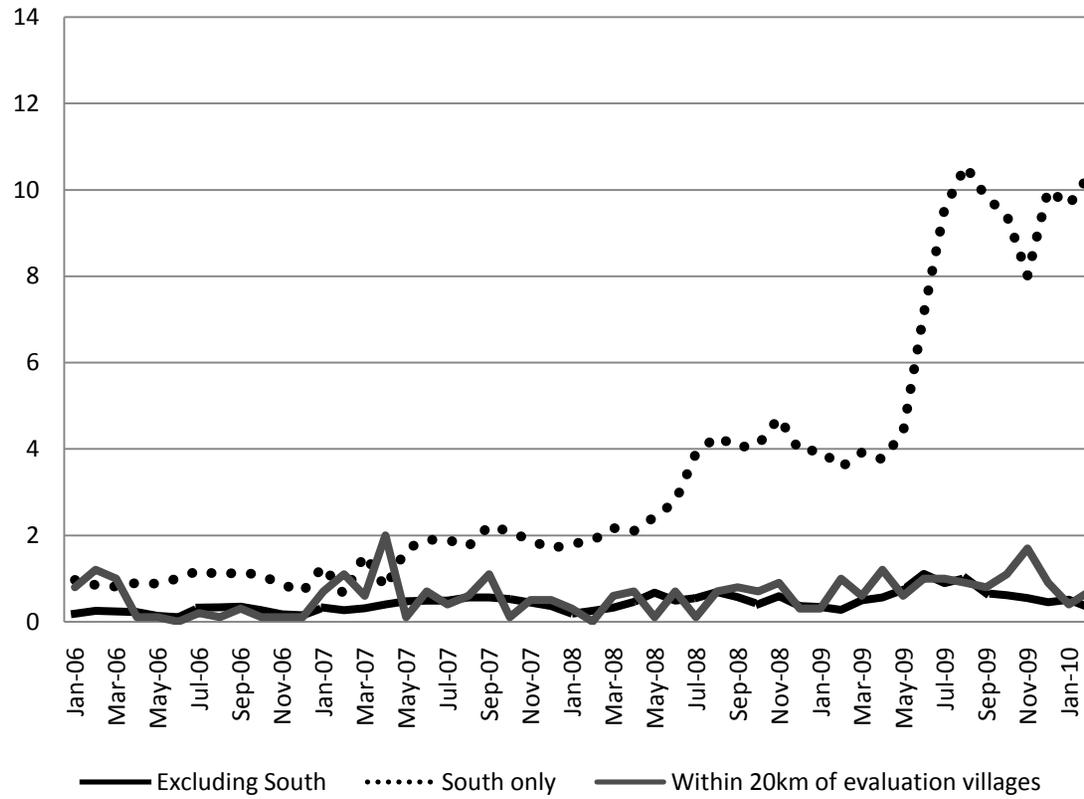
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**Figure 1 - Average Number of Incidents per District**



*Notes:* The southern region includes the provinces of Helmand, Kandahar, Uruzgan, Zabol, Nimruz, and Daykundi.

**Table 1 - Statistical Balance between Treatment and Control Groups**

| Variable  | Mean Level in Control Group | Mean Level in Treatment Group | Normalized Difference | t-Statistics |
|---|-----------------------------|-------------------------------|-----------------------|--------------|
| Number of Households in Village   | 103.02                      | 109.76                        | 0.07                  | 0.76         |
| Number of People in Household   | 9.87                        | 9.76                          | - 0.02                | - 0.42       |
| Age of Respondent   | 43.30                       | 43.80                         | 0.04                  | 1.10         |
| Respondent Speaks Dari as Mother Tongue                                     | 0.69                        | 0.70                          | 0.04                  | 0.45         |
| Respondent Received no Formal Education                                     | 0.71                        | 0.71                          | 0.01                  | 0.18         |
| Household Has Access to Electricity   | 0.13                        | 0.15                          | 0.04                  | 0.59         |
| Male Health Worker is Available to Treat Villagers                          | 0.10                        | 0.13                          | 0.12                  | 1.32         |
| Female Health Worker is Available to Treat Villagers                        | 0.08                        | 0.10                          | 0.10                  | 1.07         |
| Main Source of Drinking Water is Unprotected Spring                         | 0.27                        | 0.27                          | - 0.00                | - 0.02       |
| Dispute among Villagers Occurred in Past Year                               | 0.37                        | 0.36                          | - 0.03                | - 0.36       |
| No Problems are Experienced in Meeting Household Food Needs                 | 0.45                        | 0.45                          | 0.02                  | 0.38         |
| Household Borrowed Money in Past Year                                       | 0.48                        | 0.47                          | - 0.02                | -0.36        |
| Respondent Reports Attending Meeting of Village Council in Past Year        | 0.30                        | 0.31                          | 0.03                  | 0.59         |
| Expenditures on Weddings in Past Year ( <i>Afghanis</i> )                   | 11,676                      | 10,380                        | - 0.03                | - 0.73       |
| Expenditures on Food in Past Month ( <i>Afghanis</i> )                      | 3,644                       | 3,566                         | - 0.04                | - 0.68       |
| Respondent Believes that Women Should be Members of Council                 | 0.41                        | 0.43                          | 0.05                  | 0.92         |
| Views of Women are not Considered in Resolving Disputes                     | 0.51                        | 0.48                          | - 0.06                | - 1.64       |
| Assets  | 0.00                        | -0.01                         | - 0.02                | - 0.52       |
| Natural Log of Income   | 8.67                        | 8.63                          | - 0.07                | - 1.15       |
| Security incident within 1 km of the village between 2004 and start of NSP  | 0.02                        | 0.02                          | 0.00                  | 0.00         |
| Security incident within 5 km of the village between 2004 and start of NSP  | 0.14                        | 0.12                          | -0.06                 | -0.66        |
| Security incident within 10 km of the village between 2004 and start of NSP | 0.20                        | 0.21                          | 0.03                  | 0.33         |

**Table 2 - Economic Outcomes**

| Variable   | Mean in Control | Treatment Effect | Standard Error | Eastern District* Treatment Effect | Standard error | N     | R <sup>2</sup> |
|--|-----------------|------------------|----------------|------------------------------------|----------------|-------|----------------|
| <b>A. Income, Consumption, and Employment</b>                            |                 |                  |                |                                    |                |       |                |
| Ln(Annual Household Income)  | 7.077           | 0.027            | [0.020]        | 0.061**                            | [0.029]        | 4,578 | 0.15           |
| Ln(Annual Household Consumption)   | 7.509           | 0.004            | [0.019]        | 0.030                              | [0.034]        | 4,315 | 0.22           |
| Respondent is Unemployed   | 0.065           | 0.005            | [0.007]        | -0.024**                           | [0.011]        | 4,621 | 0.08           |
| Respondent is Employed in Subsistence Agriculture and Husbandry          | 0.554           | -0.032**         | [0.014]        | 0.025                              | [0.038]        | 4,621 | 0.16           |
| Summary Index  | -0.002          | 0.026**          | [0.013]        | 0.011                              | [0.025]        | 4,665 | 0.18           |
| <b>B. Perceptions of Economic Situation by Male Respondents</b>          |                 |                  |                |                                    |                |       |                |
| Respondent Perceives Household's Situation Has Improved in the Past Year | 0.406           | 0.044***         | [0.014]        | 0.016                              | [0.032]        | 4,662 | 0.21           |
| Respondent Expects Economic Welfare of Villagers to Improve Next Year    | 0.302           | 0.053***         | [0.013]        | -0.006                             | [0.029]        | 4,633 | 0.11           |
| <b>C. Perceptions of Economic Situation by Female Respondents</b>        |                 |                  |                |                                    |                |       |                |
| Respondent Perceives Household's Situation Has Improved in the Past Year | 0.287           | 0.044***         | [0.016]        | 0.079***                           | [0.027]        | 4,227 | 0.23           |
| Respondent Expects Economic Welfare of Villagers to Improve Next Year    | 0.377           | 0.042***         | [0.016]        | 0.024                              | [0.036]        | 4,213 | 0.18           |
| <b>D. Migration</b>  |                 |                  |                |                                    |                |       |                |
| Net Number of Families Migrating to the Village                          | 4.805           | 1.055            | [1.528]        | 19.355*                            | [10.915]       | 460   | 0.68           |

Treatment effect is estimated in the regression, which includes a constant, a dummy variable for villages that have been assigned to the treatment group and fixed effects for the matched pairs. Measures of income, consumption and migration are winsorized at 1 percent and 99 percent level. Robust standard errors adjusted for clustering at the village-cluster level in brackets. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Table 3 - Perceptions of Government, Civil Society, and ISAF Soldiers**

| Variable  | Mean in Control | Treatment Effect | Standard error | Eastern District* Treatment Effect | Standard Error | N     | R <sup>2</sup> |
|---|-----------------|------------------|----------------|------------------------------------|----------------|-------|----------------|
| District Governor Acts For the Benefit of All Villagers           | 0.654           | 0.061***         | [0.014]        | -0.018                             | [0.046]        | 4,414 | 0.28           |
| Provincial Governor Acts For the Benefit of All Villagers         | 0.707           | 0.077***         | [0.014]        | -0.115***                          | [0.038]        | 4,148 | 0.26           |
| Central Government Officials Act For the Benefit of All Villagers | 0.688           | 0.061***         | [0.015]        | -0.080**                           | [0.036]        | 4,256 | 0.22           |
| President of Afghanistan Act For the Benefit of All Villagers     | 0.801           | 0.057***         | [0.012]        | -0.097***                          | [0.023]        | 4,490 | 0.22           |
| Members of Parliament Act For the Benefit of All Villagers        | 0.557           | 0.079***         | [0.014]        | -0.099***                          | [0.036]        | 4,409 | 0.24           |
| Government Judges Act For the Benefit of All Villagers            | 0.512           | 0.063***         | [0.017]        | -0.067*                            | [0.040]        | 4,491 | 0.20           |
| National Police Act For the Benefit of All Villagers              | 0.725           | 0.038***         | [0.014]        | -0.129***                          | [0.035]        | 4,556 | 0.22           |
| NGO Employees Act For the Benefit of All Villagers                | 0.684           | 0.063***         | [0.014]        | -0.096***                          | [0.037]        | 4,472 | 0.17           |
| ISAF Soldiers Act For the Benefit of All Villagers                | 0.289           | 0.042**          | [0.016]        | -0.030                             | [0.023]        | 4,062 | 0.18           |
| Summary Measure   | -0.004          | 0.128***         | [0.022]        | -0.177***                          | [0.049]        | 4,660 | 0.28           |

Treatment effect is estimated in the regression, which includes a constant, a dummy variable for villages that have been assigned to the treatment group and fixed effects for the matched pairs. All the measures are based on the responses of male villagers. Robust standard errors adjusted for clustering at the village-cluster level in brackets. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Table 4 - Perceptions of Security**

| Variable   | Mean in Control | Treatment Effect | Standard Error | Eastern District* Treatment Effect | Standard Error | N     | R <sup>2</sup> |
|--|-----------------|------------------|----------------|------------------------------------|----------------|-------|----------------|
| <b>A. Security Perception by Male Respondents</b>  |                 |                  |                |                                    |                |       |                |
| Respondent Believes Security In and Around Village Has Improved in Past Two Years  | 0.655           | 0.058***         | [0.015]        | -0.042                             | [0.032]        | 4,661 | 0.28           |
| Respondent Believes Security In and Around Village Has Deteriorated in Past Two Years  | 0.121           | -0.026**         | [0.010]        | 0.041*                             | [0.021]        | 4,661 | 0.22           |
| Summary Measure  | -0.028          | 0.099***         | [0.027]        | -0.106**                           | [0.051]        | 4,661 | 0.29           |
| <b>B. Security Perception by Female Respondents</b>  |                 |                  |                |                                    |                |       |                |
| Respondent Believes that compared to two years ago women feel more safe in working for NGOs or the government or attending training courses            | 0.292           | 0.049***         | [0.018]        | -0.054                             | [0.038]        | 4,063 | 0.29           |
| Respondent Believes that compared to two years ago women feel less safe in working for NGOs or the government or attending training courses            | 0.171           | -0.039**         | [0.016]        | 0.013                              | [0.032]        | 4,063 | 0.32           |
| Respondent Believes that compared to two years ago teenage girls feel more safe when traveling to and from school or when socializing with other girls | 0.294           | 0.044**          | [0.018]        | -0.069                             | [0.043]        | 4,020 | 0.27           |
| Respondent Believes that compared to two years ago teenage girls feel less safe when traveling to and from school or when socializing with other girls | 0.213           | -0.037**         | [0.017]        | 0.009                              | [0.055]        | 4,020 | 0.31           |
| Summary Measure  | 0.003           | 0.098***         | [0.034]        | -0.084                             | [0.059]        | 4,102 | 0.29           |

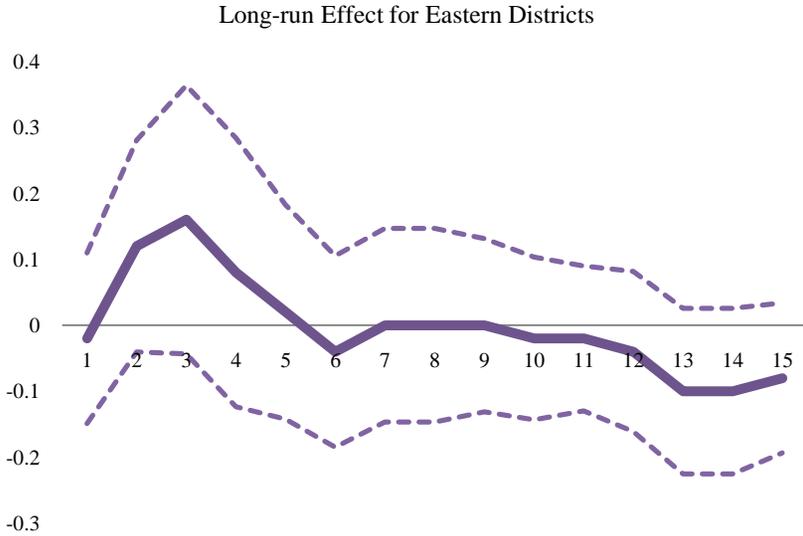
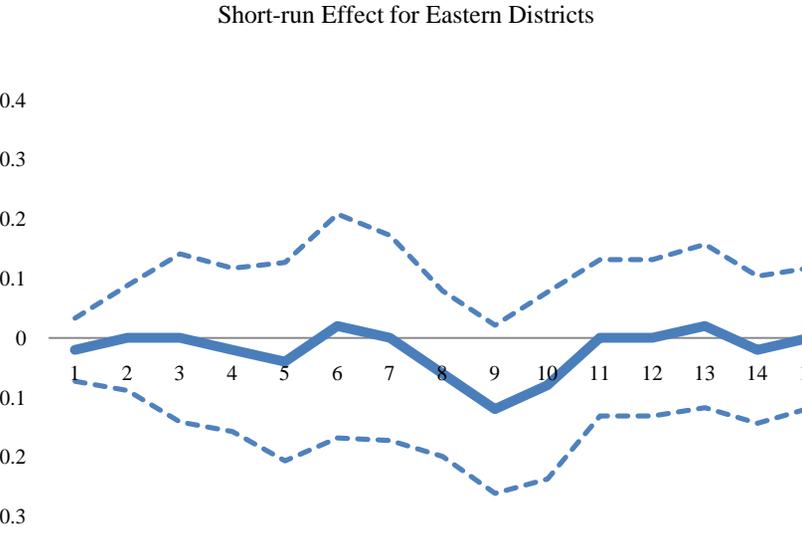
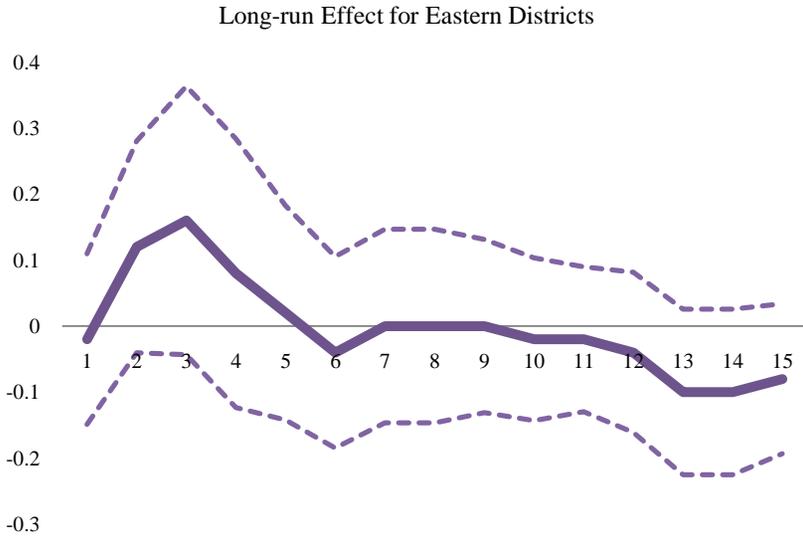
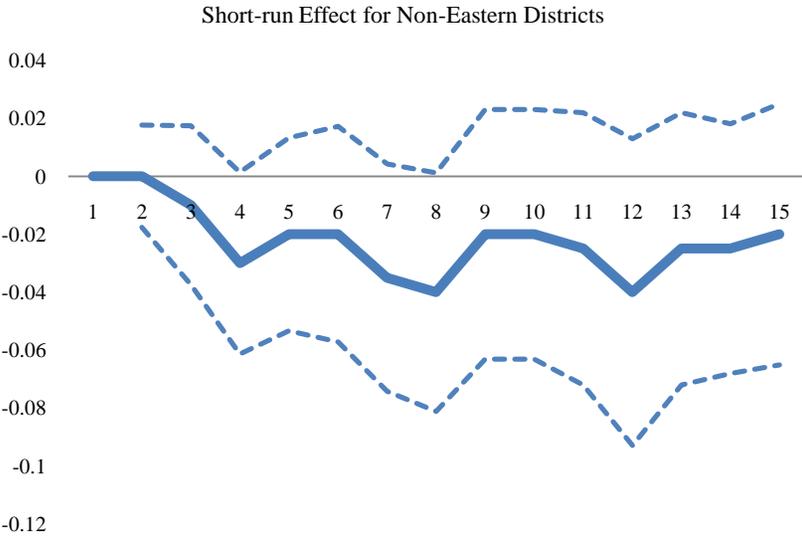
Treatment effect is estimated in the regression, which includes a constant, a dummy variable for villages that have been assigned to the treatment group and fixed effects for the matched pairs. Robust standard errors adjusted for clustering at the village-cluster level in brackets. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Table 5: Survey-Based Measures of Security Incidents**

| Variable  | Mean in Control | Treatment Effect | Standard error | Eastern District* Treatment Effect | Standard Error | N     | R <sup>2</sup> |
|---|-----------------|------------------|----------------|------------------------------------|----------------|-------|----------------|
| Village Has Experienced Attack in Past 12 Months                                    | 0.035           | -0.003           | [0.009]        | -0.007                             | [0.016]        | 4,661 | 0.33           |
| Village Has Experienced Attack by Anti-Government Elements in Past Year             | 0.029           | -0.003           | [0.008]        | -0.008                             | [0.015]        | 4,664 | 0.34           |
| Household Has Been Affected by Insecurity in Village During Past Year               | 0.019           | 0.003            | [0.006]        | -0.003                             | [0.006]        | 4,660 | 0.27           |
| Household Has Been Affected by Insecurity on Roads Around District During Past Year | 0.026           | 0.003            | [0.005]        | -0.003                             | [0.005]        | 4,660 | 0.12           |
| Summary Measure   | 0.002           | -0.003           | [0.033]        | 0.032                              | [0.045]        | 4,666 | 0.34           |

Notes: Treatment effect is estimated in the regression, which includes a constant, a dummy variable for villages that have been assigned to the treatment group and fixed effects for the matched pairs. Short-run effects are estimated using data between the start of the program in October 2007 and January 2009. Long-run effects are estimated using data between January 2009 and March 2010. Robust standard errors adjusted for clustering at the village-cluster level in brackets. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Figure 2. Treatment Effect for the Probability of Security Incidents for Different Radii around Villages**



Notes: The figures plot estimated treatment effects (along with 5% confidence interval) for the probability of having a security incident within a certain radius of a village, where the radius changes from 1km to 15km.