

Winning Hearts and Minds through Development: Evidence from a Field Experiment in Afghanistan¹

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Abstract:

Development programs have been increasingly used not only as an instrument for economic and political development, but also as a tool for counter-insurgency. Using a large-scale randomized field experiment in Afghanistan, we explore whether the inclusion of villages in the country's largest development program alters perceptions of well-being, attitudes towards the government, and levels of security in surrounding areas. We find that the program has a positive effect on all three measures in relatively secure regions, but no effect on attitudes and security in areas with high levels of initial violence, suggesting that a certain minimum threshold of security has to be in place for the provision of goods and services to have an effect on improving attitudes towards the government and reducing violence.

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I. Introduction

Development programs have long been used to promote economic and political development. In recent years, however, they have assumed yet another role: they have been used to promote security in countries fighting raging insurgencies, such as Afghanistan and Iraq. The approach contends that such projects - which are commonly implemented by the domestic government and their allies and which provide basic services and infrastructure to the population - 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 on-going use 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 counter-insurgency outcomes. We find that villagers residing in communities that have received the program 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 that have received NSP are 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). Civil conflicts result not only in loss of lives and physical destruction, but have also led to significant decline in investment in physical (Collier, 1999) and human (Sánchez, 2010) capital. The role of violent conflicts in underdevelopment was most recently acknowledged in the 2011 World Development Report that was fully devoted to security issues. Development programs that help prevent or at least ameliorate civil conflicts are therefore considered to have a major effect on improving people's lives that goes far beyond the provision of basic services. Insurgencies are a specific 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 specific region or territory (Iyengar

and Monten, 2008).² Counter-insurgency, 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 and the attendant levels of violence depend primarily on its level of popular support, since such support determines the ease by which insurgents can recruit additional members and the degree to which the population is willing to share intelligence with government agents. Development projects can form part of a counter-insurgency strategy if they are successful in increasing support for the government and weakening support for insurgents in the affected area. The effectiveness of this approach will depend on projects delivering perceptible benefits to the concerned population and the population assigning credit to the government for delivering those benefits.

One of the main challenges in identifying the impact of development projects on counter-insurgency 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 aid 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 as well as individual perceptions and attitudes. This allows us to test the specific mechanisms through which development programs affect the underlying security situation.

² 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).

We find that development aid program improves villagers' perceptions of economic well-being and attitudes towards central and sub-national government, NGOs and foreign military forces. It also improves villagers' perceptions of the local security situation and causes a reduction in the number of security incidents recorded by the International Security Assistance Force (ISAF) one 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 household surveys.

In areas facing high levels of violence, we observe no effects of development aid on attitudes towards the government or on security incidents, despite positive effects on perceptions of economic well-being. These results indicate that, in areas where attitudes towards the government are unfavorable either due to government failure to ensure security or to broad-based support for the insurgency, even development aid that delivers perceptible benefits proves insufficient in swaying attitudes towards the government or in curtailing insurgency. The results collectively indicate that projects can prevent the spread of insurgency in areas with low levels of initial violence, but are ineffective in containing insurgencies in areas afflicted by already high levels of violence.

The findings generally support theories of civil conflict that analyze insurgencies as the product of interactions among rational actors that respond to economic incentives. In this framework, the level of violence is dependent on popular support for the insurgency, which determines the population's willingness to join the insurgency and share information with government agents and/or members of the insurgency. Our results indicate that such decisions are affected by the provision of public goods, but are not consistent with theories that focus on the amount of material resources for capture as the main determinant of violence while only being partially consistent with the opportunity cost theory of conflict that emphasizes the costs of joining the insurgency as the main determinant of violence.

The paper is divided into eight sections: Section II reviews the relevant literature; Section III describes the experiment; Section IV outlines the hypotheses; 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 counter-insurgency. Contributions to the growing body of literature have examined levels of mechanization (Lyll and Wilson, 2009), force strength (Friedman, 2010), violence (Lyll, 2009; Kalyvas, 2006), the role of ethnicity (Lyll, 2010), interaction of strategies between state and insurgents (Arreguin-Toft, 2001), government counter-insurgency campaigns (Lalwani, 2010), and foreign military assistance (Dube and Naidu, 2010). Findings suggest that force strength is not a decisive determinant of counter-insurgency outcomes and that mechanization has an adverse affect; that co-ethnics help more than external forces; and that foreign military assistance may strengthen insurgent elements. Results diverge on whether the indiscriminate use of violence increases or decreases insurgent attacks.

Current discussions of counter-insurgency 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 counter-insurgencies 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 is a key determinant in popular 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 counter-insurgency, 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 motivations of agents and thus making 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 potential rewards for insurgents from 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 agents at war, 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 the fight. 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 the attitudes of the general population toward 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, while the recruitment effect takes longer to kick in. 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 with respect to on-going insurgencies in Afghanistan, Iraq, Columbia and the Philippines.³

Berman, Felter, and Shapiro (2009) test the “opportunity cost” theory, examining the correlation between unemployment rates and insurgent attacks in Iraq and the Philippines. 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) provide evidence in favor of the opportunity cost theory by showing that labor-intensive reconstruction projects in Iraq reduce violence. 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—which one of them dominates depends on the type of commodity.

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.⁴ 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 casualties result in a reduced willingness among 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

³ 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.

⁴In the context of Afghanistan Lyall, Imai and et al (2011) show that the effect of violence on civilian attitudes is asymmetric. Harm inflicted by ISAF is met with reduced support and increased Taliban support, but Taliban-inflicted harm does not translate into greater ISAF support

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 the differences in the nature of the conflicts and/or the characteristics of the respective development projects. While the war in Iraq is relatively recent, engulfed most of the country, and involved large numbers of foreign forces, the civil conflict in the Philippines is over four decades old, localized in nature, with 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 KALAH-I-CIDSS, the biggest development program in the country, which is run by the government.

III. Description of the Experiment

III.1. The 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 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.⁵

In order to facilitate the creation of representative institutions for village governance, NSP mandates the creation of 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.⁶ Projects are selected by the CDC in consultation with the village community.⁷ Selected projects are ordinarily focused on either the construction or rehabilitation of infrastructure, such as drinking water facilities, irrigation canals, roads and bridges, or electrical generators; or the provision of human capital development, such as training and literacy courses. The program is implemented by a contracted NGO, but is introduced

⁵ 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, randomized 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).

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

⁷ 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.

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 dramatic growth in the insurgency after 2007, journalists and some representatives of foreign governments and foreign forces became interested in the counter-insurgency potential of NSP and similar programs. A 2009 policy brief by the Center for a New American Security and co-authored by counter-insurgency 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). There is also evidence that schools built by the NSP have less chance of being destroyed by Taliban than schools built by other aid programs, arguably because villagers have a greater sense of local ownership over NSP projects (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 during the first stage of NSP in 2003 - 2006.⁸ 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.⁹

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 (see Figure 1). 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

⁸ 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 in this paper 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 were not available.

⁹ See Online Appendix for more details on the district selection procedures.

respondents or income (see Table A1 in the Appendix), 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, although the magnitude of these differences is quite small.¹⁰

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 2, the rate of security incidents between January 2006 (a year and a half before the start of the study) and February 2010 (two and a half years 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. These two districts provide a basis for inference over the potential effects of NSP on the reduction of violence in already insecure regions, whereas the other eight districts represent ‘marginal’ areas which may be at risk of increased violence subject to local and national developments. Collectively, the sample thus provides insights into the effect of NSP on violence in areas which have already succumbed to the insurgency and in areas which are at risk of doing so.

III.3. Assignment of Treatment

In each of the 10 districts, 50 villages were selected to be included in the study,¹¹ 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 1 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.

¹⁰ 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.

¹¹ 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.

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 based on background characteristics provided that the villages were not in the same village cluster. The matching was done based on information available before the baseline survey and used background characteristics such as village size (based on data collected a few years earlier by Afghanistan’s Central Statistics Organization) and a set of 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.¹²
4. *Violations of Clustering Restrictions.* In a few districts, the large number of clustered villages precluded the co-assignment of all the villages in the same village cluster to the same treatment status. For cases in which assignment of treatment status without a violation of the clustering restriction was not possible, the number of violations was minimized through a simulation approach.¹³

As expected, the randomization procedure was successful in ensuring statistical balance between treatment and control groups. Table 1 below presents means, normalized differences,¹⁴ and t-statistics for several important variables using pre-treatment data collected during a baseline survey and shows that, 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 to us through the randomized evaluation of NSP to test the “hearts and minds” theory of counter-insurgency, which posits that the presence of a development program will increase economic welfare, improve attitudes towards the government, and reduce insurgent violence. The three hypotheses below formalize these predictions:

¹² 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.

¹³ For instance, 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).

¹⁴ Per Imbens and Wooldridge (2009), normalized differences are differences divided by pooled standard errors.

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

The “hearts and minds” theory places a particular focus on attitude-driven behavior. Accordingly, subjective perceptions of one’s economic situation are as important as objective economic outcomes. Thus, to test this hypothesis, we look both at objective measures of economic well-being and at subjective perceptions of economic well-being, 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 that of “opportunity cost”, 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 development program.

This hypothesis asserts that economic benefits arising from development program will translate into improved 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 development program will result in an improvement in attitudes towards the government.

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

According to the “hearts and minds” theory, improved attitudes towards the government should decrease support for the 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 the existence of a development program would lead to an increase in insecurity at least in the short run.

V. Data

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

V.1. Baseline Survey

Data from the baseline survey was collected during August and September 2007 and prior to the introduction of the development program to 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.¹⁵

V.2. Follow-Up Survey

Data from the follow-up survey was 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.¹⁶ The administration of the survey at a time when the projects were being implemented but were not yet delivering benefits enables the isolation of effects of expectations from the actual provision of goods. 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.

The follow-up survey drew upon many of the same 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.¹⁷ Detailed information on the coverage of the baseline and follow-up surveys can be found in Table A2 in the Appendix. Enumerators administering the male household

¹⁵ See Online Appendix for more information on the survey instruments.

¹⁶ Projects funded by NSP ordinarily take 18–24 months to complete. By that time the follow-up survey was conducted only 18 percent of the projects were fully completed.

¹⁷ During our baseline survey, an individual survey was administered only to female elites because of logistical constraints. During our follow-up survey potential panel data on individual responses of the female elites was sacrificed in order to measure attitudes of ordinary female villagers.

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.¹⁸

Due to deterioration in security conditions 26 villages (11 treatment and 15 control villages) could not be surveyed during the first 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 comes from the International Security Assistance Forces (ISAF) Combined Information Data Network Exchange (CIDNE) database that relies on soldiers' reports and includes declassified fields such as date, time, location, and type of event.¹⁹ The data contains information on security incidents in the 10 districts between March 2003 and March 2010. Overall, there were 535 security incidents prior to the start of NSP mobilization in October 2007 and 688 such incidents after. Almost all the incidents are related to Improvised Explosive Devices (IED), with 45 percent of incidents being IED explosions and 53 percent incidents in which 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 the nature of IEDs, and the fact that they are usually put along roads and not necessarily exacted on the village level, we use these varying distance levels ranging from 1 KM to 15KM. To measure the level of violence before the start of the program and to separate between short-run and long-run effects—which the literature has found to differ—indicators were constructed separately for three time

¹⁸ 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.

¹⁹ 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.

periods: between March 2003 and September 2007 (to measure the existing levels of violence),²⁰ between October 2007 and December 2008 (which is considered the short run as the project selection process had been completed, but the project implementation has not yet started) and for the period between January 2009 and March 2010 (which is considered the longer run, as the implementation of the projects have started, but had in most cases not been completed).

There is a notable difference in the levels of violence in the two eastern districts in Nangarhar province as 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 would need to also 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 this is an NSP village or not), $East_v$ is the dummy for villages from the two eastern districts, φ_p is the village-pair fixed effect, and ε_{vi} is the error term.

Following Bruhn and McKenzie (2009), we include village-pair fixed effects to account for the allocation of treatment to villages using pair-wise 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

²⁰ 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 the one used in Kling, Leibman and Katz (2007). The summary index is defined to be the equally weighted average of z-scores of the individual measures.²¹

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 either unemployed or employed 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 of respondents 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 Nangarhar districts is significantly higher for income, which in the eastern districts increases by 9 percent, and for the share of unemployed, 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 impact on subjective economic outcomes. Both male and female respondents in villages receiving NSP are more likely to report that the economic situation in their household 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 in a positive light 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 Nangarhar districts, the results are generally the same.

²¹ 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 clear 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.

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 Afghan 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 (NGOs and foreign military). 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 areas receiving NSP reporting significantly lower approval of the president and of the police.

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 based both on the information from the survey of villagers 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 the

security situation has deteriorated is 3 percentage points lower.²² Among females, the proportion of 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 percent of a standard deviation. In contrast, the average treatment effect of NSP on the perception of security in the two Nangarhar districts is not statistically significant (although for female respondents the difference with the other eight districts is not statistically significant).

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 dataset on ISAF-reported incidents. Figure 3 presents estimates of the effect of NSP on these incidents.²³ 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, for which it is significant at 1 percent level and corresponds to a 6 percentage point decrease in the probability of having an incident. In the eastern districts, where the initial levels of violence are high,

²² 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.

²³ 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 Online Appendix).

there is no statistically significant effect of the program 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 security incidents reported by survey respondents, the number of security 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.

Robustness of Results

To check the robustness of results, we include baseline responses of the same (or most 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 (see Tables A5 and A6 in Online Appendix).

An important characteristic of the two Nangarhar 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 their levels 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 (see Table A7 in Online Appendix) suggesting that the divergence of results in the East are driven by insecurity and/or regional specificity rather than by their being ethnically Pashtun. More generally, there is also no evidence that the results are driven by a specific subset of districts among the eight non-Nangarhar districts (see Figures A1 and A2 in Online Appendix).

Heterogeneity of Results

To examine whether the above effects are affected by progress in implementing projects, we use data from NGOs indicating the rates of completion of individual projects 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 (see Table A8 in Online Appendix).

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 (see Table A9 in Online Appendix) 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 program's impact (see Tables A10-A13 in Online Appendix).

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 the local security situation. Projects also appear to reduce the number of incidents around villages, an effect which is more pronounced in the long run.²⁴

The positive effects of the program on economic and security outcomes are consistent not only with the “hearts and minds”, 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.

We find that the effect of program on security incidents is the strongest for 9 km radii, which is the distance that is not close enough to the village to put villagers at risk, but is close enough for villagers to place the IED. This is consistent with “hearts and minds” and “opportunity cost” theories in that the program changes incentives of the villagers in the treatment villages to be

²⁴ 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.

involved in violent activities, as opposed to “greed” or “bargaining” models, where treatment villagers become targets of the attacks from outside.

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

These results are not entirely consistent with the “opportunity cost” theory, which presumes that economic improvement and decrease in unemployment rate should lead to a decrease in violence. This suggests that development programs might be more effective in preventing the spread of violence in relatively secure regions, but are considerably less effective in reducing the violence in regions in which it is already high. In relatively secure regions, the population is primarily concerned with harsh 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 turn reducing their willingness to join the insurgency. In regions with high levels of violence, however, security is likely to be the main concern on people’s minds, so that marginal improvements in economic outcomes are not enough to change people’s attitudes toward the government as long as insecurity is raging strong. More broadly, the hierarchy of needs beginning with security as identified 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 efforts, nor do we have data on who is joining the insurgency. Thus, we do not have direct evidence on the mechanisms that link increased government support with a reduction in violence, although indirect evidence regarding the timing of the effect on the security situation suggests that the willingness to join the insurgency plays a more 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.²⁵ 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 the program on 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 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 delivered by the Afghan government and that villages receiving

²⁵ Note, however, that the opposite effect can also take place. A decrease in violence in villages that have received development program can lead to a displacement effect, i.e. increase the violence in the neighboring villages if insurgents move their operations near those places that are more supportive to them.

the program are informed that NSP is sponsored by the central government.²⁶ Thus, the results presented here cannot be extended to programs in which development projects are delivered by foreign military (e.g. CERP in Iraq or Afghanistan), which may be perceived differently by the local population and thus may 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 counter-insurgency outcomes. In particular, we test the strategy of “winning hearts and minds” by looking at the effect of the program on economic welfare, attitudes towards the government, and security. Random assignment of the development program across 500 evaluation 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 foreign forces. We also identify a positive effect on violence in the long run, although only in regions with moderate levels of initial 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 support for the strategy of winning “hearts and minds” through development aid. The provision of development programs appears to make non-combatants more inclined to view government actors as working in their best interest, which in turn makes them less likely to support the insurgency. The results, however, indicate that development programs 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. These results are particularly important in demonstrating that the benefits of development programs are not limited to the provision of direct economic and social benefits, but can also contribute to preventing the spread of violent civil conflicts.

²⁶ This information is communicated at the start of the program and is emphasized by special signs that mark all finished projects, so that villagers understand that the program is sponsored by the central government. 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.

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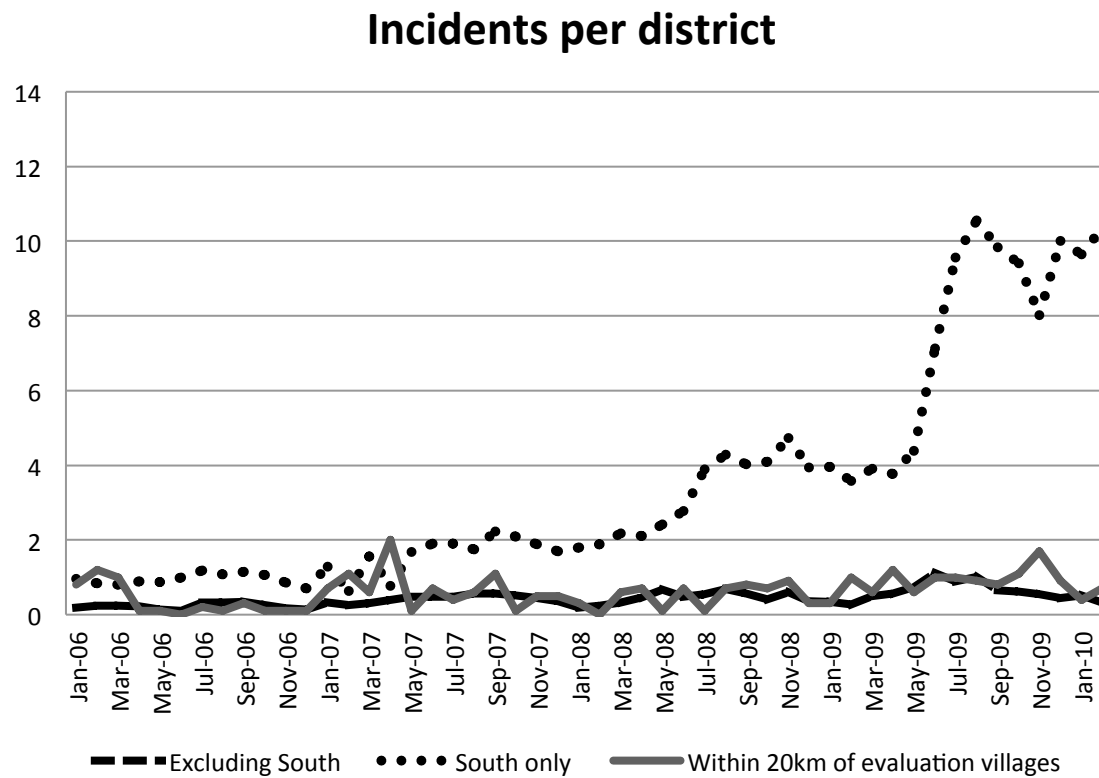
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Figure 1. Ten Sample Districts



Figure 2. Average Number of Incidents per District



Note: The southern region includes the provinces of Helmand, Kandahar, Urozgan, Zabol, Nimruz, and Day Kundi.

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-squared
A. Income, Consumption, and Employment							
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. Perceptions of Economic Situation by Male Respondents							
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
C. Perceptions of Economic Situation by Female Respondents							
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
D. Migration according to village leaders							
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-squared
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-squared
A. Security Perception by Male Respondents							
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. Security Perception by Female Respondents							
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

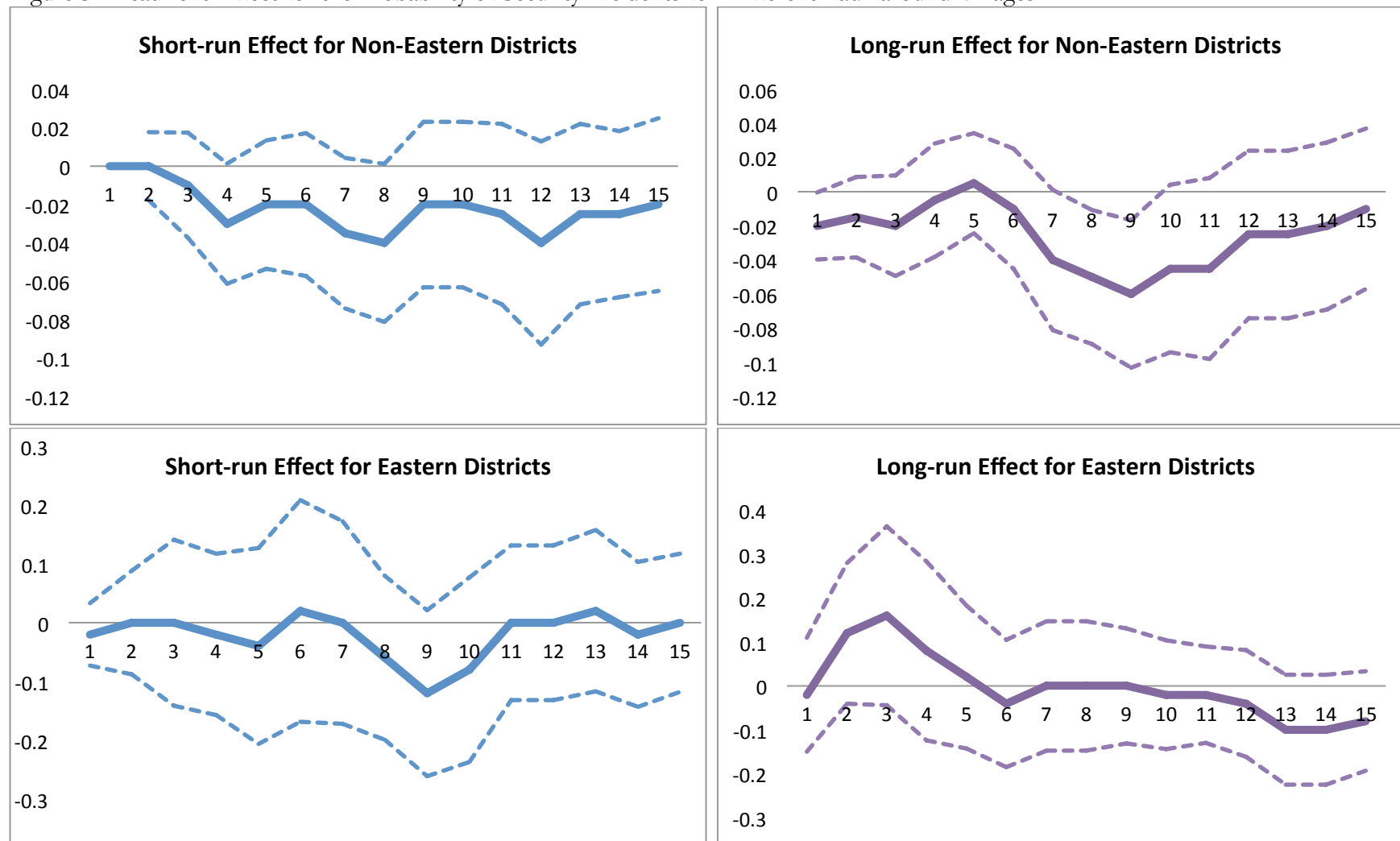
Treatment effect is estimated in the regression, which includes a constant, a dummy variable for villages that have been assigned to the treatment group and fixed effects for the matched pairs. Robust standard errors adjusted for clustering at the village-cluster level in brackets. * significant at 10%;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

Table 5: Security Incidents

Variable	Mean in Control	Treatment Effect	Standard error	Eastern District* Treatment Effect	Standard error	N	R-squared
Security Experience According to Male Respondents							
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 the Past Year	0.029	-0.003	[0.008]	-0.008	[0.015]	4,664	0.34
Respondent Household Has Been Affected by Insecurity in Village During the Past Year	0.019	0.003	[0.006]	-0.003	[0.006]	4,660	0.27
Respondent Household Has Been Affected by Insecurity on Roads Around District During the 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

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 3. 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.