On the Role of Community Management in Correcting Market Failures of Rural Developing Areas:

Evidence from a Randomized Field Experiment of COGES Project in Burkina Faso

May, 2016

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Selected Paper prepared for presentation at the 2016 Agricultural & Applied Economics Association Annual Meeting, Boston, Massachusetts, July 31-August 2

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Abstract: We estimate the short-term impacts of a school-based management program in Burkina Faso in a range of outcomes that include education, voluntary contribution to public goods, participation in informal saving groups, and health. Evaluated at the control average, COGES increases the voluntary contributions to public goods by 15.90%. Participation in informal saving groups increases by 0.016 percent for the lowest income group, and enrollment in school increases by 7.1%. Overall the findings are consistent with the observation that social capital, strengthened by SBM, plays a critical complementary role in correcting financial market failures in low income economies. The results also demonstrate that impact evaluation of SBM that focus only on education are likely to undervalue the overall effects of SBMS.
1. Introduction

In developing countries, markets are generally underdeveloped and thus the issues of market failures are rampant (Stiglitz, 1989). The government is supposed to amend market failures: there are some recent evidence showing the role of government programs in amending market failures (Angelucci and Giorgi, 2009). However, the government also fails due to a variety of reasons such as corruption and weak administrative capacities. In this respect, a community-driven program is supposed to fill the gaps of market and government failures. The importance of complementarities of the market, government, and community mechanisms have been emphasized by Hayami (2009) and Mansuri and Rao (2013, Chap 2). Indeed, a number of empirical studies support the strong complementarities between market and community mechanisms (Feigenberg, Field, and Pande, 2013; Mobarak and Rosenzweig, 2013; Karlan, 2005). Yet, these existing studies shed lights on only partial aspects of the role of community. In this paper, we bridge the gap in the existing studies by investigating the multi-dimensional role of communities in correcting market failures which are inherent to rural developing areas. Our analyses are based on a unique multi-dimensional experimental and non-experimental data on School Management Committees (COGES) project in primary school of Burkina Faso which was introduced by a randomized roll-out design.

There are three subcomponents of this paper. First, we investigate the role of the COGES project in facilitating voluntary contributions to public goods among community members and teachers where market fails by nature. We adopt a hybrid evaluation method of a randomized controlled trial combined with a large-scale artefactual field experiment on public goods with monetary rewards to examine unexplored issues on the sustainability of voluntary provision of local public goods closely and identify the mechanisms at least partially. We find that the COGES project significantly increased social capital in the form of voluntary contributions to public goods, especially linking social capital in which people can be connected vertically. With the treatment of the COGES project, the average amount of people’s voluntary contributions to public goods increased by 8.0%-10.2% directly from the implementation of the COGES project. For groups composed of school principals, teachers, and parents, the average contribution increased by 12.7%-24.1% through the democratic election of school management committee members and by 11%-17.2% through the implementation of the COGES project. These results suggest that community management projects can improve local cost recovery by increasing local contributions to public goods, potentially leading to better fiscal sustainability.
of community-driven projects.

Second, we focus on whether and how the school-based management program can change human capital outcomes of the students, ranging from standard learning outcomes to health outcomes: since human capital involves investment decisions under uncertainties, irreversibility, and long gestation periods, market failures become a serious binding constraint. Based on our analysis of education outcomes using randomized controlled trials data, the program increased student enrollment, decreased repetition, and decreased teacher absence. The results also indicate that it had a stronger impact on the 6th grade students, presumably reflecting parents’ priority. This suggests that community participation can improve educational outcomes not only through empowering the overall community and enhancing social capital, but the results can be affected by the perception and the knowledge of each community member. As to the health related outcomes, while we find only weak evidence of the project impact on body mass index (BMI) of the students under the treatment of the project, our findings suggest positive effects on provision of school meals for free, water points of wells/drills, and functional toilet facilities for girls.

Third, we address a question of whether a community participation program in local schools can correct the market failures at a broader scale by facilitating financial inclusion of the poor in each community. In this aim, we examine the program’s impacts on community-wide outcomes captured by the level of student parents’ trust to others and their participation in rotating savings and credit associations (ROSCAs). We hypothesize that parents involved in SBM are more likely to participating in ROSCAs through collaboration with other community members in SBM because they foster trust to others, which is a necessary precondition for the development of informal financial arrangements. Using a unique data set collected exclusively for this study, we find that in particular, relatively poor parents involved in SBM were more likely to participate in ROSCAs than other poor parents. These findings contain two important implications: First, our findings are consistent with a view that social capital, strengthened by SBM, plays a critical complementary role in correcting financial market failures in low income economies (Hayami, 2009); and, second, impact evaluation of SBM focusing only on students’ performance may undervalue its overall effects on the whole community, ignoring important spillover effects of SBM.

From these findings, we can also derive broader implications regarding the role of the community in developing countries where market mechanisms for resource allocation are generally underdeveloped. To correct such market failures, governments often provide other mechanisms to enforce people to adjust their resource allocations. However, the government
itself can also fail, especially in developing countries, because politicians and bureaucrats pursue their own objectives. In contrast, the community is a mechanism that uses social capital to help promote voluntary cooperation, which facilitates the supply of local public goods. Social capital thus plays a critical complementary role in correcting both market and government failures (Hayami, 2009). In fact, the complementarity between the market and social capital can be well-understood by the public goods game adopted in the first section of this study because the public goods game is a version of the prisoner's dilemma game, in which the profit-seeking behavior of self-interested group members leads to a socially sub-optimal outcome or non-Pareto efficient Nash equilibrium. This is a canonical example of market failure where laissez-faire cannot achieve the efficient outcome. In the public goods game, levels of voluntary contribution to the public goods are defined as the extent to which the observed outcome deviates away from the socially inefficient Nash equilibrium and toward the social optimal. In other words, the contribution level elicited by the public goods game captures complementarity between market mechanisms and social capital. Our empirical results indicate that such a complementarity can be strengthened by an SBM project.

The remainder of this paper is organized as follows. We describe the COGES project in section 2. The third section presents the survey and summarizes the data. The fourth section reviews our econometric specifications and identification. The fifth section discusses our econometric results, and the sixth section concludes.

2. Program Description and Randomization

Burkina Faso lags behind much of the rest of the world in achieving universal primary education.1 To address this deficiency, the government of Burkina Faso adopted a Poverty Reduction Strategy in 2000, stating that one of the most important goals of this strategy is to “guarantee that the poor have access to basic social services.” To achieve this goal, the Ministry of Basic Education and Literacy (hereafter MEBA) drew up a Basic Education Ten-Year Development Plan (hereafter PDDEB), which was divided into Phase I (2000-2006) and Phase II (2007-2010).2

In the latter phase, strong emphasis was placed on improving the quality of basic

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1 The education system of Burkina Faso comprises three years of preschool, six years of primary, four years of lower secondary, and three years of upper secondary education, followed by tertiary education. Multi-grade classrooms are also common, especially in rural schools.
2 MEBA refers to Ministere de l’Enseignement de Base et de l’Alphabetisation in French. PDDEB refers to Plan decennal de developpement de l’éducation de base in French.
education by decentralizing the education system. During Phase II, a presidential decree of July 2007 mandated tuition-free primary and lower middle education. The government also adopted the Education Policy Law (Lettre de politique educative) in July 2008 to specify concrete strategies to achieve the MDGs in the education sector. In the decentralization process, each district was divided into the lowest administrative levels for basic education or Circonscription d’education de base (hereafter CEB). Each CEB has an office, staffed with inspectors to facilitate teacher training programs overseeing 13 to 14 elementary schools on average. In 2009, the government issued a decree (2009-106) to delegate the right to manage infrastructure in preschool, basic education, and literacy programs to the CEB.

Since the initiation of PDDEB, enrollment at public primary schools has increased by 9.7% annually, but the discrepancies between boys and girls have actually been widening, especially in poorer regions. Moreover, dropouts and grade repetitions are still major constraints to achieving universal completion of a full course of primary schooling.

Community involvement in education has been limited until very recently. Although parents’ associations (APE) and mothers’ associations (AME) have existed as school councils since the 1960s, their function in school management has been limited. To expand involvement of the community and parents in school management, in 2008 the government issued a decree to establish new school committees (Comité de Gestion de l’Ecole, or COGES) that consist of the mayor, the presidents of APE and AME, the school’s director and representatives of teachers, teachers’ unions, and NGOs. To expand community and parents in school management in an attempt to improve child education, health, and nutrition, and to empower parents and community members, the government issued a decree to establish new school committees, i.e., COGES, in 2008. While a COGES has a central role in setting and

The COGES Project

COGES basically involves setting up a management committee in each primary school whose members are democratically elected from among the parents of the students and community members. Although Parents’ Associations (APE) and Mothers’ Associations (AME) among parents of students have existed as school councils in Burkina Faso since the 1960s, they have had limited roles in actual school management. In order to involve community stakeholders in school management in an attempt to improve child education, health, and nutrition, and to empower parents and community members, the government issued a decree to establish new school committees, i.e., COGES, in 2008. While a COGES has a central role in setting and

3 Officially, the COGES project is called PACOGES (projet d'appui aux comités de gestion des écoles).
implementing an annual school action plan, a distinctive feature of the intervention of the project was the introduction of a democratic election by a secret ballot of all community members to select new members, in addition to the members already defined by the decree such as the Mayor, the Presidents of APE and AME, the school principal, representatives of teachers, NGOs and teacher unions. These new members include the COGES president and persons in charge of community participation, girls’ enrollment, monitoring, accounting, and auditing. The rationale for democratic election was to build confidence among the community members by making a COGES transparent and representative of the community.

After the election, the COGES proceeded to organize a series of community meetings in which any community members within the school district could participate. The agenda of the first meeting was to discuss problems facing the school and, based on the discussion, to make an action plan to be implemented during the subsequent school year. A second meeting was then held to discuss and approve the action plan. Typical action plans included things like constructing and repairing school facilities, such as classrooms, desks, chairs, and separate toilets for female students, providing school lunch for students, providing housing for teachers, and purchasing learning materials for students.

Because most of the schools could not expect external resources, a COGES could also mobilize financial and non-financial resources within the community in order to implement the school action plan. A third meeting was held to monitor the implementation of the action plan, and a fourth meeting evaluated the activities implemented by the COGES in the previous year. The same cycle is repeated every year: at the beginning of the new school year, with the COGES and the community members making a new action plan for the year, including a plan to implement, monitor, and evaluate the action plan using their own resources.

Third, to facilitate these practices by COGES, the project provided several types of training for education officials and COGES members. Before establishing COGES, school directors attend a two-day training to learn how to organize elections for COGES members and community meetings. After elections, school directors, COGES presidents and accountants, and representatives from the municipal offices receive a two-day training to learn how to make, implement, monitor, and evaluate action plans for schools.

**COGES, Trust Building and ROSCAS**

By increasing trust level within the community, COGES can also increase participation in ROSCAS. In less developed countries, formal financial institutions are
underdeveloped, and thus, people rely substantially on informal financial arrangements including ROSCAs (Karlan and Morduch 2010). In ROSCAs, members regularly meet and contribute a certain amount of money, and the sum of the contributions is given to a particular member who is either determined a priori by random assignments or by bidding at each meeting. Therefore, ROSCAs provide credit to members who have received contributions from others in earlier meetings, while also providing savings opportunities to members who may receive contributions later.

An important channel of trust building is communication (Das and Teng 1998; Vangen and Huxham 2003). In particular, frequent face-to-face meetings are found to promote trust. For example, Burt and Knez (1995) find that trust among managers in a large firm is higher when they meet face-to-face on a daily basis than when they meet less frequently. Wilson et al. (2006) and Hill et al. (2009) find that people trust their team members more when they meet face-to-face than when they interact through the Internet, utilizing social experiments. In this respect, SBM programs provide great opportunities for community members to meet, communicate, and collaborate with each other: SBM programs hold meetings of community members regularly to elect their board members, discuss current problems of the school, approve the action plan, and monitor outcomes of the plan. In addition, under SBM, community members often collaborate to build school facilities and prepare school meals.

Therefore, we hypothesize that SBM fosters deeper trust among community members, thereby indirectly promoting participation in ROSCAs with other community members. In addition, effects of SBM on participation in ROSCAs may vary depending on the accessibility of households to financial markets as well as their needs for informal financing. Generally, as households with larger assets and income can rely more on formal financing than otherwise, the effects of SBMs on ROSCAs are likely to be larger for poorer households with little access to formal financing than for richer households.

**Randomization**

COGES covered all elementary schools in the Ganzourgou province of Burkina Faso, and the roll-out was randomized. The randomization proceeded in two steps. In the first step, a total of 279 elementary schools in the province were divided into 30 strata within 10 educational districts (CEB) and three school types: public schools, private Islamic schools, and private Catholic schools. In the second step, schools within each stratum were randomly assigned either to first-year COGES (i.e. treatment in the first year) or to second year COGES (i.e. treatment in
the second year).

In total, 141 schools were randomly chosen to receive treatment in the first year (2009/2010 academic year) while 138 schools were randomly assigned to receive treatment in the second year (2010/2011 academic year). During the survey, we discovered that some schools did not exist or had been closed, which reduced the number of the schools to 134 and 132 for the 1st year treatment and control groups, respectively.

3. Surveys and Descriptive Statistics

The first-round baseline and second-round endline surveys were fielded in December 2009/January 2010 and in January/February 2011, respectively. The survey was administered all the major stakeholders in the school: the school principal, a randomly selected teacher from each grade, five randomly selected students of each randomly selected teacher, and the household head of each of the five randomly selected students.

Learning outcomes were measured through two exams administered to students in March 2009 and July 2010. The first exam in March 2009 covered language (French) and mathematics. Only students from the study area took that exam. The second exam in July was conducted as a regular exam of Ganzouregou Province, but the data is available only for public schools. The students tested in French, math, science and social studies. In addition, we conducted public goods experiments to measure the amount of stakeholder voluntary contributions to public goods, as analyzed by Sawada et al. (2015).

Table 1 reports the test results of pre-treatment balance in observables across interventions on subjects of artefactual field experiments using the baseline dataset. The results indicate that we cannot reject the null hypothesis that the means of the covariates are equal between these two groups. Appendix 1 shows geographical distribution of treatment and control schools under investment.

4. Econometric specifications and identification

We are interested in the impacts of the COGES project on three set of outcomes: the level of social capital as measured by the voluntary contributions made in the public goods game,
In this section, we describe the econometric specifications and the identification strategy used for each set of outcomes, $Y$, and a dichotomous variable for program treatment, $D$, which takes the value of one if treated, and zero otherwise. The level of an outcome variable with treatment is denoted by $Y^1$, and without treatment by $Y^0$. The average impact on outcome caused by the program can be captured by the following average treatment effects of the treated (ATT): $E(Y^1 - Y^0|D=1 \ X)$, given the same set of observables $X$.

Assuming a linear conditional expectation function, we use the following linear regression model to quantify the effects of COGES project on the outcome of interest:

$$ Y_{it} = \alpha + \beta D_i + X_{it}' + u_{it} $$

where $t=1^{st}$ year or $2^{nd}$ year; the binary treatment variable $D$ takes the value of one if a COGES project is implemented during the first year and zero otherwise; $i$ stands for an individual and $\beta$ represents the estimated impact of the COGES project; and $X$ is a set of covariates.

In the case of social capital, the treatment (assigned to COGES) and the outcome are measured at the village level, conditional on being assigned to treatment, take up is perfect. Thus, $\beta$ measures the Average Treatment Effects on the Treated (ATT). Furthermore, when $t$ is the first year, the treatment effect $\beta$ can be interpreted as the effect generated by the election. Alternatively, when $t$ is the second year, the treatment effect $\beta$ can be interpreted as the effect generated by the implementation of the project net of the direct election effect. The outcomes are measured at the child level for education and at the individual level for ROSCAS. For these, outcomes, $\beta$ estimates the Intent to Treat (ITT) since take up is less than perfect, conditional on a village being assigned to treatment.

Since 8 of the 43 first-year COGES schools did not conduct COGES projects due to their slow project adoption speed, and 3 schools out of the 40 assigned to the list of second-year COGES schools were “crossovers” and had implemented a COGES-like project during the first year, we estimated equation (1) using the random treatment assignment as an instrumental variable. In doing so, we identified the treatment effect on the subpopulation of compliers, i.e., the local average treatment effect (LATE) of Imbens and Angrist (1994).
5. Results and Discussion

Table 2 summarizes the estimation results based on equation (1). Our outcome variables are: the amount contributed voluntarily in the public goods game (Sawada et al., 2016), a binary variable to participate in ROSCAs (Todo, et al., 2016), Change rate in number of enrolled students (Kozuka, et al., 2016), and a binary variable of availability of functional female toilet (Noguchi, et al., 2015).

As to the voluntary contribution to the public goods, we found that the COGES project significantly increased social capital in the form of voluntary contributions to public goods (column (1), Table 2). The point estimate shows that participation in COGES increases the amount contributed to public goods game by 46.934 CFA with the initial stake of 500FCFA. Evaluated at the control average, this indicates that the overall increase in voluntary contributions to public goods by the COGES project was 15.90%. The result suggests that community management projects can improve local cost recovery by increasing local contributions of public goods, potentially leading to better fiscal sustainability in community-driven projects. Moreover, the results based on our hybrid experiments are largely in line with real-world decisions observed in the schools under our investigation (Sawada et al., 2016).

The COGES project also promotes financial inclusion of the poor in the region. We employ an IV probit estimation of Newey (1987) and estimated effects of COGES on the participation of each household in any ROSCA, an informal financial system in the region. We find that the coefficient on a household's participation in COGES is positive, whereas the coefficient on the interaction term between the COGES participation and household income in logs is negative (column (2), Table 2). The results imply that the effect of COGES participation varies depending on the income level. Its marginal effect is positive and significant, 0.016, for the poorest 10%, insignificant, 0.0015, for the median, and negative and significant, -0.010, for the richest 10%.

Column 3 presents the estimate of the impact on student enrollment taken from Kozuka et al. (2016), showing that the program increased the number of enrolled students per grade by around 7.1%. This result is understandable, because by involving community members widely a COGES can reach parents of school-age children and enhance their awareness in education, and thus increase enrollment.

As to health outcomes, according to Noguchi et al. (2015), an impact of COGES on the availability of female toilet, one of the health-related indicators, has been shown in
Specification (4). COGES seems to generate a significant positive effect on the provision of functional toilet facilities for girls by increasing availability by 16%.

6. Conclusion

In this paper, we reported the short-term impact of a school-based management program in Burkina Faso. In addition to the effects of SBM on education that have been investigated in previous studies, we have also assessed the impacts of SBM on other outcomes including the voluntary contribution to public goods, participation in saving groups, and health outcomes. We find that the program has positive and significant effects on all these outcomes.

These findings have two main implications. First, the findings are consistent with a view that social capital, strengthened by SBM, plays a critical complementary role in correcting financial market failures in low income economies (Hayami, 2009). Second, the results indicate that impact evaluation of SBM focusing only on students’ performance may understate its overall effects on the entire community, ignoring important spillover effects of SBM.

The findings also provide valuable insights on the role of the community in developing countries where both the market as institution is relatively weak, and often fails to allocate resources efficiently. To correct these market failures, states often provide other mechanisms to enforce people to adjust their resource allocations. However, in developing countries; the state as institution is usually weak and often fails. Hence, in these environments, the community can serve as an institution that uses social capital to help promote voluntary cooperation, which facilitates the supply of local public goods approaches cannot achieve an efficient outcome.
References


Sawada, Yasuyuki, Takeshi Aida, Andrew S. Griffen, Eiji Kozuka, Haruko Noguchi, and Yasuyuki Todo (2016) "Election, Implementation, and Social Capital in School-Based Management:
Evidence from a Randomized Field Experiment on the COGES Project in Burkina Faso,” JICA-RI Working Paper No.120, JICA Research Institute, Tokyo.

Table 1: Balance of School-Level Covariates at Baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Comparison Schools</th>
<th>Treatment Schools</th>
<th>$t$-statistics for the null hypothesis of the same mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Number of students per grade</td>
<td>42.097</td>
<td>120</td>
<td>38.682</td>
</tr>
<tr>
<td>Number of grades</td>
<td>4.25</td>
<td>120</td>
<td>4.333</td>
</tr>
<tr>
<td>Proportion of girls</td>
<td>0.438</td>
<td>120</td>
<td>0.443</td>
</tr>
<tr>
<td>Grade repetition-boys</td>
<td>0.094</td>
<td>120</td>
<td>0.096</td>
</tr>
<tr>
<td>Grade repetition-girls</td>
<td>0.109</td>
<td>120</td>
<td>0.092</td>
</tr>
<tr>
<td>Director experience</td>
<td>5.231</td>
<td>121</td>
<td>5.323</td>
</tr>
<tr>
<td>Teacher experience</td>
<td>6.019</td>
<td>119</td>
<td>6.308</td>
</tr>
<tr>
<td>Proportion of female teachers</td>
<td>0.357</td>
<td>120</td>
<td>0.301</td>
</tr>
<tr>
<td>Proportion of contract teachers</td>
<td>0.546</td>
<td>119</td>
<td>0.588</td>
</tr>
<tr>
<td>Teacher attendance</td>
<td>0.87</td>
<td>120</td>
<td>0.852</td>
</tr>
<tr>
<td>Located in rural area</td>
<td>0.91</td>
<td>122</td>
<td>0.931</td>
</tr>
</tbody>
</table>

Source: Kozuka et al. (2016).
Table 2: Summary of Impact Evaluation Results of COGES Participation Effect

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The amount contributed in the public goods game with the initial stake of 500FCFA; Participation in ROSCA</td>
<td>Change rate in number of enrolled students</td>
<td>Availability of functional female toilet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COGES Effect (standard error)</td>
<td>45.621* (25.651)</td>
<td>1.518* - 0.125* × log(income) (0.870) (0.0710)</td>
<td>0.071** (0.030)</td>
<td>0.163*** (0.0082)</td>
</tr>
<tr>
<td>Method</td>
<td>IV-Difference in Difference</td>
<td>IV probit - ANCOVA* + ANCOVA is to control for the baseline (lagged) value of the outcome variable in the regression rather than differencing it out in the more common difference-in-difference (DD) specification.</td>
<td>IV-ANCOVA* + ANCOVA is to control for the baseline (lagged) value of the outcome variable in the regression rather than differencing it out in the more common difference-in-difference (DD) specification.</td>
<td>Propensity score matching – Difference in Difference on the common support</td>
</tr>
<tr>
<td>Strata FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Control</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>2,568</td>
<td>3,583</td>
<td>234</td>
<td>332</td>
</tr>
</tbody>
</table>

Note: Results taken from Sawada et al. (2016). Robust standard errors are in parentheses; All standard errors are clustered at the school-group level; Control variables are: age, years of schooling, and dummy variables for male, private school, Islamic school, school director, teacher, AME member, and APE member. The effect of COGES participation varies depending on the income level. Its marginal effect is 0.016 for the poorest 10%, 0.0015 for the median-income, and -0.010 for the richest 10%. Robust standard errors are in parentheses; All standard errors are clustered at the school-group level; Control variables are: lagged outcome, the number of household members (logs), assets (logs), income (logs), the share of females in adult members, the dummy for a female head. Results taken from Todo, et al. (2016). Results taken from Kozuka et al. (2016). Robust standard errors are clustered at the school level and are in parentheses. The unit of observation is the school. Control variables are: Number of grades, Director experience, Teacher experience, Female teacher ratio, Contract teacher ratio, Teacher attendance, Female student ratio, Rural school Results taken from Noguchi et al. (2015). Robust standard errors are clustered at the school level and are in parentheses. The unit of observation is the school. Control variables for propensity matching: type of school, number of grades, ratio of sex of children, average age of children, average IQ estimated from Draw-a-Person (DAP) test, average characteristics of household (size, income, and assets), CEB dummies.

Note: *** p<0.01, ** p<0.05, * p<0.1.
Appendix 1

Treatment and Control Schools in Ganzourgou Province, Burkina Faso

Legend
- Treatment School
- Control School

Base map data: GADM database of Global Administrative Areas, which is distributed through http://www.gadm.org/ for free. Coordinates information of schools was collected by the research team. This map is created using QGIS.