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Abstract

Natural disasters can bring considerable damages to households in terms of casualties of household members, destruction of houses, and loss of physical assets. We examine the impact of an earthquake in Indonesia on children's school and work activities and how the effect differs by access to credit. We find that the earthquake decreases education and increases child labor, but the effect is stronger for households with access to credit. Our finding indicates the complementary effect between credit and child labor and suggests the need for policies to increase educational investment when providing credits to households recovering from a shock.

Keywords: Natural disaster, Earthquake, Education, Child labor, Credit, Indonesia
JEL codes: Q5, I2, J2, N3, H8

1 Introduction

Increasing number of countries around the world have experienced natural disasters in the past years. Natural disasters can bring considerable damages to households in terms of destruction of houses, loss of physical assets and casualties of household members. In addition to the direct impact of natural disasters, natural disasters can produce unforeseen consequences on health and education through different channels. Households may have lower accessibility to basic services including schools and hospitals due to destruction of roads and public infrastructure. Besides, households may respond to income shocks by reducing food consumption or increasing labor supply of household members including children. Lastly, natural disasters can decrease wages, and thus lower the opportunity cost for schooling.

In face of these shocks, there are limited number of smoothing mechanisms, including formal insurance market and credit, especially in low-income contexts. How poor households cope with this large shock and how responses differ by access to credit are the central questions.

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In this paper, we employ an exogenous shock that happened in Indonesia to test the hypothesis that children's school and work activities change following shocks but that the relationship differs by access to credit. In particular, we explore the impact of the 2006 Yogyakarta earthquake, followed by large reconstruction programs, on school enrollment and child labor among Indonesian children. In particular, we would like to examine if there is a substitution or complementary effect between credit and child labor in the aftermath of the Yogyakarta earthquake. The substitution between child labor and credit as means of consumption smoothing is strong if credit is intended for consumption purposes. At the same time, production credit is expected to complement child labor and might increase child labor.

Our study shows the complementarity between credit and child labor. We find that, following the Yogyakarta earthquake, education level decreased among children under 15 and an increase in child working. This effect was observed especially among households with access to credit and those that owned home-based business. This study stands out from the previous literature in two aspects. First, the existing studies have mainly focused on labor market and household wealth outcomes following a natural disaster, while this paper looks at human capital outcomes, especially child labor and credit through which a natural disaster affects education. Second, this study investigates longer-term effects 8 years after the earthquake occurred. Our study provides important policy implications for the way in which reconstruction aid should be given in the aftermath of a natural disaster.

The remainder of the paper proceeds as follows. Section 2 presents the related literature, Section 3 describes the background, Section 4 describes the data, Section 5 presents the empirical strategy, Section 6 reports the main findings, and Section 7 concludes.

2 Related Literature

2.1 Impact of Earthquake

The immediate negative impact of natural disasters on education has been examined in many studies in different contexts (Baez 2010). One interesting finding is that the impact differs by gender. During the reconstruction period, the increased wage in the construction sector can lead to higher child labor especially among boys and further decrease their school enrollment (Takasaki 2017). At the same time, after the reconstruction activities, villages having received reconstruction aid may have better school infrastructure as well as paved roads, which may lead to higher school enrollment rate. The impact of paved road on education is ambiguous

since Aggarwal (2018) finds that increased market access led teenagers out of school to join the labor force following a road construction program in India.

While the short-term negative impact of natural disasters on schooling is fairly apparent, their long-term effect on human capital is ambiguous and disentangling the channels are empirically difficult (Baez 2010). Recent findings suggest that natural disasters followed by efficient government responses can have non-negative and even positive impact on household welfare as well as wage growth (Gignoux and Menendex 2016; Kirchberger 2017). Using information from individuals affected by a set of earthquakes in Indonesia, Gignoux and Menendez (2016) find that affected individuals experience short-term economic losses but recover in the medium run, and even exhibit income and welfare gains in the long term. Kirchberger (2017) finds that the 2006 Yogyakarta earthquake in Indonesia had a positive effect on wage growth for workers who were employed in the agricultural sector as labor shifted out of the agricultural sector into the construction sector.

At the same time, the afore-mentioned two studies only explore the household assets and wage growth in the aftermath of natural disasters, and do not examine the impact of natural disasters on long-term human capital. Using the Indonesia Family Life Survey, this paper aims to investigate if the earthquake caused children to simply delay schooling or resulted in lower stock of human capital leading to different work choices. We would also like to explore the heterogenous impact by access to finance.

2.2 Child Labor and Shocks

Many previous studies show the insurance role of child labor in developing countries. In response to shocks, households may smooth consumption by relying on child labor (de Janvry et al. 2006; Jacoby and Skoufias 1997). At the same time, access to finance, especially microfinance, can mitigate this negative impact. The impact of improved access to credit on child labor is not unequivocal. Improved household liquidity might lower child labor (Alvi and Dendir 2011). Also, Guarcello et al. (2010) show that negative shocks push children to work, while access to insurance increases education and reduces child labor. At the same time, some researches show that an increase in entrepreneurships, followed by an increase in access to credit, tends to increase child labor (Lakadawala 2018).

In case of the Yogyakarta earthquake, the affected regions are known to be centers for artisanal and other producing small and micro enterprises, and thus, a large percentage of affected households are self-employed small and micro entrepreneurs (GTZ 2007). To increase

access to credit for these households, a large-scale microfinance program was rolled out following the earthquake. Our study shows the complementarity between credit and child labor. Since most of the households affected by the earthquake are small-business owners, households without access to credit (and potentially those who were not able to restart business following the earthquake) experienced a decline in child labor.

3 Background

3.1 Yogyakarta Earthquake

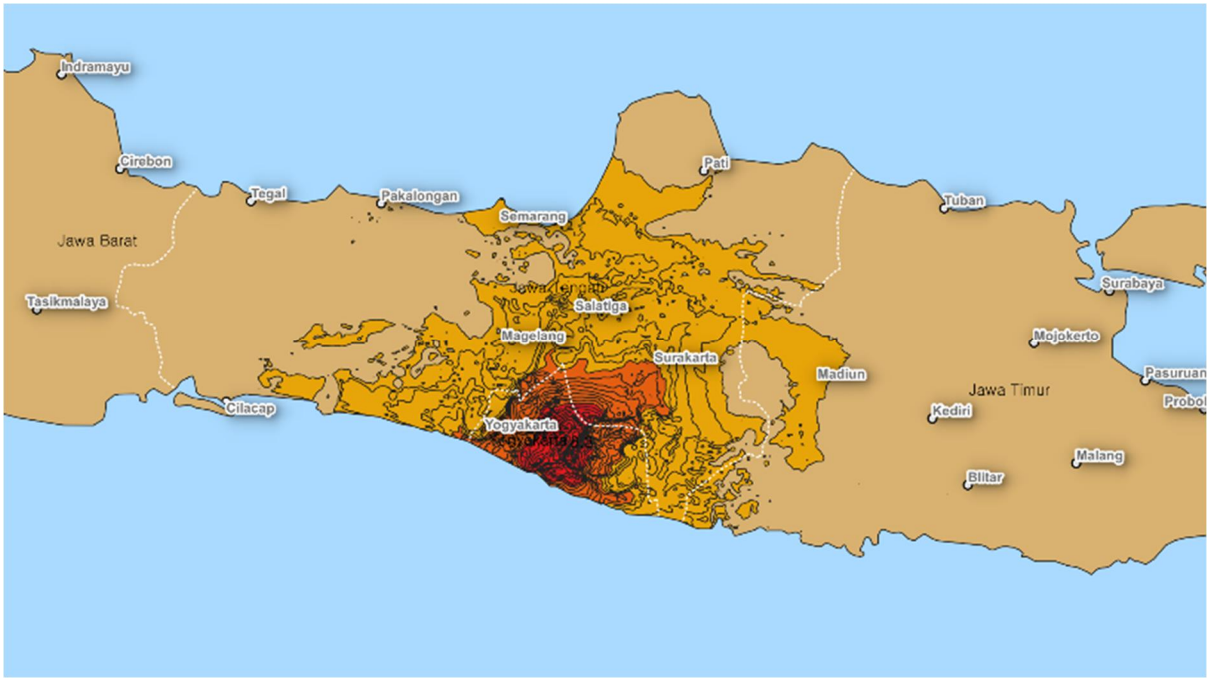
Indonesia, a Southeast Asian country composed of many volcanic islands, has endured numerous natural disasters including earthquakes, tsunamis, and volcanic eruptions. As the country is located between several tectonic plates, the country has especially experienced a large number of earthquakes.

The Yogyakarta earthquake, occurred on May 26, 2006, has been one of the major earthquakes with a magnitude of 6.3 that killed more than 5,000 people and injured more than 36,000 people (Figure 1). The housing sector was especially affected destroying over 280,000 homes (Java Reconstruction Fund 2007). The earthquake affected two provinces, Central Java and Yogyakarta. The areas that were affected by the earthquake are Bantul, Solo, Yogyakarta, Pati, and some parts of Semarang.

The reconstruction and rehabilitation activities were swift – according to the Java Reconstruction Fund report (2007), 52% of affected houses were rebuilt by March 2007, and some communities were able to experience public infrastructures with better condition than before including village roads, water supply facilities, and sanitation facilities.

In addition, 15,000 earthquake-affected micro, small and medium enterprises had increase in access to finance. The region affected by the Yogyakarta earthquake is known for home-based enterprises, and around 95% of those enterprises reported complete or partial destruction of their business assets (Java Reconstruction Fund 2007). In the aftermath of the earthquake, many of the enterprises were able to run business again but with lower productivity.

Figure 1: Yogyakarta Earthquake



4 Data

We test our hypothesis with data mainly from the Indonesia Family Life Surveys (IFLS) in order to measure the impact of Indonesian earthquakes on individual outcomes. In total, there are five waves of the IFLS – the first wave was conducted in 1993, and follow-ups took place in 1997, 2000, 2007, and 2014. The sample is representative of about 83% of the Indonesian population and contains over 30,000 individuals living in 13 of the 27 provinces in the country.

The IFLS surveys contain individuals and household information on a wide range of topics including consumption, income, assets, education, migration, labor market outcomes, marriage, fertility, contraceptive use, health status, use of health care and health insurance, relationships among co-resident and non- resident family members, processes underlying household decision-making, transfers among family members, and participation in community activities. The IFLS also contains community-level information on physical and social environment, infrastructure, employment opportunities, food prices, access to health and educational facilities, and the quality and prices of services available at those facilities.

Similar to the method used by Kirchberger (2017), we examine the impact of the 2006 Yogyakarta earthquake and conduct difference-in-differences approach using the 2000, 2007, and 2014 surveys. The 2007 IFLS took place approximately 600 days after the Yogyakarta earthquake and we estimate the short-term effect of the earthquake on child enrollment as well

as child labor (while the reconstruction activities are taking place). The 2014 IFLS tracks the same individuals who were 0-14 years old during the 2007 IFLS and thus we investigate their education level as well as their labor market outcome approximately 8 years after the earthquake.

To measure exposure to the earthquake, we use data on the intensity measure of the Yogyakarta earthquake from the United States Geological Survey. In particular, we use the ShakeMap to estimate the modified Mercalli intensity at each village in our sample. Figure 1 shows the intensity map using data from the U.S. Geological Survey.

Table 1 shows summary statistics at the baseline year 2000 by earthquake intensity. 17% (column 3) of households in the most affected region succeeded in borrowing money compared to 6% of households in the control region (column 1). In the high intensity region, 52% owned farmland as opposed to 21% in the control region. Similar percentage of households run non-farm business across different regions. School attendance and educational attainment are the highest among children living in the most affected regions, and child labor is the lowest in those regions. Since we are employing the difference-in-differences method, the initial difference shown in Table 1 is not a particular concern as the impact of the earthquake is shown by the difference in changes between regions. We show that the earthquake-affected region follows a common trend with the non-affected region prior to the earthquake in Section 6.1.

Table 1: Summary Statistics (2000)

	(1)		(2)		(3)		(4)	
	Control		Mid Intensity		High Intensity		Total	
	Mean	N	Mean	N	Mean	N	Mean	N
Loan	0.06	6552	0.08	4529	0.17	1829	0.08	12910
Own farmland	0.21	1443	0.30	1103	0.52	490	0.29	3036
Own business	0.51	1443	0.49	1103	0.49	490	0.50	3036
7-18 currently attending school	0.92	969	0.92	679	0.99	230	0.93	1878
Years of education (7-14)	4.21	969	4.15	679	4.95	230	4.28	1878
Child labor (5-15)	0.04	1385	0.03	945	0.01	317	0.03	2647

Note: Mid intensity is defined as communities affected by the 2006 Yogyakarta earthquake with Mercalli Modified Intensity 3-5, and high intensity is defined as communities affected by the Yogyakarta earthquake with Mercalli Modified Intensity over 5. Control region is defined as communities within Java Islands not affected by the Yogyakarta earthquake.

5 Empirical Strategy

5.1 Identification Strategy

This paper exploits the exogenous nature of the earthquake to identify the short-term and long-term impacts of the 2006 Yogyakarta earthquake. Under the assumption that communities affected by the Yogyakarta earthquake followed a parallel trend with those not affected by the earthquake, we use a difference-in-differences strategy using the following specification:

$$Y_{ijt} = \alpha_0 + \beta_1 post_{2007} + \beta_2 post_{2014} + \beta_3 mid\_intensity_j + \beta_4 high\_intensity_j + \beta_5 (mid\_intensity_j * post_{2007}) + \boldsymbol{\beta_6 (high\_intensity_j * post_{2007})} + \beta_7 (mid\_intensity_j * post_{2014}) + \boldsymbol{\beta_8 (high\_intensity_j * post_{2014})} + X_{it} + \gamma_k + \varepsilon_{ijt}, \quad (1)$$

where Y_{ijt} denotes the outcome variables of interest (education and child labor) for individual i living in community j at time period t. $mid\_intensity_j$ equals to 1 if community j was affected by the 2006 Yogyakarta earthquake with Mercalli Modified Intensity 3-5 and $high\_intensity_j$ equals to 1 if community j was affected by the 2006 Yogyakarta earthquake with Mercalli Modified Intensity over 5. $post_t$ equals to 1 if the survey was collected in 2007 (or 2014 for long-term analysis), X_{it} is a vector of village, household and individual level control variables, and γ_k is a district (kabupaten) fixed effect.

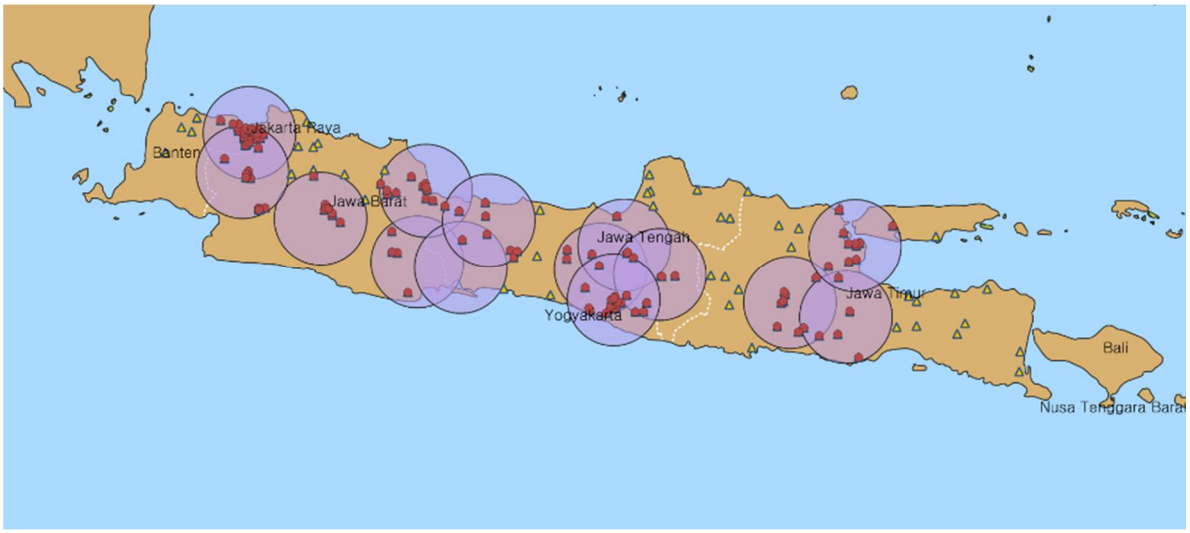
5.2 Sample Selection

Since there are several islands within Indonesia, we restrict the sample to Java Islands where Yogyakarta is located. Also, the communities affected by the earthquake are relatively urbanized compared to other communities in Java Islands, and we further restrict the sample following the method used by Kirchberger (2017).[1] Following Kirchberger (2017), we select 14 cities within Java Islands with more than 250,000 residents and communities within circles with a radius of 50km around the 14 cities are included in our sample. Figure 2 shows the map of communities included in our sample. Red circle indicates the communities included in our sample, while yellow triangle indicates communities excluded from the sample. In order to reduce attrition bias, we also exclude households that moved to another community since 2000. In addition, migrants are likely to be different from non-movers: The richer and more educated

[1] When including rural communities in our analysis, results rarely change.

are likely to migrate to non-affected regions. Also this sample selection would mitigate the concern of changes in composition between treated and no-treated regions. We also test difference in observable characteristics between migrants and non-migrants.

Figure 2: Sample Selection



6 Estimation Results

6.1 Pre-trends

Although we exploit the exogenous nature of the earthquake, it is important to ensure that villages affected by the earthquake follow similar trajectory relative to the villages not affected by the earthquake in terms of our main outcome variables. In order to test the parallel trend, we follow the standard method from the literature, which is to run placebo regressions before the earthquake. Specifically, we compare outcomes in the year 2000 to those in 1997. Tables 2 and 3 do not show any significant effect on community and household outcomes except education in the regions with high intensity, although it is marginally significant.

Table 2: Pre-trend Analysis Using Community Characteristics

VARIABLES	(1) Paved road	(2) Electricity	(5) New road	(6) Road construction	(7) New hospital
Intensity 3-5	-0.038	-0.346***	-0.192***	-0.244***	0.012
	(0.038)	(0.095)	(0.071)	(0.074)	(0.038)
Intensity over 5	-0.112**	-0.127	-0.269***	-0.346***	0.037
	(0.048)	(0.123)	(0.090)	(0.094)	(0.049)
Year 2000	0.025	-0.012	-0.064	-0.128**	0.051
	(0.031)	(0.078)	(0.058)	(0.060)	(0.031)
(Intensity 3-5 * Year 2000)	0.051	0.141	0.115	0.103	-0.000
	(0.054)	(0.136)	(0.101)	(0.105)	(0.054)
(Intensity over 5 * Year 2000)	0.074	0.062	0.064	0.178	-0.101
	(0.069)	(0.173)	(0.128)	(0.134)	(0.069)
Constant	0.962***	0.577***	0.269***	0.346***	0.012
	(0.022)	(0.055)	(0.041)	(0.042)	(0.022)
Observations	274	274	274	274	274
R-squared	0.040	0.063	0.064	0.092	0.019

Table 3: Pre-trend Using Household Characteristics

VARIABLES	(1) Have electricity	(2) Access to Pipe water	(3) Own toilet	(4) Years of education (10-14)	(5) Child Labor
Intensity 3-5	-0.027	0.037	-0.050	0.332	0.001
	(0.020)	(0.060)	(0.068)	(0.215)	(0.008)
Intensity over 5	0.073**	0.101	0.114	0.912***	0.008
	(0.035)	(0.093)	(0.110)	(0.341)	(0.008)
Year 2000	0.012	0.019	0.032**	0.321**	0.017**
	(0.009)	(0.014)	(0.013)	(0.138)	(0.007)
(Intensity 3-5 * Year 2000)	0.030	0.001	-0.000	-0.067	0.005
	(0.024)	(0.036)	(0.024)	(0.221)	(0.009)
(Intensity over 5 * Year 2000)	-0.004	0.021	0.016	0.331*	-0.009
	(0.013)	(0.019)	(0.026)	(0.193)	(0.010)
Constant	0.980***	-0.080	1.026***	5.230***	-0.039**
	(0.038)	(0.125)	(0.126)	(0.406)	(0.015)
Observations	24,688	24,688	24,688	2,450	4,484
R-squared	0.349	0.385	0.153	0.130	0.023

6.2 Overall Impact

Table 4 shows that communities affected by the earthquake with an intensity over 5 were more likely to experience new events such as new road opening, road construction, and introduction of new hospital. The majority of communities that experienced introduction of infrastructure reported that the newly built infrastructure was better than before. This implies that earthquake-

affected communities may have benefitted from improved public infrastructures in the aftermath of the earthquake as reported in the 2007 Java Reconstruction Fund Report.

Table 4: Introduction of Community Infrastructure

	(1)	(2)	(3)	(4)
VARIABLES	New road opening	Road construction	New hospital	New school
Year 2007	-0.179***	-0.000	0.025	0.141***
	(0.050)	(0.064)	(0.040)	(0.043)
Year 2014	-0.101**	0.002	-0.025	0.130***
	(0.050)	(0.064)	(0.040)	(0.043)
Intensity 3-5	-0.076	-0.141*	0.012	0.000
	(0.061)	(0.079)	(0.049)	(0.052)
Intensity over 5	-0.205***	-0.168*	-0.064	0.000
	(0.079)	(0.101)	(0.063)	(0.067)
(Intensity 3-5)*post2007	0.103	0.154	-0.051	-0.115
	(0.087)	(0.112)	(0.069)	(0.074)
(Intensity over 5)*post2007	0.479***	0.450***	0.174*	-0.041
	(0.112)	(0.143)	(0.089)	(0.095)
(Intensity 3-5)*post2014	0.127	0.202*	0.050	0.075
	(0.087)	(0.112)	(0.069)	(0.074)
(Intensity over 5)*post2014	0.251**	0.047	0.025	-0.029
	(0.112)	(0.143)	(0.089)	(0.095)
Constant	0.205***	0.218***	0.064**	-0.000
	(0.035)	(0.045)	(0.028)	(0.030)
Observations	410	410	410	410
R-squared	0.058	0.049	0.027	0.067

Table 5 shows that households affected by the earthquake are more likely to get loans and own businesses in the short-term. Also, they are more likely to experience a decrease in asset index in the short-term.

Table 5: Impact of Earthquake on Household Outcomes

	(1)	(2)	(3)	(4)
VARIABLES	Loan	Own farmland	Own business	Asset Index

Year 2007	0.0346***	-0.0466***	-0.0688***	-0.0230
	(0.0131)	(0.0133)	(0.0169)	(0.0504)
Year 2014	0.117***	-0.0687***	-0.109***	0.0528
	(0.0183)	(0.0136)	(0.0184)	(0.0567)
Intensity 3-5	0.0324	0.0560	0.0219	0.132
	(0.0229)	(0.0493)	(0.0359)	(0.0847)
Intensity over 5	0.132***	0.287***	0.0449	0.742***
	(0.0297)	(0.0595)	(0.0472)	(0.141)
(Intensity 3-5)*post2007	0.0391	0.0147	0.0442*	0.0635
	(0.0238)	(0.0205)	(0.0249)	(0.0804)
(Intensity over 5)*post2007	0.0856***	0.00674	0.0551*	-0.155
	(0.0285)	(0.0237)	(0.0296)	(0.115)
(Intensity 3-5)*post2014	0.0358	-0.0167	0.0536*	-0.127
	(0.0311)	(0.0193)	(0.0297)	(0.0878)
(Intensity over 5)*post2014	0.0425	-0.00252	0.0530	-0.365***
	(0.0400)	(0.0290)	(0.0434)	(0.128)
Constant	0.299***	0.148**	0.539***	0.950***
	(0.0499)	(0.0722)	(0.0675)	(0.262)
Observations	8,511	8,511	8,511	8,360
R-squared	0.067	0.309	0.052	0.100

Table 6 shows that the earthquake has a statistically significantly negative impact on education. Two years after the Yogyakarta earthquake, there is a drop in years of education for children 7-14 by 0.51 years in the short term and 0.36 years in the long term.[2] Child labor increases 2.2 and 2 percentage points in the short and long terms, respectively.

Table 6: Impact of Earthquake on Education and Child Labor

	(1)	(2)	(3)	(4)

[2] Following Fitzsimons (2007), we use years of education of the child to measure level of education.

VARIABLES	Currently at school (7-14)	Years of education (7-14)	Years of education (15-20)	Child primarily working in the past month (5-15)
Year 2007	0.002	0.091	0.336*	-0.013*
	(0.014)	(0.112)	(0.181)	(0.007)
Year 2014	0.016	-0.291**	0.630***	-0.023***
	(0.017)	(0.140)	(0.219)	(0.005)
Intensity 3-5	0.022	0.023	0.085	-0.011
	(0.017)	(0.128)	(0.243)	(0.008)
Intensity over 5	0.094***	0.708***	0.686*	-0.029***
	(0.027)	(0.196)	(0.365)	(0.006)
(Intensity 3-5)*post2007	0.021	0.022	0.115	0.004
	(0.019)	(0.130)	(0.257)	(0.010)
(Intensity over 5)*post2007	-0.013	-0.506***	-0.044	0.022**
	(0.020)	(0.186)	(0.355)	(0.010)
(Intensity 3-5)*post2014	0.017	0.056	-0.146	0.009
	(0.023)	(0.170)	(0.321)	(0.010)
(Intensity over 5)*post2014	-0.036	-0.364*	-0.758*	0.020**
	(0.025)	(0.213)	(0.397)	(0.008)
Constant	0.269*	-11.63***	-39.78***	0.127***
	(0.141)	(0.623)	(6.706)	(0.022)
Observations	5,009	5,009	3,891	7,237
R-squared	0.058	0.664	0.050	0.057

6.3 Impact of Loan

First, we would like to understand the impact of loan or microfinance in mitigating the negative impact of the earthquake. In our study, we measure access to finance following Gertler et al. (2006) by using distance to bank, including microfinance institutions. In Indonesia, there are two types of banks, Bank Rakyat Indonesia (BRI) and People Credit Bank (BPR). BRI mainly provides financial services for "better-off" poor and non-poor households, while BPR mainly aims to provide loans for micro enterprises. Following the earthquake, donor agencies tried to help micro and small business owners in Yogyakarta by providing funds to BPR (GTZ 2007). Since we are interested in the mitigating impact of loans provided to micro-enterprises following the earthquake, a household takes value 1 if the household is located within 1km from a BPR and 0 otherwise. In our study, the variable "child labor" takes value 1 if a child has worked for wages, family farm businesses or family non-farm businesses in the past month.

As shown in Table 7, households affected by the earthquake with access to credit are more likely to own a business in both the short and long terms. At the same time, households

affected by the earthquake, but did not have access to loans, are more likely to engage in farm business.

Table 7: Impact of Earthquake on Farm/Non-Farm Business by Distance to Bank

	(1)	(2)	(3)	(4)
	Bank	*No Bank*	*Bank*	*No Bank*
VARIABLES	Own farmland		Own business	
Year 2007	-0.009	-0.043***	-0.304***	-0.062***
	(0.049)	(0.015)	(0.045)	(0.017)
Year 2014	0.006	-0.066***	-0.333***	-0.118***
	(0.036)	(0.015)	(0.062)	(0.019)
Intensity 3-5	0.040	0.058	-0.181**	-0.000
	(0.048)	(0.059)	(0.077)	(0.038)
Intensity over 5	0.071	0.359***	-0.102	-0.003
	(0.046)	(0.065)	(0.070)	(0.050)
(Intensity 3-5)*post2007	-0.062	0.022	0.224***	0.038
	(0.061)	(0.030)	(0.069)	(0.026)
(Intensity over 5)*post2007	0.020	0.101*	0.308***	-0.004
	(0.069)	(0.052)	(0.057)	(0.048)
(Intensity 3-5)*post2014	-0.108**	-0.027	0.219***	0.065**
	(0.053)	(0.024)	(0.076)	(0.032)
(Intensity over 5)*post2014	-0.035	0.000	0.239***	0.089*
	(0.061)	(0.042)	(0.075)	(0.047)
Constant	0.529***	0.092	0.726***	0.524***
	(0.087)	(0.071)	(0.108)	(0.066)
Observations	2,206	6,816	2,206	6,816
R-squared	0.201	0.333	0.058	0.053

Note: Bank includes households living within 1 km from a BPR bank. Basic controls and district fixed effects are included and standard errors are clustered at community level.

6.4 Loan and Education/Child Labor

Table 8 shows that when having access to bank, education decreases by 0.74 years in the short term and school attendance declines by 10 and 8 percentage points in both terms among children most affected by the earthquake. Consistently, Table 9 shows that when having access to credit, child labor increases by 7.3 and 4.7 percentage points in both terms. Child education in households located far from a bank decreases by 0.47 years in the long term (Table 8, column 4) and consistently, their labor increases by 2.9 percentage points in the long term (Table 9, column 2). This might be because households without access to credit right after the earthquake

could get loans in the long run and start new businesses that require child labor in the early stage.

Our study in general shows that children under 15 are more likely to be working with increased access to credit, while children living in households without access to finance are less likely to be engaging in child work including paid work as well as helping out in a family business. This result seems counter-intuitive at first as we expect households to use child labor as a means to smooth consumption. At the same time, following the Yogyakarta earthquake, most of the loans were provided and used to help small and micro-businesses. Those with access to microfinance are more likely to receive help from their children, while those without access to microfinance were less likely to able to restart their businesses and did not need to receive help from their children.

Table 8: Impact of Earthquake on Education by Distance to Bank

	(1)	(2)	(3)	(4)
	Bank	*No Bank*	*Bank*	*No Bank*
VARIABLES	Currently at school (7-14)		Years of education (7-14)	
Year 2007	0.073	-0.006	0.347	0.067
	(0.044)	(0.016)	(0.396)	(0.127)
Year 2014	0.059	0.017	-0.036	-0.308*
	(0.044)	(0.020)	(0.435)	(0.162)
Intensity 3-5	0.133**	0.006	0.767	-0.059
	(0.058)	(0.018)	(0.484)	(0.140)
Intensity over 5	0.112***	0.106***	0.342	0.894***
	(0.039)	(0.032)	(0.434)	(0.203)
(Intensity 3-5)*post2007	-0.086*	0.018	-0.464	-0.001
	(0.049)	(0.022)	(0.442)	(0.147)
(Intensity over 5)*post2007	-0.099*	0.012	-0.740*	-0.218
	(0.051)	(0.026)	(0.435)	(0.197)
(Intensity 3-5)*post2014	-0.106**	0.026	-0.453	0.034
	(0.052)	(0.027)	(0.461)	(0.205)
(Intensity over 5)*post2014	-0.080*	-0.041	-0.366	-0.468*
	(0.048)	(0.033)	(0.502)	(0.253)
Constant	0.590***	0.161	-9.672***	-12.09***
	(0.151)	(0.157)	(0.992)	(0.694)
Observations	1,059	3,884	1,059	3,884
R-squared	0.045	0.067	0.731	0.648

Table 9: Impact of Earthquake on Child Work by Distance to Bank

	(1)	(2)
	Bank	*No Bank*
VARIABLES	Child primarily working (7-14)	
Year 2007	-0.042*	-0.010
	(0.023)	(0.010)
Year 2014	-0.045*	-0.027***
	(0.024)	(0.007)
Intensity 3-5	-0.021	-0.011
	(0.025)	(0.011)
Intensity over 5	-0.076***	-0.037***
	(0.019)	(0.007)
(Intensity 3-5)*post2007	0.009	0.005
	(0.027)	(0.015)
(Intensity over 5)*post2007	0.073***	-0.004
	(0.025)	(0.013)
(Intensity 3-5)*post2014	0.036	0.006
	(0.029)	(0.013)
(Intensity over 5)*post2014	0.047*	0.029***
	(0.025)	(0.010)
Constant	0.153*	0.326***
	(0.078)	(0.053)
Observations	1,230	4,533
R-squared	0.045	0.076

7 Conclusion

In this paper, we use an exogenous shock that happened in Indonesia to understand how children's school and work activities change following shocks and how the relationship differs by access to credit. In particular, we study the impact of the 2006 Yogyakarta earthquake on school enrollment and child labor among Indonesian children.

We find that, following the Yogyakarta earthquake, educational attainment decreased among children under 15 and child working increased. This effect was observed especially among households with access to credit and those that run family-owned business. This finding suggests that the micro-loans rolled out following the earthquake had an impact on households to restart their home-based business, and in turn led households to rely on child labor. Our study provides important policy implications for the way in which reconstruction aid should be given in the aftermath of a natural disaster. One policy that can be considered is attaching

conditions related to schooling when providing micro-loans for households with children under 15.

In future work, we will use alternative sample selection including rural communities and different definition of financial institutions. Further, we will investigate heterogenous effects by gender as boys might be more demanded as labor force and by the number of siblings as more siblings might weaken the need for child labor.

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