Conflict, Access to Markets, and Self-Employed Shopkeepers in Rural Peru

Abstract

This paper examines how violent conflict affects the decision to become a self-employed shopkeeper or vendor, proposing reduced access to markets through road insecurity as a new channel of conflict transmission. In a conflict situation, the risk of road assaults increase the cost of transporting goods. The impact of distance to the next market on the probability of opening a shop is thus expected to differ between conflict and non-conflict districts. I test this prediction in the context of the Peruvian armed internal conflict. I find that the probability of opening a shop decreases with distance to the next market in conflict districts, and that this effect is exacerbated in districts with high conflict intensity and long conflict duration. Several robustness checks provide further support to this result, showing that the result is not driven by geographic and cultural similarities of districts closer to the epicenter of the conflict or by general effects on self-employment.

"... y regresamos a nuestra casa de miedo; de cierto ya no salíamos ya a la calle o no había negocio. Ya no había ni qué hacer comer a nuestros hijos, ya no entraba ni a la tienda nadie, se ha cerrado no más ya, adentro estábamos con miedo."

"... frightened, we returned to our house; we did not go out in the street anymore, neither was there any business. There was not even anything left to feed to our children, nobody entered the shop anymore, it was simply closed, and we were inside, frightened."

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1 Introduction

This paper assesses the impact of violent conflict on self-employment as a shopkeeper or vendor in rural Peru of the 1990s. As highlighted by Brück et al. [2013], "entrepreneurs in rural areas are often the worst affected" by conflict. I examine a new channel through which conflict can affect the self-employment decision, namely reduced access to markets through road insecurity.

In rural Peru, over 50% of the non-agricultural self-employed work as shopkeepers or street vendors. Many of the goods they sell are not produced in the same village, but need to be transported there. In a peaceful context, distance to the next market might increase the profitability of a shop, since distance makes it more efficient to bundle transportation. During the armed internal conflict, however, the insurgent group[1] Sendero Luminoso (Shining Path) tried to impose a subsistence economy and "starve out the cities". They prohibited villagers to participate in markets, persecuted those who did not comply, and assaulted vehicles transporting goods (Del Pino [1996]). Thinking of road insecurity as an increase in transportation cost, it should lead to a reduction in vendors' profits. Ceteris paribus, I expect road insecurity to deter people from becoming a self-employed shopkeeper or vendor.

Identifying road insecurity is not straightforward, as data on road assaults is not available for the Peruvian conflict. Therefore, I use an interaction term between conflict and the distance of a village to the next market to capture road insecurity. If the road security hypothesis is correct, the impact of distance to the next market should differ between conflict and non-conflict districts. I regress self-employment as a shopkeeper or street vendor on district-level conflict, the distance between the village and the next market, and the interaction term between conflict and distance to market. The results suggest that distance to market has a negative impact on the probability of working as a self-employed shopkeeper in conflict districts. This finding is in line with my hypothesis, according to which conflict affects the occupation decision via the channel of road insecurity. It is robust to a variety of specifications, in which I control for other factors influencing the occupation decision.

Several robustness checks provide support for the road insecurity hypothesis, and raise interesting further questions on the underlying mechanisms. The negative effect of distance to market on the decision to work as a vendor is neither driven by unobserved common characteristics of the districts around Ayacucho (the epicenter of the conflict) nor by a general effect of distance to market on non-agricultural self-employment. Conflict intensity, measured as the number of fatal victims in a district, increases the negative impact of distance to market, as does conflict duration. Finally, the results appear to be driven by villages connected to roads of high quality.

While this paper focuses on "imports" to rural areas, which has implications for the income of self-employed shopkeepers and the consumption opportunities of rural populations, the importance of conflict-induced road insecurity is likely to also affect agricultural and manufacturing production by reducing access to markets in the country and beyond. If remoteness exacerbates an overall

[1] In its decree to establish the Truth and Reconciliation Commission (CVR), the Peruvian government qualified Sendero Luminoso as a terrorist organization. The CVR itself, however, distinguishes between terrorist and non-terrorist actions in its analysis. As this paper does address the legal dimension of the conflict, I use the term insurgency when referring to Sendero Luminoso.

negative impact of conflict on economic activity, and if such impacts are persistent over time, post-conflict reconstruction efforts may need to pay particular attention to rural areas.

2 Literature Review

The self-employment literature has traditionally focused on the importance of credit constraints, such as the classic papers by Evans and Jovanovich [1989] and Blanchflower and Oswald [1998] as well as recent work, for example Blattman et al. [2014] or, in a post-conflict context (Bosnia), Demirgüc–Kunt et al. [2011]. Other determinants of self-employment which have been highlighted include age, household characteristics, parents' employment status, education, experience, and alternative labor market options (Georgellis et al. [2005], Le [1999]).

Most of the literature is concerned with industrialized countries, but a number of recent studies have analyzed the determinants of self-employment in developing country contexts. Paulson and Townsend [2004] find that financial constraints restrict entrepreneurial activity in Thailand. The importance of infrastructure for the household decision to establish a nonfarm enterprise is emphasized in Deininger et al. [2007] for Sri Lanka, and in Jin and Deininger [2008] for Tanzania. Both studies report significant positive effects of different types of infrastructure, such as electrification, distance to a bank, credit access, public transport, and road quality. Escobal [2001] studies the determinants of income shares by activities in Peruvian households using the 1997 Living Standards Measurement Survey (LSMS). He finds a positive impact of education, electricity and credit access and a negative impact of distance to market on the share of income stemming from non-agricultural self-employment activities.

As to conflict and entrepreneurship, in their introduction for a 2011 special issue of the Jounal of Small Business and Entrepreneurship on this topic, Brück et al. [2011] stated that "the relationship between conflict and entrepreneurship, and small business in particular, is not well understood in the scientific literature". Possibly the first in this relatively small literature, Deininger [2003] finds that civil strife reduces non-agricultural enterprise start-ups at the household level in Uganda. Bozzoli et al. [2013] focus on the impact of conflict on self-employment in Colombia. They find that a net influx of displaced people has increased self-employment in the services sector in affected municipalities, while violent attacks have increased self-employment in agriculture.

A number of studies have addressed the microeconomic consequences of conflict on firms, households and individuals. While they do not necessarily address entrepreneurship per se, they yield insights on the dynamics of conflict and production that can be useful for understanding self-employment, too. At the firm level, Collier and Duponchel [2013] find persistent negative effects of conflict intensity on firm size in Sierra Leone. They also detect a loss of human capital, a phenomenon they call "forgetting by not doing". Camacho and Rodriguez [2013] find that guerrilla and paramilitary attacks increase the probability of planing exit for manufacturing plants in Colombia. Singh [2013] finds a negative impact of terrorist killings on farmers' long term investment in agricultural technology in Punjab (India). Kondylis [2010] studies the labour market impact of

displacement of the war in Bosnia and Herzegovina and finds that Bosnians displaced during the war are less likely to be employed afterwards.

In terms of socio-economic outcomes, Justino and Verwimp [2013] find that households in Rwanda are more likely to fall into poverty after the conflict if they lost their house or land, thus highlighting the importance of the channel of the destruction of assets. Using panel data from Burundi, Mercier et al. [2015] demonstrate long-term effects of conflict on different measures of household-level deprivation, and highlight that these adverse effects have mostly concerned poor households. For Rwandan households and localities, Serneels and Verpoorten [2015] find persistent negative effects of conflict intensity on consumption.

While the literature on conflict and entrepreneurship has thus grown since 2011, not least as a result of the above-mentioned special issue in the Jounal of Small Business and Entrepreneurship and a subsequent one in the Journal of Conflict Resolution in 2013, Brück et al. [2017] affirm that the "gap in the literature on local-level entrepreneurship [...] in post-conflict settings" is not closed yet.[2] This paper contributes to reducing this gap by suggesting a new channel through which violent conflict affects the self-employment decision, namely road insecurity. Since this channel is of particular importance for rural shopkeepers and vendors, who bring in goods in order to sell them in their village, my analysis concentrates on these professions. While highlighting road insecurity, I control for other determinants of self-employment, such as education or credit access, which may be affected by conflict.

The importance of market access for agricultural producers in developing countries has been highlighted by numerous studies, for example Jacoby [2000]. To my knowledge, the impact of distance to market on vending activities in rural areas has not yet been investigated. In the conflict literature, Verpoorten [2009] mentions the risk of cattle raiding on the road (on the way to a possible buyer) in her paper on cattle sales by Rwandan households, but does not explicitly test this hypothesis or measure road assaults. Brück et al. [2013] highlight that the markets that are "closed or too dangerous to travel to" can be a channel how conflict affects agricultural producers, but do not address vending activities. Besides investigating this new channel of conflict transmission, this paper is also the first one to explicitly examine the relation between market access and vending activities.

3 The Peruvian Armed Internal Conflict

Peru was just undergoing a transition from a military dictatorship to democracy and had elected a new government when the Maoist insurgent group Sendero Luminoso declared a "people's war" and initiated violence in 1980 in the Central Andean province of Ayacucho. Initially, the conflict did not figure among the government's main preoccupations, but was perceived as a local delinquency problem. But when Sendero Luminoso enlarged the scope of its activities, and the police was not able to contain them, the government decided to deploy the military to the conflict zones in 1982.

[2]For a more detailed overview on this literature, see Brück et al. [2011], Brück et al. [2013] and Brück et al. [2017].

The conflict spread from Ayacucho to other regions of the country, mainly neighboring Andean provinces, Lima and the central jungle region. Parties to the conflict included Sendero Luminoso and Movimiento Revolucionario Túpac Amaru (MRTA), another left-wing insurgent group, as well as police, armed forces and rural self-defense committees (rondas campesinas). Violence escalated, and human rights violations by both insurgents and state forces were numerous. The total number of dead and disappeared during the conflict is estimated 70,000 by the Truth and Reconciliation Commission (Comisión de la Verdad y Reconciliación, CVR).

The main violent phase of the conflict ended in 1992 with the capture of Abimael Guzmán, the head of Sendero Luminoso, in Lima. However, violence continued on a lower scale during the autocratic government of Alberto Fujimori, which lasted until 2000 (Comisión de la Verdad y Reconciliación [2003]). Until today, isolated attacks take place in the Andean and jungle regions of the country, where Sendero Luminoso is still cultivating links to drug trafficking (Huerto Amado [2012]).

According to the CVR, the majority of victims were among the rural, historically excluded population, which was symptomatic of the divisions within the Peruvian society. The extensive research of the CVR focused on the numerous human rights violations committed in the conflict, paying close attention to the juridical dimension of the conflict, but also the context which enabled its emergence and duration. The conflict also caused profound disruptions of public life and social and economic interactions (Theidon [2001]). The destruction of roads, the assaults, and the ideologically motivated effort of Sendero Luminoso to suppress market activity have affected the local economy, especially in rural areas. The aim of this paper is to contribute to a better understanding of their consequences, which could have persistent implications on rural livelihoods.

4 Data

4.1 Identifying Road Insecurity

Comprehensive data on road assaults is not available for the Peruvian conflict. The Truth and Reconciliation Commission intended to collect data on the exact location of human rights violations recorded, but was only able to do so for 3.4% of all incidents. Out of these, 10% were reported to have occurred on roads, which suggests that road assaults were a non-negligible phenomenon.

Given these data constraints, I suggest to identify road insecurity using an interaction term between a dummy for conflict in a district and the distance between a village and the next market. This methodology relies on the assumption that the risk of being assaulted varies more or less proportionally with the distance of travel. If the interaction term is negative and significant, i.e. the effect of distance to the next market on the decision to work as a self-employed shopkeeper or vendor is more negative in conflict than in non-conflict districts, this suggests that road insecurity deters people from choosing these occupations.

4.2 Data Sources

I use data from the 1994 Living Standards Measurements Survey (LSMS, conducted by the Instituto Nacional de Estadística e Informática [1994]) for employment status, distance to market and individual, household and village-level controls. The LSMS comprises individual and household modules on a variety of topics, as well as a community questionnaire. For my analysis, I restrict the sample to adults (15 years and older) from rural areas who are active in the labor market and for whom all necessary information is available.

96.5% of the individuals in my initial sample live in villages which are at most 26 km away from the next market. The remaining 3.5% live in those 7 villages (out of 182) which lie between 47 and 84 km away from the next market. I exclude these observations, since they considerably alter the magnitude and significance of the regression coefficients (see robustness check 6.5) and might be caused by errors. My final sample comprises 2,699 individual observations from 175 villages in 94 districts.

For all conflict variables, I use yearly district-level data from the Peruvian Truth and Reconciliation Commission on deaths and disappearances during the armed internal conflict. Distance to Ayacucho is measured with respect to each district capital. I constructed the data using the online tool "Distance Calculator Peru [????]", which measures the air distance between locations based on their latitude and longitude. Altitude is obtained for each district capital from Google Earth. Temperature and precipitation are measured at department level, by constructing the average annual value between 1997 and 2006. The climate variables are obtained from the Compendio Estadistico 2007, an extensive statistical publication of the Instituto Nacional de Estadística e Informática [2007]. District-level data on education is constructed from the 1993 national census conducted by the Instituto Nacional de Estadística e Informática [1993].

4.3 Descriptive Statistics

4.3.1 General

Summary statistics of the main variables used in the analysis are reported in table 3. 13% of the 2698 working adults in my sample are shopkeepers or vendors. With 39%, women are underrepresented in the sample, which is because they are less likely to be participating in the labour force than men. The average age is 37 years, and 58% of respondents have completed primary education. Households are, on average, comprised of 3.7 adults and 2.4 children between 0 and 14 years. Only 16% of individuals live in households that reported access to some form of credit. This low percentage may be explained by the fact that the Peruvian microcredit sector only took off in the early to mid-1990s, and might not have reached many rural areas in 1994. 24% of respondents live in households with electricity. Mean annual consumption expenditures per adult equivalent (counting children between 0 and 14 years as 0.5 adults), which include the value of consumption from own production, amount to 907 Nuevo Soles, which corresponds to approximately 440 US dollars. 70% of respondents live in villages that have grown since 1991, and only 6% in villages that have shrunk. 53% live in villages that benefitted from investments by the Peruvian Social Fund, FONCODES, which indicates that they are relatively poor. 14% of individuals live in villages with a positive labour market evolution

since 1991 ("it has become easier to find a job", according to village respondents), and 59% in villages with a negative labour market evolution ("it has become more difficult to find a job"). Distance to the next market, a core variable in this analysis, ranges between 0 and 26km in the main sample[3], with a mean of 5.9km. The main road leading to the villages is a paved highway for 20% of respondents, and unpaved highway for 26%, a dirt road for 33%, a horse path for 14% and a river for 7%. District level education measures the percentage of persons 15 and older with at least one year of secondary education, and lies at 45% on average. Altitude ranges from 7 to 4191 meters above the sea level, and annual precipitation from 7 to 2701mm, which illustrates the large variation in climatic zones in the country. Distance to Ayacucho, the epicenter of the armed internal conflict, a variable that I will use in one of the robustness checks, ranges from 0 to 1192km. 37% of respondents live in districts that were affected by the armed internal conflict between 1980 and 1992, the main conflict period, and district-level conflict intensity, measured by the number of victims reported to the Truth and Reconciliation Commission, is 11 on average, with a maximum of 311.[4]

4.3.2 Shopkeepers and Street Vendors

Table 4 reports descriptive statistics on non-agricultural self-employment. 22% of the people in my sample list some form of non-agricultural self-employment as their primary or secondary activity in the year before the survey, with a significantly higher proportion in conflict (26%) than in non-conflict districts (20%). More than half of them (56%) work as shopkeepers or street vendors as their primary non-agricultural self-employment activity. Other types of non-agricultural self-employment activities are significantly less common: the second- and third-largest categories, tailors and artisans, regroup 14% and 13% of the non-agricultural self-employed. There is no significant difference in the distribution of self-employment activites between conflict and non-conflict regions, with the exception of food production, which is more common in conflict regions. This may indicate that importing processed food is more difficult in conflict regions, which would favour producing it locally, even at a small scale.

Table 5 presents all regression variables by occupation, comparing vendors to non-vendors.[5] A high percentage of shopkeepers and vendors are female (62%, compared to 36% of women in the rest of the sample). Shopkeepers and vendors are more likely to have completed primary education than people working in other occupations. Their households have higher than average consumption expenditures, credit access and electricity. Shopkeepers' villages are not closer to markets, but benefit from higher quality roads, with unpaved highways being more and dirt roads being less common than for other villages. Finally, shopkeepers are slightly more likely to live in districts affected by the armed internal conflict

[3] There are a number of outliers, which are discussed in section 6.6.

[4] This number is an underestimation of the true number of victims, as not all victims were reported to the Commission.

[5] This includes individuals for whom being a shopkeeper or vendor is a secondary non-agricultural self-employment occupation, which is the case of 12 respondents.

4.3.3 Conflict versus Non-Conflict Districts

Summary statistics comparing individuals from conflict to those from non-conflict districts are presented in table 6. In conflict districts, 15% of individuals work as shopkeepers or vendors, compared to 12% in non-conflict districts. This difference is statistically significant at the 10% level. Individuals in conflict districts are more likely to have completed primary education, and the general education level obtained from the 1993 national census is higher in conflict than in non-conflict districts. Individuals in conflict districts live in villages that are further away from the next market (6.6 km, compared to 5.5 km for those in non-conflict districts) and that have had a relatively favorable labor market evolution. Individuals in conflict districts are more likely to be connected to an unpaved highway or a river, and less likely to be connected to a dirt road or horse path. On average, their districts are significantly closer to Ayacucho, where the conflict started.

5 Theory and Empirical Strategy

5.1 Conflict, Transport Cost and the Occupation Decision

Only 6% of the villages in my dataset have their own market; another 18% are less than 2km away from the next market. The inhabitants of the other 76% of villages have to cover a non-negligible distance to reach the market. Shopkeepers and vendors "import" goods from the market to sell them in their home village. *Ceteris paribus*, a greater distance to the next market is expect to make it more efficient to "bundle" transportation. Therefore, distance to market is expected to raise the profitability of working as a shopkeeper or vendor in a peaceful situation. In a conflict situation, however, vendors travelling to the market risk losing their goods or being injured or killed in an assault. Conflict-induced road insecurity can be understood as an increase in transport cost and thus the cost of supplying products. Anecdotal evidence shows that fear from the insurgents (or the armed forces) caused people to substantially reduce economic and social interaction (Comisión de la Verdad y Reconciliación [2003]. The risk of assaults is assumed to be higher the further individuals need to travel. Therefore, distance to the next market is expected to have a more negative impact on the likelihood of working as a shopkeeper in conflict regions as compared to non-conflict regions.

But conflict also affects profitability through other channels, such as clients' income, and influences other factors of the self-employment decision, such as individual and labor market characteristics. As discussed above, the literature on self-employment identifies a number of variables which influence the occupation decision. Conceptually, they can be divided into two categories: individual and outside factors. Individual factors include personal characteristics such as age, education and physical and intellectual capabilities, but also family characteristics such as household composition, wealth, and access to credit. Outside factors comprise labor market conditions (i.e., alternatives to self-employment) and the profitability of different professional activities given local conditions. As the aim of my estimation strategy is to isolate the effect of road insecurity on the occupation decision, I include a number of control variables to capture the effects of these other channels. These variables will be discussed more in detail in section 5.3.

5.2 The Baseline Equation

I regress a binary variable for working as a self-employed shopkeeper or vendor on a conflict dummy, distance to market and the interaction between these two. Standard errors are clustered at the village level, and different sets of control variables are included. While the outcome is binary, I report OLS results as a baseline, as the coefficients from binary choice models cannot be interpreted directly. I also estimate a logit model and, finally, a complementary log-log (cloglog) model. The latter is motivated by the fact that the dependent variable only takes the value 1 for 13 % of the observations.[6]

$$vendor_i = \beta_1 \cdot distmkt_v + \beta_2 \cdot conflict_d + \beta_3 \cdot conflict_d * distmkt_v + \beta_4 \cdot controls + \epsilon_i \quad (1)$$

The subscript i indicates that the variable is measured at the individual level. v denotes village, and d district level. The different sets of controls vary at individual, household, village, district and department level (for a complete list, see appendix table 5). The dependent variable, *vendor*, takes the value 1 if a person has been working as a self-employed shopkeeper or street vendor as her primary or secondary occupation during the 12 months preceding the survey (i.e. in 1994 or 1993). *conflict* is a binary variable which takes the value 1 when the number of dead and disappeared at district level between 1980 and 1992 is positive, and 0 when no fatal victims were registered in this time period. This covers the entire period of the conflict that has occurred before the self-employment activity of the respondent. The importance of different conflict periods is investigated in detail in robustness check 1. Distance to market (*distmkt*) is measured at village level.[7] Control variables include several individual, household and village-level variables. They are discussed in detail in section 5.3., and a list of all variables and their definitions is included in the appendix.

All specifications are, in addition, estimated including district fixed effects. The conflict variable is then captured by the district fixed effects, as conflict is measured at district level. However, the interaction term between conflict and distance to market can still be estimated, as there is variation in distance to market between the villages within a same district. The interpretation of the interaction coefficient is the same as in the model without fixed effects. In 11 districts, there are no observations of self-employed shopkeeper and vendors in the dataset. The district fixed effect would predict the outcome perfectly in these cases, which is why they are excluded from this analysis. The sample size is therefore reduced to 2,429 observations. Furthermore, in 12 of all districts, there is no within-district variation in distance to market, as there is only one village per district in the dataset. (Out of these, 1 is already dropped from the estimation because it also have no shopkeepers.) For these districts, the interaction between conflict and distance to market is subsumed in the district fixed effect. The fixed effects estimate of the main variable of interest is thus only based on variation within 75 districts. Given the total number of 97 districts, this represents a considerable reduction of the sample size. Therefore, I also report the results from the regressions without fixed effects, which may be affected by district-specific unobservables, but include the information from all data points.

[6] The complementary log-log model is asymmetric around zero, which is why it is used when the outcome of interest is rare. Conditional probability in this model is given by the cdf of the extreme value distribution: $C(x'\beta) = 1 - exp(-exp(x'\beta))$ (Cameron and Trivedi [2005]).

[7] To capture the time-dimension of transport costs, it would be ideal to construct a measure of "effective" distance to market by combining geographic distance with measures of road access and the availability of public transport. Unfortunately, the data is not detailed enough for this endeavor.

A further concern is that other explanatory variables which are correlated with conflict could affect the coefficient of interest. Therefore, I estimate all specifications including interaction terms between all control variables and conflict.

I expect the impact of distance to market to differ between conflict and non-conflict districts. If β_3, the coefficient on the interaction term between conflict and distance, is negative and significant, this supports my hypothesis that conflict-induced road insecurity deters people from becoming a self-employed vendor. The interpretation of interaction terms in binary choice models is, however, not straightforward and will be discussed in further detail in section 5.4.

5.3 Control variables

I control for basic characteristics at the individual and household level, namely age, gender, and household composition (number of children (0-14) and adults in the household). Furthermore, I introduce a number of control variables aimed to capture other important factors in the occupation decision: education, access to capital, infrastructure, migration, labor market conditions and agricultural opportunities.

A person's education is an important determinant of her range of employment options. In particular, skills such as literacy and numeracy may give her a comparative advantage in vending occupations. To control for these effects, I introduce a dummy variable for complete primary education.

Access to capital has been highlighted by the literature as one of the most decisive determinants of self-employment. Individual ability to raise capital is determined by a person's (and her household's) wealth, and by access to credit. I approximate household wealth by including the log of annual consumption expenditures in the regression equation. The variable includes the value of consumption from own production, and is computed per adult equivalent, with children below 15 being counted as 0.5 adults. This measure is not completely exogenous to the occupation decision and the income generated in each individual member's activity. However, alternative measures, such as farm size, durable asset ownership or size of the household dwelling are not completely exogenous either, and consumption expenditures present the advantage of being a more contemporaneous measure of the household's financial situation. To control for credit constraints, I include a self-reported binary measure of credit access. Since the development literature highlights the importance of infrastructure for establishing a nonfarm household enterprise, I include a binary variable indicating whether the household dwelling has electricity or not.

Individuals with entrepreneurial talent or motivation might migrate to villages in which vending activities are particularly profitable, but also be more likely to migrate to escape violence. Bozzoli et al. [2011] highlight that conflict may affect local labor markets through displacement. As a proxy for migratory movements at a more aggregate level, I include dummy variables indicating whether the number of dwellings in the village has increased or decreased since 1991.

The labor market situation in a village is probably one of the most important factors in the individual occupation decision. One potential measure of alternative employment opportunities in

rural areas are agricultural wages. However, their impact on the occupation decision may go into both directions. High agricultural wages may prevent people from becoming vendors, but they may also make vending activities more profitable by raising the income of potential clients. Since my analysis is not directly interested in the impact on wages, I use a more direct measure of alternative opportunities. I combine an indicator of how the labor market in the village has evolved since 1991 with a proxy for the village's economic situation in the beginning of the 1990s.

The LSMS community questionnaire contains a question whether it was easier or more difficult to find a job in 1994 than in 1991. This variable the perceived evolution of the labor market situation during those years, but does not provide a level-level comparison between villages. In order to control for the relative economic situation, I use a binary variable indicating whether the Peruvian Social Fund (FONCODES) has invested in a village until the time of the survey. FONCODES was created in 1991 and started funding a variety of community-based projects in 1992. Resources were allocated using a district-level poverty index and informal on-site assessments. Looking at school infrastructure investments, Paxson and Schady [2002] find that FONCODES effectively targeted poor districts, which is why its activities can be used as a proxy for low economic development. Together, the FONCODES dummy and the recent labor market evolution should therefore capture a village's economic and labor market situation.

Education, an important factor in the occupation decision, played a crucial role in the advent of the Peruvian conflict. The country experienced an unprecedented education expansion between the 1940s and 1960s. With the increased access to education, rural and lower-class Peruvians were hoping for progress and social mobility. The frustration of these expectations made the population more receptive to violent, radical proposals such as those of Sendero Luminoso. Degregori describes the Ayacuchan "Movimiento del 1969", a protest against the abolition of the gratuity of education by the military government, as a *"clarion call, which announced the possibility of the apparition of a phenomenon like Sendero Luminoso, and of its expansion to other places"* (Degregori [2007], p. 6). Furthermore, given their distinguished position in the villages, school teachers (many of them educated at Universidad Nacional San Cristóbal de Huamanga, where the leader of Sendero Luminoso was a professor in the department of education) were instrumental in diffusing the movement's ideology and gaining support among the rural population (Comisión de la Verdad y Reconciliación [2003]). Education could thus be an important source of omitted variable bias, which is why I introduce a measure for the education level in each district, namely the percentage of persons 15 and older with at least one year of secondary education.

Finally, agriculture is the most important source of (self-)employment in rural areas, and might alter the relative attractiveness of non-agricultural self-employment. I therefore include log(altitude) of the district capital and average annual precipitation at the department level as proxies for agricultural opportunities.

5.4 Results

The results from the different models are in line with my hypothesis. The coefficient on the interaction term between conflict and distance to market is negative and significant at the 5% in most cases, at the 10% level in the others. The inclusion of district fixed effects increases the coefficient

of interest, as does interacting all explanatory variables with conflict. The main result is robust to a variety of specifications, in which I include different sets of the control variables described above (see appendix table 6 for a detailed list of variables). It indicates that the likelihood of working as a self-employed shopkeeper decreases with distance to market in conflict districts.

The coefficient on distance to market is insignificant for the baseline specifications (without fixed effects, columns (1), (4) and (7)). These results suggest that distance to market does not influence the decision to work as a shopkeeper in non-conflict districts, but deters individuals from choosing this occupation in conflict districts. With the inclusion of district fixed effects, however, the coefficient on distance to market turns positive and strongly significant. This suggests that, within a given district, distance to market makes individuals more prone to work as a shopkeeper in non-conflict settings. This positive effect of distance is offset in the presence of conflict, in which case the net effect is negative. Conflict per se appears to increase the likelihood of being a vendor, as the coefficient is positive and significant. The reason for this effect cannot be easily determined. While it is, for example, possible that the conflict curtailed other employment opportunities, note that there is no such positive effect for other non-agricultural self-employment activities (see robustness check 6.4).

As mentioned above, the interpretation of coefficients on interaction terms in binary choice models is not straightforward. Norton et al. [2004] highlight that the marginal effect depends on the other covariates, and may even switch signs. Furthermore, its statistical significance also varies between observations. The authors suggest reporting the interaction effects (i.e., the cross partial derivative of the probability) for each observation and their significance plotted against the predicted probability of observing the outcome of interest for each observation. Kolasinski and Siegel [2010] criticize the use of the cross partial derivative and show that the switch in signs can be a mechanical effect driven by the restriction of the outcome variable between zero and one. Greene [2010] questions the usefulness of testing the statistical significance of the interaction effect for each individual, and suggests the use of graphics for a more meaningful analysis. In line with this suggestion, I construct graphs to illustrate the relation between increasing distance to market and the likelihood of working as a vendor in a non-conflict and conflict district respectively. The graphs depict the predictions from the cloglog regression with all control variables. All individual, household, village, district and geographical controls are set at the sample mean. The solid line represents the predicted likelihood of working as a vendor from the cloglog estimation, and the dashed lines represent the 95% confidence interval. The graphs illustrate that, in non-conflict districts, the likelihood to work as a shopkeeper or vendor rises slightly with distance to market (with a very large confidence interval at large distance to market), while in conflict districts, it clearly decreases.

Figure 1: Distance to market and likelihood of working as a shopkeeper/vendor

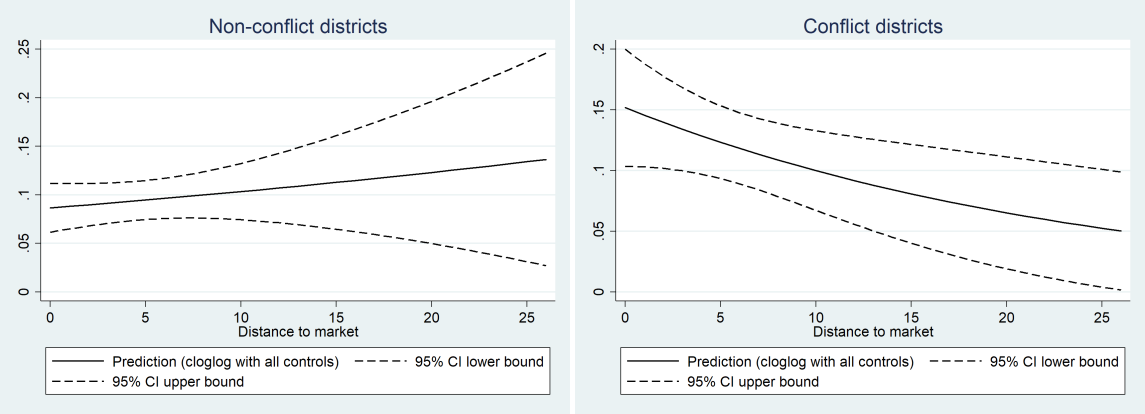


Table 1: Baseline regression: Conflict dummy (1980-92)

	OLS			Logit			Cloglog		
Self-employed shopkeeper or vendor (dummy)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Conflict (1980-92)	0.071**			0.689***			0.613***		
	(0.030)			(0.245)			(0.214)		
Distance to market (km)	0.002	0.005**	0.005**	0.021	0.059***	0.066***	0.019	0.056***	0.064***
	(0.003)	(0.002)	(0.002)	(0.024)	(0.019)	(0.020)	(0.021)	(0.015)	(0.016)
Conflict*Dist. market	-0.007**	-0.007**	-0.008**	-0.071**	-0.071*	-0.086*	-0.064**	-0.067*	-0.086**
	(0.003)	(0.003)	(0.004)	(0.033)	(0.041)	(0.050)	(0.030)	(0.035)	(0.044)
Constant	-0.247*	-0.489***	-0.473***	-5.910***	-8.459***	-9.017***	-5.432***	-7.666***	-8.374***
	(0.131)	(0.136)	(0.163)	(1.319)	(1.371)	(1.743)	(1.173)	(1.178)	(1.563)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2429	2429	2699	2429	2429
(Pseudo) R^2	0.077	0.145	0.155	0.104	0.183	0.197			

* p<0.1, ** p<0.05, *** p<0.01

6 Robustness Checks

This section discusses the results of a variety of robustness checks, which I conduct to corroborate my results and to gain more detailed insights in the mechanisms underlying the relation between distance to market, conflict, and the occupation decision. Tables reporting the respective results are included in the appendix.

6.1 Conflict Intensity

Conflict intensity, measured by the number of victims reported to the Truth and Reconciliation Commision, varied importantly between districts. Among the districts in my sample that were affected by the conflict, 53% count less than 10 reported victims, while 10% count more than 100 victims. I expect that the effect of deterring people living far from the market to work as shopkeepers or vendors is larger in districts with higher conflict intensity.

To test this hypothesis, I replace the conflict dummy in the baseline regression by the number of victims per district. In further specifications, I use dummies for different conflict intensities, namely for low (1-10 victims), medium (11-30 victims) and high (31 and more victims) per district. As pointed out by León [2012], the conflict data collected by the CVR is likely to suffer from measurement error, given that it is self-reported and collected in public hearings. The share of victims caused by different perpetrators (insurgent groups, state agents and others) differs considerably between the CVR database and those of other institutions, such as human rights organizations and ministries (Comisión de la Verdad y Reconciliación [2003]). This might be caused by selective reporting of cases according to the mandate of each organization or its perception by the public. Therefore, the results on conflict intensity should be interpreted with caution.

Results are reported in tables 7 and 8. The coefficient on the interaction term between the number of victims and distance to market is negative. It is significant in several specifications and, most importantly, in the cloglog specification with district fixed effects and all effects interacted with the conflict variable, which is arguably the most pertinent specification. (Table 7, column 9). Table 8 displays the results from using different conflict intensity dummies. The coefficient on the interaction term between the low conflict dummy and distance to market is negative, but only significant in some specifications (and, notably, insignificant in both cloglog specifications with district fixed effects (columns 8 and 9)). The interaction between the medium conflict dummy and distance to market is always insignificant. The interaction between high conflict and distance to market is negative, of a much larger size than the others, and highly significant in some, but not all specifications.

Another measure of conflict intensity is the duration of the conflict, which may also play a role in changing people's economic behavior. To test this channel, I interact the total number of years a district was affected by conflict with distance to market. The results are reported in table 9. The coefficient of interest is negative in all specifications, but only significant in some. Table 10 presents results from interacting dummies for different numbers of conflict years (1 to 3, 4 to 7 and 10 to 13) with distance to market. For low (1-3) and medium (4-7) conflict duration, the coefficient

of interest is sometimes insignificant, sometimes negative and significant. For 10 to 13 years, the coefficient is negative, of a larger and sometimes very large size, and highly significant in a number of specifications.

Taken together, these results suggest that the negative impact of distance to market in conflict districts increases with conflict intensity, both in terms of the level of violence and in terms of conflict duration.

6.2 Distance to Ayacucho

The large and significant coefficients on districts that were affected by the conflict during a larger number of years raises the question whether the negative effect of distance to market observed in conflict districts could be caused by other factors than the violence. The districts around the epicenter of the conflict, which were already affected in its early stages, are culturally and geographically similar. With the expansion of the conflict, the characteristics of the conflict districts became more diverse. To verify whether the coefficient of interest is not merely driven by regional specificities of the core conflict districts, I implement a further robustness check. I run the baseline regression replacing the conflict dummy with distance to Ayacucho, and the interaction term with distance to Ayacucho multiplied by distance to market, and run this regression for all districts that did not experience conflict. Results are reported in table 11.

If the coefficient on the interaction term between distance to Ayacucho and distance to market were positive and significant, this would entail that the negative effect of distance to market on the likelihood of being a vendor is a general characteristic of districts closer to Ayacucho, independently from the conflict. However, the coefficient is negative and significant in the first specification (all control variables, columns 1, 4 and 7) and insignificant when including district fixed effects (all other columns). This means that the effect of distance to market decreases or remains constant with distance to Ayacucho. Therefore, the negative effect of distance to market in conflict districts does not seem to be driven by unobserved regional specificities of the districts at the epicenter of the conflict.

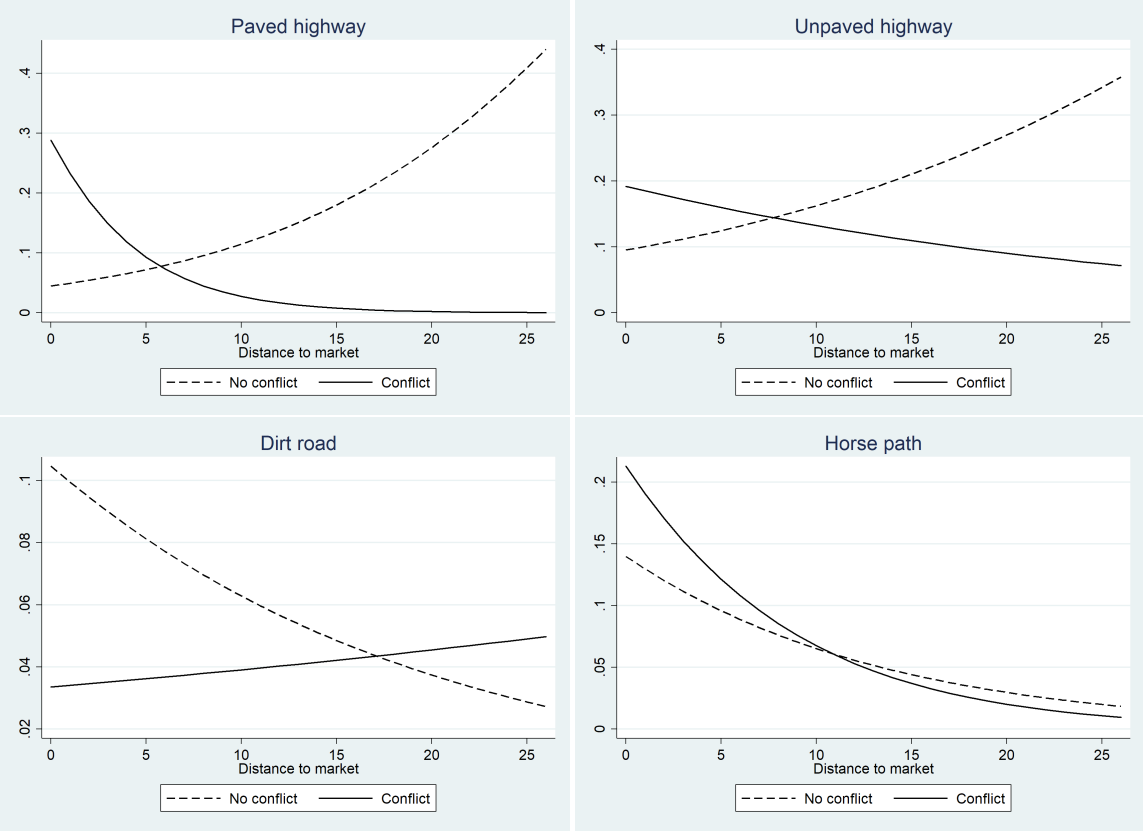
6.3 Different Road Types

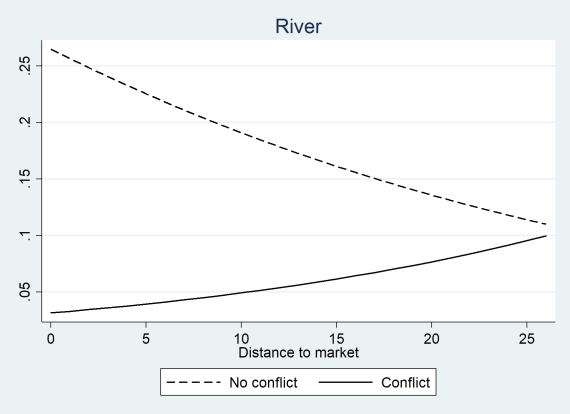
The impact of distance to market in km is likely to be affected by the quality of the road connecting the village to the market. The time and effort of traveling the same distance on a paved road or a horse path are very different. In addition, the likelihood of road assaults might differ on different road types. To investigate how road quality affects the result of interest, I estimate the baseline regression including triple interaction terms, interacting conflict, distance to market, and a road type dummy. The five road types reported in the data are paved highway, unpaved highway, dirt road, horse path and river.

As results from this triple interaction methodology (see table 12 in the appendix) cannot be interpreted directly, I plot the predicted likelihood to work as a shopkeeper or vendor against distance to market using the cloglog specification with all control variables, like in section 5.4.

Each plot includes the predictions for conflict (straight line) and non-conflict (dotted line) for a certain road type. The figures suggest that the result of interest is driven by villages with high-quality roads (paved and unpaved highways), which together amount to 46% of observations. The higher effective cost of transport and a reduced risk of insurgent assaults on roads of lower quality offer one possible explanation for this finding.

Figure 2: Road type





6.4 Other Non-Agricultural Self-Employment

Non-agricultural self-employment is generally more prevalent in the conflict districts, as shown in the summary statistics. If the differential impact of distance to market applied not only to shopkeepers and vendors, but also to other self-employment activities, this would cast doubt on the hypothesis that the transmission channel is road insecurity and the increase in transport cost. To verify this, I run the baseline regression on a dependent variable which takes the value 1 if a person is self-employed in a non-agricultural activity, but not a shopkeeper or vendor. Results are reported in table 13. The coefficient on the interaction term between conflict and distance to market is insignificant in all but one specification. This result indicates that the negative impact of distance to market is indeed proper to vendors and shopkeepers. It can be interpreted as support for the road insecurity hypothesis, since transport costs are likely to affect these professions in particular.

6.5 Outliers and Market Villages

As mentioned in section 4, 7 out of the 182 villages in the LSMS data lie very far away from the next market (between 48 and 84 km, compared to a mean of 5.9 km in the rest of the sample). I suspect that these values might be caused by errors, for example misunderstanding concerning the definition of a "market or fair". Unfortunately, I cannot verify their accuracy, since the LSMS data does not provide village names. While I consider it justifiable to exclude the outliers from my analysis, I report the results of the baseline regression on the full sample for transparency. Results are reported in table 14. The coefficient on the interaction term between conflict and distance to market decreases in magnitude and becomes insignificant in specifications with district fixed effects. The outliers exert considerable leverage on the results.

Selective migration is an important concern when studying the impact of conflict on the occupation choice, as mentioned in section 5.3. If persons desiring to work as vendors migrate selectively to villages close to markets, and the same "type" of person is also more likely to migrate to escape conflict, this can bias the result of interest. I conduct robustness checks using a sample excluding

market villages (i.e., for which distance to the next market equals zero), and a sample excluding markets which are at most 1 km from the next market. Results are reported in tables 15 and 16. The interaction term remains negative, significant, and of similar magnitude as with the usual sample, which corroborates my main result.

7 Conclusion

This paper examined road insecurity as a transmission channel of conflict, and illustrated how it alters individual occupation decisions at the example of self-employed shopkeepers and vendors in rural areas of Peru. The initial hypothesis was that conflict-induced road insecurity raises the cost of transporting goods to a village, and thus prevents individuals from working as shopkeepers or vendors if they live relatively far from the next market.

In line with this hypothesis, the results display a negative relation between distance to market and the decision to become a self-employed shopkeeper or vendor, but only in districts affected by conflict. This result is robust to the inclusion of district fixed effects and to interacting all control variables with conflict. Together with the robustness checks, which show, among others, that the result is neither driven by the geographic and cultural similarity of the districts close to the conflict's epicenter nor by general effects on self-employment, these results can be viewed as evidence for the existence of a road insecurity channel through which conflict affects rural livelihoods. There seems to be a "transport cost" imposed on shopkeepers by conflict-induced road insecurity, although, in the absence of data on assaults, it is not possible to say whether the fear of loosing one's life or the risk of loosing one's goods in an assault was more important in the Peruvian context.

Given that non-agricultural income often represents more than 50% of rural households' budgets (Davis et al. [2010]), the impact of conflict on the occupation decision can have important implications for poverty. Understanding its underlying mechanisms is thus relevant for development policy. Further research is necessary to investigate the potential persistence of the effects of conflict-induced road insecurity. If there is a "forgetting by not doing" for shopkeepers, akin to the one detected by Collier and Duponchel [2013] for firms in Sierra Leone, and if market participation is inhibited due to road insecurity, conflict regions may suffer a permanent fall-back in terms of economic activity. Policies to specifically tackle this problem could constitute a useful component of post-conflict reconstruction efforts. In order to provide insights for policy-makers, further research should focus on the relevance of the road insecurity channel for other activities for which market access is important (such as agriculture or manufacturing in rural areas) and the persistence of its effects.

From a broader perspective, this paper highlights one particular way in which conflict can disrupt local economic interaction and affect the daily life of rural populations. By focusing on one aspect of the micro-economic cost of conflict, it shows how conflict restrains individuals' economic opportunities, and may thereby cause persistent adverse effects on their well-being.

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A Appendix

Table 2: List of Variables

VARIABLE	DEFINITION	LEVEL
Dependent variable		
Vendor	Dummy: Self-employed shopkeeper or vendor (primary or secondary occupation, in year before survey)	Individual
Independent variables		
Conflict	Dummy: No. of victims between 1980-92 > 1	District
No. of victims	No. of victims reported to the CVR (1980-92)	District
Years of conflict	No. of years between 1980-92 in which victims > 1	District
Distance to market	Distance in km	Village
Individual controls		
Female	Dummy	Individual
Age	Age in years	Individual
Primary education	Dummy: Completed primary school	Individual
Household controls		
Children	Numbe of children (0-14) in household	Household
Adults	Other adults in household	Household
Consumption expenditures	Yearly, in 100 Peruvian Soles	Household
Credit access	Dummy: Self reported access to credit	Household
Electricity	Dummy: Dwelling has electricity	Household
Village and district controls		
More households in village	Dummy: No. of households increased since 1991	Village
Less households in village	Dummy No. of households decreased since 1991	Village
FONCODES	Dummy: FONCODES invested in village	Village
Easier to find job	Dummy: Easier to find a job than in 1991	Village
More difficult to find job	Dummy: More difficult to find a job than in 1991	Village
Education level	% of adults ($\geq$15) with secondary education	District
Paved highway	Road type: paved highway	Village
Unpaved highway	Road type: unpaved highway	Village
Dirt road	Road type: dirt road	Village
Horse path	Road type: horse path	Village
River	Road type: river	Village
Geographical controls		
Altitude	Altitude of district capital in m	District
Precipitation	Average yearly precipitation in mm, 1997-2006	Department
Distance to Ayacucho	Distance of district capital to Ayacucho, in km	District

Sources:
Conflict: Comisión de la Verdad y Reconciliación (CVR)
Individual, household and village-level variables: Living Standards Measurement Survey 1994 (LSMS)
Education level: National Census 1993, INEI
Altitude: Google Earth
Precipitation: Instituto Nacional de Estadística e Informatíca 2007 (INEI)
Distance to Ayacucho: Peru Distance Calculator (PDC)

Table 3: Summary statistics - All regression variables

	(1)			
	mean	sd	min	max
Self-employed shopkeeper or vendor	0.13	0.34	0.00	1.00
Female	0.39	0.49	0.00	1.00
Age	36.71	15.72	15.00	90.00
Primary education	0.58	0.49	0.00	1.00
Number of children in HH	2.42	1.85	0.00	11.00
Number of adults in HH	3.71	1.77	1.00	12.00
Credit access	0.16	0.36	0.00	1.00
Electricity	0.24	0.43	0.00	1.00
Annual consumption exp./adult equ.	907.32	643.02	52.95	6462.52
More households in village	0.70	0.46	0.00	1.00
Less households in village	0.06	0.23	0.00	1.00
FONCODES	0.53	0.50	0.00	1.00
Easier to find job	0.14	0.35	0.00	1.00
More difficult to find job	0.59	0.49	0.00	1.00
Distance to market (km)	5.89	5.93	0.00	26.00
Paved highway	0.20	0.40	0.00	1.00
Unpaved highway	0.26	0.44	0.00	1.00
Dirt road	0.33	0.47	0.00	1.00
Horse path	0.14	0.35	0.00	1.00
River	0.07	0.25	0.00	1.00
Education level (district)	0.45	0.15	0.13	0.75
Altitude	1871.14	1438.59	7.00	4191.00
Precipitation	755.86	648.07	7.37	2701.26
Distance to Ayacucho	603.50	300.24	0.00	1192.11
Conflict (1980-92)	0.37	0.48	0.00	1.00
No. of victims (1980-92)	11.02	37.77	0.00	311.00
Years of conflict	1.47	2.69	0.00	13.00
Observations	2699			

Table 4: Summary statistics - Occupations

VARIABLES	(1) Full sample mean (sd)	(2) No conflict mean (sd)	(3) Conflict mean (sd)	(4) Difference (2)-(3)
Full sample				
Non-agricultural self-employment	0.22	0.20	0.26	-0.06***
	(0.42)	(0.40)	(0.44)	
Observations	2699	1711	988	-
Primary non-agricultural self-employment activity				
Shopkeeper or vendor	0.56	0.56	0.56	0.01
	(0.50)	(0.50)	(0.50)	
Tailor, sewer, or other textile professional	0.14	0.14	0.15	-0.01
	(0.35)	(0.34)	(0.36)	
Services	0.09	0.07	0.11	-0.04
	(0.29)	(0.26)	(0.31)	
Artisan or craftsman	0.13	0.14	0.12	0.01
	(0.34)	(0.34)	(0.33)	
Food production	0.04	0.06	0.02	0.04***
	(0.20)	(0.23)	(0.14)	
Technical professional	0.04	0.04	0.04	0.00
	(0.19)	(0.19)	(0.19)	
Observations	605	347	258	-

Asterisks denote the significance level of the t-test on the difference between conflict and non-conflict districts: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Summary statistics - All regression variables, by vendor

	(1)		(2)		(3)	
	mean	sd	mean	sd	b	t
Female	0.36	0.48	0.62	0.49	-0.26***	(-9.23)
Age	36.74	15.95	36.58	14.11	0.16	(0.19)
Primary education	0.57	0.50	0.64	0.48	-0.08**	(-2.75)
Number of children in HH	2.44	1.87	2.32	1.66	0.12	(1.22)
Number of adults in HH	3.76	1.78	3.32	1.64	0.44***	(4.65)
Credit access	0.15	0.36	0.20	0.40	-0.05*	(-2.38)
Electricity	0.22	0.42	0.33	0.47	-0.11***	(-4.12)
Annual consumption exp./adult equ.	885.59	649.94	1052.21	575.05	-166.62***	(-4.98)
More households in village	0.69	0.46	0.72	0.45	-0.03	(-1.17)
Less households in village	0.06	0.24	0.03	0.16	0.04***	(3.78)
FONCODES	0.52	0.50	0.59	0.49	-0.07*	(-2.34)
Easier to find job	0.15	0.35	0.12	0.32	0.03	(1.45)
More difficult to find job	0.59	0.49	0.58	0.49	0.00	(0.15)
Distance to market (km)	5.96	5.99	5.42	5.52	0.54	(1.68)
Paved highway	0.19	0.39	0.22	0.41	-0.03	(-1.09)
Unpaved highway	0.24	0.43	0.36	0.48	-0.12***	(-4.37)
Dirt road	0.35	0.48	0.22	0.42	0.13***	(5.29)
Horse path	0.14	0.35	0.13	0.33	0.02	(0.86)
River	0.07	0.25	0.07	0.25	-0.00	(-0.03)
Education level (district)	0.45	0.15	0.45	0.15	-0.00	(-0.52)
Altitude	1884.51	1448.42	1781.97	1369.88	102.54	(1.30)
Precipitation	757.15	646.39	747.20	660.06	9.95	(0.26)
Distance to Ayacucho	607.00	299.06	580.12	307.38	26.88	(1.54)
Conflict (1980-92)	0.36	0.48	0.42	0.49	-0.06*	(-2.22)
No. of victims (1980-92)	10.54	37.59	14.23	38.92	-3.68	(-1.66)
Years of conflict	1.43	2.66	1.71	2.83	-0.28	(-1.77)
Observations	2347		352		2699	

Table 6: Summary statistics - All regression variables, by conflict

	(1)		(2)		(3)	
	mean	sd	mean	sd	b	t
Self-employed shopkeeper or vendor	0.12	0.32	0.15	0.36	-0.03*	(-2.22)
Female	0.38	0.49	0.41	0.49	-0.03	(-1.49)
Age	37.04	15.87	36.16	15.43	0.88	(1.41)
Primary education	0.56	0.50	0.61	0.49	-0.06**	(-2.84)
Number of children in HH	2.30	1.84	2.63	1.85	-0.33***	(-4.47)
Number of adults in HH	3.76	1.81	3.61	1.69	0.15*	(2.16)
Credit access	0.17	0.37	0.14	0.34	0.03*	(2.20)
Electricity	0.23	0.42	0.25	0.43	-0.03	(-1.46)
Annual consumption exp./adult equ.	899.84	628.82	920.27	667.03	-20.43	(-0.78)
More households in village	0.70	0.46	0.69	0.46	0.01	(0.36)
Less households in village	0.06	0.23	0.06	0.24	-0.00	(-0.49)
FONCODES	0.53	0.50	0.53	0.50	0.00	(0.10)
Easier to find job	0.08	0.27	0.26	0.44	-0.18***	(-11.64)
More difficult to find job	0.63	0.48	0.51	0.50	0.12***	(5.91)
Distance to market (km)	5.49	5.49	6.57	6.58	-1.07***	(-4.34)
Paved highway	0.19	0.40	0.20	0.40	-0.01	(-0.50)
Unpaved highway	0.18	0.39	0.40	0.49	-0.21***	(-11.84)
Dirt road	0.41	0.49	0.20	0.40	0.21***	(12.01)
Horse path	0.17	0.38	0.09	0.29	0.08***	(6.25)
River	0.04	0.20	0.11	0.31	-0.07***	(-6.03)
Education level (district)	0.42	0.14	0.50	0.16	-0.08***	(-13.65)
Altitude	1974.53	1422.49	1692.09	1449.41	282.44***	(4.91)
Precipitation	653.97	573.59	932.29	727.27	-278.32***	(-10.32)
Distance to Ayacucho	668.62	270.10	490.71	316.12	177.92***	(14.84)
No. of victims (1980-92)	0.00	0.00	30.11	57.66	-30.11***	(-16.42)
Years of conflict	0.00	0.00	4.00	3.09	-4.00***	(-40.70)
Observations	1711		988		2699	

Table 7: Robustness check: Conflict intensity (number of victims, continuous)

Self-employed shopkeeper or vendor (dummy)	OLS (1)	(2)	(3)	Logit (4)	(5)	(6)	Cloglog (7)	(8)	(9)
No. of victims reported (asinh)	0.026***			0.242***			0.219***		
	(0.010)			(0.076)			(0.069)		
Distance to market (km)	0.002	0.002	0.002	0.017	0.034	0.046*	0.016	0.035*	0.046**
	(0.002)	(0.002)	(0.002)	(0.022)	(0.024)	(0.024)	(0.019)	(0.020)	(0.020)
No. of victims*Dist. market	-0.002**	-0.001	-0.001	-0.023**	-0.013	-0.023*	-0.020**	-0.012	-0.024**
	(0.001)	(0.001)	(0.001)	(0.011)	(0.011)	(0.012)	(0.010)	(0.010)	(0.011)
Constant	-0.267**	-0.457***	-0.428***	-6.128***	-8.183***	-8.537***	-5.643***	-7.428***	-7.817***
	(0.129)	(0.136)	(0.156)	(1.297)	(1.409)	(1.634)	(1.151)	(1.215)	(1.444)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2429	2429	2699	2429	2429
(Pseudo) R^2	0.080	0.145	0.154	0.107	0.182	0.193			

* p<0.1, ** p<0.05, *** p<0.01

Table 8: Robustness check: Conflict intensity (number of victims, dummies)

Self-employed shopkeeper or vendor (dummy)	OLS (1)	OLS (2)	OLS (3)	Logit (4)	Logit (5)	Logit (6)	Cloglog (7)	Cloglog (8)	Cloglog (9)
No. victims 1-10	0.063*			0.631**			0.555**		
	(0.034)			(0.273)			(0.236)		
No. victims 11-30	-0.009			0.010			0.027		
	(0.036)			(0.342)			(0.311)		
No. victims > 30	0.272***			2.020***			1.781***		
	(0.067)			(0.395)			(0.343)		
Distance to market (km)	0.002	0.005**	0.004**	0.022	0.061***	0.064***	0.021	0.059***	0.062***
	(0.002)	(0.002)	(0.002)	(0.023)	(0.018)	(0.020)	(0.020)	(0.014)	(0.016)
Victims 1-10*Dist. market	-0.007*	-0.010**	-0.010*	-0.071*	-0.116	-0.086	-0.064*	-0.110	-0.079
	(0.004)	(0.005)	(0.006)	(0.040)	(0.080)	(0.094)	(0.039)	(0.071)	(0.083)
Victims 11-30*Dist. market	-0.002	0.006	0.002	-0.026	0.027	-0.016	-0.024	0.013	-0.020
	(0.003)	(0.004)	(0.004)	(0.037)	(0.033)	(0.054)	(0.034)	(0.030)	(0.042)
Victims > 30*Dist. market	-0.026**	-0.037***	-0.023	-0.165**	-0.341***	-0.511	-0.147**	-0.275**	-0.462
	(0.010)	(0.013)	(0.016)	(0.082)	(0.132)	(0.451)	(0.074)	(0.116)	(0.417)
Constant	-0.281**	-0.498***	-0.482***	-6.301***	-8.485***	-9.071***	-5.810***	-7.615***	-8.425***
	(0.123)	(0.136)	(0.162)	(1.263)	(1.377)	(1.737)	(1.128)	(1.174)	(1.557)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2429	2413	2699	2429	2413
(Pseudo) R^2	0.088	0.148	0.167	0.116	0.185	0.212			

* p<0.1, ** p<0.05, *** p<0.01

Table 9: Robustness check: Conflict intensity (number of years, continuous)

Self-employed shopkeeper or vendor (dummy)	OLS (1)	(2)	(3)	Logit (4)	(5)	(6)	Cloglog (7)	(8)	(9)
Years of conflict	0.016***			0.147***			0.134***		
	(0.006)			(0.044)			(0.038)		
Distance to market (km)	0.001	0.002	0.001	0.013	0.032	0.032	0.012	0.033*	0.035*
	(0.002)	(0.002)	(0.002)	(0.021)	(0.024)	(0.024)	(0.018)	(0.020)	(0.020)
Years of conflict*Dist. market	-0.002**	-0.001	0.000	-0.016**	-0.009	-0.005	-0.014**	-0.009	-0.008
	(0.001)	(0.001)	(0.001)	(0.006)	(0.007)	(0.008)	(0.006)	(0.006)	(0.007)
Constant	-0.259**	-0.459***	-0.453***	-5.968***	-8.159***	-8.579***	-5.494***	-7.418***	-7.806***
	(0.130)	(0.135)	(0.149)	(1.306)	(1.406)	(1.574)	(1.159)	(1.214)	(1.385)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2429	2429	2699	2429	2429
(Pseudo) R^2	0.079	0.145	0.152	0.106	0.182	0.191			

* p<0.1, ** p<0.05, *** p<0.01

Table 10: Robustness check: Conflict intensity (number of years, dummies)

Self-employed shopkeeper or vendor (dummy)	OLS (1)	OLS (2)	OLS (3)	Logit (4)	Logit (5)	Logit (6)	Cloglog (7)	Cloglog (8)	Cloglog (9)
Conflict 1-3 years	0.042			0.453			0.402		
	(0.036)			(0.300)			(0.267)		
Conflict 4-7 years	0.106**			0.954***			0.849***		
	(0.045)			(0.340)			(0.292)		
Conflict 10-13 years	0.171			1.514**			1.446**		
	(0.118)			(0.769)			(0.703)		
Distance to market (km)	0.002	0.005**	0.005**	0.022	0.061***	0.065***	0.020	0.058***	0.063***
	(0.003)	(0.002)	(0.002)	(0.023)	(0.019)	(0.020)	(0.021)	(0.015)	(0.016)
Conflict 1-3 ys*Dist. market	-0.005	-0.009**	-0.008	-0.057	-0.097	-0.080	-0.051	-0.092*	-0.077
	(0.004)	(0.004)	(0.005)	(0.037)	(0.062)	(0.074)	(0.035)	(0.056)	(0.066)
Conflict 4-7 ys*Dist. market	-0.009**	0.004	-0.000	-0.086**	0.009	-0.035	-0.076**	0.000	-0.040
	(0.004)	(0.005)	(0.006)	(0.040)	(0.040)	(0.058)	(0.036)	(0.036)	(0.050)
Conflict 10-13 ys*Dist. market	-0.019	-0.034**	-0.023	-0.155	-0.317**	-4.028***	-0.156	-0.287**	-3.773***
	(0.016)	(0.014)	(0.016)	(0.121)	(0.140)	(0.519)	(0.117)	(0.124)	(0.472)
Constant	-0.266**	-0.485***	-0.477***	-6.058***	-8.400***	-9.060***	-5.559***	-7.573***	-8.413***
	(0.130)	(0.136)	(0.162)	(1.308)	(1.375)	(1.739)	(1.160)	(1.177)	(1.558)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2429	2403	2699	2429	2403
(Pseudo) R^2	0.080	0.147	0.162	0.107	0.185	0.203			

* p<0.1, ** p<0.05, *** p<0.01

Table 11: Robustness check: Distance to Ayacucho, no conflict districts

Self-employed shopkeeper or vendor (dummy)	OLS (1)	(2)	(3)	Logit (4)	(5)	(6)	Cloglog (7)	(8)	(9)
Distance to Ayacucho (100km)	0.013*			0.121*			0.107*		
	(0.007)			(0.067)			(0.058)		
Distance to market (km)	0.015*	0.003	0.008*	0.133**	0.035	0.086*	0.117**	0.035	0.089*
	(0.008)	(0.005)	(0.004)	(0.056)	(0.057)	(0.051)	(0.047)	(0.051)	(0.049)
Dist. Ayacucho*Dist. market	-0.002**	0.000	-0.001	-0.020***	0.005	-0.009	-0.017***	0.005	-0.010
	(0.001)	(0.001)	(0.001)	(0.007)	(0.010)	(0.009)	(0.006)	(0.009)	(0.009)
Constant	-0.315**	-0.486***	-0.392*	-6.877***	-9.293***	-9.012***	-6.471***	-8.642***	-8.307***
	(0.156)	(0.168)	(0.220)	(1.694)	(1.850)	(2.517)	(1.545)	(1.653)	(2.160)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	1711	1503	1503	1711	1503	1503	1711	1503	1503
(Pseudo) R^2	0.088	0.140	0.166	0.126	0.189	0.227			

* p<0.1, ** p<0.05, *** p<0.01

Table 12: Robustness check: Road type

Self-employed shopkeeper or vendor (dummy)	OLS (1)	(2)	(3)	Logit (4)	(5)	(6)	Cloglog (7)	(8)	(9)
Conflict (1980-92)	0.247***			2.376***			2.066***		
	(0.044)			(0.404)			(0.345)		
Distance to market (km)	0.012***	0.007*	0.006	0.115***	0.113*	0.113*	0.099***	0.114*	0.109*
	(0.002)	(0.004)	(0.004)	(0.026)	(0.061)	(0.066)	(0.022)	(0.059)	(0.062)
Conflict*Dist. market	-0.040***	-0.026***	-0.013	-0.439***	-0.452***	-0.247*	-0.380***	-0.429**	-0.227*
	(0.008)	(0.006)	(0.009)	(0.115)	(0.166)	(0.132)	(0.097)	(0.173)	(0.127)
Unpaved highway	0.076*	0.127**	0.128*	0.894**	1.883**	2.078**	0.794**	1.721**	1.870**
	(0.045)	(0.057)	(0.066)	(0.426)	(0.902)	(0.966)	(0.388)	(0.858)	(0.903)
Conflict*unpavedhighway	-0.130*	-0.409***	-0.296**	-1.491**	-3.950**	-3.277**	-1.312**	-3.374**	-2.653*
	(0.071)	(0.127)	(0.128)	(0.621)	(1.614)	(1.488)	(0.546)	(1.666)	(1.435)
Dist. market*	-0.002	0.005	0.007	-0.041	-0.044	-0.054	-0.037	-0.054	-0.049
unpavedhighway	(0.005)	(0.006)	(0.007)	(0.040)	(0.072)	(0.082)	(0.036)	(0.067)	(0.076)
Conflict*Dist. market*	0.023**	0.025***	0.008	0.319***	0.452**	0.236	0.278***	0.424**	0.199
unpavedhighway	(0.010)	(0.009)	(0.013)	(0.121)	(0.180)	(0.155)	(0.101)	(0.190)	(0.150)
Dirt road	0.085***	-0.024	-0.022	0.967***	0.189	0.261	0.878***	0.294	0.390
	(0.029)	(0.059)	(0.067)	(0.354)	(0.899)	(0.949)	(0.327)	(0.861)	(0.903)
Conflict*dirtroad	-0.361***	0.267*	0.059	-3.586***	5.786**	4.105	-3.170***	4.901**	3.115
	(0.060)	(0.146)	(0.189)	(0.658)	(2.517)	(2.710)	(0.588)	(2.381)	(2.435)
Dist. market*dirtroad	-0.016***	-0.006	-0.004	-0.174***	-0.056	-0.050	-0.154***	-0.056	-0.045
	(0.002)	(0.004)	(0.004)	(0.037)	(0.064)	(0.071)	(0.035)	(0.062)	(0.068)
Conflict*Dist. market*	0.048***	-0.017	-0.015	0.514***	-0.355	-0.428	0.444***	-0.285	-0.350
dirtroad	(0.008)	(0.014)	(0.018)	(0.132)	(0.272)	(0.291)	(0.115)	(0.247)	(0.267)
Horse path	0.111***	-0.018	-0.033	1.224***	0.293	0.289	1.124***	0.285	0.307
	(0.035)	(0.088)	(0.091)	(0.417)	(1.046)	(1.108)	(0.383)	(0.968)	(1.031)
Conflict*horsepath	-0.136*	0.193*	0.176	-1.657***	3.217	2.862	-1.502***	2.799	2.749
	(0.073)	(0.114)	(0.123)	(0.565)	(1.957)	(2.084)	(0.501)	(1.871)	(2.051)
Dist. market*horsepath	-0.019***	-0.007	-0.003	-0.192***	-0.105	-0.090	-0.171***	-0.098	-0.082
	(0.004)	(0.007)	(0.007)	(0.053)	(0.086)	(0.089)	(0.050)	(0.082)	(0.085)

Conflict*Dist. market*	0.030***	-0.023*	-0.020	0.372***	-0.308	-0.291	0.317***	-0.231	-0.248
horsepath	(0.010)	(0.013)	(0.013)	(0.130)	(0.268)	(0.252)	(0.114)	(0.259)	(0.248)
River	0.270***	0.076	0.001	2.268***	1.094	0.018	1.922***	1.109	0.136
	(0.061)	(0.107)	(0.106)	(0.665)	(1.334)	(1.278)	(0.604)	(1.214)	(1.136)
Conflict*river	-0.480***	-0.236*	-0.164	-4.895***	-5.693***	-3.917**	-4.259***	-5.151***	-3.640**
	(0.061)	(0.125)	(0.131)	(0.979)	(1.669)	(1.766)	(0.937)	(1.537)	(1.635)
Dist. market*river	-0.020**	0.011	0.010	-0.160*	0.012	-0.007	-0.140*	-0.003	-0.019
	(0.009)	(0.007)	(0.008)	(0.094)	(0.070)	(0.074)	(0.083)	(0.062)	(0.065)
Conflict*Dist. market*river	0.048***	0.013	-0.001	0.532***	0.532***	0.299**	0.462***	0.498**	0.275**
	(0.013)	(0.008)	(0.011)	(0.155)	(0.192)	(0.146)	(0.132)	(0.201)	(0.137)
Constant	-0.294**	-0.720***	-0.714***	-6.595***	-10.335***	-11.174***	-6.085***	-9.178***	-10.199***
	(0.124)	(0.143)	(0.165)	(1.290)	(1.646)	(2.040)	(1.116)	(1.419)	(1.812)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2429	2429	2699	2429	2429
(Pseudo) R^2	0.109	0.157	0.164	0.147	0.200	0.211			

* p<0.1, ** p<0.05, *** p<0.01

Table 13: Robustness check: Other non-agricultural self-employment

	OLS			Logit			Cloglog		
Other non-agricultural self-employed	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Conflict (1980-92)	-0.019			-0.203			-0.197		
	(0.026)			(0.295)			(0.273)		
Distance to market (km)	-0.002	-0.002	-0.002	-0.024	-0.032	-0.039	-0.023	-0.029	-0.032
	(0.002)	(0.002)	(0.002)	(0.027)	(0.045)	(0.051)	(0.026)	(0.041)	(0.046)
Conflict*Dist. market	0.005	-0.006	-0.008*	0.054	-0.080	-0.063	0.052*	-0.066	-0.060
	(0.003)	(0.004)	(0.004)	(0.034)	(0.063)	(0.071)	(0.031)	(0.054)	(0.064)
Constant	-0.129	0.048	-0.002	-5.443***	-3.741**	-4.964***	-5.258***	-3.280**	-4.712***
	(0.091)	(0.092)	(0.108)	(1.216)	(1.522)	(1.876)	(1.157)	(1.519)	(1.732)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2699	2429	2429	2699	2025	2025	2699	2025	2025
(Pseudo) R^2	0.035	0.158	0.167	0.054	0.166	0.179			

* p<0.1, ** p<0.05, *** p<0.01

Table 14: Robustness check: Including outliers

Self-employed shopkeeper or vendor (dummy)	OLS (1)	OLS (2)	OLS (3)	Logit (4)	Logit (5)	Logit (6)	Cloglog (7)	Cloglog (8)	Cloglog (9)
Conflict (1980-92)	0.059**			0.566**			0.504**		
	(0.028)			(0.226)			(0.198)		
Distance to market (km)	-0.001	0.001	0.001	-0.006	0.012	0.012	-0.005	0.015	0.015
	(0.001)	(0.001)	(0.002)	(0.006)	(0.013)	(0.014)	(0.006)	(0.011)	(0.011)
Conflict*Dist. market	-0.004*	-0.004	-0.004	-0.044*	-0.027	-0.032	-0.040	-0.028	-0.037
	(0.002)	(0.003)	(0.003)	(0.026)	(0.039)	(0.048)	(0.025)	(0.034)	(0.042)
Constant	-0.251**	-0.503***	-0.498***	-5.991***	-8.476***	-9.172***	-5.493***	-7.725***	-8.584***
	(0.125)	(0.140)	(0.165)	(1.301)	(1.462)	(1.832)	(1.158)	(1.294)	(1.677)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2805	2498	2498	2805	2498	2498	2805	2498	2498
(Pseudo) R^2	0.076	0.144	0.153	0.103	0.182	0.195			

* p<0.1, ** p<0.05, *** p<0.01

Table 15: Robustness check: Excluding market villages

Self-employed shopkeeper or vendor (dummy)	OLS (1)	OLS (2)	OLS (3)	Logit (4)	Logit (5)	Logit (6)	Cloglog (7)	Cloglog (8)	Cloglog (9)
Conflict (1980-92)	0.069**			0.668**			0.591**		
	(0.033)			(0.282)			(0.249)		
Distance to market (km)	0.001	0.004**	0.004**	0.014	0.054***	0.059***	0.013	0.052***	0.059***
	(0.003)	(0.002)	(0.002)	(0.025)	(0.017)	(0.018)	(0.022)	(0.014)	(0.014)
Conflict*Dist. market	-0.007**	-0.007**	-0.007**	-0.072**	-0.068	-0.082*	-0.065**	-0.065*	-0.085*
	(0.003)	(0.003)	(0.003)	(0.035)	(0.042)	(0.049)	(0.032)	(0.036)	(0.045)
Constant	-0.180	-0.418***	-0.410**	-5.346***	-7.781***	-8.347***	-5.004***	-7.171***	-7.809***
	(0.135)	(0.138)	(0.170)	(1.356)	(1.368)	(1.755)	(1.224)	(1.201)	(1.594)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2507	2228	2228	2507	2228	2228	2507	2228	2228
(Pseudo) R^2	0.073	0.142	0.152	0.099	0.180	0.194			

* p<0.1, ** p<0.05, *** p<0.01

Table 16: Robustness check: Excluding villages less than 1km from market

	OLS			Logit			Cloglog		
Self-employed shopkeeper or vendor (dummy)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Conflict (1980-92)	0.061*			0.602**			0.531**		
	(0.034)			(0.298)			(0.261)		
Distance to market (km)	0.001	0.005***	0.005***	0.011	0.059***	0.067***	0.011	0.056***	0.064***
	(0.003)	(0.002)	(0.002)	(0.026)	(0.017)	(0.019)	(0.022)	(0.014)	(0.015)
Conflict*Dist. market	-0.006*	-0.007*	-0.008**	-0.067*	-0.069*	-0.088*	-0.060*	-0.066*	-0.090**
	(0.003)	(0.003)	(0.004)	(0.036)	(0.042)	(0.050)	(0.033)	(0.036)	(0.046)
Constant	-0.196	-0.437***	-0.428**	-5.494***	-7.914***	-8.465***	-5.131***	-7.244***	-7.900***
	(0.137)	(0.144)	(0.179)	(1.391)	(1.406)	(1.782)	(1.250)	(1.223)	(1.613)
All control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
District fixed effects	×	✓	✓	×	✓	✓	×	✓	✓
All variables interacted with conflict	×	×	✓	×	×	✓	×	×	✓
Observations	2446	2166	2166	2446	2166	2166	2446	2166	2166
(Pseudo) R^2	0.074	0.144	0.154	0.101	0.181	0.196			

* p<0.1, ** p<0.05, *** p<0.01