Land Tenure, Price Shocks and Insurgency: Evidence from Peru*

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Abstract

How do different property arrangements affect armed conflict? I revisit this long-standing question by exploiting exogenous variation in the agricultural incomes of Peruvian coffee producers to examine how they affect violent outcomes conditional on the type of land tenure arrangement prevailing. Using detailed data on district level land arrangements and violent events in Peru from 1990 to 2000, I find that negative coffee price shocks leads to a differential increase in violence in coffee producing districts compared to non-coffee districts. Yet, such spikes in violence are significantly smaller in districts with a greater number of shared property arrangements such as communal lands and sharecropping areas as opposed to districts with greater individual land ownership. To examine the mechanisms at work I exploit monthly variation in the demand for agricultural labor due to harvesting to show how negative price shocks reduce agricultural employment particularly in districts with a greater prevalence of individual ownership. Evidence from individual surveys further corroborates this result. The paper provides the first micro-estimations of the role of different property arrangements on violence intensity in Peru. The paper provides the first micro-estimations of the role of different property arrangements on violence intensity in Peru.

*I am grateful to Oeindrila Dube, Adam Przeworski, and participants of the 2014 ISNIE Conference at Duke University and the 2011 Chicago Ronald Coase workshop on Institutional Analysis. All remaining errors are my own.

1 Introduction

Do certain property arrangements fuel armed conflict? During the last century, the type of access to land has been frequently referred to as a major factor driving peasant rebellion and insurrection. From Che Guevara to Mao itself, the mobilization of scores of peasants living under exploitative property arrangements was considered key for revolutionary success. Thus motivating a large body of studies emphasizing the role of land tenure and access to land to explain the rise of guerrilla movements and demand for agrarian reforms, particularly in Latin America[1].

Despite the perceived importance of land tenure arrangements for insurgency, little micro-level evidence exists about its effect on armed conflict and the mechanisms which may explain such effect. The reasons for such gap are twofolded: First, there is an inherent difficulty in disentangling the effects of land arrangements from overall economic conditions associated with violence (e.g. poverty). Second, a slow-changing factor such as land tenure is considered unsuitable to explain the dynamics behind conflict onset and intensity. In this paper I address these concerns by examining how land tenure affects the onset and intensity of armed conflict in the presence of exogenous changes in the opportunity cost of joining armed organizations.

Specifically, the paper uses two sources of variation to identify the role of different land tenure arrangements on violence. First, I exploit plausibly exogenous variation in the international prices of coffee to approximate changes in the opportunity cost of violence among coffee producers. Due to the labor-intensive nature of coffee production and the fact that it is harvested annually, price shocks are more likely to affect household income (Dal Bo and Dal Bo 2011). Moreover, given Peruvian producers are essentially price-takers in the international market for coffee – the main agricultural export of Peru at the time – changes in the international price would best capture exogenous variation in the returns to coffee cultivation. Second, I use cross-sectional variation in the distribution of land tenure arrangements[2] recorded prior to the beginning of the conflict period. In other words, I compare the effect of coffee price shocks among the three main land arrangements of coffee production in Peru: individual landholders, collective owners (e.g. communities) and wage laborers. Using both sources of variation I examine whether shocks to the returns of coffee production affect conflict differentially according to the prevaling land tenure arrangements.

Using this approach, the paper has three main results. First, consistent with an opportunity cost argument (Collier and Hoeffler 1998 and 2004; Fearon and Laitin, 2003; Miguel et. al. 2004; Dube and Vargas 2012), a drop in the price of coffee differentially increases violence intensity in Peru in coffee producing districts compared to non-coffee

[1] Among prominent studies: Scott (1977), Paige (1978), Popkin (1979), Wolf (1969), Wickham-Crowley (1992) among others.

[2] By "land tenure arrangements" I am not referring to the presence or not of secure property rights in the form of titling, but rather, in the form of production of this land such as tenancy arrangements, single land holders, or communal land arrangements.

ones. Estimates show that a decrease of 10% in the value of coffee production – roughly the yearly variation observed throughout the period – leads to 0.15 more violent events. Given the average number of attacks is 0.57 in coffee areas during these years, such increase is around 26 percent. In the case of guerrilla attacks, the results show that a 10% decrease in the value of coffee production leads to an increase of 33 percentage more attacks evaluated at the mean. Similar results are obtained for the case of army attacks, attacks against peasants and political leaders – the signature attacks of the leftist guerrillas– as well as overall killings. These results imply that although commodity price shocks may not explain violence intensity everywhere (Blattman and Bazzi 2014) it was an important factor driving violence intensity during the Peruvian civil war.

Second, the increase in violence due to negative price shocks is smaller in districts with a greater prevalence of shared property arrangements in which peasants cultivate the land but do not own it individually (e.g. communal land and wage laborers). Specifically, while a 10% decrease in the value of coffee production increases attacks by 0.16, this number is only 0.14 or 0.13 for each additional hundred communal or sharecropping farms in the district. In contrast, there is little to no difference depending on the number of farms owned by individuals in the district. These results suggest that districts with a greater prevalence of shared arrangements see a smaller increase in violence driven by drops in the value of coffee production. Hence, studies linking agricultural commodity price shocks to armed conflict must account for differences in the mode of production that might attenuate the impact of such shocks.

Third, after establishing the role of each property arrangement on violence intensity I examine the role of land tenure on agricultural employment as a potential causal mechanism. To do so, I exploit the length and start date of the coffee harvesting season to examine how price shocks affect violence at times of greater demand for labor versus times in which the demand is lower. While a decrease in the value of coffee production leads to a differential increase in violence during the coffee harvesting months – potentially driven by unemployment – such effect is smaller in districts with a greater number of wage-laborer farms (and less so communal lands). These findings suggest that wage-laborers – as opposed to individual owners – may better secure employment and pay for coffee production thus reducing the amount of violence when commodity prices fall. These results are consistent with individual-level findings showing that employment opportunities could reduce participation in illicit activities (Blattman and Annan 2014) while contrasting with studies finding no role for wage employment in fueling violence (Berman et. al. 2011). To further corroborate this mechanism I collected individual level data from national household surveys between 1986 and 2000 to analyze the patterns of occupation in the agricultural sector. Results using these surveys show how unemployment in the agricultural sector is differentially higher during negative coffee shocks, particularly for districts with a greater number of individual owners. Therefore, the fall in the value of coffee production between 1986 and 1995 is associated with a differentially higher level of unemployment in the agricultural sector in districts with more individually owned farms thus consistent with the higher increases of violence observed.

The paper contributes to the current literature in the following ways: First, these results provide evidence that shared property rights (e.g. communal lands and sharecroppers) might reduce violence intensity by mitigating the effect of income shocks driven by international market conditions. In contrast, individuals left to face the volatility of the international markets have greater incentives to engage in violence when there is a drop in the value of coffee production. Although in theory individual landowners would find it easier to switch to alternative crops or use land in some other ways to offset reduced profits (e.g. as a collateral, Feder et. al. 1988), in practice this does not seem to case given the higher prevalence of unemployment in districts with individual ownership when coffee prices plummet. These results are consistent with previous findings documenting how small landholders appear more vulnerable to commodity price shocks, at least in the case of coca producers (Angrist and Kugler 2008) as well as coffee producers in Colombia (Dube and Vargas 2013). In sum, while strong and well defined property rights may be crucial for economic development (North and Thomas, 1973; De Long and Shleifer, 1993; Johnson et. al. 2002) and investment (Demsetz 1967; Alchian and Demsetz, 1973), it is unclear whether property rights in the form of individual ownership is better than shared ownership to insure against income shocks that lead to violence, at least in the Peruvian case.

Similarly, while it is a well-established fact that negative economic shocks affect conflict (Collier and Hoeffler 1998; Fearon and Laitin 2003; Miguel et. al. 2004; Fearon 2005), this paper contributes to a better understanding of the intermediate mechanisms between price shocks of labor intensive crops and conflict by looking at the land arrangements under which these crops are produced and the patterns of seasonal labor. Results shown here calls for a re-examination of the role of different types of property arrangements on how they reduce the appeal of joining armed organizations at times of poor economic performance.

Second, the paper contributes to understanding the role of international commodity markets on the Peruvian Civil War. On the one hand, some accounts of the Peruvian case argue for a limited influence of the export crop industry on the rise and success of the guerrilla movement (McClintock 1984). On the other, sociological accounts posit that instances of peasant unrest cannot be detached from the agrarian export industry, at least after the first half of the 20th century. For instance, Scott (1977) argues that the introduction of market relations in the countryside, particularly international markets, exposed peasants to greater risk thus providing incentives for revolutionary action. More specifically, Paige (1978) and Wickham-Crowley (1992) argue that it is agricultural workers, sharecroppers and migrant state laborers working for wages in the export crop industry who are more vulnerable to market shocks and likely to rebel or radicalize demands. Some evidence of this relationship is provided by Hofheinz (1977) who finds tenancy and sharecropper support for the Chinese communist guerrillas. My findings for the case of Peru suggest that the export crop sector did play an important role in the intensity of violence more generally. However, contrary to the sociological literature, price shocks led to a smaller increase in violence among districts dominated by peasants

living in communal lands and wage laborers.

Finally, according to some accounts Shining Path did not benefit from the revenues obtained through coca trade. Rather, these "coca taxes" remained in the region where they were mostly generated (Huallaga) and did not help finance Shining Path's violent actions elsewhere (McClinctock 1998). Yet, other studies seem unable to rule out or confirm the financing means of the guerrilla through coca trade (Weinstein 2007: 93). Using agricultural data on district coca cultivation I explore the alternative explanation that increases of violence in coffee areas was due to the expansion of illicit crops (Angrist and Kugler 2008). I find that after excluding the main production regions from the sample, and interacting the levels of coca production with export crop prices, price shocks still have a negative effect on violence. Moreover, the effect of higher coffee prices *increased* violence in coca producing areas, which seem counter intuitive considering coca production should be more attractive at times of *lower* coffee production not when prices are relatively higher. Future research will investigate the precise mechanisms through which this occurs.

The paper is organized as follows: Section 2 describes the main features of the Peruvian Civil War as well as Peru's recent developments in the export sector and land reforms. Section 3 describes the data and the construction of the variables included in the paper. Section 4 describes the identification strategy and estimation procedure. Section 5 presents and discusses the results. Section 6 concludes and considers extensions and venues for future research.

2 Shining Path and MRTA - Peruvian Civil War

From 1980 until 2000, two guerrilla movements caused the most intense period of violence in recent Peruvian history. The rebel group P*artido Comunista del Perú - Sendero Luminoso* (PCP-SL or Shining Path) and the *Movimiento Revolucionario Tupac Amaru* (MRTA) were in constant fights with both the army and paramilitary groups and sometimes even among themselves. According to the Peruvian Truth and Reconciliation Commission (CVR, for its acronym in Spanish), this conflict caused the death of about 69,290 people (CVR, 2004) thus making the Peruvian civil war one of the bloodiest political conflicts in Latin America.

The PCP-SL, also known as Shining Path, declared a "war" on the Peruvian State in May 1980 which would continue until its full dismantling in 2000. Alone, Shining Path is responsible for the death of 31,331 people or 54% of total casualties (CVR 2004). The rebel group, initially founded with 17 members in 1970 reached its peak in 1990 with 2,700 core militants without counting other sympathizers or occasional collaborators (CVR 2004). Shining Path's first violent action was to symbolically boycott national elections by burning ballot boxes and the voter registry on the eve of the elections in the district of Chuschi, in Ayacucho state (Weinstein 2007:81). At the onset, the state of Ayacucho was the center of Shining Path's political activity, however, inspired by the

Chinese revolution it attempted to advance from the rural areas to the cities. As put elsewhere, Shining Path's leader "envisioned a rural movement led by the peasantry that would 'encircle the cities from the countryside'" (Weinstein 2007: 84).

Shining Path was not a centralized organization. Rather, it was formed by a large number of groups each of which contained a small number of trained cadres which would agitate, mobilize, and start the process of "population education" of peasants and exert "popular" justice. The main targets of Shining Path were visible figures of "the system": government representatives, police force, peasant leaders, and local officials as well as public infrastructure. In financial terms, Shining Path was also a decentralized organization whereby each regional committee was financed with resources locally extracted from peasants as in the case of coca producers from the Upper Huallaga Valley.

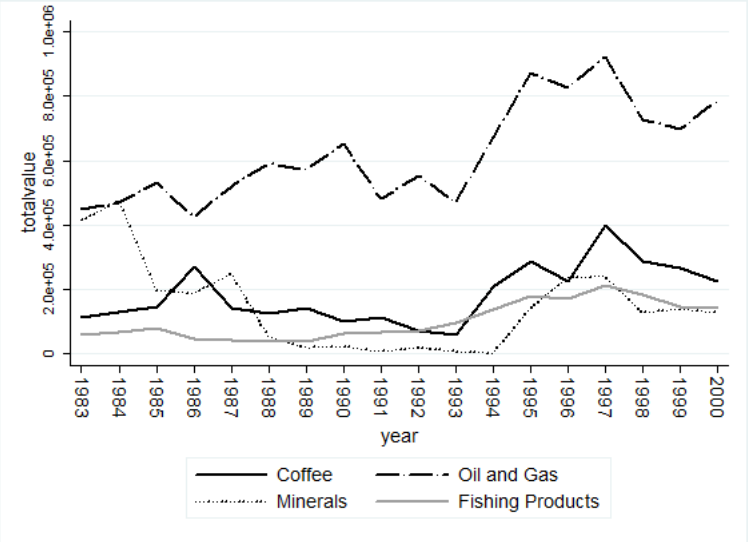
2.1 Peruvian Economy and Export Sector: 1980-2000.

Parallel to the conflict, worsening economic conditions between 1970 and 1992 were particularly felt by peasants in the rural highlands (Weinstein 2007). For instance, McClintock (1984:64) argues that by 1980 the terms of trade between the coast and the highlands have turned against the latter. The crisis started during the mid 80's when Peru was finally transitioning to democracy after years of military dictatorship. Soon after the transition, during the first presidential period (1986-1990) of Alan Garcia, the country underwent one of its worst macroeconomic economic crises with a sharp decrease in its gross domestic product and hyperinflation episodes. Macroeconomic indicators, such as consumer price indexes and exchange rates skyrocketed. Moreover, starting 1980, a trade policy oriented towards liberalization and tariff reduction on food imports made Peruvian peasants face external competition, lower food prices and greater price volatility. The only peasant villages that remained unaffected by the market economy were the most backwards, isolated and reliant on subsistence agriculture. Such economic instability may have contributed to the onset and appeal of Shining Path in the countryside.

Despite the crises of the 1980's, and after years of structural adjustment and market oriented reforms, the agricultural export sector experienced a notable expansion during the 1990's (MINAG 2011). According to the Peruvian Ministry of Agriculture, the expansion of the agricultural export sector occurred both in traditional agricultural Peruvian exports (coffee, cotton and sugar) as well as in an incipient "non-traditional" agricultural exports (asparagus, cacao, grapes, bananas, and beans). These changes were driven largely by previous structural adjustment policies, that is, drastic liberalization by reduction of tariff levels in agricultural sectors (Boloña and Illescas 1997; Fairlie and Torres Zorrilla 2002). As shown in Figure 1 below, coffee exports largely benefited from liberalization, as the value of total exports increased sharply after 1993. Moreover, coffee is also one of the main Peruvian exports only exceeded by the proceeds obtained from oil and natural gas and even more important than that of minerals and fishing products.

The value of the exports of other agricultural goods was quite small, include those of sugar, corn, beans and cotton.

Figure 1: Value of Peruvian Exports: 1983-2000



[Source: ECLAC. Export value of other agricultural goods was too small to be included].

2.2 Peruvian Land Reforms

The variable of interest in this paper is land tenure, which before 1970 was characterized by the prevalence of large landholders (approximately 90% of Peruvian land was held by 5% of total owners) often established since colonial times. Even by Latin American standards, land distribution in Peru was one of the most unequal in the world (McClintock 1984: 4). Therefore, in 1969, the governing military junta launched a land reform of populist cut ordering the redistribution of large landholders, generally haciendas, into collective or individual ownership which in turn could not be sold in the private markets. The military junta also explicitly promoted associative or collective forms of production such that vast territories would be given in property to associations, towns or *pueblos*, mostly indigenous. In numbers, the reform meant that between 1969 and 1979 9,066 thousands of hectares were expropriated and distributed among 368,817 peasants. The land distributed were those of former *haciendas* or single-owned large extensions of land, which would be collectivized and to be run under cooperatives ("cooperativas"). In practical terms the reform ordered the transfer of ownership of *haciendas* to the peasants already working there with the limitation of not being able to sell it. A similar arrangement was that of "communal" land tenure which was land distributed to members of an

indigenous peasant community[3] with the same restriction of not being able to be sold, privatized or divided. This effort was partially dismantled with the Constitution of 1979 which allowed for collective forms of land to be divided and small property or "minifundos" to exist. Later, in 1991, the decree of 1969 was completely abolished thus allowing land to be sold and to register individually the land distributed during the 1970s.

2.3 Land Tenure and Crop Cultivation

The main agricultural export of Peru, coffee, is mostly grown in the highland areas of Peru and part of the tropical jungle. In particular, coffee grows in middle altitudes with plenty of precipitation. Coffee also has the advantage of being able to grow jointly with other food crops to guarantee a minimum provision of subsistence even in cases of bad harvesting (Paige 1978).The organization of coffee production in different land tenure arrangements responds to historical events as well as to the agricultural characteristics of the crop.

In Table 1 I created a dichotomous variable indicating coffee presence to assess the distribution of different land tenure arrangements. As shown, among coffee areas, at least 99% have some sort of individual ownership farm, who often sell their coffee produce to major distributors. Such percentage is very close to the average observed outside coffee areas. Compared to owners, shared land arrangements see a greater presence in coffee regions compared to non-coffee regions. That is, coffee areas also exhibit a higher proportion of communal farms especially in the Andean highlands as well as commercial manors such as those of tenants or sharecroppers who grow coffee in exchange for a wage. Specifically, around 57% of coffee areas have at least one communal farm in it, compared to only 50% of non-coffee areas. In terms of sharecropping arrangements, there is at least one sharecropping farm in 89% of coffee districts while only in 80% of districts without coffee production. Although the presence of tenant and communal land tenure are a small fraction of all land tenure arrangements, they have a greater presence among coffee producing districts. The fact that there is a greater presence of shared arrangements in coffee producing areas alleviates the concern that results are driven by a smaller presence of these arrangements in coffee producing regions. It should be noted that the dichotomous measure of coffee captures the presence of cultivation but it does not reveal the specific intensity with which it is cultivated, which will be closely analyzed in section IV.

In sum, we observe different ownership arrangements being present in both coffee and non-coffee areas which will be useful to contrast the effect of different tenure systems on conflict intensity. Such heterogeneity in land tenure arrangements will allow me to document whether there is an effect of income shocks on conflict. While this claim was initially put forward by Scott's (1977) landmark book and widely tested in the literature on economic shocks and violence, I use such finding to establish: First, whether

[3]By peasant communities it is generally referred as those of strong indigenous and traditional roots located in the Andean highlands.

individual versus communal arrangements better insures against income shocks to reduce violence intensity. Second, whether wage-laborers seem particularly susceptible to radical appeals given their limited access to land and their larger vulnerability to price shocks which would leave them without means of subsistence (Wickham-Crowley 1992) than non-wage laborers.

3 Data

The dataset on violence was collected by the Peruvian Truth and Reconciliation Commission (CVR), which recorded individual level data on the number and type of human rights violations (illegal detentions, kidnapping, murder, extra judicial executions, torture, or rapes) as well as the perpetrator (government forces, guerrilla or paramilitary groups) over the twenty years of the Peruvian civil war. The Peruvian Truth and Reconciliation Commission collected around 19,000 testimonies from victims of the conflict or their relatives. To do so, the CVR held public hearings around the country to gather testimonies from victims, relatives, witnesses and survivors to report any violent act between 1980 and 2000. Testimonies were coded by the type of violent action, location, responsible group, time of occurrence and the victim's individual characteristics. Testimonies were also crosschecked with other NGO's to verify their accuracy. The location and timing of the crimes allows me to identify where and when the victim was attacked by either the army, guerrilla or paramilitary groups.

To measure land tenure, I collected district level measures of property arrangements from the agricultural census of 1972. I sought information *preceding* the conflict episode to minimize possible confounders. The agricultural census data identifies the type of land tenure, size of the land plot in hectares and type of crops cultivated. I measure crop intensity as the number of hectares per district to obtain the relative coffee intensity at the district level. This measure is commonly used by the Statistics Institute in Peru in their elaboration of their indicators as well as in other related papers using crop cultivation intensity (Dube and Vargas 2012). I measure land tenure according to the proportion of the district which is under one land tenure arrangement or another. The data distinguishes three main types of land tenure: full property, tenants (individuals who use others land in exchange for a fee) and communal land tenure. Although other types exist, their proportion from the total is negligible[4]. While full (individual) property is the most prevalent form, communal land tenure is common in places with historical strong indigenous community organization (departments of Apurimac, Cusco and Amazonas). Finally, tenant forms are present in areas in which peasants work in exchange for a wage for a landowner who does not personally cultivate the land, particularly in the departments of Lima (8%), Ancash (8%), and Cajamarca (9%).

[4]According to the Ministry of Agriculture, the other associative forms created of land tenure created in 1969 are the "Cooperativas Agrarias de Production" (CAP), the "Sociedades Agricolas de Interes Social" (SAIS) and the "Empresas de Propiedad Social" (EPS). These forms only represent 0.28% of production units in 1994. Source: http://iinei.inei.gob.pe/iinei/cenagro1994/

As shown in Figure 2, none of these types of tenure are clustered regionally. Since the census data identifies the type of land tenure per district I therefore matched these measures with the conflict data, to obtain the levels of violence per year and district as well as the types of land tenure, crop production and district size. This allows me to exploit variation over time within a district (there are about 1800 districts in Peru), controlling for time-invariant districts characteristics that are potentially correlated with conflict. The final dataset is at the district level, including both district and department level controls when necessary.

Time series of export crop prices comes from the International Monetary Fund which collects monthly data on crop prices from which I created a simple annual average of the price and used it directly in the estimation as the number of US cents per kilo of coffee[5]. These prices are further adjusted by U.S. inflation between 1990 and 2000. Since it is an international price, it represents a benchmark price representative of the global market and determined by the largest exporter of a given commodity. For none of the commodities included is Peru the largest exporter for the years under study.

Data on Peruvian exports was obtained from ECLAC (Economic Commission for Latin America and the Caribbean) which provides the value in dollars per year of Peruvian exports.[6] This data is limited to the period 1983 to 2000. Yet, because of the limitations imposed by other district controls, most of my estimates come from the period 1990 to 2000 such that the information provided appropriately describes the data used. In addition, information on the market share for coffee was provided by the International Coffee Organization (ICO) from 1990 to 1999.

Information on crop cultivation was obtained from the 1972 Agricultural Census, which provides a time-invariant measure of the number of hectares cultivated per districts of a specific crop. This variable measures crop cultivation intensity for each district thus avoiding potential endogeneity concerns when using time-varying measures of production, since these might respond to prevailing violence. The 1972 census includes the number of hectares, number of farms and tons produced per district cultivating coffee. A concern with this data is that it is not possible to identify both the type of land tenure and their crop cultivation at the level of the agricultural unit, therefore I use district totals. Among the other crops included in the analysis is that of coca cultivation. Due to the increasing salience of Peruvian coca production, and mainly for political and security reasons, the hectares of coca cultivation for the period 1980 - 2000 were not published by the Ministry of Agriculture. Yet, information on coca cultivation was coded from the agricultural census of 1972 at a time in which coca cultivation from peasants was not banned. Although more reliable accounts of coca production would be desirable (e.g. satellite images) it has the advantage of preceding the period of observed violence, and provides and approximation for historical zones of coca production and a lower bound

[5]Data for monthly prices: http://www.imf.org/external/np/res/commod/External_Data.xls

[6]The specific data source is the Statistical Data Base of Foreign Trade (BADECEL, Base de Datos Estadisticos de Comercio Exterior). I used the classification of exports given by CUCI Rev 2 to the group and partida level. http://websie.eclac.cl/badecel/basededatos.asp

of actual production. Finally, additional district controls such as district population from 1990 to 2000 was included in all specifications and obtained from INEI (*Instituto Nacional de Estadistica e Informatica*).

3.1 Descriptive Statistics

Table 2 summarizes the descriptive statistics of the main dependent and independent variables in districts with a large presence of coffee or sugar cultivation. As shown, farms or "rural economic units" compose around 38% of all farms while communal, sharecropping and those distributed during the agrarian reform compose around 4% of the total. The rest falls under the category of "other"which mostly comprises farms under mixed arrangements (sharecropping and owner) - which makes it difficult to disentangle their overall effect on violence.

In terms of coffee production, the average price throughout the period is of 275 cents per kg or 2.75 dollars. The average level of coffee production is of 0.034 tons or 34 kilos, yet, it should be noted that those not producing coffee are coded as zero. When looking at violence, the average number of attacks per district per year was 0.35 followed by army and guerrilla attacks respectively. When examine whether violence occurred disproportionately in coffee areas, Figure 4 appears to suggest it does. Not only was violence greater in coffee regions, but it also appear to be so at times when the price of coffee was particularly low.

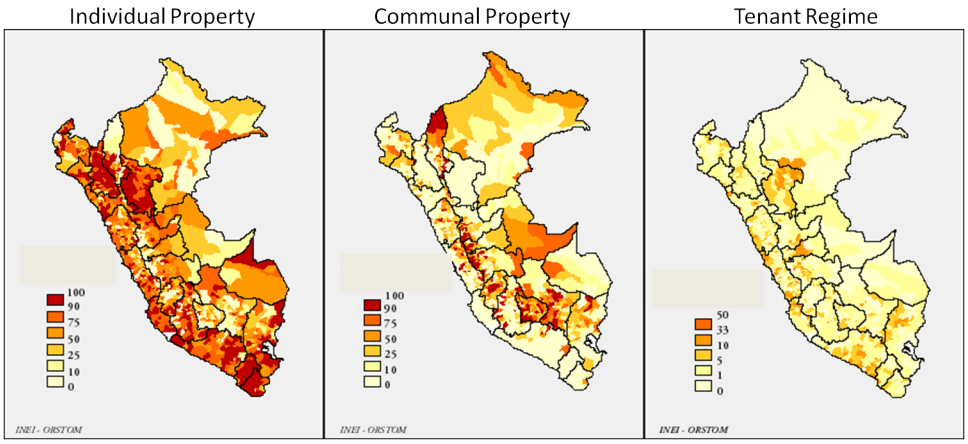
To better depict the It is noteworthy that on the aggregate, overall violence, guerrilla and army attacks are not different depending on whether they cultivate coffee or not. That is, violence does not occur exclusively in coffee producing areas. However, as shown in Figure 3 (below), violence does seem to respond to changes in the international price of coffee: high prices are associated with lower violence while a steep decrease in prices also sees a surge in overall violence.

Finally, from Table 2 we should also notice the higher proportion of coca farms and coca cultivation in coffee areas. Since coca and coffee often benefit from same climatological conditions, we must account for the substitution between coca and coffee in the case of a drop in the international price of the latter. Considering these differences I will account for coca production including the number of hectares interacted with coffee prices to control for changes in violence in these coca production zones.

4 Empirical Strategy

The paper uses a difference in difference (DID) approach to estimate whether the effect of price shocks affected violence disproportionately in places under specific land tenure arrangements or not. The heterogeneity and widespread distribution observed in the Peruvian land tenure system ensures no single type of tenure is clustered regionally as shown in Figure 2. Although individual property arrangements are the most prevalent form, communal and tenant regimes are also present in every Peruvian department.

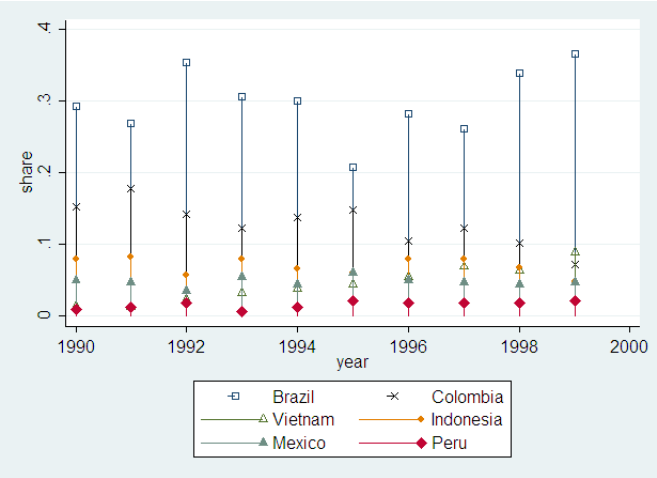
Figure 2: Peruvian Land Tenure Arrangements Distribution in 1994



[Note: Darker areas reflect higher intensity of a specific land tenure arrangement].

To account for the change of income of Peruvian peasants I use *international* crop prices which are clearly exogenous to Peruvian production. Local prices would raise serious endogeneity concerns if prices respond to violence levels (e.g. reduced production increasing prices) thus affecting my estimates. Since violence *does* tend to disrupt productive activities, especially when the victims are peasants or landowners as many of the victims were, I use the price of Peruvian export crops. Coffee, the main export crop of Peru, only holds a small fraction of the Latin American market, let alone of the international market thus Peru can be considered a price-taker for practical purposes. As seen in Figure 3, the share of the market for Peruvian coffee is only 1/5 of Brazil's (the major exporter) and behind producers such as Vietnam, Mexico, Indonesia and Colombia as well as producers from Africa and the Middle East (not shown). Therefore, I am rest assured that changes in the conditions prevailing in Peru will not affect coffee prices as events in Vietnam, Brazil and Colombia would.

Figure 3: Market Share of Coffee: 1990-1999



Moreover, Figure 6 of Appendix A show that the Peruvian value obtained from coffee exports are small in comparison to Brazil, the United States, and in some cases from the Argentinean value obtained from export agricultural production. Some of these goods have been generally expanding from 1980 onwards, consistent with the liberalizing politics of the period and the growth of export agricultural production. This shift has turned Peru into a new player in the world commodity markets. Figure 7 of Appendix A shows the time series of international commodity prices (in real US dollars). Using changes in the international commodity prices allows me to assess whether price shocks affect conflict differentially in zones under particular land tenure arrangements. As shown in Figure 4 (below), the price of *coffee* exhibits a large increase between 1994 until 1997 when coffee prices sharply decline until the end of my sample. Moreover, this pattern of price decline mirrors the increase in violence observed from Shining Path between 1985 to 1992 in coffee versus non-coffee areas.

Figure 4: Distribution of Violence in Coffee vs Non-Coffee Districts

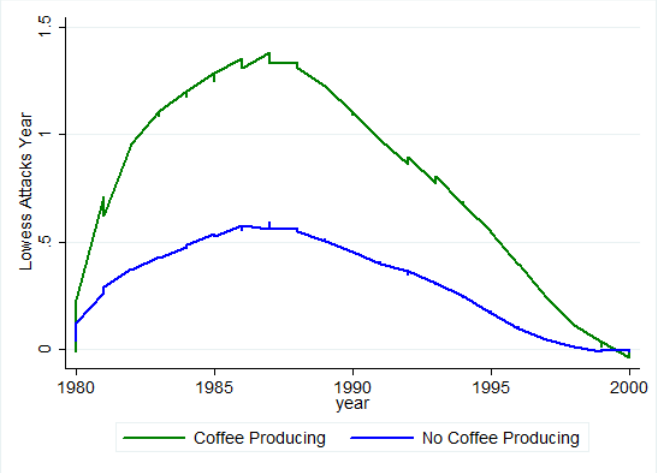
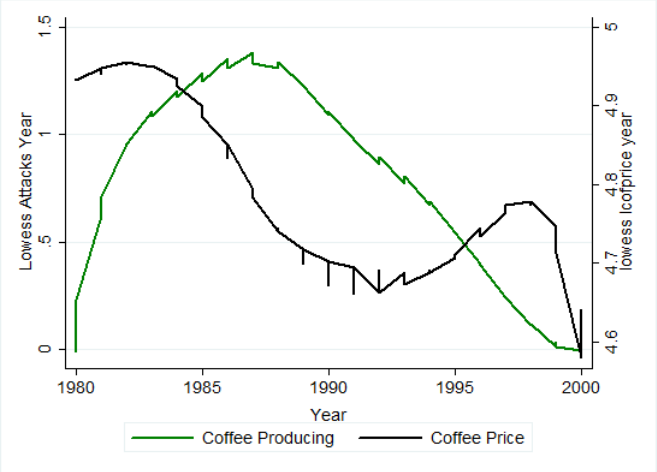


Figure 5: Timing of Attacks in Coffee Regions



Other endogeneity concerns arise if specific land tenure arrangements are associated with features potentially fostering violence (e.g. mountains as hideouts, or roads susceptible to be attacked). In such case, conflict would be correlated with land tenure via a third unknown factor (omitted variable bias). Similarly, it is possible that violent conflict promotes a switch towards specific land tenure arrangements (reverse causality). For example, if conflict reduces land productivity and therefore pushes peasants

to leave their land and become wage laborers elsewhere. To address both concerns I first use exogenous price shocks to make sure changes in income and prevailing land tenure are not due to local conflict. Second, I use a measure of district land tenure conditions, the agricultural census of 1972, which measures district level land tenure arrangements before the conflict period started and are therefore unlikely to be related to it. However, potential concerns arise from land reforms themselves. For instance, the land reform launched in 1969 appeared to be one of the most comprehensive reforms in Latin America which drastically changed Peruvian rural landscape in the 1970s (Guillet 1979). These changes in land tenure would be of concern if one particular type of land tenure were to be grown exponentially and devoted to particular land crops. In such case, the census of 1972 would no longer truly reflect the conditions prevailing in 1990. However, as shown by MINAG[7], the variation in land tenure between 1972 to 1994 was minimal for individual proprietors. Thus, there was no large increase in individual property due to communal lands being divided and sold as the 1990 land reform allowed. If anything, there was a notable increase in communal lands between 1972 and 1994 by the reform. However, this expansion of communal land was accompanied by a decrease in the number of cooperatives or "cooperativas" (a pre-1969 land tenure form). According to qualitative accounts, the functioning of "cooperativas" and "communal land" became very similar due to a decree in 1970 issued as an adjunct to the Agrarian Reform Law of 1969. As Guillet (1979: 98-99) explains:

> "Prior to the Peasant Communities Law, indigenous communities had a peculiar organization [...] dating from the provisions of the Constitution of 1920. Under the provisions of the new law, peasant communities now have an organization almost identical to that specified in the General Law of Cooperatives (No. 15260). There is an administrative council, charged with the administration of community affairs; a vigilance council, which overlooks the activities of the administration council; and a general assembly of *comuneros*, the maximum decision-making body of the community, which sets long-term policy and review the actions of the administrative councils" (p.98-99)

Thus, although there is an increase in the number of communal lands, part of this growth can be counteracted by the decrease in the number of "cooperativas" arrangement. However, additional increases in communal land arrangements would then affect my estimates on communal land, although not those concerning ownership and tenants.

Another concern arises if those benefiting from land redistribution were for some reasons more belligerent and politically active thus exhibiting a higher level of violence. Although this possibility is real, those benefiting from the 1969 land reform were collective forms of land tenure such as communities and cooperatives. Therefore, if these districts were simply more belligerent, we should expect them to exhibit larger violence when a negative shock ensues. The fact that those most benefited from the reform were indigenous communities, and that these do not exhibit a higher propensity to violence

[7] Available at: http://iinei.inei.gob.pe/iinei/cenagro1994/ under "Formas Juridicas de Tenencia"

during crises make this option less plausible. In fact, those *not* benefited from the reform responded more promptly to price shocks and higher violence overall. How the 1969 reform might have triggered such forms of violence in the presence of income shocks is an interesting avenue for future research.

Finally, an alternative approach to the DID is to instrument local prices with international prices. However, it was not possible to instrument the internal price per department with the international price provided by the IMF given the two hyperinflation periods experienced in Peru. International prices, once converted to Peruvian Soles to make them comparable with local real prices, reflects the spikes of the exchange rate and the internal consumer price index. Thus, changes in international prices would no longer be driven by exogenous market jumps but rather by these inflationary periods clearly due to internal Peruvian politics of which civil war most likely played a role. Figure 8 of Appendix A shows the international price converted to Peruvian soles as well as the internal prices (wholesale average prices across Peruvian departments) of the same commodities. As seen, the spikes in prices reflect internal Peruvian conditions and not exogenous price shocks. For this reason, I use directly the international price in US dollars.

4.1 Estimation

My empirical strategy relies on the heterogeneity of Peruvian land tenure arrangements which creates spatial variation across districts. I use measures preceding the conflict period (census of 1972), thus I can be sure that the land tenure distribution is not a response to violent conflict dynamics.

As mentioned above, local prices could be endogenous to violent dynamics: If violence affects crop production, this could confound any estimates on the effect of price shocks on conflict. Specifically, if violence reduces agricultural productivity thus increasing prices, this would generate a downward bias considering the opportunity cost for a peasant of fighting is now higher. Conversely, if for some reason violence increases agricultural output thus reducing prices, this creates an upward bias in my estimates. To address the potential endogeneity of local prices, I directly use changes in international commodity prices as a proxy for changes of internal prices in Peru. To look at the differential effect of price shocks on conflict I estimate:

$$Attacks_{ijt} = \alpha_i + \gamma_t + \beta_1 \cdot PriceShock_{it-1} + \mathbf{X}_{ijt} + \eta_{jt} + \epsilon_{ijt} \quad (1)$$

Where j is the department, i is the district and t is the year (1980-2000). $Attacks_{ijt}$ can either refer to aggregate number of violent episodes, or to specific acts committed by the government or guerrilla groups in department j, district i and year t. $PriceShock_{it-1}$ is the log of the interacted international price of the crop in the year $t-1$ with the number of kilos of coffee produced per districts in 1972. This variable by itself reflects the value of coffee production in year $t-1$ according to the production levels of 1972. If $\beta_1 < 0$, then a decrease in the value of coffee production increases violence. $\mathbf{X}_{ijt}$ are control

covariates including district levels controls such as population; η_{jt} are state-level linear time trends; α_i is the district fixed effect, and γ_t are the year effects. Equation 1 is estimated using OLS.

Since the variable of interest is the effect of land tenure, I look at whether there are differential effects in districts with specific land tenures using a triple interaction specification. I estimate:

$$Attacks_{ijt} = \alpha_i + \delta_t + \beta_1 PriceShock_{it-1} \tag{2}$$

$$+\beta_2(PriceShock_{it-1} \times Owner_{i,1972}) + \beta_3(PriceShock_{it-1} \times Comm_{i,1972})$$

$$\beta_4(PriceShock_{it-1} \times Sharecrop_{i,1972}) + \mathbf{X}_{ijt} + \rho_{it} + \eta_{jt} + \epsilon_{ijt}$$

Where $PriceShock_{it-1}$ is the value of coffee production in year $t-1$ as described in Equation 1. $Owner_{i1972}$, $Comm_{i,1972}$ and $Sharecrop_{i,1972}$ are continuous measures (unless otherwise specified) of the prevalence of individual ownership, communal land and sharecropping arrangements, respectively. These measures include the number of farms per hundreds or "economic units" under each arrangement, or the share of these in the district. The coefficients of interest are β_2, β_3 and β_4, which captures the differential effect of price shocks on violence in districts which a specific land arrangement relative to regions *not* exhibiting such land arrangements. For instance, if $\beta_2 > 0$ it suggests that that particular land arrangement attenuates the effect of price shocks on violence, however, to corroborate this is the case I present a test for the sum of the coefficients to assess whether the difference is statistically different from zero or not. Other variables are the same as included in Equation 1, with the exception of ρ_{it} which is an indicator accounting for coca producing districts interacted with the international price of coffee to account for substitution effects. Other sub-interactions are absorbed either by the district or by the year fixed effects.

5 Results – Export crops, Land Tenure and Conflict.

In this section I present the results for the period 1990-2000 for which I have the population data. As argued earlier, the international price of export crops is considered exogenous to Peru's production during the period, and is used to approximate changes in local prices.

5.1 Is there a Price Shock effect on Conflict?

Table 3 shows the results of estimating the price shock effect on conflict (two way interaction) of Equation 1. All regressions presented include a large set of district fixed effects controlling for any district specific characteristic. Similarly, the year fixed effects controls for any shock common to all districts in the same year. In addition, all regressions have clustered standard errors at the district level, to control for potential serial correlation in districts over time and across districts within a department.

Table 3 shows the results of changes in international prices which are therefore, exogenous to the Peruvian civil war. Coefficients of the interaction term indicate that the crop prices of coffee have a negative relationship to overall violence (perpetrated by either group): when the price of coffee increase, violence is lower in districts of export crops (coffee) relative to districts not oriented towards agricultural exports, for example, subsistence agriculture districts. These estimates imply that the average *coffee* prices, from 1990 to 2000 which is around 2.4 dollars per kilo, was accompanied by an *increase* in overall levels of violence in coffee intensive districts relative to non-coffee districts.[8] Specifically, estimates show that a decrease of 10% in the value of coffee production – roughly the yearly variation throughout the period – leads to 0.15 more attacks in general. Given the average number of attacks is 0.57 in coffee areas during the period, these results imply an increase of 26 percent. Such results are consistent with a large number of studies finding an increase in violence at times of economic downturns.

The estimates shown in Table 3 Column (1) reflect the effect of price shocks on overall levels of violence, regardless of who the perpetrator was. Therefore, in Columns (2) and (3) of Table 3-Panel A I estimate Equation 1, that is, the effect of price shocks on conflict but now distinguishing a specific type of violence: the violence perpetrated by the guerrilla movement and by the army. Given the type of strategy followed by the rebel group, in which they settled in a village monitoring and punishing non-compliance, we would expect that deteriorating economic conditions increases the recruitment opportunities and violent episodes of rebel groups (Nillesen and Verwimp 2009). In the case of government violence, I grouped together violence perpetrated by army forces (military, police, or secret security forces) but excluded crimes committed by the paramilitaries and the "rondas" during the period 1990-2000 given the small number of the latter. However, the inclusion of paramilitary violence does not alter the results obtained for army attacks. During these years, paramilitaries were only responsible for 1 case while self-defense or "rondas" were behind 5 cases throughout the 10 year period under analysis. It is before 1990 when "rondas" and paramilitaries were most violent in their attacks against alleged guerrilla members of sympathizers. In addition, the grouping is only natural given well-known links between the military and the self-defense organizations, in which civilian defense was often promoted and even armed by the military (McClintock 1984). Therefore, I included the paramilitary attacks under the "army" label, which does not

[8] Note: From 1998 to 2000 there is a second drop in coffee prices, which meant a decrease in 39% of the price. The price kept falling until 2003, yet the analysis ends in 2000.

change the results obtained in Table 3 - Column (3) .

The most salient result is the negative relationship between coffee prices and guerrilla violence: *increases* in coffee prices *reduce* the number of guerrilla victims per district in coffee export zones. In the case of guerrilla attacks, the results show that a 10% decrease implies an increase of 33 percentage more attacks evaluated at the mean. Similar results are obtained for the case of army attacks, attacks against peasants and political authorities – the signature action of the guerrillas. I also detect a differential increase in the number of killings, as opposed to other types of attacks, in coffee producing areas relative to non-producing ones.

In Table 4 I present a robustness check of the results by regressing the price shock treatment on the onset of violence by the guerrilla, the army, and other types of violence to analyze whether coffee districts were also more likley to see any kind of violence, regardless of its intensity. The coffee price shock differentially affects the likelihood of all types of violence, particularly guerrilla violence as well as of attacks against peasants and political authorities in the form of killings. In the case of army violence the coefficient is still negative, yet not so precisely estimated.

Overall, these findings are encouraging to the identification strategy adopted: negative exogenous price shocks are associated with increased violence committed by the rebels group yet less so in the case of the government violence. This result is also consistent with previous literature finding that income shocks increase the likelihood of civil war onset (Miguel et. Al 2004) potentially lowering the opportunity cost of fighting (Collier and Hoeffler 2004).

5.2 Price shocks and Coca production

Since the 1970's Peru has become an increasingly prominent supplier of coca in the world market. Unlike other cases (e.g. Colombian guerrilla movements), it is still unclear whether Shining Path financed its activities by taxing coca production. For instance, it appears that Shining Path's functioning did *not* depend on the revenues obtained through coca trade. Rather, taxes obtained remained in the region where they were generated (Huallaga) and did not serve to wage the war elsewhere (McClinctock 1998). Other studies are more cautious and highlight the lack of conclusive evidence in that regard (Weinstein 2007: 93). Nonetheless, given the correlation between coca and violence found in other cases (Angrist and Kugler 2008) the illicit drug trade can be regarded as a confounding factor. Therefore, in Table 5 I include an indicator for the presence of coca cultivated in 1972 interacted with the international price of coffee. This term would then assess whether the increase in violence due to falling coffee-prices are related to coca production areas and not due to lower opportunity costs of fighting in coffee production. To account for this possibility, I therefore estimate:

$$Attacks_{ijt} = \alpha_i + \gamma_t + \beta_1(PriceShock_{t-1}) + \beta_2 \cdot Log(CofPrice_{t-1} \times Coca_{i,1972}) \quad (3)$$

$$+\mathbf{X}_{ijt} + \eta_{jt} + \epsilon_{ijt}$$

The variable $coca_{i1972}$ refers to an indicator for the presence of coca cultivation in 1972. The interaction term between coca production levels and coffee prices controls for changes in violence of coca areas occurring while coffee prices are changing. Table 5 shows that the estimate of the parameter (β_1), that is, the coffee price shock remain negative and statistically significant and similar in magnitude to the baseline results (Table 3). However, the interaction between coca intensity and the international price of coffee reveals that a drop in coffee prices actually leads to an increase in violence, thus suggesting that a small part of the violence surge may be driven by districts cultivating coca. Table 5 and Panel C also shows the results when I exclude from the sample major coca production zones (Huallaga Valley Province)[9] to make sure that the increase in violence is not driven by drug-trafficking activities, for example. As shown in Table 5 Panel C– drops in coffee prices are still associated with increased violence after excluding major coca production areas. The coefficients remain practically identical in magnitude and statistical significance to the baseline results shown in Table 3, if not larger. However, the coefficient on the coca interaction is still negative and significant indicating that guerrilla attacks do increase in coca areas when coffee prices drop, thus in all further specifications I will include an indicator for coca production interacted with the lagged coffee price.

5.3 Price shocks, Land Tenure and Conflict.

Peruvian politics have been characterized by the recurrence of land conflict both on the highlands and the coastal areas of Peru[10]. Especially in the 1960's, when the largest number of land invasions from peasants and communities occurred, their demands were posed in terms of land tenure. In some cases the demands have been for redistribution from plantations and *haciendas*. In other cases peasants have lobbied for an expansion of labor rights. These demands have often motivated land reforms to defuse and meet the demands of peasants. On the other hand, it is possible that these areas were particularly belligerent and would not be appeased by land reforms but rather support the presence of guerrilla forces.[11] To distinguish both I will look at whether indigenous communities appear to have a greater presence of Shining Path to a greater degree than other areas.

[9] For a complete treatment on the mechanisms through which coca and Shining Path related to each other see Weinstein (2007)

[10] See Paige (1978) for a detailed account of peasants rebellions prior to 1980

[11] Guillet (1979: 97) provides some numbers regarding the distribution of land: 40.7% formed "cooperatives"; 34.8% SAIS, 17.8% Communities and only 6.7% were distributed to individuals.

Despite extensive land reform, Shining Path gained footing in the southern highlands of Peru starting in the 1980s and spreading throughout the country in the following years. Many arguments have been put forward which can be summarized around two hypotheses. The first hypothesis is that increased economic vulnerability of peasants lead them to violent actions (Hobsbawn 1959; Wolf 1969; Scott 1977). Using the current literature on civil war, this is analogous to claim that fighting is more likely in the aftermath of economic shocks that reduce income (Miguel et. al. 2004; Collier and Hoeffler; Dube and Vargas 2012). As shown in the previous sections, there appears to be strong evidence in this regard. Yet, I posit these effects will vary according to land possession. First, as argued by Paige (1978) and Wickham-Crowley (1992) peasants *not* owning land are *more* prone to conflict given they will be the first to be laid off when profits from export crops is reduced. This hypothesis predicts that landless peasants (e.g. those working for a wage, usufructuaries, tenants) will be more prone to violence than otherwise. The reason being their lack of ownership will render them unemployed in the face of lower returns from production and therefore more susceptible to "radical appeals". In contrast, individual landholders would be better able to face economic crisis by shifting to subsistence crops and in defense of their land plot therefore refraining from violence.

H2: Negative price shocks will increase violence more among those *not* individually owning land, than among individual land owners.

While it is possible that rural wage laborers are the most exposed to income price shocks, this view overlooks the role of long-term risk sharing contracts of these arrangements which would then shield these type of workers from radical appeals. In the case of communal land tenure, it is also unclear whether this type of arrangement has a disadvantage in facing international market shocks. On the one hand if the community is unable to collectively switch to subsistence crops they may not be able to smooth income shocks and therefore be more prone to violence. That is, the collective nature of communal arrangements might interfere with collective action and decisions which is a problem not faced by the small landowner. Similarly, as argued by Fearon (2007), it is possible that land tenure arrangements in which a proportion of the cultivation is divided among various individuals (e.g. communal lands) reflects this case: higher productivity of the plot provides them with a larger incentive to grab a larger portion of their share than when land productivity is lower.[12]

On the other hand, it is possible that communal land arrangements based on shared ownership may be better in attenuating declining profits by establishing collective or social insurance mechanisms. For instance, indigenous communities may be better at smoothing income shocks will fuel less violent than those leaving peasant vulnerable to international markets via social safety nets. In sum, although price shocks change peasant's opportunity costs of fighting, it is largely contingent on the relationship to their

[12]This mechanism would be also similar to the "rapacious channel" described in Dube and Vargas (2012).

source of production (land). In this section I analyze whether the effect of commodity price shocks on violence is different under various tenure arrangements zones.

Table 6 shows the results of land tenure on the district level violence. The first row presents the effect of the coffee price shock on violent outcomes. Consistent with previous tables, a decrease in the value of coffee production tends to increase violence intensity. However, this effect is attenuated by the type of land arrangement prevailing in the district. The following three rows presents the estimates of β, the term of interest comparing the three main types of land tenure: ownership, communal and sharecropping. While the coefficient on ownership suggests there is no difference across districts, that of sharecropping is consistently positive and robust to controlling by the conflict dynamics of the other two types of land tenure. In the case of communal land tenure the effects are positive and not within conventional levels of statistical significancy when analyzing attacks commited by the army, yet, still consistent with the importance of shared forms of property rights on conflict dynamics. However, communal land does appear to greatly attenuate the effect of price shocks on peasant victims, political authorities and killings more generally as shown in Panel B.

Comparing the two coefficients (ownership and tenant regimes) we can see that the increase in guerrilla violence is smaller in districts with a majority of tenant regime. This difference entails that while the negative price shock increased violence, this effect was smaller in tenant districts than otherwise, of which a majority is comprised by owner districts. That is, the increase in guerrilla attacks associated with the price-shock was lower in tenant districts. For instance, while a 10% decrease in the value of coffee production increases attacks by 0.16, this number is only 0.14 or 0.13 for each additional communal or sharecropping farm in the district. In contrast, there is little to no difference depending on the number of farms owned by individuals in the district. These results suggest that districts with a greater prevalence of shared arrangements see a smaller increase in violence driven by drops in the value of coffee productions.

The most likely explanation for this case lies in mechanisms of social insurance given the fact that these arrangements obliges the division of production among the members of the community in return for lower risk. In particular, communal lands were obliged, by law, to operate under the express prohibition of selling, dividing or renting the land assigned (Guillet 1979). Similarly, their administrative councils are in charge of major productive decisions, thus shifting the economic decisions from the household unit to the community council. These restrictions were intended to provide economic security to peasants during times of distress which suggests they were indeed more insulated from changes in the international market.

In the case of sharecropping, there is an arrangement between the landowner and the peasant (tenant) which also involves some risk sharing such that in difficult times the shared obligations might cushion these peasants from slipping into outright poverty. These sort of arrangements may reduce the radical appeal of movements such as those of Shining Path and explain why some regions actively resisted the presence of rebel groups

(often forming self-defense groups) while others at similar levels of income may find it more appealing. One of those examples is that of Cajamarca, a state where poverty and sharecropping arrangements are prevalent, yet, Shining Path found it difficult to infiltrate and establish operational bases.

In terms of the price shock, we can observe that the estimates of $PriceShock_{it-1}$, are negative and significant, thus meaning that negative coffee price shocks increased overall violence in coffee intense districts relative to non-coffee districts. For other export crops, such as sugar, the coefficients of the two-way interaction turned out insignificant (not shown) suggesting that price shocks and land tenure arrangements do not induce differential effects on the aggregate levels of violence. Also, the results corroborates that violence is responding to price shocks of coffee crops, not to what is happening to other crops or to economy-wide difficulties. In sum, the negative coffee price shocks increases overall violence but such effect is smaller in sharecropping areas than otherwise, of which a majority is formed by individual land ownership.

One concern with this approach is that these estimates compare owned farms, communal farms and sharecropping farms to the omitted category composed of mixed farms and those which were granted ownership via the Agrarian Reform of 1969. To examine whether these results are driven by the omitted category, in Table 7 I included all land types while omitting those of individual ownerhsip. As shown, results are consistent with those of Table 6, whereby communal and sharecropping arrangements continue to have an attenuating effect on violence compared to those of ownership. A second concern is whether these results are robust to measuring land tenure in terms of the share of the total farms under each regime as opposed to using levels. In Table 8 I present the results showing that the effects are similar to those of Table 6, however, the differences among types are less visible than when using levels. Yet, such pattern is reverse in Table 9, when I include an indicator for districts in which more than 50% belongs to a specific land tenure arrangements. Although the coefficient of these share indicators will be higher than previous estimates (by construction), it is always much greater for districts with a majority of either communal or sharecropping arrangements.

A final robustness check is to analyze whether the patterns obtained using yearly variation in prices are also applicable when looking at the monthly variation in prices provided by the International Monetary Fund. As shown, in Table 10, the coefficient on the price shock is much smaller than that previously estimated since I am now exploiting monthly variation in violence intensity. However, the same pattern emerges: districts with a greater number of communal and sharecropping farms exhibit a lower increase in violence due to changes in the value of coffee production. In contrast, there is no differences for districts under ownership arrangements.

In sum, combining the results from Table 6 through 10 suggests that a negative coffee price shocks increases guerrilla attacks and violence in general, yet, such increase in much smaller in areas under sharecropping and communal land districts. The findings suggest that thes property arrangements made them less vulnerable to price shocks suggesting

that the opportunity cost of fighting changes little when the price of coffee drops. In the next section I assess whether price shocks effectively changed the opportunity cost of responding to increased unemployment and patterns of harvesting as a proxy for demand for labor.

5.4. Price shocks, Land tenure and Demand for Agricultural Labor: A Mechanism.

The effect of price shocks has been interpreted as affecting the returns from export crop cultivation: when prices are higher the returns from export crop cultivation are higher thus increasing the amount of labor demanded and wages in crop cultivation areas. Employment and higher returns from crop cultivation increase the costs of participating in the guerrilla movement therefore reducing violence. In this section I take two approaches to assess whether employment or occupation in agricultural activities might explain the patterns of violence observed in districts with different land arrangements. I begin by exploiting variation in the yearly coffee cultivation cycle. As shown in Figure 6 below, major coffee producing states in Peru have a specific calendar for harvesting coffee which varies in its length and timing. As an example, in the state of Junin, the critical months for coffee harvesting is April, May and June. However, this is different from other coffee producing areas in which the harvesting period is either later or shorter. Since these dates are given by the agro-climatic conditions prevailing in the state, they are considered exogenous to the timing of Peruvian violence.

Figure 6: Crop Harvest Season: State of Junin

Calendario de cosechas (%) *

Producto/Mes	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Set	Oct	Nov	Dic	
Cacao	3.5	5.6	8.3	11.9	15.4	14.7	11.6	7.8	7.1	5.3	4.5	4.3	100.0
Café	0.4	2.3	6.6	23.4	27.9	24.6	12.3	2.2	0.2	0.1			100.0
Cebada grano				2.6	9.8	47.1	34.5	4.5	1.5				100.0
Maíz amarillo duro	10.6	20.4	22.5	15.3	10.9	6.5	3.0	2.5	2.3	1.3	1.8	2.9	100.0
Maíz amiláceo				9.2	52.9	32.3	4.9	0.4	0.3				100.0
Naranjo	5.8	5.1	5.6	6.4	9.4	12.6	12.4	10.3	9.3	8.7	7.1	7.3	100.0
Palta	17.1	14.2	11.5	9.9	8.5	6.1	3.8	2.5	3.2	5.1	8.9	9.2	100.0
Papa	4.7	8.1	11.4	20.3	27.8	15.3	5.0	1.1	0.7	0.7	1.8	3.1	100.0
Plátano	8.7	8.6	8.6	8.9	8.5	8.7	8.4	8.1	8.0	7.9	7.3	8.3	100.0
Piña	10.5	8.6	7.5	7.8	7.3	6.6	6.5	7.4	8.5	9.2	9.9	10.2	100.0
Trigo					11.8	44.4	41.0	2.7	0.1				100.0
Yuca	5.9	4.9	6.5	6.9	9.2	10.3	8.9	8.1	9.0	10.2	10.1	10.0	100.0

Source: Ministerio de Agricultura Peru (2014)

Exploiting variation in the monthly harvesting season per state and monthly changes in the international price of coffee, I estimate the following:

$$Attacks_{ijm} = \alpha_i + \delta_m + \beta_1(PriceShock_{im-1} \times Harvest_{jm}) \quad (4)$$

$$+\beta_2(PriceShock_{im-1} \times LandType_{i,1972})+$$

$$\beta_3(PriceShock_{im-1} \times LandType_{i,1972} \times Harvest_{jm}) + \rho_{im} + \eta_{jm} + \epsilon_{ijm}$$

Where $Attacks_{ijm}$ represent the number of violent attacks in district i, state j and month m. As before, I include district fixed effects (α_i) but given now the source of time variation is monthly, I control for potential factors that may afect violence across all districts in a given month (δ_m). The terms of interest is the sum of the coefficients β_2 and β_3 for each land type. Other sub-interactions are included in the main specification, yet not shown.

Table11 show the estimates from Equation 4. Specifically, it shows how a decrease in the value of coffee production is associated with greater violence. Yet, such effect is much larger if the downturn occurs during the harvesting season, consistent with the idea that there will be lower payment and less work opportunities for coffee agricultural producers thus reducing the opportunity cost of violence. Conversely, increases in the value of coffee production lowers the intensity of violence and this effect is even larger in months in which coffee is being harvested. The coffee calendar appears to have a major effect in the prevalence of violence in general, violence by guerrillas and killings. However, these estimates may be masking differential effects the harvesting season may have according to the type of land tenure prevailing. Therefore, in Table 12 I exploit the monthly variation in the agricultural cycle to assess how it affects violence depending on the type of land tenure in the district. Consistent with previous findings, a decrease in the value of coffee production increases violence. Yet, such effect is smaller in places with a greater number of communal and sharecropper farms. While this pattern shows no difference depending on the number of owned farms, it does exhibit a larger effect among districts with a greater number of sharecropping farms. That is, sharecropping farms exhibit even less violent outbreaks at times of economic downturns during the harvest seasons, suggesting they are better able to attenuate the effect of the price shock. Since sharecropping arrangements are known for relying on a great number of seasonal and temporary workers, the result is consistent with this pattern.

The next exercise is to use individual level data aggregated collected from different household surveys to assess the effect of coffee price shocks on employment in the agricultural sector per type of land arrangement. Specifically, I pooled national household surveys from the years 1986, 1991, 1993, 1994, 1996, 1997, 1998, 1999 and 2000. Unfortunately, these surveys only use a sample of districts and the pooled cross-section nature of this data does not allow me to include a district fixed effect. Therefore, these

estimates should be take as indicative rather than causally. However, if the mechanism described above is true, I should see a larger negative effect of a drop in coffee prices on employment in coffee producing areas areas with high number of individual landowners. I estimate the following model:

$$AgricEmployment_{cijt} = \delta_t + PriceShock_{it-1} \tag{5}$$

$$+\beta_1(PriceShock_{it-1} \times Owner_{i,1972}) + \beta_2(PriceShock_{it-1} \times Comm_{i,1972})$$

$$\beta_3(PriceShock_{it-1} \times Sharecrop_{i,1972}) + \mathbf{X}_{cijt} + \rho_{it} + \eta_{jt} + \epsilon_{ijt}$$

Where $AgricEmployment_{cijt}$ is the difference in the percentage of individuals in the district working in the agricultural sector per district i in department j as a share of those employed; $PriceShock_{it-1} \times Owner_{i,1972}$ is level of exposure to changes in coffee prices during the period interacted with the type of land tenure prevailing; $\mathbf{X}_{cijt}$ are other individual level controls that may influence employment decisions: gender and age. An additional control variable is the log of the district population per year. Unlike previous estimations, district fixed effects cannot be included due to the cross-sectional nature of the data, yet I cluster the standard errors at the district level. However, I include year effects to account for potential national trends in employment. Finally, the data distinguishes the percentage of agricultural workers dedicated to cultivation in general, thus I estimate equation (4) using as dependent variable the share of agricultural works from those employed. I am interested in whether the interaction term exhibits a positive coefficient: exposure to price shocks increased unemployment in certain land tenure arrangements districts than otherwise.

Table 13 presents the estimates for districts exposed to coffee price shocks: the coefficient shows that an increase in the exposure to coffee price shocks leads to a differential increase in employment in places with higher ownership relative to those non-owners. However, this effect is much smaller than the one observed for tenant regimes, and much less to those places with communal land tenure. In fact, areas under tenant or communal land tenure exhibit no difference in employment measures in general. This finding favors the channel proposed: the increase in the exposure to negative coffee prices shows a negative effect on the employment rates of *ownership* districts, thus mirroring their economic response to violence and consistent with the idea tha these arrangements may be better insured against market risk.

6 Conclusion and Extensions.

This paper has examined how export crop prices shocks affect violence during an armed conflict episode. I present evidence showing that coffee price shocks have different effects on violence contingent on the type of land tenure involved. A reduction in the

price of coffee increased violence overall and guerrilla violence in particular among coffee districts in comparison to non-coffee districts. These results are robust to a variety of specifications, including the possibility that violence were to be fueled by coca production. However, the increase in violence appears to be mediated according to the type of land tenure prevailing: tenant regimes exhibit a smaller increase in violence during negative price shocks than districts with individual ownership land tenure arrangements. This pattern suggests that communal and tenant land districts appear to provide better insurance mechanisms to smooth income shocks in the presence of an exogenous change in coffee rents.

I also present evidence on a plausible mechanism of how commodity price shocks might increase violence: an increase in unemployment rates. I find that this mechanism was particularly applicable to districts with greater exposure to price shocks from international prices of coffee and under individual ownership arrangements. That is, in the face of drops in the international prices of coffee, unemployment levels were higher in districts with greater ownership than otherwise. The opposite was true for shared land arrangements (communal and tenant). In addition, given that the type of violence that increased in coffee-owner districts was guerrilla violence, these findings support the idea of a greater ability to participate in armed groups among those owning land than among those not owning it in coffee districts. Additional evidence from the timing of violence shows that these mostly occurred outside the harvesting period for coffee, precisely when the demand for labor and job opportunities were lower. As a placebo test, I show there is no price shock effect at times when harvesting is on.

One implication of these findings is that the land reform of 1969 may have been quite successful in de-radicalizing demands of communal land peasants. Given these areas were the most benefited from the reform, it could be the case that these peasants were particularly prone to conflict and after the reform they were not. A second implication is that small coffee landowners appear vulnerable to price-shocks and therefore tend to be recruited in radical rebel groups such as Shining Path. Thus, insurance against bad harvesting should be included as a part of agrarian policy. Third, the absence of army violence in coffee areas suggest that their response to violence was motivated by other dynamics and not due to the agricultural cycle.

Finally, these findings encourage further research in three directions: i) The seasonality of violence. One plausible extension of this paper is to look into the seasonality of the crops cultivated to find whether violent crimes follow periods of crop harvesting, when peasants dedicate to other activities rather than the land. Since one of my findings is that the effect of price shocks can vary by crop and type of land tenure an additional factor to look at is the timing of the attacks. ii) The role of private conflicts in the extent of violence. Although much is said about the violence perpetrated from Shining Path, it is well known that selective killing was more the norm than the exception which can only operate in situation of peasant collaboration. Finding out whether distribution of coffee rents fueled violence will be further explored. iii) The historical dimension of peasant

rebellions. It is well established (Dell 2010) how colonial policy of certain areas historically undermined further development. Whether these past policies induced certain districts to be more conflict prone or not nowadays, is a topic to be further explored.

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Appendix A

Figure 7: Value of Exports (in thousands of dollars) of Latin American countries.

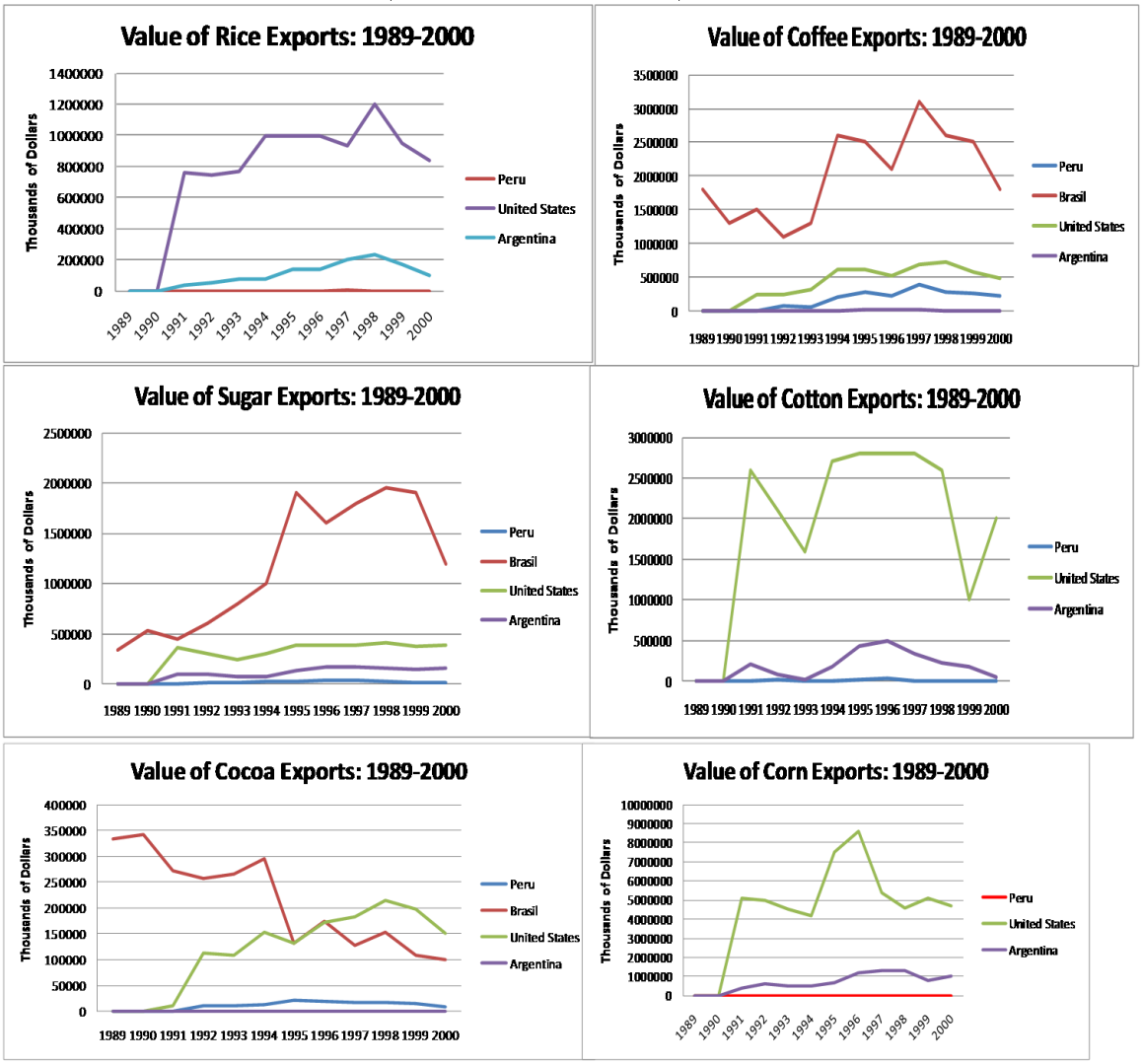

Figure 8: International Prices of Main Crops (US real dollars per kilo)

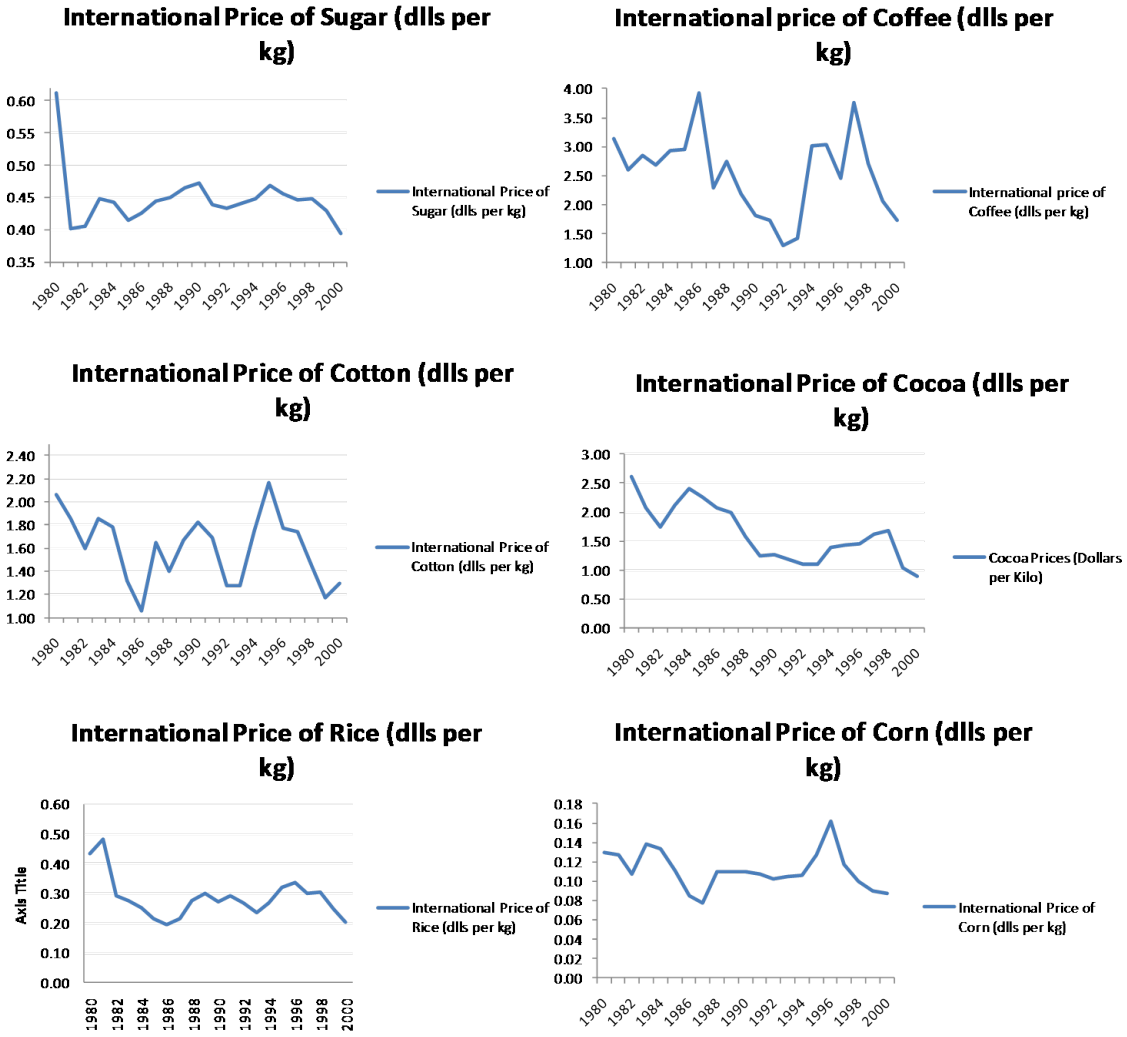

Figure 9: Real International and Local Prices in Peruvian Soles: 1980-2000

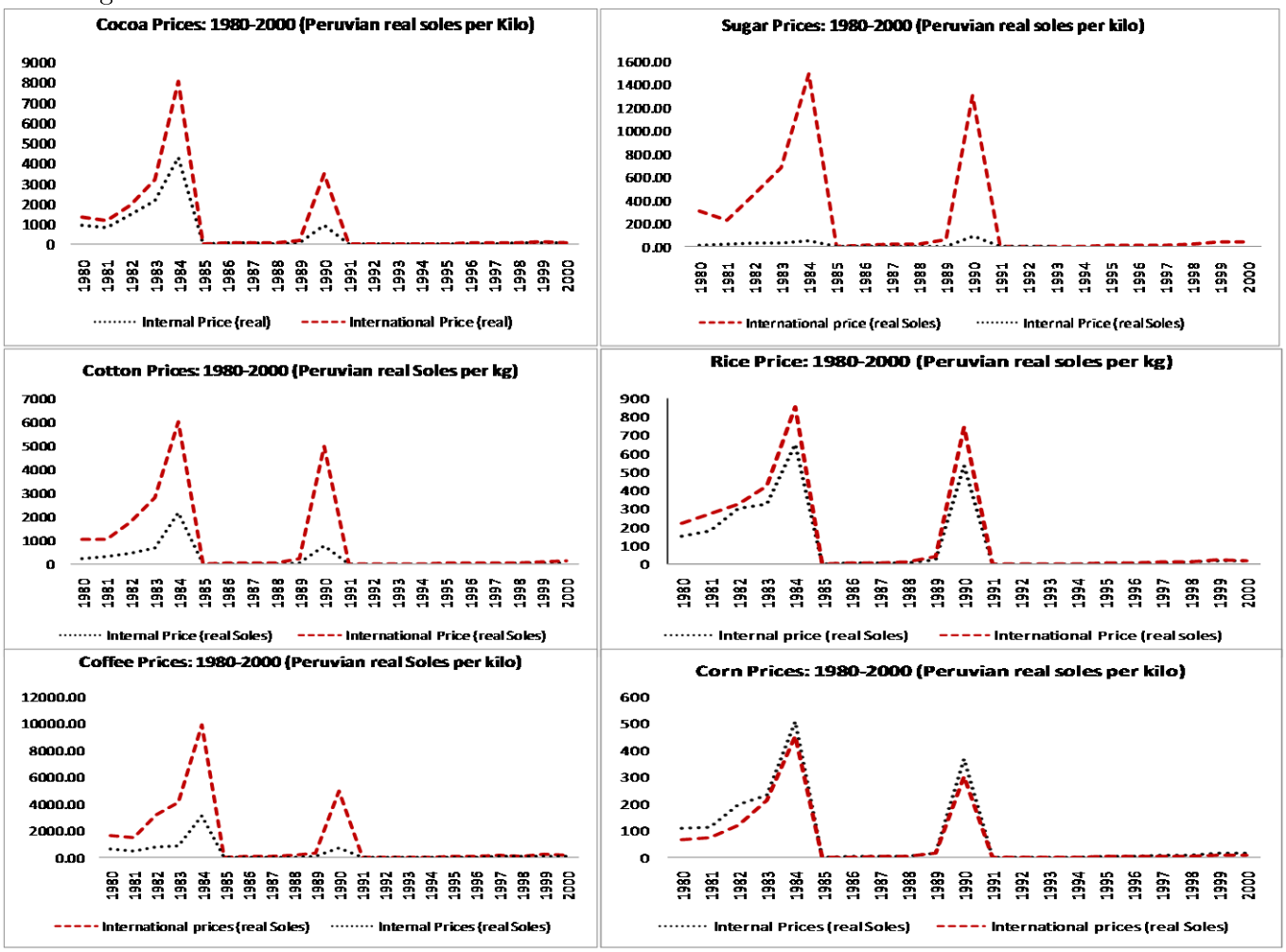

Table 1: Coffee Production by Land Tenure

	Obs	Mean % Owner	Difference
No Coffee	26670	0.987	
Coffee	7056	0.994	
T-Stat			-4.71
	Obs	Mean % Communal	Difference
No Coffee	26670	0.506	
Coffee	7056	0.574	
T-Stat			-10.19
	Obs	Mean % Sharecropper	Difference
No Coffee	26670	0.803	
Coffee	7056	0.893	
T-Stat			-18.8
	Obs	Mean % Owner Reform	Difference
Low Value	26670	0.493	
High Value	7056	0.684	
T-Stat			-28.9

Table 2: Summary statistics

Variable	Mean	Std. Dev.	N
% Owner Farms	38.755	22.449	33936
% Communal Farms	3.671	11.436	33936
% Sharecropping Farms	3.662	8.173	33936
% Owner-Reform Farms	3.441	9.800	33936
% Other Farms	50.472	21.356	33936
TotalFarms	866.085	1259.534	33936
Owner Farms (per 100)	3.44	5.226	33936
Communal Farms (per 100)	0.298	1.105	33936
Tenant Farms (per 100)	0.268	0.809	33936
Owner - Reform Farms (per 100)	0.332	1.324	33936
Coffee Price (US Cents per kg)	275.116	74.121	43890
Coffee Farms	45.293	210.516	33726
Coffee Value - Log(Price $/Kg * Production)	0.372	1.116	32120
Coffee Hectares	0.085	0.641	33726
Coffee Indicator	0.209	0.407	33726
Coffee Tons (Kg)	0.034	0.265	33726
Coca Farms	10.923	86.605	33726
Coca Tons	4.335	40.775	33726
Coca Hectares	10.748	107.455	33726
All Attacks	0.353	4.512	43890
Guerrilla Attacks	0.137	1.821	43890
Army Attacks	0.195	3.048	43890
Peasant Victim	0.083	1.172	43890
Killings	0.139	1.999	43890
Authority Victim	0.039	0.507	43890
Log(Pop) 1990-2000	8.428	1.315	18887
Log(Pop) 1980	8.276	1.267	1496
Year	1990	6.055	43890

Table 3: Coffee Price Shocks and Violent Attacks: OLS

Panel A: Perpetrators			
	All Attacks	Guerrilla Attacks	Army Attacks
$Log(CofPrice_{t-1} \times CofProduction)$	-1.55***	-0.85***	-0.67**
	(0.55)	(0.31)	(0.33)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Victims and Type			
	Peasants	Killings	Political Authority
$Log(CofPrice_{t-1} \times CofProduction)$	-0.53***	-0.84***	-0.080**
	(0.20)	(0.32)	(0.036)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include log(population) and linear state level trends
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Coffee Price Shocks and Violence Onset: LPM

Panel A: Perpetrators			
	All Attacks	Guerrilla Attacks	Army Attacks
$Log(CofPrice_{t-1} \times CofProduction)$	-0.039*	-0.054***	-0.024
	(0.020)	(0.016)	(0.018)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Victims and Type			
	Peasant	Killings	Political Authorities
$Log(CofPrice_{t-1} \times CofProduction)$	-0.043***	-0.043***	-0.021**
	(0.013)	(0.016)	(0.011)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include log(population) and state level time trends
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Price Shocks and Violence: Account for Coca Production

Panel A: Coca Time Trend			
	(1)	(2)	(3)
VARIABLES	All Attacks	Guerrilla	Army
$Log(CofPrice_{t-1} \times CofProduction)$	-1.34***	-0.74**	-0.57**
	(0.48)	(0.29)	(0.29)
$Coca \times Year$	-0.11**	-0.055***	-0.054*
	(0.044)	(0.017)	(0.028)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Coca and Coffee Price Trend			
	(1)	(2)	(3)
VARIABLES	All Attacks	Guerrilla	Army
$Log(CofPrice_{t-1} \times CofProduction)$	-1.34***	-0.71***	-0.60**
	(0.47)	(0.26)	(0.29)
$Log(CofPrice_{t-1} \times Coca)$	-0.54**	-0.36***	-0.19
	(0.22)	(0.12)	(0.13)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel C: Exclude Huallaga Region			
	(1)	(2)	(3)
VARIABLES	All Attacks	Guerrilla	Army
$Log(CofPrice_{t-1} \times CofProduction)$	-1.55***	-0.85***	-0.67**
	(0.55)	(0.31)	(0.33)
Observations	17,523	17,523	17,523
Number of coddist	1,593	1,593	1,593
District FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include log(population) and state level time trends
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Price Shocks, Violence and **Land Tenure**: Farms

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-1.64**	-0.85*	-0.73
	(0.77)	(0.44)	(0.47)
$PriceShock_{t-1} \times OwnerFarms$	-0.0060	-0.013	0.0030
	(0.069)	(0.045)	(0.047)
$PriceShock_{t-1} \times CommunalFarms$	0.12*	0.063**	0.049
	(0.067)	(0.030)	(0.048)
$PriceShock_{t-1} \times SharecroppingFarms$	0.27***	0.16**	0.10**
	(0.094)	(0.070)	(0.050)
$\beta Shock + \beta Shock * Owner$	-1.64**	-0.86**	-0.73*
$\beta Shock + \beta Shock * Communal$	-1.48**	-0.75*	-0.68
$\beta Value + \beta Value * Sharecrop$	-1.37*	-0.68	-0.63
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Violence Type and Victims			
	Peasant Victim	Killings	Authority Victim
$PriceShock_{t-1}$	-0.52*	-0.84*	-0.087
	(0.28)	(0.46)	(0.053)
$PriceShock_{t-1} \times OwnerFarms$	-0.0074	-0.016	-0.0022
	(0.027)	(0.043)	(0.0060)
$PriceShock_{t-1} \times CommunalFarms$	0.057**	0.092**	0.014***
	(0.026)	(0.044)	(0.0053)
$PriceShock_{t-1} \times SharecroppingFarms$	0.084**	0.17**	0.015*
	(0.033)	(0.067)	(0.0082)
$\beta Shock + \beta Shock * Owner$	-0.52**	-0.85**	-0.089*
$\beta Shock + \beta Shock * Communal$	-0.46*	-0.74*	-0.07
$\beta Value + \beta Value * Sharecrop$	-0.43	-0.67	-0.07
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include log(population), linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Price Shocks, Violence and **Land Tenure**: Compared to Owner

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-1.28***	-0.76**	-0.47*
	(0.48)	(0.36)	(0.25)
$PriceShock_{t-1} \times CommunalFarms$	0.16**	0.10**	0.053
	(0.076)	(0.041)	(0.053)
$PriceShock_{t-1} \times SharecroppingFarms$	0.29**	0.16**	0.12**
	(0.11)	(0.069)	(0.058)
$PriceShock_{t-1} \times Owner - ReformFarms$	-0.11	-0.078	-0.0093
	(0.11)	(0.11)	(0.011)
$PriceShock_{t-1} \times OtherFarms$	-0.0095	-0.0088	-0.0017
	(0.025)	(0.013)	(0.016)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Violence Type and Victims			
	Peasant Victim	Killings	Authority Victim
$PriceShock_{t-1}$	-0.38***	-0.76**	-0.075*
	(0.14)	(0.36)	(0.042)
$PriceShock_{t-1} \times CommunalFarms$	0.061**	0.097**	0.015***
	(0.026)	(0.041)	(0.0053)
$PriceShock_{t-1} \times SharecroppingFarms$	0.088**	0.16**	0.016*
	(0.038)	(0.071)	(0.0083)
$PriceShock_{t-1} \times Owner - ReformFarms$	-0.11	-0.078	-0.0093
	(0.11)	(0.11)	(0.011)
$PriceShock_{t-1} \times OtherFarms$	-0.0049	-0.0095	-0.0024
	(0.012)	(0.014)	(0.0024)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Year FE	YES	YES	YES

Omitted category = individual ownership
Robust standard errors in parentheses clustered at the district level
All specifications include log(population), linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Price Shocks, Violence and **Land Tenure** Distribution

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-4.33**	-2.15**	-2.16*
	(1.81)	(0.88)	(1.15)
$PriceShock_{t-1} \times OwnerShare$	0.051*	0.023*	0.028*
	(0.026)	(0.012)	(0.017)
$PriceShock_{t-1} \times CommunalShare$	0.064**	0.034**	0.029
	(0.028)	(0.014)	(0.018)
$PriceShock_{t-1} \times SharecroppingShare$	0.11***	0.059**	0.049**
	(0.040)	(0.024)	(0.023)
$\beta Shock + \beta Shock * Owner$	-4.28**	-2.12**	-2.13*
$\beta Shock + \beta Shock * Communal$	-4.26**	-2.11**	-2.13*
$\beta Value + \beta Value * Sharecrop$	-4.22**	-2.09**	-2.11*
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Violence Type and Victims			
	Peasant Victim	Killings	Authority Victim
$PriceShock_{t-1}$	-1.50**	-2.13**	-0.26**
	(0.70)	(0.96)	(0.11)
$PriceShock_{t-1} \times OwnerShare$	0.018*	0.023*	0.0030**
	(0.010)	(0.013)	(0.0015)
$PriceShock_{t-1} \times CommunalShare$	0.024**	0.034**	0.0048***
	(0.010)	(0.015)	(0.0018)
$PriceShock_{t-1} \times SharecroppingShare$	0.034**	0.059**	0.0060**
	(0.014)	(0.025)	(0.0027)
$\beta Shock + \beta Shock * Owner$	-1.47**	-2.1**	-0.25**
$\beta Shock + \beta Shock * Communal$	-1.47**	-2.09**	-0.25**
$\beta Value + \beta Value * Sharecrop$	-1.46**	-2.07**	-0.25**
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include log(population), linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Price Shocks, Violence and **Land Tenure**: Share Indicators

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-2.16***	-1.15**	-0.98*
	(0.83)	(0.47)	(0.50)
$PriceShock_{t-1} \times +50\%Owner$	1.82**	0.96*	0.89*
	(0.89)	(0.52)	(0.54)
$PriceShock_{t-1} \times +50\%Communal$	1.57	1.28**	0.21
	(1.23)	(0.50)	(1.03)
$PriceShock_{t-1} \times +50\%Sharecropping$	4.45***	2.36***	2.06***
	(1.24)	(0.70)	(0.75)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
Panel B: Violence Type and Victims			
	Peasant Victim	Killings	Authority Victim
$PriceShock_{t-1}$	-0.75**	-1.13**	-0.12**
	(0.31)	(0.49)	(0.055)
$PriceShock_{t-1} \times +50\%OwnerFarms$	0.64**	0.90*	0.099*
	(0.32)	(0.53)	(0.060)
$PriceShock_{t-1} \times +50\%CommunalFarms$	0.89***	1.16**	0.18***
	(0.34)	(0.55)	(0.060)
$PriceShock_{t-1} \times +50\%SharecroppingFarms$	1.45***	2.31***	0.29***
	(0.46)	(0.73)	(0.081)
Observations	17,589	17,589	17,589
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include log(population), linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Price Shocks, Violence and **Land Tenure**: Monthly Variation

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-0.13**	-0.037*	-0.088**
	(0.055)	(0.022)	(0.043)
$PriceShock_{t-1} \times OwnerFarms$	-0.0025	-0.0044	0.0024
	(0.0051)	(0.0030)	(0.0031)
$PriceShock_{t-1} \times CommunalFarms$	0.010*	0.0044*	0.0066
	(0.0058)	(0.0023)	(0.0045)
$PriceShock_{t-1} \times SharecroppingFarms$	0.023***	0.013**	0.0082**
	(0.0081)	(0.0056)	(0.0036)
Observations	211,992	211,992	211,992
Number of coddist	1,599	1,599	1,599
Panel B: Violence Type and Victims			
	Killings	Peasant Victim	Authority Victim
$PriceShock_{t-1}$	-0.051*	-0.046*	-0.0050*
	(0.027)	(0.025)	(0.0026)
$PriceShock_{t-1} \times OwnerFarms$	0.0010	-0.0036	-0.00043
	(0.0019)	(0.0030)	(0.00039)
$PriceShock_{t-1} \times CommunalFarms$	0.0050**	0.0045*	0.00072***
	(0.0025)	(0.0026)	(0.00027)
$PriceShock_{t-1} \times SharecroppingFarms$	0.0054**	0.013**	0.00072
	(0.0023)	(0.0054)	(0.00088)
Observations	211,992	211,992	211,992
Number of coddist	1,599	1,599	1,599
District FE	YES	YES	YES
Month FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Mechanism: Price Shocks, Violence and Labor Demand during Coffee Harvest

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-0.11***	-0.043***	-0.064**
	(0.033)	(0.013)	(0.025)
$PriceShock_{t-1} \times Harvest$	-0.0068**	-0.0033*	-0.0028
	(0.0034)	(0.0018)	(0.0025)
Observations	211,992	211,992	211,992
Number of coddist	1,606	1,606	1,606
Panel B: Violence Type and Victims			
	Killings	Peasant Victim	Authority Victim
$PriceShock_{t-1}$	-0.037**	-0.048***	-0.0058***
	(0.016)	(0.015)	(0.0019)
$PriceShock_{t-1} \times Harvest$	-0.00034	-0.0038**	-0.00019
	(0.0013)	(0.0019)	(0.00057)
Observations	211,992	211,992	211,992
Number of coddist	1,606	1,606	1,606
District FE	YES	YES	YES
Month FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Mechanism: Price Shocks, Violence and Labor Demand during Coffee Harvest

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-0.13**	-0.036*	-0.087**
	(0.054)	(0.021)	(0.042)
$PriceShock_{t-1} \times OwnerFarms$	-0.0024	-0.0044	0.0024
	(0.0049)	(0.0030)	(0.0030)
$PriceShock_{t-1} \times CommunalFarms$	0.011*	0.0042*	0.0075*
	(0.0058)	(0.0022)	(0.0045)
$PriceShock_{t-1} \times SharecropperFarms$	0.021***	0.013**	0.0072**
	(0.0079)	(0.0055)	(0.0035)
$PriceShock_{t-1} \times Owner \times Harvest$	-0.000035	-0.000011	-0.000041
	(0.00070)	(0.00041)	(0.00041)
$PriceShock_{t-1} \times Communal \times Harvest$	-0.0036	0.00032	-0.0039
	(0.0028)	(0.00023)	(0.0028)
$PriceShock_{t-1} \times Sharecropper \times Harvest$	0.0052***	0.0012*	0.0039***
	(0.0018)	(0.00064)	(0.0015)
Observations	211,992	211,992	211,992
Number of coddist	1,606	1,606	1,606
Panel B: Violence Type and Victims			
	Killings	Peasant Victim	Authority Victim
$PriceShock_{t-1}$	-0.050*	-0.044*	-0.0048*
	(0.027)	(0.024)	(0.0026)
$PriceShock_{t-1} \times OwnerFarms$	0.0010	-0.0037	-0.00044
	(0.0019)	(0.0029)	(0.00040)
$PriceShock_{t-1} \times CommunalFarms$	0.0053**	0.0046*	0.00075***
	(0.0025)	(0.0026)	(0.00028)
$PriceShock_{t-1} \times SharecropperFarms$	0.0051**	0.013**	0.00053
	(0.0023)	(0.0053)	(0.00098)
$PriceShock_{t-1} \times Owner \times Harvest$	-0.000018	0.00023	0.000026
	(0.00025)	(0.00036)	(0.000080)
$PriceShock_{t-1} \times Communal \times Harvest$	-0.0011	-0.00050	-0.00012
	(0.00078)	(0.00088)	(0.00016)
$PriceShock_{t-1} \times Sharecropper \times Harvest$	0.0011**	0.0016**	0.00070
	(0.00056)	(0.00072)	(0.00047)
Observations	211,992	211,992	211,992
Number of coddist	1,606	1,606	1,606
District FE	YES	YES	YES
Month FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Mechanism: Price Shocks, Violence and Labor Demand during Coffee Harvest –Compared to Owner

Panel A: Violence Perpetrators			
	All Attacks	Guerrilla	Army
	(1)	(2)	(3)
$PriceShock_{t-1}$	-0.10***	-0.042**	-0.055**
	(0.031)	(0.017)	(0.022)
$PriceShock_{t-1} \times CommunalFarms$	0.012**	0.0053**	0.0073*
	(0.0057)	(0.0022)	(0.0044)
$PriceShock_{t-1} \times SharecropperFarms$	0.022**	0.010**	0.011*
	(0.0090)	(0.0044)	(0.0059)
$PriceShock_{t-1} \times Communal \times Harvest$	-0.0036	0.00028	-0.0039
	(0.0028)	(0.00022)	(0.0028)
$PriceShock_{t-1} \times Sharecropper \times Harvest$	0.0043***	0.00079	0.0032**
	(0.0015)	(0.00057)	(0.0013)
Observations	211,992	211,992	211,992
Number of coddist	1,606	1,606	1,606
Panel B: Violence Type and Victims			
	Killings	Peasant Victim	Authority Victim
$PriceShock_{t-1}$	-0.029***	-0.046***	-0.0054***
	(0.011)	(0.017)	(0.0020)
$PriceShock_{t-1} \times CommunalFarms$	0.0052**	0.0055**	0.00086***
	(0.0024)	(0.0025)	(0.00028)
$PriceShock_{t-1} \times SharecropperFarms$	0.0075**	0.011**	0.00033
	(0.0038)	(0.0046)	(0.00072)
$PriceShock_{t-1} \times Communal \times Harvest$	0.00076*	0.0011	0.00066
	(0.00045)	(0.00068)	(0.00044)
$PriceShock_{t-1} \times Sharecropper \times Harvest$	0.00047***	0.00064**	0.000022
	(0.00014)	(0.00031)	(0.00013)
Observations	211,992	211,992	211,992
Number of coddist	1,606	1,606	1,606
District FE	YES	YES	YES
Month FE	YES	YES	YES

Robust standard errors in parentheses clustered at the district level
All specifications include linear state time trends and linear district coca producing trends
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Mechanism – Employment in Agricultural Sector: Individual Survey Data

DV: Share Employed in Agriculture		
	OLS	OLS
	(1)	(2)
$PriceShock_{t-1}$	1.79***	1.31***
	(0.43)	(0.24)
Observations	239,068	229,734
Number of coddist	678	641
DV: Share Employed in Agriculture		
	OLS	OLS
$PriceShock_{t-1}$	1.61***	0.65**
	(0.52)	(0.27)
$PriceShock_{t-1} \times OwnerFarm$	0.0075	0.043***
	(0.015)	(0.011)
$PriceShock_{t-1} \times CommunalFarm$	0.17	0.091
	(0.16)	(0.089)
$PriceShock_{t-1} \times Sharecropping$	0.029	0.11
	(0.11)	(0.073)
Observations	239,068	229,734
Number of coddist	678	641
Year FE	YES	YES
Log Population	NO	YES

Robust standard errors in parentheses clustered at the district level
All specifications include linear state time trends, individual controls (age, age square, gender), and linear coca price trends.
*** p<0.01, ** p<0.05, * p<0.1