Oil Palm Boom, Contract Farming, and Village Development : Evidence from Indonesia

Marcel Gatto, Meike Wollni, Rosyani, and Matin Qaim

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Abstract: Through contract farming schemes between cohorts of farmers and private companies the Indonesian government intended to spur rural economic development. In particular within the oil palm sector, such community-company 'partnerships' are commonplace. Yet, empirical evidence of the success of these formations remains mixed. In this paper, we investigate the effects of contract farming on economic development at the village level. At the same time, little is understood regarding the factors that determine that cohorts of farmers sign a contract. Analyzing data from a structured village survey, we find a positive effect of contract farming schemes on economic development, in particular on village wealth. The share of farmers under contract and contract length play a significant role in this. Regarding contract adoption, we observe that contract participation is conditional on the visit of a private investor. Controlling for this conditionality, we find that villages that have no access to electricity are more likely to participate in community-company partnerships. Finally, considering the government's intention to spur rural economic development through contract farming and the positive wealth effects associated with it, we find that contract farming has not been entirely equally accessible; however, we do not find evidence that the rural poor were excluded.

Keywords: Oil palm, contract farming, rural development, Indonesia

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Oil Palm Boom, Contract Farming, and Village Development: Evidence from Indonesia

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Abstract. Through contract farming schemes between cohorts of farmers and private companies the Indonesian government intended to spur rural economic development. In particular within the oil palm sector, such community-company 'partnerships' are commonplace. Yet, empirical evidence of the success of these formations remains mixed. In this paper, we investigate the effects of contract farming on economic development at the village level. At the same time, little is understood regarding the factors that determine that cohorts of farmers sign a contract. Analyzing data from a structured village survey, we find a positive effect of contract farming schemes on economic development, in particular on village wealth. The share of farmers under contract and contract length play a significant role in this. Regarding contract adoption, we observe that contract participation is conditional on the visit of a private investor. Controlling for this conditionality, we find that villages that have no access to electricity are more likely to participate in community-company partnerships. Finally, considering the government's intention to spur rural economic development through contract farming and the positive wealth effects associated with it, we find that contract farming has not been entirely equally accessible; however, we do not find evidence that the rural poor were excluded.

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1. Introduction

In the wake of increasing global demand for vegetable oil, the production of palm oil has extensively been promoted in many developing countries. At the same time, the emerging oil palm sector generated opportunities to spur rural economic development and alleviate poverty. To achieve this, the government of Indonesia – the largest palm oil producing country worldwide – promoted 'partnership' formations between commercial agro-industrial plantations and local communities (Feintrenie et al., 2010a). Through contract farming arrangements that were usually made with cohorts of farmers, oil palm developed along with economic development (Susila, 2004; Zen et al., 2005). However, palm oil production has also been associated with negative environmental and social implications. For example, it has contributed to deforestation, loss of biodiversity and carbon stocks, and caused the emergence of land and contractual conflicts (Colchester et al., 2006; Fitzherbert et al., 2008; Koh and Wilcove, 2008; Hansen et al., 2009; Rist et al., 2010; Carlson et al., 2012; Margono et al., 2012; Beckert et al., 2014). Authors have also pointed out that contract farming schemes have not been equally accessible to all farmers (McCarthy, 2010). Furthermore, established contracts have been found to lack transparency and to benefit private companies more than local communities (Rist et al. 2010). But also within communities the benefits are unequally shared: richer contract farmers tend to benefit considerably more than their poorer village fellows (Cahyadi and Waibel, 2013).

Thus, the empirical evidence gives rise to suspect that community-company partnerships can have detrimental effects for those villagers who participate in contract farming. Concurrently, the studies show that the emerging oil palm industry in Indonesia has potential for spurring economic development and improving rural livelihoods (Rist et al., 2010; Feintrenie et al., 2010; McCarthy, 2010; Rosyani, 2011; Cahyadi and Waibel, 2013). Taken together, the findings are mixed and oftentimes largely based on case studies and descriptive analyses. A quantitative evaluation is missing in the literature.

The first objective of this paper intends to fill the empirical gap in the literature by analyzing the effects of community-company partnerships on economic development. The unit of analysis is the village, which allows us to investigate broader implications for entire village communities that participate in community-company partnerships. In addition, this village-level perspective recognizes that usually cohorts of farmers participate in contract farming schemes. Rather than individual farmers bargaining over contract conditions, contracts are frequently negotiated at the famer cooperative or even at the village level (McCarthy and Cramb, 2009). Furthermore, the village-level analysis allows us to examine indirect effects of contract farming schemes. In this respect, the government promoted the emerging industry by investing into transportation and market infrastructure (Larson, 1996). This was likely beneficial to all villagers, contracted or not. In sum, the village-level analysis allows the investigation of direct and indirect effects of community-company partnerships on economic development.

The participation in community-company partnerships within the Indonesian oil palm industry is an obvious precondition to benefit from the supposedly positive economic effects. Within

villages, at the household level it has been reported that contract farming has not been accessible to all farmers alike (McCarthy, 2010). Perhaps, the same could be true for the inclusion into the oil palm industry *across* village communities. The inclusion encompasses two steps. First, an oil palm representative, or investor, targets prospective villages that are suitable for being included into the oil palm industry and proposes a contract. In a second step a decision is made, usually collectively, to accept or reject the contract offer (McCarthy and Cramb, 2009). The second objective of this paper is to analyze the impact of certain village-level factors on the probability of contract adoption at the village level. Due to the conditionality of contract adoption on being visited by an investor, we control for the impact of certain village-level factors on investor visit. To the best of our knowledge this has not been addressed in the literature. However, better understanding the conditions that determine the inclusion and thus the formation of communal-company relationships is necessary to guide the formulation of sound rural economic policies.

The remainder of this paper is organized as follows. In the next section we present a brief historical account of the oil palm development in Indonesia with special attention placed on contract farming in our study region. Section 3 outlines our materials and methods used. In Section 4 we present the descriptive and estimation results. Finally, Section 5 concludes.

2. Background

In Indonesia, the oil palm development can broadly be distinguished into two major phases: first, the government-led phase (1970s – 1998) that started with the arrival of oil palm in Indonesia and, second, the market-oriented phase (1999 – present) that was initiated after the fall of Suharto's New Order regime (Larson, 1996; Zen et al., 2005; McCarthy, 2010; Budidarsono et al., 2013). In this section, we will present a brief historical account of the oil palm development in Jambi province by placing the emphasis on community-company partnerships and contract farming arrangements.

2.1 Government-led phase

In the 1970s, the Indonesian government initiated the development of an oil palm sector. Before that time the focus was mainly on rubber production which is still the major cash crop to be found in Jambi to date. Advised by the World Bank at that time, the Indonesian government intended to spur economic development in rural areas by sponsoring smallholders (Zen et al., 2005). Apart from clearing lands and planting oil palm close to newly established state-owned oil palm plantations (so-called *Perseroan Terbatas Perkebunan Nusantara)*, smallholders were given 2-4 ha of land and technical assistance to successfully cultivate the perennial crop. The smallholders harvested and delivered the FFB to the attached oil palm mill for further processing (Larson, 1996).

Amid the 1980s the Indonesian government intended to further stimulate the oil palm sector by gradually involving a selection of private companies. On the one hand, the government assumed responsibility for infrastructure development and also issued large land concessions and provided subsidized loans; in exchange, companies were required to involve smallholders into their plantation plan (Larson, 1996). These community-company partnerships are also referred to as *Perkebunan Inti Rakyat*, NES, or Inti-Plasma. Typically, these had the company estate at its core (Inti) and were surrounded by plantations reserved for smallholders (Plasma; Feintrenie et al., 2010a).

To adhere to the government requirements, farmers were typically included upon surrendering a certain amount of (unproductive) land to the company. In return they received an oil palm 'package'. This comprised several services, like opening and planting of land, agricultural training in the initial 4-5 years before the oil palm trees would start yielding. Moreover, the companies provided employment at the estate. Especially during those initial 4-5 years of palm oil farming this employment was very welcome to bridge an initial income gap. Most importantly, the farmers received a developed oil palm plot on which high-yielding palm trees were planted. Furthermore, the package included technical assistance, such as fertilizers, herbicides and pesticides (Zen et al., 2005). However, farmers could either choose to work and manage the plots themselves or entrust these to the company. In the latter case operating costs are deducted from the profits generated by this plot. Sometimes the farmers decided to directly sell their land to the company and get compensated in cash (Rist et al., 2010). Finally, the package included loan schemes which the participating farmers could make use of to cover establishment and operational costs. These loans had a payback of usually 20 years (Fearnside, 1997).

This package enabled contract farmers to efficiently cultivate oil palm resulting in higher yields and, thus, higher profits compared to individual smallholders. The latter often lacked the technical knowledge needed for effective fertilizer applications and often could not access or understand the relevance of high-yielding varieties (Barlow et al., 2003).

To guarantee smooth plantation operations, the private estate and mills required labor. Apart from employing local people, the Indonesian government involved migrants in the oil palm industry. A relocation program, called the *transmigrasi program* was instrumental to meet the demand for cheap labor (McCarthy, 2010). Basically, the rationale was to relocate people from over-densely populated areas, such as Java, to areas of land abundance (Fearnside, 1997). This program was fully sponsored by the government, meaning that in addition to the general contract conditions, the transmigrants usually got 2-4 ha of oil palm land, (land for) housing as well as a homegarden. In contrast to most of the officially untitled land to be found in vast parts of Sumatra, transmigrants would receive a government land title after these completed to repay the granted loans (Murdiyarso et al., 2002).

During the next phase, the *Koperasi Kredit Primer untuk Anggota*, the mentioned package remained the contractual basis. However, after almost one decade of directly sponsoring the oil palm sector, starting around 1995, the Indonesian government decided to gradually retreat from

its active role. Rather, it started to assume a monitoring function. Instead of pushing the oil palm development through direct investments, including the transmigration program, budget constraints as well as increasing land scarcity and the emerging conflicts revolving around customary versus statutory land rights (Colchester et al., 2006) resulted in a policy shift. First, (Jambi's) local people were increasingly included. Second, raising land scarcity led companies to seek alternative land sources. They followed a rather strategic approach: villages willing to receive a contract were obliged to establish a farmer cooperative. Functioning as an intermediary between farmers and the private companies, these cooperatives were responsible for the provision of technical assistance, manage loan schemes and most of all gathered suitable village land (Larson, 1996). This land would then collectively be handed-over to the company for estate development. Established contracts at the cooperative level were binding for all its members and once a contract was signed it was usually not possible for hesitating farmers to get contracted at a later stage (McCarthy, 2010).

Before a contract is adopted at the village level, a company representative – whom we will refer to as *investor* – visits a prospective village. In more detail, the investor attends several village meetings for 'socialization' where (s)he praises the benefits oil palm cultivation is associated with, for the village as a whole, but also for participating smallholder farmers in particular. In case both parties show an interest the investor proposes a contract. At large, the components included in the package were rather fix but certain aspects (i.e. initial debt estimation, prices, interest rates) remain negotiable (Feintrenie et al., 2010a). Next, contract conditions are discussed among the villagers and, in a follow-up meeting with the investor negotiations over contract conditions take place. Finally, contract proposals are either accepted and signed, rejected, or subject to renegotiation. Usually, this process is accompanied by government officials and bank representatives. But also, oftentimes the bargaining process over contractual conditions is dominated by village elites, who, occasionally, abused their authority for personal interests (Zen et al., 2005; McCarthy et al., 2012).

2.2 Market-oriented phase

The most recent phase is the *laissez-faire* phase which was initiated simultaneously with the fall of the Suharto regime in 1998 and set in motion a process of liberalization. In more detail, this comprised the opening of the oil palm sector to private investment and companies and, at the same time, shifted budgetary responsibility down to the district level (McCarthy et al., 2012). Even the smallest political authority, the village, was entitled to more decision-making power over village related aspects (i.e. land, budgeting). Additionally, the rights of village communities were strengthened, especially vis-à-vis private companies and the government (Rist et al., 2010). In contrast, private companies could not benefit anymore from highly subsidized capital. As a consequence, money was borrowed from private banks charging steep interest rates. The government's initial terms to include smallholders into private estates were not binding anymore (Larson, 1996); nor was the provision of the package. Against this background and the increasing

competition among private companies, various forms of contractual arrangements evolved. In contrast to the preceding phases, here, the degree of benefits extracted from contracts highly depended on the bargaining skills of the village elite and his/her integrity. At the same time, contractual outcomes depended on the extent companies were able to exploit their favorable position. Considering district governments faced budgetary constraints, they tended to offer companies highly beneficial terms of production. This also affected negotiations because in this phase these had to be in line with district, rather than central government, regulations (McCarthy et al., 2012). Among various forms of contractual arrangements, during this phase, farmers frequently engaged in contract farming arrangements wherein they outsourced all operations to the company in exchange for a percentage of the revenue (Casson, 2000).

This phase is also typified by an increasing amount of independent smallholder oil palm farmers. Sometimes, these are farmers with expired contracts. Usually independent oil palm farmers never had a contract but accessed the required resources from a maturing sector (e.g. improved road conditions, disseminated technical knowledge, available input and output markets). In our analysis, we control for the two major phases we discussed.

3. Materials and methods

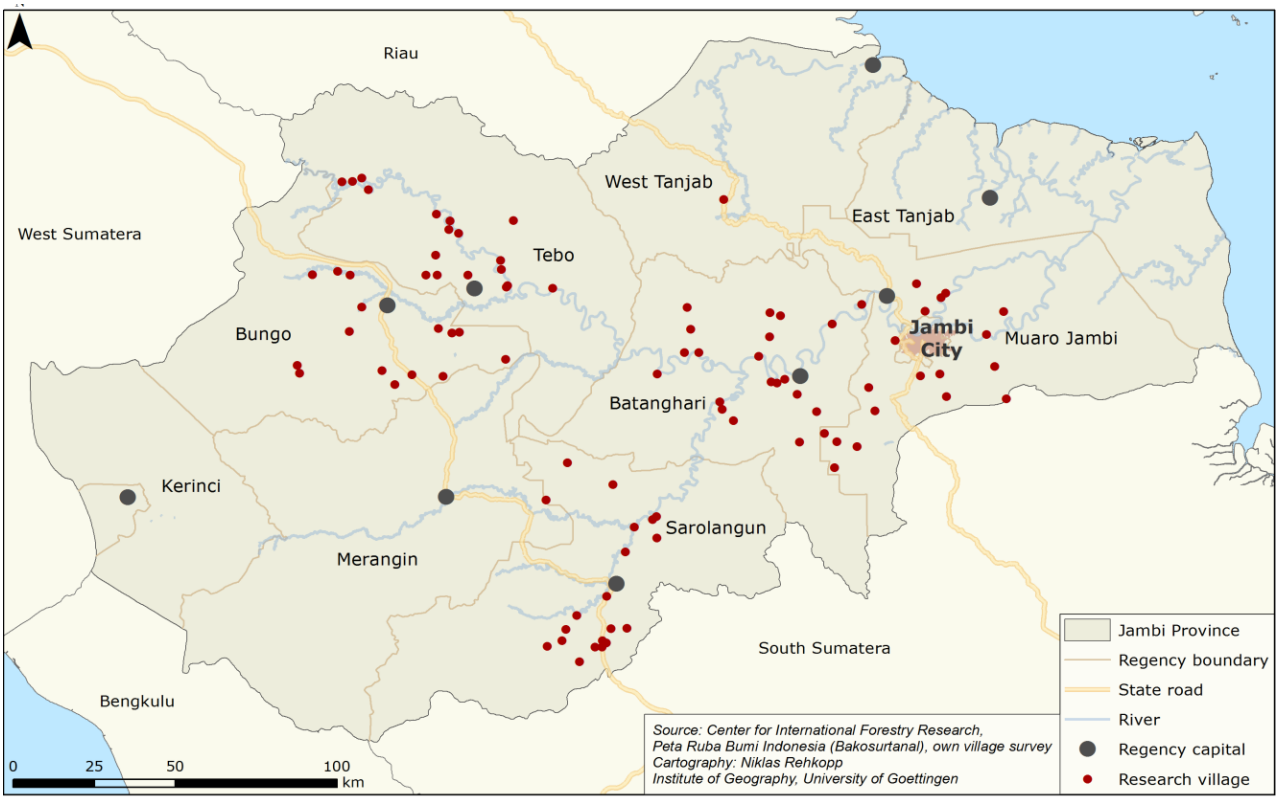
3.1 Survey design

For this research we purposively selected five districts representing the lowlands of Jambi province. The lowlands are chosen since these are characterized by major agricultural transformations towards monoculture (Gatto et al., 2014). In particular we included the districts Muaro Jambi, Batang Hari, Sarolangun, Bungo and Tebo. To account for spatial variability, within each of the districts we drew a random sample of 5 sub-districts. Further, based on an extensive list of villages we took from PODES, we drew a random sample of 100 villages. However, due to logistical difficulties in the field we had to exclude two villages. Figure 1 depicts the map of sample villages in Jambi.

Data collection took place between September and December 2012. Interviews were carried out by six students from Jambi University, who participated in intensive training during a two week workshop prior to survey implementation. Before visiting the villages we made appointments with the village head to inquire about his/her and other village officials' availability. We organized group interviews in which we invited key village officials (i.e. village head, secretary, group leaders, elderly people) in order to elicit data on certain village aspects, such as village assets, land-use change, demographics, technology use, contractual arrangements with companies, etc., by means of a structured survey. In general, the group interviews took three to four hours and were held in the house of the village head or his/her office. In addition to collecting data on the current status of the villages in 2012, we inquired data for past village characteristics, in particular for the years 2002 and 1992. To further guarantee the quality of the

data, we invited elderly people to the interviews who have been living there already for a substantial period of time. In most villages a village 'monograph' existed with current and past socioeconomic data, such as demography, land-use, land titles, and others. In case villages had a contract farming arrangement, the details were generally easier to recall due to its drastic implications for village life.

Figure 1. Map of Jambi province with sample villages



To utilize the panel structure for this study we had to drop some observations. The reasons are mainly twofold. First, unfortunately our sample includes a few villages that did not yet exist in 1992. The second exclusion criterion was that, even though some villages existed in 1992, certain villages underwent considerable changes at a given point throughout the period of interest (1992-2012). Drastic changes in, for instance, demographic or land-use characteristics occurred when a village neighborhood separated from its mother village. Hence, the data gathered for the year 2012 do not refer to the same village 20 years ago. In sum, the sample of 78 villages was used in this study.

3.2 Analytical framework

Before an effect of company-communal partnerships on economic development can be observed, villages need to be included in the oil palm industry. Therefore, we start the analytical framework by explaining how we model the inclusion in the oil palm industry. In the following section we describe how we model effect of company-communal partnerships on economic development.

3.2.1 Modeling inclusion in oil palm industry

Since the adoption of a contract is conditional on being visited by an oil palm investor, we specify an econometric model that accounts for a possible sample selection bias. In comparison with a randomly selected village, villages that are visited by an investor may also be more likely to adopt a contract. Apart from the observed factors we can control for, self-selection bias is problematic if the unobserved factors are the same for investor visit and contract adoption (Cameron and Trivedi, 2009; p.556). For instance, some village elites could be better connected to the industry than elites in other villages, possibly resulting in a greater chance that an investor visits and that the village adopts a contract. To control for this we employ a bivariate probit model that allows the specification of two separate probit models with correlated error terms. A significant correlation in the errors would indicate that the estimation suffers from a selection bias.

Following Greene's (2008, p.817) notation we specified the following model:

Selection equation: $y_a^* = \alpha_1' x_{v1} + \varepsilon_a, \quad y_a = 1 \text{ if } y_a^* > 0, \quad y_I = 0 \text{ if } y_a^* < 0$ (1)

Outcome equation: $y_v^* = \alpha_2' x_{v2} + \varepsilon_v, \quad y_v = 1 \text{ if } y_v^* > 0, \quad y_v = 0 \text{ if } y_v^* < 0$ (2)

$\varepsilon_a, \varepsilon_v \sim BVN(0,0,1,1,\rho)$, $\text{Var}[\varepsilon_a] = \text{Var}[\varepsilon_v] = 1$, $\text{Cov}[\varepsilon_a, \varepsilon_v] = \rho$

(y_v, x_{v2} is only observed when $y_a = 1$);

where y_a^* is an unobserved variable reflecting the benefits for an investor *a* of visiting a village. Likewise, y_v^* reflects the utility gain for a village *v* if a contract is adopted at the village. The outcome variables y_a and y_v are observed variables which equal one if an investor visits a village or if a village adopts a contract, respectively. The vector x comprises explanatory variables such as village size (i.e. in terms of population and land area), village accessibility (i.e. distance to an all season road, distance to oil palm mill), village infrastructure (i.e. access to electricity), village institutions (i.e. share of farmers holding government land titles), village wealth, and village type (i.e. transmigrant). The error terms ε_a and ε_v have a bivariate normal distribution with zero mean and a unit variance. The correlation coefficient between the disturbance terms will be estimated and is denoted with ρ.

In modeling village inclusion into the oil palm industry we have to take the following into account. Investors visited villages and contracts were adopted throughout the entire period from 1992-2012, and thus also within the 10 year time intervals. If we used the data for 2012 to explain contract adoption, in the analysis we would likely run into issues of reverse causality because certain village-level factors may have changed as a result of adopting a contract. Therefore, we adjusted our dataset. In case investor visit occurred in the period between 1992 and 2001, we use data for the year 1992 to explain investor visit/contract adoption. Likewise, for the villages which were visited in some year between 2002 and 2012 we make use of the data for the year 2002 to explain contract adoption.

Finally, to identify the model we need a variable that introduces nontrivial variation to the outcome equation (Cameron and Trivedi, 2009, p.558). The requirements for such a variable are the same as for instruments used in regular 'instrumental variable' estimations (IV). We identified the variable *average land slope* as a valid instrument. At the village level, this is measured as the share of village land characterized by a certain land slope (i.e. 1= flat, …, 5= steep). In the specific case of oil palm cultivation in Jambi it may be argued that steeper average land slopes in villages reflect to some extent the attractiveness of a given village. This is because in Jambi much of the available land that is characterized by flat slopes can be found in areas already under extensive agricultural cultivation (i.e. rubber). Since these are less likely transformed into oil palm (Gatto et al., 2014), investors have to seek alternative areas for oil palm cultivation. Thus, we argue that steeper average land slopes are positively correlated with the incidence of investor visit. At the same time, it is not likely that the instrument directly affects the incidence of contract adoption because of the conditionality of contract adoption on investor visit.

We want to briefly discuss our expectation regarding the impact of the explanatory variables on the outcome/selection variables. From an investor's perspective it is reasonable to visit those villages that hold much agricultural potential. Thus we predict that total village land has a positive effect on investor visit. Since more populated villages are more likely to be located in urban areas, where available land is scarce, we expect a negative correlation with investor visit. Further, the farther away a village is from an all season road, a proxy for accessibility, we predict a lower probability of being visited. These expectations are largely borrowed from the literature on land-use change (for instance Lambin et al., 2003, p. 226; Mitsuda and Ito, 2011). Furthermore, proximity to an oil palm mill is likely to predict investor visit because this would guarantee that the FFB are processed in a timely manner and would reduce transactions costs. In terms of village infrastructure, access to electricity may likely be a decisive factor for being visited, since the availability of electricity would facilitate a rapid operation commencement. Moreover, we predict government land titles to be a positive predictor for attracting investors to the village. Larger shares of households holding government land titles could imply that land disputes between villagers and the government/companies are less likely to have taken place prior to investor visit. Past village involvement in land conflicts may have negative implications for the upcoming relationship between the company and the villagers (i.e. granting lease rights for land, distrust in village) jeopardizing smooth business operations. Consequently, larger shares of

formal village land could be attractive for private companies to avoid future conflict. Next, we expect a negative relationship between village wealth and investor visit. This is because poorer villages may have less alternative income-generating activities and their main asset is probably land, which provides investors with a good bargaining position.

Our expectation regarding the impact of the explanatory variables on the incidence of contract adoption largely coincide with the impact on investor visit. Generally, the village-level factors that indicate that a village is located in a more rural area (i.e. lower population, more village land, poorer accessibility, no access to electricity) are expected to be positively correlated with contract adoption. Next, since contract farming has the potential to improve livelihoods we expect that villages with a lower wealth index are more inclined to adopt a contract. Also because a lower wealth index possibly reflects fewer outside business options. Finally, in case the explanatory variables are insignificant, this would suggest that contract farming in the oil palm sector was inclusive, conditional on being visited by an investor.

3.2.2 Modeling impacts on economic development

Village wealth index

We analyze the effects of communal-company partnerships on economic development that we proxy by village wealth. Thus, we created a village wealth measure – wealth index (WI) – in following the idea of Sahn and Stifel (2003). Technically, WI is a function of various percentages of individual-level assets and is specified as follows:

$$WI_v = \beta_1 motorbike_v + \beta_2 car_v + \beta_3 truck_v + \beta_4 tv_v + \beta_5 dish_v + \beta_6 mobile_v + \beta_7 fridge_v + \beta_8 aircon_v + \beta_9 computer_v, \quad (3)$$

where the βs are the generated results from a principle component analysis. The various wealth components are the percentage of households owning the following assets in village v: motorbike, car, truck, television, satellite dish for television reception, mobile phone, fridge, air-conditioning, and generator.[2] We normalized WI resulting in an index with scores between 0 and 1, where values closer to zero reflect lower relative asset ownership. Moreover, since the variable is within the range of 0-1, the estimation results can be interpreted as percentages.

Modeling base effects

We want to understand how economic development (i.e. WI) at the village level is influenced by communal-company partnerships. As discussed, the involvement in these partnership formations

[2] As a robustness check, we constructed an alternative WI adding various variables distance to a health clinic and to an elementary school – to the specification. Results are available upon request.

happens through contract farming schemes which are not only beneficial to the contract participants (direct effect) but also to other villagers who benefit from improved infrastructure (indirect effect). We specified the following equation:

$$WI_{1vt} = \alpha_1 + \beta_1 2012_v + \delta_1 contract_{vt} + \rho_1 X_{vt-10} + \varepsilon_{1v} + \mu_{1vt}, \quad (4)$$

where the WI_{vt} is the relative wealth of village *v* at time *t*, $contract_{vt}$ is a dummy variable that reflects if a contract was signed in village *v* at time *t*; X_{vt-10} is a vector of village-controls in village *v* at time *t*-10; the lagged values are used to avoid issues of endogeneity. ε captures the time-invariant unobserved factors that affect the WI. To control for these unobserved heterogeneities we employ a fixed/random effects model depending on the results of the Hausman test. μ_{1vt} is the idiosyncratic error term that changes over time and across villages. We also include the year dummy 2012_v to control for a possible time trend. Time *t* includes the observations for 2002 and 2012 and, accordingly, *t*-10 includes the values for 1992 and 2002.

The vector of variables, X_{vt-10}, includes socioeconomic village-level factors. We control for population density. For Jambi, higher population densities are associated with more urban settlements, whereas lower population densities are more likely to be found in Jambi's rural areas. Generally it can be expected that villages in urban areas are richer compared with their rural counterparts. Consequently, we predict that population density has a positive effect on village wealth.

Moreover, we control for institutional differences between the villages by including the share of households holding government land titles. Our expectation is mixed. There may be a positive relationship between land titles and village wealth, because land titles can be used to access formal credit. In turn, villages with lower shares of land titles may less frequently access formal credit and, consequently, cannot use this for accumulating wealth. However, the relationship may also be negative. For example, larger shares of land titles could lead to a decrease in village wealth because the money spent on applying for a land title cannot be used to purchase other assets.

Next, access to electricity is likely to induce economic development and thus we expect a positive correlation with village wealth. In a similar vein, we predict the distance to an all season road to be positively correlated with village wealth. Better village accessibility allows for more outside options which, in turn, may foster economic development. Furthermore, the distance to an oil palm mill may be an indicator for the degree of integration into the oil palm industry. This may have positive effects on village wealth, for instance, due to reduced transaction costs. Also likely, industry development may be accompanied with the emergence of new markets and various employment opportunities (e.g. oil palm mill, oil palm estate, transportation of oil palm fruits, security, input markets) which are likely to positively affect village wealth.

Moreover, oil palm smallholders without any contract have gained increasing importance in Jambi. These may, at least partly, have an effect on the accumulation of wealth at the village level. We control for the influence of independent oil palm farmers by including a variable which captures the share of oil palm land cropped by independent smallholders. Finally, contractual conflicts with private companies may have negative implications for economic development, for instance, because farmers stop working, and/or companies would refrain from disbursing salaries.

Furthermore, we will run two additional specifications of equation (4) in which we replace *contract* by *contract size* and *contract length*, respectively. The reasons are the following. The contract dummy captures the effect of being included in the oil palm industry for the entire village. However, we realize that there are large variations regarding the amount of villagers under contract. Therefore, we account for this by including *contract size* in an additional specification. We argue that contract size is positively correlated with WI because not only more villagers may benefit from contract farming but also other villagers may benefit more. For example, villages with larger shares of contract farmers may be more important for private companies than villages where only a few farmers are contracted. This may result in improved village infrastructure. In a third model specification of equation (4) we include the variable *contract length*. In doing so, we control for a time effect. It may be argued that villages where contracts were signed in the past (say 10 years ago) could exhibit a larger WI than villages that signed a contract in the more recent past (say 2 years ago). In a similar vein, the infrastructural improvements (e.g. roads, markets) need time to develop and thus to materialize their effect on WI. Therefore, the variable *contract length* captures the amount of years that passed since a contract was signed in a village. Technically, it takes the value 1 if the contract was signed in 2012, the value 2 if a contract was signed in 2011, etc., and 0 if no contract was signed. In addition, to examine if the contract effect is linear or diminish over time we add the squared terms of *contract length.*

Modeling phase effects

As we discussed earlier, the oil palm development in Jambi has undergone several phases. It may be argued that village wealth is affected by the actual phase a contract was adopted in. To investigate this, we distinguish two major phases: the *government-led* phase and the *market-oriented* phase. Within the former phase the basis of every contract was the package as well as subsidized loans which were not guaranteed anymore in the subsequent market-oriented phase. In fact, decentralization shifted budgetary responsibilities to the district governments which, consequently, competed for attracting private company investments (McCarthy et al. 2012). In addition, this phase introduced more competition among private companies which may have led to a better bargaining position of the village. However, negotiations had to be in line with district – rather than central government – regulations, providing another opportunity for private companies to exploit their favorable position vis-à-vis district governments (idem). Moreover, villages that were involved in the oil palm industry in the government-led phase were more likely benefit from spillover effects induced by government infrastructural investments (Larson, 1996). Taken together, we predict that compared to contracts adopted in the market-oriented phase,

contracts adopted in government-led phase had more potential to be beneficial for village communities.

To model this, we specified an alternative specification that is almost identical to equation (4). The difference is that we break down the *contract* variable to account for the respective phase of adoption. In doing so, we replace *contract* with two dummy variables: the first dummy captures the effect of contracts that were adopted in the government-led phase; the second dummy captures the contract effect for the market-oriented phase. The reference group consists of villages without a contract. Overall, this allows us to control for some of the potential heterogeneity originating from the respective phase of adoption that may affect our outcome variable WI.

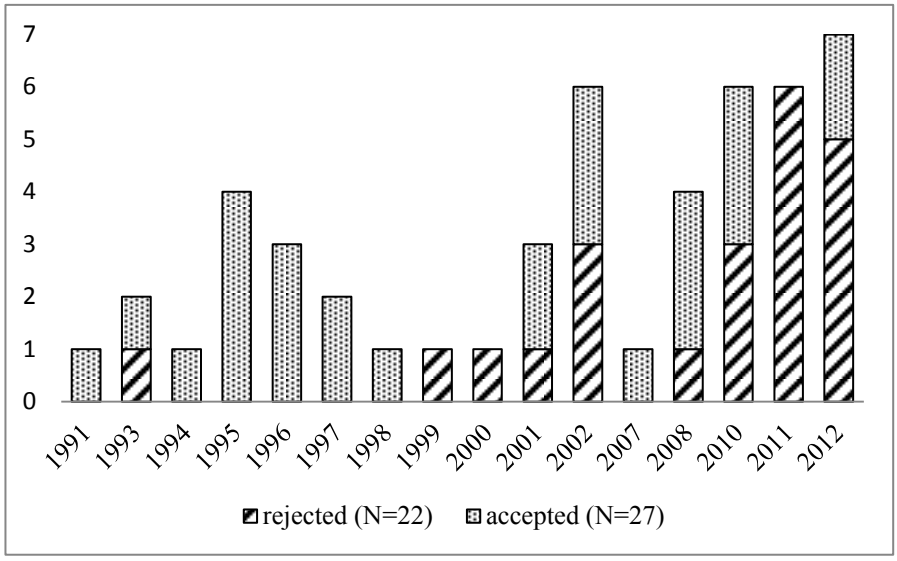
4. Results and discussion

4.1 Descriptive statistics

Throughout the period of interest, from 1992 until 2012, contracts had been adopted in our research region. Out of our total sample of villages that existed in 1992 (N=78), 49 were visited by an investor. Figure 2 depicts the year in which villages accepted (N=27) or rejected (N=22) a contract offer. It is striking that in the early 1990s relatively few offers were made which, in turn, were almost always accepted. Especially towards the end of our period of interest, however, villages were more frequently being visited and accepted the offers less often. Considering the process of liberalization associated with the earlier mentioned market-oriented phase, the increasing involvement of private companies in the oil palm sector is not surprising.

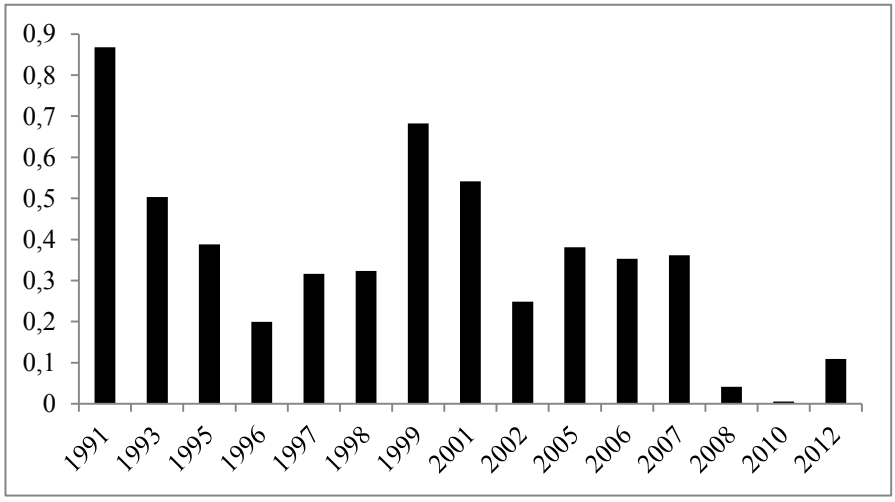
Whereas contractual opportunities increased, participation in contract farming schemes had overall been reduced throughout the entire period. In this regard, Figure 3 depicts the average share of households under contract in contract villages per year. The trend is clear: the number of households under contract is decreasing. Expressed in mean values, in 2002 about 43 % of the farming households participated in contract farming, and 35 % in 2012 (also see Table 1). Many smallholders have started to cultivate oil palm independently due to a decreasing need for company support for various reasons (i.e. better access to loans and inputs, acquired agronomic knowledge) (McCarthy, 2010). This is also reflected in our data. In 1992, only a small share of total oil palm land was cultivated independently (5%). This is in stark contrast to the year 2012 where the average share of independently cultivated oil palm land increased to 74 % (Table 1).

Figure 2. Contracts rejected and accepted at village by year



Source: own calculations

Figure 3. Average share of contract households per contract village by year



Source: own calculations

Table 1. Descriptive statistics I

	Means (Std. dev.)		
	1992	2002	2012
	Full Sample (N=78)		
Wealth index	0.266	0.509	0.742
	(0.223)	(0.249)	(0.137)
Population density	0.466	0.753	1.021
	(0.558)	(0.813)	(1.097)
Distance to an all season road (km)	4.438	2.639	1.152
	(14.07)	(7.831)	(5.711)
Distance to oil palm mill (km)	61.44	45.39	30.63
	(61.24)	(50.87)	(24.64)
Electricity (dummy)	0.374	0.756	0.910
	(0.477)	(0.432)	(0.287)
Government land title (share of HH)	0.201	0.335	0.466
	(0.346)	(0.389)	(0.351)
Share of oil palm land under independent cultivation	0.051	0.178	0.738
	(0.163)	(0.304)	(0.368)
Contract village sample (i.e. if contract exists in village)			
	N=1	N=17	N=27
Contract size	0.868	0.434	0.353
	(.)	(0.341)	(0.322)
Contract length (dummy)	-1	6.765	12.41
	(.)	(2.704)	(6.351)
Contractual conflict (dummy)	0	0.235	0.185
	(0)	(0.437)	(0.396)

Next, in 2012 the average contract length was about 12.4 years (Table 1). The shortest contract length is 1 year and the longest contract lasted for 22 years suggesting that the most recent contract was adopted in 2012 and the longest lasting contract in 1991.[3] It is also worth mentioning that none of the contracts ended during the period of interest. Finally, we observe some incidences of conflicts with a private company. These are mainly related to not well-understanding contract conditions and the alteration of conditions from the company side after the contract was agreed upon and signed. These issues have also been found to be major causes of conflict in other studies (Sirait, 2009; Rist et al., 2010). Despite the increase of signed contracts from 1992 – 2012, we observe that contractual conflicts exclusively occurred between 1992 and 2002.

[3] Generally, we explain contract adoption with village characteristics from the year 1992. It may be argued that we run into problems of endogeneity when we use data for 1992 to explain contract adoption in 1991. However, we believe that village characteristics do not alter considerably within one year. Thus, we argue that the biases are likely to be minimal. Moreover, this is only the case for one observation.

Table 1 and 2 summarize the descriptive statistics for our explanatory variables. Here, we want to highlight the WI variable. In 1992, the average village had a wealth score of 0.27. Ten years later, the average village could almost double this score. Finally, in 2012 this score reached the value 0.74. Although villages have become richer over the years, when they were first met by an investor, wealth was equally distributed across the sample villages (Table 2). In this respect, we do not find a significant difference between villages which were visited by an investor (0.36) and those which were not (0.34). Next, conditional on being visited, prior to contract adoption villages seem to have a significantly lower WI (0.32) compared to villages which rejected a contract offer (0.41). Less outside options (e.g. less employment opportunities) for villages before adopting a contract may be the reason.

Table 2. Descriptive statistics II

	Means (Std. dev.)				
	Full sample (N=78)	Investor visit (N=49)	No investor visit (N=29)	Contract adoption (N=27)	No contract adoption (N=22)
	(1)	(2)	(3)	(4)	(5)
Village population	1217	1466	1427	1472	1457
	(750.4)	(884.4)	(785.6)	(890.1)	(898.1)
Village land (ha)	6614	6854	6206	6469	7326
	(11482)	(9484)	(14425)	(6831)	(12140)
Population density	0.526	0.521	0.535	0.523	0.516
	(0.619)	(0.705)	(0.451)	(0.727)	(0.693)
Average land slope	1.934	2.116***	1.628	2.252	1.949
	(0.862)	(0.881)	(0.746)	(0.997)	(0.701)
Distance to an all season road (km)	4.438	3.735	2.061	3.931	3.493
	(14.06)	(11.65)	(6.154)	(12.675)	(10.555)
Distance to oil palm mill (km)	61.44	49.75*	71.36	52.55	46.32
	(61.24)	(60.34)	(60.46)	(72.66)	(41.99)
Electricity (dummy)	0.374	0.535	0.621	0.415	0.682
	(0.477)	(0.492)	(0.494)	(0.479)	(0.477)
Wealth index	0.355	0.363	0.342	0.321*	0.415
	(0.241)	(0.231)	(0.261)	(0.224)	(0.235)
Government land title (share of HH)	0.201	0.283**	0.141	0.283	0.283
	(0.346)	(0.378)	(0.288)	(0.388)	(0.375)
Transmigrant village (dummy)	0.154	0.184	0.103	0.259*	0.091
	(0.363)	(0.391)	(0.309)	(0.446)	(0.294)

Notes: Means are based on data for the years 1992 and 2002, depending on the year of investor visit/contract adoption. If investor visit/contract adoption occurred between 1992-2001, we used the data for the year 1992; likewise, if investor visit/contract adoption occurred between 2002-2012, we used the data for the year 2002; the asterisks refer to the significance levels from a simple t-test between the groups (2)-(3) and (4)-(5), respectively; *** significance at the 1 % level; ** significance at the 5 % level; * significance at the 10 % level.

Comparing the remaining village characteristics of villages that were visited by an investor to those villages that were not, it seems that villages were fairly similar in terms of population, land area, distance to an all season road, access to electricity, and village type (Table 2 column 2-3). The two groups of villages also differ in certain aspects. For example, investor villages were characterized by significantly steeper average land slopes and a location closer to an oil palm mill. In addition, investor villages also possessed on average more government land titles prior to being visited. This may point at a companies' strategy to avoid areas with ongoing or the potential of land conflicts.

Comparing village characteristics of villages prior to contract adoption with villages which rejected a contract offer (column 4-5), we only find little significant differences. Yet, contract villages consist significantly more of villages founded by the government-led relocation program (26%), named the transmigrasi program. This is not surprising because all of the villages received a contract per definition. That there are transmigration villages which rejected the contract offer (9%) can be explained by the fact that a few transmigration villages received a contract in the 1980s and were approached by an investor after their first contract expired. It is worth mentioning that only one transmigrant village accepted a contract for the second time after the first one expired. We will now turn to the estimation results explaining contract adoption and impacts of contract farming on village wealth.

4.2 Estimation results investor visit and contract adoption

We model contract adoption in two steps, because of its conditionality on investor visit. We employ a bivariate probit with selection model to deal with a possible selection bias (see Table A1 in the Appendix). The model is identified by using the average land slope as an instrument. The correlation in the errors equals -0.28 which is insignificant according to the Wald test. Consequently, our estimation results are unlikely to suffer from a selection bias. Thus, in Table 3 we present the univariate probit estimation results which generally confirm the estimation results of the bivariate probit with sample selection.

Staying with the probit results in Table 3, the estimation results reveal that investors are more likely to visit villages with steeper average land slopes (equation 4). As we have argued, before the Indonesian government structurally focused on developing an oil palm sector in the early 1990s, the emphasis was on the rubber sector. The well-establishment of rubber in Jambi has led to a scarcity of land. As a consequence, available land was found in areas with, on average, steeper land slopes.

Next, the results suggest that villages that are located in proximity to an existing oil palm industry (i.e. oil palm mill) are more likely to be targeted by an investor. Specifically, every additional kilometer of distance from the village to the closest oil palm decreases the probability of being visited by an investor by 0.2 %. This is not surprising because proximity to existing oil palm industry reduces transaction costs. In addition, a good connection to oil palm mills is

needed to guarantee that the FFB are processed in a timely manner. Usually, when the fruits are harvested they start to perish rapidly after 48 hours.

Table 3. Probit estimation results for determinants of investor visit and contract adoption

	Investor visit N=78	Contract adoption N=49	Investor visit N=78	Contract adoption N=49
	Coefficient		Marginal effects	
	(1)	(2)	(3)	(4)
Average land slope	0.633***	.	0.234***	
	(0.248)	.	(0.088)	
Village land area (ha; x1000)	-0.002	-0.028	-0.001	-0.011
	(0.018)	(0.025)	(0.001)	(0.011)
Village population (x1000)	-0.024	0.406	-0.009	0.161
	(0.206)	(0.274)	(0.081)	(0.111)
Electricity (dummy)	-0.181	-0.887*	-0.067	-0.349*
	(0.382)	(0.509)	(0.141)	(0.201)
Distance to all season road (km)	0.004	-0.009	0.002	-0.003
	(0.013)	(0.017)	(0.001)	(0.011)
Distance to oil palm mill (km)	-0.005*	0.000	-0.002*	-0.000
	(0.003)	(0.002)	(0.001)	(0.000)
Wealth index	0.204	-0.798	0.075	-0.315
	(0.795)	(1.114)	(0.029)	(0.438)
Transmigrant village (dummy)	0.296	0.611	0.104	0.227
	(0.436)	(0.512)	(0.146)	(0.172)
Government land titles (share of HH)	1.454***	-0.289	0.538***	-0.114
	(0.587)	(0.501)	(0.212)	(0.197)
Constant	-0.854	0.512	.	.
	(0.618)	(0.564)	.	.
Log likelihood	-42.19	-29.64		
Wald $chi^2(9/8)$	15.65	8.00		
Prob. > chi^2	0.07	0.43		
Pseudo R^2	0.18	0.12		

Notes: Explanatory variables are based on data for the years 1992 and 2002, depending on the year of investor visit/contract adoption. If investor visit/contract adoption occurred between 1992-2001, we used the data for the year 1992; likewise, if investor visit/contract adoption occurred between 2002-2012, we used the data for the year 2002;*** significance at the 1 % level; ** significance at the 5 % level; * significance at the 10 % level; robust standard errors in parentheses.

Government land titles significantly predict investor visit. It appears that private companies are more attracted by villages with higher shares of secured land, rather than unsecured land that is

largely governed by customary land rights. This is likely a response to the presence of many unresolved land conflicts between communities and companies which often resulted in physical opposition (Colchester et al., 2006) that, at the same time, disrupted smooth business operations. Overall, this result stresses the importance of formal land titles, not only for borrowing formal credit, but also to increase the villages' attractiveness.

Other factors, such as proximity to all season road and availability of electricity, we expected to be conducive to company operations, are not significant.

We now turn to the discussion of the factors that affect the probability of contract adoption. Conditional on investor visit, we find that only one variable is significant. Villages without access to electricity have a 35% higher probability of adoption a contract. As predicted, no access to the public grid could be an indication for being located in rural areas where economic opportunities are often scant. Thus, a contract represents a welcome opportunity to stimulate economic development and thus, village wealth. Apart from this, none of the explanatory variables enter significantly in explaining contract adoption.

Finally, as a robustness check we reduced the explanatory variables in the model and find consistent results. We now turn to the results regarding the impact of contract adoption on village wealth.

4.3 Impact of oil palm contracts

Base regression results

The regression results are depicted in Table 4. In all regression we use a fixed effects model, as the Hausman test largely suggests.

First, we find that village wealth had increased for all villages: compared to 2002, in 2012 the WI was around 22 percentage points higher. Further, the adoption of a contract seems to significantly affect village wealth (column 1). Controlling for confounding factors, contract adoption remains positively significant at the 10 % level (column 2). Jointly, it seems that the presence of a contract reveals a weakly significant effect on village wealth. Rather than contract adoption per se, it may be that the share of farmers under contract is pivotal for promoting the accumulation of village wealth. Indeed, contract size has a positive effect on village wealth (column 3) which remains significant after inserting control variables to the regression (column 4). In more detail, an increase of additional 10 % of farmers under contract leads to a 7.3 % increase in village wealth.

Further, we argued that after a contract is adopted the materialization of wealth takes time. In different words, we predicted that village wealth increases in the years that have passed since the

Table 4. Panel estimation results for contract adoption, contract size and contract length

	Dependent variable: wealth index					
	Coefficient (Standard error)					
	(1)	(2)	(3)	(4)	(5)	(6)
Year 2012 (d)	0.216***	0.223***	0.215***	0.230***	0.202***	0.199***
	(0.025)	(0.047)	(0.024)	(0.043)	(0.028)	(0.047)
Contract (dummy)	0.129*	0.154*	.	.	.	.
	(0.089)	(0.086)	.	.	.	.
Contract size	.	.	0.628**	0.729***	.	.
	.	.	(0.277)	(0.224)	.	.
Contract length (years)	.	.	.	.	0.044**	0.048***
	.	.	.	.	(0.018)	(0.017)
Contract length squared (years)	.	.	.	.	-0.002**	-0.002**
	.	.	.	.	(0.001)	(0.001)
Share of oil palm land under	.	0.074	.	0.084	.	0.119
independent cultivation$_{t-10}$	.	(0.103)	.	(0.106)	.	(0.111)
Distance to oil palm mill$_{t-10}$ (km)	.	0.000	.	0.000	.	0.000
	.	(0.000)	.	(0.000)	.	(0.000)
Distance to all season road$_{t-10}$ (km)	.	-0.005*	.	-0.005*	.	-0.003
	.	(0.003)	.	(0.003)	.	(0.002)
Population density$_{t-10}$	.	-0.017	.	-0.028	.	-0.032
	.	(0.082)	.	(0.081)	.	(0.081)
Electricity$_{t-10}$ (dummy)	.	-0.031	.	-0.043	.	-0.025
	.	(0.047)	.	(0.046)	.	(0.048)
Government land titles$_{t-10}$	.	0.041	.	0.049	.	0.075
	.	(0.085)	.	(0.082)	.	(0.086)
Contractual conflict$_{t-10}$	.	-0.082	.	-0.103	.	-0.142*
	.	(0.056)	.	(0.067)	.	(0.087)
Constant	0.481***	0.457***	0.449***	0.431***	0.464***	0.436***
	(0.025)	(0.073)	(0.030)	(0.074)	(0.024)	(0.073)
Observations	156	156	156	156	156	156
R^2 (overall)	0.19	0.22	0.07	0.08	0.16	0.17
Hausman	3.55	14.28**	9.27***	31.84***	20.61***	53.72***
Model specification	FE	FE	FE	FE	FE	FE

Notes: *** significance at the 1 % level; ** significance at the 5 % level; * significance at the 10 % level; standard errors clustered at the village level in parentheses.

Table 5. Panel estimation results for contract adoption, contract size by adoption phase

	Dependent variable: wealth index Coefficient (Standard error)	
	(1)	(2)
Year 2012 (dummy)	0.225***	0.206***
	(0.046)	(0.047)
Government-led contract (1991-1998; dummy)	0.444***	0.437***
	(0.083)	(0.085)
Market-oriented contract (1999-2012; dummy)	0.121	0.091
	(0.089)	(0.088)
Government-led contract size (1991-1998)	.	.
	.	.
Market-oriented contract size (1999-2012)	.	.
	.	.
Contract length (years)	.	0.011
	.	(0.008)
Share of oil palm land under independent cultivation$_{t-10}$	0.031	0.056
	(0.103)	(0.107)
Distance to oil palm mill$_{t-10}$ (km)	0.000	0.000
	(0.000)	(0.000)
Distance to all season road$_{t-10}$ (km)	-0.004*	-0.004*
	(0.003)	(0.002)
Population density$_{t-10}$	-0.002	-0.027
	(0.084)	(0.084)
Electricity$_{t-10}$ (dummy)	-0.022	-0.011
	(0.048)	(0.049)
Government land titles$_{t-10}$	0.033	0.014
	(0.085)	(0.085)
Contractual conflict$_{t-10}$	-0.076	-0.152*
	(0.051)	(0.081)
Constant	0.389***	0.386***
	(0.082)	(0.085)
Observations	156	156
R^2 (overall)	0.13	0.10
Hausman	18.45**	46.18***
Model specification	FE	FE

Notes: *** significance at the 1 % level; ** significance at the 5 % level; * significance at the 10 % level; standard errors clustered at the village level in parentheses.

contract was signed. Indeed, one additional year of contract duration increases WI by about 4.4 percentage points (column 5). In addition, the effect appears to be non-linear: the squared term enters negatively significant which suggests that the positive effects associated with contract length diminish over time. These findings are robust to the effects of confounding factors (column 6).

Regarding the explanatory variables, apart from distance to an all season road and contractual conflict, the remaining variables are not significant in the overall regression estimations. We find that increasing village accessibility is positively associated with village wealth. As we predicted, better village accessibility increases the access to outside options and, thus, to participate in alternative income-generating activities (i.e. in neighboring cities, markets, etc.).

Finally, contractual conflict affects wealth negatively (column 6). Since, it only enters significantly in one regression specification we should not overestimate this finding. Another interesting finding is that the share of oil palm land cultivated by independent smallholders is insignificant. However, this result should not be over-interpreted considering the use of lagged values. Compared to 2012, in the past independent smallholders were relatively few. We now examine if the actual phase of contract adoption matters for explaining WI.

Results on government-led versus market-oriented contracts

The results depicted in Table 5 reveal that contracts adopted before 1999, within the government-led phase, have an overall positive effect on village wealth (column 1). Compared to villages without a contract, these villages have had increased their wealth by 45 %. In contrast, villages that adopted a contract after 1998 within the market-oriented phase are not significantly different from villages without a contract. Moreover, we control for contract length (column 2). The insignificance of this variable allows us to argue that the respective phase of adoption (i.e. government-led, market-oriented), rather than the duration of the contract, matters for explaining village wealth. In terms of the size of the effect the estimation results suggest that, compared to contracts adopted within the market-oriented phase, government-led contracts reveal larger positive effects on village wealth.

In sum, as predicted, compared to the market-oriented phase, the government-led phase is more associated with village wealth. Nevertheless, also the market-oriented phase, associated with liberalization and more bargaining power for village communities, stimulated the accumulation of village wealth, however, to a relatively lesser degree.

5. Conclusion

In this paper, we investigated the effects of community-company partnerships within the Indonesian oil palm sector on economic development at the village level. In addition, we examined the conditions under which partnership formations (i.e. contract farming) are

established. We use data from a survey conducted in randomly selected villages where we collected recall data through structured interviews with village leaders covering a period of 20 years, from 1992-2012.

The results suggest considerable positive economic benefits for villages within partnership formations with private companies. In particular, the share of farmers under contract appears to play a decisive role in inducing the accumulation of village wealth. Moreover, contract length is relevant as well. In this regard, villages that are involved in contract arrangements for many years tend to have higher village wealth levels, compared to villages where a contract has been established more recently. These positive effects associated with contract length, however, are not continuously increasing. At some point, the positive effects diminish.

Furthermore, throughout the 20 year period of analysis contracts were established. The results suggest that contracts adopted in the government-led phase (before 1999) were more beneficial for improving village wealth than contracts that were adopted in the market-oriented phase (after 1999). We conjecture that these differences are due to contractual arrangements (i.e. oil palm service 'package', subsidized loans), government control and infrastructural investments that were more pronounced in the government-led phase. However, due to the complexity and various combinations of contract conditions, in this study we are unable to distinguish between the effects of these features. This will be an interesting avenue for future research.

Regarding the inclusion into the oil palm industry, the data show that the availability of land, proximity to an oil palm mill and secured land are the factors predicting that villages were targeted by private companies. Regarding the first, Jambi province is characterized by large areas which were already under rubber cultivation before oil palm was introduced. Increasingly, the availability of land shifted towards the remoter and more rural areas, where currently most of Jambi's oil palm plantations are located. Second, rather than good village accessibility, proximity to existing oil palm industry (i.e. processing mill) is crucial for being targeted. This allows private companies to reduce their transaction costs. Third, the data suggest that increasing shares of farmers possessing formal land titles attracts private companies to the village. We conjecture that this is a result of increasing conflicts that arose due to unclear land rights and are likely to have negative effects for smooth business operations. In addition, this supports the relevance of secured land for the possible inclusion into community-company partnerships.

Conditional on the factors that determine that an investor visits a village, we could demonstrate that no access to electricity predicts contract adoption at the village level. In different words, villages that are likely to be located in remoter areas because of their disconnection to the publicly provided grid seem to have few options to make an income; thus, these are more prone to adopt a contract. Overall, it appears that contract farming schemes have not been entirely equally accessible to all villages alike; however, we do not find evidence that the rural poor were excluded.

From the results we can draw some policy recommendations. First of all, the analysis demonstrates the importance of formal individual land titles for attracting private companies to the village. An increasing governmental effort is required to make land titling more accessible and the titling process more affordable for rural farmers. Second, we show the relevance of improved infrastructure for village wealth. Further investments are needed to continue this positive economic development.

We realize that this research has some limitations. For example, we adopt a specific wealth measure to capture economic development. However, apart from an asset-based measure, economic development certainly has different aspects that we did not address. Future research could apply alternative and more durable wealth measures. For instance, the average income/consumption per capita could be used. Regarding a more durable measure, future research could adopt a wealth measure that captures the investment into expanding agricultural activities (i.e. share of households buying land in and outside their village). Further analysis is desirable that confirms the positive effects of contract farming for rural communities and expands the analysis for rural households. At the same time, the household-level analysis allows to investigate if contract farming has excluded certain farmers and if it has contributed to unequal economic developments within villages.

Finally, despite the overall positive effects of community-company partnerships, contract farming should not be perceived as a panacea for improving rural livelihoods in Indonesia or elsewhere. In contrast, we observe that there are other means as well. For instance, Jambi province is characterized by rubber farmers and, more recently, a surge of independent oil palm smallholders. However, since oil palm cultivation requires resources and knowledge, contract farming provides a means to stimulate the development of an oil palm sector in its infant stages. The importance of contract farming in the oil palm industry in Jambi is likely to decrease. It should be acknowledged that the sector has been undergoing a structural change from vertically integrated plantations towards increasingly independent production of oil palm; a transformation which is similar to the tea sector in Sri Lanka (Herath and Weersink, 2009). However, there are other parts of Indonesia (and globally), i.e. Kalimantan, Borneo, where the oil palm boom is yet to start.

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References

Barlow, C., Zen, Z., Gondowarsito, R., 2003. The Indonesian oil palm industry. *Oil Palm Industry Economic Journal*, *3*(1), 8-15.

Beckert, B., Dittrich, C., S. Adiwibowo 2014. Contested Land: An Analysis of Mulit-Layered Conflicts in Jambi Province, Sumatra, Indonesia. *ASEAS – Austrian Journal of South-East Asian Studies, 7(1),* 75-92.

Budidarsono, S., Susanti, A., Zoomers, A., 2013. Oil palm plantations in Indonesia: The implications for migration, settlement/resettlement and local economic development. In: Zhen Fang (Ed.): *Biofuels – Economy, Environment and Sustainability*: Intech. Open Access.

Cahyadi, E. R., Waibel, H., 2013. Is contract farming in the Indonesian oil palm industry pro-poor?. *Journal of Southeast Asian Economies (JSEAE)*, *30*(1), 62-76.

Cameron, A. C., Trivedi, P. K., 2009. *Microeconometrics using stata* (Vol. 5). College Station, TX: Stata Press.

Carlson, K. M., Curran, L. M., Ratnasari, D., Pittman, A. M., Soares-Filho, B. S., Asner, G. P., Trigg, S.N., Gaveau, D.A., Lawrence, D., Rodrigues, H. O., 2012. Committed carbon emissions, deforestation, and community land conversion from oil palm plantation expansion in West Kalimantan, Indonesia. *Proceedings of the National Academy of Sciences*, *109*(19), 7559-7564.

Casson, A., 2000. *The hesitant boom: Indonesia's oil palm sub-sector in an era of economic crisis and political change* (No. 29). Bogor: Center for International Forestry Research.

Colchester, M., Jiwan, N., Andiko, S.M., Firdaus, A.Y., Surambo, A., Pane, H., 2006. *Promised Land: palm oil and land acquisition in Indonesia: implications for local communities and indigenous peoples.* In: Forest Peoples Programme, Sawit Watch, HuMa and ICRAF.

Fearnside, P. M., 1997. Transmigration in Indonesia: lessons from its environmental and social impacts. *Environmental Management*, *21*(4), 553-570.

Feintrenie, L., Chong, W. K., Levang, P., 2010. Why do farmers prefer oil palm? Lessons learnt from Bungo district, Indonesia. *Small-Scale Forestry*, *9*(3), 379-396.

Gatto, M., Wollni, M., Qaim, M., 2014. Oil Palm Boom and Land-Use Dynamics in Indonesia: The Role of Policies and Socioeconomic Factors. *EFForTS Discussion Paper*.University of Göttingen. ISSN: 2197-6244.

Greene, W.H., 2008. *Econometric Analysis*. Pearson Prentice Hall, New Jersey.

Hansen, M. C., Stehman, S. V., Potapov, P. V., Arunarwati, B., Stolle, F., Pittman, K., 2009. Quantifying changes in the rates of forest clearing in Indonesia from 1990 to 2005 using remotely sensed data sets. *Environmental Research Letters*, *4*(3), 034001.

Herath, D., Weersink, A., 2009. From plantations to smallholder production: the role of policy in the reorganization of the Sri Lankan tea sector. *World Development*, *37*(11), 1759-1772.

Koh, L. P., Wilcove, D. S., 2008. Is oil palm agriculture really destroying tropical biodiversity? *Conservation Letters*, *1*(2), 60-64.

Lambin, E. F., Geist, H. J., Lepers, E., 2003. Dynamics of land-use and land-cover change in tropical regions. *Annual Review of Environment and Resources*, *28*(1), 205-241.

Larson, D. F., 1996. *Indonesia's palm oil subsector* (No. 1654). The World Bank.

Margono, B. A., Turubanova, S., Zhuravleva, I., Potapov, P., Tyukavina, A., Baccini, A., Goetz, S., Hansen, M. C., 2012. Mapping and monitoring deforestation and forest degradation in Sumatra (Indonesia) using Landsat time series data sets from 1990 to 2010. *Environmental Research Letters*, *7*(3), 034010.

McCarthy, J. F., Cramb, R. A, 2009. Policy narratives, landholder engagement, and oil palm expansion on the Malaysian and Indonesian frontiers. *The Geographical Journal*, *175*(2), 112-123.

McCarthy, J. F., 2010. Processes of inclusion and adverse incorporation: oil palm and agrarian change in Sumatra, Indonesia. *The Journal of Peasant Studies*, *37*(4), 821-850.

McCarthy, J. F., Gillespie, P., Zen, Z., 2012. Swimming upstream: local Indonesian production networks in "globalized" palm oil production. *World Development*, *40*(3), 555-569.

Mitsuda, Y., Ito, S., 2011. A review of spatial-explicit factors determining spatial distribution of land use/land-use change. *Landscape and Ecological Engineering*, *7*(1), 117-125.

Miyata, S., Minot, N., Hu, D., 2009. Impact of contract farming on income: linking small farmers, packers, and supermarkets in China. *World Development*, *37*(11), 1781-1790.

Murdiyarso, D., Noordwijk, M. V., Wasrin, U. R., Tomich, T. P., Gillison, A. N., 2002. Environmental benefits and sustainable land-use options in the Jambi transect, Sumatra. *Journal of Vegetation Science*, *13*(3), 429-438.

Rist, L., Feintrenie, L., Levang, P., 2010. The livelihood impacts of oil palm: smallholders in Indonesia. *Biodiversity and Conservation*, *19*(4), 1009-1024.

Rosyani, 2011. The impact of activities pattern partnership company oil palm plantations against sustainability villagers surrounding. Prosiding of Nasional Seminar Volume II, Sumatera Indonesia.

Sahn, D. E., Stifel, D., 2003. Exploring alternative measures of welfare in the absence of expenditure data. *Review of Income and Wealth*, *49*(4), 463-489.

Sirait. M.T., 2009. *Indigenous Peoples and Oil Palm Plantations Expansion in West Kalimantan, Indonesia*. Occasional Paper. University of Amsterdam. Cordaid.

Susila, W. R., 2004. Contribution of oil palm industry to economic growth and poverty alleviation in Indonesia. *Jurnal Litbang Pertanian*, *23*(3), 107-114.

Zen, Z., C. Barlow and R. Gondowarsito., 2005. *Oil palm in Indonesian socio-economic improvement: a review of options.* Working Papers in Trade and Development. Canberra: Research School of Pacific and Asian Studies, ANU.

Appendix

Table A1. Bivariate probit with selection model estimates and marginal effects

		Bivariate probit			
Variable	First stage investor visit	Investor visit	Contract adoption	Investor visit	Contract adoption
	N=78	N= 78	N=49	N=78	N=49
		Coefficient		Marginal effects	
	(1)	(2)	(3)	(4)	(5)
Average land slope	0.632***	0.632***	.	0.234***	.
	(0.222)	(0.247)	.	(0.087)	.
Village land area (ha) (x1000)	-0.002	-0.002	-0.027	-0.001	-0.011
	(0.017)	(0.018)	(0.025)	(0.001)	(0.011)
Village population (x1000)	-0.024	-0.018	0.397	-0.007	0.159
	(0.253)	(0.204)	(0.268)	(0.081)	(0.111)
Electricity (dummy)	-0.181	-0.173	-0.805	-0.064	-0.336*
	(0.388)	(0.382)	(0.593)	(0.141)	(0.209)
Distance to all season road (km)	0.004	0.004	-0.009	-0.002	-0.003
	(0.019)	(0.013)	(0.017)	(0.001)	(0.011)
Distance to oil palm mill (km)	-0.005**	-0.005*	-0.001	-0.002*	-0.000
	(0.002)	(0.003)	(0.003)	(0.001)	(0.000)
Wealth index	0.204	0.177	-0.868	0.065	-0.341
	(0.761)	(0.819)	(1.133)	(0.303)	(0.463)
Transmigrant village (dummy)	0.296	0.284	0.539	0.101	0.221
	(0.514)	(0.426)	(0.606)	(0.143)	(0.178)
Government land titles (share of HH)	1.454***	1.439**	-0.353	0.532**	-0.056
	(0.542)	(0.587)	(0.549)	(0.212)	(0.258)
Constant	-0.854	-0.857	0.626	.	.
	(0.646)	(0.613)	(0.702)	.	.
Rho		-0.285			
		(1.003)			
Log likelihood	-42.19	-71.79			
Wald test of independent equations					
Chi^2 (1) prob. > chi^2		0.78			
Pseudo R^2	0.18				

Notes: *** significance at the 1 % level; ** significance at the 5 % level; * significance at the 10 % level; standard errors clustered at the village level in parentheses.