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Land-use change and livelihoods of non-farm households: The role of income from employment in oil palm and rubber in rural Indonesia

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ABSTRACT

Many tropical regions are experiencing massive land-use change that is often characterized by an expansion of oil palm at the expense of forests and more traditional forms of agricultural cropping. While implications of such land-use change for the environment and for local farm households were examined in previous research, possible effects on the livelihoods of non-farm households are not yet well understood. This study analyzes the role of different types of agricultural and non-agricultural employment income for non-farm households in rural Jambi, one of the hotspot regions of Indonesia's recent oil palm boom. Data from a survey show that employment in rubber and oil palm are important livelihood components for non-farm households. Employment in oil palm is more lucrative than employment in rubber, so involvement in the oil palm sector as a laborer is positively associated with total household income. Regression models show that whether or not a household works in oil palm is largely determined by factors related to migration background, ethnicity, and the size of the village area grown with this crop. These results suggest that further expansion of the oil palm area will likely benefit non-farm households through gains in employment income. As non-farm households belong to the poorest segments of the rural population, these benefits should not be ignored when designing policies towards sustainable land use. Possible negative environmental and social externalities of further oil palm expansion are also discussed.

1. Introduction

During the past few decades, oil palm has become one of the most rapidly expanding agricultural crops, especially in Southeast Asia (Euler et al., 2016; FAO, 2017). Indonesia and Malaysia are the biggest producers of palm oil, with a combined world market share of 85% (FAO, 2017). In Indonesia, the land area grown with oil palm grew by almost 50% over the last 10 years. While some of the new oil palm plantations were established on recently deforested land, oil palm has also replaced other agricultural crops such as rubber (Krishna et al., 2017a). About 60% of the oil palm land in Indonesia is managed by large-scale public or private companies, the rest is cultivated by smallholder farmers (Gatto et al., 2015; Euler et al., 2016).

The rapid expansion of oil palm in Southeast Asia has given rise to various environmental and social concerns. Oil palm is often held re-nsponsible for tropical deforestation, loss of biodiversity, increases in greenhouse gas emissions, land property conflicts, and social inequality (Fargione et al., 2008; Fitzherbert et al., 2008; McCarthy and Cramb, 2009; McCarthy, 2010; Wicke et al., 2011; Cramb and Curry 2012; Obidzinski et al., 2013; Dewi et al., 2013; Margono et al., 2014; Tsujino et al., 2016; Austin et al., 2017; McCarthy and Obidzinski, 2017). On the other hand, research also shows that oil palm can contribute to rural economic growth and development (Feintrenie et al., 2010; Rist et al., 2010; Lee et al., 2014; Castiblanco et al., 2015; Gatto et al., 2017). Recent studies found that small-farm households in Indonesia profit significantly from oil palm cultivation in terms of income gains and improvements in living standards (Krishna et al., 2017b; Euler et al., 2017).

However, in order to assesss the role of oil palm, or of land-use change more generally, for rural livelihoods it is insufficient to look at profits and incomes of farmers alone. There are also non-farm households in rural areas that may be affected through various channels, including changing conditions in local labor markets. Non-farm households often belong to the poorest segments of rural populations and typically derive a sizeable part of their income from working as agricultural laborers (von Braun and Gatzweiler, 2014). Land-use change may alter employment opportunities and incomes for these labor-supplying households (McCarthy, 2010; Li, 2011; McCarthy and

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Obidzinksi, 2017). To the best of our knowledge, no previous study has analyzed the role of oil palm and other agricultural crops for the income of non-farm households in Indonesia or elsewhere. Here, we address this research gap with data from a survey of non-farm households that we conducted in Jambi Province on the Island of Sumatra. Jambi has been one of the hotspots of the recent oil palm boom in Indonesia (Clough et al., 2016). Based on our data, including several hundred observations from 26 randomly selected villages, non-farm households account for approximately 60% of all households in rural Jambi.[1] This means that a meaningful assessment of rural livelihoods is not possible without considering non-farm households.

We analyze the magnitude and structure of non-farm household income with a particular focus on the role of employment in oil palm and rubber farms and plantations. Oil palm and rubber are by far the two most important crops in Jambi in terms of the land area cultivated (Gatto et al., 2015; Euler et al., 2016). Using regression models, we also analyze factors that influence a household's decision whether or not to work in oil palm, rubber, and other employed or self-employed activities. Finally, we examine whether employment in oil palm or rubber affects the magnitude of household income after controling for other factors. As household employment decisions are endogenous, income differences cannot be interpreted as net effects of oil palm expansion. Nevertheless, insights into the relationships between land use, employment, and income of non-farm households can broaden the understanding of the socioeconomic trends associated with land-use change and possible sustainability trade-offs.

2. Background

2.1. Land-use change in Jambi

Jambi Province is located along the eastern coast of central Sumatra and was originally covered with tropical rainforest. Significant deforestation already started in Jambi more than 100 years ago to extract timber and grow rubber. For many decades, rubber was the most common cash crop in the region grown by companies and local smallholder farmers. While some oil palm was also grown in Jambi during the first half of the twentieth century, more formal development and growth of the palm oil sector only started during the 1970s (Gatto et al., 2017). Initially, oil palm was only cultivated on large plantations. Since the 1980s, smallholder farmers also started to get involved (Euler et al., 2016).

The area planted with oil palm continued to grow during the last few decades, largely due to the rapid increase in the global demand for vegetable oil. Between 1990 and 2014, the oil palm area in Jambi almost quadrupled (Fig. 1). Much of this increase happened on previously forested land. Remote sensing data suggest that – between 1990 and 2010 alone – the forest area in Jambi decreased by more than one million hectares (Margono et al. 2012; Clough et al., 2016). Many of the new oil palm plantations were established in degraded (heavily logged) forests and shrub lands (Obidzinski et al., 2012; Gatto et al., 2015). It was estimated that around 8% of the new oil palm plantations in Jambi were established through direct clearing of intact forests (Gibbs et al., 2010; Margono et al., 2014).

To some extent, new oil palm plantations were also established on land previously cultivated with rubber, especially extensive rubber plots that are sometimes also referred to as 'jungle rubber' (Gatto et al., 2015, Drescher et al., 2016). The conversion of intensively-managed rubber into oil palm plantations was rare, as long as jungle rubber, forest, or shrub lands were still available. Fig. 1 shows that the rubber area in Jambi also increased between 1990 and 2010. Only more recently, the rubber area started to decline. With increasing land scarcity, more-intensively cultivated rubber is now also sometimes converted to oil palm. Since 2012, oil palm has been the most widely grown crop in Jambi (Fig. 1). Further land-use change can be expected in the future. If recent trends persist, oil palm will continue to grow at the expense of rubber. Against this background, it is important to understand what role these two crops play for the employment and income of local non-farm households.

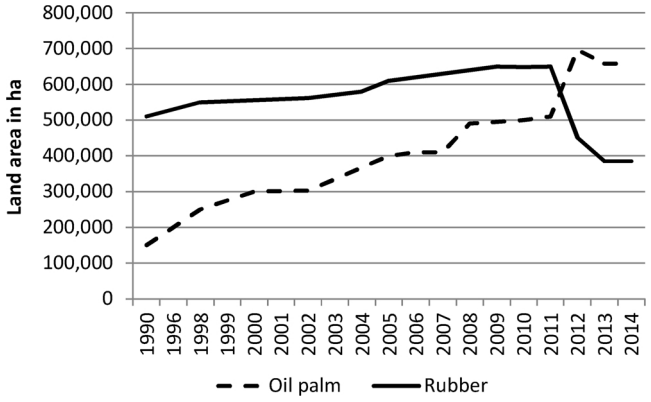

Fig. 1. Oil palm and rubber cultivation in Jambi Province between 1990 and 2014. *Source*: Own presentation based on official government statistics (BPS, 2017).

2.2. Institutional context

The autochthonous population in Jambi belongs to the Melayu ethnicity, but the proportion of people with other ethnicities has been growing due to significant in-migration. Since the early-1980s, the Government of Indonesia encouraged and supported such migration as part of its transmigration program (Fearnside, 1997). The transmigration program involved the voluntary relocation of families from densely populated Java to the so-called 'outer islands' Sumatra, Kalimantan, and Papua. Arriving families from Java were settled in newly established communities, the so-called transmigration villages. In these villages, transmigrant families were allocated a piece of land with full ownership rights and were supported in the cultivation of specific agricultural crops (Elmhirst, 1999; Murdiyarso et al., 2002; Gatto et al., 2017). In the early days of the program, transmigrant families were supported in the cultivation of rice, but soon the government's focus switched to rubber. From the late-1980s onward, new transmigrants were supported in the cultivation of oil palm, usually on land adjacent to large oil palm plantations. These large plantations were managed by public or private companies to which the transmigrant families delivered their harvest under contract (Gatto et al., 2015).

The government-sponsored contracts between palm oil companies and smallholder farmers in Indonesia are typically referred to as 'nucleus estate and smallholder' (NES) schemes (Larson, 1996; Feintrenie et al., 2010; McCarthy and Cramb, 2009; Cramb and McCarthy, 2016).[2] Under these contracts, farmers received subsidized loans and technical support. In addition, the government supported the construction of infrastructure (roads, schools etc.) in transmigrant villages. A recent study showed that communities with NES contracts experienced faster economic development than communities without such contracts (Gatto et al., 2017).

The NES schemes marked the beginning of smallholder farmers' involvement in the palm oil sector in Sumatra. Since the late-1990s, smallholders have also started to adopt oil palm independently without

[1] We define non-farm households as households that earn less than 50% of their income from own farming enterprises. Our survey includes 432 non-farm households. To estimate the proportion of non-farm households in rural Jambi, we also used data from 300 farm households living in the same 26 villages (Drescher et al., 2016; Euler et al., 2017).

[2] In later phases, government support for these NES schemes was phased out and the contracts between palm oil companies and smallholders became known as *Koperasi Kredit Primer untuk Anggota* (KKPA) schemes (McCarthy, 2010).