The Market Failures of Indonesian Palm Oil and Policy Remedies

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Contents

1. Introduction

Within the last two decades, Indonesia has undergone the largest modern agricultural export expansion through the production of palm oil, which has led to domestic poverty reduction and economic growth as well as increased global food security (Edwards, 2019; Corley, 2009). The most rapid expansion in Indonesia was among smallholders, relative to both government estates and private companies (Lee et al., 2014). However, there has been a tradeoff between the economic development and environmental conservation from oil palm plantations. The benefits of the cultivation of oil palm comes at the cost of natural capital and its respective ecosystem services leading to greenhouse gas emissions, loss of carbon sequestration, and loss of biodiversity (Setiawan et al., 2016; Vijay et al., 2016; Austin et al., 2017, Miettinen et al., 2012; Linder and Palkovitz, 2016).

These sources of natural capital face further risk, as the Indonesian government has set an increased productivity target with incentives to support the private sector in expanding and accessing plantations in the hopes of supporting Indonesia's economic growth. Simultaneously, Indonesia has agreed to reduce its carbon emissions through the strengthening of legal instruments for environmental protection and management, contradicting their productivity target (Purnomo et al, 2020; Government of Indonesia, 2016). Furthermore, there are currently many other domestic and international policies have been implemented in the hopes of mitigating the negative impacts of palm oil, however, these current policies have had marginal impacts on the negative externalities of oil palm plantations (Purnomo et al., 2020; Brandi et al., 2015).

This paper looks at the negative externalities of Indonesian oil palm plantations, more specifically the negative externalities of smallholders. The objective of this paper is to produce a policy instrument to correct the current market failures of oil palm plantations in Indonesia,

while encouraging sustainable and inclusive agricultural growth that benefits the rural poor. The paper proceeds as follows: Section 2 discusses background information regarding oil palm and oil palm plantations in Indonesia as well as the market failures of these plantations, followed by current policies in place which attempt to remedy these market failures in Section 3. Section 4 will then cover my policy recommendations, while section 5 provides a discussion and conclusion.

2. Background

Also known by its binomial nomenclature: *Elaeis guineensis,* oil palm is a species of palm native to West Africa and can be successfully grown and cultivated in tropical areas year-round. Oil palm is a highly efficient producer of vegetable oil, producing more than soybeans, rapeseeds, olives, coconuts, and sunflowers just three to four years after planting with an economic cycle of around 25 years. The oil produced has multiple end-uses, including both edible and nonedible uses such as biodiesel, and contributes to approximately 30% of the world's edible oil production (Lai et al., 2020).

Currently, Indonesia is the dominant producer of oil palm, with 14 million hectares (ha) of plantations and exports valued at 23 billion USD in 2017 and 21 billion USD in 2018 (Purnomo et al., 2020). Along with Malaysia, Indonesia is one of two countries which act as net exporters due to their rainy seasons attributing to growth in mature tree area and higher yield (Lai et al., 2020). Through the cultivation and production of oil palm, Indonesia has undergone the world's largest modern agricultural export expansion. This rapid expansion has led to 2.7% faster poverty reduction as well as a 4% faster consumption growth, while lifting 2.6 million rural Indonesians from poverty and providing 7.8 million laborers throughout the palm oil value chain

(Edwards, 2019). Additionally, oil palm has contributed significantly to global food security, as developing countries have become the major consumers of palm oil with the volume of consumption continuing to expand due to the relatively low price and high degree of substitutability (Lai et al., 2020). Although oil palm is the most efficient source of vegetable oil, its rapid expansion has led to a tradeoff between economic development and environmental conservation.

The market failures of oil palms include rent dissipation through the loss of ecosystem services provided by tropical forests. The negative externalities and public goods lost relating to land use changes of tropical forests and peatlands to plantations and smallholdings include losses of biodiversity, greenhouse gas emissions, loss of carbon stocks, water pollution, forest fires and related respiratory diseases, and displacement of indigenous people and the rural poor (Linder and Palkovitz., 2016; Miettninen et al., 2012; Vijay et al., 2016; Setiawan et al., 2016; Austin et al., 2017).

Furthermore, the issue is not related to the oil palm itself, rather the crop's establishment and cultivation. Smallholders contribute significantly to the production of oil palm, cultivating more than 40% of the total oil palm plantation area and significantly contributing to the deforestation linked to oil palm (Figure 2). As a result of asymmetric information regarding agricultural management and barriers to access to technology, smallholders utilize inefficient land use practices, relying on land expansion to increase output which has resulted in expansion rates exceeding those of large companies (Lee et al., 2014; Nurfatriani et al., 2019). As of 2018, smallholders have illegally expanded into state forestlands, making up 68% of the 2.5 million ha of illegal oil palm plantations (Nurfatriani et al, 2019).

3. Current Policies

The sustainability of oil palm plantations has received great attention both domestically and abroad. This has led to the current policies in place which address socioenvironmental issues associated with the oil palm industry. In response to the sustainability concerns of oil palm, the Roundtable Sustainable Palm Oil (RSPO) was formed in 2004 as the standard for sustainability within the industry. As a transnational private governance mechanism, the RSPO set environmental and social criteria for companies to produce Certified Sustainable Palm Oil (CSPO). The goal of these criteria is to minimize the negative impact of palm oil cultivation on the environment and communities in palm oil producing areas (Lai et al., 2020). However, the effectiveness of these certifications has been called into question including issues surrounding pro-industry bias, poor financial compensation, lack of monitoring and enforcement, and barriers to entry for smallholders which contribute to the lack of effectiveness of the CPSO (Ruysschaert and Salles, 2014; Nagia and Azmi, 2013).

Domestically, Indonesia responded to the RSPO and international criticism by forming the Indonesian Sustainable Palm Oil (ISPO) in 2011 as a mandatory sustainability standard which acts as guidance for sustainable palm oil development as well as a commitment to the implementation of various relevant laws and regulations. This standard has also met scrutiny, as it contains tension within itself making it internally incoherent and ambiguous while failing to protect secondary forests and indigenous lands. This lack of coherence and ambiguity has led to low levels of acceptance of the ISPO in international markets (Hidayat et al., 2018).

Another domestic policy issued by the Indonesian President is a moratorium on new forest clearance for activities such as palm plantations. This moratorium was first implemented in 2011 to protect 69 million ha of forestland to reduce emissions from fires caused by

deforestations and has been intermittently activated to postpone the issuance of new licenses on primary forests and peat lands (Nurfatriani et al, 2019). Recently, it has been made permanent in 2019 with a decreased protected area. These decreases in area have been met with scrutiny, along with the issues of lack of law enforcement in the protected areas. Furthermore, the impacts of this policy have been spatially heterogenous, with areas such as Sumatra suffering the greatest economic losses due to the area's dependence on palm oil (Yusuf et al., 2018).

Other actions against oil palm have been taken internationally. In 2017, the European Parliament issued a resolution to restrict the ability of EU countries to count palm oil-based biodiesel imports toward their renewable 2030 energy targets. Due to the EU only banning biodiesel, the predicted impacts of the adoption of this ban would be marginal, as shown by a simulation completed by Purnomo et al. (2019) (Figure 3). However, the economic and environmental impacts would be more profound if these sustainability concerns also affect other import regions and trigger a similar decline in import demand in other markets (Purnomo et al., 2019).

4. Policy Recommendation

The policy proposed is a Pigouvian tax on the loss of carbon sequestration in order to internalize the externality. Although multiple externalities occur from deforestation, many of these impacts are difficult to quantify. One that has been quantified is the loss of carbon sequestration potential as a result of land-use changes. A 2020 paper from Besar et al. estimates that converting one hectare of rainforest to an oil palm plantation will result in around a 2.1 megagram per hectare per year (Mg ha^{-1} yr^{-1}) decrease in carbon sequestration, which is equivalent to 2.1 metric tons. We suggest the tax rate to be equivalent to the average social cost

of carbon at a 5% discount rate calculated by the United States Government's Interagency Working Group (2021) (Figure 4), or $29.40 USD per hectare per year (ha^{-1} yr^{-1}), to disincentive further expansions to avoid higher taxes. The utilization of any lower discount rate would result in a tax that would result in a net loss for smallholders using inefficient land use practices.

An issue that may arise with this tax is a disproportionate impact on independent smallholders, as independent smallholders produce 13.1 metric tons of fresh fruit bunches per hectare per year (MT FFB ha^{-1} yr^{-1}), or 1.5 MT FFB ha^{-1} yr^{-1} less than smallholders contracted to a plantation company (Molenaar et al., 2013). To offset this, revenue generated by the tax should go towards subsidies for smallholders to gain access to more productive inputs and education. As of 2019, Indonesia holds around 14.6 million hectare of oil palm plantations (Purnomo et al., 2020). With a tax rate of $29.40 USD per hectare per year, this tax will generate around $429 million of government revenue annually. A 2016 cost analysis by the Rainforest Alliance found that smallholder palm oil producers can improve both quality and quantity of production through the implementation of best management practices and through renovations of inputs which cost $132.00 per hectare per year and $155.40 per hectare per year, respectively. These best management practices include the costs of more efficient seedlings, fertilizers, and replating. Adjusting for inflation, the cost of implementing best management practices becomes $144.65 while renovation costs become $170.30. By transferring the entire government revenue towards a subsidy promoting these best management practices and renovations, the Indonesian government can improve the output of 1,362,121 ha a year for smallholders. Furthermore, the study by the Rainforest Alliance found that the utilization of best management practices can result in increases in income of up to $1,380 USD per hectare.

5. Discussion and Conclusion

Over the last five decades, the world's population has more than doubled. This population growth, as well as growth in per capita income, has resulted in an unprecedented increase in global food demand. To meet this growing food demand, agricultural production expanded mainly in low- and middle-income countries such as Brazil, China, and Indonesia through agricultural intensification and agricultural expansion into native vegetation. From 1961 to 2011, today's high-income countries' global shares of agricultural output have decreased from 43.8% to 24.6% while the shares of all other regions have increased (Alston and Pardey, 2014). The increase in agricultural production of these low- and middle-income countries has helped to reduce rural poverty and increase global food security, but it also played a major role for global biodiversity loss and greenhouse gas emissions (Alston and Pardey, 2015; Edwards, 2019; Ramankutty et al., 2018; Setiawan et al., 2016; Vijay et al., 2016; Austin et al., 2017, Miettinen et al., 2012; Linder and Palkovitz, 2016).

Due to its high yields of vegetable oil, oil palm is a promising source of fat, contributing significantly towards global food security (Lai et al., 2020). By virtue of its tropical climate, Indonesia has capitalized on this crop by becoming the world's leading producer, allowing for economic growth and poverty reduction at the cost of environmental degradation (Purnomo et al., 2020; Vijay et al., 2016; Austin et al., 2017, Miettinen et al., 2012; Linder and Palkovitz, 2016). However, with the sustainability of oil palm plantations receiving attention both domestically and abroad, policies to counteract these negative externalities have been introduced with marginal impact. The Pigouvian tax on the loss of carbon sequestration and a subsequent subsidy presented in this paper looks to increase productivity of plantations while limiting

further deforestation to allow further economic growth while encouraging sustainable and inclusive agricultural growth that benefits the rural poor.

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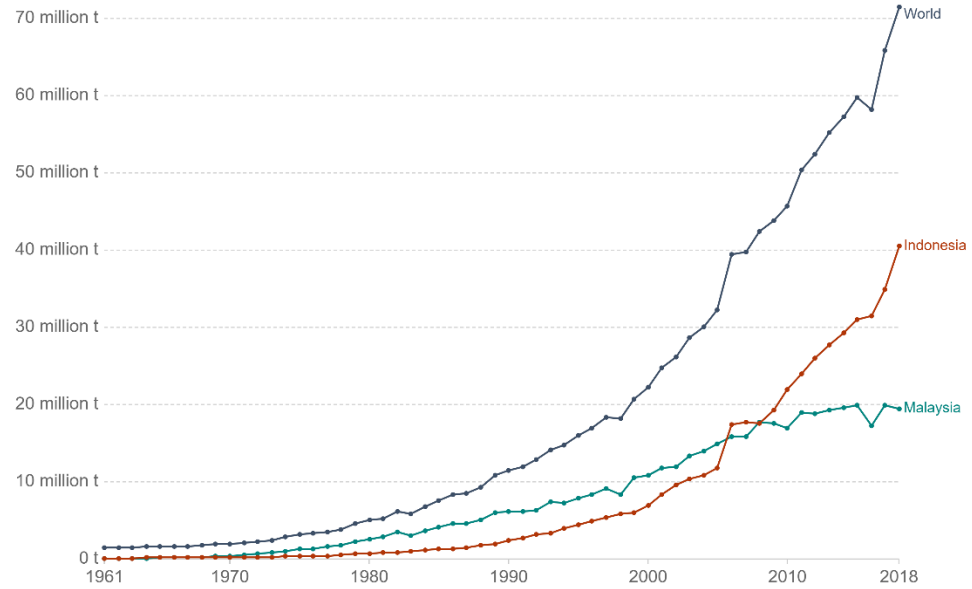
7. Appendix

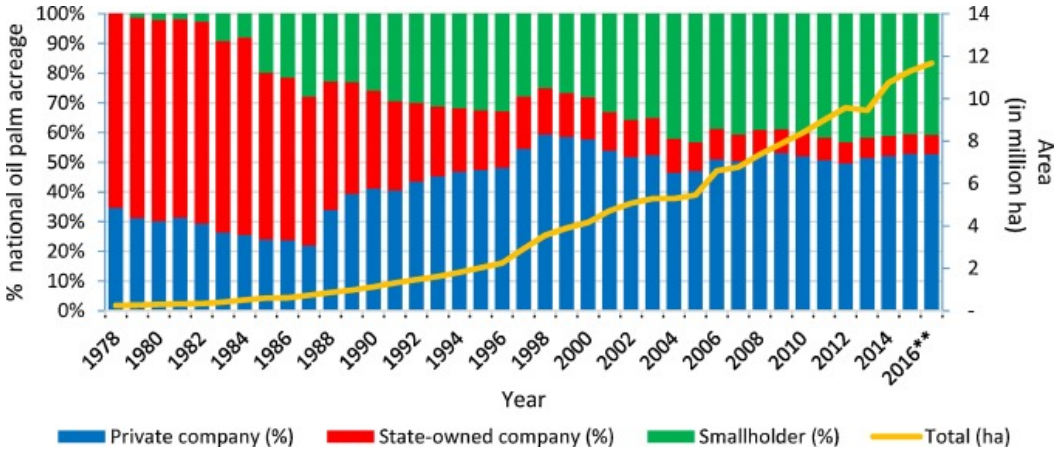
Figure 1: Oil palm crop production, metric tons



Source: UN Food and Agriculture Organization

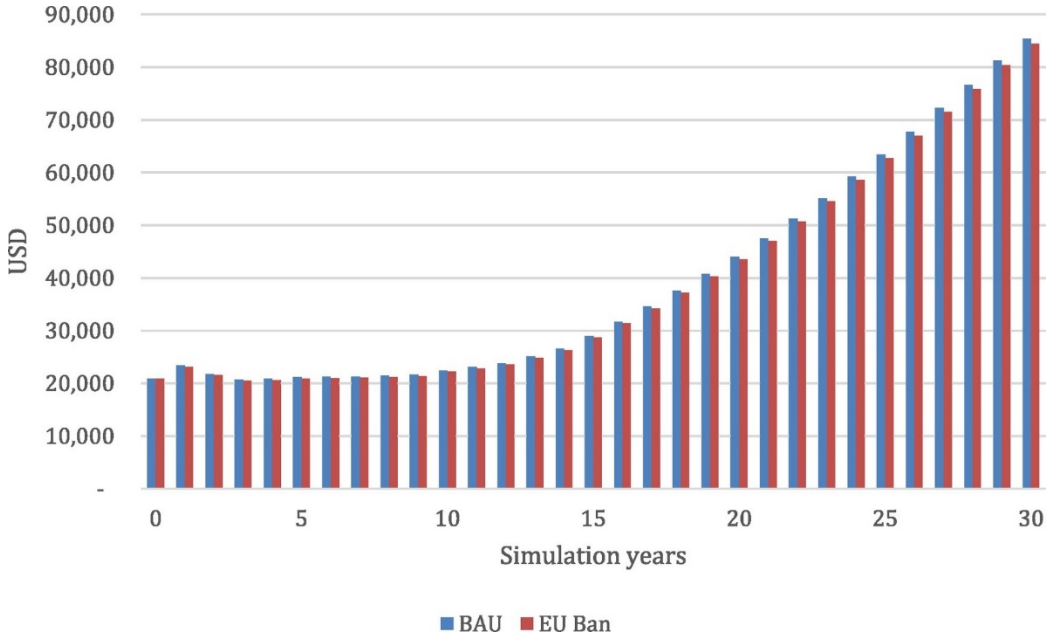
Collected: https://ourworldindata.org/palm-oil

Figure 2: Indonesia's oil palm production, by actor type (1978-2016)



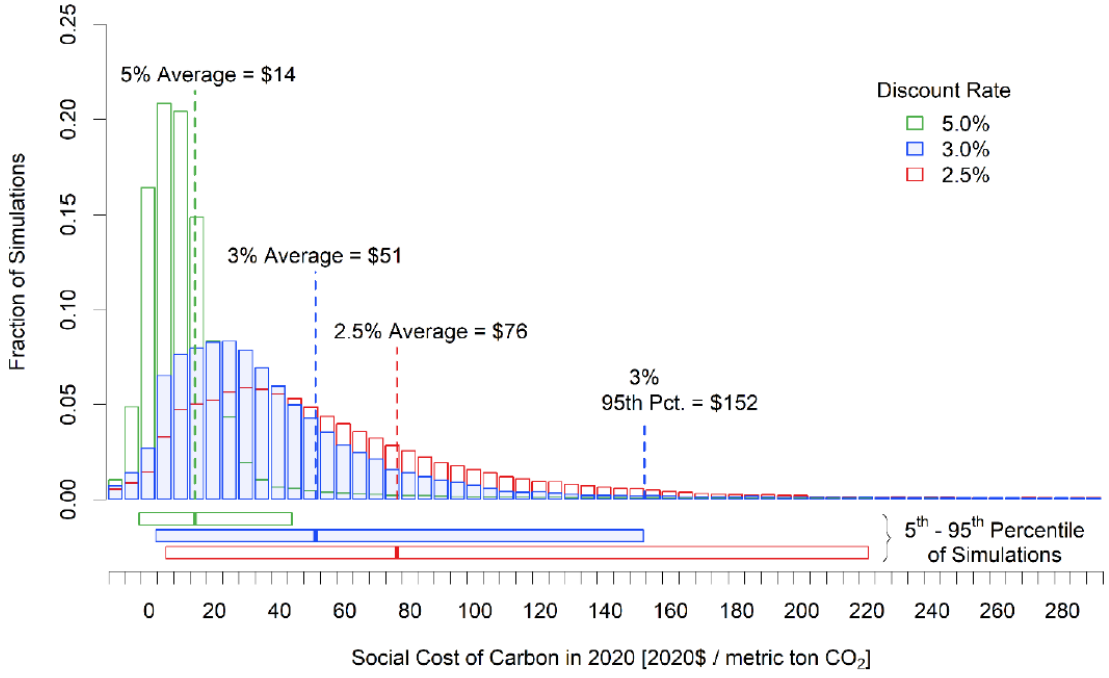
Source: Jelsma et al. (2017)

Figure 3: Effect of EU ban on palm oil-based biodiesel export to total export value



Source: Purnomo et al. (2020)

Figure 4: Frequency Distribution of SC-CO^2 Estimates for 2020



Source: Interagency Working Group on Social Cost of Greenhouse Gases, United States Government (2021)