European Union Resolution and The Profitability: The Role of Size, Difference-In-Differences Analysis

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Abstract

In this study, we examined the impact of the EU Resolution policy on the profitability of palm oil companies in Indonesia and Malaysia (The two biggest palm oil producers). We develop and estimate difference-in-differences regression model using annual data from 61 listed companies from the year 2014 to the year 2022 with a total of 549 observations. We found that the size of companies in the palm oil industry is a key factor in maintaining profitability in the event of EU Resolution implementation. Not only have larger companies managed to avoid losses from EU resolution; but they even can improve their profitability. The result is robust after a set of tests involving alternative proxies and propensity score matching. We offered a plausible explanation related to the role of size and opened future avenues for further investigation.

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Abstrak

Dalam penelitian ini, kami menguji dampak kebijakan Resolusi Uni Eropa terhadap profitabilitas perusahaan kelapa sawit di Indonesia dan Malaysia (dua negara produsen kelapa sawit terbesar). Kami mengembangkan dan mengestimasi model regresi difference-in-differences dengan menggunakan data tahunan dari 61 perusahaan yang terdaftar di Bursa Efek Indonesia dari tahun 2014 sampai dengan tahun 2022 dengan total 549 observasi. Kami menemukan bahwa ukuran perusahaan dalam industri kelapa sawit merupakan faktor kunci dalam mempertahankan profitabilitas pada saat implementasi Resolusi Uni Eropa. Perusahaan-perusahaan yang lebih besar tidak hanya berhasil menghindari kerugian dari resolusi Uni Eropa, tetapi mereka bahkan dapat meningkatkan profitabilitas mereka. Hasil ini terbukti kuat setelah dilakukan serangkaian pengujian yang melibatkan proksi alternatif dan pencocokan skor kecenderungan. Kami menawarkan penjelasan yang masuk akal terkait dengan peran ukuran dan membuka jalan di masa depan untuk penyelidikan lebih lanjut.

I. INTRODUCTION

2017 [1], The European Union (EU) by Parliament's issued resolution on palm oil and deforestation poses a significant challenge to Indonesian palm oil products entering the EU market, particularly those used for biodiesel in several member countries [2]. As the world's leading CPO producers, Indonesia and Malaysia consider the issuance of the European parliamentary resolution on Palm oil and rainforest deforestation as a form of product discrimination, and at the same time, they recommend products produced from European countries, namely rapeseed, and sunflower that been extensively cultivating. The EU aims to reduce palm oil use in biofuels on sustaining European market access, preserving exports, and promoting sustainability due to concerns about its environmental impact, and diplomacy, recognizing the issue's crucial including deforestation, habitat degradation, significance to Indonesia's national welfare [4, 5, corruption, child exploitation, and human rights 6, 7, 8]. Responding to the EU resolution, violations. been small impact to the palm oil consumption, In shifting market to the non-participating country, including domestic consumption in Indoneisa [3]. The palm oil industries in Indonesia and Malaysia confront substantial challenges including foreign negative campaigns and discriminatory policies, notably within the EU.

The governments of palm oil-producing countries are encouraging companies to meet market standards and expectations in the EU market through various strategies. Indonesia is employing diverse strategies to mitigate the EU Resolution's impact on palm oil trade, focusing has

Consequently, the resolution prohibits palm oil imports. European restrictions on high-deforestation palm oil since 2000 have companies adopted certifications such as RSPO, ISPO, and MSPO to meet environmental standards, sustain exports, and meet demand by reliance on palm oil and address environmental concerns. Table 1. below illustrates the fluctuations in prices pre- and post-EU [9, 10, 11]. Firm size has their advantages and challenges in adapting to changing times, the scale of the organization often shapes its approach to innovation, market presence, adaptability, and resilience in the face of evolving challenges. Firm size has a positive correlation with the environmental, economic, and social performance, excluding operational performance, while certified EMS within UAE firms positively influences all four performance dimensions, with no observed relationship between firm age and any performance outcomes [12]. Kunene & Chung, [13] large companies gained a strategic advantage by proactively embracing international sustainability measures.

Technology is driving improvements in agriculture and processes across various research areas, ensuring sustainable industry development with advancements in biotechnology, milling innovation, biomass, bioenergy, and eco-friendly oleochemicals [8]. Indonesia capitalizes on CPO export opportunities by meeting stringent product specifications set by importing nations, complying with standards like Roundtable Sustainable Palm Oil (RSPO) and Hazard Analysis and Critical Control Points (HACCP) certifications, ensuring safety and consumer protection [14]. The research study aimed to obtain empirical evidence that palm oil companies are capable to survive and adapt the ban on CPO exports to the European Union. Five factors that influence CPO price, are:

1. Supply & demand
2. Prices of competing for vegetable oil (especially soybeans)
3. Weather conditions
4. Import policies of importing countries
5. Changes in taxation and export-import duties

The EU resolution targets reducing or halting the use of palm oil in biodiesel due to concerns over deforestation, habitat degradation, corruption, child exploitation, and human rights violations associated with its production. This measure urges producing countries and importers to monitor and restrict unsustainable palm oil imports, advocating for sustainable certification systems surpassing existing standards. Additionally, the resolution suggests promoting domestically produced oils like canola and sunflower seeds within EU countries to mitigate

resolution; despite adjustments in 2018 and 2019, there was a gradual improvement in the following years.

Table 1.
http://www.worldbank.org/commodities

Note: CPO & PKO global market prices in the year 2017-2022

Table 2 and table 3 show information of palm oil product exports, particularly focusing on the values and quantities of CPO and PKO in Indonesia and Malaysia. These tables intricately capture the export dynamics, outlining the changes observed in the industry before and after the enforcement of the EU rule. They provide a holistic view of how the market values and volumes of these specific palm oil derivatives fluctuated or stabilized in response to the policy's implementation, aiding in understanding the policy's impact on the global export scenario of these products.

Table 2. *Central Bureau of Statistics*

Year	Crude Palm Oil		Palm Kernel Oil	
	Volume (Ton)	Value (000 US$)	Volume (Ton)	Value (000 US$)
2014	22.892.387	17.464.905	1.479.624	1.540.408
2015	26.467.564	15.385.275	1.809.307	1.557.820
2016	22.761.814	14.366.754	1.574.489	1.908.942
2017	27.353.714	18.513.463	1.781.465	2.289.246
2018	27.898.875	16.530.213	1.791.774	1.776.618
2019	28.279.350	14.716.275	1.953.204	1.320.454
2020	25.935.554	17.364.144	1.712.047	1.365.284
2021	25.635.068	26.766.373	1.432.277	1.963.082

Note: CPO & PKO Volume and Export Value of Indonesia in the year 2014-2021

Table 3. *MPOB, Department of Statistics, Malaysia*

Year	Crude Palm Oil		Palm Kernel Oil	
	Volume (Ton)	Value (000 RM)	Volume (Ton)	Value (000 RM)
2014	17.306.247	44.498	1.116.697	4.203
2015	17.454.213	41.258	1.066.694	4.080
2016	16.045.957	41.443	923.097	5.096
2017	16.559.957	46.125	967.465	5.774
2018	16.487.556	38.655	922.428	4.093
2019	18.471.065	38.027	1.086.254	3.306
2020	17.395.072	45.656	1.219.739	4.151
2021	15.566.256	64.615	1.076.732	6.668

Note: CPO & PKO Volume and Export Value of Indonesia in the year 2014-2021

II. METHOD

This study, spanning from 2014 to 2022, utilizes a population of profitability ratio and sales growth variables drawn from 61 emitters' annual reports engaged in oil palm plantations, focusing on companies listed in the Indonesia Stock Exchange and Bursa Malaysia. With a sample size of 549 samples, the research examines the impact of the European Parliament's 2017 resolution on palm oil and deforestation on the profitability and sales growth of these companies, representing over 50% of the total export value of all CPO-producing nations (see Table 5).

In this study, we employed the Difference-in-Difference method developed by [19]. Difference- in-differences (DID) is one way to estimate the effects of new policies. Based on a combination of before-after and treatment-control group comparisons, this method possesses intuitive appeal and has found widespread application in economics, public policy, health research, management, and other fields [20]. To use DID, we need observed outcomes of people who were exposed to the intervention (treated) and people not exposed to the intervention (control), both before and after the intervention.

Table 4. *Detailed sample description by Company Name and Country*

Indonesia		Malaysia	
No	Company Name	No	Company Name
1	Astra Agro Lestari Tbk	1	Bousted Plantation Bhd
2	Andira Agro Tbk	2	Far East Holding Bhd
3	Austindo Nusantara Jaya Tbk	3	Felda Global Venture Bhd
4	Eagle High Plantations Tbk	4	Genting Plantations Bhd
5	Cisadane Sawit Raya Tbk	5	Hap Seng Plantation Bhd
6	Dharma Satya Nusantara Tbk	6	IJM Plantations Bhd
7	Fap Agri Tbk	7	Innoprise Plantations Bhd
8	Golden Plantation Tbk	8	IOI Corp. Bhd
9	Gozco Plantations Tbk	9	Kuala Lumpur Kepong Bhd
10	Jaya Agra Wattie Tbk	10	Pinehill Pacific Berhad
11	PP London Sumatra Indonesia Tbk	11	Sarawak Oil Palm Bhd
12	Multi Agro Gemilang Plantation Tbk	12	Sime Darby Plantation Bhd
13	Mahkota Group Tbk	13	TDM Bhd
14	Provident Agro Tbk	14	United Malacca Bhd
15	Pradiksi Gunatama Tbk	15	Astral Asia Bhd
16	Palma Serasih Tbk	16	Batu Kawan Bhd
17	Pinago Utama Tbk	17	BLD Plantation
18	Sampoerna Agro Tbk	18	Chin Teck Plantation Bhd
19	Salim Ivomas Pratama Tbk	19	Dutaland Bhd
20	Smart Tbk	20	Golden Land Bhd
21	Sawit Sumbermas Sarana Tbk	21	Gopeng Bhd
22	Triputra Agro Persada Tbk	22	Harn Len Corp Bhd
23	Tunas Baru Lampung Tbk	23	Keck Seng (M) Bhd
24	Bakrie Sumatera Plantations Tbk	24	Kim Loong Resources Bhd
		25	Kretam Holdings Bhd
		26	Kwantas Corp. Bhd
		27	MHC Plantations Bhd
		28	Negeri Sembilan Oil Bhd
		29	NPC Resources Bhd
		30	Paos Holding Bhd
		31	Pinehill Pacific Bhd
		32	PLS Plantation Bhd
		33	Rimbunan Sawit Bhd
		34	Sin Heng Chan Bhd
		35	TH Plantation Bhd
		36	TSH Resources Bhd
		37	United Plantations Bhd
Total : 216		Total : 333	

We employ panel data comprising a total of 549 observations from various companies spanning the period between 2014 and 2022. The sample comprises 216 companies from Indonesia and 333 companies from Malaysia. We segment the Before-After period into two distinct periods of dummy event: 2014-2017 = 0, the period before the EU Resolution policy, and 2018-2022 = 1, signifying the period after the implementation of the EU Resolution policy. We conducted separate tests to determine the ability of palm oil plantation companies in exporting countries to navigate the ban on CPO product exports to Europe, evaluating their resilience and potential for achieving financial profitability. The DID regressions can be stated as follows:

$$= + \_ + + \times \_ \times + + + + +$$

In this context, Return on Equity (ROE) serves as the outcome variable, SIZE as the treatment variable, and D_EURES as the treatment period classification (before and after); these constitute the Difference-in-Difference (DID) variables. Sales Growth, Leverage, Company name (Comp), and Year make up the control covariates vector. In order to confirm the robustness of our initial results, we utilize multiple approaches. First, we replace ROE with PM as the outcome proxy, followed by substituting Size with EQ for the control variable. Meanwhile, the control covariates remain unchanged. The last for the robustness test, by the inverse propensity score estimated selecting samples by considering the similarity of covariates. A detailed description of the DID variables and control covariates can be found in Table 5.

Table 5. *Detailed description of the DID variables and control covariates*

No.	Variable Name	Measurement
1.	Return on Equity (ROE)	Net income divided by total equity to measure the return to the stockholders.
2.	D_EURES	Dummy event data; =1 after European Union Resolution is enforced; zero otherwize. The Parliament of the European Union issued a resolution on palm oil in April 2017.
3.	Size (SZ)	Logarithm of total assets of the company, ((log(total assets))
4.	Control Variables	Sales Growth (The achievement of the company's operational activities during the previous period is used as a forecast for future growth); Leverage (Dividing a company's total amount of debt by the company's total amount of assets); Profit Margin (The profit margin ratio determines what percentage of a company's sales consists of gross income); Equity (the solvency ratio that helps measure the value of the assets financed using the owner's equity); Company Name (Comp); Period (Year).

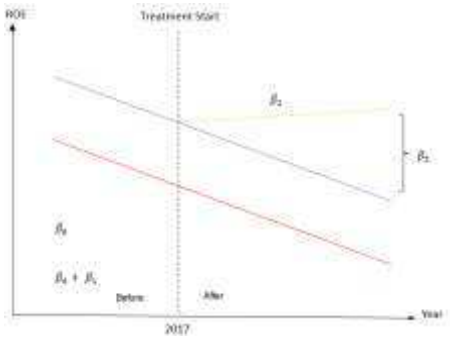

Figure 1. *DID Modification Scheme*

In Figure 1, the y-axis represents the Return on Equity (ROE) outcomes following a period denoted as D_Eures on the x-axis. The term β_0+ *represents the baseline average and time trend (D_Eures) in the control group. The blue dashed lines and red lines on the graph depict the observed outcomes of the Treatment and Control groups, respectively, at the baseline of the company size (*β_2*). The measurement was conducted by assessing the difference in outcomes before and after treatment for the treatment group. This difference is illustrated by the yellow line and the blue dashed line. The yellow dashed line indicates the assumed trajectory for large-sized companies adapting to the enforcement of the EU ruling. The impact of the European Union (EU) ruling was estimated as*

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III. RESULT AND DISCUSSION

The study was carried out with the purpose of exploring the research issue, aiming to analyze the effect of European Union (EU) policy on the profitability of palm oil companies. Exploring whether palm oil companies can endure the European ban on CPO product exports and analyzing their strategies for profit generation amidst the stringent prohibition.

1. Descriptive Statistic and Pairwise Correlation

The study's descriptive statistics are presen- ted in Table 7. After applying winsorization, with cut off 5 and 95 percentille we have confirmed that the analyzed variables exhibit appropriate behavior and validity. At the outset of our analysis, we undertake a descriptive evaluation, aiming to uncover any unusual data traits that might have the potential to impact the subsequent analysis, with a particular emphasis on the DID regression. Table 8 illustrates that there are no significant correlations among the variables employed in the study (all values are below 0.5 in absolute magnitude).

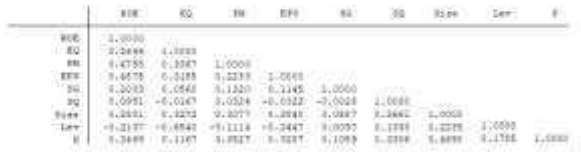
Table 6. *Descriptive Statistic*

stats	ROE	DS	PM	EPS	SG	SQ	Size	Lev	a
mean	9.257458	54.9696	30.15877	339.8884	18.54407	113749	21.65168	.4036168	6824.477
p50	9.09	53.78677	33.63627	61.29	5.871	0	22.31007	.4446477	7035
sd	11.34993	24.85257	35.06142	702.2951	35.68243	1999427	5.269999	.214052	4283.588
min	-24.66	0	-8.4533	-441.9238	-33.917	0	11.58481	.0272769	0
max	25.5	94.27103	83.60892	2428.722	71.6201	6972166.5	24.85655	.7638762	15032.27
p5	-24.66	0	-8.4533	-441.9238	-33.917	0	11.58481	.0272769	0
p95	25.5	94.27103	83.60892	2428.722	71.6201	6972166.5	24.85655	.7638762	15032.27
N	549	549	549	549	549	549	549	549	549

This table presents the descriptive statistics of variables in the study, including the mean, median (50th percentile), standard deviation, minimum, maximum, and 5th and 95th

percentiles. The statistics are calculated for the 549 samples.

Table 7. *Pairwise Correlation*



This table presents basic bivariate correlation statistics among the variables utilized in the study, with the correlation metrics calculated across the entire sample dataset. The correlations are represented in a half- triangle matrix format.

2. DID Regression & Robustness

Employing a DID regression model that includes ROE and PM as the outcome variable, proxied by company Size, EQ and D_Eures during the Before-After period, alongside covariates (SG, Lev, P, and Year), our objective is to examine the company's capacity to respond to the ban on CPO exports to Europe. The results (see Table 9) of the test indicate that companies Size positively respond to the ban on CPO exports, with a DID value of 0.579 and a P value of 0.030 (significant at the 5% level). Our finding supports our hypothesis as outlined by [12] found that larger firms can use and implement more resources and renewable energy supply chain management practices and therefore gain more performance improve- ments than small firms.

Table 8. *Difference-in-Difference Regression*

Outcome var.	ROE	P>t
Baseline		
Control	-2.10E+03	
Treated	-2.10E+03	
Diff (T-C)	0.899	0.000***
Follow-up		
Control	-2.10E+03	
Treated	-2.10E+03	
Diff (T-C)	1.478	0.000***
Diff-in-Diff	0.579	0.030**
Diff (T-C)	0.305	0.000***
Diff-in-Diff	-0.053	0.31

Control Covariate SG, Lev, Comp and Year R-square: 0.22
** Means and Standard Errors are estimated by linear regression*
***Inference: *** p<0.01; ** p<0.05; * p<0.1.*

Robustness testing by analyzing the company's capital structure showed non-significant results with a P value of 0.310 (significant at the 5% and 10% levels), further reinforcing the finding that the company is able to adapt to the impact of the EU's CPO export ban policy (see robustness check Table 9).

Table 9. *Robustness Check: Alternative Outcome and Treatment Proxies*

Outcome var.	PM	P>t
Baseline		
Control	-4.05E+02	
Treated	-4.05E+02	
Diff (T-C)	0.358	0.000***
Follow-up		
Control	-4.07E+02	
Treated	-4.07E+02	

Control Covariate SG, Lev, Comp and Year R-square: 0.19
** Means and Standard Errors are estimated by linear regression*
***Inference: *** p<0.01; ** p<0.05; * p<0.1*

We applied the Propensity Score test as the final robustness assessment in our study (see table 10). While maintaining a focus on ROE proxied against Size, D_Eures, and the covariate variables SG and Lev for impact testing during the Before-After period, the DID regression test results revealed a P value of 0.039 (significant at the 5% level). This indicates that palm oil plantation companies are capable of sustaining their financial performance despite the ban on CPO exports to Europe.

Table 10. *Propensity Score Matching*

Treatment-effects estimation					Number of obs	=
549 Estimator	: propensity-score matching				Matches: requested	=
1						
Outcome model	: matching				min	=
1						
Treatment model	: logit				max	= 17
		AI Robust				
ROE	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_EURES						
(1 vs 0)	-2.12229	1.02817	-2.06	0.039	-4.13747	-0.1071157

The correlation between company size and sustained profitability amid the implementation of the EU Resolution within the palm oil industry stands as a critical determinant. Our comprehensive analysis discerned that larger companies not only adeptly sidestepped losses attributed to the EU Resolution but remarkably amplified their profitability in the face of this regulatory shift. These findings, substantiated by rigorous testing encompassing alternative proxies and propensity score matching, fortify the assertion of size as a pivotal factor in financial resilience.

IV. CONCLUSION AND SUGGESTION

A. Conclusion

In this study, we conducted tests to ascertain the confidence level regarding the impact of the issuance of the EU Resolution illuminates prospective avenues for further exploration. The dynamics between company size, operational agility, and market responsiveness present fertile ground for deeper investigations. Exploring how larger entities leverage their resources, establish resilient market especially explore new market and diversity of products, navigate regulatory sustainability certifications could shed more light on the market acceptance especially to EU countries influencing profitability during regulatory upheavals, and effectiveness of negotiation and lobbying with either the EU agencies and domestic agencies. This endeavour holds promise in uncovering nuanced strategies that drive sustainability, foster growth, and insulate companies against regulatory fluctuations within the palm oil industry.

This study has benefit for companies in navigating market dynamics, complying with regulations, diversifying, especially within the EU for enhanced profitability during changes, emphasizing effective negotiation for sustainability, and keep growth. For the government, understand the complexities of the palm oil sector, offering insights on company strategies and market navigation, aiding policymakers in crafting better regulations for policy on the profitability of palm oil companies in the world's largest palm oil exporting countries during the period from 2014 to 2022, when the policy was issued on April 14, 2017. We employed a DID regression testing model and implemented robust tests involving various alternative proxies and propensity score matching. The findings of this study indicate that the size of companies in the palm oil industry is able to survive and maintain profitability despite the ban on CPO exports to Europe, with a DID value of 0.579 and a P value of 0.030 (significant at the 5% level).

The resilience of larger entities amid regulatory transitions can be attributed to multifaceted advantages. These companies often boast broader resource pools, enabling them to swiftly adapt operational strategies, diversify market outreach, and streamline compliance with evolving sustainability standards. Their robustness in weathering the repercussions of the EU Resolution underscore the pivotal role played by substantial resources, market reach, and adaptability— traits inherently intertwined with larger corporations.

Our analysis not only solidifies the immediate impact of company size but also sustainability and growth, particularly within the EU, while balancing industry expansion and environmental concerns. The limitations of this study are twofold; first, it only considered firm size as control variables. Second, the study was only focused to Indonesia and Malaysia in the palm oil industry, yet many other countries contribute significantly, suggesting future research could explore these unrepresented regions for a broader understanding of global production methods, market behaviors, and sustainability practices.

B. Suggeston

The discussion regarding this research is still very limited and requires a lot of input. The suggestion for future authors is to study it more deeply and comprehensively about European Union Resolution and The Profitability: The Role of Size, Difference-In-Differences Analysis.

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