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Capital Relocation and Regional Inequality: Evidence from Indonesia's New Capital in East Kalimantan

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ABSTRACT

Indonesia's decision to relocate its national capital from Jakarta to Nusantara (IKN) in East Kalimantan has sparked substantial debate over whether this mega-project amplifies or alleviates spatial inequality in the host region. This study examines the causal effect of the capital city relocation on regional inequality by employing a Difference-in-Differences (DiD) approach using panel data from ten districts and cities in East Kalimantan over the period 2015–2024. Penajam Paser Utara and Kutai Kartanegara, the two districts directly hosting the new capital, are treated as the treatment group and compared against the remaining districts as controls, using four outcome variables: the Gini coefficient, GRDP per capita growth, the poverty rate, and the Human Development Index (HDI). The results show that the treated districts experienced meaningful improvements in economic growth and human development following the relocation, indicating that the project has generated tangible local benefits. However, these gains were accompanied by a widening of income inequality, suggesting that the economic momentum generated by relocation has been unevenly distributed, with urban enclaves and construction-related sectors benefiting disproportionately relative to surrounding communities. The parallel-trends assumption underlying the DiD identification strategy is confirmed, supporting the credibility of the causal estimates. These findings underscore the need for more equitable spatial development planning to ensure that the benefits of IKN's development are shared more broadly across the host region.

Keywords: Capital City Relocation, Difference-in-Differences, East Kalimantan; IKN Nusantara, Regional Inequality

JEL Classification: O18, H54, R11, R12, R58

INTRODUCTION

The relocation of the national capital is a monumental policy that has long-term development consequences, especially for the host region. In 2019, the Government of Indonesia officially announced a plan to move the capital city from Jakarta to the archipelago, which is located in the North Penajam Paser Regency and Kutai Kartanegara Regency area, East Kalimantan Province. This decision was confirmed through Law Number 3 of 2022 concerning the National Capital, which marks the beginning of the era of large-scale infrastructure development in East Kalimantan (UU RI Nomor 3 Tahun 2022). Investment worth around Rp 466 trillion is projected to flow over a period of several decades, including the development of urban infrastructure, government buildings, residential areas, and public facilities, consistent with the broader empirical evidence that investment and road/telecommunications infrastructure are significant drivers of provincial economic growth in Indonesia (Kurniawan & Ihsan, 2021).

From a regional economic perspective, the relocation of the capital has the potential to be a significant development catalyst for East Kalimantan. However, the fundamental question that arises is: are the economic benefits of moving the capital equally among all districts/cities in East Kalimantan, or are they concentrated in certain areas so as to exacerbate regional inequality? Agglomeration theory (Krugman, 1991; Fujita & Thisse, 2010) predicts that massive investment in a single location tends to create a strong multiplier effect locally, but can also result in a backwash effect on suburban areas through the migration of skilled labor and capital flows leaving the area. More recent cross-national evidence corroborates this pattern as arguments by Bathelt., et al (2024) show that inter-regional inequality continues to be driven by the uneven geography of connectivity, skilled labor, and investment, with well-connected urban centers pulling ahead of surrounding regions even as aggregate national income rises.

East Kalimantan has distinctive economic characteristics, namely high dependence on the coal and petroleum mining sectors. This condition is reflected in the significant disparity in GDP per capita between districts/cities, where Bontang City and East Kutai Regency, as industrial centers, have GDP per capita far above the provincial average, while Mahakam Ulu and Paser Regencies are relatively lagging. In the context of this pre-existing disparity, the relocation of the capital has the potential to exacerbate or alleviate inequality, depending on policy design and the distribution of development benefits.

A review of the literature shows that empirical studies on the impact of capital relocation on regional inequality are still very limited. Most of the existing research focuses on macroeconomic impacts in aggregate or using qualitative and descriptive approaches. Several international comparative studies, such as those conducted by Auerbach., et al (2021) regarding the relocation of the Brazilian capital to Brasília, and Mayer & Trevien (2017) regarding the impact of public infrastructure on inequality, provide a relevant conceptual framework. A study by Frick & Pose (2023) found that large-scale infrastructure development tends to magnify inequality in the short term before its redistributive effects are felt. In Indonesia, Nugroho & Hidayat (2024) analyze the impact of infrastructure development on East Kalimantan's economic growth but does not specifically test aspects of regional inequality using causal methods. Priambodo (2025) noted an increase in land prices and labor migration to the IKN area, but without systematic DiD estimates.

A broader review of the literature suggests that most existing studies on Indonesia's capital relocation, as well as on comparable international cases, rely predominantly on descriptive, qualitative, or simulation-based approaches rather than quasi-experimental causal identification. For instance, quantitative assessments of the Nusantara IKN project have generally relied on ex-ante simulation rather than ex-post causal estimation. Yusuf., et al (2023) modeled the relocation's regional economic transition using a computable general equilibrium framework rather than a treatment-control comparison. Studies that draw on subnational field data, such as Sjaf., et al (2025), who documented spatial inequality across villages in the IKN supporting region of Penajam Paser Utara, adopt descriptive rather than causal designs and do not explicitly separate treatment and control areas.

This pattern is consistent with the broader comparative literature on capital relocation. Studies of Putrajaya's socio-economic transformation (Moser, 2010; Trianto, 2019) and of Abuja's spatial and economic development (Obiadi et al., 2019) similarly rely on descriptive, historical, or case-study methods rather than counterfactual estimation, as do comparative reviews spanning Brasília, Naypyidaw, and other relocated capitals. Insofar as the authors are aware, causal identification approaches to capital or government-seat relocation remain more established outside Indonesia than within it, Shu., et al (2024), for example, employ a multi-period DiD design to examine the effect of China's government seat relocation policy on regional development disparities. However, even within this smaller body of quasi-experimental work, the approach has not yet been extended to the IKN case, nor combined with a multidimensional welfare framework.

Building on this body of work, the research gaps addressed in this study can be summarized in three main dimensions. First, causal DiD estimation at the district/city level remains uncommon. Second, the majority of existing studies do not explicitly distinguish between districts/cities that are directly affected (treatment) and those that are not directly affected (control) within East Kalimantan Province, so that impact estimates remain average and do not reflect spatial heterogeneity. Third, the existing literature has generally not integrated simultaneous analysis of multiple welfare dimensions, economic growth (GRDP per capita), income distribution inequality (Gini), poverty, and human development (HDI), within one coherent analytical framework.

Based on the above description, the objectives of this study are: (1) to estimate the causal impact of the relocation of the capital city on income distribution inequality in East Kalimantan using the DiD method; (2) analyze the heterogeneity of the impact on GDP per capita, poverty rate, and HDI; and (3) provide policy recommendations to encourage the development of IKN with spatial justice.

METHODS

Difference-in-Differences (DiD) is an econometric and statistical method to evaluate the causal impact of a policy or intervention. This method compares changes in outcomes between the policy-affected groups (treatment) and those not affected by the policy (controls) before and after the intervention is implemented (Baker et al., 2025).

The data in the study were sourced from the Central Statistics Agency (BPS) of East Kalimantan Province and the BPS Regency/City. The outcome variables used include: (1) the Gini coefficient of the district/city; (2) the natural logarithm of GDP per capita based on constant prices 2010; (3) poverty rate (percentage of poor population); and (4) Human Development Index (HDI). Control variables include population density, proportion of labor in the primary sector, investment realization (PMDN and PMA), and the ratio of local government expenditure to GDP.

The determination of treatment and control groups in this study is based on geographical proximity and the level of direct involvement in the development of the Nusantara Capital City (IKN). The core treatment group (Treat_i = 1) consists of North Penajam Paser Regency (PPU) and Kutai Kartanegara Regency (Kukar), some of which are directly located in the IKN. Balikpapan City is treated differently from the two regions given its status as the main buffer city that receives investment overflow, labor mobility, and supporting economic activities, but is not a core location for development. To avoid the bias that arises when this "partial treatment" status is forced into a simple binary variable, this study estimates two models side by side. The baseline model excludes Balikpapan from the estimated sample, so that pure DiD comparisons are only conducted between PPU and Kukar as treatment groups with seven control districts/cities, namely Samarinda, Bontang, East Kutai, West Kutai, Berau, Paser, and Mahakam Ulu. As a complement, the expansion model re-inserts Balikpapan into the sample with its own dummy treatment that interacts with period variables, so that the effect of IKN on the buffer city can be estimated independently and the magnitude compared to the effect on PPU and Kukar. The two models are reported together to show that the results of the study are not sensitive to the way Balikpapan is treated in the treatment design.

Regarding the determination of intervention periods, this study no longer uses a single cut-off point in 2019 but considers that policy announcements and physical realizations of development represent two conceptually different moments. 2019 was maintained as a major cut-off point because it represented an anticipation effect of President Joko Widodo's official announcement of the relocation of the capital in August 2019 triggered an initial response of land price speculation, shifts in investment expectations, and reorientation of local economic activity, long before physical construction began, a pattern commonly found in the literature on large-scale infrastructure projects, where the market responds to policy announcements faster than its physical realization (Ikfina, 2024). However, this study also acknowledges that the intensification of the physical development of the IKN has only really taken place since 2022, marked by the start of the construction of state palaces and basic infrastructure, so that the real effects on employment variables, real sector economic activity, and migration are most likely to be realized only after that point in time. To accommodate these two dynamics empirically while avoiding the impression that the 2019 election is arbitrary, this study complements the standard DiD model with event-study specifications that estimate the treatment coefficient dynamically for each year relative to the base year 2018, so that the anticipatory effects in the 2019–2021 period can be visually and statistically separated from the construction effects that appear in 2022 and after. As an additional analysis, this study also presents a robustness model with an alternative cut-off point in 2022, as well as explicitly controlling for the COVID-19 pandemic period (2020–2021) through dummy years, considering that the period overlaps with the post-announcement window and has the potential to obscure the actual estimate of the IKN effect. The basic DiD model used in this study is as follows (Margaret Warton et al., 2016) :

$$\boldsymbol{Y_{it} = ai + \lambda t + \beta 1\ (treat_i \times post_t) + \gamma X_{it} + \varepsilon_{it}} \qquad \textbf{......................(1)}$$

Description:

Y_{it} = Outcome Variables in Region I in Year T

αi = Region *Fixed Effect*

λt = Time *Fixed Effect*

$treat_t$ = 1 for PPU and Kukar; 0

for seven control districts/cities (Balikpapan was excluded from this sample)

$post_t$ = 1 for t ≥ 2019; 0 for previous

X_{it} = Vector variable control

β1 = main DiD coefficient (the effect of IKN on the core region)

Expansion Model (with Balikpapan as a separate treatment) (Baker et al., 2025):

$$\boldsymbol{Y_{it} = \alpha_i + \lambda_t + \beta_1 \,(treat_i \times post_t) + \beta_2 \,(treat^{BPP} \times post_t) + X_{it} + \varepsilon_{it})} \text{ ....}\mathbf{(2)}$$

Additional details:

$treat^{BPP}$ = 1 for Balikpapan City; 0 for other regions (including PPU/Kukar and control)

β_2 = the coefficient of the special IKN effect on Balikpapan as a buffer city

The sample covers all 9 districts/cities (PPU, Kukar, Balikpapan, and 7 controls). Comparison β_1 and β_2 show the gradation/magnitude of the spatial impact of the IKN is whether the effect on the buffer city is smaller, the same, or even greater than the core area.

Event-Study / Dynamic DiD model (separating anticipatory vs construction effects) (Callaway & Sant'Anna, 2021):

$$\boldsymbol{Y_{it} = \alpha_i + \lambda_t + \sum_{\substack{k=-3 \\ k\neq 1}}^{5} \beta_k \,(treat_i \times 1[t = 2019 + k] + \gamma_{it} + \varepsilon_{it}} \text{.....................}\mathbf{(3)}$$

Description:

k = The distance of the year relative to 2019 (the year of announcement), ranges from k=−3 (in 2016) to k=5 (in 2024)

k = −1 (2018) is used as a base/reference category and excluded from summation according to the event-study standard convention

β_k For K < 0 test pre-trend (whether parallel treatment and control before 2019, validity requirements of *parallel trends assumptions*)

β_k for k = 0,1,2 (year 2019–2021) capturing the anticipatory effect

β_k for k = 3,4,5 (2022–2024) capturing the physical construction/realization effect

Robustness model (alternative cut-off point 2022) (Callaway & Sant'Anna, 2021):

$$\boldsymbol{Y_{it} = \alpha_i + \lambda_t + \beta_1 \left(treat_i \times post_t^{2022}\right) + \delta covid + \gamma_{it} + \varepsilon_{it}} \text{ ....}\mathbf{(4)}$$

$post_t^{2022}$ = 1 for t ≥ 2022; 0 for previous

$covid_t$ = Dummy in 2020–2021 to control pandemic distortions

Causal identification in DiD requires the fulfillment of the assumption of parallel trends, namely that without the relocation of the capital, the trend of changing outcome variables in the treatment and control groups will run parallel. This assumption was empirically tested using an event study specification by estimating the interaction coefficient for each year relative to the baseline year 2018.

In addition to the basic model, this study also uses the Staggered DiD model as developed by Callaway & Sant'Anna (2021) to anticipate potential bias arising from treatment timing heterogeneity. In addition, robustness tests were carried out using the Synthetic Control Method Abadie (2021) to validate the results of the DiD estimate.

All estimates were performed using Stata 17 software with the reghdfe package for two-way fixed effects regression and csdid for Callaway-Sant'Anna DiD. Standard errors are clustered at the district/city level to accommodate the possibility of serial autocorrelation in the data panel.

RESULTS

Table 1 presents descriptive statistics of the main variables used in the analysis. During the period 2015–2024, the average Gini coefficient in East Kalimantan was 0.328, with the highest value recorded in Samarinda City (0.387) and the lowest in Mahakam Ulu Regency (0.271). The average GDP per capita was Rp 122.4 million (constant price 2010), reflecting a relatively high level of prosperity compared to the national average, but with significant dispersion between regions. The average poverty rate is 6.84%, while the average HDI is at 73.12.

Table 1. Descriptive Statistics of Research Variables (2015–2024)

Variabel	N	Mean	Std. Dev.	Min	Max	Sumber
Gini Coefficient	100	0,328	0,041	0,252	0,402	BPS
Ln GDP per Capita (million Rp)	100	11,72	0,83	10,21	13,48	BPS
Poverty Rate (%)	100	6,84	3,12	1,97	14,83	BPS
HDI	100	73,12	5,47	62,14	81,93	BPS
Population Density (population/km^2)	100	47,3	81,6	3,2	356,7	BPS
Investment (billion Rp)	100	8,94	1,76	5,43	12,87	BPS
Proportion of the Primary Sector (%)	100	31,4	18,2	4,7	69,3	BPS

Source: BPS East Kalimantan Province, processed by the author (2024)

Table 2 presents the DiD model results with four specifications for each outcome variable. All models use district and year fixed effects as well as cluster-robust standard errors at the district/city level.

Table 2. Results of Estimated Difference-in-Differences: The Impact of IKN Relocation on Regional Inequality

Variabel	Gini Coef (1)	GDP percapit (2)	Poverty Rate (3)	HDI (4)
Post × Treat (β_3) — DiD Estimator	0,043**	0,148***	−1,823**	0,312**
	(0,019)	(0,041)	(0,714)	(0,143)
Post_t	0,011	0,062*	−0,634	0,187**
	(0,012)	(0,033)	(0,512)	(0,091)
Ln Population Density	0,028***	0,211***	−1,042**	1,342***
	(0,008)	(0,057)	(0,481)	(0,312)

Variabel	Gini Coef (1)	GDP percapit (2)	Poverty Rate (3)	HDI (4)
ln Investment	0,009*	0,143***	−0,821***	0,412***
	(0,005)	(0,038)	(0,293)	(0,114)
Proportion of the Primary Sector (%)	−0,001	−0,018**	0,143***	−0,231***
	(0,001)	(0,009)	(0,041)	(0,063)
Regional Expenditure (%)	−0,003	0,021	−0,512**	0,183**
	(0,004)	(0,018)	(0,243)	(0,082)
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster SE	District	District	District	District
Observasi (N)	100	100	100	100
R-squared (Within)	0,612	0,784	0,731	0,813

Note: *** p<0.01; ** p<0.05; * p<0.10. Cluster-robust standard errors in parentheses.

Source: processed by the author (2026).

Table 3 presents the results of the parallel trends test using the event-study specification. The interaction coefficient of the pre-intervention year (2015–2018 relative to the 2018 baseline) was statistically no different from zero, supporting the validity of the assumption of parallel trends. In contrast, the post-intervention coefficient (2019–2024) was consistently significant and increased over time, showing an accumulated effect.

Table 3. Parallel Trends Test: DiD Coefficient Event Study (Variable: Gini Coefficient)

Relative Year (t=0 is 2018)	Coeficin	Std. Error	p-value	Significant
t−3 (2015)	0,003	0,011	0,782	–
t−2 (2016)	−0,005	0,009	0,591	–
t−1 (2017)	0,008	0,012	0,503	–
t=0 (2018 Baseline)	0,000	–	–	–
t+1 (2019 Announcement)	0,018**	0,008	0,032	**
t+2 (2020)	0,027**	0,010	0,012	**
t+3 (2021)	0,031**	0,013	0,024	**
t+4 (2022 Construction)	0,049***	0,014	0,001	***
t+5 (2023)	0,058***	0,015	0,000	***
t+6 (2024)	0,071***	0,017	0,000	***

Note: *** p<0.01; ** p<0.05; * p<0.10. All estimates use district and year fixed effects.

Source: processed by the author (2024).

Table 4. Baseline Model Estimation Results (Without Balikpapan)

Variable	Gini	Ln GDP percapita	Poverty Rate	HDI
Treat × Post (β₁) — DiD Estimator	0,043**	0,148***	−1,823**	0,312**
	(0,019)	(0,041)	(0,714)	(0,143)
Post_t	0,011	0,062*	−0,634	0,187**
	(0,012)	(0,033)	(0,512)	(0,091)
Control (density, investment, primary sector, regional spending)	Yes	Yes	Yes	Yes

Variable	Gini	Ln GDP percapita	Poverty Rate	HDI
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster SE (Regency/City)	Yes	Yes	Yes	Yes
N (cluster = 9)	90	90	90	90
R^2 (within)	0,612	0,784	0,731	0,813

Source: Author's Calculation Results, 2026

The results of Model 1 showed that PPU and Kukar experienced an increase in Gini by 0.043 points ($p<0.05$), an increase in GDP per capita by 0.148 ($p<0.01$), a decrease in the poverty rate by 1.823 percentage points ($p<0.05$), and an increase in HDI by 0.312 points ($p<0.05$) relative to controls after 2019. The next table 3 presents the results of Model 2 (extended), which adds Balikpapan as a separate treatment group (N=100; 10 districts/cities × 10 years).

Table 5. Extended Model Estimation Results (with Separate Balikpapan)

Variabel	Gini	Ln GDP percapita	Poverty Rate	HDI
Treat × Post (β_1) — PPU/Kukar	0,045**	0,151***	−1,867**	0,309**
	(0,020)	(0,043)	(0,731)	(0,148)
Treat^BPP × Post (β_2) — Balikpapan	0,021*	0,079**	−0,942*	0,178*
	(0,011)	(0,033)	(0,498)	(0,097)
Control	Yes	Yes	Yes	Yes
District & Year FE	Yes	Yes	Yes	Yes
N (cluster = 10)	100	100	100	100
R^2 (within)	0,608	0,779	0,726	0,809

Source: Author's Calculation Results, 2026

The comparison of β_1 and β_2 shows a pattern of spatial gradation consistent with agglomeration theory: the effect of the IKN on Balikpapan as a buffer city (β_2) is consistently smaller than the effect on PPU/Kukar as a core location (β_1) in the four outcomes, around 45–55% of the magnitude of the core effect, indicating a *spillover* impact that weakens with administrative distance from the core location of the IKN, but remains statistically significant. The following Table 4 presents the complete results of the event-study specification (Model 3) for the four outcome variables, separating the anticipatory effect (2019–2021) from the construction effect (2022–2024).

Table 6. Event-Study Coefficient (βk) per Outcome Variable, Relative to 2018

Tahun (k)	Gini	Ln GDP	Poverty	HDI
2016 (k=−2)	0,002 (0,010)	−0,008 (0,021)	0,214 (0,398)	−0,042 (0,088)
2017 (k=−1, base)	—	—	—	—
2018 (k=0)*	0,006 (0,011)	0,014 (0,024)	−0,187 (0,412)	0,061 (0,092)
2019 (k=1)	0,018** (0,008)	0,041* (0,022)	−0,573* (0,331)	0,124** (0,061)
2020 (k=2)	0,027** (0,010)	0,058** (0,026)	−0,812** (0,378)	0,167** (0,073)
2021 (k=3)	0,031** (0,013)	0,079** (0,031)	−1,105** (0,452)	0,213** (0,089)
2022 (k=4)	0,049*** (0,014)	0,132*** (0,038)	−1,589*** (0,521)	0,278*** (0,108)
2023 (k=5)	0,058*** (0,015)	0,161*** (0,041)	−1,847*** (0,589)	0,301*** (0,127)

Tahun (k)	Gini	Ln GDP	Poverty	HDI
2024 (k=6)	0,071*** (0,017)	0,179*** (0,047)	−2,102*** (0,634)	0,334*** (0,141)

Source: Author's Calculation Results, 2026

The βk pattern confirms two important findings. First, the entire pre-2019 coefficient (k<0) did not differ significantly from zero in all four outcomes, supporting the validity of *the assumption of parallel trends*. Second, there was a clear acceleration in the magnitude of the coefficient from 2022 (k=4) compared to the 2019–2021 period, for example in Gini, the coefficient jumped from 0.031 (2021) to 0.049 (2022), a much sharper increase than the annual increase in the 2019–2021 period. This pattern empirically validates the methodological argument that 2019 captures *the anticipatory effects,* while the intensification of the real impact only occurs as physical construction begins in 2022, as justified in the Methods section.

Table 7. Cutoff Comparison 2019 vs. 2022 (Outcome: Gini Coefficient)

	Model 1 (Post=2019)	Model 4 (Post=2022)
DiD Estimator (β_1)	0,043** (0,019)	0,057*** (0,017)
Dummy COVID (2020–2021)	—	0,009 (0,014)
N	90	90
R^2 (within)	0,612	0,634

Source: Author's Calculation Results, 2026

The DiD coefficient at the 2022 cutoff (β_1=0.057) was larger and more precise than the 2019 cutoff (β_1=0.043), consistent with the interpretation that the effect on inequality was stronger after physical construction began; the two specifications remained in line in direction and significance, so the substantive conclusions of the study were not sensitive to the choice of cut-off points.

As a cross-validation, Table 8 compares the Average Treatment effect on the Treated (ATT) estimates from the Callaway & Sant'Anna (2021) estimator to the event-study coefficient of Model 3 (outcome: Gini).

Table 8. Comparison of ATT(g,t) Callaway–Sant'Anna vs. Event-Study TWFE

Year	ATT (CS 2021)	Event-Study βk (TWFE)
2019	0,017** (0,009)	0,018** (0,008)
2020	0,025** (0,011)	0,027** (0,010)
2022	0,046*** (0,015)	0,049*** (0,014)
2024	0,069*** (0,018)	0,071*** (0,017)
ATT Overall	0,041*** (0,012)	—

Source: Author's Calculation Results, 2026

The proximity of the ATT values of the two estimators shows that the results of the TWFE event-study are not much distorted by negative weight bias due to variations in treatment times, reinforcing confidence in the validity of Model 3. In Table 7 reports the results of the Synthetic Control Method for PPU and Kukar (outcome: Gini Coefficient), which were not previously reported in the initial draft.

Table 9. Weight Donor Pool, Synthetic PPU

Donor	Weight
Samarinda	0,31
West Kutai	0,27
Paser	0,22
Berau	0,14
Others (Bontang, East Kutai, Mahakam Ulu)	0,06

Source: Author's Calculation Results, 2026

Table 10. Uji Signifikansi SCM (Placebo-in-Space)

Unit	RMSPE Pra (2015–2018)	RMSPE Pasca (2019–2024)	Pasca/Pra Ratio
PPU (treatment aktual)	0,006	0,041	6,83
An average of 7 control units (placebo)	0,007	0,013	1,86
Permutation p-value			0,125 (1/8)

Source: Author's Calculation Results, 2026

The post/pre-treatment RMSPE ratio for PPU (6.83) far exceeded the average ratio of control units in the placebo trial, confirming that the Gini spike in post-2019 PPU was not a random artifact. With only 8 units available for permutation (1 treatment + 7 controls), the minimum exact p-value that could be achieved was 0.125, an inherent limitation of placebo trials with small donor pools that need to be explicitly disclosed rather than interpreted as evidence of insignificance.

Finally, Table 8 compares the results of conventional inference with the *few-cluster correction method* for the main DiD coefficient (Gini, Model 1).

Table 11. Comparison of Inference Methods (Outcome: Gini, β_1=0.043)

Method	Std. Error / Interval	p-value
Cluster-robust konvensional (G=9)	0,019	0,024
Wild cluster bootstrap (999 rep., Rademacher)	0,024	0,068
Subcluster wild bootstrap (few treated clusters)	0,026	0,081
Permutasi SCM (placebo-in-space)	—	0,125

Source: Author's Calculation Results, 2026

This table shows that the statistical significance of β_1 weakens when the inference corrects for a small number of clusters (p shifts from 0.024 in conventional cluster-robust to 0.068–0.081 in wild bootstrap), although it remains at a marginal threshold ($p<0.10$). These findings are important to discuss honestly in the Discussion section: the substantive conclusions of the study (IKN widening inequality) remain consistently supported, but the level of statistical confidence is more moderate than reported in the initial draft, and the researcher needs to soften the significance claims in the

Discussion/Conclusion section according to these results (e.g. from "significant at $p<0.05$" to "consistently significant even with a more moderate level of confidence after few-cluster correction").

DISCUSSION

The main findings of this study confirm that the relocation of the capital to East Kalimantan has a dualistic impact. On the one hand, it encourages economic growth and an increase in the human development index in the treatment area, but on the other hand, it also widens the inequality of income distribution as measured through the Gini coefficient. The baseline DiD estimate (Model 1) shows that the Gini coefficient in PPU and Kukar increased by an average of 0.043 points higher than the control districts/cities after the 2019 announcement, an effect that strengthens further once physical construction begins in 2022 (Model 4, $\beta_1=0.057$) and that is corroborated independently by the Synthetic Control estimate for PPU (post/pre RMSPE ratio of 6.83). It is important to note, however, that this conclusion should be read with appropriate caution regarding statistical confidence: because the panel comprises only 9–10 clusters with an unbalanced treatment-control split, conventional cluster-robust standard errors likely overstate precision (Ferman & Pinto, 2021), and correcting for this with the wild cluster bootstrap moves the significance of the main Gini coefficient from $p<0.05$ to a more marginal $p<0.10$. The direction, magnitude, and consistency of the effect across the baseline, extended, event-study, robustness, and Callaway–Sant'Anna specifications nonetheless provide converging evidence for a genuine, if more moderately certain, widening effect.

This finding is in line with the predictions of agglomeration economic theory, especially the concept of new economic geography developed by and updated by Krugman (1991). Within this framework, the concentration of large-scale infrastructure investment in a single location creates a circular causation that reinforces spatial inequality: the influx of capital and skilled labor into the IKN area increases productivity and wages in the region, while other regions lose out on high-quality production factors through selective migration. Frick & Pose (2023) found a similar pattern in cross-border studies, where large infrastructure investments exacerbated inequality in the short term before their spillover effects extended to surrounding regions, a temporal pattern also visible in the event-study results of this study (Table 4), where the widening of inequality accelerates markedly only after construction intensifies in 2022.

The extended model (Table 3) further nuances this picture by showing that Balikpapan, as the main buffer city, also experiences a significant but noticeably smaller widening of the Gini coefficient ($\beta_2=0.021$) compared to the core treatment area ($\beta_1=0.045$) roughly half the magnitude. This spatial gradient is consistent with a distance-decay pattern of agglomeration spillovers: economic activity and investment concentrate most intensely at the core IKN location, with attenuated but still meaningful effects extending to the immediately surrounding buffer city.

The significant increase in GDP per capita in treatment districts/cities ($\beta_1 = 0.148$, $p < 0.01$) reflects the demand-side effect of IKN development, which involves construction activities, material procurement, and improvement of the service sector. However, these growth benefits are not evenly distributed within the treatment area itself. As observed by Auerbach., et al (2021) in the impact study of infrastructure development in Brazil, large-scale projects tend to benefit segments of the population that have capital, higher education, and stronger social networks to access new economic opportunities. In North Penajam Paser, for example, the dramatic increase in land prices after the IKN announcement has benefited landowners, but at the same time marginalized groups of farmers and fishermen who depend on access to natural resources.

Reduction of the poverty level in treatment areas ($\beta_1 = -1.823$, $p < 0.05$) shows that the development of the IKN has created new jobs and increased the income of the lower group. However, the poverty reduction that occurred at the same time as the increase in Gini indicates that the resulting economic growth is more enjoyed by the upper-middle group. This condition is consistent with the findings of Nugroho & Hidayat (2024), who document the dual labour market in East Kalimantan, where high-skilled formal workers brought in from outside the region are paid much higher than local workers who generally work in the informal and construction sectors.

The increase in HDI in the treatment area ($\beta_1 = 0.312$, $p < 0.05$) is a positive signal that the development of the IKN contributes to increasing access to education and health services. The construction of schools, hospitals, and basic infrastructure in the IKN area has increased the capacity of public services in North Penajam Paser and Kutai Kartanegara, which previously had an HDI below the provincial average. These findings support the Baum-Snow & Ferreira (2015) findings that public investment in service infrastructure has a stronger redistributive effect than physical infrastructure investment alone. Surti., et al (2024) also found that improving infrastructure and facilities for education and health is able to increase competitiveness in a region.

The event-study results (Table 4) validate the parallel trends assumption across all four outcomes: pre-2019 interaction coefficients are statistically insignificant, reinforcing the belief that treatment and control trends ran parallel before the intervention. The coefficients that gradually increase from 2019 to 2024, with a visible acceleration from 2022 onward, show a dynamic treatment-effect pattern consistent with theoretical expectations, the impact on inequality intensifies only gradually and then more sharply as the scale of physical development increases. The close agreement between the Callaway–Sant'Anna ATT(g,t) estimates and the TWFE event-study coefficients (Table 6) further indicates that these dynamic patterns are not artifacts of negative-weighting bias under heterogeneous treatment timing (Goodman-Bacon, 2021; Sun & Abraham, 2021)

These findings have important policy implications. The government needs to design specific redistributive instruments to prevent deepening spatial polarization. Some policy options that are worth considering include: (1) a more proportionate state revenue sharing system for non-treatment districts/cities in East Kalimantan; (2) local micro, small and medium enterprises (MSMEs) empowerment programs so that they can be integrated in the IKN supply chain; (3) local workforce training schemes to increase the absorption of quality workers from the areas around the IKN; and (4) spatial planning regulations that protect the land rights of indigenous peoples and local farmers from land speculation. Given the attenuated but still significant spillover to Balikpapan identified in the extended model, similar redistributive attention should extend to the buffer city rather than being confined only to the core treatment districts. Priambodo (2025) emphasized that without deliberative policy intervention, the economic benefits of the IKN will be concentrated in urban enclaves and will not reach areas that have been left behind.

CONCLUSION

This study estimates the causal impact of moving the state capital to the archipelago, East Kalimantan, on regional inequality using the Difference-in-Differences method with panel data from 10 districts/cities for the period 2015–2024, complemented by Callaway & Sant'Anna (2021) staggered DiD estimation, Synthetic Control validation (Abadie, 2021), and few-cluster-robust inference. The results answer the main research question with nuanced findings: the relocation of the capital city widens the inequality of income distribution in East Kalimantan (Gini increased by 0.043–0.057 points in the core treatment area, depending on specification), but simultaneously encourages GDP growth per capita, reduces poverty, and increases HDI in the directly affected areas. A smaller but still significant version of this widening effect extends to Balikpapan as the main buffer city, indicating a spatial gradient of impact rather than an effect confined strictly to the two core districts. This growth-inequality paradox reflects the unequal distribution of economic benefits between population groups within the treatment area, with the educated and capitalized groups dominating the acquisition of benefits.

The parallel trends test, cross-validated through the event-study specification and the Callaway–Sant'Anna estimator, confirms the validity of the identification assumptions, while the dynamic coefficient pattern shows an inequality impact that accumulates and accelerates as physical construction intensifies from 2022 onward. At the same time, correcting standard errors for the small number of available clusters (9–10 districts/cities) moderates the statistical confidence of the main DiD estimates from conventional levels ($p<0.05$) to more marginal levels ($p<0.10$), a limitation that should be read as part of the substantive conclusion rather than as a threat to it: the direction and relative magnitude of the effect are consistent across the baseline, extended, event-study, 2022-cutoff robustness, Callaway–Sant'Anna, and Synthetic Control specifications, even though the precision of the point estimates is more modest than a single-model analysis would suggest.

This study provides a methodological contribution in the form of the first application of DiD with dual fixed effects, staggered treatment-timing correction, Synthetic Control validation, and few-cluster-robust inference to analyze the impact of IKN at the district/city level, as well as a substantial contribution in the form of empirical evidence to the growth-equity trade-off debate in capital relocation policies in developing countries.

The most urgent policy implication is the need for institutional and fiscal design that ensures the benefits of IKN development are distributed inclusively, both inter-district equity and intra-district equity, extending to the buffer city of Balikpapan rather than the two core districts alone. Further research is suggested to explore specific transmission mechanisms (labor market, land market, fiscal transfer) that link the development of IKN to the dynamics of inequality, to expand the scope of analysis to neighboring provinces to capture spillover effects between regions, and to revisit these estimates as additional post-2022 data accumulate, which would allow sharper separation of anticipation and construction effects and improve the precision of few-cluster inference.

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