PRODUCTIVITY IMPACT OF POLITICAL DYNAMICS IN A DECENTRALISED INDONESIA: THE CASE OF THE 2016 CENTRALISATION POLICY OF THE BATAM FREE TRADE ZONE

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In 2016, the central government of Indonesia issued a presidential decree that centralised the management of Batam Free Trade Zone (FTZ). The policy was mainly directed to improving the business climate in the zone that was deemed underperformed due to prolonged central-local conflict. This paper aims to investigate the policy change in the zone with the change in firms' productivity. I use survey data from the Statistics of Indonesia covering the years of 2015 and 2017. Difference-in-difference estimator is employed to measure the impact, with firms located in neighboring provinces are set as the control group. I find that the policy has led to a productivity loss at around 32% in the main model, with similar large drop in terms of growth. I further find that locational choice, investment origin, as well as export orientation determine their resiliency against the policy change. Policymakers, whether at the central or local level, need to pay attention to this negative impact when deciding future institutional arrangement of the Batam FTZ.

Keywords: *institutional change, industrial policy, regional development, productivity*

JEL Classification Codes: O43, E24, R5, L52

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INTRODUCTION

During his presidential visit to Singapore in July 2015, President Jokowi attempted to lure more investment to the neighboring island of Batam, the capital of Riau Island province. The island hosts Indonesia's first successful Free Trade Zone (FTZ). It showed stellar performance in the first half of the 1990s with the majority of investments coming from Singapore (Damuri et al., 2015; Negara & Hutchinson, 2020; Wulandari, 2012). In the meeting with Singaporean business leaders during the visit, he laid out a plan to restructure the FTZ governance to better improve its business climate. The purpose of this effort is two folds. First, he tried to resolve the long-lasting conflict between the central and local governments in the zone which was detrimental towards industrialization attempt in the region (Jati, 2016). Secondly, considering the regional context the measure was seemingly done to anticipate a major upcoming change, the implementation of the ASEAN Economic Community (AEC) at the end of that year. AEC could potentially lessen the policy incentive provided in the zone.

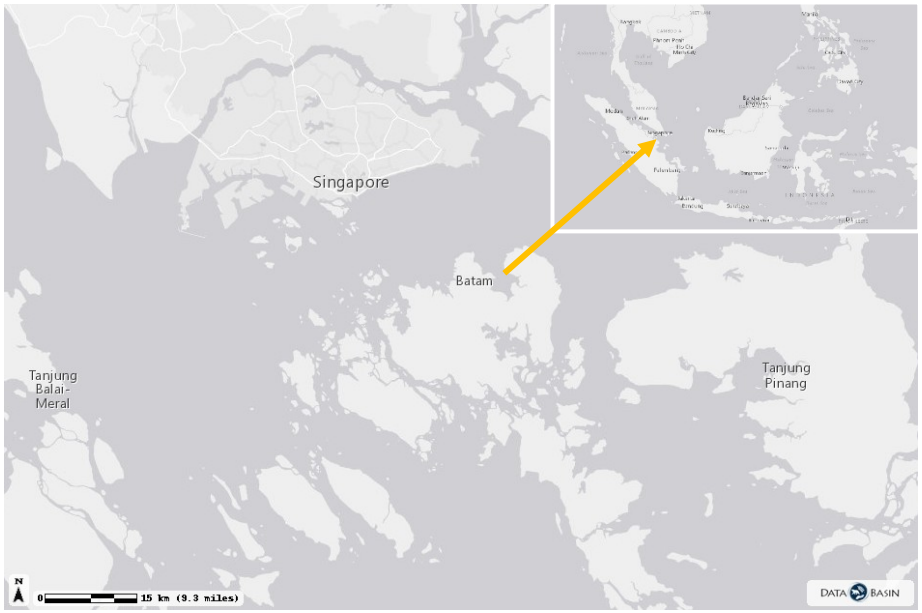
The utilization of placed-based policies such as the FTZ to boost industrial output has been a growing practice in many parts of the world . Its instrumentation in the Asian Tiger economies, and particularly in promoting export-oriented activities, has managed to sustain unprecedented high growth spanning for more than two decades. The remarkable success of China's industrialization from the 1980s to the 2010s was also largely contributed by their place-based policy. China has been successfully harnessed foreign investment by establishing Special Economic Zones in Shenzhen, Zhuhai, Shantou, and Xiamen in the early days of the open-door policy. The success has led to the larger experimentation of this approach, leading to the open coastal and open cities policy between 1988 and 1992 (Ge, 1999).

This research aims to estimate the impact of vertical institutional change in the management of Batam FTZ on firms' labor productivity. One of the latest changes, following the president's aforementioned visit to Singapore, was started in 2015 where the central government attempts to

revitalize the zone through centralising its administration. This move was finally formalized in February 2016 with the issuance of Presidential Decree (Keppres) no. 8.

Development of Batam FTZ

The island of Batam has not been originally developed as a free trade zone. Despite its strategic location in the busy Malacca Strait and shortly across the rapidly developing Singapore (see Figure 1), before 1970 its main economic activity was largely fishery and agriculture (BP Batam, 4 February 2022; see also older account from Kloss, 1908). The island was lacking sufficient infrastructure and was sparsely populated that prevented industry to develop. Back then the government did not focus their attention on the island, demonstrated with the relocation of the province's capital from Tanjung Pinang island, just next to Batam, to the main Sumatra island in the city of Pekanbaru in 1960 (BP Batam, 2021). The abundance of natural resources was one of the main reasons for this administrative change.



Source: databasin.org

Figure 1. Map of Batam FTZ (Insert: Map of Southeast Asia)

Batam's initiation as a free trade zone was done in October 1971 with Presidential Decree No. 74. It is then followed by another decree in 1973 that assigned Batam Island Industrial Area Development Authority (BIDA) as the agency responsible for zone's development (BP Batam, 2021). This placed the zone under Jakarta's direct influence with BIDA serves as *de facto* government of the island. This is in contrast from most other areas in Indonesia where regional and local governments are the ones responsible for the development in their respected jurisdiction, even when they were merely an extension arm of the central government. President Suharto's Minister of Research and Technology, BJ Habibie, was appointed as the head of BIDA, in the hope to propagate not just industry but also promoting industrial upgrading (Hutchinson, 2017). However, for nearly two decades Batam still encountered difficulties in attracting investments. This soon later change.

In 1989, the Indonesian government was one part of the tripartite SIJORI Growth Triangle plan. SIJORI stands for Singapore, Johor, and Riau, where the latter two regions are the state/province of Malaysia and Indonesia, respectively. The triangle comprised a development plan with Singapore at the center and both Johor and Riau as its periphery areas. The plan was announced by then Deputy Prime Minister of Singapore Goh Cok Tong and was responded with much enthusiasm by all parties involved.

Following the announcement of the SIJORI plan, massive investment flocked into Batam FTZ. Between 1991 and 1997 total foreign investment is $ 535.5 million, averaging at nearly $ 70 million per year (BKPM, 2020). This was also followed by increasing domestic investment at a similar rate of growth, suggesting an increasing number of joint-venture projects and economic spillovers to the island. As a result, GDP growth reached an all-time high at 18% on average between those years.

The unanticipated Asian Financial Crisis in 1997 caused a massive problem for Indonesia's industrialization as it was one of the worst-hit countries. It took around four years to recover its GDP loss. In the Batam FTZ, however, the picture was a little bit contrasting. Despite GDP growth was down sharply to 3% in 1998, FDI increased more than twofolds from $ 196.47 million in 1997 to $

514.11 million in 1998. In the two years that follow, Batam FTZ enjoyed close to $ 200 million of investment on a yearly average. However, following massive institutional change in 2000, the high investment period has not returned to the island, at least not until 2007 when the government revitalizes the FTZ approach.

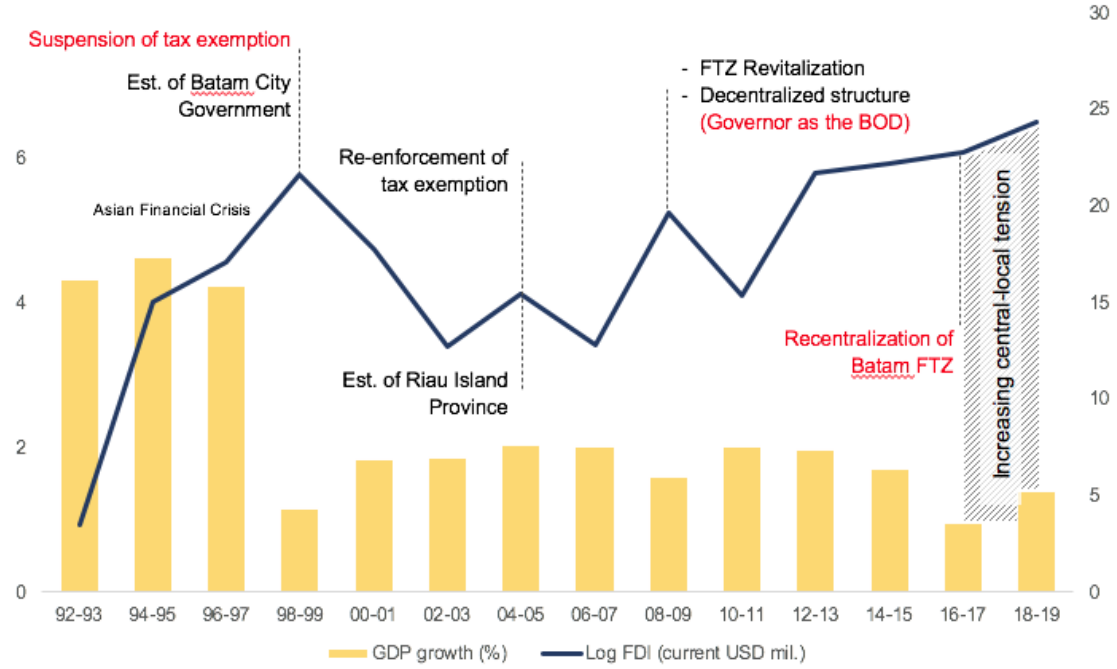
Decentralisation reform and revitalization of Batam FTZ

The 1997 Asian crisis was followed by nationwide unrest that led to economic and political reform by May the next year. This ended the heavily centralised regime of President Suharto. The new administration in Jakarta, led by President BJ Habibie, subsequently responded to the demand for a stronger local government and hastily applied the decentralisation bill in 1999. Batam FTZ has not been immune to this change. Almost overnight, a newly autonomous local government of the city of Batam is established. Prior to this, there has been already a local government that was established in 1983, but with limited autonomy, and its developmental role was practically overtaken by the FTZ authority.[1]

Following the decentralisation *zeitgeist*, Batam's Riau Province was split separating the archipelagic part of the region from the Sumatra mainland and creating the new Riau Islands Province. It consists of seven districts, with Batam serves as the main industrial center as well as its most populous areas. The emergence of autonomous local governments both at the province as well as city level complicates the business climate in the FTZ. There were overlapping responsibilities between the city government and the FTZ authority (BIDA) such as in facilitating investment and development of infrastructure. This dual authority problem has been analyzed by Damuri et al. (2015), Aritenang (2017), as well as Zaenuddin et al. (2017), among others.

[1] The establishment of the City Government of Batam in 1983 was part of the deconcentration program under Law no. 5 in 19 74 that allowed for larger local government autonomy. However, the program was merely focusing on administrative matters instead of providing real autonomy, as local policies were still dictated by the central government in Jakarta.

At the same time with the bottom-up decentralisation change, as part of the attempt to restore macroeconomic stability following the crisis, and as part of IMF's Structural Adjustment Program, the government of Indonesia was required to abandon its industrial policies. In relation to the FTZ, the first regulation issued was the suspension of value-added tax and luxury goods tax exemptions on the island in March 1998. It was not until mid-2000 that the government reverted to the old regulation, which was later renewed in December 2003.



Source : nswi.bkpm.go.id, 2021

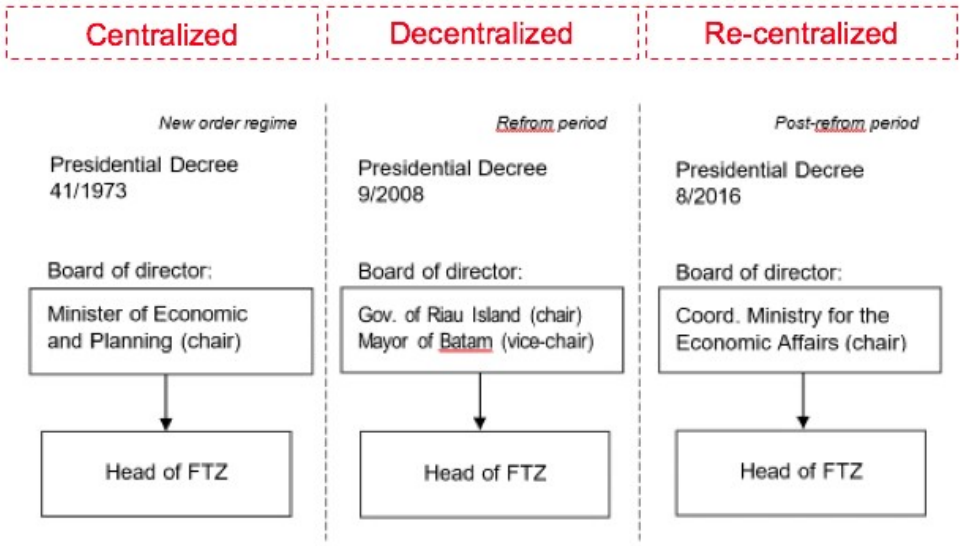
Note : (1) Blue line marks bi-yearly average FDI inflow (log current $ mil.) pegged at the left axis, (2) Yellow bar denotes bi-yearly average GDP growth pegged at the right axis, (3) BOD is the Board of Director of the zone.

Figure 2. Investment and Growth Dynamics in the Batam FTZ

The political dynamics that follows the bottom-up (decentralisation) and the top down (the IMF Structural Adjustment Program) institutional change in Batam had not immediately brought down business climate in the zone, as suggested by Broadfoot (2003). Annual growth was maintained at nearly 7% until 2003 (see Figure 2). However, investment flow was affected sharply as it was slashed at just a third sequentially from 2001 to 2003, with central-local friction serves as one of the underlying causes (Damuri et al., 2015). The government tried to prevent this spiraling down further.

The road to revitalizing the FTZ strategy in Batam took place in 2006, with leaders of Indonesia and Singapore initiated a joint ministerial meeting on economic cooperation (Wong & Ng, 2009). One of the focuses was to develop Batam and its surrounding areas. This was then followed with the establishment of a national team in Indonesia, led by the Coordinating Minister for Economic Affairs, to study several policy options. The bilateral agreement with Singapore was a demonstration of international influence that Jakarta possesses that the local government do not.

In the year after, the central government in Jakarta issued the long-awaited FTZ Law (UU no. 44/20007) which was accompanied by a presidential decree (Perpres) effective in 2008. Under the new regulations, both Governor of Riau Island and the Mayor of Batam served as the chair and vice-chair of the board, respectively (see Figure 3). The member of the board under the regulation has also consisted of local officials. The dynamics has swung the zone's political pendulum from a centralised to a decentralised one.



Source: peraturan.bpk.go.id, 2021

Figure 3. Batam FTZ Structure under Different Periods of Government

The revitalization plan dramatically increased FDI flow by 45% whilst also sustaining GDP growth at around 7% between 2008 and 2013 as shown in Figure 2. It was only interrupted in 2009 due to the global financial crisis. These numbers suggest that the decentralised policy works, accommodating local government's role in the FTZ administration helped in improving climate change which eventually results in higher investment and growth. However, as we can see in Figure 2, nearing the implementation of AEC in 2015 growth begins to falter.

Research Gap and Problems

President Jokowi's visit to Singapore in mid-2015 was met with enthusiasm and concern from the country's business chamber (SBF, 28 July 2015). One of the often expressed concern, as implied in his speech in front of 150 Singaporean businessmen, is related to the dual-authority situation in Batam. The FTZ revitalization strategy in 2007 which decentralised the zone management, was not considered competitive enough to attract larger investment.

Despite increasing total FDI inflow to the zone, the scale of investment is getting smaller and smaller. During its glory days in the 1990s foreign investment in Batam averaged above $ 5 million per project. However, by 2014 under the new FTZ policy (Perpres No. 9 in 2008) average FDI per project was only $ 2.1 – 2.3 million (BKPM, 2021). This could be a contributing factor that caused the declining growth trend between 2010 and 2015 as shown in Figure 2.

To overcome this situation the government decided to go in one direction, by centralising the FTZ administration. The FTZ authority, now known as BP Batam (Free Zone Authority of Batam), is placed under the central government's Coordinating Ministry for the Economic Affairs. The zone is then headed by one of its deputy minister, Mr. Lukita Diansyah Tuwo.

This change, however, still did not manage to improve growth on the island. In 2016 and 2017, GDP (Robert, 2003)growth plummeted to less than 4%, below national average. FDI per project

coming to the zone was also down to below $ 1 million per project (BKPM, 2021), lowest in its history.

Various literatures have studied the competitiveness of Batam FTZ (Wahyuni et al., 2010), its impact on FDI and industrialization in the region (Aritenang & Chandramidi, 2020; Negara & Hutchinson, 2020; van Grunsven & Hutchinson, 2017), or on the dual authority issue that occurred due to the policy (Damuri et al., 2015; Zaenuddin et al., 2017). This study is among the first to focus itself in the recent institutional change in Batam with the 2016 policy. Centralising the zone under Jakarta's command, in a largely decentralised state structure, is a large scale experiment worth of investigating.

ESTIMATION STRATEGY AND DATA DESCRIPTION

The research design follows quasi-experimental method that was very popular in policy evaluation studies (Chabé-Ferret, 2015; Duflo, 2001; Card & Krueger, 1994; (Card, 1992)) including in the case of Batam FTZ development (Aritenang and Chandramidi, 2020). Here I try to calculate the difference in the expected output against the selected control group to measure the impact of the policy change. The treated group, Batam FTZ, is measured using Riau Islands Province as proxy. Province level data is readily available and much easier to set up for the purpose of this study. Furthermore, using the province data as a proxy is justified, as Negara and Hutchinson (2020) described that the city of Batam contributes 84% of the number of firms to the province based on BPS survey.

Estimation strategy

The treated region ($treat$) is a binary variable mark with 1. The period before the policy came into effect ($post$) is marked as 0, and 1 is given for the period following the policy implementation which

is 2016. My initial equation set-up in predicting the impact of policy on productivity is given as the following

$$\Delta pro_{it} = \beta_0 + \beta_1 treat + \beta_2 post + \beta_3 treat * post + \varepsilon_{is} \quad \dots (1)$$

Δpro_{it} resembles per worker productivity change in firm i at the year t. All the beta coefficients $(\beta_{0,\dots,3})$ are unknown parameters. My parameter of interest is β_3, which resembles the difference-in-difference (DID) coefficient. ε_t is the error term, expected to be uncorrelated with the other coefficients. When the expected condition is met, then it can be confirmed that the parallel trend assumption is fulfilled (Albouy, 2004).

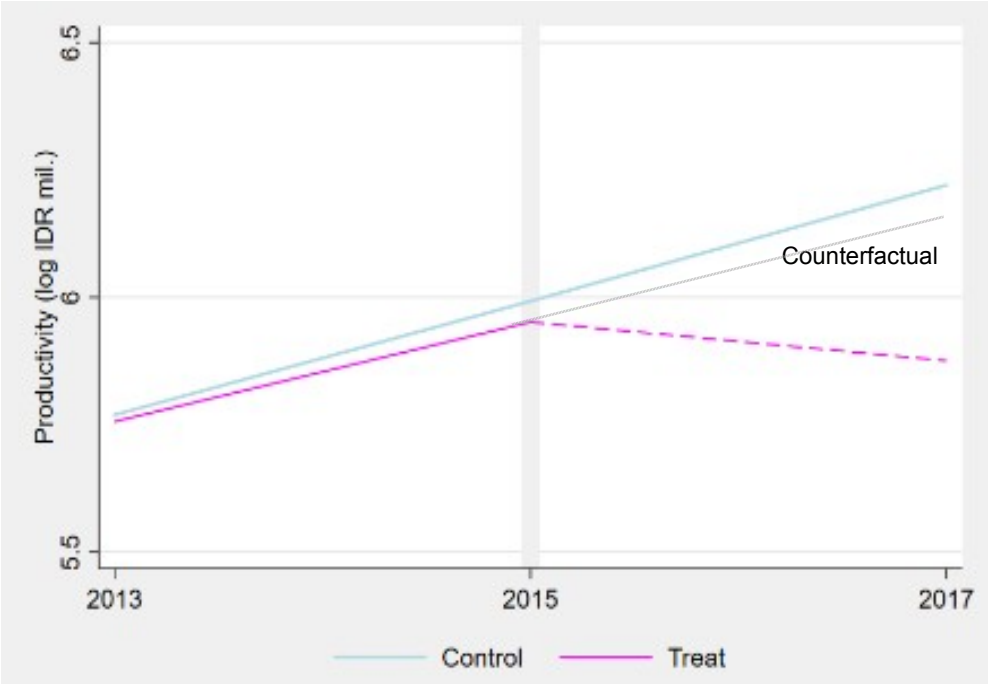
My model specification under OLS is given by

$$\Delta pro_{itr} = \beta_0 + \beta_1 treat + \beta_2 post + \beta_3 treat * post + \beta_4 X + v_r + \pi_i + \varepsilon_t \quad \dots (2)$$

X is a vector of endogenous variables that includes (1) unit labor cost, (2) machinery purchase, (3) raw material cost, and (4) foreign ownership (% share). v_r and π_i are region-specific and individual firm fixed effects, respectively, that controls for unobservable heterogeneity that might occur due to culture, language, and supply-chain network. Lastly, ε_t is an error term not correlated to the main independent variable.

Parallel trend test

To ensure the validity of the DID model as laid above it is necessary to study the parallel trend assumption in the pre-estimation stage. A failure to confirm a parallel trend could lead to a biased result. To do that I gathered the pre-treatment periods of firm productivity data in 2013, 2015, and 2017. Figure 4 shows almost virtually similar trend of growth between Batam FTZ and the control group in the period before the policy change, thus confirming the parallel trend assumption. After the policy took place in 2016, productivity in the treatment group is now lower than in the control group. The counterfactual line predicts Batam's growth projection should the policy was never in place.



Note : Batam FTZ is set as the treatment group while the neighboring provinces (North Sumatera, Riau, South Sumatera, and Lampung) are set as the control group. Vertical gray line denotes beginning of policy change; the centralisation of FTZ in February 2016. Dashed grey line marks the counterfactual line if the policy was not applied in the zone.

Source : Author, calculated from SI Industrial Survey 2013, 2015, 2017

Figure 4. Parallel Trend Graph

I confirm the parallel trend graph by testing it using lead (post) and lag (pre) data. This resulted in a statistically significant parallel trend with joint F-statistics probability that stands at 0.078 (see Table 1). Using the output variable as the dependent variable allows us to pass the lead-trend test, but it does not pass the time-trend one. The other variable of interest, productivity per worker, managed to pass both the lead-trend as well as the time-trend tests (see Table 1 column 2 and 3). The F-test score probability indicates whether the variable pass or do not pass the test.

Table 1. Parallel-trend Test Result

Parallel Trend Test	Output (1)	Productivity (2)
Lead-trend		
F-stat.	0.70	0.03
Prob. F	0.40	0.85
Result	Passed	Passed
Time-trend		
F-stat.	5.13	1.39
Prob. F	0.02	0.24
Result	Not-passed	Passed

Source: Author, calculated from SI Industrial Survey 2013, 2015, 2017

Data description

The main data source is coming from Statistics of Indonesia's Large and Medium Industrial survey. This survey is conducted yearly. However, there are some gap years in accessing the data, leaving with only odd years data selected. In choosing the data to be used, I first identify the recent policy change in Batam's FTZ and its parent province Riau Islands. From there I select the data in between its implementation. The targeted policy intervention was the 2016 FTZ centralisation policy. I then proceed by selecting industrial data of 2015 and 2017 for the estimation.

Table 2 provides descriptive statistics of the variables used. The total number of observations for the two periods (2015 and 2017) is at 2786. As an additional robustness measure, I controlled the observation to include only firms that reported their production activity for at least ten months. This eliminates firms that reported their figures for than 9 months or less.

In terms of output, we can see that firms located in the Batam FTZ, our treated group, have a higher mean score (11.06) compared to the control group (10.56) before the policy intervention. After 2016 the gap difference is closing with productivity growth in the control group outweigh the treated one. Contrastingly, per worker productivity is lower, albeit only slightly, in the treatment group (5.95) against (5.99) in the control group. Both experienced productivity growth after 2016, but the number

in the control group is noticeably larger (6.22) compared to those in Batam FTZ (5.88), our treated group.

Table 2. Descriptive Statistics

Variables	All			Control			Treat		
	Obs.	Mean	s.d.	Obs.	Mean	s.d.	Obs.	Mean	s.d.
Before policy intervention									
Dependent var.									
Output (log current IDR mil.)	1394	10.73	2.12	1126	10.56	2.17	268	11.06	1.83
Productivity (log current IDR mil.)	1394	5.98	1.51	1126	5.99	1.56	268	5.95	1.28
Independent var.									
Labor cost (log current IDR mil.)	1394	3.22	0.50	1126	3.14	0.48	268	3.51	0.49
Mac. purchase (log current IDR mil.)	1394	1.58	2.90	1126	0.84	2.13	268	4.36	3.86
Material cost (log current IDR mil.)	1394	10.01	3.27	1126	10.42	2.68	268	8.29	4.68
Foreign ownership (%)	1394	19.59	38.45	1126	9.87	28.20	268	60.47	47.83
After policy intervention									
Dependent var.									
Output (log current IDR mil.)	1392	10.88	2.08	1125	10.88	2.16	267	10.89	1.71
Productivity (log current IDR mil.)	1392	6.15	1.46	1125	6.22	1.54	267	5.88	1.02
Independent var.									
Labor cost (log current IDR mil.)	1392	3.42	0.52	1125	3.34	0.49	267	3.75	0.48
Mac. purchase (log current IDR mil.)	1392	2.39	3.06	1125	2.03	2.87	267	3.92	3.33
Material cost (log current IDR mil.)	1392	10.26	3.09	1125	10.62	2.66	267	8.75	4.15
Foreign ownership (%)	1392	19.32	38.43	1125	9.18	27.45	267	62.03	47.65

Source : Author, calculated from SI Industrial Survey 2015 and 2017

RESULTS AND DISCUSSION

This part is divided into five sub-sections. In the first one, I present the unconditional or also known as the baseline result. This serves as the benchmark as I add more control variables into the model in Sub-Section 2. Here we can also see the robustness of the full estimation result by comparing it to a

different control group using neighboring provinces. In Sub-Section 3, I present my extension analysis. I look at the different policy impact based on firm characteristics. Lastly, I provide a discussion based on the result findings.

Baseline result

Table 3 presents the baseline result, without controlling for endogenous variables. In Columns (1) and (2), the result using output as a dependent variable is shown. We can see that our DID coefficients are significantly negative, either calculated under the standard OLS or with Fixed-Effects OLS. Secondly, I use my main dependent variable, productivity, in Columns (3) and (4). The coefficients are consistently negative and significant for both, suggesting that the result could be robust.

Table 3. Baseline estimation result

Variables	Output		Productivity	
	OLS	FE-OLS	OLS	FE-OLS
	(1)	(2)	(3)	(4)
Post	0.222***	0.233***	0.227***	0.226***
	(0.084)	(0.031)	(0.059)	(0.030)
Post*Treat	-0.392**	-0.423***	-0.303***	-0.309***
	(0.175)	(0.090)	(0.116)	(0.085)
Constant	10.225***	10.727***	5.671***	5.986***
	(0.070)	(0.015)	(0.048)	(0.014)
Province FE	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes
Provinces	5	5	5	5
Observations	2786	2786	2786	2786
Deg. of freedom	6	1	6	1
Adj. R-sq	0.132	0.041	0.166	0.037
F-statistics	96.271***	31.032***	110.436***	29.192***

Note : - Output is the log value of total sales number while productivity is per worker output.Both are reported in log current IDR million.
- Variable post denotes the year after 2016 where the new FTZ policy was implemented.
- Post*Treat is our difference-in-difference estimation.
- Firm clustered standard errors are in parentheses and * 0.1 ** 0.05 *** 0.01 denote significant level.

Source: Author, calculated from SI Industrial Survey 2015, 2017

Main result

Let us continue the baseline result above by adding endogenous control variables necessary to explain productivity. Table 3 shows the main estimation results. Column (1) shows that the negative coefficient for firm output stays (-0.368) after controlling for unit labor cost, machinery purchase, raw materials purchase, and foreign ownership share. In terms of productivity, the same trend can be observed as shown in Column (5). The coefficient has smaller magnitude (-0.279) compared to previous specification but the negative trend stays.

In Column (2) I compare Batam FTZ with its closest neighboring province, North Sumatra. This resulted in a similarly negative coefficient with the previous column. I confirm the negative effect in terms of productivity in Column (6). In the next specification, I change the control to the next neighboring province, Riau, in Column (2). Here we can see that the coefficient is significantly smaller, the same with productivity (Column 7). Riau province is the former administrative province for Batam FTZ before it split into the new Riau Island province in 2004. Next, we also compare Batam FTZ to South Sumatera (Column 4) where result is negative but it is not significant, the same with productivity (Column 8).

Across all specifications shown in Table 3 the time-trend indicator, post, shows a positive coefficient except for the comparison with South Sumatra, suggesting that for both groups output productivity growth is positive. However, we are interested in the difference between those positive trends. A larger trend in the control group resulting in the negative DID coefficient. The control variables (labor cost, machinery, and raw materials) show expected positive signs. With the exception of foreign ownership which shows virtually negligible magnitude, the variables are statistically significant. Omitted variable bias is still present as my full model in Column (1) and (5) only explains around 27-29% of the changes in output and productivity. Since we have observed similar treatment effect for both dependent variable.

Table 3. Main estimation result

Variables	Output				Productivity			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	0.064**	0.084**	0.009	-0.104	0.074***	0.066**	0.091	-0.064
	(0.027)	(0.033)	(0.066)	(0.096)	(0.028)	(0.033)	(0.073)	(0.096)
Post*Treat	-0.368***	-0.375***	-0.271***	-0.175	-0.279***	-0.267***	-0.242**	-0.106
	(0.084)	(0.085)	(0.099)	(0.120)	(0.077)	(0.077)	(0.100)	(0.117)
Unit labor cost	0.307***	0.340***	0.250**	0.338***	0.324***	0.362***	0.211*	0.285**
	(0.059)	(0.080)	(0.122)	(0.129)	(0.058)	(0.075)	(0.110)	(0.117)
Mach. Purchase	0.066***	0.090***	0.064***	0.077***	0.051***	0.058***	0.057***	0.061***
	(0.010)	(0.014)	(0.015)	(0.019)	(0.009)	(0.012)	(0.014)	(0.018)
Raw material	0.168***	0.144***	0.097***	0.098***	0.159***	0.137***	0.102***	0.107***
	(0.021)	(0.023)	(0.023)	(0.023)	(0.018)	(0.019)	(0.021)	(0.021)
Foreign own. (%)	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003**
	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.001)
Constant	7.962***	7.812***	9.651***	8.645***	3.277***	3.172***	4.633***	3.723***
	(0.278)	(0.329)	(0.501)	(0.524)	(0.254)	(0.294)	(0.436)	(0.445)
Control province	All	N. Sumatra	Riau	S. Sumatra	All	N. Sumatra	Riau	S. Sumatra
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2786	1878	874	737	2786	1878	874	737
Deg. of freedom	5	5	5	5	5	5	5	5
R-sq.	0.286	0.289	0.189	0.201	0.270	0.263	0.195	0.208
F-statistics	33.010***	23.282***	8.057***	7.128***	36.942***	23.830***	9.982***	8.134***

Note : - Productivity is per worker output, reported in log current IDR million.
- Variable post denotes the year after 2016 where central-local friction regarding Batam FTZ governance has been on the rise.
- Post*Treat is our difference-in-difference estimation.
- Firm clustered standard errors are in parentheses with * 0.1 ** 0.05 *** 0.01 denote significance level.

Source : Author, calculated from SI Industrial Survey 2015, 2017

Extension analysis

For all the estimations presented in this sub-section, I apply the same control variables used in Table 3 Column (3) in the previous section. However in this part I focus on firm productivity, which is my main dependent variable. To begin with, I start my extension analysis by dividing firms based on their size. The size definition follows national standards where large firm status is assigned for a firm with

100 or more workers. Meanwhile, the medium-size firm is given to a firm with 20 to 99 workers. Table 4 gives us estimation result based on firm size with additional legal ownership status.

Table 4. Extension analysis: Heterogeneity of Firm Size and Location

			Productivity				
Variables	Medium firm	Large firm	Non-IP	IP	IP + DDI	IP + FDI	IP + FDI + Ex.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post	0.075*	0.022	0.007	0.016	0.083	-0.458	-1.492***
	(0.040)	(0.039)	(0.030)	(0.149)	(0.172)	(0.402)	(0.378)
Post*Treat	-0.229**	-0.346***	-0.513***	0.051	-0.012	0.469	1.275***
	(0.101)	(0.130)	(0.124)	(0.183)	(0.296)	(0.403)	(0.334)
Constant	4.110***	2.644***	3.901***	3.700***	3.680*	3.374***	2.439
	(0.354)	(0.366)	(0.316)	(0.716)	(1.879)	(0.955)	(1.622)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1470	1316	2029	757	472	285	171
Deg. of freedom	5	5	5	5	5	5	5
R-sq.	0.201	0..385	0.152	0.211	0.274	0.272	0.284
F-statistics	15.205***	26.075***	11.103***	5.328***	2.833**	5.085***	5.614***

Note : - Productivity is per worker output, reported in log current IDR million.
- Variable post denotes the year after 2016 where central-local friction regarding Batam FTZ governance has been on the rise.
- Post*Treat is our difference-in-difference estimation.
- Firm clustered standard errors are in parentheses with * 0.1 ** 0.05 *** 0.01 denote significance level.
- IP refers to firm residing inside Industrial Park, while FDI refers to Foreign Direct Investment firm (with 10% or more share owned by foreign entity) while DDI is Domestic Direct investment. Ex. = Exporting firm.

Source : Author, calculated from SI Industrial Survey 2015, 2017

In Columns (1) result is shown for medium firms. As we can see, the DID coefficient is showing a negative trend (-0.229), and the effect is significant. In the following Column (2) result for Large firms is shown. Here the DID coefficient becomes significantly larger while it still retains its significances.

Firm locations (Columns 3 and 4) seem to provide different results. Those located outside of Industrial Park (IP) shows a largely negative (-0.513) and significant effect whereas those located inside IP do not show negative trend although the result is not significant. This observation is relevant

as back in 2009 the Indonesian government issued Governmental Regulation (PP No. 24 in 2009) that requires all industrial activities to reside inside industrial parks.

Inside the IP, firm origin shows different sign with domestic firms (DDI) has negative and the foreign one (FDI) is positive. Both, however, are not statistically significant. Lastly, combining firm location and origin of investment with orientation (exporting firm) shows us a contrasting result with the others. It yields positive treatment effect (1.275) under 0.01 significance level (Column 7). The magnitude is exceptionally large with small number of observation (171), which is worth for further studying to confirm this result.

Discussion

Through multiple exercises in the previous section, we have observed that there is a convincingly negative productivity impact of the 2016 centralisation policy of Batam FTZ. From the main result, the -0.279 coefficient magnitude corresponds to around 32% drop in productivity. The same negative result (45% drop) is also observed for firm growth. In this section, I will focus on (1) the issue of central-local relation in the currently decentralised Indonesia, and (2) possible determinants of industrial resiliency against policy change.

The central government, through its affiliated agency, has been the dominant agent in the development and industrialization of Batam FTZ during the new order era (1967-1998). The centralisation strategy worked given the centralised nature of the institution at that time. However, under the currently contrasting political landscape since decentralisation reform in 2001, applying a centralised approach can expect to bring a counter productive consequence as shown in Table 3. To this end, my finding is similar to previous studies (Aritenang, 2017; Aritenang and Chandramidi, 2020; Negara and Hutchinson, 2020) who fails to find positive impact of political and policy change in the Batam FTZ. Poor institutions that comes with the policy change has also been pointed out to

contribute to the industrial decline in the case of electronic sector in the island (van Grunsven and Hutchinson, 2017).

Despite its ambitious attempt to strengthen national coordination, the 2016 policy was still not able to resolve the dual authority issue, if not rather exacerbating the dualism. This leads to the increasingly negative perception toward the FTZ administration in the period following the policy (Romadi 2016; Tribunnews 21 April 2017). Previously, one of the largest civil act that demands to end the duality of zone administration happened in 2007 (MKRI, 21 March 2013) although it was not successful. It is not too far fetched to think that local actors and politicians that have strong linkage to the local government of Batam supports or works behind these actions. This contributes in lowering down competitiveness in the zone as suggested by Negara and Hutchinson (2020) and translates to the declining productivity shown in this study.

The often mentioned problem related to the dualism of authority is land ownership, where most strategic location is owned by BP Batam due to its strong role during the Suharto administration. The new established autonomous government of Batam in 1999, and later the establishment of Riau Island provincial government in 2004, encountered with difficulties to find space for development in the island. Another issue is regarding the management of strategic resources. For example, in providing services regarding to land permit and license, dysfunction and overlapping roles between the two institutions has lead to legal uncertainty to some 22,000 land titles (Negara & Hutchinson, 2020).

The heterogeneity analysis shows us that the negative effect persists across firm size, whether they are medium or large. From a policy point of view, this is something that is rather difficult to control. It is easier for the government to intervene for firms' choice of location, as was done with the 2009 Industrial Park policy. We learn from result shown in Table 4 that firms located in Industrial Park (IP) are less exposed to negative impact of policy change. Dealing with a complex bureaucratic matter has been the job of IP management in many well-managed parks in Batam. Therefore, firms inside IP can concentrate more on the production side rather than wasting time dealing with regulations and permits.

We further learn that in addition to location, firms' characteristics such as its origin and orientation also affects their performance. Foreign firms which engage in exporting activity do not negatively affected by the policy change. Instead, they managed to retain their productivity level relative to the control group. Thus, in times of policy discontent such as happened in Batam, maintaining these kind of firms are essential to prevent deeper productivity drop.

CONCLUSION

After it was perceived to underperform under local government leadership, president Jokowi attempted to recentralise the Batam FTZ administration in 2016 by placing it under the Coordinating Minister of Economic Affairs. The policy is aimed to promote more efficient bureaucracy and services as well as resolving the long lasting dual authority issue between the central and the local government.

This research investigates the impact of that policy change on firms' productivity. I employ difference-in-difference estimation strategy to exploit the impact, using Batam's neighboring provinces as the control group . Prior to do this, I established that the data passed the parallel trend test for growth (passed the lead trend test) and productivity (passed both lead and time trend tests). Main results suggests that the policy has caused a large 45% drop in terms of output growth, and 32% drop in terms of productivity growth. The impact is serious that led the government to take drastic action to revert the policy decision by 2019.

There are two important things that stand out from this study. First, firms choice of location can determine its severity against policy change. Those located in the Industrial Park are not necessarily affected by the negative impact of the policy. Secondly, foreign and export oriented firms are more resilient to the change. My result shows that those type of firms are able to record positive growth relative to the control group in the period after the policy implementation. Regardless of future policy

options decided by the government, maintaining the operations of these firms is important to prevent deeper productivity loss.

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