

Institutional Change and the Challenge for Industrial Upgrading in Indonesia

by

WIRYAWAN Bangkit Aditya

DISSERTATION

Submitted in Partial Fulfilment of the requirements

for the Degree of

Doctor of Philosophy in International Development

GRADUATE SCHOOL OF INTERNATIONAL DEVELOPMENT

NAGOYA UNIVERSITY

Approved by the Dissertation Committee:

OTCHIA Christian (Chairperson)

OTSUBO Shigeru

SOMEYA Masakazu

UMEMURA Tetsuo

Approved by the Faculty Council: September 10, 2021

ABSTRACT

One of the most important institutional changes that occurred in the past four decades is decentralization reform. We have seen many countries underwent decentralization reforms due to strong support from international organizations or through own socio-political changes. This dissertation studies different impacts of decentralization on the industrial sector from multiple perspectives, with a particular focus on Indonesia. The country has been employing a nationwide decentralization policy since 2001, with subsequent policy changes to improve the efficiency of public service provisions. However, since then industrial growth has been faltering, in contrast with the remarkable growth during the pre-Asian crisis decade, with significant growth of the higher value-added industrial activities. This dissertation addresses four main issues which are: (1) cross country-level impact of local government expenditure on industrial development and upgrading, (2) the role of local capital spending on industrial growth in Indonesia, (3) the impact of local tax policy on productivity across industrial sectors, and (4) productivity impact of political dynamics due to policy change under a decentralized regime. In answering the problems, I use dynamic panel data estimation (Chapter 3 and 4) and a quasi-experimental design (Chapter 5 and 6) with additional robustness tests employing multiple methods.

As a global consensus, the impact of fiscal decentralization reform has been widely discussed from multiple perspectives. I extend the discussion by looking at the impact on the industrial sector in Chapter 3. I found that expenditure decentralization in the previous year is negatively correlated with industrial growth. However, the result is different between developed and developing countries, with the former showing a positive and significant relationship in the main result. In the group of developing countries, the estimation showed a consistent negative result. This would suggest that the decentralization program in developing countries has not been able to provide the fiscal efficiency that is needed to push industrialization. The absence of a significant relationship with the institutional variable, signifying a weak institutional setting, could be an important factor that affects the relationship. This result for developing countries confirmed the pessimistic view of decentralization raised by the second-generation theorists, that weak local institution retards development. My findings are robust to different measurements of decentralization, particularly for developing countries, as I also tested the revenue side.

Departing from the cross country finding, I delved into a more specific country case of Indonesia. Using province and district-aggregated data, I found that larger local capital spending correlates positively with the growth in the industrial sector. This finding is robust across different specifications. However, we fail to find positive and significant interactions between local capital spending and investment. If anything, the result showed a negligible negative tendency. This suggests that with every percentage increase of local governments' capital spending, the positive impact of foreign and domestic investment is marginally decreasing. It is suspected that the larger positive impact that channelled investment on industrial growth is coming from the central government's expenditure. To improve this condition, I argue that the central government needs to formulate a new institutional strategy that allows for stronger central-local collaboration, stressing a more direct role for the local governments. The current model gives too dominant role for the central government in economic-related affairs i.e. infrastructure development, and the function is carried out

separately between the central and local. The collaborative strategy is also meant to improve local governments' capacity through budget reallocation and Jakarta's assistance in development projects.

I further examine the finding in Chapter 4 above by designing a policy evaluation method to check if the negative tendency on the industry sector was indeed correlated with this fundamental institutional change of increasing local government autonomy. I targeted a specific policy that was specifically related to the local governments' role, the 2009 Local Tax Law. The policy was principally allowing the local governments to impose larger taxes on the business sector. I found that in general, the policy has been negatively affecting industrial firms' productivity, especially when comparing the deeply decentralized provinces with Jakarta, as the less decentralized unit in Indonesia. The initial result suggests that there is significant loss of productivity in the treated provinces. I also found that the effect is larger for large firms than for medium ones, and the policy does not affect low-technology firms negatively. On the other hand, I found that the impact tends to be negative for the medium and high technology industries, and especially stronger for the large firms. This confirms a long-concern issue that industrial sectors are sensitive to a major policy change.

In the last analytical part of the study, I investigate institutional change due to the central government's policy in 2016 where they recentralize the administration of the Batam Free Trade zone. This policy was received poorly by the local government, resulting in a declining business environment. In this chapter, I too found a negative impact of the policy change on firms' productivity. The initial result suggests that being located in the zone after the policy change contributed to more than a 30% loss of relative productivity. Two important things stand out from my exercise in this chapter. First, exporting firms are shown to be more resilient towards policy change. Secondly, industrial parks have been instrumental in shielding firms against bad policy.

Throughout the different analytical chapters and econometric model, I come to a piece of convincing evidence that decentralization reform has not been very efficient in promoting industrial growth for developing countries. Lack of institutional quality was the key reason behind this problem. Despite its increasingly larger responsibility under a decentralized regime, in general the local government has seemingly failed to capitalize it for the benefit of industrial growth. I suggest four important things for the government: (1) provide fiscal incentives to the local government for promoting industrial growth through the use of Specialized Allocation Grant (DAK), (2) provide larger tax as well as non-tax incentives for the export-oriented industries, (3) promote the development and modernization of industrial parks, and (4) forge a strong central-local collaboration to improve public service provision. These will not only benefiting industrial growth but could also promote diversification towards the higher value-added activities.

TABLE OF CONTENTS

ABSTRACT.....	i
TABLE OF CONTENTS.....	iii
LIST OF TABLES	vi
LIST OF FIGURES	viii
LIST OF APPENDICES.....	ix
LIST OF ABBREVIATIONS.....	x
ACKNOWLEDGEMENTS.....	xii
 Chapter 1 Introduction: Decentralization as institutional change.....	 1
1.1 Background of the study	1
1.2 Decentralization as institutional change	4
1.3 Decentralization and development around the world	5
1.4 The statement of the problem	13
1.5 Research objectives	13
1.6 Research questions	14
1.7 Structure of dissertation	15
 Chapter 2 Theoretical framework: Decentralized endogenous growth model	 18
2.1 Endogenous growth model in a decentralized government institution.....	18
2.2.1 Government in an endogenous growth model: Barro model.....	19
2.2.2 Fiscal decentralization growth model	20
2.2.3 Institutional decentralization growth model	22
2.2.4 Technological growth model in a decentralized institution.....	26
2.2 Chapter conclusion	28
 Chapter 3 The impact of decentralization reform on industrial development and upgrading ..	 30
3.1 Chapter background.....	30
3.2 Literature review.....	33
3.2.1 Efficiency theory of fiscal decentralization.....	33
3.2.2 Empirical findings	35

3.2.3	Connecting decentralization, institutions, and industrial development	36
3.3	Data and methodology	37
3.3.1	Data.....	37
3.3.2	Descriptive statistics	39
3.3.2	Methodology.....	40
3.4	Results	42
3.4.1	Baseline estimation results	42
3.3.5	Extension analysis: Industrial upgrading.....	48
3.4.2	Robustness check.....	49
3.5	Chapter conclusion	50
Chapter 4	The role of local government spending on industrial development in a decentralized Indonesia.....	52
4.1	Introduction	52
4.2	Literature review.....	56
4.3	Data and methodology	58
4.3.1	Data.....	58
4.3.2	Estimation strategy	62
4.4	Results	64
4.4.1	Baseline results	64
4.4.2	Main results	66
4.4.3	Extension analysis	70
4.4.4	Robustness check.....	72
4.4.5	Discussion.....	73
4.5	Chapter conclusion	76
Chapter 5	Regional autonomy and the challenge on industrial upgrading in Indonesia: A study on the impact of the 2009 Local Tax policy	79
5.1	Introduction	79
5.1.1	Decentralization and local autonomy	80
5.1.2	Organization of the chapter	83
5.2	Literature review.....	83
5.3	Data and estimation strategy.....	85
5.3.1	Data.....	85

5.3.2	Estimation strategy	91
5.4.	Result and discussion.....	95
5.4.1	Baseline and main results	95
5.4.2	Extension analysis: Industrial upgrading.....	99
5.5	Chapter conclusion	105
Chapter 6	Productivity impact of political dynamics in a decentralized Indonesia: The case of the 2016 centralization policy of the Batam Free Trade Zone	107
6.1	Introduction	107
6.1.1	Development of the Batam FTZ.....	108
6.1.2	Decentralization and revitalization of Batam FTZ.....	112
6.1.3	Research gap and problems	116
6.1.4	Organizational of the paper	118
6.2	Estimation method and data description.....	118
6.2.1.	Estimation method.....	118
6.2.3.	Robustness test	120
6.2.4.	Parallel trend test	121
6.2.5.	Data description.....	123
6.3	Results and discussion	126
6.3.1	Baseline results	127
6.3.2	Main results	128
6.3.3	Extension analysis: Heterogeneity and mechanisms	130
6.3.4	Robustness test	135
6.3.5	Discussion.....	138
6.4	Conclusion	141
Chapter 7	Conclusions and policy recommendations.....	143
7.1	Conclusion	143
7.2	Policy recommendations.....	149
7.3	Study limitations.....	153
7.4	Extension and future research.....	154
REFERENCES	156
APPENDICES	166

LIST OF TABLES

Table 1.1	Decentralization in selected high-income countries 1980-1992.....	8
Table 1.2	Decentralization in selected middle-income countries 1980-1992.....	9
Table 3.1	Summary Statistics	39
Table 3.2	Baseline result: Two-Step System GMM.....	43
Table 3.3	GMM2S estimation result: Developed and developing countries.....	46
Table 3.4	Alternative estimation: Revenue decentralization.....	49
Table 3.1	Summary Statistics	39
Table 3.2	Baseline result: Two-Step System GMM.....	43
Table 3.3	GMM2S estimation result: Developed and developing countries.....	46
Table 3.4	Alternative estimation: Revenue decentralization.....	49
Table 4.1	Summary statistics.....	59
Table 4.2	Correlation matrix	61
Table 4.3	Local capital spending and industrial development: Baseline results	65
Table 4.4	Local Capital Spending and Industrial Development: Main Results	67
Table 4.5	Local Capital Spending and Industrial Development: Main Result	69
Table 5. 1	Variable description.....	86
Table 5.2	Descriptive Statistics	89
Table 5.3	Entropy balancing result.....	94
Table 5.4	Baseline estimation result (without sample matching).....	96
Table 5.5	Main result for industrial firms controlling for endogenous variables.....	98
Table 5.6	Extension analysis: Policy impact on industrial upgrading.....	102
Table 5.7	Difference in institutional quality.....	104
Table 6.2	Value and number of project in Batam FTZ.....	116
Table 6.3	Parallel-trend test result	123
Table 6.4	Descriptive Statistics	124
Table 6.5	Baseline estimation result.....	127
Table 6.6	Main estimation result	129
Table 6.7	Extension analysis: Heterogeneity (Firm size).....	131
Table 6.8	Extension analysis: Heterogeneity (Firm orientation).....	132
Table 6.9	Extension analysis: Heterogeneity (Firm location)	132
Table 6.10	Extension analysis: Mechanisms.....	134

Table 6.11	Robustness Test: Instrumental variable regressions	135
Table 6.12	Placebo test result.....	137

LIST OF FIGURES

Figure 1.1	Decentralization and Per capita GDP 1995 – 2017	6
Figure 1.2	Decentralization and average manufacturing growth 1995 – 2017.....	12
Figure 1.3	Structure of dissertation.....	15
Figure 3.1	Decentralization in Developed and Developing Countries 2005-2017.....	31
Figure 4.1	Indonesia’s fiscal decentralization share 2000 – 2019.....	53
Figure 5.1	Log number of bad regulations in 2007 and 2015.....	82
Figure 6.1	Map of Batam FTZ (Insert: map of Southeast Asia).....	109
Figure 6.2	Map of SIJORI Growth – Triangle.....	111
Figure 6.3	Investment and growth dynamics in the Batam FTZ	114
Figure 6.4	Batam FTZ structure under different regimes	115
Figure 6.5	Parallel trend graph.....	122
Figure 6.6	Box plot graph: Firm productivity.....	125
Figure 6.7	Coefficient of the impact of 2016 FTZ Policy in Batam.....	125

LIST OF APPENDICES

Table A.1	Extension analysis: Industrial Upgrading (Chapter 3)	167
Table A.2	List of countries used in estimation in Chapter 3	168
Table B.1	Robustness under alternative specifications (Chapter 4).....	169
Table C.1	Cumulative number of “bad” regulations (Chapter 5)	170
Table C.2	List of “bad” regulations for the control group (Chapter 5).....	171
Table C.2	Incentives in the Batam FTZ (Chapter 6).....	172

LIST OF ABBREVIATIONS

AEC	ASEAN Economic Community
ASEAN	Association of Southeast Asian Nations
BIDA	Batam Industrial Development Authority
BKPM	Badan Koordinasi Penanaman Modal
BPS	Badan Pusat Statistik
BRICS	Brazil Russia India China and South Africa
DAK	Dana Alokasi Khusus
DAU	Dana Alokasi Umum
DDI	Domestic Direct Investment
FDI	Foreign Direct Investment
FTZ	Free Trade Zone
GDP	Gross Domestic Product
GFS	Government Finance Statistics
GMM	Generalized Method of Moments
GRDP	Gross Domestic Regional Product
IMF	International Monetary Fund
IMS-GT	Indonesia Malaysia Singapore Growth Triangle
KPPOD	Komite Pemantauan Pelaksanaan Otonomi Daerah
LAC	Latin America and the Caribbean
MENA	Middle East and North Africa
MHA	Ministry of Home Affairs
MITI	Ministry of International Trade and Industry
MOSA	Ministry for Social Affairs
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
RPJMN	Rencana Pembangunan Jangka Menengah Nasional
SAR	Special Administrative Region
SDG	Sustainable Development Goals
SIJORI	Singapore Johor Riau
SSA	Sub Saharan Africa

TFP	Total Factor Productivity
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar
VAT	Value Added Tax
WBES	World Bank Enterprise Survey
WDI	World Development Indicator
WGI	World Governance Indicators

ACKNOWLEDGEMENTS

“Yang terpenting dalam negara yang berdasar aliran pikiran integral ialah penghidupan bangsa seluruhnya. Negara tidak memihak kepada suatu golongan yang paling kuat, atau yang paling besar, tidak menganggap kepentingan seseorang sebagai pusat, akan tetapi negara menjamin keselamatan hidup bangsa seluruhnya sebagai persatuan yang tak dapat dipisah-pisahkan. Sekarang, Tuan-tuan akan membangunkan negara Indonesia atas aliran pikiran mana?”

- Soepomo, BPUPKI Speech May 1945

Soepomo raised a highly important question, as shown in the quote, that is still relevant for the quest of nation-building of Indonesia today. Changes and choices made in the hope in advancing the country have often led to a difficult path with many consequences. This dissertation captures some of those dynamics and offer few recommendations, albeit with many limitations.

Many things had happened in the completion of this dissertation and many people had given enormous help and care. I owe a great debt and thanks to Professor Shigeru T. Otsubo for his extensive comments and guidance for this dissertation. The same feeling goes to Professor Masakazu Someya and Professor Umemura for their valuable and critical comments on my work. My utmost thank is also extended to Professor Teguh Dartanto at the University of Indonesia for his kind help as the coordinating supervisor during my fieldwork in Indonesia. And most importantly, this dissertation would not happen without the careful nurturing and supervision of Professor Christian Otchia, to whom I offer my sincerest gratitude. I also thank MEXT scholarship that has provided me with financial support and to the staffs at the GSID Administrative office for their enormous helps.

At the beginning of 2021, I had the opportunity to work as an intern in the UNCRD under the supervision of Director Kazushige Endo. The experience has greatly influenced me and inspire some parts of this dissertation. My gratitude goes to the director and also to Nana-san, Izukawa-san, Yokota-san, and Professor Hiroki (GRIPS) for the help during my internship.

My friends had helped me a lot even in the slightest way, they are truly life companion. I would like to thank my friends at the PPI Jepang and PPI Nagoya, we have spent our time wonderfully. My GSID friends have been very nice and fun, *minna arigatoune!* I would like to also thank the ASEAN Nagoya Club for inviting me to the many interesting meetings and events in Nagoya, I met many new friends here. My new friends at the Rotaract Club Nagoya are among the most positive people, they inspired me to make a better change for the world. I will never forget my good friends from the Political Science Department, the University of Indonesia, the Southpole gang, and my many friends and colleagues at the Ministry of Public Works and Housing of Indonesia.

My dearest wife, Leni Ferilia, has been very supportive and patient despite having to live the longest-distance life, especially for the past two years due to Covid-19. Thank you for everything dear. Lastly, I would like to dedicate this dissertation to my parents, especially my mom who was always believe in me.

May Allah bless you all. Terima kasih!

Nagoya, 11 June 2021

Chapter 1

Introduction: Decentralization as institutional change

Institution matters. Institutional change has been one of the key focuses of development studies in the last four decades. This chapter is dedicated to providing a background argument on the importance of decentralization as part of a major institutional change that took place in many countries around the world for the past forty years. Indonesia has been riding this wave of change following its 1998 Socio-economic reform. This large magnitude of dynamics would have certainly affected development in multiple sectors. This dissertation focuses on the impact of decentralization reform on the industrial sector in Indonesia, including on the recently important discussion of industrial upgrading.

1.1 Background of the study

Modern nation-state institution has been heralded as the key building block of industrial development. It is difficult to imagine that the first industrial revolution in England in 1760 would happen without the big institutional change that was the Bill of Rights at the end of the 17th century. The bill ended the absolute monarchy system and put the king and the queen as subject to the law passed by the parliament, thus strengthening the rule of law. This later paved the way for strong civil liberty and property rights that would serve as a foundation for the industrial revolution. A similar phenomenon happened also in the late 18th century United States (US) where people's right to property was defended in their declaration of independence and the passing of the US's Bill of Rights. On the other side of the world, Japan's remarkable

industrialization during the Meiji period (1868-1912) also happened following major institutional change that ousted the older feudal system and replaces it with a more modern nation-state style that guarantees property rights. Elsewhere in the world, we could see this pattern of change between institutions and the first industrial revolution.

Fast forward to the later part of the 20th century, a strong national institution has been the prerequisite of industrial development. The national government often exercises this function such as exhibited with the instrumental role of the government through the Ministry of International Trade and Industry (MITI) in Japan (Johnson, 1982). This state-led development approach was also followed by Japan's neighbors, the four Asian Tigers. These countries are South Korea, Taiwan, Hong Kong, and Singapore. Significant government intervention in the free-market system served as a key for the countries' growing industrial prowess in the 1960s through 1990s (Wade, 2004). The strong role of the government has its roots in the institutional setting that allows such progress to happen. Japan and Asian Tigers' development experience has been largely different from the relatively smaller government institution in the market in many western countries.

Around the same time with the success of East Asian countries, economists have also been increasing their attention towards institutional development and its impact on economic growth (Acemoglu et al., 2008; Acemoglu & Robinson, 2013; Ha-Joon, 2007; North, 1991). Recently, the World Economic Forum through their Global Competitiveness Report has put institutions as one of the most important basic requirements in building competitiveness, thus maintaining economic growth (Sala-i-Martin, 2016).

However, defining institutions has not been an easy task. On the one hand, sometimes the word is tightly associated with the state and law but on the other hand it is often simply translated as the government, as shown in my elaboration on the Tiger Economies. It is

necessary here to first look at the difference between the two concepts, and then to see in which manners they could be closely associated. In its most tacit form, institution can be understood as a social contract that manifested itself in the set of rules that binds the society within a certain territory across different sectors. In a more simple and elegant way, North (1990) describes institutions as the rule of the game in a society. Customs and traditions are examples of institutions. They regulate society in a certain way, and it would be considered wrong to not comply with them. The market is another example of an institution. It is often manifested in a very concrete form, the market, but the actual institution lies in the set of rules between buyers and sellers. The market price is the cross-term product between the two sides. All these kinds of institutions can be governed by themselves but although they possess an established and coordinated structure, in most cases they lack authoritative power. This is where the role of the government as an institution becomes important.

The government often serves as the embodiment of the institution in its most rigid form. Weber attributed the modern nation-state as a legal-rational type, stressing the social contract aspect manifested in its constitution. The government is the only institution that is equipped not only with coercive power over the society (Weber, 1919 in Gerth & Mills, 1946) but also resource and means such as policy and fiscal resources. These enabled the government to have a large impact on society. For this reason, and as shown in the case of Japan and the Asian Tigers, these are all reasons to suspect that the state's policy and fiscal structure are affecting economic progression as well as industrial development.

1.2 Decentralization as institutional change

With the understanding of the importance of government as an institution, we can proceed to see the different approaches the government takes to influence the society and economy. One of the more recent institutional experiments by the government has been the decentralization reform. The World Bank (2013 para. 1) describes this as “The transfer of authority and responsibility of public functions from the central government to the lower level of governments (province or city/district)”. It gives a larger degree of control for sub-national governments, provinces and or prefectural and city-level governments to carry out public service provision. Since it involves the relationship between central government at the top of the policy structure and the local government at the bottom, it can be seen mainly as a vertical change.

Decentralization is not a singular term. The type varies widely depending on the degree of transfer of authority to the local government. Seddon and Litvack (1999) elaborate three common types of decentralization.¹ Firstly, there is administrative decentralization, which entails a certain transfer of responsibility for public service provision from the central government to its subordinate unit at the local level, however with the latter’s limited degree of authority. This type could be further divided into three categories: deconcentration, delegation, and devolution (see Seddon & Litvack, 1999). The second type is fiscal decentralization. This has many of the attributes from the former only with larger financial responsibility. It goes beyond expenditure function. It includes revenue mobilization as an inherent function which

¹Many experts accounted for three types of decentralization (others identify as many as six types, see UNDP, 1999), with the third type being the administrative decentralization. However practically it will not be distinguishable with a centralized system of governance as the central government still hold on to budgeting and political power such as the case with China during the Great Leap Forward in 1958-1962 (see Hao and Zhimin, 1994), therefore the two types of decentralization (fiscal and political) are discussed mainly in this research.

made it distinct from the first type. Finally, the third type of decentralization is the known as political decentralization. This involves a large degree of citizen participation at the local level, in addition to the two previous functions. One of the main participation channels comes through a local election.

Bahl and Bird (2008) argued that bringing the government closer to the people would benefit from welfare gain, a statement akin to the previous scholars of decentralization (Oates, 1972; Tiebout, 1956). In turn, local governments would benefit from increased revenue as their tax base is growing wider. Other arguments for decentralization include the promotion of inclusive growth and reducing inequality between regions and cities of a country (Junghun & Sean, 2018).

In the political realm, Treisman (2007) describes decentralization as being perceived by many as the cure for “... a remarkable range of political and social ills”. Indeed, there has long been a growing international belief in the positive impact of the devolvment of governance, one that was continuously promoted by international communities such as the World Bank² as well as world leaders such as the US’s Bill Clinton and George W. Bush, Francois Mitterrand, Jacques Chirac, Mikhail Gorbachev, and Boris Yeltsin.

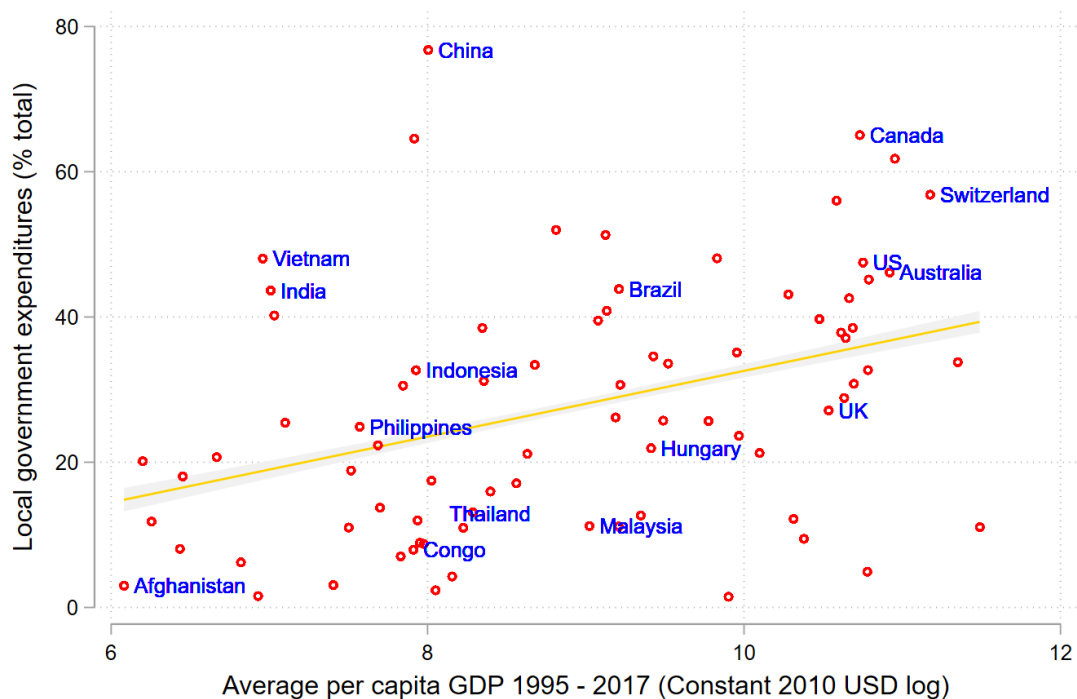
1.3 Decentralization and development around the world

A decentralized system of governance has been an integral nature of a federal nation, but it does not come naturally for a unitary nation. Large and populous countries tend to form a federation such as the US, Canada, Russia, Brazil, and India, where the local governments hold a larger

² The Bank in 1999 issued its World Development Report with the focus on globalization and localization, mentioning the importance of bottom-up and participatory development process that involves the process of decentralization (World Bank, 1999).

decision-making role on the majority issues of development. Typically, the local government's budget in the high-income economy accounts for two-thirds or more of the general government budget. Federalized non-high-income countries such as Brazil and Malaysia had a significantly higher central government budget ratio that stands at more than 50% of their overall budget. Malaysia is considered as one of the most centralized federalized nations, which some believe to be the cause for its continuing middle-income trap (Ostwald, 2017; Yeoh, 2019).

Figure 1. 1 Decentralization and Per capita GDP 1995 – 2017



Note : Decentralization is calculated as 23 years average of local government expenditure from 1995 to 2017 as a share of total government expenditure.

Source : Author, calculated from IMF's GFS and World Bank's WDI.

Cross-sectional data of various countries from various income groups between 1995 and 2017 showed that there is a common tendency whereby high-income countries have a higher degree of decentralization while low-income countries are less decentralized in terms of government expenditure (see Figure 1.1). The figure also shows how large and populous

countries such as China and India (as well as the other BRICS countries) tend to be more decentralized than the least populated country such as Azerbaijan and Armenia. All the OECD and Western European countries are among the most decentralized in the group, regardless of whether they follow the unitary or federal system type.

Emerging ASEAN countries such as Indonesia, the Philippines, and Vietnam, are in between the two extremes of the spectrum, with Vietnam being the more decentralized. Thailand and Malaysia are the exceptions in the group. Other ASEAN countries such as Myanmar, and Cambodia, are among the least decentralized countries on the list. In some way, this fits the previous observation that lower-income countries tend to be less decentralized while higher-income countries are more decentralized. However, as Cheema and Rondinelli (1983) put it, eventually decentralization is a political decision. Hence, higher-income countries such as Malaysia are still highly centralized.

The movement towards fiscal decentralization, especially for unitary nations, has been started in the early 1980s not only in many high-income countries but also in several lower-income countries. One of the underlying arguments for the movement is the classical assumption that decentralization would promote economic growth. In his seminal work in 1972, Oates argued how fiscal federalism, which is an argument for decentralization, has a positive correlation on levels of per capita real income (Oates, 1972). Similar sentiment has also been expressed by others such as Bahl and Nath (1986). However, for the latter, the direction of the relationship between the two variables is not definitive.

High-income countries felt the need to further push the development agenda amidst increasing global trade and investment. Prior to this, in the 1970s, many governments had been deconcentrating their government function, also known as administrative decentralization, to increase public service effectiveness (Cheema & Rondinelli, 1983). Under this regime,

planning and budgeting were still in the hand of the powerful central government. Later it was realized that the prevailing centralized planning has not been deemed sufficient enough to sustain growth.

Table 1.1 Decentralization in selected high-income countries 1980-1992

Country	1980	1982	1984	1986	1988	1990	1992
Canada	28.45	32.36	30.24	31.02	30.51	33.42	36.03
Finland	17.94	19.08	19.56	21.05	19.52	21.00	23.70
Norway	17.16	17.25	16.79	18.19	20.72	19.53	19.93
Australia	16.97	17.01	18.52	19.12	18.44	18.14	19.63
United States	16.66	16.79	16.22	17.03	17.31	17.91	19.29
Spain	3.29	5.83	7.81	9.58	10.57	14.51	16.00

Note : Decentralization is measured as share of sub-national government expenditure to GDP

Source: The World Bank, 2000

Canada and Finland are among the most decentralized in the high-income economy group between 1980 and 1992 (see Table 1.1). Canada, a federalized nation, increased its sub-national government expenditure (% of GDP) from 28.45% to 32.36% from 1980 to 1982, and continue to increase on average to the level of 36.03% in 1992. The unitary nation of Finland has increased its sub-national government's expenditure from 17.94% to 19.08% between 1980 and 1982. Meanwhile, Norway, Australia, and the US had a quite similar progression of decentralizing their economy between 1980 and 1992. Spain, which had initiated the decentralization act in 1978 (López-Laborda, Martínez-Vazquez, & Escudero, 2006), started with a very low share of sub-national governments' budget to GDP in 1980. However, by 1992 its share had increased to a more substantial margin at 16%.

Other developed countries during the same time period have mixed decentralization performance such as Germany (formally known as West German), France, the Netherlands, and Denmark. Towards the end of the 1970s, all these countries had an increased share of sub-national government expenditure until the early 1980s where their share started declining up to the latter half of the decade.

Table 1.2 Decentralization in selected middle-income countries 1980-1992

Country	1980	1982	1984	1986	1988	1990	1992
Argentina	5.21	5.03	7.14	8.76	8.63	8.36	9.76
Brazil	9.64	10.87	10.19	13.19	13.07	18.33	17.90
Mexico	4.43	4.88	4.49	3.90	3.67	4.04	4.91
Chile	1.08	3.45	2.65	2.33	2.51	-	1.61
Indonesia	2.80	2.96	2.60	2.36	2.03	2.21	2.34
Malaysia	6.36	8.03	7.23	7.95	7.67	7.55	6.04
Thailand	3.66	1.65	1.61	1.57	1.21	1.16	1.43
Philippines	1.72	1.84	1.41	1.42	1.28	1.31	1.87
South Africa	9.06	9.46	9.27	7.41	7.70	7.69	8.06

Note : Decentralization is measured as share of sub-national government expenditure to GDP

Source: The World Bank, 2000

In the developing world, Argentina and Brazil were the two most decentralized economies by the early 1990s. Both are all federal countries which means that the larger share of sub-national government is determined in their constitution. Meanwhile, Mexico, Malaysia, and South Africa, while also federalized nations, had a declining share of sub-national government expenditure to GDP between 1980 and 1992 (see Table 1.2).

All the remaining developing countries from Table 1.2 show a centralistic nature of their governance institution. Chile, Indonesia, Thailand, and the Philippines at some points were all under centralized authoritarian regimes. Despite its Administrative Decentralization Policy in 1974, Indonesia had a decreasing share of sub-national spending. In the Philippines, the state and local government spending share did not increase until the post-Marcos era following the “people power” movement in 1986. Wide call for decentralization was one of the main issues during the Corazon Aquino administration (1986 – 1992).

The above description shows a contrasting nature between the high-income and the middle-income. A more decentralized economies seem to have higher income levels in general, while the centralized nations tend to have lower income levels. The relationship, however, is not straightforward. Davoodi and Zou (1998) showed that in the above-mentioned period, there are no relationship between fiscal decentralization and economic growth for the high-income countries, while for the rest of the group the relationship is negative. This means that the more decentralized the government is, the less level of economic growth will be acquired. The presence of the multi-level governments, each executing their own public function through policy and tax, explains the nature of the relationship.

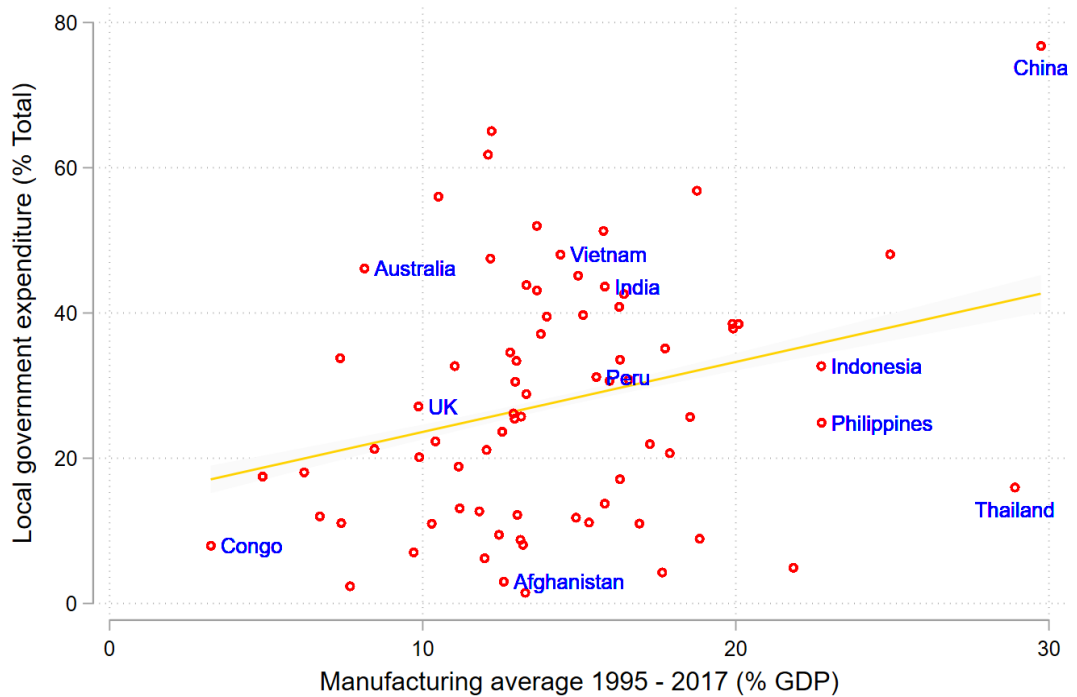
1.4 The statement of the problem

Decentralization has been part of a large institutional change that happened started in 1980s, and more widely in the developing world since the 1990s. The move in this direction has been advocated by international community, following global political change in the post-cold war era. The move may also happen following a country’s specific socio-political change such as in Brazil (1988), The Philippines (1986), and Indonesia (1998).

Institutional change at this magnitude would have brought some effect on countries's development route. We have observed that there is a tendency that richer countries are more decentralized compared to the poorer ones, suggesting that decentralized institutions could sustain growth in the long run. However, what is more important is to investigate the relationship between decentralization reform and industrial development. As suggested by many studies (Kniivila, 2007; Lin, 2010; Otsubo and Otchia, 2010), industrialization is still the key for productive structural transformation for developing countries. To achieve this under a decentralized institution, a positive relationship between decentralization reform and the share of industrial output is to be expected.

Figure 1.2 illustrates the relationship between decentralization and industrial output share to GDP. Again, here we see a positive tendency that a decentralized institutions seem to be able achieve higher industrial share. However, there is still a lot of heterogeneity. Firstly, we can observe that less-developed countries such as Republic of Congo and Afghanistan tend to be more centralized in the group. As a result, these countries recorded a substantially low share of manufacturing output. Secondly, another trend is showing for the developed country group like UK, Australia, and France. They sit on the more decentralized spectrum in the figure. Their share of manufacturing is less than 10%, however this does not suggest that they fail to industrialize but rather that these countries have entered the post-industrial stage of development where the share of manufacturing start to diminish.

Figure 1.2 Decentralization and average manufacturing growth 1995 – 2017



Note : (1) Unbalanced panel data of 74 countries are plotted in the graph for the years between 1995 and 2017, (2) Local government expenditures consist of province / state level and district / city level government, calculated as percentage of total government expenditure.

Source : Author, calculated from IMF and World Bank's WDI

In the last part of the figure, we can observe that many developing countries have been able to push their industrial output share. However, there seem to be no clear trend that it was affected by decentralization reform. Thailand sat at one end of the spectrum where they can achieve a high share of manufacturing output under a largely centralized government institution. On the opposite end, China has been able to industrialize through enacting decentralization reform.

Given the wide differences for developing countries, this dissertation is interested in investigating the general impact of decentralization policy and industrial development. I will

also explore whether the general finding applies to a single country, using Indonesia as the case study both at the macro and micro level.

1.5 Research objectives

The development of the industrial sector in developing countries has been contentious. In Indonesia, the high-performing period came under a centralized regime and as soon as the crisis hit that led to the increasing local autonomy following decentralization policy, the country's industrial prowess has waned. This study seeks to investigate the potential causal relationship between decentralization policy and industrial progression that includes growth and upgrading issues. The research objectives are, then, set in the following order:

1. To design a theoretical endogenous growth model of a decentralized state institution.
2. To explore the impact of the worldwide trend on fiscal decentralization towards industrial development and upgrading in developing countries.
3. To investigate the impact of Indonesia's 2001 decentralization reform on industrial development at the sub-national level.
4. To evaluate the impact of decentralization-related policy on sub-national business environment how it affects industrial firms' output and productivity.
5. To evaluate the impact of the central government's place-based policy on industrial productivity at firm-level.
6. To design an industrial development strategy under a deeply decentralized institution.

1.6 Research questions

Industrialization has been considered as the key to a productive structural transformation. To that end countries like Indonesia utilized industrial policy and provide incentives for the growth of the sector. In the past, tight control by the central government managed to reduce institutional frictions between the central and local governments. However, following its decentralization policy in 2001, institutional dynamics have been changing in Indonesia, especially with regards to the central-local relationship.

Building on the research objectives that I have elaborated in the previous section, the study proposed the following research questions:

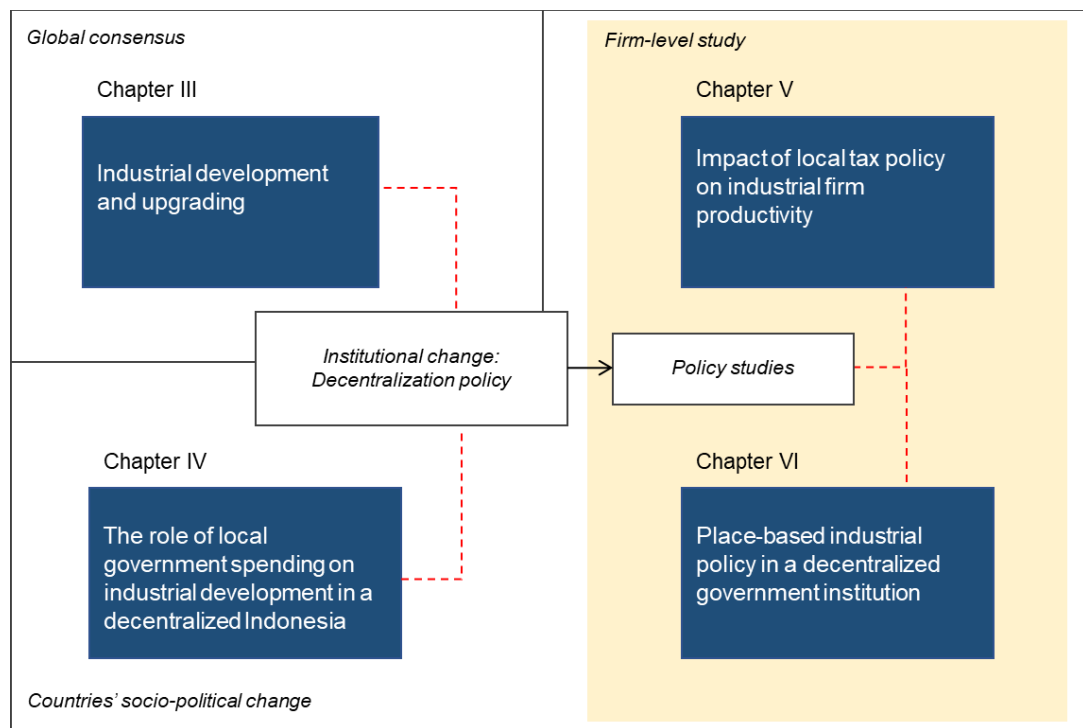
1. How can a decentralized institution affect industrial development under a theoretical endogenous growth model?
2. What is the general relationship between worldwide trends on fiscal decentralization and industrial development?
3. How can fiscal decentralization be used to support industrial development in developing countries?
4. How has increasing local autonomy at the province and district level affected industrial development in a decentralized Indonesia?
5. How does local government's capital spending related to foreign and domestic direct investment in supporting industrial growth?
6. How has the change in tax policy following the introduction of the 2009 local tax policy affected industrial firm output and productivity at the province level?

7. How has the central-local institutional change in the Batam Free Trade Zone following the 2016 recentralization policy affected industrial firm productivity amidst the increasing local autonomy?
8. How can the government at the central and local levels develop an appropriate industrial strategy under a decentralized institution?

1.7 Structure of dissertation

This dissertation offers to shed light on the relationship between the decentralization of state institutions. Figure 1.3 illustrates how I connect between the main analytical chapters. I divided this research into seven chapters, with four main analytical chapters, as follows:

Figure 1.3 Structure of dissertation



Source: Author

Chapter 1: Introduction: Decentralization as institutional change. This chapter serves as an introductory gateway to the dissertation by spotting the problem from an institutional perspective. I also elaborate my research objectives and questions in this chapter.

Chapter 2: Theoretical framework: Decentralized endogenous growth model. In this chapter I elaborate on how a decentralized institutional framework could possibly contribute to industrial growth and how it links with technological change to support industrial upgrading. The model derives largely from Barro's (1990) seminal work.

Chapter 3: The impact of decentralization reform on industrial development and upgrading. This chapter discusses decentralization as a global consensus as it was widely implemented. The discussion contrasts the reform's result in developed and developing countries. At the end, I provide an argument on how to make it work for industrial development in developing countries.

Chapter 4: The role of local government spending on industrial development in a decentralized Indonesia. This study focuses on the direct consequences of decentralization reform in Indonesia, where the local government was granted larger capital spending. I estimate the basic relationship between decentralization and industrial growth and extend my analysis to see how it forges linkage with foreign and domestic direct investments in supporting the sector's growth.

Chapter 5: Regional autonomy and the challenge for industrial upgrading in Indonesia: A study on the impact of the 2009 Local Tax Policy. This chapter provides an analysis on the impact of the 2009 Local Tax Law in Indonesia on firm productivity. The policy had enabled the local government to increase their tax base to close the fiscal gap at the local

level. I estimate its effect by comparing deeply decentralized provinces with a less decentralized province.

Chapter 6: Productivity impact of political dynamics in a decentralized Indonesia: The case of the 2016 centralization policy of the Batam Free Trade Zone. Amidst strong local autonomies granted to the local government since the 1998 reform, the central government attempted to recentralize the administration of Batam Free Trade Zone in 2016. I investigate these central-local political dynamics and how they affected firm productivity on the island. Subsequent robustness tests using alternative measures of productivity and placebo test are performed.

Chapter 7: Conclusion and policy recommendations. In this last chapter, I summarize my findings from all the main chapters and provide policy recommendations in the attempt to revitalize the industrial sector in Indonesia.

Chapter 2

Theoretical framework: Decentralized endogenous growth model

This chapter provides a theoretical model of a decentralized institutional change on economic growth, specifically in the industry sector. I propose three sections, beginning with the general endogenous growth model with government role as developed by R. J. Barro (1990). It is then followed by a more detailed model explaining the different levels of government.

2.1 Endogenous growth model in a decentralized government institution

In the era of the nation-state and considering the instrumental role of the government in economic growth in many developing countries, then factoring them in an economic growth model is necessary. The following part is an effort to elaborate on the role of government expenditure in the economic growth model. In the first part, the government is measured as a single unit of the entity and then followed by the second part that tried to separate government institutions between federal, state, and local. In the third part, a decentralized institutional government growth model is then developed based on the previous ones with the addition of distance-efficiency and institutional-efficiency measures as endogenous variables. In the last part, technological change in a decentralized institution is considered as an endogenous factor in the model, thus concluding the aim of this chapter.

2.2.1 Government in an endogenous growth model: Barro model

Barro (1990) developed an extension of the Cobb-Douglas production function to include government spending in an endogenous growth model. His model was based on the previous endogenous model (King & Rebelo, 1988; Lucas, 1988; Romer, 1986), and has been further developed in Barro and Sala-i-Martin (1992). The basic Cobb-Douglas function that includes government spending is as follow:

$$y = Ak^{1-\alpha}g^{\alpha} \quad \dots(2.1)$$

Assuming that α has a return to scale property, thus $0 < \alpha < 1$, with y as the level of output and A , k , and g indicating total factor productivity, capital, and government expenditure per-capita, respectively. The constant return to scale assumption is appropriate when considering the broad concept of capital which encompasses human and non-human (Barro 1990).

Government expenditure is constrained by tax rate constant τ , so that the equation (2.1) can be translated as the following

$$g = \tau y = \tau Ak^{1-\alpha}g^{\alpha} \quad \dots(2.2)$$

therefore as Barro put it, for a given expenditure ratio of τ , y is proportional to k , a reminiscent of the basic AK model where $y = Ak$. The marginal product of capital from equation (2.1) above is

$$f_k = A(1 - \alpha)(g/k)^{\alpha} \quad \dots(2.3)$$

With the combined equation by substituting $g = \tau y$ we will get

$$y = kA^{1/(1-\alpha)}\tau^{\alpha/(1-\alpha)} \quad \dots(2.4)$$

the above equation implies that output growth y will shifts upward with the increase of τ and the same principle applies to the marginal product of capital, f_k

$$f_k = (1 - \alpha)A^{1/(1-\alpha)}\tau^{\alpha/(1-\alpha)} \quad \dots(2.5)$$

The other implication of the model is that as long as τ is constant, meaning that g is growing at the same rate as y , the growth rate of the given country is constant. Meanwhile, given the initial capital level $k = 0$, per capita (household) growth rate can be derived from the first-order condition of that equation (2.1)

$$\gamma = \dot{c}/c = (1/\sigma)(1 - \alpha)A^{1/1-\alpha}(1 - \tau)\tau^{\alpha/1-\alpha} - \rho \quad \dots(2.6)$$

2.2.2 Fiscal decentralization growth model

In realizing the growing dynamics of decentralization, particularly between 1975 and 1990 in 46 countries, Davoodi and Zou (1998) developed a model similar to that of Barro (1990). The model assumes that three-tiered levels of government exist; federal (f), state (s), and local (l). Decentralization level is determined by each entity's expenditure and measured in percentage, so that the combination of all three levels will equal to 100%, or signified as g

$$f + s + l = g \quad \dots(2.7)$$

Plugging it into the basic Cobb-Douglas production function with only one factor of production, we will have the following growth model

$$y = k^\alpha f^\beta s^\gamma l^\omega \quad \dots(2.8)$$

Total government spending g allocated to each level of the government takes the following form

$$f = \theta_f g, \quad s = \theta_s g, \quad l = \theta_l g, \quad \dots(2.9)$$

And following Barro (1990) and Rebelo (1987), the model also has constant return to scale properties where $\alpha + \beta + \gamma + \omega = 1$ and that each has a value between 0 and 1. Government

budget constraint in the model also stated as τ akin to that in the equation (2.2), and considering the presence of private consumption per capita (c), then based on equation (2.8) we will get the following dynamic budget constraint offered by Davoodi and Zou (1998)

$$(1 - \tau)y - c = (1 - \tau)k^\alpha f^\beta s^\gamma l^\omega - c \quad \dots(2.10)$$

Assuming representative agent's (consumer) maximizing overall utility function, following Ramsey (1928), Cass (1965), and Koopmans (1963), or the Ramsey-Cass-Koopmans model where the constant rate of time preference, ρ , is positive

$$U = \int_0^\infty \frac{c^{1-\sigma}-1}{1-\sigma} e^{-\rho t} dt \quad \dots(2.11)$$

Then per capita growth rate can be measured in the same sense of the Barro (1990) static model for a decentralized government, referring to the consumer utility function in equation (2.11) above and government spending allocated for each level of government in (2.9) the following solution can be formulated as

$$\frac{dy/dt}{y} = \frac{\dot{y}}{y} = (1/\sigma) \left[(1 - \tau) \tau^{1-\alpha/\alpha} \alpha \theta_f^{\beta/\alpha} \theta_s^{\gamma/\alpha} \theta_l^{\omega/\alpha} - \rho \right] \quad \dots(2.12)$$

Meaning that per capita output growth is a function of spending by different levels of government in federal, state, and local. Up to this point, most of the work is very similar to that of Barro (1990) but with the addition of sub-national entities into the equation. The most unique element of both author's work is in their growth maximizing government budget shares mechanism. This determines that in order to achieve a higher growth rate, government spending can be reallocated among different levels of government if the existing allocation is different from the growth maximizing expenditure shares (Davoodi & Zou, 1998). Again, following equation (7) and assuming that $\theta_f + \theta_s + \theta_l = 1$, the growth maximizing the function of government budget shares are

$$\theta_f^* = \frac{\beta}{\beta+\gamma+\omega} \quad \theta_f^* = \frac{\gamma}{\beta+\gamma+\omega} \quad \theta_f^* = \frac{\omega}{\beta+\gamma+\omega} \quad \dots(2.13)$$

With the above condition, economic growth can be increased simply by reallocating the budget to each level of government without needing to increase government budget, assuming that the current condition is below optimum maximalization level.

2.2.3 Institutional decentralization growth model

The work of Barro (1990), which he later expanded to include dynamic population growth (Barro & Sala-I-Martin, 1992), has been the major starting point for many studies on the impact of government spending on growth. Later on, the model is developed further by Davoodi and Zou (1998) that sufficiently elaborated how different levels of government can affect economic growth in a below-optimum maximizing level, even without increasing government spending. However, apart from the model being static, it also failed to reflect the efficiency approach of decentralization postulated by Oates (1972) and Tiebout (1956), nor attributing the latter concern of elite-capture and weak institutions addressed by second-generation fiscal federalism theorists.

Departing from the same approach of Barro (1990) using Cobb-Douglas production function, and assuming the model has a constant return to scale properties ($0 < \alpha < 1$), we start with the following

$$y = Ak^{1-\alpha}g^\alpha \quad \dots(2.14)$$

Where A is an exogenous technological factor and y is production output. k and g denotes capital and government expenditure per capita respectively. Realizing the important role of institutions raised by North (1990; 1991) and Ja-Hoon (2007), then i is added in the equation to

signify institutional efficiency measure as a proxy of institutional quality, thus giving the following model

$$y = Ak^\alpha g^\beta i^\omega \quad \dots(2.15)$$

Assuming a constant return to scale properties of the model, then $\alpha + \beta + \dots = 1$, with i having the value > 0 . To incorporate decentralization dynamics in the model, then following Davoodi and Zou (1998) government spending g can be decomposed into central and local government. Instead of three levels of government, a dichotomous distinction is used to denote central and sub-central government that encompasses province/state or cities/district, where p is the percentage of central government spending with regards to g , and the rest $(1 - p)$ as the spending of local government

$$p + (1 - p) = g \quad \dots(2.16)$$

where $g = 1$. Then following equation (2.15), we will have this production function

$$y = Ak^\alpha p^\beta (1 - p)^\gamma \quad \dots(2.17)$$

Where $\alpha + \beta + \gamma = 1$ and that $0 < \alpha < 1$, $0 < \beta < 1$, $0 < \gamma < 1$, with budget constraint stated as τ following equation (2.2). Plugging in institutional measure into the model the following can be derived

$$y = Ak^\alpha p^\beta (1 - p)^{\gamma i^\omega} \quad \dots(2.18)$$

This model implies that the marginal product of capital is

$$f_k = A(\alpha)(p^\beta (1 - p)^{\gamma i^\omega} / k) \quad \dots(2.19)$$

Thus, giving us the understanding that increasing central and local government spending with regards to institutional efficiency level, will provide increasing capital k . Properties of

allocation for each level of total government spending g in equation (2.16) can be described as the following

$$p = \theta_p g, \quad (1 - p) = (1 - \theta_p)g \quad \dots(2.20)$$

In order to incorporate the distance-efficiency proposition in decentralized governance, ι is attributed as a property of the central government and that 2ι for local government where the value is $0 < 2\iota < 1$. This assumes that central government is not mobile and resides within a certain geographical location and that local government resides within their own geographical locations in each province or district.

Given the budget maximization of decentralized government as a modification of the Davoodi and Zao (1998) model, considering the true nature of distance-efficiency front where decentralization is preferable, then the following can be proposed

$$\theta_p^* = \frac{\iota + \beta}{\beta + \gamma} \quad (1 - \theta_p)^* = \frac{2\iota + \gamma}{\beta + \gamma} \quad \dots(2.21)$$

From the government budget maximization equilibrium in (2.21) we can draw Proposition 1: *The further a unit of government is from the people the less efficient public service can be delivered to them, and conversely the closer the government is to the people the more efficient public service can be delivered.*

Then Following Barro (1990) and similar to equation (2.11), the consumer preference is due to the Ramsey-Cass-Koopmans model of overall utility maximization with $\rho > 0$

$$U = \int_0^\infty \frac{c^{1-\sigma}-1}{1-\sigma} e^{-\rho t} dt \quad \dots(2.22)$$

As Barro elaborates, the iso-elastic utility function from the above equation, with $\sigma > 0$ is then

$$u(c) = [c^{1-\sigma} - 1]/(1 - \sigma) \quad \dots(2.23)$$

The consumer dynamic budget constraint with regards of equation (19) can be stated as

$$(1 - \tau)y - c = (1 - \tau)Ak^\alpha p^\beta (1 - p)^\gamma i^\omega - c \quad \dots(2.24)$$

Assuming Barro's logic of constant tax rate τ that if g is growing as the same rate of y then the growth level is constant. Then attributing to Davoodi and Zou (1998), the solution for the per capita growth rate in a decentralized government institution considering equation (2.24) and its budget maximization shares of (2.21), whilst also considering the household utility maximization (2.23) is stated as the following

$$\frac{\dot{y}}{y} = (1/\sigma) \left[(1 - \tau)\tau^{\beta+\gamma} / \alpha \theta_p^{(1+\beta)/\alpha} (1 - \theta_p)^{(2\iota+\gamma)/\alpha} \delta_i^{\omega/\alpha} - \rho \right] \quad \dots(2.25)$$

It implies that under the same rate of government spending, a decentralized allocation would bring higher output growth compared to centralization denoted in $2\iota + \gamma$. And then lastly, taken into account institutional efficiency δ where the value is $0 < \delta < 1$, then we can add Proposition 2: *Distance-efficiency measure in a decentralized governance is also affected by the level of institutional quality in the country, the lower its institutional quality is the less efficient public service can be delivered regardless of its decentralization level and distance and conversely the higher its institutional quality level is the more efficient public service can be delivered.*

With Proposition 1 and Proposition 2 above, it is technically possible for a country to experience increasing return to scale of growth just by decentralizing their budget structure. However i that denotes institutional quality will affect its efficiency, where a low institutional score would render decentralization inefficient. Thus, this goes in line with the concern over elite capture, corruption, and capacity constraints of the later decentralization scholars (Ahmad, Devarajan, Khemani, & Shah, 2005).

The model also suggests the following proposition 3 that even without decentralizing its budget structure a country can still enjoy higher economic growth subject to its institutional quality level but is unlikely to experience increasing return to scale when it is highly centralized. Then proposition 4 can also be drafted from the model that the higher the decentralization level of a country is with regards to its higher level of institutional quality, the higher its net effect to its economic growth is with the possibility to experience increasing return to scale growth.

It needs to be noted that in this model, technological efficiency or Total Factor Productivity, is regarded as an exogenous factor that is not affected by the change in g , p , $(1 - p)$, or i . In real-world economy, technological efficiency is surely affecting economic growth endogenously. In addition, the population is held constant in the model which goes against real-world conditions where population growth is a factor in the economy.

2.2.4 Technological growth model in a decentralized institution

This section tries to develop an institutional-based growth model where technological change is considered as an endogenous factor. The neoclassical growth model developed by Solow (1956; see also Swan, 1956) is usually the departing point for all growth models with technological change which is denoted by A in the model. Here we depart straight with the equation (2.11) as the following

$$y = Ak^\alpha g^\beta i^\omega \quad \dots(2.26)$$

Here we assume that A is the accumulation of technological knowledge in society. The model then implies that growth of y is subject to the level of A . Accumulation of technology itself depends on the effort of the economy directed towards technological improvement signified by v (Barros, 2001), which gives

$$A = vy \quad \dots(2.27)$$

Plugging the above equation into the initial production function given $\alpha + \beta + \dots = 1$ and that $0 < \alpha, \beta, \dots < 1$, will give the following

$$vy = vAk^\alpha g^\beta i^\omega \quad \dots(2.28)$$

Then we substitute A with the given above v that will give us

$$y = kv^{1/\alpha} g^{\beta/\alpha} i^{\omega/\alpha} \quad \dots(2.29)$$

Marginal product of capital f_k for an incremental increase in v is then

$$f_k = \alpha v^{1/\alpha} p^{\beta/\alpha} (1-p)^{\gamma/\alpha} i^{\omega/\alpha} \quad \dots(2.30)$$

The above equation implies that the growth rate of the economy is constant as long as the technology growth rate is also constant. Economic growth can be achieved through increasing the rate of v through innovation and R&D activities and therefore affecting the coefficient of k.

Representative agent's (consumer) preference is set the same as (18) and (19), therefore the dynamic budget constraint of the consumer in the model is

$$(1-v)y - c = (1-v)Ak^\alpha p^\beta (1-p)^\gamma i^\omega - c \quad \dots(2.31)$$

Holding on to the distance-efficiency level of a decentralized government institutions g where it is a function of central government budget ratio p and local government budget ratio $(1-p)$ with the given growth maximizing budget share as in equation (2.21) and institutional efficiency rate δ_i , then the per capita growth rate can be constructed as

$$\frac{\dot{y}}{y} = (1/\sigma) \left[\alpha(1-v)v^{1/\alpha} \alpha \theta_p^{(\iota+\beta)/\alpha} (1-\theta_p)^{(2\iota+\gamma)/\alpha} \delta_i^{\omega/\alpha} - \rho \right] \quad \dots(2.32)$$

The above model described how technological change can affect economic development in a decentralized government institution. However, as the previous growth models elaborated in this chapter, this also assumed that population is held constant with no mobility. In addition to the previous ones, this proposition 5 can be written as increasing allocation of technology in the economy given the efficiency level of government would contribute to the increasing per capita output. Considering that then proposition 6 will also be true that a decreasing institutional quality with a given steady level of technological improvement will render the economy inefficient.

2.2 Chapter conclusion

In this chapter, I started the discussion with the general idea on the role of the government in economic development following Barro's (1990) approach. Considering government endogenously in a growth model is important for its many roles in the society ranging from infrastructure development, social assistance, to set up industrial policies, etc. However, because the previous endogenous growth model was not satisfactory enough in explaining the role of the decentralization dynamic that has happened since the end of 1970s, Davoodi and Zou (1998) developed a model that incorporates different levels of governments akin to that of Barro's.

The New Institutional Economics which came around the same period raised their concern towards institutional quality that could possibly affect economic growth (Kaufmann, 2000; North, 1991). I view institutional quality as a necessary element to be considered in a growth model. My proposition here is that the distance-efficiency measure of a decentralized institution can be achieved but it depends on the readiness of its institutions. Poor institutions

would not be able to provide the necessary efficiency for the local government to work. Finally, the final section tried to develop an endogenous technological change model in a decentralized institution. The last theoretical model is supposed to explain industrial progressing or upgrading under decentralized institutions.

The model implies that institutional quality is a main mechanism that enabled the efficiency gain in a decentralized governance. Without Strong institution, decentralization would not work for industrial development. This notion is discussed further in Chapter III and Chapter IV. I also investigate in Chapter V and Chapter VI on how local governments' institutional quality affect industrial growth through policy intervention.

Chapter 3

The impact of decentralization reform on industrial development and upgrading*

Decentralization of public service provision promised to bring more efficiency that would sustain growth, hence the worldwide trend in this direction for the past four decades. In this chapter, I explore the impact of expenditure decentralization on industrial development and upgrading by comparing developed and developing countries.

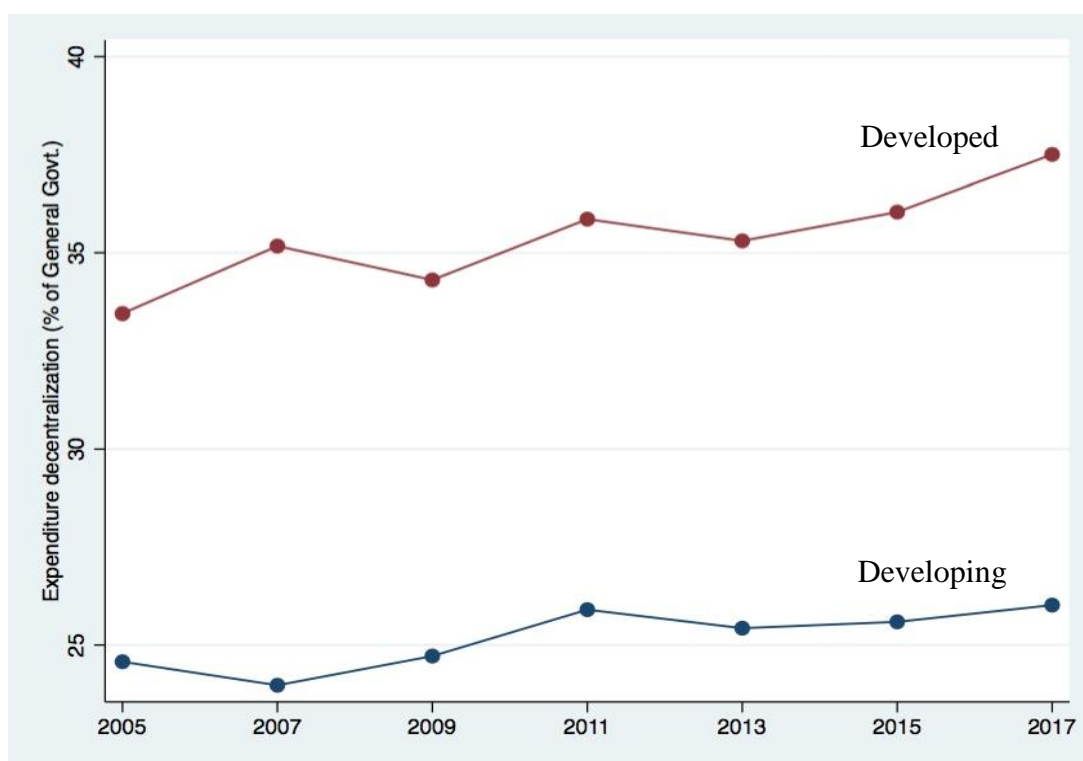
3.1 Chapter background

Waves of decentralization have silently swept the world for the last four decades. Starting with developed countries in the early 1980s, it was then followed by a number of developing countries such as Brazil in 1988, the Philippines in 1991, Uganda in 1993, and Indonesia in 2001. As many as 89 developing countries had experimented with decentralization reform up to the late 2000s (Independent Evaluation Group – World Bank, 2008). The move had even become synonymous with the democratization movement (Schneider, 2003) that came around the same time as the collapse of the centralized communist regimes in Eastern Europe. Both concepts offer a bottom-up decision-making mechanism that was the global zeitgeist of the post-cold war period.

* This chapter has been accepted for publication in Volume 52 of Forum of International Development Studies, September 2021, with the title “Making Decentralization Work for Industrial Development: Evidence from A Cross Country Analysis. Additional discussion is added at the end.

In Figure 3.1, we can see that while decentralization has grown in importance, we continue to see different dynamics of fiscal decentralization in the past decade for developed and developing countries. The major difference has been in the level of decentralization where local government spending in developed countries constitutes north of a third (33%) of general government spending, while in developing countries the number is significantly lower averaging at around 27%. The figure for developed countries goes along with the argument that higher-income countries are more likely to sustain this trend (Bahl & Linn, 1992; Bahl & Nath, 1986). Meanwhile, in the developing world, the slope is much different. Following the decentralization program in developing countries in the past, there have been only small changes in the proportion of local government spending as shown in the blue line in the graph.

Figure 3.1 Decentralization in Developed and Developing Countries 2005-2017



Note : - Decentralization is measured as a percentage of local government expenditures in state/ province and city-level against the total government,
 - Figures are comprised of 85 countries

Source : IMF 2019

In measuring decentralization, one of the most common methods is to use the ratio of local government spending against central government spending. This serves as a qualitative measure of local government's public service capabilities (Bahl & Nath, 1986). The larger the spending of local government, the higher the level of decentralization. Countries with political decentralization, such as federalist countries, tend to be more decentralized as compared to those with only administrative or fiscal decentralization. Furthermore, scholars are also looking at the structure of revenue between central and local governments, where higher local revenue also signifies a higher degree of decentralization (Schneider, 2003; Smoke, 2001). Lately, growing bodies of literature have tried to develop other measurements such as the federalism index (Arzaghi & Henderson, 2005) and the decentralization score (Ivanyna & Shah, 2012; Schneider, 2003: 32-56; Slavinskaite, 2017).

The previous body of empirical works on decentralization focused more on the impact on economic growth in general (Baskaran & Feld, 2013; Davoodi & Zhou, 1998; Gemmel et al., 2013; Rodriguez-Pose & Kroijer, 2009). Few attempts have been made to explore the relationship with industrial development on a cross-country basis. This research offers to shed light on this area. As shown in Figure 3.1, the developed and developing countries have been contrasting in their government spending pattern. This shall bring implications to the industrialization route taken by both groups. The objective of this research therefore is to explore the possible impact of economic decentralization on industrial development.

This chapter is important in several ways. In a decentralized government institution, local governments are equipped with higher expenses for public service delivery such as infrastructure development and private sector affairs, which ideally should translate to industrial growth. This will support the efficiency promise of decentralization as posed by Tiebout (1956) and Oates (1972). Furthermore, without a robust industrial sector, a productive

structural transformation would not have happened and thus income growth would tend to be slow. Failure in this area would also hinder countries' ability to increase technological capability in the future.

The remainder of this chapter is organized as follows. Section 2 describes past literature discussing decentralization, institutions, and economic development. Section 3 deals with data and descriptive statistics, while Section 4 discusses the methodology. Section 5 presents estimation results and lastly, Section 6 concludes the study.

3.2 Literature review

3.2.1 Efficiency theory of fiscal decentralization

Decentralization Theorem (Oates 1972) proposed that localized provision of public goods would result in a higher level of social welfare, as needs are tailored according to each region's demand and uniqueness. Under vis-à-vis responsibility local government's public service delivery could reach Pareto efficiency, benefiting many people without making anyone worse-off. This optimum efficiency could also affect inter-jurisdictional spillover, where efficient public goods management in one region would benefit its neighboring areas (i.e., river management and border pollution control). Furthermore, Tiebout's model (1956) of the mobile consumer also pointed out how decentralization can be enjoyed by individuals as they can optimize their preference by moving from one locality to the other. The later "regional model" (Flatters, Henderson, & Meiskowski 1974; in Oates, 2005) disagrees with the former "mobile consumer model" suggesting that individual entry across jurisdiction would retard public service provided by the neighboring government.

These first-generation theories of fiscal decentralization focused more on the efficiency front based on the asymmetry of information that exists at the local level (Oates, 2005: 355). This happened due to the difference in natural characteristics such as geographical and population size.

Bahl and Nath (1986) view population and level of economic development as determining factors in affecting decentralization rate and that defense spending contributes to retarding it. This means that decentralization tends to be significantly higher for developed countries than in developing ones relative to their defense spending. They also pointed out that due to institutional differences between fiscal and political decentralization in developing countries, the efficiency gain may differ. This is a concern that was later raised by second-generation theorists.

The late 1990s witnessed the birth of second-generation theories of fiscal decentralization as well as expanding works of empirical research on the issue. The political economy of public choice, which was somehow neglected by the first-generation theory, emerged and gained focal attention (Oates, 2005). This happened as many developing countries started to decentralize their institutions, where lack of political accountability had exploited its weakness. Furthermore, the call to attention for institutional development raised by North (1990) and others became a wide-ranging discourse that now influences the public-sphere discussion. Azfar et al. (1999) stated that there has been little empirical evidence of increasing efficiency under a decentralized regime and that its effectiveness depends on the underlying institutional framework. Their study is based on the previous work of Bird, Ebel, and Wallich (1995) that pointed out negative effects while also considering the positive results by others (Klitgaard 1998; Litvack et al. 1998; Matheson & Azfar 1999). Specifically, Bird and Smart (2003) found that transfer conditionalities should be imposed on the local government and that

there should be increased public accountability. Treisman (2002), using various decentralization measurements, proposed that decentralization would lead to a decreasing quality of governance. Lastly, Besley, and Coate (2003), proposed another institutional perspective of decentralization in which they factored in local political decision-making in the framework, concluding that in theory decentralization is preferred when there are no public goods spillovers to the neighboring regions.

Intuitively and in theory, better governance and institution should correlate with stronger economic development, but the concern of the later theorists is that decentralization reform would only suffer from inefficiency that may arise due to the weak capacity of the local governments.

3.2.2 Empirical findings

Empirical works that explored the relationship between decentralization and economic growth started burgeoning in the late 1990s. Davoodi and Zou (1998) using the Ordinary Least Square method found the impact of decentralization to be significantly negative in developing countries between 1975-1990, but not for developed countries. Similarly, Rodriguez-Pose and Kroijer (2009) revealed a negative correlation for Central and Eastern European countries from 1990 to 2004 except for tax decentralization measures. They pointed to the lack of institutional quality in many transitioning countries in the region to have contributed to the result. This has been explored previously by de Mello and Barenstein (2001), who found that decentralization is positively correlated with institutional quality. Their finding is later confirmed by Ivanyna and Shah (2011) who revealed that decentralization improved institutions by lowering the incidence of corruption.

Martinez-Vazquez and McNab (2005) using Fixed-Effects OLS and GMM models, found that fiscal decentralization helped maintain macroeconomic stability, and the effect is significant in developed countries. This comes, however, at the cost of a negative effect on growth. For developing countries, the relationship showed the same trend albeit not statistically significant. Kalamova (2009) also found a negative relationship between decentralization and FDI when measured by the number of countries' administrative tiers. The finding is robust when measured with expenditure and revenue decentralization.

3.2.3 Connecting decentralization, institutions, and industrial development

Taking into account the aforementioned works on decentralization, especially on the efficiency approach, it can be concluded here that there is a logical linkage between decentralization and growth that was raised by the early theory of decentralization. In a decentralized regime, local governments can simultaneously carry out public service provision whilst also tailoring them based on local input and needs. However, later generation scholars also pointed out how institutional quality could foster the relationship. This is the underlying reason why the two processes often go hand-in-hand, decentralization and institutional reform, because without properly functioning institution decentralization will not work for development.

Local government's important role in industrial development has been highlighted by Bianchi and Labory (2006: 3). Increased globalization that came through trade deals put constraints on the central government in its ability to enact industrial policy. Hence there was a massive decline in industrial policy around the early 2000s. A bottom-up and localized industrial planning then is seen as a way to induce agglomeration. Other than concern for macroeconomic stability, fitting institutional settings at the local level is the key to unlock the

full potential of this decentralized model (Sepulveda & Amin 2006: 321-341). A similar practice has been carried out in China's automotive industry, where Thun (2006) pointed out the importance of appropriate institutional infrastructure set up by the central government that provides incentives to local governments to promote the industry.

Through the literature, we can infer that decentralizing public spending can work for development, particularly to support industrialization. However, for that to work effectively some findings highlighted the importance of institutional quality.

3.3 Data and methodology

3.3.1 Data

The ideal dataset for studying decentralization is disaggregated data that differentiates public investment from other government expenditures. Unfortunately, none of the cross-country datasets on this topic contains such information. Most of the research to date has used the Government Finance Statistics or Fiscal Decentralization dataset provided by the International Monetary Fund (IMF). In this study, I complimented the IMF's data with some additional information gathered through the Ministry of Finance (Indonesia), National Audit Agency (The Philippines), Bureau of Statistics (China) as well as a World Bank research publication for decentralization in Vietnam. Unbalanced panel data for 74 countries are collected, consisting of 29 developed and 45 developing countries. The decentralization variable is measured in a 0 - 1 range of scale. It simply takes the ratio of sub-national government spending against total government spending.

In measuring decentralization, this paper follows the argument raised by Bahl and Nath (1986) where they insist on the expenditure rather than the revenue side. They suggested that

measuring decentralization through the revenue side would neglect the local government's service delivery responsibility. The center point of local government activities is its public service provision ranging from local infrastructure development and providing business licenses or permits to distributing access to health and education. The measurement from the expenditure side, then, is considered more accurate despite there still existing some technical problems such as different account terms used in classifying central or local government budget. In addition, past research has an exceptionally low record of revenue decentralization data due to many countries not reporting their fiscal data to the IMF. The present research uses revenue decentralization as a mechanism to test the robustness of my findings, which also serves as one of the main contributions of this paper, relative to the existing literature.

This study also uses several additional datasets. Manufacturing share to GDP is used as a proxy of industry sector output. It was obtained from UNIDO's Industrial Statistics Database. Meanwhile, institutional data (Control of Corruption) is derived from the World Bank's World Governance Indicator (WGI). It serves as the proxy for institutional quality, where a higher score indicates a better institution. The data is measured as a score between 1 and 7. This is a slight alteration of the original measurement developed by Kaufmann et al. (2010) but with the same range.

Education index data (1-100 score), which is a proxy of human capital, is a variable I modified from the original 0-1 based index from UNDP. FDI data is obtained from UNCTAD statistics. I use the World Bank's World Development Indicator (WDI) as the source for my macroeconomic and demographic data.

3.3.2 Descriptive statistics

Summary statistics in Table 3.1 shows that the average contribution of manufacturing to GDP in all countries in the present observation stands at 14.75%, with the lowest being merely 3% and the highest at 32.58% from 1995 to 2017. The average percentage confirms the important role of the industry sector in economic development and thus serves as my dependent variable in this research. This data records the lowest number of observations due to missing data from some countries.

Table 3.1 Summary Statistics

No.	Variable	Definition	Unit	Obs.	Mean	Std dev.	Min.	Max.	Source
1.	MAN	ISIC div. 15-37 industries	% GDP	1,300	14.76	5.10	3.11	32.58	UNIDO
2.	DEC	Ratio of local to total gov. exp.	0 – 1 Index	1,300	0.30	0.17	0.01	0.86	IMF
3.	REV	Ratio of local to total gov. rev.	0 – 1 Index	1,143	0.31	0.17	0.004	0.80	IMF
4.	CONCOR	Control of corruption score	1 – 7 Score	1,300	4.05	1.10	1.86	5.97	WGI
5.	GDPPC	GDP divided by population	Log Const. USD	1,300	9.38	1.32	5.95	11.64	WDI
6.	GOV	General government spending	% GDP	1,300	17.38	4.41	5.14	27.94	WDI
7.	FDI	FDI net inflows	% GDP	1,300	5.75	22.76	-58.33	499.6	UNCTAD
8.	URB	People living in urban areas	% Total population	1,300	67.20	17.96	14.38	97.96	WDI
9.	EDU	Weighted average of mean years and expected years of schooling	1 – 100 Score	1,300	72.89	13.05	32.4	94.1	UNDP

Source: Author, based on the data from IMF, UNIDO, UNCTAD, WDI, WGI, and UNDP

Decentralization index (DEC) stands at a mean value of 0.31, with 0.17 standard deviation. My data includes the highly centralized countries (e.g., where the central government spends 99% of total budget) as well as the deeply decentralized countries (e.g., where local

government spending stands at 85%). However, the relatively high mean value indicates that many countries have decentralized their expenditure to the local level despite the very high variance between countries.

The average score for CONCOR is 4.04, with the highest score being 5.97 and the lowest being 1.86. The standard deviation for CONCOR is relatively small at 1.10, indicating that the distributional difference between countries is not large. Meanwhile, the necessary control variable for industrial development, GDPPC, has a mean score of 9.36 while GDP is at 12.07. Both are measured as the log of absolute value reported in Constant 2010 USD. Other sets of independent variables I used in the estimation are Foreign Direct Investment (FDI), averaging at 5.69% of GDP for all 74 countries, urbanization rate, (URB) which mean value is at 66.80%, and lastly, an education variable (EDU) which stands at a mean of 72.79 for the years between 1995 and 2017.

3.3.2 Methodology

This paper estimates the impact of decentralization on industrial development using panel data of 74 countries between 1995 and 2017. Considering the larger number of cross-sectional samples than the number of periods, the large N and small T condition, as well as the presence of heteroskedasticity within the observations, a GMM model is preferred. The estimation follows Arellano and Bover's (1995) and Blundell and Bond's (1998) model known as System GMM. This estimation was preceded by Arrelano and Bond (1991) that was based on Holtz-Eakin, Newey, and Rosen (1998). The econometric models are set as the following:

$$MAN_{it} = \alpha + \beta_1 MAN_{it-1} + \beta_2 DEC_{it-1} + \beta_3 X_{it-1} + \nu_i + \gamma_t + u_{it} \quad \dots(3.1)$$

where the dependent variable that indicates industrial development is on the left-hand side of the equation (MAN_{it}). To resolve for endogeneity issue caused by unobserved heterogeneity, a lagged value of dependent variables (MAN_{it-1}) is placed as a regressor. This follows Arellano and Bond's (1991) model. I also apply the Windmeijer's (2005) two-step standard error correction to prevent it from becoming downwardly biased due to this endogenous regressor.

Meanwhile, the key independent variable used is the Decentralization Indicator (DEC_{it-1}). Control variables (X_{it-1}) are set at a lagged value to control for possible endogeneity bias. Following previous literature in cross-country analysis (Baskaran & Feld 2013; Levine & Renelt 1992) control variables included are investment share to GDP, human capital, population growth rate, and per capita income (GDPPC). Control of corruption (CONCOR) is used as a control variable that represents institutional quality; recall that as the literature findings above suggest, institutional quality is an important variable for measuring decentralization.

Foreign Direct Investment (FDI) and Education index (EDU) are used as a proxy of investment and human capital, respectively. General government expenditure (GOV), measured as the percentage of GDP, is used as a control for government size. Following Lim (2019) urban population share (URB) is used as a proxy to population. The ν_i and γ_t denote the year and country fixed-effects, respectively, to control for time-invariant unobserved heterogeneity and u_{it} denotes the error term. The standard error in the estimation is clustered at the country level, following Wooldridge (2010). To evaluate the validity of the model, autocorrelation tests (the AR test) are performed as well as Hansen tests.

3.4 Results

This section is divided into three parts. In the first part, the baseline estimation result is presented. Secondly, a follow-up result divided between developed and developing countries is discussed, and finally a robustness check analysis is performed. Each specification includes both year and country fixed-effects.

3.4.1 Baseline estimation results

Table 3.2 summarizes the research findings. Column (1) shows the result of the baseline specification where I regress the lagged value of decentralization and manufacturing value-added. I find a negative and significant effect of decentralization. In column (2), I control for GDPPC and its square terms and still find a negative relationship. Based on this, roughly a 1% increase in local government budget correlates to a 0.004% industrial decline in the long run. The result confirms numerous pessimistic findings on the impact of decentralization (Davoodi & Zou, 1998; Kalamova, 2009; Rodriguez-Pose & Kroijer, 2009).

Institutional quality (CONCOR) does not show any significance and I suspect that it suffers from heterogeneity as the sign changes when more control variables are added. GOV, which represents total government spending as a share of GDP, shows a positive correlation with the industry sector and it is significant, suggesting that in general GOV is properly allocated toward productive means to support industrial development. This positive effect is in contrast with the negative result of DEC in the same column (4), which is my main variable of interest. Both variables represent the government; the latter specifically refers to local government at the province and district level.

Table 3.2 Baseline result: Two-Step System GMM

VARIABLES	DEPENDENT VARIABLE: MANUFACTURING (%GDP)			
	(1)	(2)	(3)	(4)
MAN _(t-1)	1.051*** (0.018)	1.046*** (0.017)	1.046*** (0.017)	1.038*** (0.0167)
DEC _(t-1)	-0.363** (0.178)	-0.443** (0.204)	-0.446** (0.205)	-0.354* (0.212)
GDPPC _(t-1)		0.335 (0.239)	0.281 (0.265)	0.223 (0.302)
GDPPC ² _(t-1)		-0.016 (0.014)	-0.014 (0.016)	-0.012 (0.017)
CONCOR _(t-1)			0.024 (0.037)	-0.028 (0.033)
GOV _(t-1)				0.024*** (0.008)
FDI _(t-1)				0.001** (0.0005)
URB _(t-1)				-0.003 (0.002)
EDU _(t-1)				0.004** (0.002)
CONSTANT	-0.106 (0.192)	-1.277 (0.932)	-1.467 (1.027)	-1.382 (1.126)
Observations	1246	1245	1245	1238
Countries	74	74	74	74
Instruments	45	47	48	52
AR-1	0.007	0.007	0.007	0.007
AR-2	0.188	0.177	0.177	0.838
Hansen (P-val)	0.912	0.931	0.934	0.939

Note : * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, Robust standard error clustered at the country level in parentheses

Source : Author's calculation based on the data from IMF, UNIDO, UNCTAD, WDI, WGI, and UNDP

FDI shows a positive relationship with industry albeit it is a small coefficient in the final model. It is also showing significance at the 0.05 level, which is to be expected as industrial development often utilizes FDI as a production factor. Lastly, urbanization (URB) is negatively correlated with industry while education (EDU) is positive. However, only the latter is statistically significant albeit with a small coefficient value.

Post-estimation diagnostics reveals the presence of the first-order (AR-1) serial autocorrelation, which is expected, but none for the second-order (AR-2). The absence of autocorrelation on the second-order justifies the use of the lagged value of my dependent variable. Secondly, the Hansen test reports no abnormality in the use of instruments. Overall, I find that my specifications are well-justified in supporting the finding.

Next, I extend my analysis by accessing the heterogeneity by country group. I divide countries based on their income level, whether they are in the high-income territory (i.e., per capita GDP > \$12,476 in 2017) or not. Non high-income countries are grouped as developing countries. All the G-7, most of EU-19, and most OECD countries are in the developed countries group with the exception being Estonia, Latvia, and Slovakia. Two countries are included in both groups which are the Czech Republic (classified as a developed country in 2006) and Slovenia (classified as a developed country in 1997). Most of the rest; ASEAN, BRICS, MENA, SSA, and LAC countries (except Chile), and others are categorized as developing countries. Table 3 shows the result of this estimation that contains both the baseline and the main estimation.

Column (1) shows a positive but not statistically significant effect of decentralization on industrial development among developed countries. In the next, controlling for GDPPC and GDPPC², I find that the coefficient of DEC is significant at the 0.1 significance level. The result indicates that every percentage increase of DEC in the previous year is related to a 0.008% increase of MAN in the current year. This finding for the developed countries group has been in line with the earlier theories that focused on the efficiency gain (Oates, 1972; Tiebout, 1956) and also with the latter model of local-based development (Bianchi & Labory, 2006).

CONCOR in column (2) is shown to have a positive and significant effect on industrial development. This highlighted the empirical findings of previous institution-centered research

of decentralization (Ivanya & Shah, 2011; de Mello & Barenstein, 2001). Both decentralization (DEC) and institutional quality (CONCOR) have the largest β coefficient, indicating the importance of both variables in promoting industrial development. GDPPC shows a positive relationship, the same sign as my baseline model but it is now significant for the developed countries. Meanwhile, GOV, which is a measure of general government expenditure as a percentage of GDP, shows a negative and significant result. FDI also shows a negative correlation but despite being significant, the coefficient is among the smallest. This negative trend also applies to URB and EDU with the first being statistically significant at the 0.05 level. This indicates that urbanization does not push for more industrial output, but rather it supports the growth of another sector (e.g., service).

The diagnostic test for this first group, however, failed to reject that there are no overidentifying restrictions in the model. While the AR-1 and AR-2 showed no serial autocorrelation under the 0.5 level, the Hansen test result is not within the commonly approved p-value range below 1 (Roodman, 2009) for my main result in column (2). One reason for this might be due to the significantly reduced number of cross-sectional dimensions, because only the developed countries are included in the estimation. Therefore, we should treat the result with this caution in mind.

On the second group of developing countries, the estimation result shows rather contrasting evidence. Table 3.3 shows that decentralization is negatively correlated with industrial development and that the relationship is significant in both columns (3) and (4). This means that an incremental 1% move towards larger decentralization corresponds with around a 0.008% decrease in industrial output share. The coefficient is relatively small, but the sign is consistent and significant. This finding is in accordance with the pessimistic findings posed by the second-generation theorists (Azfar, 1999; Besley & Coate, 2003; Treisman, 2002).

Table 3.3 GMM2S estimation result: Developed and developing countries

VARIABLES	DEPENDENT VARIABLE: MANUFACTURING (%GDP)			
	DEVELOPED		DEVELOPING	
	(1)	(2)	(3)	(4)
MAN _(t-1)	0.987*** (0.023)	0.792*** (0.090)	1.062*** (0.030)	1.059*** (0.021)
DEC _(t-1)	0.335 (0.421)	0.837* (0.443)	-0.842* (0.475)	-0.855*** (0.323)
GDPPC _(t-1)		0.976** (0.424)		0.647 (1.781)
GDPPC2 _(t-1)		-0.174** (0.074)		-0.039 (0.106)
CONCOR _(t-1)		1.544** (0.783)		-0.024 (0.100)
GOV _(t-1)		-0.097* (0.053)		0.029*** (0.009)
FDI _(t-1)		-0.013** (0.007)		0.005 (0.008)
URB _(t-1)		-0.043** (0.020)		-0.002 (0.005)
EDU _(t-1)		-0.029 (0.022)		0.004 (0.004)
CONSTANT	-0.013 (0.276)	0 (.)	-1.340*** (0.356)	-4.535 (7.108)
Observations	583	576	663	662
Countries	29	29	47	47
Instruments	28	35	45	52
AR-1	0.084	0.041	0.015	0.014
AR-2	0.558	0.084	0.056	0.051
Hansen (P-val)	0.079	1.000	0.731	0.986

Note : *** p<0.01, ** p<0.05, * p<0.1 Robust standard error clustered at the country level in parentheses, + The Czech Republic and Slovenia are accounted in both group

Source: Author's calculation based on the data from IMF, UNIDO, UNCTAD, WDI, WGI, and UNDP

The result shows that there is no significant result for CONCOR, thus I cannot conclude that institutional qualities in developing countries are beneficial for industrial growth. The coefficient of GOV is positive and significant, signalling the government's supportive

efficiency towards the sector. However, contrary to this, the government's decision to allocate more fiscal spending to the local government, which is the DEC variable, is negatively correlated with industrial output. This could imply that spending by the central government relates more to the industry sector. Indeed, in many countries the central government holds a significant function over strategic issues that supported industrialization. An example is in Indonesia where despite its big-bang decentralization program in 2001 (Mulyo, 2015; Nasution, 2016), the central government still retains a large number of large-scale development projects at the local level particularly following the concern of local government's lack of capacity in the early days of the decentralization program (Nasution, 2016). Another example includes the federally constructed interstate-highway that affected industrialization in the US through increasing logistics efficiency (Jaworski, Kitchens, & Nigai, 2018).

Columns (3) and (4) show that there are serial autocorrelations in the first order (AR-1) with the residuals and this is expected in a GMM model. For the AR-2, under 5% rejection level the diagnostic result showed no autocorrelation. The Hansen test result lies between the approved range in both columns. Therefore, it is right to conclude that there is a negative effect of decentralization on industrial growth for developing countries and that the result is robust.

Based on the findings above, in order to make decentralization work for developing countries, it may need to be followed by improving institutional quality, as suggested by previous literature. Better institutions could enable local government to provide public service properly, even in the absence of democracy at the local level (Kosec & Mogues, 2020: 165-213). Good institutions would also provide a mechanism to reduce abuse of power and inefficiencies, hence increasing control of corruption (CONCOR). The positive result from the developed countries suggested the importance of these two variables in supporting industrial development. This is something that has been pointed out earlier by institutional economists

(Acemoglu et al. 2008, 2011; North, 1990) and has been found to be positively correlated with decentralization as studied by de Mello and Barenstein (2001) as well as Ivanyna and Shah (2011).

3.3.5 Extension analysis: Industrial upgrading

The efficiency front of a decentralized institution has been proven to have a positive linkage with industrial growth in the case of the developed world. It is reasonable to suspect that the inertia of this force would also cause a vertical expansion of the sector. This sub-section presents the nature of that relationship between developed and developing countries. Table A.1 in the appendix section shows this result. In the estimation I employed the same set of control variables that are used in Table 3.3 previously.

As a dependent variable, I use the share of medium and high technology manufacturing output, against total manufacturing output. In column (1) we can see the baseline result for the developed country group. The relationship between the increasing share of sub-national government expenditure to the higher value-added manufacturing is positive. Upon controlling for the sets of covariates we then see that the relationship is significant (see column 2). Therefore, the correlation between those variables depends on the level of the supporting variables. On the other hand, the unconditional result for developing countries shown in column (1) while also shown to be positive, result is still not significant after controlling for other variables. It is then safe to assume that the process of decentralization can channel industrial upgrading in the developed countries while it is not strongly evidenced for the developing ones. However, it is important to note that the result in Table A.2 does not pass the Hansen j-test for identifying restrictions, rendering a cautionary acceptance of this result.

3.4.2 Robustness check

To test the robustness of my findings, it is necessary to make further analyses. In this case, this study observes the impact of decentralization on the revenue side of decentralization (REV). However, it needs to be noted again here that revenue data covers a smaller number of countries compared to the expenditure side, as some countries do not report this data to the IMF. Table 3.4 presents my estimation result.

Table 3.4 Alternative estimation: Revenue decentralization

VARIABLES	ALL (1)	DEVELOPED (2)	DEVELOPING (3)
MAN _(t-1)	1.034*** (0.015)	1.039*** (0.027)	1.050*** (0.028)
REV _(t-1)	-0.258* (0.145)	0.786 (0.563)	-0.526*** (0.199)
GDPPC _(t-1)	0.475 (0.320)	-25.670* (13.400)	0.333 (1.708)
GDPPC ² _(t-1)	-0.024 (0.018)	1.225* (0.641)	-0.012 (0.102)
CONSTANT	-2.699** (1.342)	133.3* (69.70)	-2.515** (7.055)
Country fixed-effects	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes
Observations	1110	605	492
Num. of Countries	69	30	37
Num. of Instruments	47	47	47
AR-1	0.023	0.073	0.001
AR-2	0.931	0.586	0.492
Hansen (P-val.)	0.574	0.998	0.943

Note : *** p<0.01, ** p<0.05, * p<0.1 Robust standard error clustered at the country level in parentheses ⁺ The Czech Republic and Slovenia are accounted in both group

Source : Author's calculation based on the data from IMF, UNIDO, UNCTAD, WDI, WGI, and UNDP

Specification (1), which includes all samples is consistent compared to my baseline result in Table 3.3 that decentralization is negatively correlated with industrial development. However, the relationship differs between developed and developing countries. For the latter, the finding is again consistent, showing a significantly negative correlation. Specifically, a 1% increase in local revenue is correlated with a 0.005% decrease in industrial output share. My post-estimation result showed an absence of serial autocorrelation on the second-order (AR-2) as well as no abnormality on the Hansen test.

3.5 Chapter conclusion

After decades of decentralization in developed and developing countries, the impact on the industrial sector needs to be assessed. Industrialization has been the key to productivity growth for many developed countries, and developing countries wish to follow along including through applying a decentralized model. This paper tried to shed light on the relationship between these two variables. Using dynamic panel data System GMM analysis for 74 countries from 1995 to 2017, I found that expenditure decentralization in the previous year is negatively correlated with industrial development. However, the result is different between developed and developing countries, with the former showing a positive and significant relationship in the main result. In the group of developing countries, the estimation showed a consistent negative correlation. This would suggest that the decentralization program in developing countries has not been able to provide fiscal efficiency that is needed to push for industrialization. The absence of a significant relationship with the institutional variable (CONCOR), signifying a weak institutional setting, could be an important factor that affects the relationship. This result for developing countries confirmed the pessimistic view of decentralization raised by second-generation theorists (Azfar et al. 1999; Bird & Smart 2003; Treisman 2002) that weak local

institution retards development. My findings are robust to different measurements of decentralization, particularly for developing countries, as I also tested the revenue side. Finally, in order to make decentralization work to promote industrial development, a strong institutional reform that could mitigate the inefficiencies of public service provision is necessary to accompany the decentralization program.

Chapter 4

The role of local government spending on industrial development in a decentralized Indonesia**

Following the previous work at the cross-country level, this research explored the country case study of Indonesia. This chapter seeks to find the relationship between increasing local government's expenditure and the development of industry focusing on the non-oil and gas sector. Local government's capital spending is thought to have a moderation effect with investments that should contribute to industrial growth.

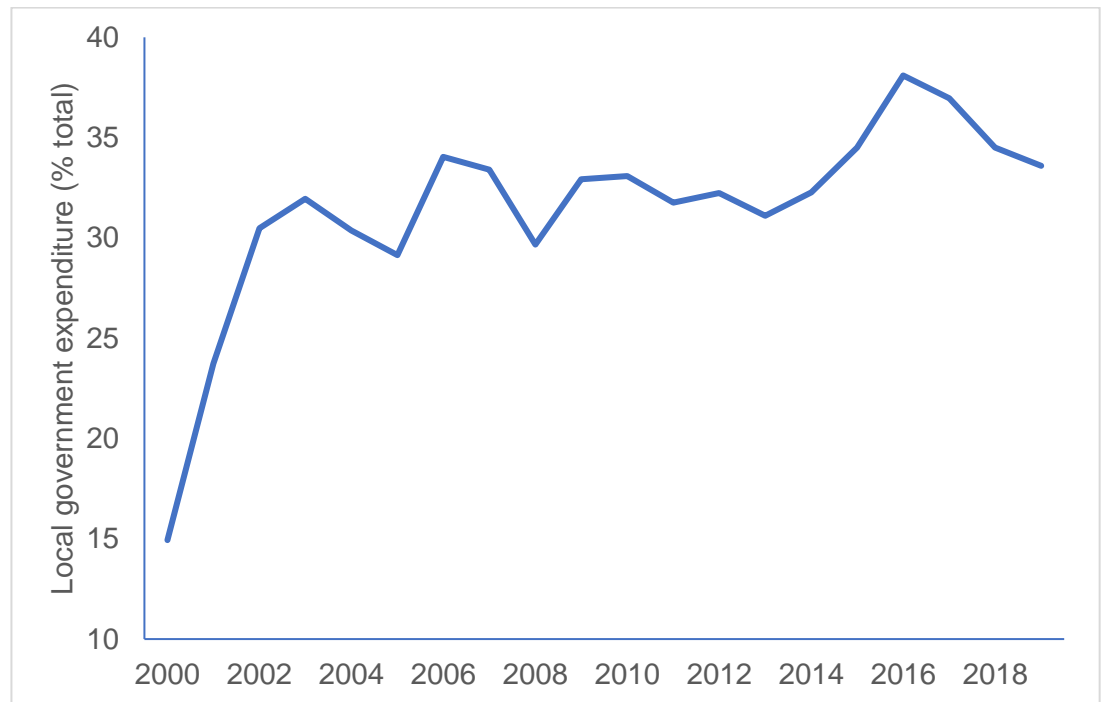
4.1 Introduction

Decentralization of government function can be best understood as the devolvment of decision-making from the central government to its lower tier-administration, as described by Litvack and Seddon (1999) in their Briefing Notes for the World Bank. This concept is supposed to bring Pareto growth efficiency according to early decentralization scholars (Tiebout, 1956; Oates, 1972). These first generation of theorists convinced decision-makers in developed countries and thus propagated a wave of decentralization movement in the 1980s. However, in many developing countries the route to a decentralized governance institution has a quite different context. Large democratic movement in Brazil and the Philippines in the mid-1980s has led to a more decentralized institutions in both countries (Oxhorn et al., 2004).

** This chapter, co-authored with Christian Otchia, is currently under review in the Journal of Economic Structure under the title "The Legacy of the Reformasi: The Role of Local Government Spending on Industrial Development in a Decentralized Indonesia (Submitted on February 19, 2021).

Indonesia followed the same narrative where the centralized-authoritarian rule of then president Soeharto⁵ met its end in 1998, provided a way for a more democratic bottom-up governance starting in 2001.

Figure 4.1 Indonesia’s fiscal decentralization share 2000 – 2019



Source: MOF 2020

Government decentralization in Indonesia was part of the nationwide *reformasi*⁶ program. This was done under the background of provincial discontent in around the time (Eaton et al., 2011), specifically in the resource-rich regions. Starting in 2001, provinces and cities/districts are assigned larger fiscal roles that include various governmental affairs excluding executive functions such as foreign and defense affairs. New provinces and cities

⁴ For consistency, we use the old Indonesian name spelling “Soeharto” widely used in the Indonesian government and media. Its modern spelling “Suharto” is the one that is generally used by the international community.

⁵ *Reformasi* is the Indonesian style of democratic and market reform, employed as a counter-narrative to the authoritarian and crony-capitalism characteristics of the Soeharto administration that lasted for over three decades. This concept deals directly with decentralization issue as it constitutes one of the six main agendas of reformasi.

were also established to meet this demand of a less-centralized state institution. Indonesian fiscal decentralization is complimented further when beginning in 2005 it further democratizes its sub-national tiers by introducing direct local elections. Figure 4.1 illustrates this change where the share of sub-national against general government spending increased dramatically from 2000 to 2003 during the early phase of decentralization, and then followed by a steady increase until 2017. Consequently, in principle, the sub-national governments are granted larger decision-making abilities.

However, it is important to notice that decentralization transition in Indonesia has not been smooth since the beginning. The transfer of authority from the central to the local government was done in a “big-bang” rush without much preparation and it was directed straight to the lowest level of government, districts and cities, bypassing the province (Nasution, 2016). This ill-prepared decision created institutional problems ranging from corruption to the constant lack of capacity building at the local level as pointed out by various studies (Alfada, 2019; Henderson & Kuncoro, 2004; Kuncoro, 2006; Mulyo, 2015; Nasution, 2016).

Due to the lack of institutional quality at the local level in this first phase, Jakarta slowed down the pace of decentralization with the announcement of Law 32 in 2004. The law introduced the ‘concurrent affairs’ which allowed the active presence of the central government at the sub-national level. Following the law, regulations were set up and various central government’s agencies were re-established in provinces and cities. Some scholars perceived this as an effort to re-centralize political and administrative power (Rahmatunnisa, 2015). In between the years, the government has also issued Law 28 on Local Tax that enabled local government to expand their tax base. This law has led to spiking numbers of local regulations in the following years. Despite all the dynamics, in political sense Indonesia is now a very much decentralized state compared to Soeharto’s ‘new order’ era.

It is expected that this dynamic institutional change would bring a substantial effect on the economic performance at the local level. Indonesia's economic progress in the decades prior to this has been hailed as the 'rising tiger' due to its unprecedented high growth rate. The progression was largely sustained by the export-driven manufacturing sector, before it was deeply affected by the 1997 Asian crisis. In the subsequent years, the manufacturing share of total GDP had been decreasing, as well as its manufacturing trade specialization (Tijaja & Faisal, 2014).

Scholars have been trying to link the impact of the new institutional arrangement on economic development. Setiawan and Aritenang (2019) found a positive impact of decentralization on regional economic growth optimally after three years. This confirmed the research of Dartanto and Brodjonegoro (2003), done in the early year of decentralization, who found out that decentralization is positively correlated with local economic growth and the effect is higher in the eastern region. In discussing elite capture, a relevant issue that could affect development under decentralization, Chowdhury and Yamauchi (2010) revealed that village decentralization in Indonesia has not lead to elite capture but rather is representing community's interests. Contrasting arguments on the impact exists, that highlighted the negative or non-discernible effects of decentralization on the economy (Lewis, 2006; Pepinsky & Wihardja, 2010; Kuncoro, 2006).

So far neither of the studies above or any other studies exploits the impact of decentralization policy towards industrial development. Industrialization has been regarded as the key towards productive structural transformation. Developing countries are employing industrialization strategies to be able to catch-up with the developed ones. The success of the Newly Industrialized Countries of South Korea, Taiwan, Hong Kong, and Singapore is the famous case of this industrialization strategy by employing export-oriented approach. The same

strategy employed by China, through its reform and opening-up (*gaige kaifang*) program in 1978 that paved the way towards an unprecedented sustained growth for multiple decades.

Considering its importance in sustaining growth and promote structural change, this paper seeks to assess the impact of decentralization policy on industrial growth at the sub-national level in Indonesia. We understand that theoretically, under neo-classical approach, investment serves as the main channel of industrial growth rather than government spending that is channelled through the local government. Therefore, we also consider the impact of investment; does higher local government spending expand or diminish investment's effect on industrial growth? How has the impact differed between various regions of the country?

The rest of this paper will discuss the literature review on decentralization in section 2, then followed by data description and estimation strategy in section 3. Results and discussion are presented in section 4 and 5, respectively. Section 6 concludes my findings.

4.2 Literature review

Arguments that support decentralization and economic growth have been started at least by C. Tiebout (1956, 1961) and Oates (1972). Tiebout's mobile consumer model describes how increasing local budget in public service provisions can benefit individual consumers across-jurisdiction by assuming a free-movement setting. This would incentivize local government as they could enjoy higher tax returns. Oates, meanwhile, argues that fiscal federalism provides Pareto-level efficiency as local government is closer to their constituents thus having a deeper knowledge of local economic needs. These theories are influential and were the driving force behind the decentralization wave that occurred starting in 1980s. Subsequent body of works that support this optimistic view include Musgrave (1969), Weingast (1995), and Qian and Weingast (1997).

In a different manner with the optimistic perspectives above, Bahl and Nath (1986) using a sample of 57 developing countries, found that fiscal decentralization happened along with income growth. Thus, they suggested that for developing countries the policy is more appropriate for the middle and upper-middle income one. This is, however, not the only prerequisite. Wallich, Bird, and Ebel (1995) showed that missing institutional framework has been the source of inefficiency in developing-transitional countries of Eastern Europe. Their study was much related to the concern of the institutionalist approach (Acemoglu & Robinson, 2013; Acemoglu et al., 2008; North 1991). The lack of institutional quality in accompanying decentralization programs then became the concern of the later decentralization scholars, (Junaid et al., 2005; Bird & Smart, 2002; Azfar et. al., 1999; Litvack et al., 1998). Another institutional work includes also Treisman (1999; 2007) who revealed that there is no conclusively positive impact of decentralization on economic development for developing countries.

Numerous cross-country empirical evidence analyzing the impact of decentralization programs on growth indicators show negative trends (Colombo & Martinez-Vazquez, 2019; Davoodi & Zou, 1998, Gemmell et al., 2013, Martinez-Vazquez & McNab, 2003, Rodriguez-Pose & Kroijer, 2009, Ubago-Martínez et al., 2018, Yushkov, 2015). Meanwhile, Martinez-Vazquez and McNab (2006) despite confirming the negative relationship on growth, found that the effect is reduced through its positive impact towards macroeconomic stability, measured by consumer price index.

In the case of Indonesia, Kharisma (2013) and Kis-Katos and Sjahrir (2014) reveal that fiscal decentralization has brought positive impact on development. However, for the latter work, in terms of political decentralization they concluded that there are no positive relationships on the public investment in the education, health, and infrastructure sectors. This

means that local expenditures in these sectors do not depend on whether the district governments are democratically elected. Another study found out that local government in the post-2001 period was considered to be negatively affecting business, as argued by Kuncoro (2006). He found that firms failed to grow and descends to a process he called ‘informalization’ or downsizing in order to escape from paying local tax and bribes.

Further studies showed that Indonesian decentralization does not bring a positive impact on economic performance (Pepinsky & Wihardja, 2010). Their estimation method is unique as it involves the creation of synthetic “Indonesia” in which the country was not decentralized. They attributed the problem to local elite capture. On the other hand, Lewis’s finding (2006) pointed out that the negative relationship is also due to the local government’s inefficiency in tax. This led to higher dependence on grant transfers from the central government.

These findings on Indonesia echo the concern of Junaid et. al. (2005) and Nasution (2016) regarding the low capacity of the local government and that larger role of central government is needed.

4.3 Data and methodology

The analysis uses official data mainly from Statistics Indonesia (Badan Pusat Statistik, BPS). The following section discusses data measurement method and descriptive statistics. Then it is followed by an elaboration of the estimation strategy.

4.3.1 Data

The main data source for the regional data on industry, trade, and inflation is derived from BPS, while investment data is coming from the Investment Coordinating Board of Indonesia (BKPM).

We use foreign and domestic investments data on the industry sector. Table 4.1 presents the descriptive statistics of variables used in the analysis. The total number of observations amounts to 544, covering the time span of 16 years (2004 – 2019) for 34 provinces. A new province established in 2012, North Kalimantan, is given imputed values to cover for the missing years.⁷

Table 4.1 Summary statistics

Variable	Unit	Obs	Mean	Std dev.	Min	Max	Source
MAN	% GDP	544	14.09	11.48	0.77	67.24	BPS
LCAP	% Total Local Capital Exp.	544	2.94	2.29	0.25	14.21	BPS
FDI _{IND}	Log Const. USD ‘000/capita	544	1.94	1.70	0.00	6.00	BKPM
DDI _{IND}	Log Const. USD ‘000/capita	544	1.70	1.43	0.00	5.69	BKPM
GRDPPC	Log Const. IDR ‘000/capita	544	12.57	0.86	10.25	14.52	WDI/BPS
TRADE	% GDP	544	94.16	46.72	17.53	326.48	BPS
INFLATION	Annual %	544	6.42	4.20	0.02	29.34	BPS

Source: Author, derived from BKPM and BPS

We use manufacturing (MAN) as the main proxy for the industry sector. The data is measured by calculating the share of manufacturing value-added in the province level against the total Regional GDP (GRDP) of the said province. Opting to focus more on the labor-intensive activities, we exclude the mining industry sector from the data. This sector is thought

⁶ Our imputation method is based on Rubin's (1987, 1996) multiple imputation method. It is a predictive approach for handling missing data in a multivariate analysis and it uses both classical and Bayesian techniques (Zhu 2014).

to be more capital intensive yet engage in extractive activities that often oppose industrialization (Dutch Disease effect).

The BPS data source that we use is the yearly statistics of “GRDP of Provinces in Indonesia”. The record provides information of GRDP by various industry sectors including agriculture and services. The mean value of MAN is 14.09% with 11.48% standard deviation.

Data of local government spending is used to reflect on the increasing provinces’ and districts’ autonomy. However, we suspect that total local government spending is not the most appropriate measurement in estimating industrial development. Rather it is the capital spending of the local government (LCAP) that is a more appropriate measurement. Largely, this capital expenditure component consists of public investment expenditure such as for infrastructure development, but a lower share yet still a substantial part of the budget goes also for the purchase of building and machinery to support routine civil service activities. The BPS publication source for this data, the yearly “Province Finance Statistics” and “District Finance Statistics”, unfortunately, does not separate between the two functions. Therefore, general capital spending is used here instead.

LCAP is measured by calculating the share of province and district government’s capital spending against total local capital spending aggregated at the province level. Table 4.1 shows that the average share of capital expenditure for each province is at 2.9%. Its standard deviation, which measures the distance between the observation, is at 2.3%.

Investment data is differentiated based on its origin, whether they are foreign or domestic. The data provided by BKPM is the realization of investment data, meaning that the numbers that went into the real sectors possibly contribute in generating fixed-capital formation in the provinces. Across 23 available sectors in 34 provinces, we selected investment in the

non-oil and gas manufacturing sectors. These sectors include food and beverages, textile, pharmaceutical, transport, and machinery. We matched these selected sectors with the manufacturing industry data from the same sectors. Additionally, we also calculate the per capita investment rather than using total value. This way we can control for the dominant effect coming from the advanced region such as Jakarta and Java provinces.

Table 4.2 Correlation matrix

VARIABLES	MAN	LCAP	FDI	DDI	RGDPPC	TRADE
MAN	1					
LCAP	0.18 ***	1				
FDI _{IND}	0.49 ***	0.25 ***	1			
DDI _{IND}	0.33 ***	0.29 ***	0.43 ***	1		
RGDPPC	0.09 **	0.48 ***	0.37 ***	0.30 ***	1	
TRADE	0.27 ***	0.14 ***	0.30 ***	0.23 ***	0.39 ***	1
INFLATION	-0.03	-0.01	-0.16 ***	-0.17 ***	-0.13 ***	-0.04

Note : (1) Total number of observation is 544, (2) * p<0.1, ** p<0.05, *** p<0.01

Source : Author

The unit of measurement for these variables is in constant thousand USD, using national CPI data as the deflator. Domestic investment data is originally coming in IDR unit, but we adjust it to the USD using mid-yearly official exchange rate issued by BPS. As Table 4.1 shows, foreign investment data (FDI_{IND}) has the mean log value of nearly 2, with standard deviation of 1.7. Several provinces at the beginning of decentralization transition phase, up to the end-2000s, received no FDI, especially in the manufacturing sector. Meanwhile, the domestic direct

investment (DDI_{IND}) bear the mean value of 1.7, lower than its FDI_{IND} counterpart, with 1.43 standard deviation.

4.3.2 Estimation strategy

Unobserved heterogeneity is one of the main concerns in selecting an estimation method. This problem may occur from the missing variables in my dataset. As briefly mentioned above, this problem is to be expected as only a handful of statistical data is available at the sub-national level. Therefore, we assume that applying a standard FE-OLS model will lead to a biased result.

Alternatively, a dynamic model is preferred. In this case, the lag value of the dependent variable is used in the regression. FE-OLS is not properly designed to control for endogeneity coming from the lagged dependent variable in the model, let alone with missing variables. System Generalized Method of Moment (GMM) is the more suitable estimation method for dynamic model. The model was first developed by (Arellano & Bover, 1995) and (Blundell & Bond, 1998) as an alternative to the previously developed estimation known as Difference-GMM.

The system GMM estimation uses two instrument equations, at the level and the first difference equation used in the Arellano and Bond method (Roodman, 2009). Our specification for system GMM equation is given as follow

$$MAN_{it} = \alpha MAN_{it-1} + \beta_1 LCAP_{it} + \beta_2 X_{it} + \mu_{it} \quad (4.1)$$

$$\mu_{it} = \eta_i + v_{it} \quad (4.2)$$

for $i = 1, \dots, N$ and $t = 2, \dots, T$, with $N > T$ with $\beta_1 < 1$

MAN_{it} denotes the non-oil and gas manufacturing share to GDP in the province i , $LCAP_{it}$ is local government's capital spending aggregated at province level, X_{it} is a vector of exogenous control variables. μ_{it} is the 'fixed effects' error term that can be decomposed into $\eta_i + v_{it}$, assuming both are independently distributed across i with the following error component structures (see Blundell & Bond, 1998)

$$E(\eta_i) = 0, E(v_{it}) = 0, E(v_{it} \eta_i) = 0 \quad \text{for } i = 1, \dots, N \text{ and } t = 2, \dots, T \quad (4.3)$$

$$E(v_{it} v_{is}) = 0 \quad \text{for } i = 1, \dots, N \text{ and } \forall t \neq s \quad (4.4)$$

We also consider the standard assumption of the initial condition of the dependent variable following Ahn and Schmidt (1995) as

$$E(MAN_{i1} v_{it}) = 0 \quad \text{for } i = 1, \dots, N \text{ and } t = 2, \dots, T \quad (4.5)$$

The orthogonality condition from equations (4.3) - (4.5), assuming that there is no serial correlation in the time-varying disturbances v_{it} , is given as follow

$$E(MAN_{it-s} \Delta v_{it}) = 0 \quad \text{for } i = 1, \dots, N \text{ and } t = 2, \dots, T \quad (4.6)$$

Where $\Delta v_{it} = v_{it} - v_{it-1}$. The equation can be simplified (Blundell and Bond 1998:118) into

$$E(Z_i' \bar{u}_i) = 0 \quad (4.7)$$

Having instrument of equations at the level and first-difference in the model is thought to bring a risk of instrument proliferation problem. It is a condition where the number of instruments tend to increase exponentially along with the number of time periods used (Heid, Langer, & Larch, 2011). This would result in a finite sample bias and will likely to be overidentified. To overcome the problem, following Roodman (2009), we collapse the instrument matrix into single column. In order to check the validity of the model we apply the Hansen test, which is robust to a heteroskedastic condition.

Per capita GDP has thought to be one of the necessary control variables that should be included in a growth estimation model, the other being investment level, population, and human capital (Levine & Renelt, 1992). However, as decentralization concept in Indonesia is also based on the population size, having population variable in the model would create a multi-collinearity problem. Applying the human capital variable in the model will also create the same problem. The investment variables, as described in the previous section, are differentiated based on its origin (FDI and DDI). Other necessary control variables used in the model are trade openness (% GDP) and inflation (% annual).

Per capita GRDP (GRDPPC) is measured as log constant USD. The data is calculated using GDP data from World Development Indicator (WDI). Using the same data directly from BPS is problematic due to statistical discrepancy following the adoption of the System of National Account in 2008, resulting in structural break in 2010.

4.4 Results

The system GMM estimation results are divided into several parts; first we look at the initial impact without covariates before adding in the control variables and the interaction effects between local capital spending data and investments. Following this, we proceed with heterogeneity analysis and robustness check. I bring the findings to formulate my arguments in the discussion part.

4.4.1 Baseline results

Table 4.3 presents the baseline results. In Column (1), we see that there is a positive correlation between LCAP and manufacturing growth. The relationship is significant at 90% confidence

level. We can then interpret that a percentage increase of local government's capital spending correlated to about 0.02% growth in the industry sector. The marginal effect that the result shows is not unexpected as fixed-capital formation merely serves in mediating with main factors of production.

Table 4.3 Local capital spending and industrial development: Baseline results

VARIABLES	DEPENDENT VARIABLE: MANUFACTURING		
	(1)	(2)	(3)
IND _(t-1)	0.956*** (0.022)	0.957*** (0.024)	0.940*** (0.031)
LCAP	0.019* (0.011)		
LCAP _(t-1)		0.015 (0.010)	
LCAP _(t-2)			0.026 (0.017)
CONS	0.561 (0.384)	0.571 (0.409)	0.709 (0.554)
Province FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	544	544	544
Provinces	34	34	34
Instruments	35	35	34
AR-1	0.02	0.02	0.02
AR-2	0.30	0.20	0.31
Hansen (P-value)	0.13	0.13	0.14

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01

- AR-1 and AR-2 denotes Arellano-Bond test with p-values results are reported. They are the necessary diagnostics for dynamic panel data estimation i.e. GMM.

- Hansen J-test calculates overidentifying restrictions that occurs due to increasing number of instruments. P-value is reported.

Source : Author, calculated from BPS, BKPM, and WDI

In column (2), the lagged value of LCAP at the first year is still positive but become not statistically significant. Here we may argue that a capital spending from the previous year contributes positively to industrial development in the current year. However, after two years

in column (3) we can see that even though the coefficient became larger so does the standard error. Therefore, we could not conclude that the result for the 2 years lag is robust.

Overall, the baseline result appears to be well justified. we do not detect serial autocorrelation problems at the AR-2 level. The Hansen J-test results show no sign of overidentifying restrictions as their p-values are above the rejection range. This suggests that the use of instruments in the model is justified.

4.4.2 Main results

Table 4.4 reports the main results. The one-step System-GMM estimator is preferred following the argument that its asymptotic variance matrix is found to be more reliable than its two-step counterpart (Blundell & Bond, 1998). Column (1) of Table 4.4 shows that the lagged value of the dependent variable is positive and significant. The β_1 coefficient stands below 1, which suffices our assumption in equation (1). We can also see that the magnitude and sign are consistent across different specifications. This confirms the dynamic attribute of industrial development in post-reform Indonesia.

Coefficient of LCAP is positive and significant, presenting the evidence of local government's role in promoting the manufacturing sector. Based on this result, we can then interpret that provinces with a larger share of capital spending have higher manufacturing share with 0.09 coefficient. This effect seems to be small by itself but is not unexpected as fixed-capital formation is not the direct contributing factor to industrial production.

Table 4.4 Local Capital Spending and Industrial Development: Main Results

VARIABLES	DEPENDENT VARIABLE: MANUFACTURING					
	(1)	(2)	(3)	(4)	(5)	(6)
MAN _(t-1)	0.943*** (0.026)	0.955*** (0.022)	0.946*** (0.023)	0.950*** (0.023)	0.922*** (0.028)	0.927*** (0.025)
LCAP	0.088* (0.048)	0.122*** (0.041)	0.129*** (0.046)	0.130*** (0.044)	0.128** (0.057)	0.117** (0.051)
RGDPPC		-0.702 (1.390)	-0.262 (1.569)	-0.389 (1.484)	0.823 (1.406)	0.534 (1.241)
RGDPPC ²		0.017 (0.054)	-0.002 (0.061)	0.002 (0.058)	-0.050 (0.055)	-0.039 (0.049)
TRADE _(t-1)			0.003** (0.001)	0.003* (0.001)	0.003** (0.002)	0.003* (0.002)
INFLATION				0.057** (0.024)	0.055** (0.025)	0.058** (0.025)
FDI _{IND}					0.241*** (0.065)	0.216*** (0.058)
DDI _{IND}						0.074* (0.039)
CONS	0.518 (0.381)	6.418 (9.003)	3.824 (10.070)	4.509 (9.521)	-2.516 (8.954)	-0.821 (7.876)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544	544	544	544	544	544
Provinces	34	34	34	34	34	34
Instruments	35	37	38	39	40	41
AR-1	0.019	0.018	0.017	0.018	0.022	0.019
AR-2	0.240	0.239	0.231	0.321	0.236	0.232
Hansen (p-value)	0.102	0.102	0.113	0.995	0.847	0.960

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01
 - AR-1 and AR-2 denotes Arellano-Bond test with p-values results are reported.
 They are the necessary diagnostics for dynamic panel data estimation i.e. GMM.
 - Hansen J-test calculates overidentifying restrictions that occurs due to increasing number of instruments. P-value is reported.

Source : Author, calculated from BPS, BKPM, and WDI

The initial results appear to be well justified judged by the post-estimation diagnostic result. We do not detect serial autocorrelation problems at the AR-2 level and the Hansen J-test

result shows no sign of overidentifying restrictions as we fail to reject them. This too suggests that the use of instruments in the model is justified.

In columns (2)-(6) of Table 4.4, we proceed to check the robustness of the main result presented in column (1) by adding several covariates. The results show that the magnitude of the target variable changed considerably. For instance, in column (2), we can see that the coefficient of LCAP is now at 0.122 after controlling for GRDPPC. To control for any non-linearity relationship between GRDPPC and the dependent variable, column (3) controls for its squared-term as a covariate. A negative correlation with GRDPPC in some of the specifications in Table 2 might suggest a diversion of per capita growth from the industry sector, however they are not statistically significant across all specifications.

Furthermore, after controlling for $\text{TRADE}_{(t-1)}$ and INFLATION in columns (3) and (4), the coefficient of LCAP changed slightly to 0.129 and 0.130, respectively. The positive sign for TRADE is to be expected as it measures both inter-provincial imports and exports of tradable goods, that are dominated by manufacturing products aside of agricultural commodities. The same argument applies with INFLATION, which is positively correlated with MAN.

As I include industrial investment variables into the model, the coefficient of LCAP is getting smaller (column 5 and 6). We suspect that there are some moderation effects caused by these variables that jointly affect my dependent variable. The first investment variable is the foreign investment (FDI_{IND}) and the second is the domestic investment (DDI_{IND}). The coefficients for both variables are positive and significant. Furthermore, their magnitude is one of the largest, which is to be expected as they are a direct factor for production. The domestic investment has a considerably smaller coefficient than the foreign one, signifying that industrial development in Indonesia is linked more to FDI compared to DDI.

Table 4.5 Local Capital Spending and Industrial Development: Main Result

VARIABLES	DEPENDENT VARIABLE: MANUFACTURING							
	All		Non-SAR		Resource rich		Non-imputation	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAN _(t-1)	0.921*** (0.027)	0.953*** (0.020)	0.916*** (0.025)	0.941*** (0.021)	1.052*** (0.008)	1.052*** (0.011)	0.920*** (0.026)	0.959*** (0.019)
LCAP	0.140*** (0.053)	0.124*** (0.041)	0.176*** (0.066)	0.154*** (0.057)	0.158** (0.067)	0.134** (0.064)	0.155** (0.061)	0.145*** (0.048)
FDI _{IND}	0.260*** (0.100)		0.272*** (0.103)		0.272** (0.124)		0.279** (0.108)	
DDI _{IND}		0.098* (0.055)		0.097* (0.056)		0.103 (0.178)		0.096 (0.058)
LCAP * FDI _{IND}	-0.005 (0.017)		-0.007 (0.018)		-0.024 (0.018)		-0.007 (0.019)	
LCAP * DDI _{IND}		-0.004 (0.011)		-0.003 (0.011)		-0.006 (0.016)		-0.010 (0.014)
CONS	-2.601 (8.992)	5.838 (7.711)	-7.268 (11.883)	-0.133 (11.490)	7.220 (48.415)	-37.457 (58.613)	-2.597 (9.727)	8.699 (7.050)
Control Var.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544	544	464	464	96	96	512	512
Provinces	34	34	29	29	6	6	32	32
Instruments	41	41	41	41	41	41	41	41
AR-1	0.022	0.016	0.036	0.027	0.169	0.170	0.026	0.019
AR-2	0.246	0.364	0.213	0.398	0.948	0.791	0.197	0.257
Hansen (p-value)	0.849	0.980	0.999	0.999	1.000	1.000	0.973	0.998

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01

- AR-1 and AR-2 denotes Arellano-Bond test with p-values results are reported.
They are the necessary diagnostics for dynamic panel data estimation i.e. GMM.

- Hansen J-test calculates overidentifying restrictions that occurs due to increasing number of instruments. P-value is reported.

Source : Author, calculated from BPS, BKPM, and WDI

The interactional effect between LCAP and investment variables is presented in Table 4.5. Across all specifications, we apply the same control variables used in the previous table. Column (1) shows that despite the positive and significant partial terms of both LCAP and FDI_{IND}, their interaction terms are not positive. We also fail to see a positive interaction between LCAP and DDI_{IND} despite the partial terms are also positive as shown in column (2). Results shown in column (1) and (2) suffices the post-estimation diagnostics. The AR-2 p-value is not significant as well as the Hansen test.

4.4.3 Extension analysis

To check the strength of the result shown in Table 4.5 column (1), subsequent heterogeneity analysis is performed. Firstly, we try to exclude all of the Special Administrative Regions (SARs) from the model. These provinces are Nangroe Aceh Darussalam (Aceh), Jakarta Capital Region, Yogyakarta Special Region, West Papua, and Papua province. The reason to exclude them is that these provinces have different institutional settings than the others. Their institutional differences vary, which are also influenced by political history and localities.

Jakarta Capital Region differs with other provinces as it does not have a politically elected district government. The city is headed by a Governor who appoints six administrative mayors with little decision-making power. Thus, the administration is more centralized than in other provinces. Secondly, as the capital region, much attention is given from the central government. This contributes to its higher fiscal and human capital resources. Thirdly, historically Jakarta has always been the important economic center of Indonesia.⁸ This further

⁷ Jakarta's prominent status as economic and administrative center has its historical context. In the early 17th century, the Dutch East Indies Company (VOC) moved their trading post from the more prosperous Banten region to the neighboring Jakarta bay area. As the Banten Empire weaken, Jakarta emerge as the region's economic hub.

accumulates resources in the area and created large gaps with other urban economic agglomerations in the country.

In the other special regions, distinct institutional setting also exists. In Yogyakarta Special Region, the province is led by a Sultan who held its position hereditary, thus it is not democratically elected, unlike other provinces. Meanwhile in Aceh, the special autonomy given to this region allows them to set up Islamic-based law that is not widely applicable to the other provinces, thus making it difficult to compare. Lastly, in the Papua and West Papua provinces, they enjoyed higher fiscal transfer from Jakarta in the form of General Allocation Grant (DAU) and Special Allocation Grant (DAK), along with a specialized local representative council (Majelis Rakyat Papua) consisted of indigenous people. The council has the ability to set up ethnic-based rules. Like in Aceh and Yogyakarta, these institutional characteristics are not found in the other provinces. Thus, removing these four provinces and Jakarta from the estimations is justified.

After removing the Special Administrative Regions (SAR), we can see in column (3) and (4) of Table 4.5 that the coefficient of LCAP improved slightly, with the magnitude of the investment variables improved. In fact, the coefficient for FDI_{IND} changed slightly from 0.260 to 0.272 while DDI_{IND} coefficient almost does not change. However, despite the partial interaction terms positive and significant, we found no positive let alone significant interactions.

We further check the result by altering the specification, keeping the resource-rich provinces in the model. Those provinces are Aceh, Riau, East Kalimantan, West Kalimantan, Papua and West Papua. The selection is based on the share of oil and gas rent against their respective RGDP. The results showed in columns (5) and (6) stated that the coefficient for

The later Dutch Colonial Government and the present Indonesian Government continued to base their administrative and economic activities on the city.

LCAP improved slightly from the original specifications. The partial interaction terms are still positive and significant except for DDI_{IND} . The interaction terms, however, still not showing any positive signs. These results, however, must be carefully interpreted as it suffers from overidentifying restrictions with the implausibly high Hansen test p-value result (1.000) for both of the specifications. This might occur due to the now lower number of cross-sectional dimensions that violated the large N and small T principle for dynamic panel data estimation.

Finally, we extend our analysis by dropping the imputed province and the outlier, which are North Kalimantan and Bengkulu. Dropping these provinces serves a double purpose, to increase the initial validity of the model and to justify the use of my imputation. The result can be found in Table 4.5 columns (7) and (8). The signs do not change and coefficient magnitudes are consistent with the previous specifications with the two provinces included.

4.4.4 Robustness check

We estimated our main result on Table 4.5 using System GMM which is known for its better handling of endogeneity that is coming from both lagged value of the dependent variable and unobserved heterogeneity. Here, we conduct more robustness tests using different estimation methods. The results are summarized in Table B.1 in Appendix B. In columns (1) and (2), OLS result is presented. We found that LCAP is positive and significant, and so does FDI but not DDI, but again none of the interactions are positive and significant.

The FE-OLS results on columns (3) and (4) depart from the previous model, showing significance only for FDI_{IND} but the interaction is negative and significant. Lastly, difference GMM estimation (columns 5 and 6) shows the closest result to the System GMM (columns 7 and 8), with LCAP, FDI_{IND} , and DDI_{IND} are positively correlated with industrial growth but with no significant interaction terms.

4.4.5 Discussion

Results showed that local capital expenditure, by itself, has a positive impact on industrialization. Districts and provinces with a larger share of capital spending have a higher marginal effect on the sector's growth. However, simply looking at this relationship without addressing the more important channel of industrialization would result in poor interpretation. Therefore, this research assessed the impact of investments, and its interaction with local capital spending.

The negative interactional terms across all specifications suggest that with every percentage increase of local government's capital spending, the positive impact of FDI_{IND} and DDI_{IND} towards industrial growth would diminish by 0.004 - 0.005 percentage point. The effects are considerably small and not significant, yet the signs are consistent. The results brought up earlier discussions raised by (Nasution, 2016) that highlighted the weak capacity of the local governments. They have not been able to provide efficient public service that would translate directly in supporting the industry sector. Similar issue was also raised by previous studies (Lewis, 2006; Mulyo, 2015; Pepinsky & Wihardja, 2010).

The weak capacity of the local government has been an inherent problem in Indonesia. Decades-long centralized administration under Suharto has impaired much of local institutional capacity. Given this condition, the sudden liberalization of provinces and districts government following the 1999 regional autonomy law has failed to encourage growth. Increasing responsibilities that come with fiscal and political decentralization outweigh their ability and capacity. Consequently, local government has not been able to expand their revenue base,

further limit their development role. Development of institutional capacity was also very low as well.

Under these circumstances, the local government relied on Jakarta for assistance. Their budgetary structure is composed of large transfer allocated by the Ministry of Finance. At the district level, the share of central government transfer to their own budget was as much as 90 percent in 2001. Meanwhile, their own-source revenue constitutes only 7 percent of their revenue (Nasution, 2016).

The central government resolved this capacity gap by introducing the ‘concurrent affairs’ with the law 2004 on regional government, which further strengthened in 2014. This paved the way for the reintroduction of central government programs and agencies at the local level. For the proponent of regional autonomy, this was viewed as a re-centralization effort (Rahmatunnisa, 2015). However, this move has been in line with previous literature addressing the lacking capacity of local government (Ahmad et al., 2005; Bird & Smart, 2002). On the one hand, the change had helped in increasing districts’ and provinces’ revenue by 4 and 11 percent, respectively. But on the other hand, the share of capital expenditure has been decreasing by 16 and 3 percent.

The increasing revenue reflects the growth on the productive sector, while the decreasing share of capital expenditure reflects their low capacity and over dependence on Jakarta. Under the concurrent affairs scheme, the central government handled major connectivity projects that linked intra-provincial areas, while local governments cover inter-provincial regions. However, local government often seek for central government’s assistance to undertake inter-provincial projects, giving a further impression of ailing local capacity.

Lastly, it is also worth noting that the development gap at the local level is not the only reason for the increasing role of central government. Jakarta's concern was also raised by the evidence of local elite-capture problems following the regional autonomy law, which has been observed by several studies (Firdaus, 2018; Lucas, 2016). This problem further prevented capacity building at the local level and justified the recentralization attempt.

The initial attempt by Jakarta was to reduce the development gap at the local level that was mainly caused by the weak capacity of the local government and Jakarta's concern over local elite-capture. The resulting over reliance on the central's role also served as a constraint for local government. In the short run the policy could be justified to resolve some institutional issues but on the long run it diverted from the main objective of the '*reformasi*' which is to ensure regional autonomy to the sub-national governments.

Based on the findings, I therefore suspect that larger positive interaction on industrial growth is mostly coming from the central government's intervention. Jakarta's enormous effort on infrastructure development, especially in the last two administrations of Susilo Bambang Yudhoyono and Joko Widodo, contributed to the sustained growth from 2004 to 2019. The positive impact of local capital expenditure on industry is perceived as a complimentary effect of the central government.

Improving the relationship between local capital spending and investment for the benefit of industrial development will remain a major challenge. This burden might be too big of a task for district governments to handle. The decision to dump fiscal budget directly to the districts in the early phase of decentralization (2001-2003) has contributed to this problem, as they do not possess the capacity. As described previously, the central government later opted to intervene at the sub-national level.

There are several steps that could be done to improve local government's capital spending efficiency in this area. First, Jakarta needs to reformulate their 'concurrent affairs' strategy. The current strategy of central-local collaboration does not require significant role of local government thus it has not improved their capacity significantly, as suggested by the findings. Rather than direct intervention separately between the central affairs and local affairs, i.e. in infrastructure development, they should promote more collaborations with the local governments beyond the said affairs. Secondly, a more direct hands-on role should be given to the local government with the central government provide assistances. These would help in increasing the latter's capacity, especially at the district level. Thirdly, from the local government side, a reformulated development role as suggested above would require them to increase capital spending. Accordingly, they also need to reallocate their budgetary spending to emphasis more capacity development programs.

In order to make this plan work, a significant institutional change would need to be done. In addition to the "concurrent affairs" that separated the central and local government, a new function that allow central-local collaborative work should be introduced. This change would require a political will from all key stakeholders, particularly the central government who needs to increasingly involve and encourage the local government in development process whilst carefully consider local institutional readiness.

4.5 Chapter conclusion

Following its major economic and political reform in 1998, the Government of Indonesia introduced the regional autonomy bill in 2001 that effectively increased the role of the local governments. This chapter attempts to unveil the impact of provinces' and districts' expenditure

on industrial development. To this end, we extend our analysis by exploring the relationship with foreign and domestic direct investments. Using province and district-aggregated data, the System GMM estimation revealed that larger local capital spending correlates positively with the industry sector. This finding is robust across different specifications. However, we fail to find positive and significant interactions between local capital spending and investment. If anything, the result showed a negligible negative tendency. This suggests that with every percentage increase of local governments' capital spending, the positive impact of foreign and domestic investment is marginally decreasing. It is suspected that larger positive impact that channeled investment on industrial growth is coming from the central government's expenditure.

In a decentralized Indonesia, issues regarding local government capacity remained a major institutional challenge. The decision to push for deep decentralization in the early period (2001 – 2004) exacerbated this situation, lead to Jakarta's intervention through the second decentralization law that introduced 'concurrent affairs'. This intervention, in turn, created over-dependency towards the central government, resulting in the negative interaction effect in my finding. To improve this condition, we argue that the central government needs to formulate a new institutional strategy that allows for a central-local collaboration, stressing a more direct role for the local governments. The current model gives too dominant role for the central government in economic related affairs i.e. infrastructure development, and the function is carried out separately between central and local. The collaborative strategy is also meant to improve local governments' capacity through budget reallocation and Jakarta's assistance in development projects. Achieving this, however, requires political will especially from the central government who need to incrementally devolve their function to the local government assuming a certain institutional quality has been met. Future research could compliment the

finding in this chapter by studying the distributional impact of the central government's expenditure towards industrial development.

Chapter 5

Regional autonomy and the challenge for industrial upgrading in

Indonesia: A study on the impact of the 2009 Local Tax policy ^{†††}

Following decentralization reform in 2001 that gave larger responsibility for the sub-national administrations, in 2009 the Indonesian government issued a local tax policy. It allows local governments to further increase their tax base. This policy was followed by massive overregulation at the local level. This chapter aims to study its impact on the industrial sector with an additional focus on the upgrading issue.

5.1 Introduction

On September 15, 2009, the government of Indonesia issued the law no. 28 on Local Tax. The law allowed the local governments, at the province as well as the district level, to expand their fiscal base by imposing additional taxes. The law was aligned with the decentralization program aimed at increasing local government's capability. A large fiscal gap at the local level has been a huge problem in a decentralized Indonesia. This constraint has prevented capacity development and efficiency at the local level (Nasution, 2016; Tirtosuharto, 2017) and could furthermore contribute to the slowing down of economic growth.

Before the implementation of this policy, the local government had relatively smaller taxing power in terms of revenue generations despite a wider range of taxation objects and

^{†††} Main part of this chapter is scheduled to be presented in the 22nd JASID Spring Conference in Bunkyo University Tokyo on June 12, 2021. This chapter presents a later development of the methodology used.

depended more on the increasing transfer of funds from Jakarta. Under the new policy type of taxation, the objects are limited to eleven, but the decision-making authority was largely given to the local government either at the province or district / city level.

This research tries to shed light on the impact of the local tax law on firms' productivity, with subsequent discussion on the industrial upgrading issue. I define firm productivity as per worker output for a given production factor input, namely the number of workers. Productivity is thought to play an essential role in a country's long-term growth (Nakamura, Kaihatsu, & Yagi, 2018). I observe the growth of 764 firms in major economic agglomerations in Indonesia. In addition to studying the time-difference dynamics, that is before and after the implementation of the law, I also explore the locational dynamics. I believe that different institutional settings in Indonesia, due to the regional autonomy initiative, affects firms' behavior differently through the law. This would later bring a distinct impact based on different industrial activities of firms.

5.1.1 Decentralization and local autonomy

The root of one of the most important institutional changes in Indonesia was the 1998 political-economic reform. The Indonesian moniker, '*reformasi*', was directed against the centralized-authoritarian rule of President Soeharto. Having ruled the country for more than three decades, the regime created dissatisfaction at the local level with serious insurgencies in some provinces, most notably in Aceh and Papua. In just about a year after the fall of Soeharto¹⁰, the new government quickly addressed this issue with the introduction of law no. 22 on Regional Autonomy. As the law suggests, it provided greater fiscal autonomy as well as larger

¹⁰ For consistency, we use the old Indonesian name spelling "Soeharto" widely used in the Indonesian government and media. Its modern spelling "Suharto" is the one that is generally use by the international community.

responsibilities for the local governments. However, due to the still imminent concern of national disintegration, that was usually coming from the province level, the regional autonomy was designed directly to the lowest tier of government. Consequently, districts and cities were receiving a larger share of fiscal share compared to province governments (Nasution, 2016). Later in 2005, the degree of local autonomy is further increased with the introduction of the direct local election.

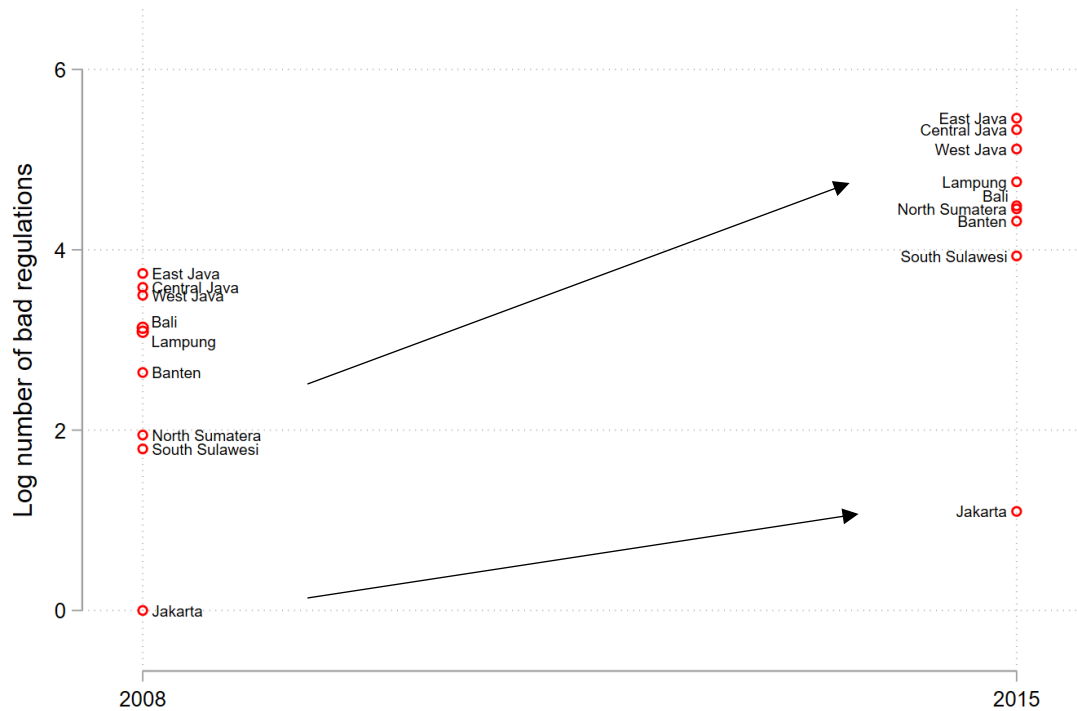
Subsequent laws that govern the decentralization process are Law no. 25 in 1999 regarding central-local finance (later renewed with Law no. 33 in 2004) and Law no. 34 in 2000 regarding local tax. The last one was aimed at strengthening local tax base as local governments are expected to rely less on transfers and more from their own revenue. Later this law was replaced with Law no. 28 in 2009 regarding the same matter, providing stronger taxation power to the local government.

Deep decentralization combined with strong taxation power resulted in over-regulation at the local level, especially after the first wave of local elections between 2005 and 2008. This concerns the central government. In 2016 the Ministry of Home Affairs (MHA) with the help of the Regional Autonomy Watch Committee (Komite Pemantauan Pelaksanaan Otonomi Daerah, KPPOD) collected more than 3000 local regulations that were deemed problematic i.e. hurting the business environment. The MHA later attempted to annul these local regulations, but the decision was cancelled by the Constitutional Court (Aziz, 2017). Their case is dismissed in favor of higher regulation that supported local autonomy.

Despite the deep decentralization at the district level, some peculiarities exist. The capital, Jakarta, has not been given the same deep institutional change. The province-level city was designed as a single political unit led by a democratically elected governor but without an

independent district or city government. In the other provinces, democratically elected mayors exist.

Figure 5.1 Log number of bad local regulation in 2008 and 2015



Source: MHA, 2016

How does the above difference between Jakarta and other provinces affect local regulations? More specifically how does that affect the prevalence of bad local regulations? Figure 5.1 presents the log number of bad regulations collected by the MHA for selected provinces in Indonesia¹¹. We can see that most of the provinces, especially those in Java, are having a higher number of bad regulations in 2015 compared to 2008. East Java province recorded the highest number, 236. The second and third highest are Central and West Java provinces, with 207 and 166 regulations, respectively (Katadata, 2017). In 2011 alone the

¹¹ We selected these provinces to match those covered by the World Bank Enterprise Survey used for the empirical analysis in this Chapter.

province of East Java registered 78 bad regulations, the most of any provinces. In most of the other provinces, the number of regulations increased sharply starting in 2010 and especially in 2011, and most of them are regarding permit issuances and fees.

The same thing, however, did not happen for Jakarta. The capital has not recorded a single bad regulation before 2010. In the two years after that, the city recorded two bad regulations, making it 2 in total by 2015. This is the least number compared to others. Furthermore, those regulations are not directly affecting the business environment as they deal with citizenship and civil registration (MHA, 2016).

I argue that the different political structure between Jakarta and the other provinces served as the underlying reason for the contrasting number of bad regulations, as I have elaborated previously. The combination of the first wave of local election and the 2009 local tax law in the deeply decentralized regions contributed to this situation.

5.1.2 Organization of the chapter

The remainder of this chapter constitutes of the following: Section 2 describes the literary works on the impact of local regulations and taxations, followed by elaboration on data source and construction, as well as the estimation strategy in section 3. Section 4 presents and discusses the findings. Finally, section 5 concludes the research as well as providing policy recommendations.

5.2 Literature review

A study done on OECD countries found that in general local tax, in the form of income and property tax (% of own revenue), correlated negatively with local public expenditures (Liberati

& Sacchi, 2013). Similarly, the impact of local tax on Italian manufacturing firms' growth has been revealed to have a negative correlation on capital, employment, and value-added, but no conclusive finding on total factor productivity (Belotti, Di Porto, & Santoni, 2020). However, Sacchi and Salotti (2017) suggest to the local government not to rely more on the budgetary transfer from the central government, as this will hamper their fiscal stability.

In Indonesia, local tax i.e. property and local income tax has resulted in negative per capita growth and contributed to increasing regional disparity (Dartanto & Brodjonegoro, 2003). A later study found a similar result where local governments' revenue is negatively correlated with per capita GDP. However, the coefficient is smaller in the period where the nation-wide decentralization program was implemented in 2001 compared to the period before (Kharisma, 2013).

Lewis (2006) investigates the efficiency level of the local government tax administration. He found that the cost outweighs the revenue generated rendering them inefficient. Furthermore, Lewis also found that democratically elected local leaders do not contribute to the improvement of tax efficiency. The finding serves as another evidence of the weak capacity of the local governments in Indonesia. Findings by Henderson and Kuncoro (2004) and Kuncoro (2006), using firm level data, also echoes this. They found that increasing local regulations, which they call *red tape*, is positively correlated with increasing corruption incidence. They further found that this problem dissipates with the increasing education of local officials. From these studies, we can conclude that local governments' inefficiency has led to the increasing red tape measure, and this contributes to the corruption issue. The condition persists when the human capital level of a local official is low. Supporting evidence from Vietnam by Tan and Tran (2017) reveals that increasing local capacity benefits firm growth through the reduction in corruption level.

5.3 Data and estimation strategy

This section provides detailed information regarding data collection and measurement, and the identification strategy to reduce selection bias. I also explain the sample balancing method using entropy balance developed by Hainmueller (2012). In the second part, I elaborate the difference-in-difference estimation strategy rigorously.

5.3.1 Data

In answering this chapter's research problem, I utilize panel data from the World Bank Enterprise Survey done in eight provinces in Indonesia, namely North Sumatra, Lampung, Banten, West Java, Central Java, East Java, Bali, and South Sulawesi. The time period of the survey covers two fiscal years; 2009 and 2015. The first wave was done from August 2009 to January 2010, while the second was conducted from April to November 2015. The World Bank Enterprise Survey uses a sample frame from Statistics Indonesia (BPS) and performed stratified randomization. The survey follows this sample frame and was then carried out by a third party to prevent biased responses. To further control for this bias issue, I omit observations that are perceived as not truthful. This was done by triggering question (a.16) towards the end of the questionnaire. In this section, the World Bank Enterprise Survey provided a question to the interviewer whether the answer given during the interview process was truthful or not truthful. By removing the non-truthful result, I end up with more reliable data.

Survey locations include most of the provinces in Java excluding only Yogyakarta, which is a tourism and education-centered province. In the non-Java regions, the survey was done in North Sumatra, South Sulawesi, Bali, and Lampung. Those provinces cover around

70% of the total population and around 60% of the total GDP of Indonesia, which serves as the reason for location selection (WBES, 2016).

The time periods of the survey fit perfectly with my policy target, the 2009 Local Tax Law. As the law was only stipulated by the government and legislative assembly in September 2009, the law has not immediately affected the local level in the same year. Local governments were only responding to the change in the following year 2010 at the earliest and would be in full effect sometimes at the latter part of the year.

Table 5. 1 Variable description

VARIABLES	UNIT	DESCRIPTION
Output	Log IDR mil.	Firm's sales output in the latest fiscal year
Productivity	Log IDR mil.	Firm's total output divided by total number of workers
Unit labor cost	Log IDR	Total labor cost divided by total number of workers
Land purchase	Log IDR mil.	Value of land purchased
Machinery Purchase	Log IDR mil.	Value of machinery purchased
Material cost	Log IDR mil.	Cost of intermediate goods used in production
Training dummy	Dummy	Dummy score 1 is given if firm has skill training program
Export	% of total product	Share of exported product sales to total sales
Tax rates	Scale of 5	Firm's perception on tax rate, lower is better
Irregular payment	% of output	Share of irregular payment against contracted value/total sales
Building permit	Scale of 5	Number of days to get building permit, categorized into 5

Source: Author, calculated from the WBES 2015

Table 5.1 presents the description of the variables used in this chapter. The main dependent variable is productivity, which is measured as per worker output of total sales. It is measured as the natural log value of the local currency in million. The control variables are those that relate to productivity growth. Unit labor cost is a measurement of firms per worker cost measured as log of local currency. The next variable is land or building purchase, which

serves as an indicator of whether a firm is expanding or diversifying its production. Machinery purchase is another variable that relates tightly to productivity.

Training dummy variable tries to capture firm's effort in improving human capital quality. Score 1 is given if a company held substantial training for workers, otherwise 0. The material cost reflects the use of intermediate goods in production activity. Meanwhile, the export variable denotes market orientation, the share of exported products to total production. The rest of the variables deal with institutional quality and are measured categorically at 5 points range, with the exception of irregular payment. Higher institutional score marks lower institutional quality.

Irregular payment captures the amount of payment that is given to public officials outside of the usual and acknowledged procedure. Essentially the variable captures incidents of bribery. As this is a sensitive issue that firms often reluctant to give a precise answer the numbers given could be largely different from the real condition. First, I measure irregular payment as a percentage of money, out of total contracted value, that needed to be paid for securing a procurement. Secondly, if this information is not available, then I constructed irregular payment by calculating the amount of money paid for this purpose against the firm's total sales.

Lastly, the building permit variable is categorical data with 5 scale range. This is the only variable that reflects the institutional quality of local government better. Other institutional variable does not separate the effect of central and local government. In a decentralized Indonesia, applying for a building permit is largely under local government administration. The variable measures the number of days that it took to get a building permit, then the numerical data is classified into categorical data.

Descriptive statistics shown in Table 5.2 provides information on firms' productivity before and after the 2009 policy. The total observations amount to 764 firms, divided into 110 for the control group, which is Jakarta, and 654 in the treatment groups. Firms that belong to the treatment group are those located in West Java, Central Java, East Java, Banten, North Sumatera, Lampung, Bali, and South Sulawesi. Of both groups, the sample also split before and after the policy implementation, resulting in 55 firms in the control group and 327 firms in the treatment group.

We can observe that in terms of sales output, before 2009 firms located in the treatment area have a higher mean value (23.2) than the control group (22.2). The number for both groups decreases after 2009, but in the treatment group, the drop is larger (21.7) than the control group (21.2). However, when it comes to per worker output, or productivity, the picture is contrasting. The treated group is recording a lower value (17.7) compared to Jakarta (18.8) before the policy change. In the period after, both groups managed to increase their productivity but with different effects, with smaller change for the treatment group (18.2), while it is larger in the other group (19.6).

In terms of unit labor cost, the treatment group shows an initial lower value (14.9) than the control group (16.0). This difference is to be expected as Jakarta is the most advanced region, so it has higher labor cost compared to the other provinces. After the policy introduction, we see that there is an increase in the cost in the treatment group (16.2) as well as the control group (16.7), but the rate of change is larger for the former.

For the land and material purchase, the score is higher for the control group than the treatment one, but in both groups, we can see that the number decreased sharply after the policy intervention year. Meanwhile, for material cost, both groups showed an almost similar rate of change before and after the policy.

Table 5.2 Descriptive Statistics

Variables	All groups		Control group		Treatment group	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<i>Before 2009 policy</i>						
	Obs. = 382		Obs. = 55		Obs. = 327	
Output	21.3	2.8	22.2	2.8	23.2	3.5
Productivity	17.9	1.8	18.8	1.6	17.7	1.8
Unit labor cost	15.0	3.6	16.0	2.6	14.9	3.7
Land purchase	1.3	5.1	2.8	7.5	1.1	4.6
Mach. Purchase	5.3	8.8	6.9	9.3	5.0	8.6
Material cost	15.6	9.5	11.9	11.3	16.2	9.0
Training dummy	0.1	0.4	0.16	0.4	0.15	0.4
Foreign tech. licence	0.2	0.4	0.1	0.2	0.2	0.4
Export	11.4	27.9	9.1	27.3	11.8	28.0
Tax rates	0.6	0.9	0.4	0.8	0.6	0.9
Irregular payment	0.5	2.6	0.8	3.2	0.4	2.5
Building permit	0.6	0.9	1.1	1.3	0.5	0.9
<i>After 2009 policy</i>						
	Obs. = 382		Obs. = 55		Obs. = 327	
Output	21.9	2.9	21.2	2.8	21.7	2.8
Productivity	18.4	2.2	19.6	2.2	18.2	2.1
Unit labor cost	16.3	1.8	16.7	2.4	16.2	2.2
Land purchase	0.1	1.2	0.3	1.7	0.1	1.1
Mach. Purchase	1.0	3.6	0.9	3.0	1.0	3.7
Material cost	16.5	8.8	13.0	10.9	17.1	8.2
Training dummy	0.1	0.3	0.2	0.4	0.1	0.3
Foreign tech. licence	0.2	0.4	0.4	0.5	0.2	0.4
Export (% total)	12.6	28.6	18.3	33.9	11.7	27.5
Tax rates	0.8	1.0	0.5	0.8	0.9	1.1
Irregular payment	3.3	16.4	3.0	13.6	3.3	16.8
Building permit	0.7	1.0	0.5	0.8	0.7	1.0

Source: Author, calculated from the WBES 2015

Firms' activity in licensing foreign technology is expected to help to increase productivity. In the control group, we can see that the evidence is lower (0.1) than in the treated group (0.2). Conversely, in 2015 in the control group, foreign technology licensing is increasing significantly to (0.4) while it stays the same for the treated on (0.2).

The initial score for the training dummy shows that it is almost similar for both groups. After 2009, the mean score is significantly higher in the control group (0.2) than the treatment group (0.1). In terms of export share, firms in Jakarta are getting increasingly export-oriented with double growth from 9.1 to 18.3, while for the treatment group the score almost does not change.

In terms of firms' characteristics, we can see that the treatment group shows a relatively unchanged level of export share and foreign technology licensing, with a lower value compared to Jakarta. Institution-related characteristic scores such as irregular payment / bribery incidents and perception on tax are higher in the treatment group after the 2009 policy. Before the policy, the bribery rate is higher in Jakarta (0.8) than in the treatment group (0.4), but it increased sharply in this group after 2009 (3.3), surpassing Jakarta. We suspect that this large difference in bribery incidents is affected by the increase in regional autonomy.

Lastly, the building permit variable is an indicator of the local government's efficiency in providing service. We see that before the policy was implemented, the treatment group is better (0.5) against (1.1) for the control group. However, after the policy, we can see that the control group has a better score compared to the treated one.

5.3.2 Estimation strategy

There are various methods for measuring productivity ranging from basing them on total output or on value-added to measure it using labor cost or other labor units (Freeman, 2008). The productivity measurement used in this chapter follows the rather traditional definition that is the output produced per number of workers. With this set, I proceed with the econometric calculation.

Difference-in-difference estimation

I carry out the analysis using a difference-in-difference (DID) estimator following Angrist and Pischke (2009; see also Abadie, 2005; Donald & Lang, 2007). This estimation strategy has been very popular in impact evaluation studies (Abadie, 2003; Card & Krueger, 1994; Duflo, 2001). In a simple model, we compare two groups within two different periods of time, before and after an intervention. The difference across groups and periods yields the DID estimation.

The ideal way to get a perfect estimation result is to have real counterfactual data, where the control group has never been exposed to the policy intervention. The difference between before and after intervention serves as one part of the DID result. However, obtaining counterfactuals from the same group is not possible, therefore we collect data from a different group that was not affected by the policy. As discussed above, Jakarta has a contrasting institutional setting compared to the other provinces and was largely unaffected by the 2009 law. For this reason, I select Jakarta as the counterfactual, or control group. I model the policy impact on productivity as following

$$\Delta pro_{its} = \beta_0 + \beta_1 treat + \beta_2 post + \beta_3(treat * post) + \varepsilon_{is} \quad \dots (5.1)$$

Where Δpro_{its} is productivity change in firm i at the year t , and in the specific industry sub-sector s . This is the main output variable. The coefficients $\beta_0, \beta_1, \beta_2, \beta_3$ are all unknown parameters and ε_{is} is an error term expected to be zero (Albouy, 2004). β_0 is a constant term, while β_1 is the treatment group-specific effect and β_2 is the time trend coefficient applied to both the control and treated group. Lastly, β_3 is the average treatment effect that is the policy impact variable.

The expectation for zero error term ε_{is} in the equation (5.1) can be expressed as

$$cov(\varepsilon_{is}, treat_{is}) = 0 \quad \dots (5.2)$$

$$cov(\varepsilon_{is}, post_{is}) = 0 \quad \dots (5.3)$$

$$cov(\varepsilon_{is}, treat_{is} * post_{is}) = 0 \quad \dots (5.4)$$

The last of the three above assumptions is the called parallel-trend assumption. The failure to confirm this trend would mean that the $treat * post$ is associated with error, thus the resulting coefficient will be biased.

From equation (1) we can arrange the expected value for each treated and non-treated group before and after the policy implementation as

$$E[\Delta pro_{treat=1, post=0}] = \beta_0 + \beta_1 \quad \dots (5.5)$$

$$E[\Delta pro_{treat=1, post=1}] = \beta_0 + \beta_1 + \beta_2 + \beta_3 \quad \dots (5.6)$$

$$E[\Delta pro_{treat=0, post=1}] = \beta_0 + \beta_2 \quad \dots (5.7)$$

$$E[\Delta pro_{treat=0, post=0}] = \beta_0 \quad \dots (5.8)$$

Combining the equation (5) through (8) in a DID equation, it will allow us to calculate the difference between the treated and control group after the policy intervention, with the

difference before policy intervention. The predicted DID coefficient is $\widehat{\beta}_3$. This can be expressed as the following

$$\widehat{\beta}_3 = (E[\Delta pro_{treat=1,post=1}] - E[\Delta pro_{treat=1,post=0}]) - (E[\Delta pro_{treat=0,post=1}] - E[\Delta pro_{treat=0,post=0}]) \dots (5.9)$$

then we plug in the right-hand side of the equation above to get to the unbiased estimate of DID as follow

$$\widehat{\beta}_3 = (\beta_0 + \beta_1 + \beta_2 + \beta_3 - (\beta_0 + \beta_1)) - ((\beta_0 + \beta_2) - \beta_0) \dots (5.10)$$

$$\widehat{\beta}_3 = \beta_3 \dots (5.11)$$

I carry out equation (1) under fixed-effects OLS specification, with the addition of endogenous control variables necessary in explaining productivity. The final equation is given below

$$\Delta prod_{its} = \beta_0 + \beta_1 treat + \beta_2 post + \beta_3 treat * post + \beta_4 X + v_k + \varepsilon_{ts} \dots (5.12)$$

Where v_k is region specific fixed effects. The covariates X , as presented in table 1 above, are (1) unit labor cost, (2) land purchase, (3) machinery purchase, (4) material cost, (5) training dummy, and (6) export share. I also control for institutional quality (7) perception on tax rates, (8) evidence of irregular payment, and (9) building permit.

Sample matching

From the data shown in table 5.2 in the previous section, we can see that the parallel trend assumption has been violated as the treatment and the control group has different values and the between period growth was also different. To resolve this imbalanced sample situation, I apply the matching method. This is a widely applied strategy in DID-based analyses (Chabé-

Ferret, 2015). However, instead of employing the common matching method such as the nearest neighbor matching, I apply the entropy balancing scheme developed by Hainmueller (2012). The reason for choosing this over the other method is because its reweighting scheme prevents the loss of information. This way, we get to keep the same number of observations after the matching process.

The strategy started by estimating the counterfactual based on the treatment group, shown as below

$$E[\widehat{prod_0} | treat = 1] = \frac{\sum_{\{i|treat = 0\}} prod_i \omega_i}{\sum_{\{i|treat = 0\}} \omega_i} \quad \dots (5.13)$$

where ω_i is a weight chosen for the control unit, with the following reweighting scheme

$$\min_{\omega_i} H(\omega) = \sum_{\{i|treat = 0\}} h(\omega_i) \quad \dots (5.14)$$

$h(.)$ signify distant metric based on Kullback (1959) entropy divergence, and $\omega_i \geq 0$ for all i such that $treat = 0$.

Table 5.3 Entropy balancing result

Variables N = 764	Without entropy balancing				With ent. balancing	
	Treat (N=654)		Control (N=110)		Control (N=110)	
	Mean	S.d.	Mean	S.d.	Mean	S.d.
Unir labor cost	15.5	8.7	16.4	5.2	15.5	12.3
Land purchase	0.6	11.2	1.6	30.5	0.6	11.1
Mach. purchase	3.0	48.0	3.9	57.0	3.0	44.8
Training dummy	0.1	0.1	0.2	0.2	0.1	0.1
Foreign tech. license	0.2	0.1	0.2	0.2	0.2	0.1
Export share	11.7	770.3	13.7	959.2	11.7	834.7

Source: Author, calculated from WBES 2015

Table 5.3 presents the counterfactual result following the entropy balancing method. The scheme provides a balanced mean value between the treatment and control group. Furthermore, as the method keep the information from the pre-processed data, the number of observations (N) is still the same before and after. I use only the most relevant control group that are (1) unit labor cost, (2) land purchase, (3) foreign technology license, (4) training dummy, and (4) export share.

5.4. Result and discussion

I predicted that a policy intervention could have an effect on firms' productivity and that the effect would be different across industrial sectors. This section will be divided into two main parts. First, I present the baseline and main result of my estimation based on the equation (1) and (2). In the second part, I apply extension analysis and observe the result based on technological activity using Lall (2000) classification.

5.4.1 Baseline and main results

Table 5.4 presents my basic estimation results. The specifications are carried out without applying the sample matching. I test the policy impact using two dependent variables. Firstly, in columns (1) through (4) I use total sales output, and then from column (5) to column (8), I use productivity per worker as the dependent variable. In the first column, with all observations counted, I found that the local tax policy has a negative coefficient. After applying sub-sectoral fixed-effects (column 2) the coefficient does not change significantly. Then, using only data from the industrial sector in column (3), I found the effect to be larger. Furthermore, selecting

only for large firms (workers > 100 people) the coefficient become even larger. However, none of the results is statistically significant in this first set of regression.

Next, I move on to use productivity measurement. Columns (5) and (6) are consistent with previous trends that there are negative impacts. When the only firm in the industrial sector is selected, I found that the coefficient becomes larger (-0.74). Furthermore, when I estimate the effect on the large industrial firm (column 8) the result becomes even larger (-1.77), suggesting a larger drop in productivity. For this last one, the result is statistically significant. However, the number of observations is the lowest compared to the previous column. This baseline result serves only as a benchmark comparison to check if the trend is consistent after applying the full model and sample matching.

Table 5.4 Baseline estimation result (without sample matching)

Variables	Dependent variables:							
	Output				Productivity			
	All (1)	All (2)	Industry (3)	Large ind. (4)	All (5)	All (6)	Industry (7)	Large ind. (8)
Post	0.993* (0.601)	1.124* (0.575)	1.488* (0.797)	1.359 (0.941)	0.799** (0.372)	0.770** (0.363)	1.341*** (0.473)	1.997*** (0.753)
Post*Treat	-0.502 (0.635)	-0.572 (0.614)	-0.831 (0.830)	-1.179 (1.028)	-0.292 (0.401)	-0.287 (0.395)	-0.735 (0.502)	-1.770** (0.841)
Constant	22.191*** (0.381)	21.716*** (0.720)	21.908*** (0.804)	25.626*** (0.985)	18.758*** (0.221)	18.042*** (0.398)	18.083*** (0.442)	19.183*** (0.897)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Obs.	764	764	629	184	764	764	629	184
R ²	0.14	0.20	0.21	0.26	0.12	0.17	0.19	0.25

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01
- Industry refers to all activities classified under ISIC Rev.4 Code 15-37, while large industry refers to firms with ≥ 100 workers as classified in national definition.
- Sector Fixed-effects refers to sub-sector sets of dummies applied to control for differences due to firm sectoral activities

Source : Author, calculated from WBES 2015

In Table 5.5, I present the main result following sample balancing by only using productivity as the dependent variable, and industrial firm in the sample. The results in column (1) through (4) also controlled for the endogenous variables, whereas column (4) through (8) add institutional quality variable.

In column (1), using all industrial firms in the sample, we can observe a small and not statistically effect of the local tax policy on firm's productivity. Column (2) focuses on small firms with less than 20 workers. The impact also tends to be positive (0.05). For larger firm, we started to see the negative impact of the policy (column 3), and the impact is exceptionally large (-1.89) for large firms as shown in column (4). The result is also statistically significant.

The control variables applied do not show abnormality. Unit labor cost is positive and mostly is significant. Land purchase, despite its positive coefficient, is only significant for all observations (columns 1 and 5). Machinery purchase is shown to have a negative relationship across specifications except for small firms, where the coefficient is positive and significant. Material cost, or the use of intermediate input for production, is mostly positive and significant.

The training dummy coefficient is shown to be positive and significant for larger firms, while it is negative for small firms. The coefficient for the small firm is also significantly large. On the use of foreign technology, in terms of licensing it, we can see it tends to be negative for the small firms, while positive for the larger ones. However, the correlation is only significant for the medium and larger firm group (columns 3 and 7), not for the large firm (columns 4 and 8). And lastly, for the share of export product, we see a similar trend that larger share of export shows a positive correlation with productivity growth, but it is not significant for the small as well as large firms.

Table 5.5 Main result for industrial firms controlling for endogenous variables

Variables	Dependent variables: Productivity							
	All (1)	Small (2)	Med+large (3)	Large (4)	All (5)	Small (6)	Med+large (7)	Large (8)
Post	0.344 (0.402)	0.885** (0.447)	0.195 (0.546)	1.714** (0.749)	0.378 (0.412)	0.983** (0.467)	0.277 (0.546)	2.066*** (0.734)
Post*Treat	0.015 (0.420)	0.055 (0.466)	-0.210 (0.571)	-1.888** (0.780)	0.016 (0.437)	-0.131 (0.488)	-0.208 (0.579)	-1.964** (0.774)
Unit labor cost	0.064 (0.044)	0.150** (0.059)	0.039 (0.048)	0.205** (0.101)	0.063 (0.045)	0.157*** (0.054)	0.042 (0.047)	0.211** (0.096)
Land purchase	0.034** (0.015)	0.036 (0.029)	0.024 (0.018)	0.016 (0.021)	0.033** (0.015)	0.032 (0.024)	0.021 (0.017)	0.019 (0.021)
Mach. purchase	-0.013 (0.014)	0.051** (0.024)	-0.030* (0.016)	-0.048** (0.021)	-0.012 (0.013)	0.048** (0.023)	-0.031** (0.016)	-0.048** (0.020)
Material cost	0.083*** (0.019)	0.052** (0.025)	0.093*** (0.025)	0.033 (0.026)	0.083*** (0.019)	0.044* (0.023)	0.092*** (0.025)	0.032 (0.026)
Training dum.	0.214 (0.290)	-1.059*** (0.398)	0.255 (0.317)	0.787* (0.400)	0.223 (0.287)	-1.070*** (0.380)	0.318 (0.310)	0.827** (0.376)
Foreign tech.	0.874*** (0.278)	-0.145 (0.251)	0.943*** (0.344)	0.563 (0.382)	0.874*** (0.279)	-0.102 (0.256)	0.935*** (0.343)	0.570 (0.356)
Export share	0.013*** (0.003)	0.008 (0.006)	0.012*** (0.004)	0.008 (0.005)	0.013*** (0.003)	0.008 (0.006)	0.012*** (0.004)	0.008 (0.005)
Tax rates					-0.072 (0.097)	0.092 (0.139)	-0.217* (0.119)	-0.549*** (0.168)
Irreg. pay.					-0.005 (0.005)	-0.002 (0.003)	-0.019** (0.009)	-0.021* (0.012)
Permit					0.040 (0.110)	0.211 (0.153)	0.089 (0.134)	0.211 (0.172)
Constant	15.214*** (0.777)	13.771*** (1.052)	15.602*** (0.745)	13.970*** (1.933)	15.234*** (0.811)	13.619*** (0.990)	15.734*** (0.744)	13.997*** (1.829)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Obs.	629	232	397	184	629	232	397	184
R ²	0.42	0.50	0.41	0.48	0.42	0.52	0.42	0.51

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01

- Industry refers to all activities classified under ISIC Rev.4 Code 15-37, while large industry refers to firms with ≥ 100 workers as classified in national definition.

- Sector Fixed-effects refers to sub-sector sets of dummies applied to control for differences due to firm sectoral activities

Source : Author, calculated based on WBES 2015

On the second set of regression, with a focus on the addition of institutional variables, I expect to see some result consistency. From columns (5) through (8) we can see that my DID coefficients do not change drastically, with the exception of column (6) now showing a negative trend. Tax rates are shown to have a negative association with productivity growth. The coefficient is especially significant for larger firms and large firms, but it is not necessarily negative for small firms.

Secondly, the incidence of irregular payment seems to be negative across all sizes of firms, but they are significant for the larger groups of firms. Lastly, the number of days in getting land and building permit turns out to not have significant correlations. The relationship seems to be similarly large for both small firms (0.21) and large firms (0.21). However, across all estimations, we can see that the result is not significant.

5.4.2 Extension analysis: Industrial upgrading

I follow the result in Table 5.5 with extension analysis, focusing on the policy impact on different levels of industries. I use Lall's (2000) technological classification that categorized the following activities as low technology; textile, footwear, leather manufacturer, basic metal, furniture, toys, and plastic products. On the higher technology group, we combined Lall's classification of the medium and high technology industry, referring to the activities such as; vehicles, chemicals, fertilizers, engines, machinery, electronics, pharmaceutical, and precision engineering. In each of the specifications in this section, we retain the use of the same control variables applied in the previous model.

In Table 5.6 columns (1) through (3), I present the result for the low-tech industry. Across all specifications, I fail to see a negative relationship between the local tax policy and

firm productivity. Despite that, none of them are showing statistical significance. In this group, institutions are showing a negative effect on productivity, specifically the irregular payment variable which stands significant under 0.1 confidence level.

On the second group of regression with the higher-tech industries across all firm sizes, we started to see a different picture. The DID results show a negative tendency, which suggests that the policy has a negative impact on firms' productivity. Meanwhile, institutional variables are not necessarily negative for this group except for tax rates.

Regression results in this second group still do not show any statistical significance. Therefore, I perform another step of heterogeneity check by looking only at the medium and large firms. Columns (7) through (9) show the finding for this group. First, in addition to the negative coefficient, we can see that the magnitude is noticeably larger compared to the previous group. The specification in column (9) is shown to be statistically significant. For the institutional quality, we see that the tax rate has a negative relationship with productivity, and the effect is significant. For these larger firms, irregular payment and building permits are not necessarily negative.

However, the result in this group has a significantly lower number of observations, meaning that this might not adequately represent the real-world situation, although can still be useful to reveal some tendency. Lastly, Table 5.6 tells us that the model explains only around 34% of the change in the productivity output for low-tech firms. It has significantly higher explanatory power for the higher-tech firms at around 54-55% and even higher for the large firms of the same group with its R-squares stand at around 72-74%.

The finding implies several things. First and foremost, it shed light on how a policy change could affect the real sector. Most importantly it affects the productivity of the industrial

sector, the much-needed sector for sustaining growth and productive transformation. Secondly, this finding revealed the current state of decentralization in Indonesia. Local governments low institutional capacity, as pointed out by Nasution (2016), has been an imminent issue since the beginning of Indonesian decentralization in 2001. Thus, the local tax policy was implemented radically, with this problem intact. This then served as one of the main reasons for the consistently negative relationship in the findings.

Thirdly, another reason for the negative effect is due to the lowering business climate. For a long time scholars such as Kaufmann, Kraay, and Mastruzzi (2004) and Acemoglu and Robinson (2013) have been arguing about the importance of institutions and governance, specifically on the quality of regulation. The main argument is that poor regulation would not lead to sustained economic growth. In this sense, my findings are in agreement with this group of scholars. The result also echoes the previous finding on the negative effect of decentralization reform with regard to local institutional quality in the case of Indonesia (Henderson & Kuncoro, 2004; Kuncoro, 2006). In their work, Kuncoro and Henderson extend the corruption issue further and revealed that it occurred due to the increasing bureaucratic red tape at the local level. This poses a huge challenge for Indonesia's industrialization effort, as targeted in its National Five-Year Plan (RPJMN) as well as the country's own SDG Goals. The situation is also difficult for the effort on industrial upgrading as well, as it reveals larger negative coefficients.

Table 5.6 Extension analysis: Policy impact on industrial upgrading

Variables	Dependent variables: Productivity								
	Low-tech. industry			Med-hi tech. Industry			Med-hi tech. Ind. (Large firm)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	0.242 (0.407)	0.248 (0.404)	0.222 (0.410)	0.355 (1.146)	0.350 (1.148)	0.559 (1.096)	2.414** (0.957)	2.335** (0.952)	2.647*** (0.917)
Post*Treat	0.175 (0.429)	0.197 (0.430)	0.192 (0.440)	-0.289 (1.166)	-0.321 (1.151)	-0.549 (1.110)	-1.297 (1.045)	-1.428 (1.034)	-1.616* (0.932)
Tax rates	-0.032 (0.086)			-0.065 (0.201)			-0.541* (0.306)		
Irreg. payment		-0.011* (0.006)			0.002 (0.005)			0.005 (0.008)	
Permit			-0.028 (0.099)			0.264 (0.222)			0.385 (0.248)
Constant	15.189*** (0.972)	15.235*** (0.966)	15.205*** (0.982)	15.282*** (1.532)	15.263*** (1.547)	15.165*** (1.500)	17.030*** (2.249)	16.715*** (2.403)	16.427*** (2.428)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	478	478	478	121	121	121	49	49	49
R ²	0.34	0.34	0.34	0.54	0.54	0.55	0.74	0.72	0.73

Note : (1) Robust standard error in parentheses. (2) * p<0.1, ** p<0.05, *** p<0.01. (3) Post*treat is the difference-in-difference coefficient. (4) Industry refers to activities classified under ISIC Rev.4 Code 15-37. (5) Large industry refers to firms with ≥ 100 workers as classified by national definition. (6) Sector Fixed-effects refers to sub-sector set of dummies applied to control for firms sectoral differences.

Source : Author, calculated from WBES 2015

My finding on productivity is based on the industry's level of technology, refers to the negative tendency for the higher-technology firms. The signs are found to be larger when we isolate the observation to include only large firms. This confirms two things. First, higher-tech. industries are seemingly more sensitive to institutional change. In this case, the policy contributes to creating uncertainty or simply hurting the business climate. Firms then would prefer to scale down their operations and or relocate to other places with better business competitiveness. In the context of Southeast Asian industrialization, the emerging challenge from neighboring countries such as Malaysia and Vietnam could accelerate this process. Furthermore, the implementation of the ASEAN Economic Community (AEC) at the end of 2015 could also serve as a confounding variable that worked in the same direction as the policy change. The AEC framework offers lower trade and tariff barriers between the ASEAN countries, thus encouraging firm mobility across the countries in the region to find the most competitive environment.

Secondly, the fact that local governments in Indonesia have not been prioritizing industrial upgrading, is another possible contributing factor that led to the result. The regional autonomy policy, or decentralization, has led to the increasing local capability in providing several important services such as education and healthcare. However, in terms of infrastructure development, which is an important aspect in supporting the industry sector, earlier works found negative results (Kis-Katos & Sjahrir, 2017; Mulyo, 2015). And in this area the finding in this chapter is also aligned.

On the mechanism that explains the difference in institutional quality, Table 5.7 provides the DID estimation using institutional variables. A differential change in the institution should be able to explain the negative results laid above. Here we see that across all industrial sectors (column 1-3 there is evidence of increasing institutional obstacles, particularly very high

and significant for irregular payment. For the low-tech industrial firms, the one significant institutional increase is dealing with the building permit. In terms of the number of days, getting this permit has become longer. Meanwhile, for the medium and high-tech industrial firms, the highest institutional obstacle is irregular payment. In the context of the 2009 local tax policy, this would mean that the increasing number of local taxes and regulations has led to the increasing evidence of irregular payment. This is a similar finding with Kuncoro (2006) regarding the association of local regulations with bureaucratic red tape and corruption.

Table 5.7 Difference in institutional quality

Variables	Dependent variables: Institutional quality								
	All industry sector			Low tech. industry sector			Med-high tech. industry sector		
	Tax rate	Irr. pay.	Permit	Tax rate	Irr. pay.	Permit	Tax rate	Irr. pay.	Permit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	0.073 (0.194)	0.615 (0.653)	-0.509* (0.282)	0.076 (0.253)	0.914 (0.825)	-0.414 (0.349)	-0 (0)	0.166 (0.288)	-0.500 (0.469)
Post*Treat	0.207 (0.214)	3.157** (1.354)	0.680** (0.296)	0.207 (0.272)	1.800 (1.405)	0.632* (0.363)	0.173 (0.224)	8.790* (4.911)	0.356 (0.504)
Constant	0.431* (0.247)	3.326* (1.944)	0.311 (0.274)	0.204 (0.325)	5.256 (6.559)	0.610 (0.835)	0.498*** (0.110)	8.683*** (2.433)	-0.947*** (0.102)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	629	629	629	478	478	478	121	121	121
R ²	0.11	0.07	0.11	0.06	0.14	0.09	0.08	0.09	0.18

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01

- Institutional variables have inverse quality score; lower is better.

- Post*treat is the difference-in-difference coefficient.

- Industry refers to all activities classified under ISIC Rev.4 Code 15-37, while large industry refers to firms with > 100 workers as classified in national definition.

- Sector Fixed-effects refers to sub-sector sets of dummies applied to control for differences due to firm sectoral activities.

Source : Author, calculated from WBES 2015

Results shown in Table 5.7 serves to confirm that firms' perception of institutional quality has been declining in general due to the policy change in 2009. The effect of each institutional variable may not necessarily be statistically significant, but the trend shown has been consistent across the different specifications and also with earlier findings.

5.5 Chapter conclusion

In the last twenty years, regional autonomy and local political power in Indonesia have been increasing down to the lowest level of government administration, cities and districts. This chapter estimated the impact of policy change, where in 2009 the Indonesian government introduced the local tax law, principally allowing the local governments to impose taxes on the business sector. This chapter is interested in observing the impact of the policy on industrial firms' productivity. I utilize WBES survey data, done before and after policy implementation, and carried out the analysis under a quasi-experimental design. I managed to find that in general, when comparing the deeply decentralized provinces and Jakarta, the policy has a negative effect on firm productivity. My baseline model suggests that there is a 0.3 percentage loss of productivity in the treated provinces. I also found that the effect is larger for large firms. I extend my analysis to look for the potential impact on a specific sub-sector of the industry. I found that the policy is not necessarily negative for low-technology firms. On the other hand, I observed that the impact tends to be negative for the medium and high technology industries, and especially stronger for the large ones.

The finding is robust to the existence of necessary endogenous variables as well as with the application of the sample matching technique. I confirm previous bodies of literature on the impact of regional autonomy in Indonesia in general, whilst also offering a new perspective on

policy impact that has never been done before. Further research needs to control for possible regional influence such as the AEC as well as expanding research coverage to include more provinces especially in the Eastern part of Indonesia.

Some limitations with regards to the findings in this chapter need to be pointed out. Firstly, the survey covered only about a fourth of the total number of provinces in Indonesia, despite covering more than 70% of the national population in the 9 provinces. Furthermore, we have not control for exogenous factors coming simultaneously with our targeted policy. One of the largest possible sources of exogenous interruption is the implementation of AEC, which happened in 2015. This multilateral agreement abolished tax regimes and created a rather uniform incentive between ASEAN countries. If this suspicion stands true, then there is a possibility that this has caused firm relocation outside of the country. I suspect that this could have a different impact between the control and treatment group, benefitting the capital for its fewer number of bad regulations. Controlling for this effect would leave us with a more precise finding on the 2009 local tax impact on firms' productivity.

Chapter 6

Productivity impact of political dynamics in a decentralized Indonesia: The case of the 2016 centralization policy of the Batam Free Trade Zone

During his presidential visit to Singapore in July 2015, President Jokowi attempted to lure more investment to the neighboring island of Batam, the main city in the Riau Island province. The island hosts Indonesia's first successful Free Trade Zone (FTZ). It had shown stellar performance in the first half of the 1990s with the majority of investments coming from its direct neighbor Singapore. This chapter tries to study the central government's attempt in centralizing the Batam FTZ administration on industrial productivity growth.

6.1 Introduction

In the meeting with Singaporean business leaders during his visit, President Jokowi laid out a plan to restructure the FTZ governance to better improve its business climate. Jokowi's adamant effort in Batam was possibly motivated by two accounts. 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. Secondly, the measure was seemingly done to anticipate a major upcoming change in the region, the implementation of the ASEAN Economic Community (AEC) at the end of that year. AEC would 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 successful instrumentation in the Asian

Tiger economies, and particularly in promoting export-oriented activities, had managed to sustain unprecedented high growth spanning for more than two decades (Dowrick, 1994).

The remarkable success of China's industrialization from the 1980s to the 2010s was also largely contributed by their place-based industrial 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.

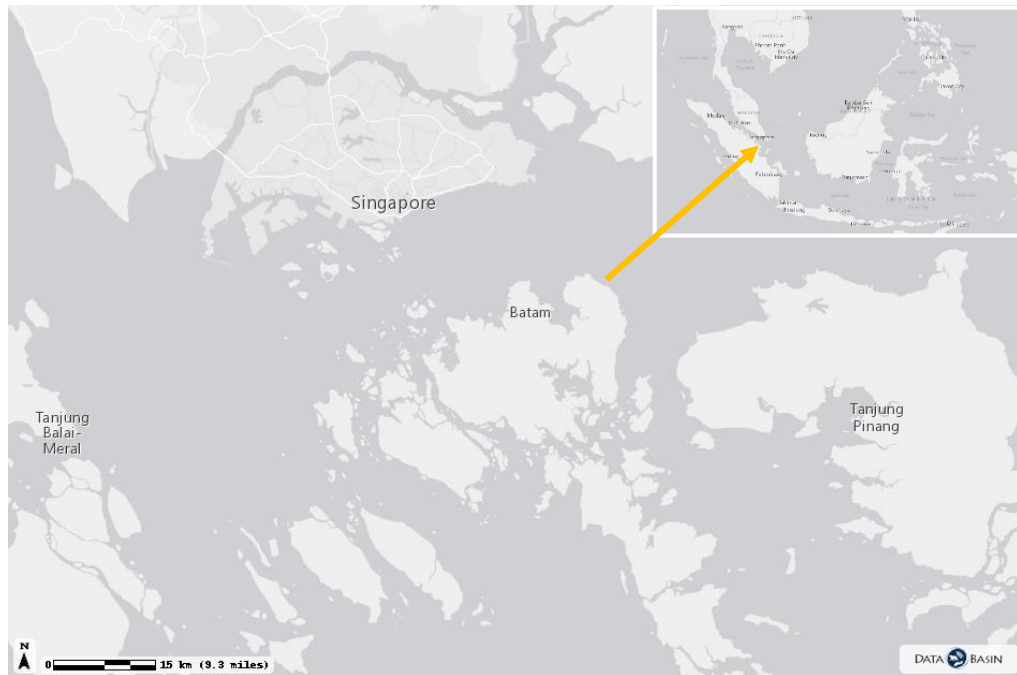
This research aims to estimate the impact of vertical institutional change in the management of Batam FTZ on firms' productivity. One of the latest changes, following the president's visit to Singapore, was started in 2015 where the central government attempted to centralize the FTZ administration. The move was finalized in December 2016. This only resulted in the increasing conflict between the central and local governments, which was eventually won by the local government. Starting in 2020 the FTZ administration was handed over to the city government of Batam with its mayor serve as the head.

6.1.1 Development of the Batam FTZ

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), its main economic activity before 1970 was largely fishery and agriculture. The island was lacking sufficient infrastructure and was sparsely populated that prevented industry to develop. Back then the government was not even focusing their attention on the island, with the relocation of the province's capital from Tanjung Pinang island, which is located just next to Batam, to the

main Sumatra island in the city of Pekanbaru in 1960.¹² In the early years of Soeharto's New Order regime, development in the province is concentrated in its new capital. The abundance of natural resources was one of the main reasons for focusing Riau's development on the Sumatra mainland.

Figure 6.1 Map of Batam FTZ (Insert: map of Southeast Asia)



Source: databasin.org

The realization of the need to develop the island as a specialized area came following the successful export-oriented industrialization experiment of Singapore and the other Tiger economies. Batam's initiation as FTZ was done in October 1971 with Presidential Decree No. 74. It is then followed with the issuance of another decree in 1973 that assigned Batam Island Industrial Area Development Authority (BIDA) as the agency responsible for Batam FTZ development (bpbatam.go.id). These led to the increasing infrastructure project from roads,

¹² Taken from History of Batam article from Batam FTZ official website www.bpbatam.go.id.

airport, to a reservoir, for the next couple of years. Consequently, this also placed the zone under Jakarta's direct influence, making the FTZ authority the *de facto* government of the island. This is strikingly different from most other areas in Indonesia where local governments are the one responsible for the development in their respected jurisdiction, even when they were merely an extension arm of the central government.

Following the slow early stage between 1971 and 1977, another significant step of development was taken place in 1978 with the appointment of the then Minister of Research and Technology and later President, BJ Habibie. He was famous for proposing the "balloon theory" that depicts Singapore as the increasingly overblown balloon. Eventually, he said, the balloon will need to disperse pressure to prevent it from exploding. Batam, then, is seen as having the potential to gain from Singapore's reduced pressure for its development. Appointing a research and technology minister as the head of FTZ was also done purposefully in the hope to propagate not just industry but also promoting technological upgrading (Hutchinson, 2017). However, in the first ten years under Habibie's leadership, the zone still encounters difficulties in attracting investments and subsequently generating industrial growth.

In 1989, the Indonesian government was one part of the tripartite SIJORI Growth Triangle framework. SIJORI stands for Singapore, Johor, and Riau, where the latter two regions are a state of Malaysia and a province of Indonesia, respectively. The triangle comprised a development plan with Singapore at the center and both Johor and Riau as its periphery areas. As predicted by the balloon theory above, by the end of 1989 Singapore was nearing its industrial capacity limit without sufficient resources of land, unskilled labor, and natural resources, which are provided by the neighboring countries. The plan was announced by then Deputy Prime Minister of Singapore Goh Cok Tong and was responded to with much enthusiasm by all parties involved. The framework would later be expanded into the larger

Indonesia-Malaysia-Singapore Growth Triangle (IMS-GT) and another similar framework among ASEAN countries.

Figure 6.2 Map of SIJORI Growth – Triangle



Source: van Grunsven and Hutchinson, 2017

Following the announcement of the SIJORI plan, massive investment flocked Batam FTZ. Between 1991 and 1997 total Foreign Direct Investment is USD 535.5 million, averaging at nearly 70 million per year (BKPM, 2020). This was then 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 was still increasing more than twofold from USD 196.47 million in 1997 to USD 514.11 in 1998. In the two years that follow, Batam FTZ enjoyed close to 200 million of investment on a yearly average. This resiliency was also observed by Hutchinson (2017) as he studied the electronic industries in the zone. After the recovery in the early 2000s, the high investment period has not returned to the island, at least not until 2007 when the government revitalizes the FTZ approach.

6.1.2 Decentralization and revitalization of Batam FTZ

The 1997 Asian crisis was followed by nationwide unrest that was known as the “reformasi movement”. This ended the heavily centralized regime of President Soeharto. The new administration in Jakarta subsequently responded to the demand for a stronger local government and hastily applied the decentralization bill in 1999. Batam FTZ has not been immune to the institutional change that comes. Almost overnight, a newly autonomous local government of the city of Batam is established. Prior to this, there has been already a government that was established under the 1983 Government Decree, but it only had limited autonomy, and its developmental role was practically overtaken by the FTZ authority.⁸

Following the decentralization atmosphere, after the establishment of the autonomous government of Batam city, in 2002 the Riau Province was split separating the archipelagic part of the region from Sumatra mainland and making it the new province of Riau Island. The

⁸ The establishment of the City Government of Batam in 1983 was part of the deconcentration program under Law no. 5 in 1974 that allowed for larger local government autonomy. However, the program was merely focusing on the expansion of local administration instead of providing real autonomy, as many things are still dictated by the central government in Jakarta.

province has seven districts, with Batam serves as the main industrial center as well as the most populous areas.

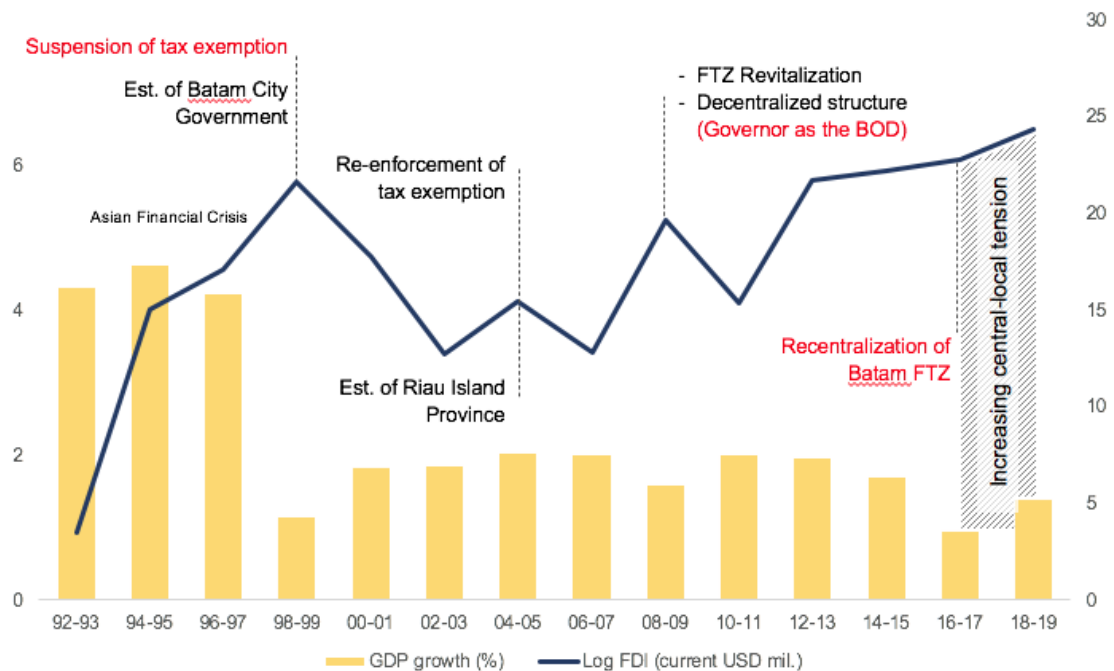
The emergence of autonomous local governments both at the province as well as city-level complicates the business climate in the FTZ. There are overlapping responsibilities between the city government and the FTZ authority (BIDA) such as in facilitating investment and development of infrastructure. Jakarta tried to anticipate this by issuing a Government Decree that would synergize the two institutions, but at the cost of lesser authority for BIDA. A few years later, with the formalization of the new autonomous province of Riau Island in 2004, the zone was once again under threat of growing province government's authority. One of the major changes with the establishment of the new province is that the government must now accommodate its role in the zone.

At the same time, as a part of the effort to restore macroeconomic stability following the crisis, and as a part of IMF's Structural Adjustment Program, the government of Indonesia was required to abandon its industrial policy. In relation to the Batam FTZ, the first regulation issued was the suspension of tax exemptions on the island in March 1998. The kind of taxes imposed is the value-added and luxury tax. It was not until mid-2000 that the government reverted to the old regulation, which was later renewed in December 2003. The organization of the FTZ is, meanwhile, still disputed by the local governments.

The political dynamics following this bi-directional vertical institutional change in Batam have not immediately brought down business climate in the zone, as revealed by Broadfoot(2003). Annual growth was maintained at nearly 7% until 2003 (see Figure 6.3). This is an improvement compared to the crisis period. However, investment flow was affected sharply as it was slashed at just a third sequentially from 2001 to 2003. The friction between

FTZ Authority and Batam city until the mid-2000s was perceived lowly by investors, resulting in the lowest average of FDI inflow since 1994.

Figure 6.3 Investment and growth dynamics in the Batam FTZ



Note : Blue line marks two-yearly average FDI inflow (log current USD mil.) pegged at the left axis and yellow bar denotes bi-yearly average GDP growth pegged at the right axis.

Source : Author, 2021

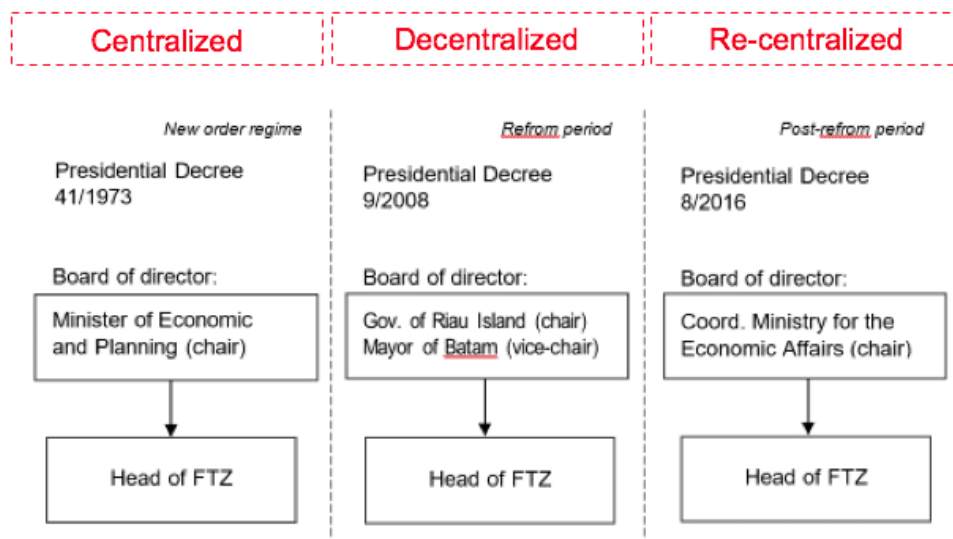
The road to revitalize Batam FTZ took place in 2006, with leaders of Indonesia and Singapore initiated a joint ministerial meeting on economic cooperation. One of the focuses was to develop Batam and its surrounding areas. This was then followed by the formation of a national team in Indonesia, led by the Coordinating Minister for Economic Affairs, to study several policy options. The bilateral agreement with Singapore was a demonstration of the international influence that Jakarta possesses over the local government.

In the year after, Jakarta issued the long-awaited FTZ Law (44/20007) which was immediately followed by Governmental Decree on Batam FTZ effective in 2008. Its biggest

change is on the composition of the board of directors of the zone. Under the new regulation, both Governor of Riau Island and the Mayor of Batam served as the chair and vice-chair of the board, respectively (see Figure 6.4). The member of the board under the regulation has also consisted of local officials.

The revitalization plan had helped in maintaining long-run GDP growth at about 7% between 2008 and 2013 as shown in Figure 6.3. It was only interrupted with below national average growth in 2009 (4.6%) due to the global financial crisis. In terms of investment flow, it managed to increase FDI by 45% annually in the same period.

Figure 6.4 Batam FTZ structure under different regimes



Source: Author

The dynamics had swung the zone's political pendulum from a more centralized administration during Soeharto's new order regime to an increasing local government influence in the reform period. This was also perceived as the period of increasing political tension in the zone, caused by frictions between the zone authority and local government such as in the case of luxury goods import (liputan6.com, 2002).

6.1.3 Research gap and problems

The progression of Batam FTZ after its change in 2008, however, was not without problems. Despite trying to accommodate the central-local interest, dissent voices from the local side are still coming. In 2013, activists of local Non-Government Organizations challenged the legal status of the Batam FTZ to the Constitutional Court in Jakarta ("Putusan Mahkamah Konstitusi"). They cited that the dual authority in the zone has created confusion in the community. In the next two years, the City Government of Batam was constantly disputing the FTZ authority over regulations and local assets, resulting in lower GDP growth in 2014 and 2015 despite increasing FDI.

Table 6.1 Value and number of project in Batam FTZ

Period	FDI (USD mil.)	FDI project	FDI /project
1990 - 1998	101.1	11	5.3
1999 - 2002	122.1	29	4.3
2002 - 2006	39.0	12	3.6
2007 - 2010	121.3	58	2.1
2011 - 2014	255.3	112	2.3
2015 - 2018	481.2	563	0.9

Source: BKPM, 2021

Regarding FDI, Table 6.1 illustrates the changing scale of foreign investment in Batam since 1990. Along with the increasing FDI value, number of projects was also increasing overtime. However, in terms of its value per project it is getting smaller. During the high growth period it managed to receive on average around 5 million USD per project, only to see it decreased to just above 2 million USD between 2007 and 2014. This decreasing scale of

investment clearly contributes to the lower growth. Thus, this brings us to the earlier story of Jokowi's visit to Singapore in mid-2015.

After visiting Singapore, the president crossed the strait to the Batam island and arranged a meeting with local chamber of commerce. His visit boils down to a decision to centralize the FTZ Administration. The Presidential Decree no. 8 in 2016 materialized this by shifting it under the central government c.q. Coordinating Ministry for the Economic Affairs. The zone was then headed by one of its deputy ministers.

This change, however, did not manage to improve the growth on the island. In 2016 and 2017, GDP growth was plummeted to less than 4%, below national average. FDI scale coming to the zone was also down to below 1 million USD per project, the lowest since the implementation of SIJORI Plan.

Batam's continuously lowering growth is worrying as it might signify industry crowding out. Hutchinson (2017) and van Grunsven and Hutchinson (2017) observed this symptom in the electronics sector of Batam, the island's main driver of growth since the 1990s. This paper offers to shed light on similar issue, opting to focus on a more recent change which was the central government's intervention in 2016. The policy was Jokowi's effort to reenact industrialization through a place-based approach, which was once highly successful but is currently in constant development interruption.

Various literatures have studied the impact of FTZ policy on Batam's investment climate (Broadfoot, 2003, 2002; Kuncoro, 2005), its impact on FDI and industrialization in the region (Aritenang & Chandramidi, 2020; Negara & Hutchinson, 2020; van Grunsven & Hutchinson, 2017), but however there have been less works with focus in firm productivity.

6.1.4 Organizational of the paper

Following the introductory part, the rest of the paper is organized as follows. Section 2 discusses my data and estimation method. Section 3 deals with the results and robustness test of our econometric model, with section 4 concludes the study.

6.2 Estimation method and data description

This section provides an elaboration of my chosen estimation method and descriptive information on the data. The research design follows a quasi-experimental method that was very popular in policy evaluation studies (Card & Krueger, 1994; Duflo, 2001) including in the case of Batam FTZ development (Aritenang & Chandramidi, 2020). We 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 Island Province as a proxy. Province level data is readily available and much easier to set up for the purpose of this chapter. 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 the industrial survey done by BPS.

6.2.1. Estimation method

Like the previous chapter, the dependent variable of productivity follows the conventional method that is total output per worker. As a robustness test, I use alternative productivity measurement, explained in the corresponding sub-section. I compare productivity for the Batam FTZ with the productivity of its surrounding regions; North Sumatra Province, Riau Province, South Sumatra Province, and Lampung Province.

The treated group (*treat*) is assigned the binary variable value of 1, otherwise 0. The period before the policy came into effect (*post*) is also marked as 0, and 1 is given for the period after the policy is being employed. The initial equation set-up in predicting the impact of policy on productivity is given as the following, recall that this is the same model as in the previous chapter

$$\Delta pro_{it} = \beta_0 + \beta_1 treat + \beta_2 post + \beta_3 treat * post + \varepsilon_{it} \quad \dots (6.1)$$

Δpro_{it} resembles productivity change in firm i at the year t . All the beta coefficients (β_0, \dots, β_3) are unknown parameters. The parameter of interest is β_3 , which resembles the 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.

As we know that β_3 is the treatment effect coefficient, let us arrange equation (6.1) into the basic DID set-up to predict β_3

$$\hat{\beta}_3 = (E[\Delta pro_{treat=1, post=1}] - E[\Delta pro_{treat=1, post=0}]) - (E[\Delta pro_{treat=0, post=1}] - E[\Delta pro_{treat=0, post=0}]) \quad \dots (6.2)$$

where

$$E[\Delta pro_{treat=1, post=0}] = \beta_0 + \beta_1 \quad \dots (6.3)$$

$$E[\Delta pro_{treat=1, post=1}] = \beta_0 + \beta_1 + \beta_2 + \beta_3 \quad \dots (6.4)$$

$$E[\Delta pro_{treat=0, post=1}] = \beta_0 + \beta_2 \quad \dots (6.5)$$

$$E[\Delta pro_{treat=0, post=0}] = \beta_0 \quad \dots (6.6)$$

plugging in equation (6.3) through (6.6) into equation (6.2), followed with simple elimination process resulted in

$$\widehat{\beta_3} = ((\beta_0 + \beta_1 + \beta_2 + \beta_3) - (\beta_0 + \beta_1)) - ((\beta_0 + \beta_2) - \beta_0) \quad \dots (6.7)$$

$$\widehat{\beta_3} = \beta_3 \quad \dots (6.8)$$

My model specification under OLS is given by the following

$$\Delta prod_{its} = \beta_0 + \beta_1 treat + \beta_2 post + \beta_3 treat * post + \beta_4 X + \nu_s + \varepsilon_t \quad \dots (6.9)$$

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). ν_s is region-specific fixed effects, controlling for unobservable locational 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.

6.2.3. Robustness test

I perform two steps of robustness test in order to corroborate my main finding from equation (6.9). First, I set the policy variable as an instrument variable in a Two-stage Least Square regression. Then on the second step of this first robustness check I apply different measurement of Total Factor of Productivity (TFP) developed by Levinsohn and Petrin (2003). They developed a method for calculating the unobserved productivity shock in the estimation of production function that is different from the existing model.

Their production function approach, departed from Olley and Pakes (1996) is given as the following Cobb-Douglas model

$$y_t = \beta_0 + \beta_l l_t + \beta_k k_t + \beta_m m_t + \beta_f f_t + \beta_e e_t + \omega_t + \eta_t \quad \dots (6.10)$$

y_t is the target output variable, k_t is capital stock, l_t denotes labor input, respectively. m_t , f_t , e_t are intermediate goods, fuels, and electricity. Error components are represented as ω_t

and η_t . The former, ω_t , is the unobserved variables that is assumed to impact firm's output, therefore containing element of productivity ξ_t . The equation is given as

$$\omega_t = E[\omega_t|\omega_{t-1}] + \xi_t \quad \dots (10)$$

Combining equation (10) to the equation (9) with regards to the interest variable ξ_t gives us

$$\Xi_t = y_t - \beta_l l_t - \beta_k k_t - \beta_m m_t - E[\omega_t|\omega_{t-1}] - \eta_t \quad \dots (11)$$

The error term η_t is expected to be uncorrelated with the input factors. Despite the assumption, it is still a possibility that η_t could correlate with other variables, thus lead to bias result. However, I expect that the disturbance would be negligible as the main unobserved variable ξ_t is controlled for.

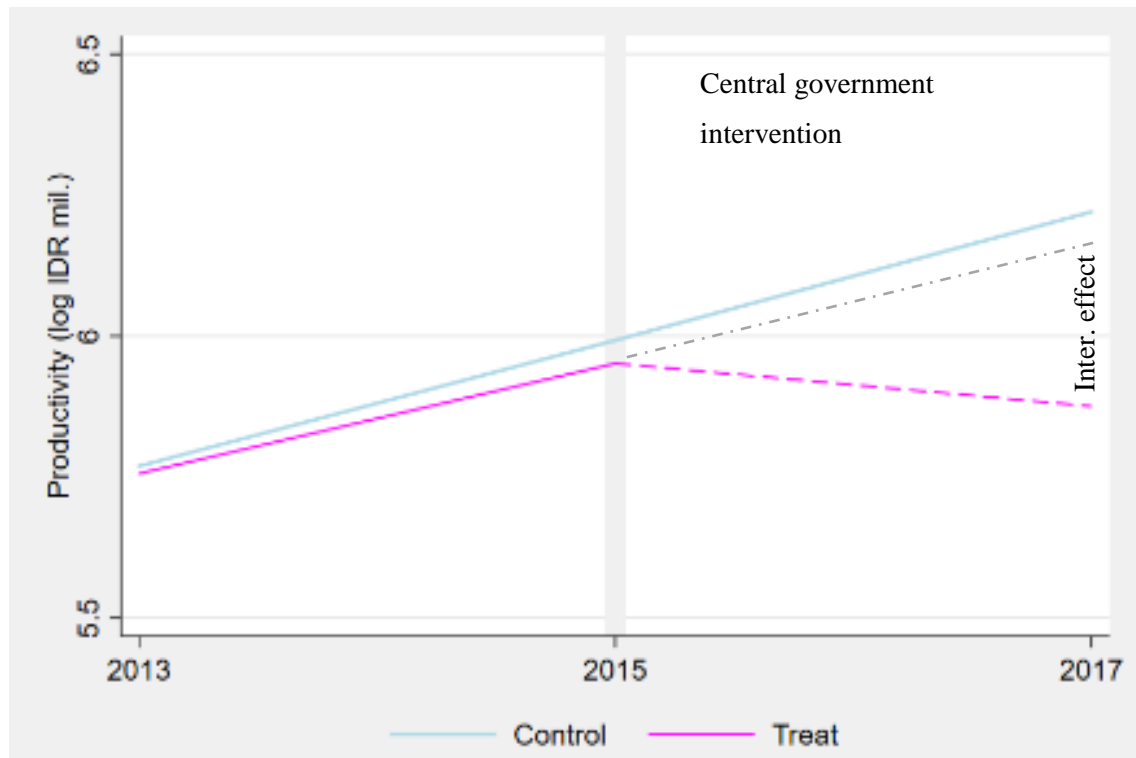
In the second step of the robustness test, I perform a placebo test using firm-level data from 2015. In this year, the 2016 policy has not taken effect despite the sign from the central government towards that direction has been expressed to the media from July of that year. Therefore, we can expect to see some negative trends. However, the coefficient should be closer to zero and the magnitude is largely different from what is shown in the main estimation.

6.2.4. Parallel trend test

To ensure the validity of the DID model 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 6.5 shows a 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.

Figure 6.5 Parallel trend graph



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 centralization of FTZ in 2016. Dashed grey line marks the counterfactual line if the policy was not applied in the zone.

Source : Author, calculated from SI Industrial Survey 2011, 2013, 2015, 2017

I confirm the parallel trend above 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. 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 two variables of interest; productivity per worker and TFP calculation based on the Levinsohn and Petrin (2003) approach, both

managed to pass the lead-trend as well as the time-trend tests (see Table 6.3 column 2 and 3). Figure 5 showed the parallel trend test result. The F-test score probability indicates whether the variable pass or do not pass the test.

Table 6.2 Parallel-trend test result

Parallel Trend Test	Output (1)	Productivity (2)	TFP (Lev.-Petrin) (3)
<i>Lead-trend</i>			
F-stat.	0.70	0.03	0.43
Prob. F	0.40	0.85	0.51
Result	Passed	Passed	Passed
<i>Time-trend</i>			
F-stat.	5.13	1.39	0.21
Prob. F	0.02	0.24	0.65
Result	Not-passed	Passed	Passed

Source: Author

6.2.5. 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 year data selected. In choosing the data to be used, I first identify the recent policy change in Batam's FTZ and the Riau Island province, and then I select the data in between its implementation. The targeted policy intervention was the 2016 FTZ restructurization / recentralization policy. Then I proceed by selecting industrial data of 2013 and 2017 for the estimation.

Table 6.4 provides descriptive statistics of the variables used. The total number of observations is at 2925, but only 2815 is suitable for productivity analysis, and even fewer observations for the alternative productivity measurements (Levinsohn-Petrin TFP), as I only measure the non-zero value of firms' production factors. 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 less than 9 months.

Table 6.3 Descriptive Statistics

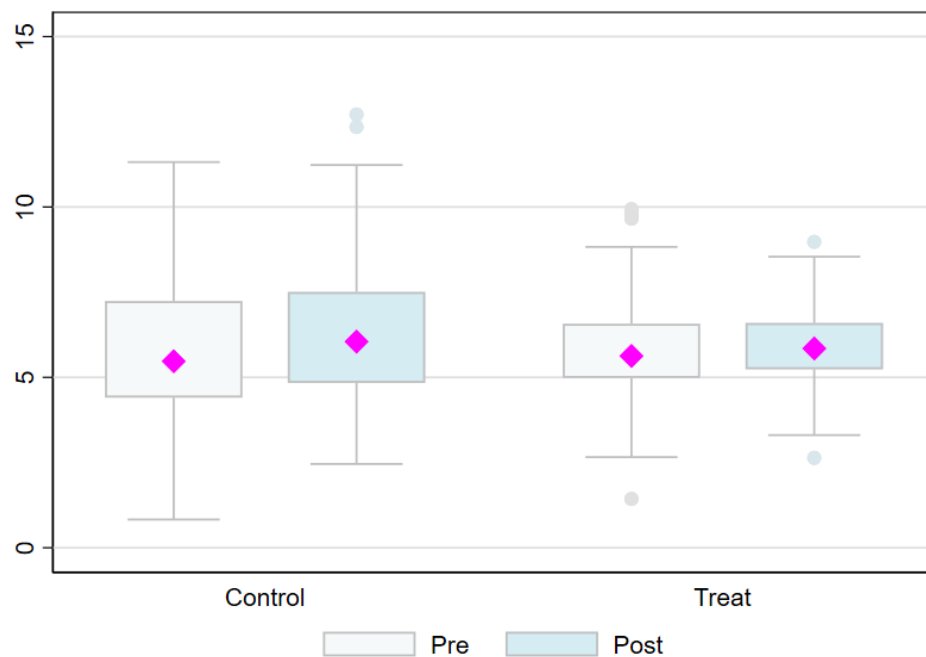
Variables	All			Control			Treat		
	Obs.	Mean	s.d.	Obs.	Mean	s.d.	Obs.	Mean	s.d.
<i>Before 2016</i>									
Dependent var.									
Output (log current IDR mil.)	1,469	10.43	2.24	1,201	10.33	2.30	268	10.87	1.91
Productivity (log current IDR mil.)	1,423	5.77	1.58	1,159	5.77	1.64	264	5.76	1.29
TFP (Levinsohn-Petrin)	975	8.20	1.94	803	8.11	1.99	172	8.63	1.58
Independent var.									
Labor cost (log current IDR mil.)	1,467	7.77	1.39	1,200	7.62	1.31	267	8.45	1.52
Mac. purchase (log current IDR mil.)	1,469	1.4	2.8	1,201	0.8	2.0	268	4.2	3.8
Material cost (log current IDR mil.)	1,401	9.54	2.60	1,194	9.56	2.63	207	9.42	2.42
Foreign ownership (% ownership)	1,469	17.0	36.5	1,201	8.1	25.8	268	57.0	48.5
<i>After 2016</i>									
Dependent var.									
Output (log current IDR mil.)	1,456	10.76	2.13	1,183	10.75	2.22	273	10.84	1.73
Productivity (log current IDR mil.)	1,392	6.15	1.46	1,125	6.22	1.54	267	5.88	1.02
TFP (Levinsohn-Petrin)	895	8.34	1.80	734	8.28	1.87	161	8.62	1.39
Independent var.									
Labor cost (log current IDR mil.)	1,455	8.05	1.41	1,182	7.89	1.35	273	8.71	1.46
Mac. purchase (log current IDR mil.)	1,456	2.3	3.0	1,183	2.0	2.8	273	3.9	3.3
Material cost (log current IDR mil.)	1,408	9.82	2.50	1,175	9.88	2.56	233	9.52	2.19
Foreign ownership (% ownership)	1,456	18.7	37.9	1,183	8.8	27.0	273	61.4	47.8

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

In terms of output, we can see that firms located in the Batam FTZ, the treated group, have a higher mean score of (10.87) compared to 10.33 in the control group before the policy

intervention. After 2016 the gap difference is closing with productivity growth in the control group outweigh the treated one. Contrastingly, productivity per worker is lower, albeit only slightly, in the treatment group (5.76) against in the control group (5.77). 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).

Figure 6.6 Box plot graph: Firm productivity



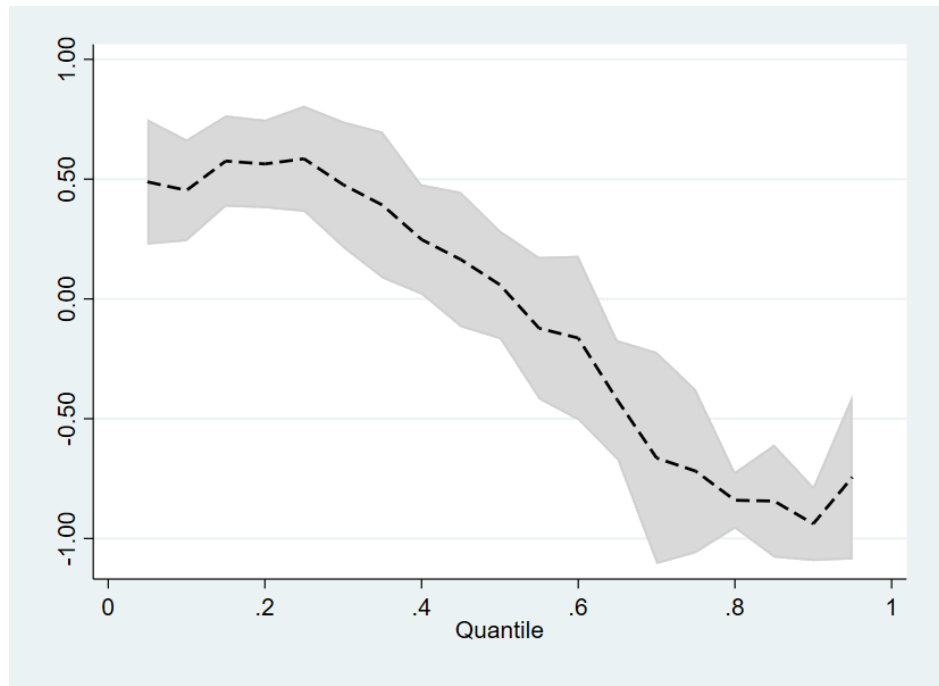
Note : Vertical axis represents firm per-worker output value (log IDR million) and the mean value is marked in magenta.

Source : Author, calculated from SI Industrial Survey 2011, 2013, 2015, 2017

The difference in productivity between the two time periods and groups can be visualized in a graph. Figure 6.6 shows the mean value for each group as well as the minimum and maximum values. We see a larger increase of productivity for the control group while it stays almost the same for the treatment group while its whiskers get shorter. This suggests that compared to the control group, the productivity growth of the treated group has a negative

coefficient. Figure 6.7 shows the coefficient plot of the treatment variable, indicating that the most productive firms are affected negatively by the policy change.

Figure 6.7 Coefficient of the impact of 2016 FTZ Policy in Batam



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

6.3 Results and discussion

This part is divided into five sub-sections. In the first one, I am presenting 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. In sub-section 4, I perform a robustness test using various methods, including instrumenting the policy in a production function model. Lastly, I provide a discussion based on the result findings.

6.3.1 Baseline results

Table 6.4 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 the 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 results are robust.

Table 6.4 Baseline estimation result

Variables	Output		Productivity	
	OLS (1)	FE-OLS (2)	OLS (3)	FE-OLS (4)
Post	0.418*** (0.092)	0.400*** (0.033)	0.451*** (0.067)	0.420*** (0.031)
Post*Treat	-0.449** (0.182)	-0.375*** (0.096)	-0.325*** (0.117)	-0.275*** (0.085)
Constant	9.934*** (0.071)	10.432*** (0.016)	5.467*** (0.050)	5.777*** (0.015)
Province FE	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes
Provinces	5	5	5	5
Observations	2925	2925	2815	2815
Adj. R-sq	0.137	0.083	0.177	0.112
F-statistics	10.573***	74.391***	116.753***	91.721***

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 my difference-in-difference estimation.
- Standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significant level.

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

6.3.2 Main results

I extend the previous analysis by adding endogenous control variables necessary to explain productivity. Table 6.6 shows my main estimation results. Column (1) shows that the negative coefficient stays (-0.317) after controlling for unit labor cost, and again in column (2) controlling further with the value of machinery purchase. Finally, in the final model shown in column (3), the negative trend still stands and significant. Coefficient change is expected but not as large.

In column (4) I compare Batam FTZ with its closest neighboring province, North Sumatra. This resulted in a similarly negative coefficient with the previous column. However, after we change the control to the next neighboring province, Riau, in column (5) we find that the coefficient is significantly smaller. 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 Sumatra (column 6) and Lampung province (column 7). Lampung gave a very large negative coefficient compared to the others. This suggests that this province might not be a proper control group.

Across all specifications shown in Table 6.6 my time-trend variable, *post*, shows a positive coefficient, suggesting that for both groups 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 we encounter in Table 6.5. The control variables show expected positive signs. With the exception of foreign ownership, the variables are statistically significant. Omitted variable bias is still present as my full model in column (3) only explains around 30% of the changes in productivity.

Table 6.5 Main estimation result

Variables	Dependent variable: Productivity						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post	0.334*** (0.034)	0.247*** (0.035)	0.236*** (0.032)	0.225*** (0.038)	0.200*** (0.075)	0.221** (0.107)	0.404*** (0.087)
Post*Treat	-0.317*** (0.085)	-0.201** (0.086)	-0.313*** (0.083)	-0.302*** (0.085)	-0.210** (0.105)	-0.239* (0.131)	-0.435*** (0.114)
Unit labor cost	0.282*** (0.056)	0.262*** (0.054)	0.234*** (0.053)	0.253*** (0.069)	0.169** (0.067)	0.179** (0.074)	0.180** (0.070)
Mach. Purchase		0.077*** (0.010)	0.062*** (0.009)	0.070*** (0.012)	0.050*** (0.013)	0.049*** (0.018)	0.048*** (0.017)
Raw material			0.138*** (0.014)	0.121*** (0.015)	0.083*** (0.015)	0.085*** (0.016)	0.093*** (0.016)
Foreign own. (%)			0.001 (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.003)	0.004 (0.003)
Constant	4.906*** (0.174)	4.859*** (0.168)	3.595*** (0.201)	3.457*** (0.238)	4.783*** (0.272)	4.163*** (0.294)	3.946*** (0.283)
Control province	All	All	All	N. Sumatra	Riau	S. Sumatra	Lampung
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2814	2814	2814	1890	871	734	909
R-sq.	0.135	0.182	0.310	0.296	0.194	0.189	0.225
F-statistics	69.069***	67.085***	70.956***	43.789***	14.650***	10.607***	17.605***

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 the difference-in-difference estimation.

- Standard errors in parentheses are clustered at firm level.

- * 0.1 ** 0.05 *** 0.01 denote significance level.

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

6.3.3 Extension analysis: Heterogeneity and mechanisms

For all the estimations presented in this sub-section, I apply the same control variables used in Table 6.7 column (3) in the previous section. 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. As the survey did not cover for micro and small enterprises, the results do not cover this particular group. In addition, I further separate between firms with legal status as foreign investment firms and domestic firms.

In columns (1) through (3) result is shown for large firms. As we can see, in all specifications the DID coefficients are showing a negative trend, and the effect is larger for large Foreign Direct Investment (FDI) firms. However, in the case of large and Domestic Direct Investment (DDI) firms, the result in column (3) is not statistically significant.

Continuing in columns (4) through (6) result for medium size firm is presented. In this firm category, we still see a negative growth trend for productivity. Its coefficient is significantly larger for medium FDI firms (column 5), and surprisingly it is positive for DDI, despite no significances.

Table 6.6 Extension analysis: Heterogeneity (Firm size)

Variables	Dependent variable: Productivity					
	Large firm			Medium firm		
	All (1)	FDI (2)	DDI (3)	All (4)	FDI (5)	DDI (6)
Post	0.179*** (0.049)	0.187*** (0.058)	0.182 (0.120)	0.247*** (0.043)	0.227*** (0.043)	0.183 (0.246)
Post*Treat	-0.252** (0.114)	-0.880*** (0.236)	-0.174 (0.169)	-0.291** (0.125)	-0.460*** (0.158)	0.193 (0.288)
Constant	4.413*** (0.277)	3.229*** (0.437)	5.291*** (0.444)	2.913*** (0.318)	2.533*** (0.375)	4.643*** (0.857)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1477	1044	433	1337	1194	143
R-sq.	0.221	0.365	0.153	0.454	0.492	0.371
F-statistics	25.018***	29.809***	4.424***	48.223***	49.358***	2.862**

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 the difference-in-difference estimation.
- standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significance level.
- FDI refers to Foreign Direct Investment firm (with 10% or more share owned by foreign entity) while DDI is Domestic Direct investment.

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

To strengthen my analysis, next I separate firms based on their trade orientation, non-exporting and exporting. Table 6.8 provides the estimation results. We can find that non-exporting firms especially large firms are having negative productivity growth (see column 1 and 2). Meanwhile, the medium-sized firms are not significantly affected despite the negative sign. For the exporting firms, we can see in column (4) through (6) that they are also not significantly affected by the policy. Among them, the coefficient for medium-sized firms is negative but not statistically significant.

Table 6.7 Extension analysis: Heterogeneity (Firm orientation)

Variables	Dependent variable: Productivity					
	Non-export			Export		
	All (1)	Large (2)	Medium (3)	All (4)	Large (5)	Medium (6)
Post	0.246*** (0.036)	0.243*** (0.044)	0.207*** (0.064)	0.035 (0.094)	0.057 (0.189)	-0.044 (0.099)
Post*Treat	-0.380*** (0.109)	-0.473*** (0.150)	-0.211 (0.162)	-0.193 (0.183)	0.062 (0.319)	-0.261 (0.218)
Constant	3.382*** (0.245)	2.817*** (0.332)	4.330*** (0.376)	3.962*** (0.803)	4.941*** (0.697)	3.417*** (0.910)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2296	1223	1073	518	114	404
R-sq.	0.365	0.494	0.248	0.197	0.224	0.305
F-statistics	64.500***	50.397***	17.888***	2.364**	2.560**	3.643***

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 the difference-in-difference estimation.
- Standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significance level.
- FDI refers to Foreign Direct Investment firm (with 10% or more share owned by foreign entity) while DDI is Domestic Direct investment.

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

Lastly, I checked for heterogeneity using locational information. I separate firms located inside industrial parks or not in industrial parks (see Table 6.9). This analysis is necessary 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. In columns (1) through (3) results for firms located outside of industrial parks are presented.

Table 6.8 Extension analysis: Heterogeneity (Firm location)

Variables	Non-Industrial Park			Industrial Park		
	All	FDI	DDI	All	FDI	DDI
	(1)	(2)	(3)	(4)	(5)	(6)

Post	0.205*** (0.033)	0.195*** (0.037)	0.203 (0.134)	0.051 (0.239)	-0.062 (0.215)	-0.225 (1.153)
Post*Treat	-0.454*** (0.159)	-0.646*** (0.158)	-0.132 (0.341)	-0.109 (0.285)	-0.058 (0.277)	0.294 (1.248)
Constant	3.686*** (0.272)	2.927*** (0.379)	5.868*** (0.571)	2.614*** (1.005)	1.125 (1.126)	4.153** (1.804)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2224	1862	362	590	376	214
R-sq.	0.267	0.333	0.155	0.294	0.724	0.126
F-statistics	29.844***	29.568***	3.585***	4.385***	.	1.040

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 the difference-in-difference estimation.
- Standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significance level.
- FDI refers to Foreign Direct Investment firm (with 10% or more share owned by foreign entity) while DDI is Domestic Direct investment.

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

With regards to the 2016 policy change in Batam FTZ, we can observe that results are statistically negative for this group, with the exception of DDI firms (column 3). Meanwhile, firms located in industrial parks do not exhibit significantly negative results. However, there is a tendency for positive productivity growth for DDI firms.

Upon finding consistently negative impact at the firm-level, particularly for those non-exporting and those not located in industrial parks, I am motivated to further investigate a possible mechanism that explains the results. I use my main independent variables and place them into separate estimations. The idea is that productivity should be correlated with production input i.e. labor and capital. Therefore, the differential change in those variables could possibly serve as the mechanism for the result. Table 6.10 presents this exercise. All estimations shown are not controlled for other covariates.

Table 6.9 Extension analysis: Mechanisms

Variables	Dependent variables:			
	Workers (log) (1)	Unit labor cost (2)	Machinery (3)	Foreign own. (4)
Post	-0.032* (0.019)	0.297*** (0.017)	1.168*** (0.089)	0.585 (0.576)
Post*Treat	-0.091 (0.056)	0.128** (0.051)	-1.424*** (0.242)	3.877** (1.753)
Constant	4.695*** (0.009)	3.076*** (0.008)	1.431*** (0.042)	17.203*** (0.280)
Firm FE	Yes	Yes	Yes	Yes
Observations	2924	2923	2925	2925
R-sq.	0.007	0.212	0.101	0.009
F-statistics	4.186**	190.762***	87.226***	4.149**

Note : - Workers refers to total number of workers, unit labor cost is total labor cost divided by number of workers, machinery is the purchase of machinery in IDR. All variables reported in log.

- Foreign own. is the total percentage of firm share owned by foreign individual or entity.
- Variable post denotes the year after 2016 where central-local friction regarding Batam FTZ governance has been on the rise.
- Post*Treat is the difference-in-difference estimation.
- Standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significance level.

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

From column (1) we can see that there is a negative impact of the policy on the employment side. However, the coefficient is quite small and not significant. Furthermore, the result in this column can be explained in column (2) where there is strong evidence that labor cost is on the rise in Batam FTZ, with regards to its neighboring provinces. The result is quite convincing, but it should be corroborated with another input of production. Column (3) shows that the purchase of machinery has been stalled in the zone, and the magnitude is exceptionally large. In column (4) we can see that foreign ownership is significantly larger and significant in the zone, suggesting that the policy change does not affect firm ownership structure.

6.3.4 Robustness test

Result in Table 6.6 can be checked using an alternative method. I follow Duflo (2001) in predicting the change in productivity using the DID variable, $treat \times post$, as an instrument in a two-stage equation. We have found that there are two possible explanation channels for the negative growth trend in Batam, rising labor cost and firms' reluctance to invest in new machinery. In the earlier, it is pretty much reasonable to immediately think that increasing labor cost is due to the 2016 policy intervention. However, I suspect that the relationship is not as straightforward and direct, as the policy does not dictate labor relations. Firms' decision to purchase machinery, on the other hand, can be seen as the more reasonable link between the policy and lagging productivity in Batam. I therefore instrumenting machinery using the 2016 FTZ policy.

Table 6.11 provides us with this result. In addition to using per worker productivity as the main dependent variable (columns 1 through 3), I use also TFP calculation based on Levinsohn and Petrin (2003), shown in columns (4) through (7). In this part, I use only data for firms located in Batam FTZ.

Table 6.10 Robustness Test: Instrumental variable regressions

Variables	Productivity			TFP (Levinsohn-Petrin Approach)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
OLS							
Mach. purchase	0.044**			0.074**			
	(0.021)			(0.040)			

R-sq.	0.016			0.140			
<hr/>							
2SLS							
Mach. purchase	-0.508	-0.294	-0.091	-0.090	-0.318**	-0.331**	1.859
	(0.530)	(0.288)	(0.133)	(0.537)	(0.157)	(0.139)	(4.050)
Unit labor cost		0.184*	0.158**		-0.244	-0.273	-1.402
		(0.103)	(0.077)		(0.278)	(0.277)	(3.670)
Raw material			0.077***			0.051	-0.419
			(0.018)			(0.039)	(1.558)
<hr/>							
R-sq.	0.017	0.017	0.017	0.140	0.140	0.140	0.124
<hr/>							
Instruments (first-stage):							
Post*Treat	-0.286	-0.242	-0.206	-0.224	-0.169	-0.191	N/A
(2016 FTZ policy)	(0.222)	(0.308)	(0.379)	(0.493)	(0.604)	(0.552)	
Foreign own. (%)		-0.010	-0.010		-0.024	-0.021	-0.004
		(0.309)	(0.307)		(0.071)	(0.140)	(0.733)
Initial capital			0.088			0.275	0.019
			(0.058)			(0.065)	(0.765)
<hr/>							
R-sq.	0.017	0.040	0.004	0.000	0.071	0.060	0.001
Batam FTZ	Yes	Yes	Yes	Yes	Yes	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	531	531	531	333	333	333	1537

Note : - Productivity is per worker output, reported in log current IDR million.
- TFP is calculated from OLS residual with treatment provided by Levinsohn and Petrin (2003)
- Standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significance level.

Source : Author, calculated from BPS's Industrial Survey 2013 and 2017

In columns (2) and (5) I add foreign ownership as an instrument, and in columns (3) and (6) I use an additional instrument, initial capital stock value. In each of this addition, the coefficient in column (2) and (3) gets smaller but still retain the negative trend. For the TFP

variable, I found that the addition of these instruments inflated the coefficient, and it turns to be significant (columns 5 and 6). Finally, column (7) serves as a comparison to the result in Batam FTZ. Here only the control group, the neighboring provinces, is used in the estimation. We can see that purchase of machinery tends to be positively correlated with TFP and the magnitude is large.

Table 6.11 Placebo test result

Variables	Dependent variables: productivity				
	All (1)	Large firm (2)	Export (3)	FDI (4)	Ind. Park (5)
Post	0.157*** (0.024)	0.084** (0.036)	0.196*** (0.064)	0.160** (0.076)	0.003 (0.093)
Post*Treat	-0.051 (0.071)	0.001 (0.098)	0.004 (0.112)	-0.052 (0.113)	0.096 (0.143)
Constant	3.555*** (0.262)	4.213*** (0.379)	4.201*** (0.499)	5.136*** (0.429)	2.991*** (0.799)
Control variables	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	2816	1491	818	585	375
R-sq.	0.211	0.159	0.269	0.131	0.246
F-statistics	26.541***	8.762***	9.322***	4.513***	3.337***

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

Note : - Variable post denotes the year after 2016 where central-local friction regarding Batam FTZ governance has been on the rise.

- Post*Treat is the difference-in-difference estimation.
- Standard errors in parentheses are clustered at firm level.
- * 0.1 ** 0.05 *** 0.01 denote significance level.

Lastly, to further check whether the negative trend across all estimations above is coming from a spurious relationship, and not because of the policy change, I employed a placebo test using data from 2015. Result shown in Table 6.11 suggests that there are no statistically significant DID results across all specifications (column 1 through 5). The

coefficients are shown to be closer to zero, indicating that there is no difference between Batam FTZ and the surrounding provinces. Result in Table 6.11 also serves as a confirmation for my parallel trend test presented in section 6.2.4 previously.

6.3.5 Discussion

Through multiple exercises, we have observed that there is a convincingly negative impact of the 2016 centralization policy of Batam FTZ. In this section, I will focus on (1) the issue of central-local relation in the currently decentralized 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. The centralization strategy worked under given the centralized nature of the institution at that time. However, under the current totally contrasting political landscape since decentralization reform in 2001, a centralized approach can be expected to bring undesired consequences.

As elaborated in the introduction, the policy was aimed at shifting the institution closer to Jakarta. In the past decade, local governments at the province and city level had substantial supervisory control over the zone. In one way, this setting would offer the least challenge from the local government. However, on the other way, it is more difficult for Jakarta to force its industrial agenda. President Jokowi intention to increase Batam FTZ's role in Indonesia's industrialization was the central tenet of his action in 2016, thus could be read as his attempt to dictate development at the local level.

From the bottom side, local government's challenge against the existence of Batam FTZ Agency has started not long after the establishment of the autonomous city government of

Batam in 1999. The mayor was quick to identify that Batam city has only limited resources in exercising its development role. The first often mentioned problem is related to land resources, where most strategic location is owned by the FTZ Agency. In addition, the agency had managed to develop a number of facilities ranging from roads, seaport, and airport. They have tried to keep those resources under their jurisdiction. Facing this contrast, it is possible that the local government was attempting to have a comparable degree of control over the island.

Around the early 2010s, rifts between Jakarta, represented by the FTZ Agency, and the city government of Batam, did not show a sign of ending. Each side claimed to have strong legitimation under firm laws. The basic policy for the FTZ was Law no. 44 in 2007, while for the local government it was Law no. 32 in 2004, later revised with Law no. 23 in 2014. With both sides granted strong legal power is already a complicated matter. This issue has not been adequately addressed at the national level. Jakarta's insistence on centralizing the FTZ administration in 2016 on the basis to improve its investment climate, would certainly be met with disagreement from its local counterpart. Thus, it would seem that the policy is doomed since the beginning.

The changing landscape of global manufacturing and rising competitiveness from neighboring countries does serve as an important contributing factor for the under-performance of Batam FTZ. However, it does not discount any internal issues laid in this chapter.

We then left with these internal and external realities. We can still see some sign of resiliencies that could be useful for Indonesia's industrial policy evaluation. First, the negative impact persists across firm size, medium and large. From a policy point of view, this is something that is difficult to control by the government either at the central or local level. Secondly, however, looking at firms' orientation we have seen in Table 7 that exporting firms are less affected by the policy. This fits with the discussion on firm survival. Lastly, we learn

from Table 6.9 that firms located in Industrial Park (IP) are less susceptible to the bad policy impact. One frequent complaint in Batam, as discussed by Hutchinson (2017), is regarding the double bureaucracy and overlapping role between FTZ Agency and the local government. However, my finding suggests that firms located inside IP are less exposed to this problem. 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 in the production side rather than wasting time dealing with regulations and permits.

The government can also utilize or strengthen instruments that could contribute to promoting industrial export. The central government can provide more incentives for productive firms that are export oriented. Further bureaucratic reform needed to be pushed to suppress red tape and closing the gap for corruption. Reflecting my finding and recommendation in Chapter IV, I would suggest the government to provide a larger incentive for the local government using the Special Allocation Grant (DAK) instrument, directed for increasing physical as well as human capital at the local level.

It is also crucial for the local government to comply with the national goal in the industrial sector. Local governments' lack of attention in this direction has been the Achilles heel in industrializing a decentralized Indonesia. Local leaders mostly care for popular social issues that are more relevant for their political stability, rather than forging a strong industrial prowess that often takes longer time. To escape the middle-income trap, sustained industrial growth is necessary for developing countries such as Indonesia (Lin, 2010).

6.4 Conclusion

Indonesia has long employed a place-based industrial policy since the 1970s with the establishment of Batam FTZ. It used to be a central government agency appointed and responsible to the president. In the early 1990s, the zone performed remarkably well with double-digit growth, inviting praises from around the world. However, the Asian Crisis in 1997 had interrupted its growth, and the subsequent decentralization reform in the following year as well as strings of policy altering the nature of Batam FTZ further complicate its development. Many outlets attributing the presence of dual authorities in the zone, FTZ Authority and local government of Batam, as one of the main problems. After it performed lowly under local government leadership, the Jokowi administration attempted to recentralize the FTZ in 2016. However, this only escalated the central-local conflict, culminating in the 2019 zone takeover by the local government.

This chapter focuses on the institutional change that took place with the central government intervention in 2016. I have explored its impact on firms' productivity as it relates closely to industrial upgrading, a strategic goal that Jakarta set in the early years of Batam's development. My quasi-experimental method resulted in the negative impact of the policy change on firm productivity. The initial result suggests that being located in the zone after the policy change contributed to more than a 30% loss of relative productivity, compared to those located in the neighboring provinces.

There are two important things that stand out from my exercise in this chapter. First, exporting firms are shown to be more resilient towards policy change. Secondly, the development of industrial parks is instrumental in shielding firms against bad policy. The government, both at the central and local level, should focus on these two areas by providing

incentives for exporting firms and facilitate the development and modernization of industrial parks.

Chapter 7

Conclusions and policy recommendations

Institution matters! It is, borrowing North's term (1990), the rule of the game. Institution governs almost every aspect of societal relations. Government, specifically, is one of the strongest forms of institutions. It possesses legitimate and formal authority based upon social contracts formed usually through elections or referendum. Thus, it would make a lot of sense that how government institution is arranged can affect the society.

One of the most important institutional changes that occurred in the past four decades is decentralization reform. It has been a major global agenda, partly due to strong support from international organizations. From the bottom-up perspective, decentralization commonly happened following a wide social-political change. This research has covered the different impacts of decentralization on the industry sector from multiple points of view. This chapter is divided into four sections. In section one, I present my general conclusion from each chapter and tailor them into a more general finding narrative. The following section discusses possible policy recommendations that the government can employ to increase the effectiveness and efficiency of the decentralization program. In section three, I elaborate on some limitations of this research that might not have been properly addressed. And lastly, I laid out possible follow-up research to complement the findings in each of the analytical chapters.

7.1 Conclusion

In Chapter 2, I started my discussion with the general idea on the role of the government in economic development following Barro's (1990) approach. Considering government

endogenously in a growth model is important for its many roles in the society ranging from infrastructure development, social assistance, to set up industrial policies, etc. However, the previous endogenous growth model would not be satisfactory enough in explaining the role of the decentralization dynamic that has happened since the end of the 1970s, thus Davoodi and Zou (1998) developed a model that incorporates the different levels of government akin to that of Barro's.

The New Institutional Economics which came around the same period raised their concern towards institutional quality that has possibly affected economic growth (Kaufmann, 2000; North, 1991). I view institutional quality as a necessary element to be considered in a growth model. My proposition here is that the distance-efficiency measure of a decentralized institution can be achieved but it depends on the readiness of its institutions. Finally, the final section tried to develop an endogenous technological change model in a decentralized institution. The last theoretical model is supposed to explain industrial progressing or upgrading under decentralized institutions.

The theoretical model in Chapter II implies that institutional quality serves as the main mechanism that enabled the efficiency gain in a decentralized institutions. Without Strong institution, decentralization would not work for industrial development. This notion is discussed further in Chapter III and Chapter IV. I further investigate in Chapter V and Chapter VI how local governments' institutional quality affect industrial growth through policy intervention.

As a global consensus, fiscal decentralization has been widely discussed from multiple perspectives. I extend the discussion by estimating its impact on the industrial sector in Chapter 3. Industrial development has been the key to productivity growth for many developed countries, and developing countries wish to follow along including through applying a decentralized model. This chapter tried to shed light on the relationship between these two variables. Using dynamic panel data analysis for 74 countries from 1995 to 2017, I found that expenditure decentralization in the previous year is negatively correlated with industrial development. However, the result is different between developed and developing countries, with the former showing a positive and significant relationship in the main result. In the group of developing countries, the estimation showed a consistent negative correlation. This would suggest that the decentralization program in developing countries has not been able to provide fiscal efficiency that is needed to push for industrialization. The absence of a significant relationship with the institutional variable (CONCOR), signifying a weak institutional setting, could be an important factor that affects the relationship. This result for developing countries confirmed the pessimistic view of decentralization raised by second-generation theorists (Azfar et al., 1999; Bird & Smart, 2003; Treisman, 2002) that weak local institution retards development. My findings are robust to different measurements of decentralization, particularly for developing countries, as I also tested the revenue side. Finally, in order to make decentralization work to promote industrial development, a strong institutional reform that could mitigate the inefficiencies of public service provision is necessary to accompany the decentralization program.

Result in this chapter spotlighted some issues of decentralization in developing countries. Departing from that fact, I delved into more specific country case in Indonesia. Following its major economic and political reform in 1998, the Government of Indonesia

introduced the regional autonomy bill in 2001 that effectively increased the role of the local government. This chapter attempts to unveil the impact of provinces and districts expenditure on industrial development. To this end, I extend my analysis by exploring the relationship between foreign and domestic direct investments. Using province and district-aggregated data, my System GMM estimation revealed that larger local capital spending correlates positively with the industry sector. This finding is robust across different specifications. However, we fail to find positive and significant interactions between local capital spending and investment. If anything, the result showed a negligible negative tendency. This suggests that with every percentage increase of local governments' capital spending, the positive impact of foreign and domestic investment is marginally decreasing. It is suspected that the larger positive impact that channelled investment on industrial growth is coming from the central government's expenditure.

In a decentralized Indonesia, issues regarding local government capacity remained a major institutional challenge. The decision to push for deep decentralization in the early period (2001 – 2004) exacerbated this situation, led to Jakarta's intervention through the second decentralization law that introduced 'concurrent affairs'. This intervention, in turn, created over-dependency towards the central government, resulting in the negative interaction effect in my findings. To improve this condition, I argue that the central government needs to formulate a new institutional strategy that allows for a central-local collaboration, stressing a more direct role for the local governments. The current model gives too dominant role for the central government in economic-related affairs i.e. infrastructure development, and the function is carried out separately between central and local. The collaborative strategy is also meant to improve local governments' capacity through budget reallocation and Jakarta's assistance in development projects. Achieving this, however, requires political will especially from the

central government who need to incrementally devolve their function to the local government assuming a certain institutional quality has been met. Future research could complement the finding in this chapter by studying the distributional impact of the central government's expenditure towards industrial development.

Upon stumbling onto the fact that the Indonesian local government has not been able to increase its capacity, specifically in the area of infrastructure provisions. Thus, they are not strongly linked with direct investments. In Chapter V, I design a policy evaluation method to further check if the negative tendency on the industry sector was indeed correlated with this fundamental institutional change of increasing local government autonomy. I targeted a specific policy that was employed with the sole purpose of increasing local governments' capacity, the 2009 Local Tax Law. The policy was principally allowing the local governments to impose larger taxes on the business sector.

This chapter observed the impact of the policy on industrial firms' productivity. I utilize WBES survey data, done before and after policy implementation, and carried out the analysis under difference-in-difference estimation. I found that in general, the policy has been negatively affecting firms' productivity, especially when comparing the deeply decentralized provinces with Jakarta, as the less decentralized political unit in Indonesia. The initial result suggests that there is a 30 percent loss of productivity in the treated provinces. I also found that the effect is larger for large firms than for medium ones. I extend the analysis to look for the potential impact on a specific sub-sector of the industry, following Lall's (2000) industrial classification. The estimation revealed that the policy is not necessarily negative for low-technology firms. But on the other hand, we can observe that the impact tends to be negative for the medium and high

technology industries, and especially stronger for the large firms. It confirms a long concern that industries are sensitive to a major policy change.

The result in this chapter is robust to the existence of necessary endogenous variables as well as with the application of the sample matching technique. The finding confirms previous bodies of literature on the impact of regional autonomy in Indonesia in general, whilst also offering a new perspective on policy impact that has never been done before. Further research needs to control for possible regional influence such as the AEC as well as expanding research coverage to include more provinces.

In my last analytical chapter, I focused on the more recent issue concerning the consequences of decentralization on Indonesia's existing place-based industrial policy. Indonesia has long employed this type of policy since the 1970s with the establishment of the Free Trade Zone (FTZ) in the island of Batam. The FTZ Agency used to be a central government institution appointed and responsible to the president. In the early 1990s, the zone performed remarkably well with double-digit growth, inviting praises from around the world. However, the Asian Crisis in 1997 interrupted its growth, and the subsequent decentralization reform in the following year as well as strings of policy altering the nature of Batam FTZ further complicated its development. Many outlets attributing the presence of dual authorities in the zone, FTZ Authority and local government of Batam, as one of the main problems. After it performed lowly under local government leadership, the Jokowi administration attempted to recentralize the FTZ in 2016. However, this only escalated the central-local conflict, culminating in the 2019 zone takeover by the local government.

This research focused on the institutional change that took place with the central government intervention in 2016. I explore its impact on firms' productivity as it relates closely

to industrial upgrading, a strategic goal that Jakarta set in the early years of Batam's development. The quasi-experimental method resulted in the negative impact of the policy change on firm productivity. The initial result suggests that being located in the zone after the policy change contributed to more than a 30% loss of relative productivity, compared to those located in the neighboring provinces.

There are two important things that stand out from the exercise in this last chapter. First, exporting firms are shown to be more resilient towards policy change. Secondly, the development of industrial parks is instrumental in shielding firms against bad policy. The government, both at the central and local levels, should focus on these two areas by providing incentives for exporting firms and facilitate the development and modernization of industrial parks.

Throughout the different analytical chapters and econometric model, I come to a piece of convincing evidence that decentralization reform has not been very efficient in promoting industrial growth for developing countries. Lack of institutional quality was the key reason behind this problem. Despite its increasingly larger responsibility under a decentralized regime, the local government has failed to capitalize it for industrial growth.

7.2 Policy recommendations

Considering the main findings elaborated in the previous section, I come with several policy recommendations to improve the effectiveness and efficiency of decentralization policy for industrial development. The recommendations are aimed at the government, either at the central or local level. They are arranged based on their nature, from general to specific as well as

sequentially from chapter to chapter. Table 7 summarizes the policy recommendations offered in this dissertation.

1. In order to minimize the negative impact on the industry, decentralization reform should be applied at a gradual pace to give space for local institutional adjustment. The government should also avoid applying a one-size-fits-all approach.
2. A measured institutional reform aimed at strengthening local government's capacity should be precedence prior to the full implementation of decentralization policy. The central government can incentivize local governments to increase their capacity in exchange for larger local autonomy.
3. In an established decentralized institution such as the case of Indonesia, where backtracking the process would be harmful, local government capacity can be improved through forging a stronger central-local collaborative framework that enabled the local government instead of allowing the central government to intervene. The current framework gave emphasis to a larger role of the central government in supporting the industry sector. This requires high political commitment from both sides.
4. An additional way to promote local-based industrial development is to incentivize the local government to push for industrial growth using the Special Allocation Grant (the DAK). This could further minimize over-taxation problems at the local level.
5. Local government should not be granted larger taxation power, without proper strategy to mitigate the adverse industrial impact, as this tends to lead to over-regulation at the local level.

6. The government should provide a larger incentive for exporting firms. These firms are not just more productive and can survive under policy change but can also offer technology transfer for the domestic firms.
7. The government, especially at the local level, should further promote the use of industrial parks, with strong managerial linkage with the central and local governments, for industrial development as it shows a degree of resiliency towards policy change.
8. Central government should not attempt to recentralize development but rather assist local government in carrying out development plan.

Table 7.1 Policy recommendations

Chapter	Findings	Recommendations
III	Negative impact of decentralization reform on industry	<ol style="list-style-type: none"> 1. The policy should be employed gradually without a one-size fits all approach. 2. A measured institutional reform should precede or accompany fiscal transfer, therefore incentivize local government to increase their capacity.
IV	No evidence of linkages between local capital spending and foreign and domestic investments towards industrial growth	<ol style="list-style-type: none"> 3. Reform the central-local collaborative framework to enable local governments instead of allowing the central government to intervene. 4. Provide larger incentive to the local government using Special Allocation Grant (DAK) budgetary instrument to be used for strategic infrastructure spending directed towards forging industrial competitiveness
V	Negative impact of local tax policy on firms' productivity and upgrading possibility	<ol style="list-style-type: none"> 5. Local government should not be granted larger taxation power without proper strategy to mitigate its industrial impact.
VI	Negative impact of central government's place-based industrial policy applied in a decentralized Indonesia	<ol style="list-style-type: none"> 6. Provide larger incentives for exporting firms in addition to VAT and luxury goods exemptions in the case of Batam FTZ 7. Promoting the use of industrial parks for industrial development with strong managerial linkage with the central and local governments. 8. Under a decentralized regime, industrial policy be carried out in a collaborative work between the central and local government. the central government should increase local governments' development capacity.

Source: Author

7.3 Study limitations

Through a rigorous and multi-layered process, this dissertation has found a consistent result on the dynamic relationship between institutional change and the industrial sectors in Indonesia. However, this study is still subject to several limitations

1. The IMF Fiscal Decentralization dataset provides a quite large number of observations on this subject, but they are often unbalanced with many missing values especially for developing countries. This unbalance could possibly affect the robustness of my finding in Chapter 3. With many missing values, a lot of information is also missing in the sub-component of the local government budget. A more complete and more detailed dataset can provide a larger context in explaining the findings in Chapter 3.
2. With regards to Chapter 4, a heterogeneity analysis using sub-sectoral industrial data could not be conducted due to the unavailability of data for the pre-2010 observations. BPS's more detailed GDP accounting is only available starting 2010.
3. Despite representing the majority of the population, the firm survey in Chapter 5 is not proportionally arranged in terms of geographical representations. The Eastern regions of the country, as well as the Kalimantan region, were unrepresented in the survey. I urge the WBES to expand their data collection to include more provinces and districts.
4. The policy impact analysis in Chapter 5 and 6 has not been able to address the possible endogenous effect of the AEC implementation. The AEC plan is practically lowering tax and tariff barriers among ASEAN countries, rendering Batam FTZ to lose its advantages (Chapter 6 discussion). And due to its exceptionally high share of foreign ownership of firms, particularly from Singapore, the zone could have been suffered from investment crowding out in favor of a more politically stable region.

7.4 Extension and future research

This dissertation is by no mean a definitive answer regarding government institutional change and industrial development. There are still many unanswered questions. This study would benefit from an extension and new research agendas in the future:

1. Investigating the long run impact of political decentralization on the change of economic structure in developing countries. This can be done by utilizing fiscal decentralization dataset as used in Chapter 3 and combine it with the political decentralization dataset provided by Varieties of democracy (V-dem). Using both data can highlight the political dimension that has not been sufficiently addressed in Chapter 3.
2. Predicting the impact of a decentralized institution on the change of the economic structure at the sub-national levels in Indonesia. The result in Chapter 5 provides a micro-level evidence. Macro-level findings reflecting the same issue could serve to complement my findings in this chapter.
3. One of the highlights in Chapter 6 is the possible positive role of Industrial Parks in cushioning the negative impact of policy change on the industrial sector. I plan to further investigate this notion using an experimental research design employing difference-in-difference or regression discontinuity model using province data.
4. My other future research agenda is another continuation of Chapter 6 regarding Indonesia's place-based industrial policy. The development and progression of the industrial sector is one of the main goals stated in the 2020 – 2024 National Five-Year Plan (Rencana Pembangunan Jangka Menengah, RPJMN) as well as part of Sustainable Development Goal 9 on industry and innovation. Combining firm data at the district as well as sub-sectoral level could reveal the heterogeneous effect of the policy. This

research will compare the performance of Batam FTZ and the newly set Special Economic Zone of Kendal in Central Java. The political dynamics of the two cases are fundamentally different, thus is worthy to be studied further.

5. There has been a new breed of industrial policy known as “Smart Specialization Strategy”. This strategy has been implemented in the EU and its extension regions. This bottom-up and democratically planned policy could be the answer for the recent increase of industrial growth in many developed countries. This has not been discussed as a possible answer to the challenge of a locally based industrialization. Examining the impact of the policy in many EU countries and region is, thus, in my future research agenda.

REFERENCES

- _____. Decentralization: A Sampling of Definitions. (1999). New York: United Nations Development Program.
- Abadie, A. (2005). Semiparametric difference-in-differences estimators. *Review of Economic Studies*, 72(1), 1-19. doi: Doi 10.1111/0034-6527.00321
- Acemoglu, D., Johnson S., Robinson, J.A., Yared, P. (2008). *Income and democracy*. *American Economic Review* 98(3):808-842. Doi: 10.1257/aer.98.3.808
- Acemoglu, D., Robinson, J. A. (2013). *Why nations fail: the origins of power, prosperity, and poverty* Why nations fail the origins of power, prosperity and poverty. Profile, London.
- Acemoglu, D., Johnson, S., Robinson, J. A., & Yared, P. (2008). Income and democracy. *American Economic Review*, 98(3), 808-842. doi: 10.1257/aer.98.3.808
- Acemoglu, D., Ticchi, D. & Vindigni, A. (2011). Emergence and Persistence of Inefficient States. *Journal of the European Economic Association*. 9(2): 177 – 208.
- Ahmad, J., Devarajan, S., Khemani, S., & Shah, S. (2005). *Decentralization and service delivery*. The World Bank.
- Ahn S.C., Schmidt, P (1995) Efficient Estimation of Models for Dynamic Panel-Data. *Journal of Econometrics* 68(1):5 -27. Doi: 10.1016/0304-4076(94)01641-C
- Albouy, D. (2004). Program evaluation and the difference in difference estimator. *Economics*, 131, 1-4.
- Alfada, A. (2019). *Does Fiscal Decentralization Encourage Corruption in Local Governments? Evidence from Indonesia*. *Journal of Risk and Financial Management* 12(3). Doi: Artn 11810.3390/Jrfm12030118
- Angrist, J.D., & Pischke, J. S. (2009). *Mostly Harmless Econometrics: An Empiricists Companion*. *Mostly Harmless Econometrics: An Empiricists Companion*, 1-373.
- Arellano, M., Bond S. (1991). Some Tests of Specification for Panel Data - Monte-Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies* 58(2):277-297. Doi: 10.2307/2297968
- Arellano, M., Bover O. (1995) Another Look at the Instrumental Variable Estimation of Error-Components Models. *Journal of Econometrics* 68(1):29-51. Doi: 10.1016/0304-4076(94)01642-D
- Aritenang, A. F., & Chandramidi, A. N. (2020). The Impact of Special Economic Zones and Government Intervention on Firm Productivity: The Case of Batam, Indonesia. *Bulletin of Indonesian Economic Studies*, 56(2), 225-249.
- Arzaghi, M. & Hendersen. 2005. Why Countries Are Fiscally Decentralizing. *Journal of Public Economics*. 89(7): 1157-1189.
- Azfar, O., Kahkonen, S., Lanyi, A., Meagher, P., & Rutherford, D. 1999. Decentralization, Governance, and Public Services, The impact of Institutional Arrangements: A Review

- of the Literature. *Center for Institutional Reform and the Informal Sector Working Paper* No. 255. College Park: University of Maryland.
- Aziz, A. (2017). Mendagri Tak Lagi Berwenang Batalkan Perda Bermasalah. *Tirto.id*. Retrieved Retrieved 30 May 2021, from <https://tirto.id/mendagri-tak-lagi-berwenang-batalkan-perda-bermasalah-cqJ4>
- Bahl, R. W., & Bird, R. M. (2008). Tax policy in developing countries: Looking back-and forward. *National Tax Journal*, 61(2), 279-301. doi: Doi 10.17310/Ntj.2008.2.06
- Bahl, R., & Linn, J. F. (1992). *Urban Public Finance in Developing Countries*. New York: Oxford University Press.
- Bahl, R., & Nath, S. (1986). Public Expenditure Decentralization In Developing Countries. *Environment and Planning C: Government and Policy*. 4(4): 405 – 418.
- Barro, R. J. (1990). Government Spending in a Simple-Model of Endogenous Growth. *Journal of Political Economy*, 98(5), S103-S125. doi: Doi 10.1086/261726
- Barro, R. J., & Sala-I-Martin, X. (1992). Public Finance in Models of Economic Growth. *The Review of Economic Studies*, 59(4), 645-661. doi: 10.2307/2297991
- Barros, A. (2001). A Fully Neoclassical Model with Endogenous Growth. *Working Papers* 30, Datametrica Consultoria Economica, revised 2001.
- Baskaran, T., & Feld, L. P. (2013). Fiscal Decentralization and Economic Growth in OECD Countries: Is There A Relationship? *Public Finance Review*. 41(4): 421 – 445. <https://doi.org/10.1177/1091142112463726>.
- Belotti, F., di Porto, E., & Santoni, G. (2020). The effect of local taxes on firm performance: Evidence from geo-referenced data. *Journal of Regional Science*. doi: <https://doi.org/10.1111/jors.12518>
- Besley, T., & Coate, S. (2003). Centralized Versus Decentralized Provision of Local Public Goods: A Political Economy Approach. *Journal of Public Economics*. 87: 2611 – 2637
- Bianchi, P., & Labory, S. (2006). From ‘old’ Industrial Policy to ‘new’ Industrial Development Policy. In P. Bianchi and S. Labory (eds), *International Handbook on Industrial Policy*. 3 – 27. Massachusetts: Edward Elgar.
- Bird, R. M., Smart M. (2002) Intergovernmental fiscal transfers: International lessons for developing countries. *World Development* 30(6): 899-912. Doi: 10.1016/S0305-750x(02)00016-5
- Bird, R., Ebel, R., & Wallich, C. (1995). Fiscal Decentralization: From Command to Market. In R. Bird, R. Ebel, & C. Wallich (eds), *Decentralization of the Socialist State: Intergovernmental Finance in Transition Economies*. Pp. 1 – 68. Washington, D.C.: The World Bank
- Blundell, R., & Bond, S. 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87(1): 115-143.
- Broadfoot, R. (2003). *Batam Risk Report*. Political and Economic Risk Consultancy. Hong Kong. Retrieved from https://emerhub.com/wp-content/uploads/PERC_REPORT.pdf
- Calvert, R., North, D. C., Press, C. U., & Eggertsson, T. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.

- Card, D., & Krueger, A. B. (1994). Minimum-Wages and Employment - a Case-Study of the Fast-Food Industry in New-Jersey and Pennsylvania. *American Economic Review*, 84(4), 772-793.
- Cass, D. (1965). Optimum Growth in an Aggregative Model of Capital Accumulation. *Review of Economic Studies*, 32(3), 233-240.
- Chabé-Ferret, S. (2015). Analysis of the bias of Matching and Difference-in-Difference under alternative earnings and selection processes. *Journal of Econometrics*, 185(1), 110-123. doi: <https://doi.org/10.1016/j.jeconom.2014.09.013>
- Cheema, G. S., & Rondinelli, D. A. (1983). *Decentralization and development : policy implementation in developing countries*. Beverly Hills: Sage.
- Chowdhury, S., Yamauchi F. (2010). *Has Decentralization in Indonesia Led to Elite Capture or Reflection of Majority Preference?* JICA Research Institute, Tokyo.
- Colombo DG, Martinez-Vazquez J. (2019). Fiscal Decentralization and Public R&D Policy: A Country Panel Analysis: International Center for Public Policy. Georgia State University, Atlanta.
- Dartanto, T., & Brodjonegoro, B. P. (2003). Dampak Desentralisasi Fiskal di Indonesia Terhadap Pertumbuhan Ekonomi dan Disparitas Antar Daerah: Analisa Model Makro Ekonometrik Simultan. *Jurnal Ekonomi dan Pembangunan Indonesia*, 4(1), 17 - 38.
- Davoodi, H., & Zou, H. F. (1998). Fiscal decentralization and economic growth: A cross-country study. *Journal of Urban Economics*, 43(2), 244-257. doi: 10.1006/juec.1997.2042
- de Mello, L., & Barenstein, M. 2001. Fiscal Decentralization and Governance: A Cross-Country Analysis. *IMF Working Paper* WP/01/71, Washington D.C.: IMF.
- Donald, S. G., & Lang, K. (2007). Inference with difference-in-differences and other panel data. *Review of Economics and Statistics*, 89(2), 221-233. doi: DOI 10.1162/rest.89.2.221
- Dowrick, S. (1994). The East-Asian Miracle - Economic-Growth and Public-Policy. *Economic Record*, 70(211), 469-470.
- Duflo, E. (2001). Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment. *American Economic Review*, 91(4), 795-813. doi: 10.1257/aer.91.4.795
- Eaton K, Kaiser K, Smoke P (2011). *The Political Economy of Decentralization Reforms*. Washington, DC: World Bank.
- Firdaus, S. (2018). Fenomena Elite Capture dalam Pengelolaan Badan Usaha Milik Desa (BUMDes): Studi kasus bekerjanya kekuasaan elite dalam pengelolaan BUMDes Argosari, desa Pulosari, Kabupaten pemalang. *Jurnal Ilmu Politik* 9(2):20-37. doi: <https://doi.org/10.14710/politika.9.2.2018.20-37>
- Gemmell N, Kneller R, Sanz I. (2013). Fiscal decentralization and economic growth: Spending versus revenue decentralization. *Economic Inquiry* 51(4). Doi: 10.1111/j.1465-7295.2012.00508.x
- Gerth, H. H., & Mills, C. W. (1946). *From Max Weber: Essays in Sociology*. New York: Oxford University Press.

- Group, I. E. (2008). *Decentralization in Client Countries : An Evaluation of World Bank Support, 1990-2007*. Washington, DC: World Bank.
- Hainmueller, J. (2012). Entropy Balancing for Causal Effects: A Multivariate Reweighting Method to Produce Balanced Samples in Observational Studies. *Political Analysis*, 20(1), 25-46. doi: 10.1093/pan/mpr025
- Ha-Joon, C. (2007). *Institutional Change and Economic Development*. New York, USA: Anthem Press with UNU Press.
- Hao, J., & Zhimin, L. (1994). *Changing Central-Local Relations in China: Reform and State Capacity*. Boulder: Westview Press.
- Henderson, J. V., & Kuncoro, A. (2004). Corruption in Indonesia. National Bureau of Economic Research Working Paper.
- Holtz-Eakin, D., Newey, W., & Rosen, H. S. 1988. Estimating Vector Autoregressions with Panel Data. *Econometrica*. 56: 1371–1395.
- Hutchinson, F. E. (2017). "Rowing Against the Tide? Batam's Economic Fortunes in Today's Indonesia". *Trends in Southeast Asia* (2017/08). Singapore.
- Ivanyna, M. & Shah, A. (2011). Decentralization and Corruption: New Cross-Country Evidence. *Environment and Planning C: Government and Policy*. 29(2): 344-362.
- Ivanyna, M. & Shah, A. (2012). How Close is Your Government to Its People? Worldwide Indicators on Localization and Decentralization. *Policy Research Working Paper*. No. 6138, Washington, DC: The World Bank.
- Jaworski, T., Kitchens, C. T. , & Nigai, S. (2018). The Interstate Highway System and the Development of the American Economy. Unpublished Manuscript. Boulder: University of Colorado.
- Johnson, C. (1982). *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925-1975*. Stanford University Press, California.
- Junghun, K., & Sean, D. (2018). *OECD Fiscal Federalism Studies Fiscal Decentralisation and Inclusive Growth*. OECD Publishing.
- Kalamova, M. (2009). *Essays in International Trade and Public Economics*. Berlin: Peter Lang.
- Katadata. (April 7, 2017). Berapa Peraturan Daerah yang Bermasalah? Retrieved April 30, 2021, from <https://databoks.katadata.co.id/datapublish/2017/04/07/berapa-jumlah-peraturan-daerah-yang-bermasalah>.
- Kaufmann, D. (2000). Governance and anticorruption: New insights and challenges. *Evaluation and Poverty Reduction*. Proceedings from a World Bank Conference, 289-294.
- Kaufmann, D., Kraay, A., & Mastruzzi, M. (2004). Governance matters III: Governance indicators for 1996, 1998, 2000, and 2002. *World Bank Economic Review*, 18(2), 253-287. doi: 10.1093/wber/lhh041
- Kaufmann, D., Kraay, A., & Mastruzzi, M. 2010. The Worldwide Governance Indicators: A Summary of Methodology, Data and Analytical Issues. *World Bank Policy Research Working Paper*. No. 5430, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130

- Kharisma, B. (2013). Desentralisasi Fiskal dan Pertumbuhan Ekonomi: Sebelum dan Sesudah Era Desentralisasi Fiskal di Indonesia. *Jurnal Ekonomi dan Studi Pembangunan*, 14(2), 101 - 119.
- King, R., & Rebelo, S. (1988). *Business cycles with endogenous growth*.
- Kis-Katos, K., & Sjahrir, B. S. (2017). The impact of fiscal and political decentralization on local public investment in Indonesia. *Journal of Comparative Economics*, 45(2), 344-365.
- Klitgaard, R. (1998). *Controlling Corruption*. Oakland: University of California Press.
- Kniivilä, M. (2007). Industrial development and economic growth: Implications for poverty reduction and income inequality. *Industrial development for the 21st century: Sustainable development perspectives*, 1(3), 295-333.
- Koopmans, T. (1963). *On the Concept of Optimal Economic Growth*: Cowles Foundation for Research in Economics, Yale University.
- Kosec, K., & Mogues, T. (2020). Decentralization Without Democracy. *World Politics*. 72(2): 165-213.
- Kuncoro A (2006) Decentralization and Corruption in Indonesia: Manufacturing Firms Survival under Decentralization (Vol. 25). The International Centre for the Study of East Asian Development, Kitakyushu.
- Lall, S. (2000). The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-98. *Oxford Development Studies*, 28(3), 337-369. doi: 10.1080/713688318
- Levine R., Renelt, D. (1992) A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review*, 82(4):942-963.
- Levinsohn, J., & Petrin, A. (2003). Estimating Production Functions Using Inputs to Control for Unobservables. *The Review of Economic Studies*, 70(2), 317-341. doi: 10.1111/1467-937x.00246
- Lewis, B.D. (2006). Local government taxation: An analysis of administrative cost inefficiency. *Bulletin of Indonesian Economic Studies*, 42(2):213-233. Doi: 10.1080/000749-10600873666
- Liberati, P., & Sacchi, A. (2013). Tax decentralization and local government size. *Public Choice*, 157(1), 183-205. doi: 10.1007/s11127-012-9937-9
- Lim, Sunghun. 2019. Global Agricultural Value Chains and Structural Transformation. *Staff Paper Series P 19-4*. St. Paul: University of Minnesota.
- Liputan6.com. (2017, January 24). Harga Mobil Impor di Batam Turun 50 Persen. liputan6.com. <https://www.liputan6.com/news/read/29965/harga-mobil-impor-di-batam-turun-50-persen>.
- Litvack, J. I., Ahmad, J., & Bird, R. M. (1998). *Rethinking decentralization in developing countries PREM*. Washington, D.C.: The World Bank.
- Litvack, J., & Seddon, J. (1999). Decentralization Briefing Notes. In J. Litvack & J. Seddon (Eds.), *WBI Working Papers*. Washington, D.C.: The World Bank.

- Litvack, J., Ahmad, J., & Bird, R. 1998. *Rethinking Decentralization in Developing Countries*. Washington, DC: The World Bank
- López-Laborda, J., Martínez-Vazquez, J., & Escudero, C. (2006). *The Practice of Fiscal Federalism in Spain*.
- Lucas, A. (2016). Elite Capture and Corruption in two Villages in Bengkulu Province, Sumatra. *Human Ecology*, 44(3), 287-300. doi: 10.1007/s10745-016-9837-6
- Lucas, R. E. (1988). On the Mechanics of Economic-Development. *Journal of Monetary Economics*, 22(1), 3-42. doi: Doi 10.1016/0304-3932(88)90168-7
- Martínez-Vázquez J, McNab RM (2003) Fiscal decentralization and economic growth. *World Development* 31(9):1597-1616. Doi: 10.1016/S0305-750x(03)00109-8
- Martínez-Vázquez, J. 2005. Fiscal Decentralization, Macrostability, and Growth. *International Center for Public Policy Working Paper Series* 0506.
- Matheson, T., & Azfar, O. 1999. Decentralization and Social Welfare in the Minority Provinces of the Philippines. Mimeo. College Park: University of Maryland.
- Mulyo, S. A. (2015). Decentralization in Indonesia: an empirical analysis of district and city performance. In S. Otsubo (Ed.), *Globalization and Development Volume III: In search of a new development paradigm* (1st ed.) (pp. 114 - 141). London: Routledge.
- Musgrave R.A. (1969). Theories of Fiscal Federalism. *Public Finance* 24(4):521-536.
- Nakamura, K., Kaihatsu, S., & Yagi, T. (2018). Productivity improvement and economic growth: Lessons from Japan. *Economic Analysis and Policy*, 62. doi: 10.1016/j.eap.2018.11.002
- Nasution, Anwar. (2016). Government Decentralization Program in Indonesia. *ADBI Working Paper* no. 601 DOI: <http://dx.doi.org/10.2139/ssrn.2877579>
- Negara, S. D., & Hutchinson, F. (2020). Batam: Life after the FTZ? *Bulletin of Indonesian Economic Studies*, 56(1), 87-125. doi: 10.1080/00074918.2019.1648752
- North D.C. (1991). Institutions. *Journal of Economic Perspectives* 5(1):97-112. Doi: 10.1257/Jep.5.1.97
- North, D. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- Oates, W.E. (1972). *Fiscal Federalism*. Hartcourt Brace Jovanovich, New York.
- Oates, W. (2005). Toward A Second-Generation Theory of Fiscal Federalism. *International Tax and Public Finance*, 12: 349 – 373.
- Oates, W. E. (1972). *Fiscal Federalism*. New York: Hartcourt Brace Jovanovich.
- Olden, A., & Møen, J. (2020). The Triple Difference Estimator: Norwegian School of Economics, Department of Business and Management Science.
- Olley, G. S., & Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica*, 64(6), 1263-1297. doi: Doi 10.2307/2171831
- Ostwald, K. (2017). Federalism without Decentralization: Power Consolidation in Malaysia. *Journal of Southeast Asian Economies*, 34(3), 488-506.

- Oxhorn P, Tulchin JS, Selee A (2004) Decentralization, Democratic Governance, and Civil Society in Comparative Perspective: Africa, Asia, and Latin America, Woodrow Wilson Center Press, Washington DC.
- Pepinsky T.B., Wihardja M.M., (2010) Decentralization and Economic Performance in Indonesia. *Journal of East Asian Studies* 11(3).
- Qian, Y.Y., Weingast, B.R. (1997). Federalism as a commitment to preserving market incentives. *Journal of Economic Perspectives*, 11(4):83-92. Doi: 10.1257/Jep.11.4.83
- Rahmatunnisa M. (2015). Jalan Terjal Kebijakan Desentralisasi di Indonesia pada Era Reformasi. *Jurnal Ilmu Hukum* 2(3):505-522. Doi: 10.22304/pjih.v2n3.a5
- Rodriguez-Pose, A., & Kroijer A. (2009) Fiscal Decentralization and Economic Growth in Central and Eastern Europe. *Growth and Change* 40(3):387-417. Doi: 10.1111/j.1468-2257.2009.00488.x
- Romer, P. M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy*, 94(5), 1002-1037. doi: Doi 10.1086/261420
- Roodman D (2009) How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9(1):86-136. Doi: 10.1177/1536867x0900900106
- Rubin, D.B. (1987). Multiple Imputation for Nonresponse in Surveys. John Wiley & Sons Inc, New York.
- Rubin, D.B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association*, 91(434):473-489. Doi: 10.1080/01621459.1996.10476908
- Sacchi, A., & Salotti, S. (2017). The influence of decentralized taxes and intergovernmental grants on local spending volatility. *Regional Studies*, 51(4), 507-522. doi: 10.1080/00343404.2015.1111512
- Sala-i-Martin, X. (2016). *The global competitiveness report 2016–2017*. Davos, World Economic Forum.
- Schneider, A. (2003). Decentralization: Conceptualization and measurement. *Studies in Comparative International Development*, 38(3), 32-56. doi: Doi 10.1007/Bf02686198
- Sepulveda, L., & Amin, A. 2006. Decentralizing industrial policies: threat or opportunity in developing countries? In P. Bianchi and S. Laborine (eds), *International handbook on industrial policy*. 321 – 341. Massachusetts: Edward Elgar.
- Setiawan, F., & Aritenang, A.F. (2019). The impact of fiscal decentralization on economic performance in Indonesia. *IOP Conference Series: Earth and Environmental Science* 340. Doi: 10.1088/1755-1315/340/1/012021
- Slavinskaite, N. (2016). Fiscal Decentralization and Economic Growth in Selected European Countries. *Journal of Business Economics and Management*. 18(4): 745 – 757.
- Smoke, P. (2001). Fiscal Decentralization in Developing Countries: A Review of Current Concepts and Practice. *Democracy, Governance, and Human Rights Programme Paper No. 2*. Geneva: UNRISD.
- Statistics of Indonesia (2007). *Financial Statistics of Province Governance 2003-2006*. BPS-Statistics Indonesia, Jakarta.

- Statistics of Indonesia (2007). *Gross Regional Domestic Product of Province in Indonesia by Industry 2002-2006*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2008). *Financial Statistics of Regency/Municipality Government 2006-2007*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2009). *Financial Statistics of Province Governance 2005-2008*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2010). *Financial Statistics of Regency/Municipality Government 2008-2009*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2010). *Gross Regional Domestic Product of Province in Indonesia by Industry 2006-2010*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2012). *Financial Statistics of Province Governance 2008-2011*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2012). *Financial Statistics of Regency/Municipality Government 2010-2011*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2014). *Financial Statistics of Regency/Municipality Government 2012-2013*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2015). *Gross Regional Domestic Product of Province in Indonesia by Industry 2010-2014*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2016). *Financial Statistics of Province Governance 2012-2015*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2016). *Financial Statistics of Regency/Municipality Government 2014-2015*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2017). *Gross Regional Domestic Product of Province in Indonesia by Expenditure 2004-2008*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2018). *Financial Statistics of Regency/Municipality Government 2016-2017*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2020). *Financial Statistics of Province Governance 2016-2019*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2020). *Financial Statistics of Regency/Municipality Government 2018-2019*. BPS-Statistics Indonesia, Jakarta.
- Statistics of Indonesia (2020). *Gross Regional Domestic Product of Province in Indonesia by Industry 2015-2019*. BPS-Statistics Indonesia, Jakarta.
- Tan, S. W., & Tran, T. T. (2017). The Effect of Local Governance on Firm Productivity and Resource Allocation : Evidence from Vietnam. *World Development Report Background Paper*. Washington, D.C.: World Bank.
- Thun, E. (2006). *Changing Lanes in China: Foreign Direct Investment, Local Governments, and Auto Sector Development*. Cambridge University Press, New York.
- Tiebout C.M. (1956) A Pure Theory of Local Expenditures. *Journal of Political Economy*, 64(October): 416 – 424
- Tiebout C.M. (1961). An Economic Theory of Fiscal Decentralization. NBER, New Jersey.

- Tijaja, J., & Faisal, M. (2014). *Industrial Policy in Indonesia: A Global Value Chain Perspective*. Asian Development Bank, Manila.
- Tirtosuharto, D. (2017). Does Fiscal Decentralization Help Indonesia Avoid the Middle-Income Trap? *Working Paper 729*. Tokyo: Asian Development Bank Institute.
- Treisman, D. (1999). Political decentralization and economic reform: A game-theoretic analysis. *American Journal of Political Science*, 43(2):488-517. Doi: 10.2307/2991803
- Treisman, D. (2007). *The Architecture of Government: Rethinking Political Decentralization*. Cambridge University Press, Massachusetts.
- Treisman, D. (2002). Decentralization and the Quality of Government. Mimeo. Los Angeles: UCLA.
- Ubago-Martínez Y, Arzoz PP, Apezteguía, BI (2018) Does decentralization contribute to efficiency? Evidence from OECD countries. *Applied Economics*, 50(7):726-742. Doi: 10.1080/00036846.2017.1340572
- van Grunsven, L., & Hutchinson, F. E. (2017). The evolution of the electronics industry on Batam Island (Riau Islands Province, Indonesia): an evolutionary trajectory contributing to regional resilience? *Geojournal*, 82(3), 475-492. doi: 10.1007/s10708-015-9692-9
- Wade, R. (2004). *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton University Press, New Jersey.
- Wallich, C., Bird, R. M., & Ebel, R. D. (1995). *Decentralization of the Socialist State: Intergovernmental Finance in Transition Economies*. The World Bank, Washington D.C.
- Weingast, B.R. (1995). The Economic-Role of Political-Institutions - Market-Preserving Federalism and Economic-Development. *Journal of Law Economics & Organization* 11(1): 1-31.
- Windmeijer, F. 2005. A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators. *Journal of Econometrics*. 126: 25–51.
- Wooldridge, J. M. 2010. *Econometric analysis of cross section and panel data*. Cambridge: MIT Press.
- World Bank. 2008. Decentralization in Client Countries: An Evaluation of World Bank Support 1990-2007. Washington: The World Bank.
- World Bank. (1999). *Entering the 21st century: World development report, 1999/2000*. New York: Published for the World Bank, Oxford University Press.
- World Bank (2000). *Entering the 21st Century*. World Development Report 1999/2000.
- World Bank (2001). Fiscal Decentralization Indicators. 20 June, 2019, from <http://www1.worldbank.org/publicsector/decentralization/fiscalindicators.htm#Formulas>
- World Bank (2013, June 3). Decentralization. Retrieved April 30, 2021, from <https://www.worldbank.org/en/topic/communitydrivendevelopment/brief/Decentralization>
- World Bank (2016, August 17). Enterprise Survey 2015. World Bank Enterprise Survey. from <https://microdata.worldbank.org/index.php/catalog/2665>.

- Yeoh, T. (2019). Reviving the Spirit of Federalism: Decentralisation Policy Options for a New Malaysia. Kuala Lumpur.
- Yushkov A. (2015). Fiscal decentralization and regional economic growth: Theory, empirics, and the Russian experience. *Russian Journal of Economics* 1(4):404-418. Doi: 10.1016/j.ruje.2016.02.004
- Zhu, X. (2014). Comparison of Four Methods for Handling Missing Data in Longitudinal Data Analysis through a Simulation Study. *Open Journal of Statistics* 04:933-944. Doi: 10.4236/ojs.2014.411088

APPENDICES

Appendix A

Table A.1 Extension analysis: Industrial Upgrading (Chapter 3)

VARIABLES	DEPENDENT VARIABLE: MHMAN			
	DEVELOPED		DEVELOPING	
	(1)	(2)	(3)	(4)
MHMAN _(t-1)	0.797*** (0.102)	0.710*** (0.0959)	0.982*** (0.0416)	0.869*** (0.0810)
DEC _(t-1)	6.694 (5.119)	6.909* (3.901)	0.738 (1.652)	2.171 (2.356)
CONSTANT	7.241** (2.905)	0 (.)	0.592 (0.624)	47.49 (69.93)
Control variables	No	Yes	No	Yes
Country fixed-effects	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Observations	583	576	628	627
Num. of Countries	29	29	45	45
Num. of Instruments	26	33	26	52
AR-1	0.001	0.002	0.003	0.003
AR-2	0.654	0.869	0.489	0.521
Hansen (P-val.)	0.398	1.000	0.302	0.782

- Note : - MHMAN denotes the share of medium and high technology share of manufacturing output following ISIC Rev. 4 code 24, 29, 30, 31, 32, 33, 34, 35 excluding 351. The share of MHMAN is used as a proxy for countries' industrial upgrading.
- AR-1 and AR-2 denotes Arellano-Bond test with p-values results are reported. They are the necessary diagnostics for dynamic panel data estimation i.e. GMM.
 - Hansen J-test calculates overidentifying restrictions that occurs due to increasing number of instruments. P-value is reported.
 - Robust standard errors in parentheses, * p<0.1 ** p<0.05 *** p<0.01

Source : Author's calculation based on the data from IMF, UNIDO, UNCTAD, WDI, WGI, and UNDP

Appendix A

Table A.2 List of countries used in estimation in Chapter 3

1	Afghanistan	26	Estonia	51	New Zealand
2	Argentina	27	Finland	52	Norway
3	Armenia	28	France	53	Paraguay
4	Australia	29	Georgia	54	Peru
5	Austria	30	Germany	55	Philippines
6	Azerbaijan	31	Greece	56	Portugal
7	Belarus	32	Honduras	57	Romania
8	Belgium	33	Hungary	58	Russia
9	Bolivia	34	Iceland	59	Serbia
10	Bosnia	35	India	60	Slovakia
11	Brazil	36	Indonesia	61	Slovenia
12	Bulgaria	37	Ireland	62	South Africa
13	Cambodia	38	Israel	63	Spain
14	Canada	39	Italy	64	Sweden
15	Cape Verde	40	Japan	65	Switzerland
16	Chile	41	Kenya	66	Thailand
17	China	42	Korea	67	The Netherlands
18	Colombia	43	Kyrgyzstan	68	Tunisia
19	Costa Rica	44	Latvia	69	Turkey
20	Rep. of Congo	45	Lithuania	70	UK
21	Croatia	46	Luxembourg	71	US
22	Czechia	47	Malta	72	Uganda
23	Denmark	48	Mexico	73	Ukraine
24	Egypt	49	Moldova	74	Vietnam
25	El Salvador	50	Myanmar		

Source: Author

Appendix B

Table B.1 Robustness under alternative specifications (Chapter 4)

VARIABLES	DEPENDENT VARIABLE: INDUSTRY							
	OLS		FE-OLS		Diff. GMM		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IND _(t-1)	0.966*** (0.014)	0.971*** (0.013)	0.887*** (0.019)	0.889*** (0.019)	0.962*** (0.043)	0.973*** (0.050)	0.926*** (0.028)	0.954*** (0.021)
RGDPPC	-0.323** (0.127)	-0.288** (0.128)	-0.308 (0.235)	-0.224 (0.230)	-1.924* (1.089)	-1.817 (1.135)	-0.443*** (0.127)	-0.346*** (0.108)
TRADE _(t-1)	0.0001 (0.001)	0.0001 (0.001)	0.002 (0.002)	0.002 (0.002)	0.005 (0.004)	0.005 (0.004)	0.003** (0.001)	0.002* (0.001)
INFLATION	0.056* (0.030)	0.056* (0.030)	0.054 (0.036)	0.053 (0.036)	0.070** (0.030)	0.070** (0.027)	0.054** (0.026)	0.061** (0.024)
LCAP	0.024*** (0.007)	0.026** (0.010)	0.002 (0.016)	-0.003 (0.016)	0.022* (0.012)	0.018* (0.011)	0.033*** (0.012)	0.029*** (0.009)
FDI _{IND}	0.143*** (0.047)		0.175** (0.079)		0.220*** (0.081)		0.266*** (0.099)	
DDI _{IND}		0.158** (0.076)		0.094 (0.090)		0.034 (0.086)		0.107* (0.055)
LCAP * FDI _{IND}	-0.00002 (0.002)		-0.008* (0.004)		-0.004 (0.002)		-0.002 (0.003)	
LCAP * DDI _{IND}		-0.002 (0.002)		-0.006 (0.005)		-0.002 (0.003)		-0.002 (0.003)
CONS	1.675** (0.757)	1.388** (0.699)	2.883** (1.421)	2.503* (1.411)			2.353*** (0.770)	1.824*** (0.635)
Province FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544	544	544	544	544	544	544	544
Provinces	34	34	34	34	34	34	34	34
Instruments					38	38	40	40
Adj. R ²	0.985	0.985	0.813	0.812				
F-stat.	1876***	1727***	110***	109***				
AR-1					0.019	0.015	0.022	0.016
AR-2					0.280	0.353	0.276	0.550
Hansen (p-val)					0.179	0.317	0.508	0.854

Note : - Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01

- AR-1 and AR-2 denotes Arellano-Bond test with p-values results are reported. They are the necessary diagnostics for dynamic panel data estimation i.e. GMM.
- Hansen J-test calculates overidentifying restrictions that occurs due to increasing number of instruments. P-value is reported.

Source : Author, calculated from BPS, BKPM, and WDI

Appendix C

Table C.1 Cumulative number of “bad” regulations (Chapter 5)

Provinces	2007	2011	2015
Aceh	0	42	65
North Sumatera	4	60	85
West Sumatera	2	58	103
Riau	19	67	84
Jambi	17	52	80
Bengkulu	1	31	54
Lampung	12	61	115
South Sumatera	14	111	166
Bangka Belitung	33	73	93
Riau Archipelago	4	13	26
Jakarta	0	1	2
West Java	14	111	166
Central Java	19	145	206
Yogyakarta	9	28	57
East Java	18	178	234
Banten	6	53	74
Bali	12	63	88
West Nusa Tenggara	24	84	115
East Nusa Tenggara	8	76	113
West Kalimantan	5	62	104
Central Kalimantan	4	28	31
South Kalimantan	15	43	62
East Kalimantan	4	25	37
North Kalimantan	4	10	15
North Sulawesi	0	2	5
Central Sulawesi	1	19	32
South Sulawesi	4	59	93
Southeast Sulawesi	13	23	45
Gorontalo	2	6	9
West Sulawesi	0	6	8
Maluku	2	55	109
North Maluku	13	46	66
West Papua	2	40	47
Papua	5	32	64

Note : Number of bad regulations constitute regulations issued at the province and district level

Source : The Ministry of Home Affairs, 2019

Table C.2 List of “bad” regulations for the control group (Chapter 5)

No.	Province	Title of regulation	Regulation number	Administrative Level	Year	Remarks
1	Jakarta	Persyaratan dan Tata Cara Pendaftaran Penduduk dan Pencatatan Sipil	93 Tahun 2012	Province	2012	Civil registration procedure
2	Jakarta	Pendaftaran Kependudukan dan Catatan Sipil	2 Tahun 2011	Province	2011	Civil registration procedure

Source: MHA, 2017

Appendix C

Table C.3 Incentives in the Batam FTZ (Chapter 6)

No.	Type of tax	Batam FTZ	Other regions
1.	Import tariff	0%	5-15%
2.	Value-added tax	0%	10%
3.	Luxury goods tax (PPnBM)	0%	50%
4.	Income tax*	0%	25%
5.	Foreign ownership	100% (export-oriented firms)	49% after 5 years
6.	Land lease	80 years	30+20 years
7.	Double taxation avoidance	58 countries	58 countries

* new investments in selected sectors

Source: bpbatam.go.id