Essays on the Political Economy of Development

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Abstract

This thesis presents essays on the political economy of development in Indonesia. It consists of three chapters exploring some of the important aspects in the political economy literature.

Chapter 2 asks how does political competition in a newly democratised and decentralised country like Indonesia affect local government performance? While a large literature on the topic already exists for well-democratised and developed country, the impacts of political competition in developing countries, especially Indonesia remains understudied. Using a novel dataset of local election results between 1999 and 2009, I find that stiffer political competition improves local government performances and economic outcomes.

Chapter 3 focuses on the role of Information and Communications Technology (ICT) in policy-making. This study examines the impacts of the mobile phone adoption on leaders' decision-making. Using Indonesian Village census data, I find robust evidence that the introduction of mobile phone increases the probability of the village head to implement policies to improve infrastructure, to provide training and grants and to increase civic engagement activities among the villagers. This chapter suggests that villagers usage of the mobile phone and spillover effects affects village leaders' policies.

Chapter 4 examines the role of the Islamic party on policy choice and economic performance. Using Indonesian mayoral election results and a regression discontinuity design (RDD), I show that districts where the Islamic party barely won the election tend to have lower local state capacity. I show that partisan alignment and the implementation of Islamic laws are the key drivers of these results. The mechanisms suggest that districts with Islamic mayors will receive lower central government transfers and generate less local tax revenues.

Contents

List of Tables

List of Figures

Dedication

To Manda, Malaika, Fahiem and my Parents.

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Declaration

I, Jahen Fachrul Rezki, declare that this thesis entitled, "Essays on the Political Economy of Development" is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as references.

Chapter 1

Introduction

Understanding political developments in an emerging economy remains a primary challenge for economists. This thesis focuses on the performance of political institutions in Indonesia after the fall of Suharto's authoritarian regime. Specifically, it addresses a long-standing question in the political economy literature by assessing the impact of economic reforms and institutional transformations on government performance and economic outcomes.

This thesis comprises three chapters. The first chapter explores the impact of political competition on local government performance. The second chapter addresses the role of Information and Communications Technology (ICT) in policy-making. The final chapter investigates the impacts of religious parties (e.g. Islamic party) on policy choice and economic performance.

Indonesia instituted a democratic government after President Suharto's 32-year regime. Since 1999, the country has transformed into a newly democratised country and faced several major challenges. For instance, the number of political parties has increased significantly. Moreover, members of parliament at the local level are elected through the general election. The country held its first direct presidential election in 2004, after which, in 2005, the first direct mayoral and governor elections were held.

The role of civil society has been increasing since the nation instituted democracy. Consequently, the media plays an instrumental role in shaping government policies; Voters are arguably becoming better informed about politicians' policies and behaviour, and several social movements have emerged following the introduction of freedom of speech. One of the consequences of this phenomenon is that the Islamic movement has

become influential in politics.

From an administrative perspective, the Indonesian government has become more decentralised. For example, Law No. 22/1999 on regional governance and Law No. 25/1999 on regional fiscal balance were passed by the government to ensure the transfer of power from the central government to local governments. As a result, local governments — especially district governments — now have more power and responsibilities. The provision of public goods (e.g. education, health and infrastructure) has also become the domain of local governments. However, the effects of decentralisation on government performance and economic outcomes in Indonesia remains understudied.

Indeed, there is much debate within the literature regarding the consequences of political reform in developing countries. Previous studies have often explored this issue in Latin American countries or in India. One striking difference between these countries and Indonesia, however, is that they have been democratised for a longer period compared to Indonesia. Indonesia is also a unique case study because, unlike other developing countries, it transitioned from an autocracy to a democracy relatively smoothly. In terms of country characteristics, Indonesia is a multicultural and multi-ethnic country that provides substantial within-country variations.

Three main aspects will be elaborated in this thesis. First, it is important to note that the number of political parties competing in the election has been increasing, which affects the degree of political competition. Previous studies have generally found that political competition, like market competition, improves citizens' welfare by reducing rent-seeking behaviour. However, it is unclear whether the increase in political parties has further incentivized the Indonesian government to perform better. Thus, the first chapter focuses on how political competition influences district government policies.

This thesis also addresses the role of ICT in policy-making. A major concern in many developing countries is the limited access to ICT services. The government of Indonesia has expressed a desire to improve this sector, and indeed the country has seen major improvements in the telecommunication sectors recently. The existing literature suggests that media and ICT play a major role in shaping government policies, as well-informed citizens put pressure on policy-makers to perform well. However, the relationship between ICT and government policies remains understudied.

Lastly, this thesis elaborates the effect of religious parties — specifically Islamic parties

— on government policies. Indonesia has the largest Muslim population in the world, which makes it an ideal case to comprehensively answer this research question. Studies on the role of religious parties have presented mixed results. As such, it remains unclear how and why Islamic parties perform differently compared to other parties. The third chapter provides evidence on the impact of Islamic parties on policy choices.

This thesis contributes to the current understanding of the effect of political developments on a country's economy. Currently, Indonesia is understudied within the academic literature. Since Indonesia's economic, political and social institutions are quite different from other countries, it is an ideal case study to procure evidence on a newly democratised and heavily decentralised country.

Chapter 2 investigates the impact of political competition on district government performance and economic outcomes. The extant literature suggests that political competition leads to improved economic welfare. Studies on the association between political competition and economic performance usually employ data from highly democratic and advanced economies. Previous studies have started to investigate the effects of political competition on developing countries; Nonetheless, there is still limited evidence on the role of electoral competitiveness in countries that are transitioning towards democracy.

This chapter uses the novel district-level political competition measure, i.e. the Herfindahl Hirschman Concentration Index, based on district parliament election results. The data covers 427 districts in Indonesia between 2000 and 2013. The main issue with the study is the non-randomness of the political competition variable. Districts with better economic indicators tend to have higher political competition. Another issue is that political competition is likely to be correlated with unobservable variables. To address this problem, I use political competition in neighbouring districts and political competition based on the 1955 general elections as instrumental variables.

The results indicate that political competition boosts economic outcomes (e.g. real regional gross domestic product (RGDP) per capita and real RGDP per capita growth). A one standard deviation increase in political competition increases RGDP per capita and RGDP per capita growth by 1.9% and 0.81%, respectively. Moreover, stiffer political competition is associated with lower tax revenues. I also find robust evidence that political competition increases government expenditure for infrastructure sectors. These

findings are consistent with previous studies.

Chapter 3 analyses the impact of mobile phones on leaders' policymaking. This chapter is motivated by the rapid growth of ICT and the crucial role of information in political processes. Although Aker and Mbiti (2010) documented the development of ICT and its impacts on Africa's economic development, studies on the impact of ICT, especially the mobile phone, on political processes and policy outcomes are limited. The majority of studies focus more on the effect of media (e.g. television, radio and newspaper) on voter turnout or political accountability. This chapter contributes to the literature by examining the effects of mobile phone usage on a village leader's policies. In recent years, the quality of ICT services in Indonesia has been improving and, simultaneously, village governments have been granted more power and responsibility for the provision of public goods.

This study exploits data from different waves of Indonesian Village Potential Statistics (*Potensi Desa*) to answer two questions: First, does the adoption of mobile phones improve infrastructure and economic programs? Second, does mobile phone usage increase civic engagement among villagers? I use mobile phone signal strength as the main explanatory variable in the linear probability models (LPM) and the logistic regression. The quality of mobile phone signal strength is potentially endogenous and related to unobservable variables. Another potential problem is the measurement error from the mobile phone signal information. To address these problems, I exploit lightning strike intensity as an alternative source of exogenous variation for the instrumental variable estimation. A study by Manacorda and Tesei (2017) has shown that lightning strike intensity has a negative relationship with mobile phone adoption in Africa.

I find robust evidence that mobile phone signal strength is associated with improved infrastructure and better economic programs. Moreover, in accordance with the existing literature, I find that villages with better mobile phone signals are more likely to engage in civic activities. The results indicate that ICT has a stronger effect in rural villages, specifically. One possible explanation is that mobile phones improve individuals' ability in rural areas to interact with their leaders. The results presented in this chapter can be explained by the following: 1) increased telecommunication usage and 2) spill-over effects from neighbouring villages.

This chapter is the first quantitative study to examine the relationship between the introduction of mobile phones and government policies in Indonesia. It provides policy implications regarding the improvement of several ICT sectors in Indonesia and how to promote communication between the government and the country's citizens.

Chapter 4 contributes to the literature by exploring how religious parties, in particular Islamic parties, affect policy choice and economic performance. Previous studies have shown that religion (e.g. Islam, Catholic, etc.) is associated with lower government performance. On the other hand, country-specific studies have found that Islamic governments tend to implement more progressive policies that can lead to better development outcome (e.g. higher school enrolment for females, lower infant mortality rates and better access to health services). Nevertheless, there is limited evidence regarding why Islamic parties would perform differently compared to secular parties. This chapter discusses the effects of Islamic parties on policy choice and investigates the mechanisms behind these findings.

Using information from mayoral election results in Indonesia between 2005 and 2013, I compared districts within which mayors from the Islamic party barely won or lost using a regression discontinuity design (RDD). Based on the Islamic party vote margin variable, the districts were either assigned to the treatment group or the control group. Therefore, the RDD allows me to examine the causal link between the Islamic party and several policy and outcome variables.

I find that districts with mayors from the Islamic party are associated with lower government revenues, government expenditures and tax revenues. Interestingly, even though Islamic mayors generate less revenues, they tend to spend more on education. Moreover, I do not find any correlation between Islamic parties and economic outcomes. I propose two mechanisms behind these findings: First, districts with Islamic mayors will receive 16% to 19.7% less central government transfers due to partisan dis-alignment. Second, districts with Islamic mayors tend to implement policies that are motivated by Islamic laws, including restricting certain types of activities (e.g. banning alcohol, night life, etc.), which ultimately reduces tax revenues from these sectors by 0.13 % to 1.5%.

This chapter contributes to our understanding of the role of Islamic parties on policies. Although studies have increasingly begun to examine the role of religion in economics,

there is still limited evidence on how religious parties perform in a newly democratic country, like Indonesia.

The remaining chapters in this thesis are as follows. Chapter 2 analyses how political competition affects local government performance. Chapter 3 examines the impact of mobile phone usage on government policies. Chapter 4 investigates how an Islamic government performs differently compared to a secular government. Finally, chapter 5 concludes this thesis and provides recommendations for further research.

Chapter 2

Political Competition and Local Government Performance: Evidence from Indonesia

This paper analyses the impact of political competition on local government performance in Indonesia. This study uses a new database that covers 427 districts in Indonesia, from 2000 to 2013. In Indonesia, local governments are largely responsible for fulfilling basic service delivery and, in this regard, they are extremely powerful. Political competition is measured using the Herfindahl Hirschman Concentration Index for the district parliament election. This variable is potentially endogenous, therefore, I use the lag of political competition for neighbouring districts within the same province, as well as the political competition from the 1955 general election, as instrumental variables for political competition. The degree of political competition has been found to boost real Regional Gross Domestic Product (RGDP) per capita by 1.9%. Furthermore, a one standard deviation increase in political competition would increase RGDP growth by approximately 0.81%. The results also support the findings of previous studies, which have found that stiffer political competition is associated with higher public spending (e.g. infrastructure spending) and pro-business policies.

2.1 Introduction

Economic theory often suggests that competition leads to improved economic welfare. Many studies consider this argument within a political context, asking whether competition in political systems, such as in parliaments or through elections, could benefit society (Downs, 1957; Becker, 1958; Stigler, 1972; Wittman, 1989; Persson and Tabellini, 2000).[1] However, the theory also suggests that the relationship between political competition and performance might be non-linear (Besley et al., 2010).[2] Studies on the nexus between political competition and economic performance in developing countries remain limited, however. Furthermore, there is little evidence on the role of political competition on policies in developing countries or in countries that are transitioning towards democracy, such as Indonesia.

Indonesia initiated a democratic government after 32 years of President Suharto's regime (*Order Baru* or New Order). Research on this country have been increasing, especially since the country held its first general election after Suharto's presidency in 1999. After the New Order era, Indonesia entered the *Era Reformasi* (Reformation Era), which signifies the beginning of its transition from an authoritarian country into a democracy. During this period, Indonesia passed two laws to decentralise the fiscal and administrative policies. Sub-national and especially district governments are now responsible for providing the majority of key public services, such as education, healthcare and infrastructure. District government expenditure covers almost 75% of total sub-national public expenditure (Lewis, 2016).

While studies on the role of local government in Indonesia have become more common, research is still limited. The majority of extant studies have examined the impact of directly elected local executives (*Pemilihan Kepala Daerah Langsung*/PILKADA) on local government performance, but have neglected the impact of political competition. Sjahrir et al. (2013) have investigated political budget cycles at the district level, and discovered a significant relationship between political budget cycles and mayoral elections. Thus, the findings indicate that the current executive is likely to use their discretionary

[1] Many studies have been expanding this argument, for example Polo (1998) and Svensson (2005) which agree that political competitiveness affects policies and welfare.

[2] Other studies have examined the relationship between political competition and other outcome variables: for example, economic performance (Padovano and Ricciuti, 2009), government efficiency (Ashworth et al., 2014), land supply (Solé-Ollé and Viladecans-Marsal, 2012), political rent (Svaleryd and Vlachos, 2009) and service delivery (Arvate, 2013; Nye and Vasilyeva, 2015).

spending—such as financial assistance spending (*belanja bantuan sosial*) and financial assistance to sub-districts and donations (*hibah*)—to enhance their chances of being re-elected.

Previous studies on Indonesia have focused on local elections and public service deliveries, although the majority did not address the potential endogeneity problems associated with political competition. Issues with endogeneity might arise due to the fact that districts with higher economic growth or income per capita might be correlated with the degree of political competition, and therefore bias the results. Previous studies have acknowledged this possible reverse causality between government performance and electoral competition (Besley et al., 2010; Padovano and Ricciuti, 2009).

To discuss the role of political competition on government performance and policy choice, I use data from three different sources. The first source is the district parliamentary election results from the General Election Commission of Indonesia (*Komisi Pemilihan Umum*/KPU). I also check the consistency of the data with data from Pemilu Asia.[3] Regarding the socio-economic indicators, I use data provided by the INDO-DAPOER dataset, which has collected extensive information about province and district characteristics in Indonesia from 1976 to 2014. Finally, the dataset used in this study consists of 427 of the 508 districts in Indonesia, and was collected between 2000 and 2013.

Political party concentration index (Herfindahl-Hirschman Index (HHI)) is the measurement for political competition. I find that higher political competition is indeed associated with pro-business and growth policies. In terms of outcome variables, both log real Regional Gross Domestic Product (RGDP) per capita and log real RGDP per capita growth increase with a higher degree of political competition. In terms of magnitude, a one standard deviation increase in political competition is estimated to increase RGDP per capita and RGDP growth by 1.9% and 0.81%, respectively. An increase in political competition by a one standard deviation is associated with lower log owned source revenues per capita by 10.1%. This suggests that higher political competition reduces tax revenue. Moreover, an increase in political competition by a one standard deviation is associated with higher infrastructure expenditure per capita by 17%.

To address endogeneity problems caused by the non-random political competition

[3]Pemilu Asia is a non-governmental organisation (NGO) that aims to provide data for election results in several Asian countries, such as Indonesia, Malaysia, Singapore, India and Turkey. Their website can be accessed from this link `http://pemilu.asia/`.

variable that could bias the estimation results, I employ an instrumental variable estimation strategy. I use the lag of the average political competition from the national parliamentary election in neighbouring districts within the same provinces, and of the historical political competition from the 1955 general election (which was held under democratic conditions prior to the Suharto regime) as the instruments. This strategy has also been used by (Svaleryd and Vlachos, 2009) and (Solé-Ollé and Viladecans-Marsal, 2012). The results from 2SLS supports the initial findings.

In further support of these findings, the effect of higher political competition is also statistically significant when I employ additional control variables or introduce new dependent variables. Moreover, I also use the vote margin between the winning party and the second-place party as an alternative explanatory variable for political competition. The results suggest that using the vote margin does not change the baseline results.

The main contribution of this study is that it empirically tests the role of political competition in economic performance and policy choice (Besley et al., 2010; Padovano and Ricciuti, 2009; Ashworth et al., 2014; Svaleryd and Vlachos, 2009; Solé-Ollé and Viladecans-Marsal, 2012; Arvate, 2013; Nye and Vasilyeva, 2015), specifically in the developing country of Indonesia. Moreover, this study constructs and documents a new dataset on the degree of political competition in Indonesia at the district level since the reformation period. Using an Indonesia dataset provides an alternative approach to what is typically performed in political economy literature, especially regarding whether political competition is beneficial in a young democracy and a highly decentralised country. Previous studies have focused on well-established democratic countries, such as the US (Besley et al., 2010), Italy (Padovano and Ricciuti, 2009), Belgium (Ashworth et al., 2014), Sweden (Svaleryd and Vlachos, 2009) and Spain (Solé-Ollé and Viladecans-Marsal, 2012).

Nonetheless, studies focusing on developing countries have been growing, such as Brazil (Arvate, 2013; De Janvry et al., 2012; Chamon et al., 2018), Russia (Nye and Vasilyeva, 2015), India (Crost and Kambhampati, 2010; Nath, 2014; Mitra and Mitra, 2017), Mali (Gottlieb and Kosec, 2017) and Mexico (Clearly, 2007; Díaz-Cayeros et al., 2014). These countries have a different institutional set up than Indonesia, which might provide an alternative perspective for this particular context. This study widens the narrow research conducted on political competition in a developing country with highly

decentralised setting.

This paper proceeds as follows: Section 2.2 reviews the relevant literature. Section 2.3 provides the conceptual framework. Section 2.4 discusses the institutional background within both an administrative and political context. The data is explored in Section 2.5, and the results are discussed in Section 2.6. Finally, Section 2.7 concludes this study.

2.2 Literature Review

2.2.1 Effects of Political Competition

Several studies have analysed the consequences of political competition for government policies and rent extraction. Downs (1957) introduced the theory which states that the main objective for a government in a democracy is to implement policies that increase their votes. Voters vote for the government or party if their actions could increase their income utility in the future. However, Becker (1958) has suggested that there may be significant differences between political competition and democracy theories and what occurs in the real world. In theory, market and political competition increase efficiency. Nevertheless, in the real world, political competition is relatively difficult to achieve, and sometimes imperfect political competitiveness is necessary. Stigler (1972) has also suggested that the role of competition in politics is not to make voters happy, but to reduce unnecessary returns to the party. Finally, Wittman (1989) created a model in which an increase in competition for a political opponent diminishes the rent-seeking behaviour of politicians. Moreover, political competition also increases government efficiency.

A formal economic analysis supports the idea that public good provision and tax revenues are affected by electoral competition. In Polo (1998), voters differ in regard to their opinions on redistributive policies. Furthermore, the candidates also have different interests and prefer to gain some utility upon election. Once a candidate is elected, they would retain the rent extraction. The study suggests that this problem could be reduced through greater political competition. Svensson (2005) has further suggested that electoral competition reduces opportunistic behaviour by the government and increases discipline. Moreover, this study has also found that competition between public agencies could reduce the cost of policies and make them more efficient. The empirical results indicate that the degree of political competition and ethnic polarisation increase government

spending, with lower public goods provision.

The main motivation for this study is Besley et al. (2010), which investigated the effect of the degree of political competition on both policy and economic growth. Their theoretical model suggests a non-linear relationship between political competition and government policy, as well as economic growth. As political competition decreases, there is less of an effect on policy. Moreover, political competition will have a greater impact in an intermediate interval. Under such conditions, both parties would increase the probability of implementing pro-growth policies to enhance their chances of winning votes. Finally, when it is too competitive, the effect on pro-growth policies will be deteriorating, if not ambiguous, as the weaker party will pursue rent-seeking policies.

Empirically, using U.S. data, Besley et al. (2010) have found that stiffer political competition is associated with pro-business and growth policies, such as higher infrastructure spending, relative to total government expenditure, lower tax revenue (as a percentage of state personal income) and the existence of a law concerning an individual's right to work. This study also addresses the endogeneity problems that stem from the political competition variable. The instrument variable for political competition used in this study is the 1965 Voting Right Act (VRA).

In addition to Besley et al. (2010), extensive empirical studies have been conducted on political competition in relation to policy outcomes. Padovano and Ricciuti (2009), for example, analysed the consequences of political competition and economic performance in Italy after the 1995 institutional reforms, and have found that political competition increases economic performance. On the other hand, stiffer political competition reduces spending on healthcare and government administration. The study further argues that spending, for both sectors, tends to be wasteful and inefficient. An increase in political competition is estimated to increase the growth rate by 0.9%. Other studies, for instance Ashworth et al. (2014), have verified that electoral competitiveness is associated with efficiency, specifically regarding the local government in Flanders.

Moreover, Fiva and Natvik (2013) explored the effects of political competition on investment in public good provisions in Norway. This study used the neighbouring vote share within the same municipality as the instrumental variable. Svaleryd and Vlachos (2009) have found that political competition in Sweden and local media coverage reduces the political rents among the local governments. To address endogeneity concerns, this

study used historical vote patterns in national elections, and the vote margin in neighbouring districts, as variables for district political competition. Political competition also affects government policy on land. Solé-Ollé and Viladecans-Marsal (2012) investigated the effect of political competition on land supply in Spain. The study has found that the closeness of an election affects the supply of new land designated for development. The study employed the same variables as a previous study by Svaleryd and Vlachos (2009), namely historical vote margin and provincial vote margin.

Previous studies heavily investigated the role of political competition in developed countries. However, studies that examine developing countries are limited. Nevertheless, one such study was conducted by Nye and Vasilyeva (2015); It examines the relationship between political competition and public goods provision in Russia. This study uses data from 74 Russian regions between 2004 and 2009 to determine whether the way in which a governor is appointed affects public expenditure on education and health. The governors in Russia were chosen by the inhabitants between 1995 and 2005. However, in 2005, President Vladimir Putin changed the law, and governors have since been appointed by the federal government. Governors are reappointed if they have the support of the ruling party in parliament. According to this study, when there is monopoly of power in the parliament, with no strong opposition, government spending on education and health decreases.

Another study by Arvate (2013) has found that a higher number of candidates in municipality elections in Brazil is associated with increased public goods provisions. Greater political competition increases the number of students enrolled in primary school, the number of teachers, and the extent of immunisation. To address the endogeneity problem, this study introduces two dummy variables for the number of seats in the local legislative body based on population size: medium size (for municipalities with 11 to 30 seats) and larger district (for municipalities with 31 or more seats). The reasoning behind these variables is based on the federal law, which controls the relationship between the number of seats on the local parliament and the size of the local population.

From the above discussion, it can be seen that an abundance of evidence exists which suggests that political competition affects government policy choices and rent extraction behaviour. Nevertheless, most of the existing studies focus on political competition and its impact in developed, democratic countries. Debate about the impacts of democratisation

which is not always a panacea. More newly democratised countries might experience difficulties during their transition period. Moreover, political competition is not always beneficial (Becker, 1958) and, in extreme cases, can even reduce pro-growth policies (Besley et al., 2010). Therefore, the objective of the present study is to determine whether political competition similarly affects more newly democratised, developing countries, such as Indonesia.

2.2.2 The Political Economy of Indonesia

Political economy literature related to Indonesia is still limited, and literature on the effects of political competition on policy and economic outcomes is entirely non-existent. Rather, the extant literature has focused on the effect of direct mayoral elections and political business cycles, as well as local executive behaviour after the decentralisation period. For example, Sjahrir et al. (2013) analysed political budget cycles at the district level. After the decentralisation era, in 2001, local governments were elected through direct elections; This study investigates whether incumbents tend to increase their discretionary expenditure during an election year. They find political business cycles with direct mayoral elections. However, there is no evidence of political business cycles in districts where the mayor was appointed by the local parliament.

Skoufias et al. (2014) have also found that direct mayoral elections have a positive effect on district expenditures and revenues, as well as human development outcomes. Moreover, directly elected local governments are more responsive to health issues, because voters more highly demand health service delivery. The composition of district expenditure changes during an election year, as well as before an election period: It has been argued that this is a means for the incumbent to buy voter support. Similarly, Skoufias et al. (2011) have also found that direct mayoral election affects the composition of public spending. However, this finding is mainly the result of an increase in expenditure outside Java and Bali, as well as because incumbents tended to spend more during their administration to enhance their chance of being re-elected. In addition to the previous argument, the study has found that, before a direct election year, district governments tend to increase their spending on public works.

Another factor that affects the provision of public goods is the quality of the leader. Martinez-Bravo (2014) analysed the appointment procedures to elect village leaders and

their impacts. Village leaders inherited from the authoritarian regime are associated with the presence of voting suppression and fraud. Moreover, those who were appointed by Suharto's regime tend to be associated with increased clientelistic spending. Based on this model, appointed village leaders have a larger incentive to force voters to vote for their party during the general election, because if their party wins the election, there is a greater probability that village leaders will be re-appointed.

Unlike previous studies, political competition somehow has a negative association with criminal violence, such as the risk of sea piracy. Daxecker and Prins (2016) investigated the impact of electoral competition and sea piracy in Indonesia. Pirate activities depend on their agreement with local law enforcement agents, polices, and elected officials. Therefore, when a reformist comes to the office, pirate criminal activity increase. This is because the pirates feel threatened by possible reforms to the fishing sector. Empirically, the study has found that close elections increase the risk of piracy by 0.08 of a point.

The aim of the present research is to fill a gap in the political economy literature on Indonesia, by focusing on the impact of political competition on government performance. Unlike previous studies, this study focuses on the impact of district parliamentary political competition on local government performance. Previous studies have primarily investigated the mayor's role in delivering necessary services through a direct mayoral election. However, the mayor alone cannot implement a policy without enough support from parliament. Hence, I want to determine whether districts with increased political competition push their mayors to implement policies that will improve the economy and public spending. This study also extends the analysis on whether, after the decentralisation era, there has been any improvement to political competition in Indonesia.[4]

2.3 Conceptual Framework

Based on the previous literature on the association between local government performance and political competition, I explored the following two hypotheses. The first investigates

[4]A previous study investigated the role of fiscal decentralisation on public good provision in Indonesia. For example, Pal and Wahhaj (2017) have found that fiscal decentralisation is associated with higher spending on social infrastructure. However, the main objective of their study was to explore the role of fiscal decentralisation; It does not elaborate the impact of political competition on government spending.

whether political competition enhances economic performance. The second hypothesis proposes that government policy is improved by political competition.

There are different forces at play between the effects of political competition and policy choices. First, as documented in Besley et al. (2010) and Padovano and Ricciuti (2009), political competition is associated with higher income per capita and income per capita growth. Conversely, Man (2016) has suggested that, in a cross-country panel, the empirical relationship between political competition and economic growth is inconclusive. The study has found that the political competition variable displays a U-shaped partial relationship with growth. Furthermore, Acemoglu and Robinson (2006) have suggested that political competition can cause political instability and reduce government incentives to implement reforms that enhance economic growth.

In the context of Indonesia, it is unclear whether political competition enhances economic growth or, on the other hand, may lead to political and economic instability. However, political competition - and political decentralisation – is likely to decrease the incentive to engage in rent-seeking behaviours, since it is easier for voters to punish incumbents who perform poorly. When voters are given several options in an election, politicians need to implement policies that will benefit voters' welfare. In the present study, I predict that political competition will drive the government to promote pro-growth policies, and therefore increase GDP per capita. Given the fact that political competition in a newly democratised country like Indonesia would also increase political instability in that country, it might provide the opposite result as Besley et al. (2010) and Padovano and Ricciuti (2009).

Hypothesis 1 *Political competition is associated with higher economic performance.*

Another potential implication of increased political competition is that it increases pressure on the government to provide more public goods. As previously mentioned, political competition is associated with government policies. In general, higher political competition increases the provision of public goods, such as education and health expenditure in Russia (Nye and Vasilyeva, 2015), number of teachers, students and free immunisation in Brazil (Arvate, 2013), spending on infrastructure in the US (Besley et al., 2010), public provision in Italy (Padovano and Ricciuti, 2009), government efficiency in

Flanders (Ashworth et al., 2014), and land supply in Spain (Solé-Ollé and Viladecans-Marsal, 2012).

Notwithstanding, higher spending is not always associated with improved government performance, because policy-makers can spend more money in unproductive sectors (e.g. civil servant salaries or general administrative spending), which is associated with rent-seeking behaviour. In this context, I want to specifically observe the impact of political competition on government expenditures by sectors. Local governments in Indonesia have more power and also responsibility with regard to public goods provision. Therefore, an increase in government spending on infrastructure, health and education is associated with more public goods. For example, local governments are responsible for providing health care facilities, improving basic education services and social and public infrastructure. Thus, I expect that as political competition increases, pressure on the government to provide more public goods also increases.

Hypothesis 2 *Political competition increases public goods provision.*

It is also possible that higher spending on public goods provision is not associated with improved quality of public goods. Unlike other developed countries, where the initial quality of the goods provided by the government are already good, Indonesia still has problems with infrastructure. Based on the Global Competitiveness Report, in 2018 Indonesia ranked 71st of 140 countries in terms of infrastructure development.[5] Therefore, an increase in the provision of public goods can be interpreted as an improvement in government performance.

2.4 Institutional Background

2.4.1 Administrative Context

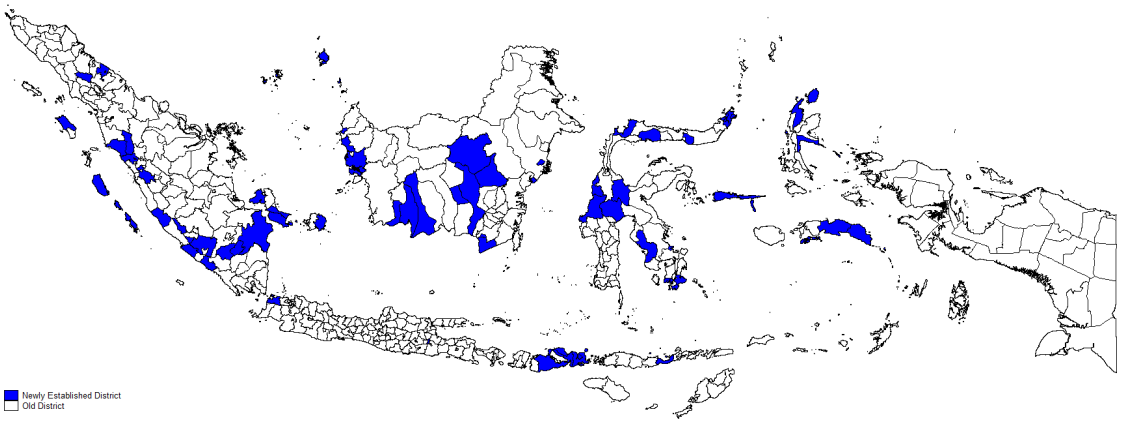
During the almost three decades of President Suharto's administration, Indonesia's government was profoundly centralised and autocratic: everything was decided in the capital city. The Golkar party was the main ruling party, which competed—in a loose sense—with two weak opposition parties. Despite the predominantly centralised rule,

[5] See `http://reports.weforum.org/global-competitiveness-report-2018/`.

Suharto did allow some local governments to perform limited political activities, in accordance with Law No. 5/1974. Even though this law provided a framework for decentralisation, lower levels of government possessed limited authority and power.

In 1999, following the regime change, two laws (Law No. 22/1999 on regional governance and Law No. 25/1999 on regional fiscal balance) on decentralisation were passed by the government. These laws made district governments responsible for basic services, integrated the de-concentrated structure into local government and provided them with grants and natural revenue sharing (Skoufias et al., 2014).[6]

Figure 2.1: District Boundaries in Indonesia



Notes: This is Indonesia's district boundaries based on Home Office, 2014.

The fiscal and political decentralisation took effect in January 2001. Administrative decentralisation involved the granting of autonomy to two levels of the government: provinces and *Kabupaten* and *Kota* (i.e. regencies and cities: for simplicity, referred to as districts or local governments). Administrative decentralisation preceded an increase in the number of local governments, from 340 in 1999 to 514 in 2014 (Ministry of Home Office, 2014) (See Figure 2.1 and Table 2.1). Most of the newly formed districts are located outside the island of Java. In total, 174 new districts have been formed since the decentralisation period. Districts were primarily split due to fiscal incentives, although political division and interest in natural resources also played a part in the division (Fitrani et al., 2005). District proliferation gives new districts the power to manage their own revenues and expenditures. This mechanism helps rich districts that had previously depended heavily on parent districts to use their own resources independently.

Own-source revenues (*Pendapatan Asli Daerah*/PAD) and the transfer from central

[6]In 2015, the funds transferred from the central government to provincial and district governments was approximately 31.7% of the total central government expenditure (Ministry of Finance, 2016).

government (*Dana Perimbangan*) comprise local governments' revenue sources. The former is collected directly by local governments and comes from taxes and levies on businesses, service activities and vehicle ownership, while the latter is collected by the central government and comes from taxes and levies on natural resource extraction activities and personal income tax (World Bank, 2007). In the past five years, the proportion of PAD to total local governments' revenues was approximately 17% (Ministry of Finance, 2016).

Central government transfers form a large portion of local governments' total revenue. It comprises approximately three-quarter of a district's total revenue (Ministry of Finance, 2016). Government transfers assume three forms: the general allocation fund (*Dana Alokasi Umum*/DAU), the special allocation fund (*Dana Alokasi Khusus*/DAK), and the shared revenues fund (*Dana Bagi Hasil*/DBH). The DAU mainly covers civil servants' salaries. The DAK and the DBH provide funds for development activities. The difference between the DAK and the DBH is that the DAK is an earmarked budget, which means that the budget is allocated for specific spending, while the DBH is not. Only districts in which many people pay income tax and districts with abundant resources can earn a significant amount of DBH (World Bank, 2007). In 2015, the DAU's share of the national budget was approximately 17.3%. For the DAK and the DBH, the share was approximately 1.7% and 6.2%, respectively (Ministry of Finance, 2016).

Table 2.1: Number of Districts in Indonesia

Year	Number of Districts	Number of District Excluding Districts in DKI Jakarta	Number of Regencies	Number of Cities
1999	340	335	268	72
2000	340	335	268	72
2001	353	347	269	84
2002	390	384	302	88
2003	439	433	349	90
2004	439	433	349	90
2005	439	433	349	90
2006	439	433	349	90
2007	464	458	370	94
2008	494	488	397	97
2009	496	490	399	97
2010	496	490	399	97
2011	497	491	399	98
2012	501	495	403	98
2013	511	505	413	98
2014	514	508	416	98

* Source: Own Calculation based on Home Office, 2014.

Following decentralisation, district governments became responsible for infrastructure, education, health, agriculture, trade and industry, transportation, the labour market, and the environment. In education, district governments are responsible for the first nine years of education (six years of primary school and 3 years of secondary education). In the health sector, local governments are responsible for providing primary health services and employing health workers. On average, district government expenditure covers almost 75% of the total district expenditures (Lewis, 2016). The rest of it comes from a special allocation grant. Furthermore, districts' nominal expenditures have doubled from 2001 to 2007 and increased significantly in both 2008 and 2009 (Sjahrir et al., 2014). In 2016, the ratio between the districts' total expenditures and the central government's total expenditures was 38% (Ministry of Finance, 2016). This is relatively higher than in the US and European countries, where local government expenditures account for around 25% of total government expenditures (Ferraz and Finnan, 2011).

2.4.2 Political Context

The Indonesia parliament system uses proportional representation, in which citizens can vote for a party or specific candidates within a party. In the 1999 general election, 48 parties competed in the national and local elections. In the national general election, five parties stood out: *Partai Demokrasi Indonesia-Perjuangan* (PDIP-P) won the election by 34% of the votes, followed by *Golongan Karya* (Golkar) with 22% and *Partai Kebangkitan Bangsa* (PKB), *Partai Persatuan Pembangunan* (PPP) and *Partai Amanat Nasional* (PAN) which earned 13%, 11% and 7%, respectively.

The reforms made to Indonesia's administration occurred simultaneously with enormous development in politics at the local level. Before 1999, local executives and local members of parliament at the district and provincial levels (*Dewan Perwakilan Rakyat Daerah*/DPRD) were chosen by the central government. The government changed this procedure gradually, by holding direct elections to choose local members of parliament and district heads/mayors (known as *bupatis* and *walikotas*). In 2004, the government introduced a new law on local direct elections to strengthen local accountability. In 2005, the first direct mayoral election was held in Indonesia. In June 2005, 266 local governments (49% of total local governments; 11 provinces and 214 districts) participated in democratised elections. By the end of 2009, around 80% of the local governments held

their own direct elections. These reforms aimed to increase the accountability of all local governments, because local leaders had previously been appointed by local parliaments.

Indonesia held its first direct presidential election in 2004, with Susilo Bambang Yudhoyono and Jusuf Kalla appointed as the first directly elected President and Vice President of the Republic of Indonesia. In the same year, 24 parties competed in the parliamentary election. During the 2009 general election, 44 parties participated in the election. Until 2014, years after the political transition, Indonesia had only four legislative elections (1999, 2004, 2009 and 2014) and three direct presidential elections (2004, 2009 and 2014), although it had numerous direct local elections to choose local leaders.

2.5 Data and Specification

The analysis was conducted using an unbalanced panel dataset for all districts in Indonesia, except for those located in NAD, DKI Jakarta, Papua and Papua Barat.[7] The number of districts in this sample are 427 out of 508 districts, with many newly formed districts formed after 2001 (See Figure 2.1 and Table 2.1). Based on data availability, this study covers 14 years, from 2000 to 2013.[8] Table 2.2 provides the summary statistics of the data in this study.

2.5.1 The Dependent Variables

I analysed seven separate dependent variables: (1) Log real Regional Gross Domestic Product (RGDP) per capita; (2) Log real RGDP per capita growth; (3) Log own source revenues per capita; (4) Log total expenditure per capita; (5) Log total infrastructure expenditure per capita; (6) Log total education expenditure per capita and (7) Log total health expenditure per capita. Some of these variables have been used in previous studies, such as: health expenditure variables by Padovano and Ricciuti (2009) and infrastructure expenditure in Besley et al. (2010). Moreover, real RGDP per capita and real RGDP per

[7] I excluded districts in the provinces of Nanggroe Aceh Darussalam, Papua and Papua Barat, because a significant amount of data was not available for the districts in these provinces. Moreover, DKI Jakarta was excluded because the districts in Jakarta are not autonomous. A previous study that used the same dataset, (Sjahrir et al., 2014), also excluded these districts for the same reasons.

[8] Most of the indicators in this study were collected from the INDO-DAPOER dataset that contains data, especially the socio-economic indicators for the district-level from 1976 to 2013. The data is accessible from this web page: `http://data.worldbank.org/data-catalog/indonesia-database-for-policy-and-economic-research`. This data was collected and shared by the World Bank group.

Table 2.2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Political Competition	5458	0.81	0.09	0.24	0.94
RGPD per Capita (in Rupiah)	5458	6,311,955	6,603,461	247,913.2	98,584,192
Log RGDP per capita Growth	5458	0.06	0.06	-0.78	1.99
Own Source Revenues per Capita (in Rupiah)	5042	120,202.9	214,067.3	1,726.51	5,211,151
Total Expenditure per Capita (in Rupiah)	5037	1,729,274	2,031,852	4,522	46,597,656
Total Infrastructure Expenditure per Capita (in Rupiah)	5031	321,166	683,147	462	24,256,530
Total Education Expenditure per Capita (in Rupiah)	5031	478,609	400,857	137	8,176,531
Total Health Expenditure per Capita (in Rupiah)	5031	145,454	160,013	1,764	2,102,416
Lag Neighbour HHI	5031	0.87	0.10	0.31	0.99
Historical HHI	5458	0.65	0.10	0.15	0.82
Log Total Population	5458	5.84	0.96	2.28	8.56
Urban Rate (%)	5458	66.80	28.02	0.52	100
Population Density (thousand people per km^2)	5458	1.06	2.23	0.00	32.64
Literacy Rate (% of total Population)	5458	92.02	6.81	50.08	99.94
Log Central Government Transfer	5458	26.38	1.44	7.29	29.95
Resource Rich	5458	0.97	0.18	0	1
PDI-P Share	5458	17.50	13.28	0	86.92
PPP Share	5458	6.96	5.59	0	44.02
Number of Primary School	1825	406.85	352.96	2	2818
Number of Clinic	1419	78.96	46.23	5	292
Non Agricultural Share	5001	0.67	0.19	0.21	0.99

capita growth variables have been used in Besley et al. (2010) and Padovano and Ricciuti (2009).

The first dependent variable tested is the real district gross domestic product over total population (*RGDP per Capita*). Figure 2.2 depicts RGDP per capita trends, based on Indonesia's main Islands, from 2000 to 2013. It is evident that Kalimantan exhibits the highest RGDP per capita during the given time period relative to other islands. The mean RGDP per capita in Kalimantan between 2000 and 2013 was Rp 9.8 million (US$ 654.44).[9] Notably, Kalimantan possesses the largest reserves of energy resources in Indonesia.

Figure 2.3 depicts RGDP per capita by district in Indonesia. Kediri (RGDP per capita = Rp 98.5 million $\approx$ US$ 6,572.28) in East Java has the highest RGDP per capita. On the other hand, Halmahera Barat district (RGDP per capita = Rp 247,913.22 $\approx$ US$ 16.52) in Maluku is the district with the lowest RGDP per capita. Based on the summary statistics in Table 2.2, the mean RGDP per capita is Rp 6.3 million (US$ 420.80) and the standard deviation is Rp 6.6 million (US$ 440.23)

Real RGDP per capita growth (*growth*) is also used as a dependent variable. The mean value for RGDP per capita growth is 0.06 and the standard deviation is 0.06. Figure 2.4 depicts the trend of real RGDP per capita growth. Moreover, Figure 2.5 provides the average growth by district in Indonesia. We can see that districts in East Kalimantan,

[9] US$ 1 $\approx$ Rp 15,000.

Figure 2.2: Trend of Log RGDP per Capita by Islands from 2000-2013

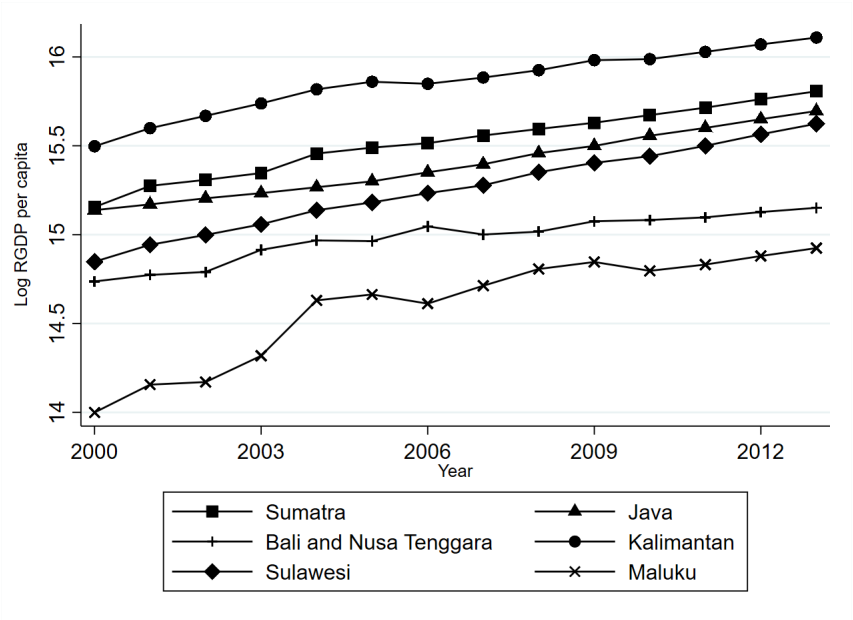
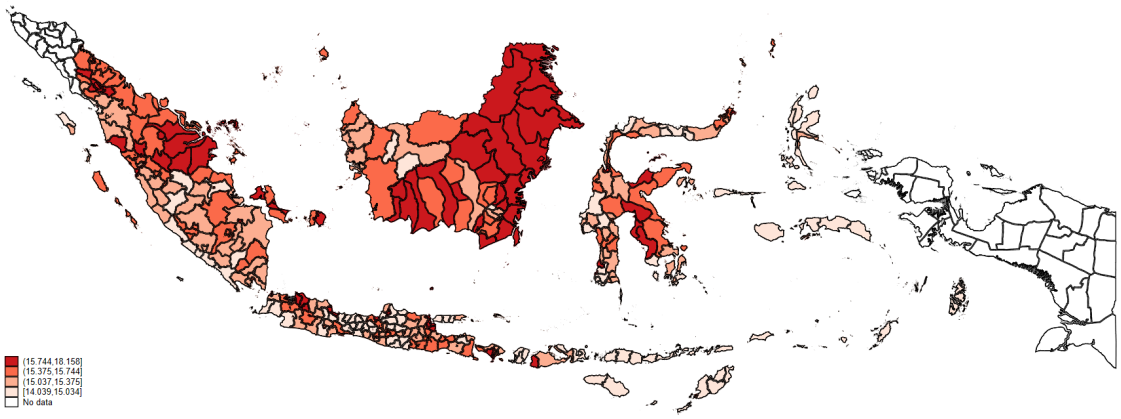


Figure 2.3: Average Log RGDP per Capita by Districts from 2000-2013



several districts in Sulawesi, and parts of Riau have performed relatively better than their neighbours. Labuhan Batu (North Sumatra Province) was the district with the highest real RGDP growth in 2008 (growth = 1.99 percent). Pontianak (West Kalimantan), on the other hand, had the lowest real RGDP per capita growth in 2006 (growth = -0.78).

Figure 2.4: Trend of Log RGDP per Capita Growth by Islands from 2000-2013

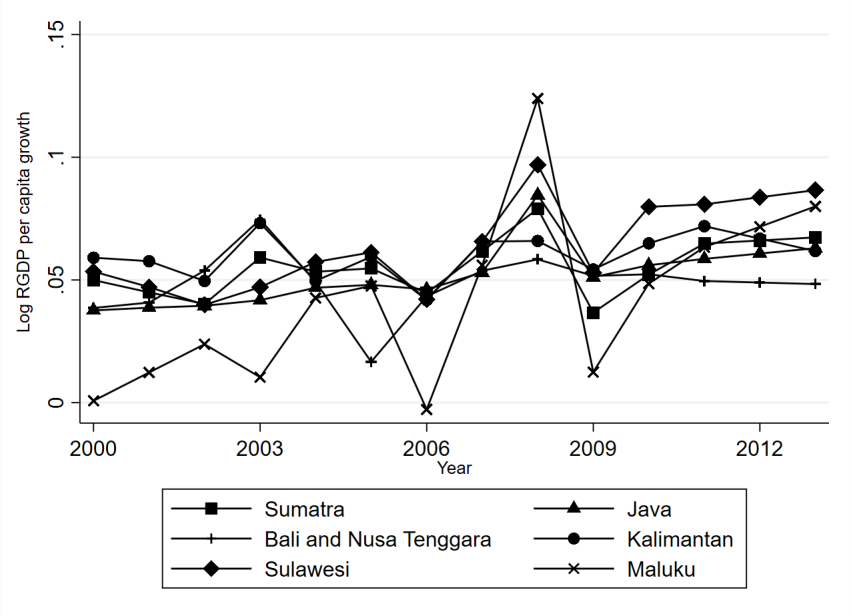
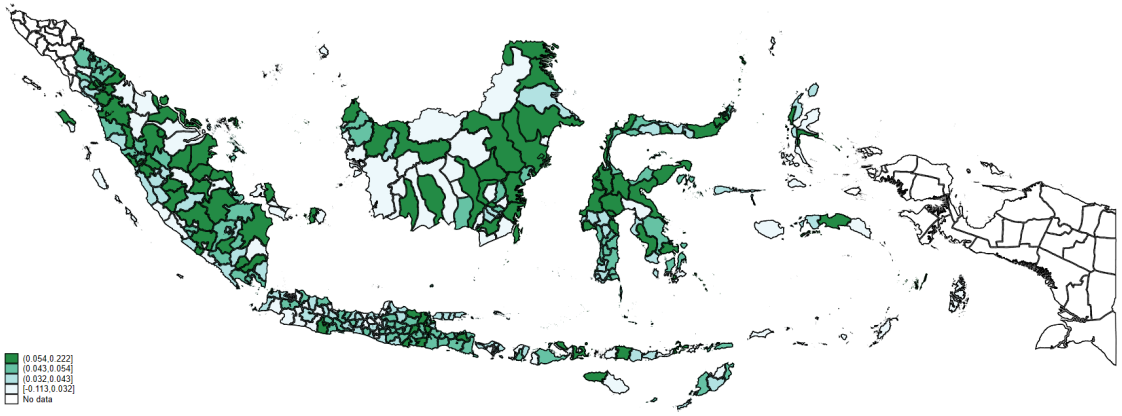


Figure 2.5: Average Log RGDP per Capita Growth by Districts from 2000-2013



The next dependent variable used to capture locally generated government revenues is own source revenues per capita (*PAD*). Based on the statistics provided in Table 2.2, the mean value for this dependent variable is Rp 120,203 (US$ 8.01) and the standard deviation is Rp 214,067 (US$ 14.27). South Lampung district had the lowest own source of revenues per capita in 2000 (*PAD* = Rp 1,726 $\approx$ US$ 0.12). The district with the highest own source revenues was Tana Tidung district with Rp 5.2 million (US$ 347.41) in 2011.

In terms of government expenditure, I used total government expenditure per capita and total government expenditure by sector. The mean for total expenditure per capita is approximately Rp 1.7 million (US$ 115.28) and the standard deviation is around Rp 2 million (US$ 135.45). The last three dependent variables used are total infrastructure per capita (mean = Rp 321,165/US$ 21.41; s.d. = Rp 683,147/US$ 45.54); total education expenditure per capita (mean = Rp 478,609/US$ 31.91; s.d. = Rp 400,857/US$ 26.72) and total health expenditure per capita (mean = Rp 145,454/US$ 145; s.d. = Rp 160,013/US$ 10.67). The share of total expenditure for infrastructure, education and health—relative to total government expenditure—is approximately 56.7%, which is quite substantial.[10]

2.5.2 Explanatory Variables

Political competition measured in district parliaments are constructed using data from the General Election Commission of Indonesia (KPU) and Pemilu Asia, from 2000 to 2013. The data used comprise the vote shares for each party from the district parliament elections. As previously mentioned, Indonesia's electoral system is one of proportional representation. During the election, voters can vote for individual candidates or just the party. If voters choose to vote for the party, then the winning party will choose the member of parliament based on their rank in the party list.

Previous studies have used various approaches to define political competition: for example, the number of parties competing in the election (Polo, 1998; Arvate, 2013), the vote margin (Besley et al., 2010; Padovano and Ricciuti, 2009; Solé-Ollé and Viladecans-Marsal, 2012; Svaleryd and Vlachos, 2009) and political volatility (Ashworth et al., 2014). In this study, the main measure is the Herfindahl Hirschman Index (HHI), which is the sum of squares of the vote shares of each political party in the election at district d and time t, i.e. $\Sigma\ VS^2_{p,d,t}$. This variable reflects the strength of the party in the general election at the district level, as well as the political concentration in the district parliament.[11]

[10] Other government expenditures that are not used in this study include spending on agriculture (4%), administrative activities (31.7%), social protection (0.7%), goods and services (18.3%) and other spending (11.4%). The figures inside the parentheses represent the shares relative to total government expenditure.

[11] Another possibility is to use the vote share margin between the mayoral candidates. However, the effects of political competition using data collected from the mayoral election is not within the scope of this study. Nevertheless, several potential links may affect a mayor's policies. For example, stiffer political competition at the parliamentary levels will affect a mayor's policies. Mayors with strong parliamentary support will also exert more discretion over which policies they choose to implement. Nonetheless, in the robustness check I also included a number of covariates to address the role of local executive powers.

Therefore,

$$Political\ Competition_{d,t} = 1 - \Sigma\ VS^2_{p,d,t} \tag{2.1}$$

where, $Political\ Competition_{d,t}$ is the political competition in district d at time t, which is equal to 1 minus the Herfindahl Hirschman Index. Since I subtracted the HHI from 1, an increase in the size of the political competition, leads to a higher degree of political competition. For example, if the value of political competition is close to one, political competition is high. On the other hand, if the political competition value is close to zero, there will be less political competition in the district.

As presented in Table 2.2, politics in Indonesia are relatively competitive, and the distribution is skewed to the right. The mean value of political competition in Indonesia is 0.81 and the standard deviation is 0.09. Districts with the highest degree of political competition are Sintang, Bulukumba, North Tapanuli, Humbang Hasundutan and South East Maluku (Political Competition = 0.94) in the 2009 general election. Tabanan has the lowest political competition variable: 0.24 in the 1999 general election.

Figure 2.6, Figure 2.7 and Figure 2.8 reveal that the degree of political competition varies over time. From Figure 2.6, it can be seen that, during the 1999 general election, districts in Bali and South Sulawesi exhibited the lowest degree of political competition (smaller than 0.5). The mean political competition in Bali was 0.33 in the 1999 general election. Similarly, the mean political competition in South Sulawesi was 0.43 in 1999. By 2009, districts in Bali still had the lowest political competition relative to other districts, and the mean of the variable was 0.75, which was lower than the average political competition throughout the country (political competition = 0.87). On the other hand, political competition in South Sulawesi in 2009 was 0.88, which was higher than the average political competition throughout the country.

These two provinces have a long history of voting for certain political parties. For example, South Sulawesi has close ties with the Golkar Party, since many major political figures in the Golkar party came from South Sulawesi, such as the former President, B.J. Habibie, from *Kabupaten* Pare-Pare. Moreover, the current Vice President, Jusuf Kalla, came from *Kabupaten* Bone and was a well-known entrepreneur in South Sulawesi and Eastern Indonesia before entering politics. Bali also has a strong alignment with the PDI-P and, as a result, the PDI-P is the winner in almost every general election.

In general, political competition in Java, Sumatra, Kalimantan and Indonesia is quite heterogeneous between elections and districts. This heterogeneity makes it suitable to use fixed effects when conducting a regression analysis.

Figure 2.6: Political Competition by Districts in 1999

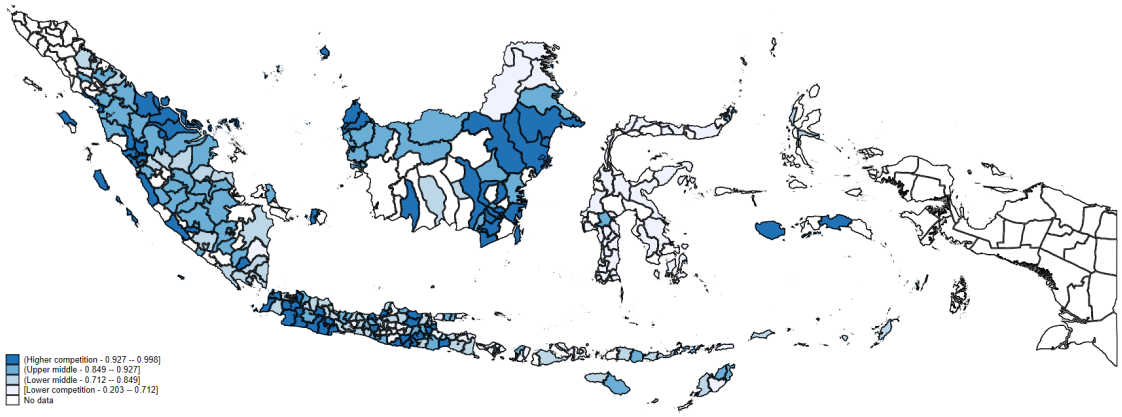


Figure 2.7: Political Competition by Districts in 2004

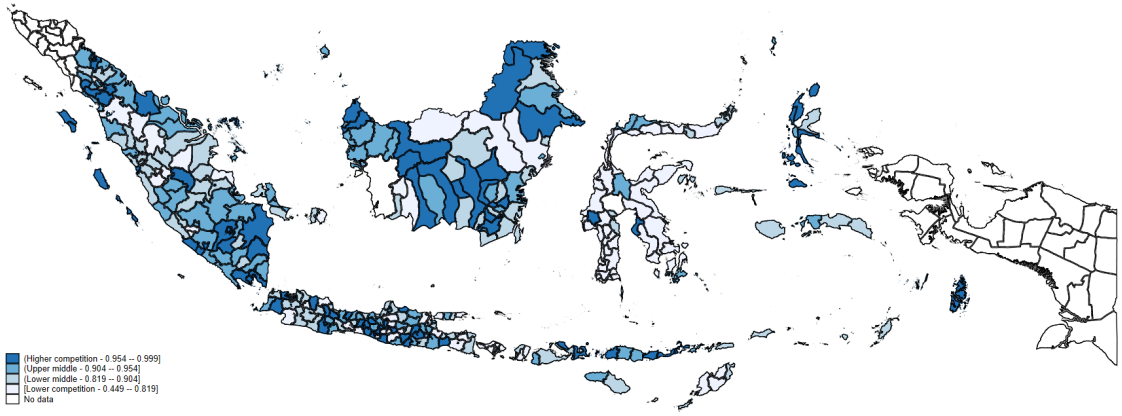
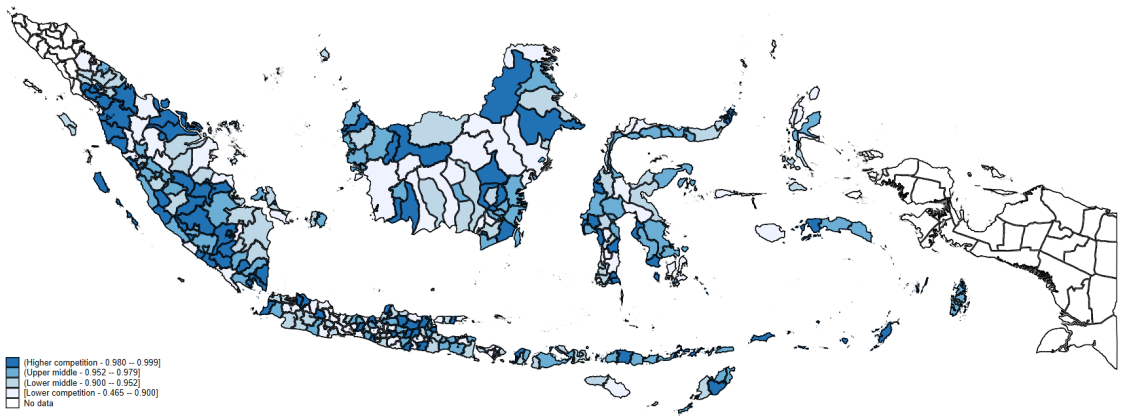


Figure 2.8: Political Competition by Districts in 2009



2.5.3 Specification and Identification

The objective of this study is to assess whether political competition produces more pro-development policies and better economic performance. Following Besley et al. (2010), the relationship between political competition and local government performance is modelled as follows:

$$Y_{d,t} = \beta + \delta Pol\ Comp_{d,t} + \gamma X_{d,t} + \theta_d + \vartheta_t + \epsilon_{d,t} \tag{2.2}$$

where $Y_{d,t}$ is the dependent variable in district d at time t, regressed on political competition (*Pol Comp*) and a vector of control variables (X). The dependent variables in this model are log real RGDP per capita, log real RGDP per capita growth, log own source revenues per capita, log total expenditure per capita, log total infrastructure expenditure per capita, log total education expenditure per capita and log total health expenditure per capita.

$Pol\ Comp_{d,t}$ is political competition in district d at time t. The variable for political competition is time invariant within each election cycle. For example, the political competition for year 2000-2003 at district d would be the political competition from the 1999 general election. Similarly, the political competition for district d during years 2004-2008 would the political competition from year 2004 and 2009 for t = 2009-2013.

One advantage of using the past election year is that it can mitigate the potential of reserve causality between political competition and dependent variables, because current government activities cannot affect past political competition. This is also the reason why the present study does not follow previous literature that used future political competition (Solé-Ollé and Viladecans-Marsal, 2012; Arvate, 2013).

Components that relate to a district government's ability to execute policies depend on the characteristics of the district, in terms of accessibility and possible scale economies. Therefore, several time variant control variables are included in this estimation. The controls include interpolated log of population, the urbanisation rate, population density, the literacy rate, the log of central government transfers, dummy variables for districts who have abundant natural resources, vote share for PDI-P and PPP.

I employed several control variables, in accordance with Clearly (2007), Ashworth et al. (2014) and Arvate (2013), subject to data availability. The logs of population and

urbanisation rate are included, because areas with larger populations and a higher degree of urbanisation affect the decisions made regarding public goods provision. For instance, districts with larger populations will require more infrastructure compared to districts with smaller populations. Population density is included to capture economies of scale when providing public services (Oates, 1999). This is because each district government needs to implement a pro-growth agenda, and might end up investing more per unit of infrastructure or service because it would be operating in a smaller scale.

To capture fiscal capacity, the log of central government transfers and resource rich indicators are also included in the regression. Resource rich indicators is a binary variable for districts where one of their revenues come from natural resources, such as fishery, forestry, gas, mining, and oil. Any of these variables can be used as the indicator regardless of whether the district government has the fiscal ability to make improvements to public services. Districts that have abundant natural resources will be less dependent on the central government.

Literacy rate and vote shares for PDI-P and PPP are used to control for political and ideological influence. PDI-P is a nationalist party and PPP is an Islamic party. By including these two parties in the regression, we can capture whether ideological differences affect government policy choices.

The vector of controls is augmented with district fixed effect θ_d and time effects ϑ_t. By using district and time fixed effects, the political competition measures are differentiated across time and across districts. Therefore, it differentiates between unobserved fixed district characteristics and removes common time effects. In addition, robust standard errors are clustered at the district level.

The lag of log real district RGDP per capita is also included to account for Solow convergence when district real RGDP per capita growth is the dependent variable. Theoretically, some districts exhibit a higher growth rate because they were initially poorer than other districts. Other controls would be mentioned in the specific regressions.

2.5.4 Instrumental Variables

Political competition is an endogenous variable and $Pol\ Comp_{d,t}$ may be correlated with $\epsilon_{d,t}$ in equation 2.2. This issue will plausibly biases the results from the OLS estimation (Angrist and Pischke, 2009; Wooldridge, 2010). A potential reverse causality

problem exists, because not only do the votes affect the dependent variables, but it is possible that the dependent variables in the estimation would affect the degree of political competition. For example, it is possible that a higher income would affect political competition. Moreover, the government could use spending to influence political competition. Therefore, an instrumental variable should be used to address this problem.

In this study, I use two plausibly exogenous instruments for political competition. The first is the lag of neighbour political competition and the second is historical political competition in the 1955 general election, interacted with a time trend. Therefore, I will implement at two-stage least squares (2SLS), where the first stage is:

$$Pol\ Comp_{d,t} = \alpha_{d,t} + Z_{1,d,t-1} + Z_{2,d,1955} * time\ trend + \gamma X_{d,t} + \theta_d + \vartheta_t + \mu_{d,t} \tag{2.3}$$

where $Z_{1,d,t-1}$ is the lag of political competition in the neighbouring districts within the same province during the election year t and $Z_{2,d,1955}$ is the historical political competition at district d and during the 1955 general election.

Lag of Neighbours Political Competition Following Fiva and Natvik (2013), I created the neighbouring political competition variable, which is computed from the HHI for the national parliamentary election results of neighbouring districts within the same province. A similar strategy was also employed by Svaleryd and Vlachos (2009) and Solé-Ollé and Viladecans-Marsal (2012). Indonesia has 34 provinces and approximately 514 districts, therefore one province has approximately 15 districts. To compute this instrument, I used the average of district political competition from the national parliamentary election results in all other districts in the provinces to which the districts d belong at *t-1*. Therefore, the instrument is calculated as follows:

$$Z_{1,d,t-1} = \frac{\sum_{n \neq d}^{P_d} Pol\ Comp_{n,t-1}}{P_{d,t-1}} \tag{2.4}$$

where P_d is the number of other districts in the province to which the district d belongs and $Pol\ Comp_{n,t-1}$ is the political competition from the national parliamentary election results of district n in year *t-1*.

The voters movement across different parties can be attributed to the general trends, which are exogenous to local politics. For instance, the policies made by the central

government or local governments in neighbouring districts may affect the political preferences at the local level that is entirely unconnected to local politics. Hence, using the national parliamentary election results for districts within the same provinces will provide the plausibly exogenous variation for use as the instrument of district political competition. The underlying assumption here will be that a change in political competition at the national level for neighbouring districts will affect the degree of political competition at district d and have an orthogonal relationship to the policies of district d. More specifically, if political competition in a neighbouring district increases, political competition in the district d will also increase. Similarly, if neighbouring districts have lower political competition, hence the political competition of district d will decrease.

The idea behind using this instrumental variable is that votes in local elections are driven by local conditions and other external factors, as mentioned above. Studies by Fiva and Natvik (2013), Svaleryd and Vlachos (2009) and Solé-Ollé and Viladecans-Marsal (2012) have suggested that local election results determine the strength of political parties at the highest levels (e.g. province and central governments). In an Indonesian context, voters have different preferences for parties or candidates in the different levels of elections. Liddle and Mujani (2007) have observed that political figures shape voters' preferences in local elections in Indonesia. Voters in Indonesia are significantly attached to national leaders, which is unrelated to local politics. Therefore, a change in the political landscape at the national level would affect the political competition at the district levels, although it rarely affects local government policies due to decentralisation, and also local governments have more power in regard to decision-making and are more autonomous.

Due to district proliferation, which is potentially exogenous, the political dynamics of neighbouring districts will impact the government's ability to oversee natural resources (Burgess et al., 2012) as well as conflict (Bazzi and Gudgeon, 2018), which could ultimately affect the outcomes and violate the exclusion restriction. In order to mitigate any violation of the exclusion restriction, additional robustness tests were conducted by including the resource rich indicators for the neighbouring districts as well as a dummy variable for the parent districts interacted with time trend (See Table 2.B.1). Moreover, another robustness check was conducted by excluding Java from the sample (See Table 2.B.2) to estimate areas where the majority of district proliferation occurred after the decentralisation (See Figure 2.1). The lag of the neighbouring political competition was used to mitigate the

potential reverse causality between outcome variables and the instrument.

The mean for lag neighbouring HHI is 0.87 and the standard deviation is 0.10. Figure 2.A.1 is a scatter plot that illustrates the positive correlation between political competition and lag of neighbour HHI.

Historical Political Competition This paper uses political competition at the district level from the 1955 general election, since many scholars have noted that it was the fairer election after the country achieved independence and before Suharto's regime (Feith, 1957; Liddle, 2000). Approximately 28 political parties competed during the election, with around 91.5% voter turnout (Ricklefs, 2008).

Political partisanship is found to have a persistent pattern in the US (Kaplan and Mukand, 2011). Similarly, in Indonesia, the results of the 1999 general election had a robust relationship with the results from the 1955 general election (Liddle, 2000; King, 2003; Liddle and Mujani, 2007). For example, in the 1999 general election, the PDI-P party won in areas where PNI (Indonesian Nationalist Party) was the winner of the 1955 general election.[12] There is also a persistent religious partisanship in Eastern Java. For example, the PKB (National Awakening Party), an Islamic party founded by NU (*Nahdatul Ulama*), won in areas where NU also won the 1955 general election. Therefore, political competition in 1955 can potentially be a credible predictor for current political competition.

To create this instrument, I followed the procedures outlined by Solé-Ollé and Viladecans-Marsal (2012) and Svaleryd and Vlachos (2009).[13] In previous studies, historical data was regressed in a cross-sectional analysis. Here, I interact the historical political competition and time trend to achieve the variation for the instrumental variable, and therefore am able to use time and district fixed effects for the analysis. The use of the interaction term generated a continuous difference-in-differences estimator that could identify the causal effect of time invariant variation from the 1955 political competition (Angrist and Imbens, 1995; Angrist, 1998).

To check whether this instrument is considered exogenous, the conditional covariance between historical political competition and ϵ should be zero. This may not satisfy the

[12]The party was founded by former President Sukarno, the father of former President Megawati, the chairman of the PDI-P party.

[13]Sørensen (2014) uses the same strategy for Norwegian local governments.

assumption if the current districts' socio-economic indicators and political environment are correlated with the conditions in 1955. For example, the exclusion restriction may be violated if a district exhibits a specific ethnic composition or repression of communist groups during Suharto's regime that affect current economic conditions.

Regarding this issue, in 1955 Indonesia was undergoing a transition period. The country had just achieved its independence in 1945, and it faced several military attacks from the Netherlands and the British. The economy was relatively poorer during that period, and there were no significant differences (in terms of economic conditions) between the districts. Moreover, during this period, Indonesian politics were volatile. President Sukarno was overthrown by the military and Suharto subsequently implemented an authoritarian and very centralised form of government.

District governments in 1955 did not have the power to implement policies, because everything was decided by the central government. Moreover, since there was a fundamental change to district structures after the decentralisation era, political competition in the 1955 elections better reflects political sympathies that were less affected by the current socio-economic conditions. Moreover, as a result of the proliferation of districts and provinces, several may not have existed in 1955.

Similar to the strategy used for neighbouring political competition, parent district fixed effects interacted with the time trend were used in the robustness checks in the appendix to mitigate the potential problems outlined above. The historical competition mean value is 0.65 and the standard deviation is 0.10. Figure 2.A.2 reveals to positive correlation between political competition and historical competition.

2.6 Results

In this section, I discuss the OLS and 2SLS estimations of equation (2.2), which analyse the effects of political competition on the dependent variables.

2.6.1 OLS Results

The first outcome variable in this study is log real RGDP per capita. Table 2.3 illustrates the estimation results for this dependent variable. All specifications include district and year fixed effects. All standard errors in the regressions are clustered according to district.

In column 1, regressing log real RGDP per capita on political competition without adding any covariates yields a positive and insignificant association. However, once I include the covariates, the results in columns (2) - (4) suggest that political competition is positively associated with log real RGDP per capita and it is statistically significant at 5%. If interpreted as causal, the estimation suggests that an increase in political competition by one standard deviation would increase log real RGDP per capita by 1.2% (See column (4) $\approx$ 0.09 x 0.134 x 100). The results suggest that, after the reformation era, increased political competition increased the level of real RGDP per capita in Indonesia. Besley et al. (2010) and Padovano and Ricciuti (2009) have also determined the same pattern in the US and Italy, where higher political competition increases income levels.

Table 2.3: Log Real RGDP per Capita and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political competition	0.0893	0.128**	0.128**	0.134**
	(0.0777)	(0.0552)	(0.0551)	(0.0527)
Log total population		-0.737***	-0.738***	-0.738***
		(0.0561)	(0.0562)	(0.0560)
Urban rate		0.000850	0.000848	0.000938
		(0.00104)	(0.00104)	(0.00104)
Population density		-0.000267	-0.000237	0.000111
		(0.00225)	(0.00228)	(0.00231)
Literacy rate		-0.000423	-0.000426	-0.000481
		(0.00165)	(0.00165)	(0.00169)
Central government transfer			0.00103	0.000571
			(0.00128)	(0.00127)
Resource rich			0.0000394	0.000344
			(0.00723)	(0.00719)
PDI-P share				0.000885
				(0.000577)
PPP share				-0.0000299
				(0.00114)
N	5458	5458	5458	5458
R^2	0.608	0.832	0.832	0.832
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log real RGDP per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The second outcome variable is real RGDP per capita growth. Table 2.4 illustrates the results for this variable. For this estimation, lagged personal income is included in columns (2) - (4). The results demonstrate that real RGDP per capita growth is also

positively correlated with political competition in columns (2) - (4). The negative sign associated with lag personal income suggests an income convergence. With regard to the magnitude itself, a one standard deviation increase in political competition increases economic growth by 0.4% or around 6.05% of one standard deviation. The results are consistent with Besley et al. (2010), in which increased political competition ultimately increases economic growth.

Table 2.4: Real RGDP Growth and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political competition	0.0209	0.0443**	0.0447**	0.0428**
	(0.0152)	(0.0181)	(0.0181)	(0.0182)
Lagged RGDP per capita		-0.0752***	-0.0753***	-0.0758***
		(0.0204)	(0.0204)	(0.0205)
Log total population		-0.0309***	-0.0308***	-0.0310***
		(0.0115)	(0.0115)	(0.0115)
Urban rate		-0.0000650	-0.0000611	-0.0000499
		(0.000183)	(0.000183)	(0.000183)
Population density		-0.000546	-0.000540	-0.000308
		(0.00102)	(0.00103)	(0.00100)
Literacy rate		-0.000497	-0.000504	-0.000551
		(0.000387)	(0.000388)	(0.000391)
Central government transfer			0.00000482	-0.0000483
			(0.000680)	(0.000672)
Resource rich indicator			-0.00523	-0.00510
			(0.00497)	(0.00495)
PDI-P share				0.000276
				(0.000177)
PPP share				0.000269
				(0.000272)
N	5458	5031	5031	5031
R^2	0.035	0.063	0.063	0.063
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is real RGDP per capita growth. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results for log own source revenue are presented in Table 2.5. The association is expected to be negative because higher political competition usually increases the government's incentive to reduce tax revenues. Therefore, it could reduce the amount of revenue generated for district own source revenues. In column 1, the relationship between political competition and log own source revenue (without adding control variables) was estimated to be negative and significant at 1%. In columns (2) - (4), after

including the covariates into the OLS specifications, the results remain negative and statistically significant at 1%. We can also see that the R-square becomes higher after including several covariates. In terms of magnitude, a one standard deviation increase in political competition is associated with a 6.48% decrease in log own source revenues per capita. This is also consistent with the previous results in Besley et al. (2010), which found that stiffer political competition reduces tax revenue relative to total revenue in the US.

Table 2.5: Own Source Revenue per Capita and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political Competition	-0.68***	-0.67***	-0.68***	-0.72***
	(0.15)	(0.14)	(0.14)	(0.14)
Log total population		-0.57***	-0.66***	-0.67***
		(0.070)	(0.071)	(0.069)
Urban rate		-0.0011	-0.0013	-0.0016
		(0.0019)	(0.0019)	(0.0020)
Population density		0.0042	0.0043	0.0033
		(0.0066)	(0.0067)	(0.0069)
Literacy rate		0.0020	0.0022	0.0022
		(0.0036)	(0.0036)	(0.0036)
Central government transfer			0.25***	0.25***
			(0.057)	(0.057)
Resource rich			-0.022	-0.023
			(0.036)	(0.036)
PDI-P share				-0.0026*
				(0.0015)
PPP share				0.0014
				(0.0032)
N	5042	5042	5042	5042
R^2	0.808	0.819	0.825	0.825
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log own source revenue per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Because the total revenue generated locally by district governments has a negative result, it is interesting to determine the impacts on government expenditures. I use total expenditure per capita and total government expenditures per capita by sectors as

additional dependent variables. Table 2.6 illustrates the results for total expenditure per capita. The results indicate that the association between political competition and total government expenditure per capita is statistically insignificant.

Table 2.6: Total Expenditure and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political Competition	0.45	0.57	0.56	0.62
	(0.41)	(0.40)	(0.40)	(0.41)
Log total population		-0.016	-0.025	-0.028
		(0.12)	(0.12)	(0.12)
Urban rate		0.013	0.013	0.013
		(0.013)	(0.013)	(0.013)
Population density		0.014	0.014	0.015
		(0.022)	(0.022)	(0.022)
Literacy rate		-0.012	-0.012	-0.012
		(0.0086)	(0.0086)	(0.0086)
Central government transfer			0.017	0.017
			(0.024)	(0.023)
Resource rich			-0.0096	-0.0087
			(0.060)	(0.060)
PDI-P share				0.0010
				(0.0034)
PPP share				-0.0033
				(0.0065)
N	5037	5037	5037	5037
R^2	0.003	0.008	0.009	0.009
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log total expenditure per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Moreover, although the results for total government expenditure are statistically insignificant, it is interesting to determine whether political competition affects government expenditure based on sector (e.g infrastructure, education and health). Table 2.7 provides the estimation results for log total infrastructure expenditure per capita. The association between political competition and the dependent variable is positive and statistically significant at 5%. A one standard deviation increase in political competition leads to

an increase in infrastructure expenditure by 17% or 11.47%, relative to the standard deviation.

Table 2.7: Infrastructure Expenditure and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political Competition	1.66*	1.77**	1.75**	1.90**
	(0.85)	(0.82)	(0.82)	(0.86)
Log total population		0.077	0.057	0.051
		(0.17)	(0.17)	(0.17)
Urban rate		0.011	0.012	0.012
		(0.021)	(0.021)	(0.020)
Population density		-0.024	-0.022	-0.020
		(0.075)	(0.073)	(0.073)
Literacy rate		-0.0093	-0.0096	-0.0084
		(0.013)	(0.013)	(0.013)
Central government transfer			0.034	0.034
			(0.035)	(0.035)
Resource rich			0.053	0.055
			(0.096)	(0.096)
PDI-P share				0.0016
				(0.0062)
PPP share				-0.010
				(0.012)
N	5031	5031	5031	5031
R^2	0.007	0.008	0.009	0.010
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log total infrastructure expenditure per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The estimation results for log total education expenditure per capita are presented in Table 2.8. The evidence suggests that political competition does not affect government expenditure in education. Even though there is a positive correlation between political competition and the dependent variable, it is not statistically significant.

The last dependent variable is log health expenditure per capita. Table 2.9 depicts the results for this dependent variable, which suggest that political competition results in an increase in health expenditure per capita, which is statistically significant at 10% after several covariates were included into the regression specifications. If I interpret the

Table 2.8: Education Expenditure and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political Competition	0.29	0.37	0.36	0.38
	(0.38)	(0.36)	(0.36)	(0.38)
Log total population		0.0011	-0.0037	-0.0044
		(0.094)	(0.094)	(0.094)
Urban rate		0.0080	0.0080	0.0081
		(0.0094)	(0.0094)	(0.0093)
Population density		0.024	0.023	0.023
		(0.017)	(0.017)	(0.017)
Literacy rate		-0.0097	-0.0098	-0.0097
		(0.0065)	(0.0065)	(0.0065)
Central government transfer			0.010	0.010
			(0.015)	(0.015)
Resource rich			-0.025	-0.025
			(0.046)	(0.046)
PDI-P share				0.00024
				(0.0031)
PPP share				-0.0011
				(0.0052)
N	5031	5031	5031	5031
R^2	0.003	0.006	0.007	0.007
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log total education expenditure per capita. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.9: Health Expenditure and Political Competition: OLS Estimation

	(1)	(2)	(3)	(4)
Political Competition	0.63	0.74*	0.72*	0.66*
	(0.41)	(0.39)	(0.39)	(0.39)
Log total population		0.12	0.096	0.095
		(0.13)	(0.13)	(0.13)
Urban rate		0.012	0.012	0.012
		(0.012)	(0.012)	(0.012)
Population density		-0.010	-0.0090	-0.0084
		(0.042)	(0.041)	(0.041)
Literacy rate		-0.012	-0.013	-0.013
		(0.010)	(0.010)	(0.010)
Central government transfer			0.045	0.043
			(0.040)	(0.039)
Resource rich			0.0057	0.0059
			(0.071)	(0.071)
PDI-P share				0.0026
				(0.0033)
PPP share				0.0049
				(0.0077)
N	5031	5031	5031	5031
R^2	0.004	0.009	0.012	0.013
Estimation Method	OLS	OLS	OLS	OLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log total health expenditure per capita.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

magnitude of the association between these two variables, then a one standard deviation increase in political competition leads to an increase in government expenditure in health by 5.95% or around 5.44%, relative to the standard deviation. Results from Table 2.7 and 2.9 are consistent with previous studies (Arvate, 2013; Besley et al., 2010; Nye and Vasilyeva, 2015) in which stiffer political competition corresponds to higher public spending. However, it is still unclear whether higher spending is associated with more productive spending. Therefore, in the robustness check (Section 2.6.3), I also extended the analysis by including several other dependent variables to determine whether spending was allocated to sectors that could increase people's welfares.

Overall, the estimation results indicate that political competition has a statistically significant correlation with several of the dependent variables. Nonetheless, the results do not fully establish a causal relationship. Indeed, the endogeneity problem with political competition might bias the results of the OLS estimation. Therefore, I use 2SLS to deal with this problem.

2.6.2 IV Results

The results presented thus far establish a robust statistical relationship between political competition and some of the dependent variables, after being controlled for with a substantial battery of covariates. However, there is still an issue with the endogeneity concern discussed in subsection 2.5.4. In an attempt to identify the causal relationship between political competition and outcomes, this section depicts the results for the two-stage least square (2SLS) estimations by using the lag of neighbouring political competition and political competition from the 1955 general election interacted with the time trend.

Table 2.10 illustrates the 2SLS estimation results for log real RGDP per capita (columns (1) - (2)) and log real RGDP per capita growth (columns (3) - (5)). Columns (1) and (3) are estimated without including any covariates. Column (2) and (4) are estimated by including the covariates used in the OLS estimation strategy. In column (5), I use the Arellano-Bond first difference estimator, as recommended by Caselli et al. (1996) and Besley et al. (2010). In this specification, I use one additional lag of log RGDP per capita growth as the instrument for lag dependent variable. All estimations include district and year fixed effects.

Table 2.10: Economic Outcomes and Political Competition: 2SLS Estimation

	(1) RGDP pc.	(2) RGDP pc.	(3) RGDP growth	(4) RGDP growth	(5) RGDP growth
Political competition	0.121	0.211*	0.0846**	0.0915**	0.0540**
	(0.150)	(0.125)	(0.0342)	(0.0382)	(0.0227)
Log total population		-0.698***		-0.0314***	0.0253
		(0.0614)		(0.0114)	(0.0330)
Urban rate		0.000933		0.00000191	0.000387
		(0.00106)		(0.000187)	(0.000293)
Population density		-0.00248		-0.000197	-0.0113
		(0.00500)		(0.000992)	(0.00757)
Literacy rate		-0.000917		-0.000649	-0.00105*
		(0.00189)		(0.000404)	(0.000605)
Central government transfer		-0.000994		-0.0000815	-0.000494
		(0.00200)		(0.000668)	(0.000692)
Resource rich		-0.00250		-0.00533	-0.00501
		(0.00745)		(0.00495)	(0.00561)
PDI-P share		0.00106*		0.000284	0.0000633
		(0.000627)		(0.000183)	(0.000181)
PPP share		0.000166		0.0000606	0.000209
		(0.00124)		(0.000323)	(0.000440)
L.Log RGDP pc				-0.0763***	-0.0289*
				(0.0204)	(0.0162)
N	5031	5031	5031	5031	4604
Estimation Method	2SLS	2SLS	2SLS	2SLS	Arrelano Bond
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
First stage					
Lag Neighbour Comp	0.382***	0.374***	0.382***	0.373***	
	(0.032)	(0.031)	(0.032)	(0.031)	
Comp 1955 X Time Trend	0.021***	0.014*	0.021***	0.014*	
	(0.007)	(0.007)	(0.007)	(0.007)	
F	111	100	111	100	
Hansen's *J* Statistic (*p*-value)	0.4016	0.7348	0.3329	0.4187	

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is log real RGDP per capita for columns (1) - (2) and log real RGDP per capita growth in columns (3) - (5). Political competition is instrumented by lag of neighbour political competition and by political competition in 1955 general election interact with time trend. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results from the first stage between the instruments and political competition are positive and statistically significant. The F statistics are above 100, much higher than what is expected for weak instrumental variables. The Hansen's J statistic for the over-identification tests are not rejected, which supports the assumption of instrument exogeneity and the associated exclusion restrictions. In column 1, the results are statistically insignificant when the log RGDP per capita is regressed on political competition without adding any covariates. Nonetheless, by adding control variables in column (2), the association between political competition and RGDP per capita is positive and statistically significant at 10%. This finding means that the exclusion of the control variables might bias the coefficient to zero. The coefficient from the 2SLS is higher than for the OLS in Table 2.3, which suggests that the OLS regression has a downward bias. This is in accordance with the results of Besley et al. (2010). In terms of the magnitude, under the conditions of instrument validity, the estimated quantitative effect is quite substantial: a one standard deviation increase in political competition is estimated to cause an increase of RGDP per capita by 1.9%.

The 2SLS estimation results in columns (3) and (4) for log RGDP per capita growth suggest that political competition increases the outcome variable and is statistically significant at 5%. A one standard deviation increase in political competition is associated with an increase in RGDP per capita growth by 0.81% or 13.5% relative to the standard deviation. In column (5), the Arrelano Bond estimation method was employed as suggested by Caselli et al. (1996) and Besley et al. (2010). The estimation results suggest a positive and statistically significant relationship between political competition and RGDP per capita growth. The results indicate that, in different estimation methods, the association between political competition and growth is robust and exhibits similar magnitudes. This finding is consistent with previous studies by Besley et al. (2010) and Padovano and Ricciuti (2009). Both studies find that stiffer political competition is beneficial for income growth. The results of the IV estimations for growth are similar to that of the OLS.

Table 2.11 presents the 2SLS estimation results for log own source revenue per capita (columns 1 - 2) and log total government expenditure per capita (columns 3 - 4). The first stage results for the instruments suggest that both lag neighbour political competition and historical political competition have a positive and statistically significant relationship

with the political competition variable. Moreover, the *F* statistics range from 97 to 110. I cannot reject the null hypothesis for the over-identification test, as the *p-values* for the Hansen's J statistics range between 0.3549 and 0.8681.

Table 2.11: Local State Capacity and Political Competition: 2SLS Estimation

	(1) Log Own Source Rev. pc	(2) Log Own Source Rev. pc	(3) Log Total Expenditure pc	(4) Log Total Expenditure pc
Political competition	-1.126***	-1.121***	0.723	0.973
	(0.311)	(0.328)	(0.853)	(0.918)
Log total population		-0.622***		-0.0898
		(0.0689)		(0.107)
Urban rate		-0.00276		0.0128
		(0.00212)		(0.0121)
Population density		-0.000648		0.0414
		(0.0130)		(0.0329)
Literacy rate		0.00157		-0.00642
		(0.00387)		(0.00926)
Central government transfer		0.279***		0.0196
		(0.0500)		(0.0245)
Resource rich		-0.0251		0.0318
		(0.0416)		(0.0569)
PDI-P share		-0.00332**		0.000354
		(0.00148)		(0.00357)
PPP share		0.00408		-0.00744
		(0.00325)		(0.00686)
N	4779	4779	4641	4641
Estimation Method	2SLS	2SLS	2SLS	2SLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
First stage				
Lag Neighbour Comp	0.396***	0.389***	0.392***	0.377***
	(0.034)	(0.033)	(0.033)	(0.032)
Comp 1955 X Time Trend	0.020***	0.012*	0.020**	0.015**
	(0.007)	(0.007)	(0.008)	(0.007)
F	110	97	109	98
Hansen's *J* Statistic (*p*-value)	0.3549	0.8681	0.7575	0.7524

* Notes: Robust standard errors in parentheses and clustered at the district level. Political competition is instrumented by lag of neighbour political competition and by political competition in 1955 general election interact with time trend. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The estimated coefficients for log own source revenue per capita are -1.126 in column 1 and -1.121 in column 2; Both are statistically significant at 1%. The results are still robust after including covariates in column 2. The point estimates from the 2SLS estimations are larger than the results obtained from the OLS regressions. The results obtained from the instrumental variables regression suggest that a one standard deviation increase in political competition leads to a decrease of own source revenue per capita by 10.1% or 9.44%, relative to the standard deviation, which is substantial. The results for log total expenditure per capita in columns 3 and 4 also support the OLS estimates, where political competition does not affect total government expenditure per capita.

Table 2.12: Government Expenditure and Political Competition: 2SLS Estimation

	(1) Log Infra. Expenditure pc.	(2) Log Infra. Expenditure pc.	(3) Log Education Expenditure pc.	(4) Log Education Expenditure pc.	(5) Log Health Expenditure pc.	(6) Log Health Expenditure pc.
Political competition	3.42**	3.92**	-0.10	-0.034	0.13	0.18
	(1.66)	(1.79)	(0.74)	(0.80)	(1.09)	(1.16)
Log total population		-0.14		-0.010		0.040
		(0.15)		(0.13)		(0.12)
Urban rate		0.011		0.0062		0.0099
		(0.019)		(0.0087)		(0.011)
Population density		0.10*		0.032		0.028
		(0.053)		(0.023)		(0.031)
Literacy rate		-0.0072		-0.0060		-0.011
		(0.014)		(0.0072)		(0.010)
Central government transfer		0.022		-0.000026		0.032
		(0.037)		(0.017)		(0.041)
Resource rich		-0.024		-0.0042		-0.0092
		(0.088)		(0.050)		(0.073)
PDI-P share		0.0023		0.00079		0.0018
		(0.0064)		(0.0033)		(0.0035)
PPP share		-0.020		0.00032		0.0035
		(0.013)		(0.0057)		(0.0079)
N	4636	4636	4636	4636	4636	4636
Estimation Method	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
First stage						
Lag Neighbour Comp	0.392***	0.377***	0.392***	0.376***	0.392***	0.377***
	(0.033)	(0.032)	(0.033)	(0.032)	(0.033)	(0.032)
Comp 1955 X Time Trend	0.020**	0.015**	0.020**	0.015**	0.020**	0.015***
	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)
F	109	98	109	97	109	98
Hansen's *J* Statistic (*p*-value)	0.7203	0.7081	0.6765	0.7173	0.5512	0.5373

* Notes: Robust standard errors in parentheses and clustered at the district level. Political competition is instrumented by lag of neighbour political competition and by political competition in 1955 general election interact with time trend. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.12 provides the results for total government expenditures based on sector. Columns 1 and 2 contain the results for log infrastructure expenditure per capita. Columns 3 and 4 depict the results for log education expenditure per capita, and columns 5 and 6 provide the results for log health expenditure per capita. The first stage results in all columns suggest that lag neighbour political competition and political competition from the 1955 general election could be the source of exogenous variation for the instrumental variables strategy. The association between these two instruments and political competition is positive and statistically significant. The *F* statistics pass the robustness checks for weak instruments. The over-identification test results also permit me to use both variables as instruments, since the *p-values* for the Hansen's J statistics indicate that the null hypothesis cannot be rejected.

Importantly, political competition is still found to be positive and statistically signifi-

cant for the infrastructure expenditure per capita. The estimated coefficients increase in relation to the OLS estimates, and range from 3.42 (column 1) to 3.92 (column 2). The results for log education expenditure per capita in columns 3 and 4 also support the results from the OLS regression: there is no statistically significant evidence that political competition affects total government expenditure on education. These results are in accordance with the study conducted by Skoufias et al. (2014), which found no association between directly elected mayors and education funding. Finally, the 2SLS estimation results for health expenditure per capita are statistically insignificant. This contradicts the results from the OLS regression, which suggests a statistically significant, positive relationship at 10%. This implies that the association between political competition and health expenditure observed in this study might be just a correlation, rather than a causal relationship.

2.6.3 Extensions

Lagged Dependent Variables To capture the dynamic effects for the dependent variables, I augmented the analysis by including the lagged dependent variables in the estimation. One reason for using lagged dependent variables is that the current level of dependent variables is probably determined by past levels. Therefore, including these variables could minimise the potential of omitted variable bias in this estimation. Table 2.B.3 depicts the results for this estimation. The association between political competition and the dependent variables for both OLS and 2SLS specifications are similar to the estimation results from the baseline specification. Indeed, past levels of the dependent variable effects their current values. Nevertheless, the inclusion of the lagged dependent variables does not change the association between political competition and the variables of interest.

Lagged Political Competition An alternative specification uses lagged political competition. The previous value of political competition might affect policy makers' performance. Indeed, if politics had previously been more competitive, they would expect it to be so again, and the parliament and voters would urge policy makers to perform well and produce better policies. Table 2.B.4 illustrates that the lag of political competition affects current policies. Lagged political competition is associated with lower log own source revenues per capita for OLS and 2SLS estimation. It also determines the total

infrastructure expenditure per capita.

Regarding the outcome variables, both real RGDP per capita and RGDP growth positively correlate to lagged political competition. The lag value of political competition increases the incentives for policy makers to implement policies that increase RGDP per capita and RGDP growth. These findings confirm that previous political competition is a key determinant for policy makers to produce certain policies.

Old Districts District proliferation might affect how political competition affects the outcome of an election. As mentioned in section 3.1, 174 new districts have been created since the decentralisation era. Most of them are located outside the Java Islands, such as Sumatra, Kalimantan, Sulawesi, Nusa Tenggara, and Maluku. According to this analysis, districts that were established before the decentralisation might have better institutions than newly established districts. Keefer and Vlaicu (2008) have found that younger democracies tend to be more unproductive and have low quality bureaucracy. In this study, I find that heterogeneous effects exist between political competition and outcomes, if the sample is split into districts that were established before the decentralisation era in 2001 and districts that were established after 2001. We can see from Table 2.B.5 that, in old districts, political competition affects RGDP per capita growth, own source revenue and infrastructure expenditures. For newly formed districts, however, although political competition does affect RGDP per capita, the effect on other variables is not significant.

Puskemas and Primary School District governments are responsible for health and education provisions. Therefore, I also investigated whether political competition influences districts to increase the number of community health centres (*Puskemas*) and primary schools. Table 2.B.6 suggests that political competition is associated with improved *puskemas* and primary school provisions. Columns (1) - (4) are the estimation results for *puskesmas*. For columns (1) - (2), I used the OLS estimation method and for columns (3) - (4) I used the 2SLS method with the over-identified model. The same procedures were adopted for primary school (Columns (5) - (8)). The results for *puskemas* are positive; However, once I included the set of control variables, it becomes statistically insignificant. If I interpret the results without including the covariates, a one standard deviation increase in political competition leads to an increase in the number of *puskemas* by roughly

3 units. The results for primary schools are positive and statistically significant. In column (8), the 2SLS results suggest that a one standard deviation increase in political competitiveness is associated with an increase in the number of primary schools by 8 units. However, the *p-values* for the Hansen's J statistic suggests that we need to be careful when interpreting the results from the 2SLS estimation, since the null hypothesis is rejected.

Non Agricultural RGDP relative to Total RGDP In theory, increased political competition leads the government to allocate policy-promoting resources to modern sectors or non-agricultural sectors (Besley et al., 2010). Therefore, I used the share of non-agricultural RGDP relative to total RGDP as the dependent variable. Table 2.B.7 reveals that political competition has a robust and positive association with larger, non-traditional sectors. For example, in column (2), it can be seen that the association between political competition and the modern sectors is significant at 1%. A one standard deviation increase in political competition increases the share of non-agricultural sectors by roughly 0.7%.

2.6.4 Robustness Checks

To check that these findings are robust, I performed further robustness checks by introducing additional control variables related to several political aspects. The first aspect is the timing of local mayoral elections, which is a dummy variable equal to one for years during which districts held a mayor election. This variable captures the possibility that government policies differ during the election period. Another additional control variable is a dummy that indicates whether the mayor comes from the majority party in the parliament. If the mayor has political support from the parliament, this might affect government policies by minimising the likelihood that the parliaments would reject the policy.

Table 2.B.8 contains the estimation results for the seven main dependent variables. Previous control variables are included in these regressions as well as district and year fixed effects. We can see that, even including the additional political covariates, the impact of political competition on the dependent variables remains unaltered and statistically significant.

Another robustness check includes further explanatory variables: in particular, the vote margin between the first winning party and the second winning party. This new explanatory variable reflects the strength of the winning party relative to their competition and the closeness of district-level general elections. Similar to the political competition variable, vote margin would be the fractionalisation; Therefore, a higher vote margin represents higher political competition. This variable replaces previous political competition measures (Herfindahl-Hirschman Index) in the new estimation strategy.

The results for this robustness check are presented in Table 2.B.9. The evidence indicates that real RGDP per capita, economic growth and total infrastructure expenditure are positively related to the vote margin. Moreover, own source revenues per capita decreases in accordance with the vote margin. The estimation results are robust and statistically significant.

These findings reveal that, when other factors and alternative measure of political competition are considered, there is consistent evidence that political competition has a positive impact on government performance and voters' economic welfare. These results support the previous literature, which has found that higher political competition improves pro-growth policies (Besley et al., 2010; Padovano and Ricciuti, 2009), increases supply of public goods (Svaleryd and Vlachos, 2009; Solé-Ollé and Viladecans-Marsal, 2012; Fiva and Natvik, 2013; Arvate, 2013) and improves government efficiency (Ashworth et al., 2014).

2.7 Conclusions

This paper investigates whether political competition improves policies in Indonesia. Since 1999, the number of political parties able to compete in the national and local elections has increased. Before 1999, only three parties could compete in elections, while in the latest election in 2014, 10 parties participated in the election. Beginning in January 2001, local governments became largely responsible for providing basic services in Indonesia. A higher degree of political competition could encourage the government to reduce opportunistic behaviour and more efficiently allocate resources (Wittman, 1989).

I use district-level data from 2000 to 2013 in Indonesia to examine the role of political competition on local government performance. Political competition is measured using

the Herfindahl-Hirschman political concentration index (HHI). However, as has been elaborated in many previous studies, political competition is also an endogenous variable (Besley et al., 2010; Padovano and Ricciuti, 2009; Svaleryd and Vlachos, 2009; Fiva and Natvik, 2013; Solé-Ollé and Viladecans-Marsal, 2012; Ashworth et al., 2014; Sørensen, 2014). To resolve this issue, political competition is instrumented using lagged political competition in neighbouring districts within the same province and the interaction between political competition in 1955 and a time trend.

This study confirms that political competition increases the incentive for policy makers to produce policies that increase RGDP per capita and improve RGDP per capita growth. I further find that stiffer political competition reduces own sources revenue per capita. Moreover, higher political competition is associated with increased spending on infrastructure and health, even though the results for the latter do not hold in the IV estimations. By extending the analysis to only include districts that had been established long before the decentralisation era, the findings again indicate that political competition matters. Moreover, stiffer political competition increases the number of community health centres and primary schools, and increases the share of non-agricultural income relative to total income. The results are robust to several additional tests. Therefore, the relationship between political competition and policy choices in this study is statistically significant and economically important. These findings could be useful for an Indonesian political context, and may be a starting point to enhance the degree of political competition and reform the current political system.

There is clearly more work to be done on this area. Whilst it is clear that political competition is related to several outcomes, a further exploration into the mechanisms would be especially useful to improve this chapter. One limitation of this study is that I do not consider the role of mayors in this analysis. Extending the data into the mayoral election results could also improve the analysis.

2.A Appendices to Chapter 2: Figures

Figure 2.A.1: Political Competition vs Lag Neighbour Competition

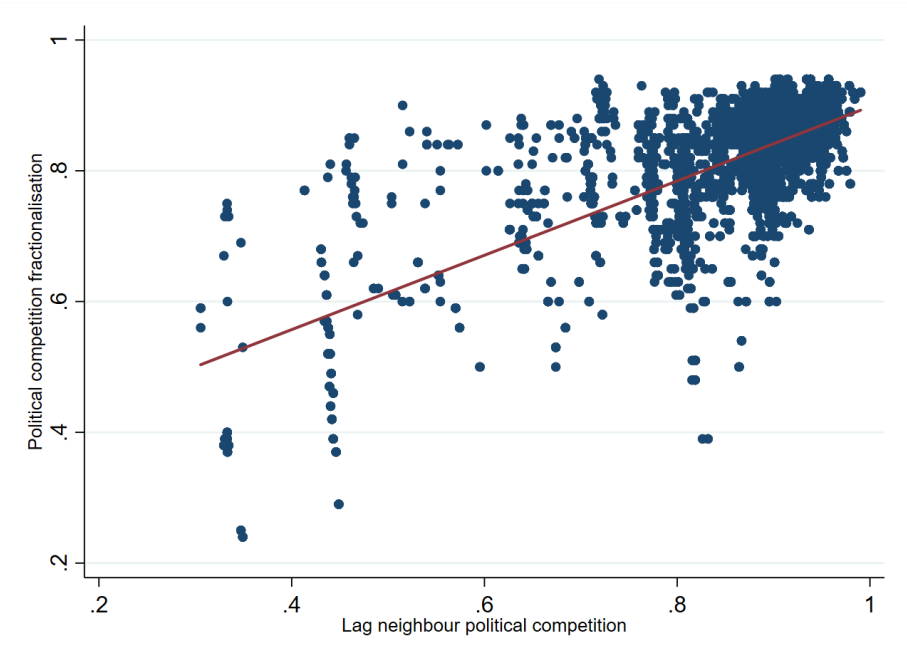
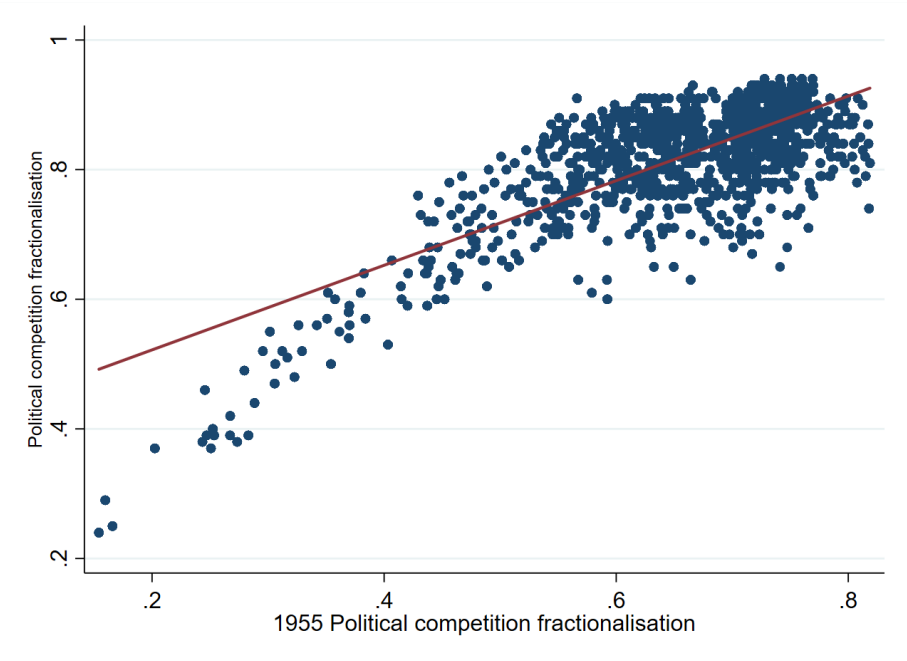


Figure 2.A.2: Political Competition vs Historical Competition



2.B Appendices to Chapter 2: Tables

Table 2.B.1: District Proliferation, Political Competition and Outomes: 2SLS Estimation

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc
Political competition	0.21*	0.083**	-1.12***	0.98	3.89**	-0.039	0.16
	(0.13)	(0.039)	(0.33)	(0.92)	(1.79)	(0.79)	(1.17)
Resource rich at neighbouring districts	0.019	0.035	-0.041	-0.12	0.12	0.071	0.18
	(0.040)	(0.024)	(0.11)	(0.22)	(0.38)	(0.19)	(0.25)
Log total population	-0.70***	0.0085	-0.62***	-0.087	-0.14	-0.015	0.040
	(0.061)	(0.014)	(0.069)	(0.11)	(0.15)	(0.088)	(0.12)
Urban rate	0.00093	-0.000066	-0.0027	0.013	0.011	0.0062	0.0098
	(0.0011)	(0.00017)	(0.0021)	(0.012)	(0.019)	(0.0087)	(0.011)
Population density	-0.0025	0.00018	-0.00054	0.042	0.10*	0.032	0.028
	(0.0050)	(0.00098)	(0.013)	(0.033)	(0.054)	(0.023)	(0.031)
Literacy rate	-0.00092	-0.00048	0.0016	-0.0068	-0.0080	-0.0065	-0.011
	(0.0019)	(0.00040)	(0.0039)	(0.0093)	(0.014)	(0.0072)	(0.011)
Central government transfer	-0.00096	0.00034	0.28***	0.020	0.022	0.00074	0.033
	(0.0020)	(0.00070)	(0.050)	(0.025)	(0.037)	(0.017)	(0.041)
Resource rich	0.014	0.027	-0.062	-0.078	0.080	0.058	0.15
	(0.039)	(0.022)	(0.10)	(0.22)	(0.36)	(0.18)	(0.25)
PDI-P share	0.0011*	0.00019	-0.0033**	0.00019	0.0020	0.00074	0.0019
	(0.00063)	(0.00017)	(0.0015)	(0.0036)	(0.0064)	(0.0033)	(0.0035)
PPP share	0.00016	0.000023	0.0041	-0.0073	-0.020	0.00032	0.0034
	(0.0012)	(0.00030)	(0.0032)	(0.0068)	(0.013)	(0.0057)	(0.0079)
N	5031	5031	4779	4641	4636	4636	4636
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent District FE x time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First stage							
F	100	100	97	97	97	97	97
Hansen's *J* Statistic (*p*-value)	0.7560	0.5185	0.8823	0.7497	0.7380	0.6703	0.4992

* Notes: Robust standard errors in parentheses and clustered at the district level. See Notes of Table 2.3 and Table 2.10 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.2: Excluding Java, Political Competition and Outomes: 2SLS Estimation

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc
Political competition	0.22	0.10**	-1.20***	1.26	4.52**	0.26	0.26
	(0.14)	(0.045)	(0.40)	(0.98)	(1.90)	(0.83)	(1.25)
Log total population	-0.69***	0.0072	-0.63***	-0.11	-0.19	-0.032	0.011
	(0.063)	(0.015)	(0.072)	(0.11)	(0.17)	(0.092)	(0.13)
Urban rate	0.0014	-0.00017	-0.0048	0.020	0.017	0.014	0.015
	(0.0015)	(0.00026)	(0.0031)	(0.020)	(0.032)	(0.014)	(0.018)
Population density	0.00090	0.0012	-0.012	0.053	0.13*	0.048*	0.039
	(0.0048)	(0.0013)	(0.0095)	(0.044)	(0.077)	(0.028)	(0.036)
Literacy rate	-0.00064	-0.0010*	0.0054	-0.011	-0.017	-0.014	-0.019
	(0.0027)	(0.00058)	(0.0058)	(0.011)	(0.017)	(0.0089)	(0.014)
Central government transfer	0.000089	0.00051	0.28***	0.020	0.0098	0.0047	0.033
	(0.0023)	(0.00079)	(0.056)	(0.028)	(0.041)	(0.019)	(0.046)
Resource rich	-0.0010	-0.0063	-0.0041	-0.0012	-0.11	-0.0074	-0.020
	(0.0093)	(0.0065)	(0.052)	(0.065)	(0.095)	(0.056)	(0.086)
PDI-P share	0.0015**	0.00016	-0.0031*	-0.00036	0.0015	0.0019	0.0022
	(0.00066)	(0.00021)	(0.0017)	(0.0043)	(0.0077)	(0.0040)	(0.0042)
PPP share	-0.0012	-0.00048	0.0079	-0.014	-0.034*	-0.00065	0.0027
	(0.0020)	(0.00055)	(0.0054)	(0.0092)	(0.018)	(0.0077)	(0.012)
N	3598	3598	3374	3208	3203	3203	3203
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent District FE x time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First stage							
F	99	99	98	96	96	96	96
Hansen's *J* Statistic (*p*-value)	0.9063	0.6147	0.7273	0.9567	0.3362	0.9477	0.6181

* Notes: Robust standard errors in parentheses and clustered at the district level. See Notes of Table 2.3 and Table 2.10 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.3: Further Results: Adding Lagged Dependent Variables

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc	(8) Log GDP pc	(9) Log GDP pc Growth	(10) Log Own Source Revenue pc	(11) Log Total Expenditure pc	(12) Log Total Inf. Expenditure pc	(13) Log Total Educ. Expenditure pc	(14) Log Total Health. Expenditure pc
Political competition	0.088**	0.038**	-0.27**	0.27	0.70	0.28	0.24	0.19**	0.097**	-0.49*	0.62	2.12**	-0.012	0.054
	(0.035)	(0.018)	(0.11)	(0.23)	(0.43)	(0.23)	(0.25)	(0.076)	(0.042)	(0.25)	(0.49)	(0.93)	(0.51)	(0.63)
L.Log RGDP pc	0.40***							0.40***						
	(0.046)							(0.046)						
L.Log RGDP pc growth		-0.14***							-0.14***					
		(0.044)							(0.044)					
L.Log own source revenue pc			0.25***							0.25***				
			(0.023)							(0.023)				
L.Log total expenditure pc				0.47***							0.47***			
				(0.053)							(0.053)			
L.Log total infrastructure exp. pc					0.47***							0.46***		
					(0.051)							(0.051)		
L.Log total education exp. pc						0.36***							0.36***	
						(0.048)							(0.048)	
L.Log total health exp. pc							0.46***							0.46***
							(0.046)							(0.045)
N	5031	5031	4506	4641	4636	4636	4636	5031	5031	4504	4641	4636	4636	4636
R^2	0.873	0.058	0.818	0.242	0.233	0.138	0.219							
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F								100	100	94	97	97	98	97
Hansen's *J* Statistic (*p*-value)								0.7835	0.3828	0.3353	0.8664	0.7885	0.8900	0.8372

* Notes: Robust standard errors in parentheses and clustered at the district level. Political competition is instrumented by lag of neighbour political competition and by political competition in 1955 general election interact with time trend.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.4: Further Results: Adding Lagged Political Competition

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc
Panel A	OLS Estimation Results						
L.political competition	0.14***	0.033**	-0.47***	0.39	1.32*	0.30	0.43
	(0.050)	(0.013)	(0.14)	(0.39)	(0.76)	(0.34)	(0.38)
N	5031	5031	4779	4649	4644	4644	4644
R^2	0.815	0.038	0.779	0.008	0.007	0.005	0.009
Panel B	2SLS Estimation Results						
L.political competition	0.16*	0.069**	-0.87***	0.70	2.99**	-0.051	0.068
	(0.095)	(0.029)	(0.24)	(0.70)	(1.35)	(0.61)	(0.87)
N	5031	5031	4779	4641	4636	4636	4636
F	125	125	110	123	123	123	123
Hansen's J Statistic (p-value)	0.9897	0.7397	0.7350	0.5698	0.8267	0.7224	0.5320
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. See Notes of Table 2.3 and Table 2.10 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.5: Old vs New Districts

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc
Panel A	Sample: Old Districts						
Political competition	0.14	0.097**	-0.82***	0.72	3.41*	-0.025	-0.31
	(0.13)	(0.041)	(0.29)	(0.84)	(1.78)	(0.78)	(0.98)
N	4142	4142	4002	3921	3921	3921	3921
F	109	109	103	109	109	109	109
Hansen's *J* Statistic (*p*-value)	0.4560	0.6496	0.3017	0.5289	0.2441	0.7733	0.6410
Panel B	Sample: Newly Established Districts						
Political competition	1.43*	-0.092	-1.64	9.51	23.5	-0.089	15.2
	(0.80)	(0.17)	(4.69)	(14.5)	(16.8)	(8.09)	(23.1)
N	889	889	777	720	715	715	715
F	10	10	6	9	7	7	7
Hansen's *J* Statistic (*p*-value)	0.5760	0.4709	0.5897	0.1004	0.1478	0.1281	0.1230
Estimation Method	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. Political competition is instrumented by lag neighbour political competition and historical political competition. See Notes of Table 2.3 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.6: Additional Dependent Variable: Number of Community Health Centre and Primary School

	(1) Puskesmas	(2) Puskesmas	(3) Puskesmas	(4) Puskesmas	(5) Primary School	(6) Primary School	(7) Primary School	(8) Primary School
Political competition	19.3*	12.2	35.4**	22.2	124.8***	121.0***	145.6**	92.2*
	(10.2)	(8.95)	(17.8)	(14.2)	(41.6)	(42.7)	(64.9)	(52.9)
N	1419	1419	1092	1092	1825	1825	1520	1520
R^2	0.086	0.395			0.327	0.458		
Estimation Method	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
F			129	118			119	110
Hansen's J Statistic (p-value)			0.0012	0.0245			0.0003	0.0010

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is number of puskemas or community health centre for column (1-4) and number of primary school for column (5-8). See Notes of Table 2.3 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.7: Alternative Dependent Variable: Non Agricultural RGDP over total RGDP

	(1)	(2)	(3)	(4)
Political competition	0.074***	0.074***	0.14***	0.13***
	(0.018)	(0.017)	(0.036)	(0.038)
N	5001	5001	4596	4596
R^2	0.324	0.360		
Estimation Method	OLS	OLS	2SLS	2SLS
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
F			110	99
Hansen's J Statistic (p-value)			0.0190	0.0037

* Notes: Robust standard errors in parentheses and clustered at the district level. The dependent variable in this estimation is the share of non agriculture RGDP over total RGDP. See Notes of Table 2.3 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.8: Robustness Check: Political Covariates

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc
Panel A	OLS Estimation Results						
Political competition	0.13**	0.021	-0.72***	0.62	1.91**	0.39	0.66*
	(0.053)	(0.016)	(0.14)	(0.41)	(0.86)	(0.38)	(0.39)
Local election	0.00036	0.0000052	-0.065***	0.0031	0.061	0.0053	-0.042
	(0.0034)	(0.0047)	(0.016)	(0.030)	(0.049)	(0.030)	(0.035)
Mayor majority	0.44***	0.0034	1.66***	-0.034	-0.31	-0.045	-0.11
	(0.020)	(0.0070)	(0.13)	(0.13)	(0.23)	(0.11)	(0.14)
Secular party majority	-0.0052	0.00025	-0.017	0.12	0.11	0.13*	0.12
	(0.015)	(0.0036)	(0.041)	(0.075)	(0.13)	(0.069)	(0.081)
N	5458	5458	5042	5037	5031	5031	5031
R^2	0.832	0.036	0.826	0.010	0.010	0.008	0.014
Panel B	2SLS Estimation Results						
Political competition	0.21*	0.087**	-1.12***	1.02	3.94**	0.016	0.24
	(0.13)	(0.039)	(0.33)	(0.91)	(1.78)	(0.79)	(1.16)
Local election	-0.00018	-0.00045	-0.066***	0.0035	0.064	-0.0073	-0.047
	(0.0034)	(0.0048)	(0.016)	(0.030)	(0.049)	(0.029)	(0.036)
Mayor majority	-0.22***	-0.022***	-0.73***	-0.080	-0.21**	-0.084	-0.095
	(0.0069)	(0.0042)	(0.029)	(0.055)	(0.10)	(0.053)	(0.068)
Secular majority	-0.0043	0.00097	-0.023	0.11	0.092	0.11*	0.13
	(0.013)	(0.0034)	(0.042)	(0.077)	(0.13)	(0.067)	(0.081)
N	5031	5031	4779	4641	4636	4636	4636
F	101	101	98	98	98	98	98
Hansen's J Statistic (p-value)	0.7223	0.4417	0.8781	0.6844	0.7317	0.6324	0.4693
N	5031	5031	4779	4649	4644	4644	4644
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. Local direct election is dummy variable for mayor election. Election is dummy variable for general election year. Mayor majority is dummy variable for which the mayor who are in power come from the majority party in the parliament. See Notes of Table 2.3 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.B.9: Robustness Check: Using Vote Margin

	(1) Log GDP pc	(2) Log GDP pc Growth	(3) Log Own Source Revenue pc	(4) Log Total Expenditure pc	(5) Log Total Inf. Expenditure pc	(6) Log Total Educ. Expenditure pc	(7) Log Total Health. Expenditure pc
Panel A	OLS Estimation Results						
Vote margin fractionalisation	0.065**	0.020**	-0.33***	0.21	0.70	0.11	0.25
	(0.032)	(0.0092)	(0.090)	(0.24)	(0.48)	(0.22)	(0.25)
N	5458	5458	5042	5037	5031	5031	5031
R^2	0.832	0.036	0.825	0.008	0.007	0.006	0.012
Panel B	2SLS Estimation Results						
Vote margin fractionalisation	0.12*	0.050**	-0.66***	0.58	2.32**	-0.015	0.12
	(0.072)	(0.023)	(0.20)	(0.55)	(1.06)	(0.47)	(0.69)
N	5031	5031	4779	4641	4636	4636	4636
F	129	129	127	126	126	126	126
Hansen's J Statistic (p-value)	0.6579	0.3616	0.7465	0.7950	0.6201	0.7186	0.5421
N	5031	5031	4779	4649	4644	4644	4644
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses and clustered at the district level. Vote margin fractionalisation is 1 minus the margin between the winning party with the second wining party in the district elections. See Notes of Table 2.3 for additional information. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 3

Call Your Leader: Does the Mobile Phone Affect Policymaking?

This paper analyses the impact of Information and Communication Technology (ICT) on policymaking on an Indonesian Village level. In this study, I use data from different waves of the Indonesian Village Potential Statistics (*Potensi Desa*) to determine whether mobile phone signal strength affects village policies and civic engagement activities. The results indicate that villages with a strong signal are statistically more likely to possess the proper infrastructure and economic programs. Furthermore, mobile phones increase civic engagement, which is consistent with previous studies related to collective action or mass mobilisation. Using the plausibly exogenous variation of lightning strike intensity as the instrumental variable, this study suggests that higher mobile phone signal strength is positively associated with the policies implemented by the village head. This study also demonstrates that ICT has a stronger effect in rural areas. One possible explanation is that mobile phones improve the relative ability for rural people to interact with their leaders. Another potential answer is the fact that there are significant differences between rural village and urban village governments, which could also affect policymaking.

3.1 Introduction

The role of media and the rapid growth of information and communication technology (ICT) have become increasingly significant over the years. The development of ICT has been documented by Aker and Mbiti (2010), who explain the growth of mobile phone adoption and its impacts on Africa's economic development. The World Bank (2016) describes the extensive growth of ICT throughout developing countries. Nonetheless, studies on the impact of ICT in policymaking are limited. The majority of previous studies focus their research on the impact of media (e.g. television, radio, newspaper) and information on voter turnout or political accountability (Cook et al., 1983; Persson and Tabellini, 2000; Besley and Burgess, 2002; Strömberg, 2004b; Olken, 2009; Snyder Jr and Strömberg, 2010; Gentzkow et al., 2011; Enikolopov et al., 2011; Aker et al., 2017). To my knowledge, studies on the impact of ICT, especially mobile phones, on policymaking are scarce.[1]

Indonesia is an ideal natural laboratory for this study because, not only had the country recently democratised and become a more decentralised country after being led by President Suharto for 32 years, but also because ICTs (especially mobile phones) have been growing at an increasingly higher rate. In 2002, only 11.7 million people owned mobile phones, while in 2016 almost 385.5 million people owned mobile phones. Moreover, Law No. 36/1999 on telecommunication promoted the liberalisation of ICT sectors in Indonesia, which led to an increase in the number of telecommunication providers. Consequently, the cost to use and connect to a mobile network decreased significantly (Lee and Findlay, 2005).

In terms of political context, the introduction of Law No. 22/1999 on regional administrations, followed by Law No. 6/2014 on village administrations, increased the power of local administrative as well as village governments. These laws were introduced to ensure village governance and to improve community participation at the village level. Indonesia has a substantial number of villages. In 2014, there were around 82,190 villages across the country. Moreover, local governments have shown an increase in responsibility, according to Martinez-Bravo (2014) and Martinez-Bravo (2016) who examined the role of

[1]Several studies have investigated the role of mobile phones in developing countries, such as: Aker et al. (2017) on the role of mobile phones and newspapers in voting intention in Mozambique, Jensen (2007) on the effect of mobile phones in the fisheries sector in South India, Aker (2010) on the impact of mobile phones on agriculture markets in Niger and Bailard (2009) on the relationship between mobile phone diffusion and corruption in Namibia.

local leaders in Indonesia after the country's democratisation. These studies suggest that local leaders play a significant role in implementing policy.

To discuss the role of mobile phone usage in policymaking, I use different waves of data from the village census (*Podes*), i.e. data from 2008, 2011 and 2014. The dataset used in this study consists of 42,663 number of observations, which are collected from 14,221 villages across 27 provinces, 156 districts and 1,188 sub-districts. *Podes* provides extensive information about the village characteristics; It has data related to village-level administrations, village economic activities, village geographical conditions, etc. The data also provides information about the ICT development in the village (e.g. signal strength, number of households with fixed-line subscription, number of internet cafes, number of public phones, etc.) Therefore, I am able to investigate the role of mobile phone usage in policymaking and collective action at the village level in Indonesia. I use a binary variable to represent signal strength coverage at the village level as my main explanatory variable. In this study, I only focus on the impact of mobile phones via text messages and/or phone calls. Therefore, the effect of social media or internet usage will not be studied. I employ a linear probability model and a logistic model to estimate the impact of signal strength on policies.

A potential problem with using signal strength is the possibility that signal strength is non-random, which could bias the estimation results. Areas with better infrastructure and larger populations tend to have better signal strength, because the telecommunication sector invests heavily in these areas. A study by Buys et al. (2009) reveals that mobile phone signal depends on the presence of cell tower, size of the population, cost of maintaining the tower, cost of installing the tower and the national competition policy. Another potential problem is related to the measurement error of the signal strength variable, which could affect the estimation results in this study.

To address this concern, I employ an instrumental variable strategy by using the plausibly exogenous variation of flash rate (or lightning strike) intensity at the village level. Greater instances of lightning strike leads to slower connectivity. Given the fact that Indonesia is also located in a tropical area, and that there is significant geographical variation within the country, I expect that flash rate incidences would affect signal strength quality. Using data from the National Aeronautics and Space Administration (NASA), I show that areas with higher lightning strike incidence have lower signal

strength.

I also estimate the model using propensity score matching (PSM), based on the distance between observable geographical and demographic covariates. As has been observed by Rosenbaum and Rubin (1983), under the *unconfoundedness assumption*, the average treatment effect between the treatment group and the control group is characteristically causal.[2] One of the benefits of using this method is that matching based on the same geographical matched covariates significantly reduces the possibility of selection bias (Heckman et al., 1998).

This paper finds that higher signal strength is associated with an increased likelihood of infrastructure programs. The results are robust for different types of estimation methods. In terms of the magnitude, I find that villages exhibit a 0.37 percentage points increase in the probability of having an infrastructure program if the village has strong signal strength. Moreover, the same patterns are also observed for the economic program. I also find that higher signal strength increases the likelihood of having an economic program by 0.52 percentage points. Finally, this study shows that mobile phone usage increases the probability that a village will have a civic engagement program. Villages with strong signal strength are more likely to engage in civic activities compared to villages with weak signals or no signal. The coefficient from the two-stage least square estimation indicates that higher signal strength is associated with an increase of 1.59 percentage points in civic engagement activities.

As the types of villages in Indonesia differ greatly depending on location, urban (*Kelurahan*) or rural (*Desa*), I investigated whether signal strength has heterogeneous effects. Signal strength is estimated to have a stronger influence in rural villages than in urban villages, especially with regard to infrastructure programs. One potential explanation is that the different types of village governments are run differently: *desa* in rural areas the village head is elected by the people and, in urban areas, *kelurahan* the village head is appointed by the district and sub-district governments. Another possibility is that inhabitants in urban areas have alternative sources for collecting information. Therefore, rural villages would benefit significantly from the introduction of ICTs.

I propose several mechanisms that explain why mobile phones affect policies. First, mobile phone signal coverage affects villagers' ability to call their leader. If the signal is

[2]See also Athey and Imbens (2017) for further explanations.

strong, it becomes easier for villagers to inform their leader about their needs. Therefore, people will use their mobile phone more frequently, increasing mobile phone usage. We assume here that telecommunication consumption is a normal good, and therefore improved signal strength increases individuals' consumption of telecommunication services.

Second, mobile phones appear to be the primary information exchange devices among villagers. Once the villagers become aware of a policy implemented by another village's leaders, they will increase the pressure on their leader to adopt the same policy. I explore the potential of spillover effects from neighbouring villages, and find that signal strength in a neighbouring village will affect a village head's policies.

The main contribution of this paper is to empirically test the role of mobile phones in policymaking. To my knowledge, there is no study that investigates the effect of mobile phone usage on a local leader's decision-making. However, previous studies have focused heavily on the impact of mass media in developed countries, such as in the U.S. (Strömberg, 2004b; Snyder Jr and Strömberg, 2010; Gentzkow et al., 2011).[3] The distinct differences between a developing country and a developed country in terms of ICT adoption and infrastructure, as well as the quality of the government, could be an interesting topic of research. This study fills the gaps on the importance of mobile phone usage, not only to increase political participation, but also to improve policies and political leaders' decisions. This study explores the extent to which mobile phone usage affects policies, and in which place it significantly contributes. This paper is able to isolate the endogeneity concern of mobile phone adoption by using a relatively new instrument (e.g. lightning strike) to examine the causal relationship between mobile phones and policies (Manacorda and Tesei, 2017). Finally, this study could explain village leaders' behaviour, which differs from that of other elected and/or appointed policymakers.

The rest of the paper proceeds as follows: Section 3.2 reviews the relevant literature, section 3.3 provides some institutional background covering both the regulation and political context, as well as the development of ICT in Indonesia. Section 3.4 presents the conceptual framework and section 3.5 describes the data specifications. The results of this study are explained in section 3.6, and section 3.7 discusses the potential mechanisms of mobile phone effects on policies. Finally, section 3.8 concludes this study.

[3] As well as less developed countries Besley and Burgess (2002) like India, Olken (2009) Indonesia and Reinikka and Svensson (2011), Grossman et al. (2014) and Grossman et al. (2016) Uganda.

3.2 Literature Review

Studies on the importance of media and information in political economy literature have emerged in recent decades.[4] Nevertheless, the majority of previous studies focus more on the impact of mass media on policymaking.

The important role of ICT in government policies has yet to be explored extensively. Extensive research on the impact of ICTs predominantly investigates the role of mobile phones in agricultural sectors and political mobilisation. Studies related to the role of mobile phones in agricultural sectors were initiated by Jensen (2007), which investigated the role of mobile phone adoption in fisheries in South India. This study has found that, based on micro-level survey data, introducing mobile phones in Kerala, the South Indian fisheries sector, reduces price dispersion. By allowing fisherman to search for information on fish prices and perform spatial arbitrage, mobile phone adoption increases the fishermen's profits and decreases consumer prices.

Aker (2010) has also performed a similar study on the agriculture market in Niger. Based on market and trader level data from 1999 to 2007, this study confirms that mobile phone coverage in Niger reduces agricultural price dispersion. The effects of mobile phone coverage are significantly stronger in remote areas and markets that are connected by unpaved roads. However, unlike the study conducted by Jensen (2007), only traders' welfare increased. This is possible due to the characteristic differences between fisheries markets and agricultural markets.

In addition, Aker and Fafchamps (2014) have extended the previous study by Aker (2010). His study investigates the impact of mobile phone coverage on producer prices in Niger by combining agricultural datasets from 1999 to 2009. It has been observed that mobile phone coverage reduces price dispersions on producer prices. However, decreases in price dispersion only reduce the annual price for certain products (e.g. cowpea)

This study also contributes to the research related to the role of ICT in political mobilisation that has been steadily growing in recent decades. For example, Pierskalla

[4]Cook et al. (1983) initiated study on the impact of media in policymaking. The study uses an experimental approach to address the impact of media on the public, policymakers, interest groups and policy. The study finds that the media plays a significant role in shifting or changing issues that are a priority for both the public and the government. However, the study observes that change in policy is not caused by the news, but rather the cooperation between journalists and policymakers. Studies investigating the role of media in the political economy, specifically with regard to elections, were initiated by Lazarsfeld et al. (1944) and Berelson (1954). These studies observe that mass media, such as the radio and newspapers, has a marginally small effect on voting intention.

and Hollenbach (2013) have studied the effect of cell phones on the organised violent accidents that occur throughout Africa. The study has found that the availability of cell phone coverage is positively associated with an increase in political violence. As a result of better phone coverage, rebel group become more well-informed, which increases their collective action.

On the other hand, Shapiro and Weidmann (2015) have found opposing results in the case of Iraq. Indeed, this study indicates that an increase in the number of cell phone towers in Iraq significantly reduces the amount of violence. They argue that this could be because better cell phone towers help the U.S. and Iraqi armies prevent terrorist attacks, due to their improved ability to gather information about the potential attack.

A recent study by Manacorda and Tesei (2017) has explored the role of ICTs on political mobilisation using cross country data. Employing extensive datasets for the African continent between 1998 and 2012, this study demonstrates that mobile phone coverage is exceedingly instrumental to increasing protest mobilisation during an economic crisis. The study further argues that mobile phones make two significant contributions: as a way of informing individuals about current economic conditions and as way of informing people about upcoming or nearby political protest events. To address potential endogeneity problems, the study also introduces the lightning rate data collected from the National Aeronautics and Space Administration (NASA) as an instrument for analysing mobile phone coverage.

This study is related to the previous research on the effects of media on policies. A study conducted by Strömberg (2001) was the first to provide a theoretical model related to the role of media on public policy. This study reveals that the information received from mass media significantly contributes to, inter alia, political competition, lobby groups, political business cycle and policy. Extending the same model, Strömberg (2004a) has developed a new theoretical model, and argues that mass media competition increases the amount of news provided to larger audiences, e.g. taxpayers, to increase profits; Thus, these news outlets tend to ignore news related to small audiences. The number of news channels greatly affects public policy, and tends to be biased in favour of the issues presented by the mass media.

A theoretical model was further developed to examine the impact of media coverage on policies. This model, introduced by Prat and Strömberg (2013), shows that when

there is a surge in the intensity of news related to specific issues, the number of well-informed citizens increases. Moreover, better access to information increases both voters' responsiveness to certain issues and government spending. Finally, based on this model, an increase in information is associated with an increase in government performance, which is followed by a higher share of the votes for the incumbent if their competency on a certain issue is relatively better than their challenger.

Several studies have attempted to investigate the effect of well-informed voters on policies in specific countries. For example, Besley and Burgess (2002) theoretically and empirically investigated the effect of well-informed voters on the government policies in India. Using data on the state governments in India between 1958 and 1992, this study has found that state governments with higher newspaper circulation are more responsive to a decline in food production, and are more likely to increase spending on calamity relief and expand public food distribution. Thus, this study suggests that governments are more responsive to informed voters.

The same results were observed during the New Deal Program (1933-1935) in the US (Strömberg, 2004b). Examining the data on the amount spent by the Federal Emergency Relief Administration (FERA) in U.S. counties between 1920 and 1940 and the expansion of radio presence, this study has found that governors sent more aid to counties with a higher number of radio listeners. This paper addresses the potential endogeneity problem by considering the quality of radio reception and share of woodland. This study has also observed that the radio effects are larger in rural areas. Thus, this study suggests the introduction of the radio increased rural citizens' ability to influence government transfers.

A further study conducted by Snyder Jr and Strömberg (2010) has investigated the impact of newspaper coverage in the US. This study has found that voters living in areas with higher press coverage of their local congressmen will be better informed about their representatives, and will also be more likely to vote during the election. Indeed, higher press coverage affects a congressman's performance. Furthermore, areas with higher press coverage receive more federal aid.[5]

[5]Study by Strömberg (2016) and Strömberg (2015) have extensively studied the impact of media on politics. Moreover, Enikolopov and Petrova (2016) have also provided a comprehensive analysis on the causes and impacts of media capture – the condition where the government or special interest groups have the power to control the mass media. DellaVigna and Gentzkow (2010) have also conducted comprehensive literature surveys on the effects of media as a tool to persuade people.

Finally, Reinikka and Svensson (2011) have investigated whether providing information related to education grants in the newspaper could reduce the possibility of public funds capture. Using administrative and survey data from Uganda, this study has found that access to newspapers reduces the capture of education grants, and leads to an increase in learning outcomes and primary school enrolment rate. This paper also suggests that media plays a significant role in monitoring policymakers' policies and improving accountability.

This study is also related to another potential channel in which mobile phone usage affects the likelihood that voters will interact with their leaders. Grossman et al. (2014) and Grossman et al. (2016) have investigated the role of ICT on the probability that citizens will call their parliament members in Uganda. Both studies have suggested that the introduction of ICT reduces the barrier for citizens to interact with their representatives and increases their political participation. Moreover, Grossman et al. (2014) have observed that marginalised people (e.g. women and poor people) will receive more benefits as a result of easy access to telecommunication and will, thus, be more likely to contact their representatives. Furthermore, Grossman et al. (2016) have also suggested that implementing a mobilising strategy (e.g. sending texts to voters and encouraging them to participate in political engagement) increases the probability that voters will contact their elected leaders.

Within the context of Indonesia, studies that investigate the role of media in policymaking are limited. One such study, conducted by Olken (2009), has explored the impact of television and radio on social capital. Examining data collected from village-level governments in Eastern and Central Java, this study has found that improved television and radio signal reception decreases the amount of social participation at the village level, because people consequently spend more time listening to the radio or watching television. Furthermore, the introduction of television and radio have no significant impact on the number of village meetings or creation on infrastructure, which are the proxies for village governance.

This study is also closely related to the role of the village leader in Indonesia. Martinez-Bravo (2014) has observed that villages in which the local leader was appointed by Suharto's regime tend to vote for Suharto's party (*Golongan Karya*/Golkar). This study also reveals that the appointed village head's decisions are strongly aligned with higher

level government policies. Furthermore, Martinez-Bravo (2016) has documented an extensive study on the role of the village leader in Indonesia, especially related to school construction and development projects in Indonesia. By combining data from different waves of village census (1986-2003) in Indonesia, specifically for villages located in Java, this study finds that an educated leader is associated with a higher number of projects funded by the village budget. Furthermore, educated leaders also spend less time finishing development projects, since, as the evidence suggests, educated village heads are more effective project managers.

Based on the above discussion, there is an abundance of evidence that media affects government policy and political mobilisation. Nevertheless, existing studies focus on mass media, while studies that investigate the role of ICT, especially using micro-level data, are limited. Hence, the present study aims to determine whether technology adoption has a similar impact in newly democratised countries, such as Indonesia.

3.3 Institutional Background

3.3.1 Village Regulation and Political Context

In 1999, after Suharto's presidency, a major change occurred in the process of democratisation and decentralisation in Indonesia. During the Suharto regime (New Order Era), all decisions were made by the central government, and local governments were controlled and monitored by the central government.[6] Law No. 22/1999 on regional administrations was introduced to provide major reforms in terms of transferring decision-making powers to the district and village governments (Antlöv, 2003; Bebbington et al., 2006).[7]

There are many reforms related to local governments and also village-level administrations. As a result, villages are more autonomous. Indeed, villagers may now elect their village head and are allowed to run their village-owned enterprises. Before 1999, the

[6]During President Sukarno's regime, the Indonesian government recognised approximately 250 types of administrative governments and communities. For example, in Java and Bali, there was *Desa*, *Nagari* in West Sumatra or Minangkabau, *Dusun* and *marga* in South Sumatra (Antlöv, 2003). However, the variation of these types of governments did not match the leadership style of his successor, President Soeharto, who preferred to exercise strong control over the local governments. Therefore, in 1979, the government introduced Law No 5/1979, which aimed to impose the same type of institutions for almost all across the countries. Village-level governments would be controlled and supervised by a higher authority, therefore the village head did not have any ability to implement their own agenda. All decisions were made following the advice of the district or sub-district governments.

[7]The discussion in this subsection is based on Evers (2000), Antlöv (2003), Bebbington et al. (2006) and Antlöv et al. (2016).

only source of revenue for the village was via transfers from the district or sub-district governments. Moreover, the village now also has more autonomy to accept or reject programs provided by the central government (Antlöv, 2003).

Another reform provided by Law No. 22/1999 is the accommodation of cultural diversity of Indonesia's society. Villages can be managed through original customs and local traditions. Villages also have village councils (*Badan Perwakilan Desa*, BPD) that consist of 5 to 13 members and serve as a democratic village body. These village councils have the power to introduce legislation, accept the village budget, and also monitor the village government. In terms of checks and balances, village leaders have to submit a report on an annual basis to the BPD regarding his or her activities. Therefore, village heads are accountable for the villages' inhabitants, which is quite different from the previous law which stated that the village leaders would report their activities to the district or sub-district governments (Antlöv, 2003).[8]

3.3.2 Village Administrative Institutions

Indonesia has five levels of administrative structure: central government, provinces government, districts government, sub-districts government and village-level government. In 2014, there were 34 provinces in Indonesia. Each province was divided into two districts: *Kota*, or urban district (98 in 2014) and *Kabupaten* or rural district (416 in 2014) (Ministry of Home Office, 2014). Each district was then further divided into sub-districts *Kecamatan*, and finally, the sub-districts were divided into villages, which are the lowest administrative level. Similarly, with districts, there are two types of villages: *Desa*/rural and *Kelurahan*/urban. In 2014, there were 81,190 villages in Indonesia, of which 72,949 villages (around 89.8%) are *Desa* and 8,241 villages (around 10.2%) are *Kelurahan* (Central Bureau of Statistics, 2014).

Desa and *Kelurahan* villages are characteristically different, especially in regard to

[8]Recently, the government of Indonesia introduced Law No.6/2014 on village administrations in Indonesia. This is the extended version of the previous regulation related to village governments (Lewis, 2015; Antlöv et al., 2016). The bill attempted to empower village governance, reduce inequality between villages and ensure the effectiveness of the proposed development programs. The major reforms in this law are related to central government transfers. The central government will allocate up to 10% of the national budget for transfers to village governments. Moreover, to ensure good governance of the village administrations, this law also increases the power of BPD and introduces village assemblies, which are government bodies that approve or reject the programs proposed by the village heads (Antlöv et al., 2016). The establishment of a village assembly also encourages community participation in the village. Therefore, decision-making at the village level heavily relies on communication between the village communities and the village leaders.

government structure. The village head is elected by villagers every six years with a term limit of three periods. On the other hand, the *kelurahan* village leader is appointed by the head of the district government. Furthermore, everyone can become a village leader in the *Desa*. The *Kelurahan* leader, however, must be a civil servant. Therefore, *Desa* and *Kelurahan* are expected to have heterogeneous effects in this study, due to the differences in government structure.

In terms of public goods provisions, villages can provide the goods funded from their budget or from other sources of funding, such as upper-level governments (National Development Planning Process or P5D) and donors (e.g. PNPM-Mandiri managed by the World Bank).[9] In 2014, mean village own source revenues were around Rp 88.8 million (US$ 5,920), and the total village revenues were around Rp 350.57 million (US$ 23,371).[10] Moreover, almost 48% of the infrastructure programs (e.g. roads, bridges, schools, sanitation, clean water, electricity, clinics, markets and irrigation) implemented at the village level were funded by the village's own budget (Central Bureau of Statistics, 2014). One way for a village leader to increase spending on public goods is by reducing spending on administration (e.g. salary, meeting expense, office equipment, etc.) and increasing spending on infrastructure (Martinez-Bravo, 2016).

3.3.3 Telecommunication Sectors in Indonesia

The development of ICT, especially in the telecommunication sectors in Indonesia, cannot be separated from the Asian financial crisis of 1997-1998. One of the recovery packages proposed by the International Monetary Fund (IMF) stated that the Government of Indonesia had to rescind the monopoly power over Indonesia's state-owned telecommunication company, PT Telekomunikasi Indonesia (Telkom), and remove restrictions on foreign investment.[11] Furthermore, Indonesia joined the World Trade Organisation's Agreement, by which one of their commitments was to urge the country's members to liberalise the telecommunication sectors under the supervision of an independent regulator. Moreover, the agreement also endorsed the eradication of Telkom's monopoly

[9] See Evers (2000) and Martinez-Bravo (2016) for further information.

[10] US$ 1 $\approx$ Rp 15,000.

[11] From 1964 to 1989, Indonesia had two state-owned telecommunication companies, PT Telekomunikasi Indonesia (Telkom) and PT Indonesian Satellite Corporation (Indosat). Telkom exclusively provided all domestic services, while international services were monopolised by Indosat. In 1989, due to a lack of funding in the telecommunication sector, the government introduced Law No. 3/1989, which encouraged private investments and established a partnership between Telkom and Indosat for the first time.

in the domestic, long-distance and international telephone markets (Lee and Findlay, 2005).

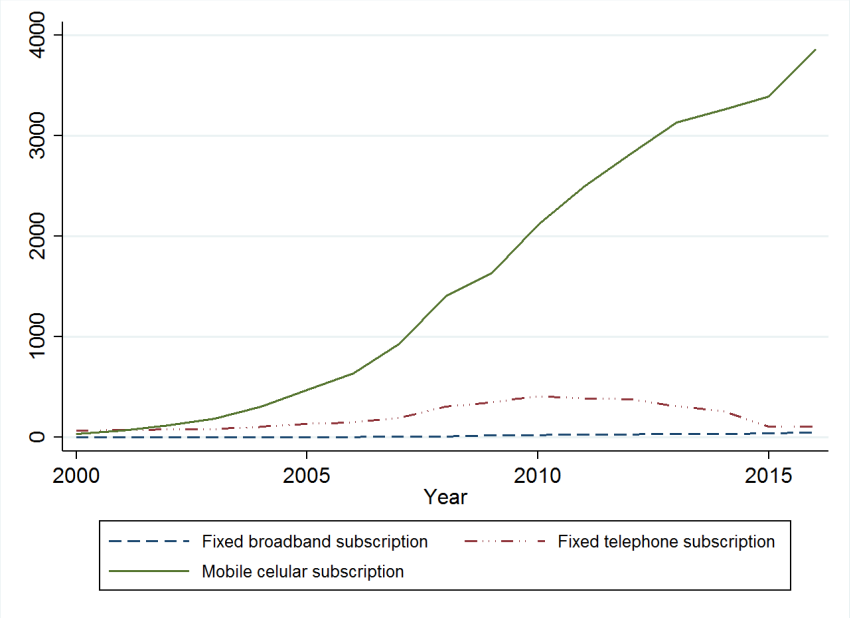
In 1999, the government of Indonesia passed a new law related to the telecommunications sector (Law No.36/1999), which introduced two important regulations. First, the government would introduce duopoly markets between Telkom and Indosat, and slowly introduce private telecommunications companies into the markets. Second, the restrictions for foreign companies to enter the telecommunication market would be removed (Lee and Findlay, 2005). The (partial) liberalisation of the telecommunication sector resulted in competition between six different providers. In 2016, the largest Indonesian telecommunication companies, based on their market share, were Telkomsel (Telkom subsidiary company) with 77.6% share, XL Axiata with 11.2% share, Indosat with 6.2% share and Hutchison Tri and Smartfren with a combined 5% share (PT Telekomunikasi Selular, 2016). However, no further major reforms have been implemented in Indonesia's telecommunication sector, and there is no significant link between the post-authoritarian period and reform in this sector (Baulch, 2017).

Even though no further reform has been made in the telecommunication sector, it cannot be denied that Law No.36/1999 has significantly transformed Indonesia's ICTs sector. By increasing the number of competitors and providers, the cost to use and to connect over mobile networks has dropped significantly (Lee and Findlay, 2005). As a result, many new telecommunications devices have emerged in the market, making mobile phones more affordable for low and middle-class individuals.

Since 2010, almost all Indonesian people have had access to telecommunication, and especially to mobile phones. From Figure 3.1, it is possible to observe the development of ICT subscriptions in Indonesia. The growth of mobile phone adoption in Indonesia started to surpass the growth of the fixed telephone line in 2002; In 2002, 11.7 million people owned a mobile phone, compared with the 7.7 million people who owned a fixed telephone line. By 2016, the number of people who owned a mobile phone increased to 385.5 million, compared to only 10.3 million people who owned a fixed telephone line. Thus, it is clear that mobile phone subscriptions have grown significantly since 2000, while fixed-line subscription has been steadily declining since 2011. Based on the Intercensal Population Survey (SUPAS), conducted by the Indonesia Central Bureau of Statistics, in 2005, approximately 23% of the population owned a telephone or mobile

phone. According to the 2010 Population Census, approximately 76% of the population owned a mobile phone (Minnesota Population Center, 2017).[12]

Figure 3.1: The Development of ICTs Subscription in Indonesia (in 10,000 People)



Source: International Telecommunication Union, 2017

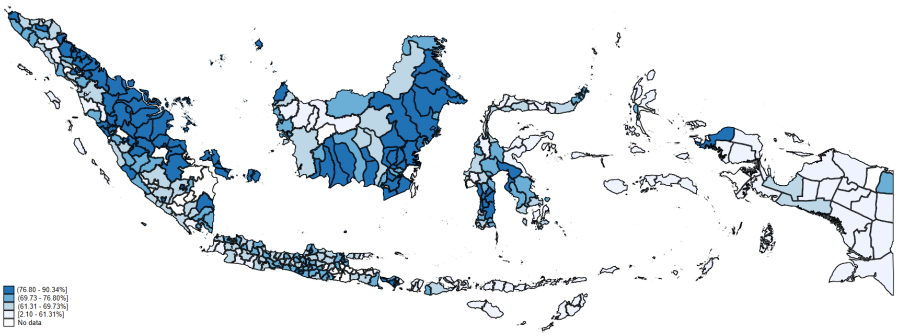
ICT infrastructure has become a main priority for the government of Indonesia. However, ICT infrastructure is developed slowly in Indonesia, due to a number of problems that the country faces, especially a lack of access to extensive investment. To increase access to telecommunication for all parts of Indonesia, in 2005 the government initiated The Indonesian Broadband Plan (IBP), called the Palapa Ring Project, which sought to increase connectivity between islands in Indonesia, both in western and eastern parts, and especially remote areas in Indonesia. The target of this project is that, by the end of 2019, all areas in Indonesia will be covered and connected by ICT infrastructure (Rohman, 2014).

The association between ICT and policymaking in Indonesia has grown progressively stronger. In 2014, the Ministry of Villages, Disadvantaged Regions and Transmigration introduced call centres that would provide an opportunity for villagers to report their villages' needs or problems. Moreover, one recent example is when the former Governor of Jakarta, Basuki Tjahaja Purnama (*Ahok*), made his mobile phone number public to

[12]See also the expansion of mobile phone subscriptions at the village level between 2005 and 2010 in Figure 3.2 and Figure 3.3. The figures demonstrate that mobile phone subscriptions have grown significantly. However, in some parts of Indonesia, especially in Eastern Indonesia, the subscription rates were consistently lower for both years. One possible explanation is that the quality of the ICT infrastructure in these areas is relatively poorer compared to the rest of the country (See Figure 3.4, Figure 3.5 and Figure 3.6).

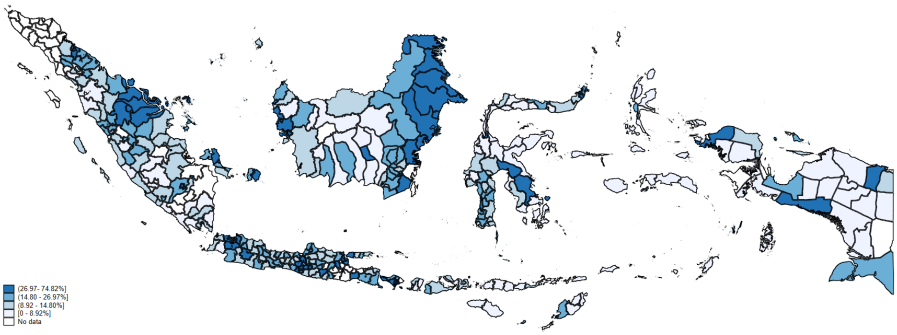
allow citizens to call or text him if they have a problem that requires government attention. Jakarta has also introduced Qlue, which is a mobile application that can report and monitor problems faced by Jakarta citizens.[13]

Figure 3.2: Mobile Phone Subscriptions at District Level in 2010



Source: Author's calculation from Population Census 2010

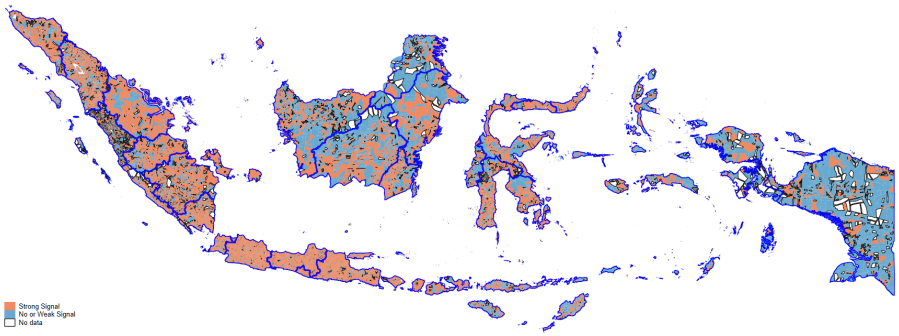
Figure 3.3: Mobile Phone Subscriptions at District Level in 2005



Source: Author's calculation from SUPAS 2005

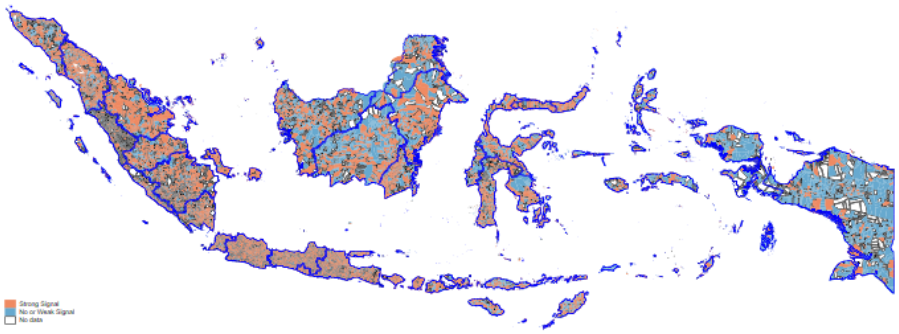
[13]See the website at `http://qlue.co.id/site/`.

Figure 3.4: Mobile Phone Signal Strength at Village Level in 2014



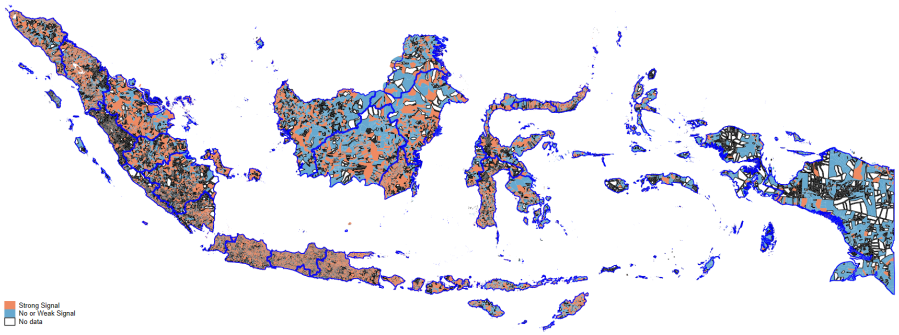
Source: Author's calculation from Podes 2014

Figure 3.5: Mobile Phone Signal Strength at Village Level in 2011



Source: Author's calculation from Podes 2011

Figure 3.6: Mobile Phone Signal Strength at Village Level in 2008



Source: Author's calculation from Podes 2008

3.4 Conceptual Framework

In this study, two mechanisms are used to explain how ICT, specifically mobile phones, affect government policies or development. This study focuses only on the effect of mobile phones via calls or text messages to the village leader regarding policies. Therefore, I do not consider the effects of internet or social media in this mechanism. The mechanisms

in this study are motivated by the previously explored studies, which were detailed in section 3.2. Section 3.7 provides an extensive discussion on the mechanism of this study.

Mechanism 1 *Mobile phones increase the incentive for citizens to report or request their needs to the village leader.*

The first mechanism explains the direct link between mobile phones and the village leader's policies. As has been observed by Grossman et al. (2016) and Grossman et al. (2014), mobile phones reduce the barriers to interact with government representatives, and therefore increase voters' engagement with them. Adopting the same mechanism, this study assumes that villagers use their mobile phones to call or send a text message to their village leader. Therefore, it is easier for a villager to attract their leader's attention when they have better access to ICT, i.e. better ICT infrastructure, and better signals.

Villagers who are living in areas with better signal strength can maximise the usability of their mobile phone to improve their welfare. On the other hand, villagers who are living in areas with weak signal strength need to meet their leaders directly to inform them of their difficulties. Therefore, it increases the cost required to inform the village leader of their problems, and consequently decreases the village leader's ability to know what kind of policy the villagers need. Thus, the leader is less likely to implement effective policies, due to a lack of information about the villagers' problems.

Another possible explanation is that better signal is followed by higher mobile phone subscription rates. Figure 3.2 and Figure 3.3 illustrate that areas with stronger signal (See Figure 3.4, Figure 3.5 and Figure 3.6) have higher mobile phone subscriptions compared to area with weak signal. Therefore, villages with better signal strength exhibit an increase in the number of messages sent from villagers to their leaders. This results in an increase in villagers' consumption of telecommunication products.

From the village leader's perspective, better ICT infrastructure makes them more aware of problems in their village. Because village leaders become better informed, this affects their policy decisions. As previously mentioned, Strömberg (2004b) has found that during the new deal program in the US, governors would increase their spending in areas with higher radio coverage. Similarly, Besley and Burgess (2002) have also found a similar condition in India. Therefore, I expect ICT to affect village leaders' policies.

It is also expected that there will be heterogeneous effects of ICT between rural and urban villages. Strömberg (2004b) has observed that higher radio penetration has a significant effect on rural areas in the US. Because Indonesia has two types of village governments, I also expect that villages with elected leaders will be significantly impacted by the expansion of ICT. Martinez-Bravo (2014) has shown that villages with appointed leaders tend to exhibit clientelistic spending, which affects voters' welfare.

Mechanism 2 *Mobile phones are used to transfer information among villagers and, therefore, increase pressure on village leaders to perform well.*

The second mechanism explores the exchange of information between villagers who live within the same villages, and between villagers who live in different villages. Studies have found that ICT increases the exchange of information among the population, which consequently increases political mobilisation and pressure on the government (see, inter alia, Manacorda and Tesei (2017); Pierskalla and Hollenbach (2013); Shapiro and Weidmann (2015)).

Suppose that the leader of a neighbouring village implements a policy to improve infrastructure. The villagers of neighbouring villages would learn of this policy by communicating via their mobile phones, and thus increase pressure on their own leaders to implement the same policy. This transfer of information is accomplished with better signal strength. Villages with bad ICT infrastructure will not be able to learn about their neighbours' policies, thus reducing the probability that the villagers will ask for such policies from their village head.

Another possible mechanism considers within-village communication. Suppose that a villager discovers that the leader engaged in rent seeking behaviour. Using their mobile phone, they can distribute this information to their neighbours within the village. As a result, the villagers could mobilise and increase pressure on their leader. However, this is more likely in villages with better ICT infrastructure, because information can be exchanged with more relative ease than in villages with poor ICT infrastructure.

Moreover, it could also affect the possibility that the village leader will be re-elected. Since village leaders are elected by the villagers (only in *desa*), ICT can also affect their chances of being re-elected. Villages with better ICT infrastructure are better informed

about their leader's performance. This mechanism is also motivated by Strömberg (2004a), Strömberg (2004b) and Snyder Jr and Strömberg (2010), who have found that the amount of information voters receive affects their vote as well as voter turnout.

In accordance with these mechanisms, I have developed the following three hypotheses on the role of ICT in policymaking.

Hypothesis 1 *Infrastructure and economic policies improve with ICT.*

Based on mechanism 1 and mechanism 2, it is expected that an increase in the quality of ICT will increase the likelihood that village leaders will improve their policy decisions for development purposes. In this study, I expect that villages with better ICT infrastructure will be more likely to implement policies regarding infrastructure and the economic sector.

Hypothesis 2 *Civic engagement increases with ICT.*

Similar to hypothesis 1, I expect that better ICT infrastructure will increase civic engagement due to the ease with which villagers can exchange information. Therefore, villagers with better ICT are more likely to be civically involved. Hypothesis 2 differs from Olken (2009), which has found that radio and television have a negative impact on social participation in Indonesian villages. However, while people cannot participate in other activities while listening to the radio or watching television, mobile phones do not reduce individuals' ability to simultaneously participate in other activities.

Hypothesis 3 *ICT has a stronger effect in rural areas.*

The last hypothesis argues that rural areas will benefit from an increase in access to infrastructure due to heterogeneous government and village characteristics between villages in urban and rural areas. It is assumed that people in rural villages would benefit greatly from mobile phone diffusion, since rural villagers, unlike urban villagers, do not have alternative sources for receiving information.

3.5 Data and Specification

The data used in this study are from the Indonesian Village Potential Statistics (*Potensi Desa*/PODES). These data are collected by the Indonesian Central Bureau of Statistics (*Badan Pusat Statistik*/BPS) every three or four years. The sample of PODES in every census is +/- 65,000 villages across the country. Podes is a census that provides information about Indonesian villages' characteristics, such as government administrations, public goods provided in the village, socio-economic characteristics and other comprehensive information.[14] Because each wave has a different focus, however, some variables are not reported on in all waves of the village census.

In this study, I merge three different waves of the village census, collected from 2008, 2011 and 2014. The main problem when constructing this dataset is that The Central Bureau of Statistics in Indonesia uses village identifiers across waves inconsistently. Therefore, some of the villages have a different identifier in different waves. Moreover, the introduction of new villages during the study period is not easily detected. Given the difficulty in merging the dataset with a large number of observations, I chose to use only the villages that are consistently included in all of the waves.

The dataset used in this study consists of 14,221 villages, which cover 27 provinces, 156 districts and 1,188 sub-districts. In total, I have 42,663 observations for this study.[15] Table 3.1 provides the summary statistics for the data in this study. As previously mentioned, there are different types of government divisions at the village level. In this study, I use a comprehensive sample of villages in Indonesia. However, I will analyse the results by dividing them according to the different types of government, specifically between *Desa* and *Kelurahan*.

3.5.1 The Dependent Variables

This study aims to examine whether access to mobile phones increases the number of calls, reports or requests made by the villagers to their village leaders, resulting in

[14] In every survey, the enumerator collects the answers from a person who works in the village administration, and verifies this information against the village's administrative records. Some measures of public goods, such as the number of schools, health facilities, mosques, and churches, can be easily verified. Therefore, this survey produces accurate information about the village.

[15] While the data is not representative across the country, it covers all the major islands and the majority of Indonesia's population. Moreover, to mitigate the potential of selection bias, I also estimated using propensity score matching (PSM) based on geographical matched covariates, which will be explained in section 3.6.3.

Table 3.1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Main Variables					
Infrastructure = 1 if there is program for infrastructure; 0 = otherwise	42,663	0.55	0.50	0	1
Economic = 1 if there is program on providing capital; 0 = otherwise	42,663	0.53	0.49	0	1
Civic Engagement = 1 if village has civic engagement activity; 0 = otherwise	42,663	0.47	0.49	0	1
Signal = 1 if signal is very strong; 0 = otherwise	42,663	0.81	0.39	0	1
Base Transceiver Station = 1 if village has BTS; 0 = otherwise	42,663	0.37	0.48	0	1
Mean flash rate density ($flash\ rate/km^2$)	42,663	20.29	10.91	0	88.91
Other Variables					
Male Leader	41,594	0.94	0.24	0	1
Age	41,594	44.59	8.13	20	87
Years of Education	41,594	12.35	2.66	0	22
Population (in numbers of people)	42,663	4,229.78	4,598.85	16	95,031
Expenditure per Capita (in Rupiah)	42,663	520,427.8	231,317.1	179,700	2,671,080
Main Source of Income 1 = agriculture; 0 = others	42,663	0.84	0.36	0	1
Muslim Majority	42,663	0.44	0.49	0	1
Multi Ethnic	42,663	0.65	0.47	0	1
Numbers of Mosque	42,663	4.78	5.07	0	99
Numbers of Church	42,663	0.55	1.63	0	75
Topography 1 = Top of a Mountain 2 = Valley or Slopes 3 = Lowland	42,663	2.68	0.71	1	3
Coastal	42,663	0.07	0.26	0	1
Transportation Access 1 = by land, 0 = otherwise	42,663	0.96	0.20	0	1
Asphalt Road	42,663	0.75	0.43	0	1
Distance to Jakarta (km)	42,663	705.86	560.04	10.61	3,773.78
Distance to District (km)	42,663	32.35	38.99	0.1	999.8
Distance to Sub-District (km)	42,663	6.69	11.18	0.05	599.8
Village Own Sources Revenues (in million Rupiah)	42,663	80.54	228.94	0	9,857
Additional Informations					
Number of Provinces	27				
Number of Districts	156				
Number of Sub-districts	1188				

an increase in the number of policies implemented. Furthermore, this study examines whether access to a mobile phone reduces or increases social activities at the village level.

I divided the analysis of this study into two main groups: (1) the impact of mobile phones on village leaders' policies and (2) the impact of mobile phones on civic engagement or collective actions. With regard to the first analysis, I used two dummy variables for the dependent variable. The first dummy variable is *Infrastructure*, which is a binary variable that represents whether the village has an infrastructure program (e.g. building roads, bridges, schools, sanitation, housing, etc.) funded by the village budget. From Table 3.1, it can be observed that the mean for *Infrastructure* is 0.55, and that the standard deviation is 0.5. This finding indicates that only 55% of the study sample had infrastructure programs during the study period. The mean for infrastructure programs for each survey was: 0.21 in 2008, 0.47 in 2011, and 0.93 in 2014.

The second dependent variable is *Economic*, which is a dummy variable that represents whether the village has a program to provide grants to people who are going to start a new business or to expand their current business activities. This program also entails training provided by the village governments to increase villagers' skills. Both the mean and the standard deviation for this variable are 0.53. In 2008, only 28% of the villages had economic programs, although this number increased to 58% in 2011, and 72% in 2014.

For the second analysis, a dummy variable on whether the village has *Civic Engagement* activities (*gotong royong*) (e.g. mutual and reciprocal assistance (Bowen, 1986)) are the dependent variable. Civic engagement or collective action (I will use the term interchangeably) in Indonesia are considered social activities that help others or that organise people to improve the conditions of their neighbourhood. *Gotong royong* has become a key element of Indonesian political and cultural systems. Indeed, this activity is very important in villages and rural areas, especially for agricultural and economic activities (Bowen, 1986).

Therefore, higher civic engagement can be interpreted in two ways: (1) the villages have good community activities and social relationships or (2) the villages lack necessary facilities and infrastructure or have just experienced a natural disaster, and therefore the people are working together to improve their current condition. From Table 3.1, it can be seen that the mean for *civic engagement* is roughly 0.47 and the standard deviation is

0.49. In 2008, only 16% of the villages had civic engagement activities. However, this has increased to 0.55 in 2011 and, subsequently, to 0.68 in 2014. Thus, there has been an increase in civic engagement activities during these years.

3.5.2 Explanatory Variables

Publicly available data related to mobile phones in Indonesia is mobile phone signal strength at the village level, which can be collected from Podes.[16] In Podes, signal strength is divided into three criteria: (1) no signal, (2) weak signal and (3) strong signal.

In this study, the core explanatory variable is *Signal*, which is a dummy variable that equals one if the village's mobile phone signal is strong. Therefore, the value of signal will be zero if the village's signal strength is weak or non-existent. From Table 3.1, it is evident that the mean for *Signal* is 0.81 and the standard deviation is 0.48. Thus, almost 81% of the sample villages in the study have strong signal strength. Between 2008 and 2014, the signal strength improved throughout the villages, whereas the average signal strength was 0.79 in 2008, it became 0.82 in 2014.

Figure 3.4, 3.5 and 3.6 depict the conditions of mobile phone signal strength in Indonesia from 2008 to 2014. Almost all areas in Java are covered by a strong signal, because the ICT infrastructure in Java is significantly better than on the other islands. Furthermore, the majority of Sumatra also has relatively strong signal. Eastern parts of Indonesia, especially Papua, have poor signal strength, however. This is because the infrastructure quality in the eastern part of Indonesia is generally worse than on the other islands. It is also clear that from 2008 to 2014, signal strength greatly improved, especially in Java and Sumatra.

Some variables that were used as additional explanatory variables include: information about the village leaders, such as gender (i.e. 1 if male, 0 otherwise), years of schooling and age. From Table 3.1, it can be observed that almost 94% of the village heads are male; The standard deviation is 0.24. This data suggests that there is a bias among village leaders in Indonesia towards males. Moreover, most of the village heads only have a high school degree, which is quite low (mean = 12.35 and sd = 2.66). Furthermore, the average age of the leader is approximately 44.59 and the standard deviation is 8.13.

[16]Other data related to ICTs in PODES include the number of households with fixed line subscription, the existence of public phones, and the number of internet cafes.

The minimum value for leader age is 20 years old and the maximum value is 87 years old.

3.5.3 Specification and Identification Strategy

In this study, two main econometric methods are used to examine the impact of mobile phone usage on policies: (1) linear probability model (LPM) and (2) logistic model.

The linear probability model is as follows:

$$Y_{v,t} = \beta Signal_{v,t} + \gamma X_{v,t} + \theta_v + \vartheta_t + \epsilon_{v,t} \tag{3.1}$$

where $Y_{v,t}$ is the binary dependent variable in the village v at time t. $Signal_{v,d,t}$ is a dummy variable that has a value of 1 if the village v and time t have a strong mobile signal strength, and 0 otherwise; $\gamma X_{v,t}$ represent the vector of control variables; θ_v are the village fixed effects; and ϑ_t are the year fixed effects. The main coefficient of interest is β, because it estimates the within-village difference in the probability of the dependent variable being 1 (Pr ($Y_{v,t}$ = 1)), between villages with strong and weak signal strengths that exhibit similar characteristics.

The control variables used in this paper are the set of rich datasets related to village-level characteristics, such as variables related to village governance, e.g. male leader (i.e. 1 if male, 0 otherwise), age, years of education; village-level demographic, e.g. number of population, expenditure per capita, main sources of income (i.e. 1 if agriculture, 0 otherwise); and social indicators, e.g. Muslim (i.e. 1 if Muslim majority, 0 otherwise), multi-ethnic (i.e. 1 if more than one ethnicity, 0 otherwise), number of mosques and number of churches. The list of control variables for the village-level demographics is displayed in Table 3.1.

The second method is the logistic model that is estimated via the following equation:

$$Pr(Y_{v,t} = 1) = F(\beta Signal_{v,t} + \gamma X_{v,t} + \theta_v + \vartheta_t + \epsilon_{v,t}) \tag{3.2}$$

where $F(.)$ is the cumulative standard logistic function and $\epsilon_{v,t}$ is an error distributed by the standard logistic distribution. Through the use of this logistic model it is also possible to estimate the within-village variation of the signal strength on $Pr(Y_{v,t} = 1)$.[17]

[17]Logit and Probit, however, exhibit several limitations when using fixed effects. See Heckman (1979) and

3.5.4 Instrumental Variable

The results from the LPM and Logit estimations might be biased, however, because the signal strength variable might not be entirely random (Angrist and Pischke, 2009; Wooldridge, 2010). Areas with larger populations or better infrastructure might have better signal strength. Moreover, urban cities could have bad signal strength due to the large number of high buildings in the surrounding the area. This condition could also make signal strength endogenous, because the decision to place buildings might also effect policy choice. Another potential problem that could potentially bias the results is the measurement error of signal strength. The data on signal strength is based on the answers provided by the village administrations and, thus, may not accurately reflect the true condition of mobile phone signal strength.

Although an instrumental variable strategy could be used to solve these potential problems, it is quite difficult to find exogenous variables that would work in this study. As noted by Aker and Mbiti (2010), the problem with ICT studies is that it can be difficult to find a credible instrumental variable. I used the mean of flash rate or lightning strike (I will use this term interchangeably) intensity per km^2 between 1998 and 2013 at the village level, as the intrument.[18] The data is available across the world and, in this study, I was able to construct the flash incidence data at the Indonesian village level. Because the data is time invariant, I used the interaction between flash rate intensity for the village v and time trends to allow me to estimate the effects of the instrument on the mobile phone signal strength in the panel data setting. The use of the interaction term generated a continuous difference-in-differences estimator that could identify the causal effect of time invariant variation from the flash rate intensity (Angrist and Imbens, 1995; Angrist, 1998). A similar approach has been used by Manacorda and Tesei (2017); They used the interaction between flash rate incidence and time trend as an instrument for mobile phone coverage in Africa.

Greene (2004) for further explanation.

[18]Data retrieved from LIS 0.1 Degree Very High Resolution Gridded Lightning Full Climatology (VHRFC) `https://ghrc.nsstc.nasa.gov/hydro/details/lisvhrfc`. This data is provided by the US National Aeronautics and Space Administration (NASA). The data is the avearge flash rate betweem 1998 and 2013 and, therefore, is time invariant. Andersen et al. (2012) and Manacorda and Tesei (2017) have determined that a consistent pattern exists for the lightning strike across this period of time. See Cecil et al. (2014) for further information.

Hence, the first stage of this estimation is:

$$Signal_{v,t} = \alpha_{v,t} + Z_{v,t} + \gamma X_{v,t} + \theta_v + \vartheta_t + \mu_{v,t} \tag{3.3}$$

where $Z_{v,t} = Flash\,rate_v * time\,trend$. I also include the set of control variables $\gamma X_{v,t}$, as well as village fixed effects (θ_v) and year fixed effects (ϑ_t).

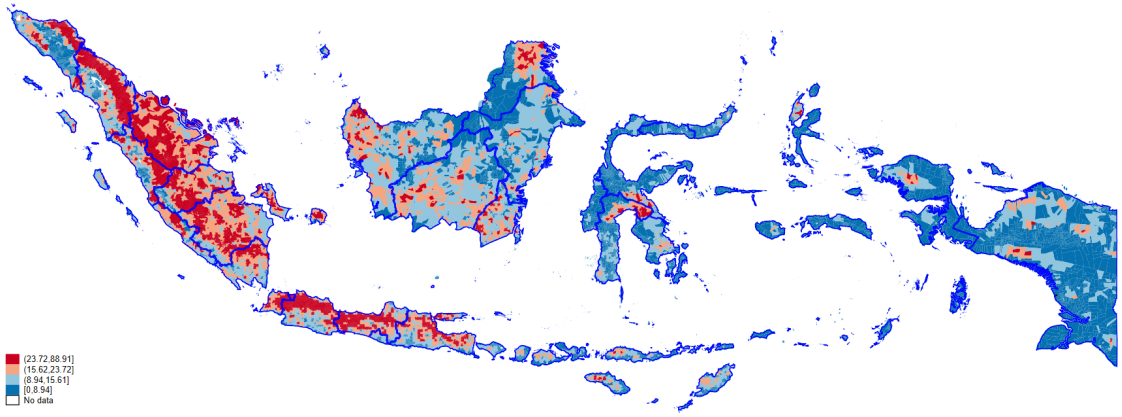
Cecil et al. (2014) have suggested that tropical and sub-tropical regions tend to have a higher annual flash rate. Albrecht et al. (2011) have also observed that high flash rates are linked to topographical features. Therefore, Indonesia has a higher flash rate incidence due to its location and geographical characteristics. Figure 3.7 depicts the variation of lightning strike in Indonesia between 1998 and 2013. Based on the figure, areas in Sumatra have increased incidences of lightning strike. Most of this area is located at a higher altitude. Moreover, some parts in Java also exhibit higher lightning strike incidences.

The figure shows that there is a high variation across the country, implying that the incidences of lightning strike may explain the variation in signal strength throughout Indonesia. The mean flash rate in Indonesia from 1998 to 2013 was 20.29 flash rate/km^2 (See Table 3.1). This number is higher than the global flash rate, which is around 2.9 flash rate/km^2, and the average flash rate in the tropic and sub-tropics (10 flash rate/km^2).

Thus, lightning strike has a strong relationship with the provision and quality of telecommunication infrastructure. Andersen et al. (2012) have observed that lightning can damage mobile phone transmitters, and thus negatively affect connectivity. Since this can result in less investment in telecommunication towers, which ultimately reduces the quality of mobile phone services, I expect that villages with higher flash rate intensity would have lower signal strength. The underlying assumption here is that flash rate intensity only affects the dependent variables through mobile phone signal strength.

Even though I am relying on the assumption that flash rate intensity is exogenous, this assumption might be not true because flash rate also depends on geographical conditions. Moreover, it is possible that a higher intensity flash rate would affect village conditions and, ultimately, affect the policies implemented by the village government. To isolate this, I also included sets of controls and geographical fixed effects.

Figure 3.7: Mean Annual Flash Rate Density between 1998 and 2013 (Flash Rate/km^2)



Source: Author's calculation from Cecil et al. (2014)

3.6 Results

In this section, I discuss the results from the LPM and Logit estimations of equation 3.1 and equation 3.2. I begin the analysis by discussing the association between signal strength and the policies made by village leaders, as well as the probability of civic engagement activity based on the LPM and Logit estimation results.

3.6.1 LPM and Logit Results

Infrastructure Program Table 3.2 exhibits the estimation results for the infrastructure program. The dependent variable in this table is the dummy variable, which has a value of 1 if the village has an infrastructure program, and 0 otherwise. Columns (1) - (4) were estimated using a linear probability model and columns (5) - (6) were estimated using a Logit model. All specifications from columns (1) to (5) include village fixed effects. Year fixed effects are included for columns (2) - (6). For columns (4) - (8), I use the interaction between urban and year fixed effects to isolate the variation in ICT coverage within villages located in urban areas, and therefore control for unobservable variables that might be correlated to signal strength. For the logistic model, column 5 depicts the fixed effect logistic regression and column 6 depicts the estimation results of the random effect logistic regression.

From Table 3.2, it is clear that strong signal strength is associated with a higher probability that an infrastructure program will be implemented. The results are robust for all estimation methods. The magnitude is quite large and statistically significant at

1% when excluding the covariates and year fixed effects. Once I included the year fixed effects and the interaction between the urban and year fixed effects in columns (2) - (4), the point estimates decreased and were statistically significant at 5% (in column 4).

Table 3.2: Baseline Results: Infrastructure Program

	(1)	(2)	(3)	(4)	(5)	(6)
Signal	0.054***	0.011*	0.013*	0.014**	0.11**	0.11***
	(0.0093)	(0.0066)	(0.0068)	(0.0068)	(0.056)	(0.035)
Male Leader			-0.0089	-0.012	-0.038	-0.090*
			(0.010)	(0.010)	(0.085)	(0.054)
Age			0.00073**	0.00084**	0.0065**	0.0091***
			(0.00033)	(0.00033)	(0.0026)	(0.0016)
Years of Education			0.0037***	0.0039***	0.022***	0.025***
			(0.0010)	(0.0010)	(0.0083)	(0.0052)
Log Population			-0.060***	-0.052***	-0.21	0.32***
			(0.0092)	(0.0091)	(0.13)	(0.019)
Log Expenditure per Capita			-0.088***	-0.092***	-0.48***	-0.20***
			(0.018)	(0.018)	(0.18)	(0.057)
Main Sources of Income			0.013	0.0089	-0.089	0.021
			(0.013)	(0.013)	(0.11)	(0.046)
Muslim			-0.028***	-0.024***	-0.21***	-0.23***
			(0.0081)	(0.0082)	(0.063)	(0.043)
Multi Ethnic			-0.014**	-0.0066	-0.055	-0.080***
			(0.0057)	(0.0057)	(0.046)	(0.029)
Mosque			0.0012	0.0014*	0.0098*	0.030***
			(0.00084)	(0.00084)	(0.0059)	(0.0032)
Church			-0.0016	-0.0012	0.00074	-0.079***
			(0.0021)	(0.0021)	(0.018)	(0.0091)
N	42663	42663	41594	41594	34768	41594
R^2	0.001	0.472	0.467	0.470		
pseudo R^2					0.617	
Estimation Method	LPM	LPM	LPM	LPM	Logit	Logit
Village FE	Yes	Yes	Yes	Yes	Yes	No
Year FE	No	Yes	Yes	Yes	Yes	Yes
Urban * Year FE	No	No	No	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses. Columns (1) - (4) are at the village levels. The unit of observation is at the village level. The dependent variable in this estimation is dummy variable for infrastructure program at the village level. The years included in the regressions are 2008, 2011 and 2014. Column (5) is the coefficient for the fixed effects logit regression. Column (6) is the coefficient for the random effects logit regression. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Moving to the logit regression results in columns (5) and (6), it is evident that the number of observations is smaller in the fixed effects model than in the random effects model, due to the fact that the logit method excluded villages that do not exhibit variation in the dependent variable. Nevertheless, the results from the fixed effects logit estimation supports the results from the LPM estimation. The random effects estimation, however, does not isolate the within-village variation and may this create potential problems, such

as an omitted variable bias. Regardless, the results from column 6 also indicate that better signal strength increases the likelihood of having infrastructure programs.

These results are consistent with the hypothesis in this study that an increase in access to ICT will increase a village leader's incentive to implement policies that are beneficial for the people, such as building roads, school, and other forms of infrastructure. Moreover, an increase in access it ICT also makes it easier for villagers to report their problems to the village leader.

Economic Program The association between signal strength and economic program is presented in Table 3.3. Based on the LPM results, higher signal strength is associated with higher probability of economic programs. The results are robust for all types of specifications. In column 4, higher signal strength increases the likelihood of having economic programs, and is statistically significant at the 5% level after considering unobservable village characteristics and time effects, as well as after isolating the village's location. Even though this cannot be interpreted as a causal effect, this result suggests that signal strength could an important variable to increase the probability of better policies implemented by a village leader.

The coefficient from logit estimations in column (5) is positive and statistically significant at 5% level. Moreover, the result from random effects logit model in column (6) exhibits that higher signal strength increases the likelihood of having economic empowerment programs.

These findings are important because the results of the economic and infrastructure programs in areas with higher and lower signal strength, respectively, remain unchanged after considering the differences between the confounding variables. In terms of magnitude, villages with higher signal strength are more likely to implement economic programs by 1.7%.

Civic Engagement Table 3.4 depicts the estimation results for civic engagement, where the dependent variable will have a value of 1 if a village exhibits civic engagement or *gotong royong* related activities, and 0 otherwise. Columns (1) to (4) present the results from the LPM method. We can observe that villages with higher signal strength have a higher probability of participating in civic engagement activities than villages with

Table 3.3: Baseline Results: Economic Program

	(1)	(2)	(3)	(4)	(5)	(6)
Signal	0.050***	0.017**	0.016**	0.017**	0.098**	0.15***
	(0.0087)	(0.0076)	(0.0078)	(0.0078)	(0.044)	(0.031)
Male Leader			0.0015	0.0011	-0.026	-0.078*
			(0.012)	(0.012)	(0.068)	(0.048)
Age			0.00090**	0.00092**	0.0041*	0.0092***
			(0.00037)	(0.00037)	(0.0021)	(0.0015)
Years of Education			0.0049***	0.0050***	0.027***	0.031***
			(0.0012)	(0.0012)	(0.0067)	(0.0047)
Log Population			-0.050***	-0.049***	-0.21***	0.28***
			(0.013)	(0.013)	(0.079)	(0.016)
Log Expenditure per Capita			-0.10***	-0.10***	-0.33**	-0.21***
			(0.022)	(0.022)	(0.14)	(0.050)
Main Sources of Income			-0.011	-0.011	-0.12	0.011
			(0.015)	(0.015)	(0.085)	(0.042)
Muslim			-0.018*	-0.017*	-0.15***	-0.25***
			(0.0093)	(0.0094)	(0.054)	(0.040)
Multi Ethnic			-0.017***	-0.016**	-0.086**	-0.15***
			(0.0065)	(0.0066)	(0.036)	(0.026)
Mosque			0.00085	0.00089	0.0098*	0.034***
			(0.00091)	(0.00091)	(0.0052)	(0.0030)
Church			-0.0048*	-0.0047*	-0.021	-0.086***
			(0.0025)	(0.0025)	(0.014)	(0.0084)
N	42663	42663	41594	41594	30076	41594
R^2	0.001	0.212	0.213	0.213		
pseudo R^2					0.285	
Estimation Method	LPM	LPM	LPM	LPM	Logit	Logit
Village FE	Yes	Yes	Yes	Yes	Yes	No
Year FE	No	Yes	Yes	Yes	Yes	Yes
Urban * Year FE	No	No	No	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses. Columns (1) - (4) are at the village levels. The unit of observation is at the village level. The dependent variable in this estimation is dummy variable for economic program at the village level. The years included in the regressions are 2008, 2011 and 2014. Column (5) is the coefficient for the fixed effects logit regression. Column (6) is the coefficient for the random effects logit regression. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

a weak signal for all different types of specifications. The results are robust at the 1% level for column (1) when the model is regressed by excluding year fixed effects and the control variable. It becomes less significant, however, in column 2 when year fixed effects are included in the regression. Once I include the control variables in column (3) and the interaction between urban and year dummies in column (4), the results indicate that higher signal strength is associated with increased likelihood of participating in civic engagement activities.

Table 3.4: Baseline Results: Civic Engagement

	(1)	(2)	(3)	(4)	(5)	(6)
Signal	0.051***	0.013**	0.018***	0.019***	-0.020	0.11***
	(0.0079)	(0.0062)	(0.0063)	(0.0063)	(0.080)	(0.041)
Male Leader			-0.0036	-0.0047	-0.14	-0.035
			(0.0092)	(0.0092)	(0.14)	(0.071)
Age			-0.00035	-0.00029	0.00040	0.0051**
			(0.00030)	(0.00030)	(0.0040)	(0.0020)
Years of Education			0.00075	0.00092	-0.012	0.015**
			(0.00097)	(0.00097)	(0.012)	(0.0061)
Log Population			-0.010	-0.0067	-0.15	0.33***
			(0.0099)	(0.0099)	(0.17)	(0.022)
Log Expenditure per Capita			-0.12***	-0.12***	0.093	-0.52***
			(0.020)	(0.020)	(0.27)	(0.075)
Main Sources of Income			0.00083	-0.00054	0.11	0.0045
			(0.011)	(0.011)	(0.18)	(0.060)
Muslim			0.030***	0.032***	0.42***	0.16***
			(0.0086)	(0.0087)	(0.095)	(0.040)
Multi Ethic			0.0086*	0.012**	0.28***	-0.012
			(0.0050)	(0.0051)	(0.070)	(0.035)
Mosque			-0.00070	-0.00060	-0.0050	0.048***
			(0.00079)	(0.00079)	(0.011)	(0.0044)
Church			0.00092	0.0012	-0.014	-0.065***
			(0.0023)	(0.0022)	(0.021)	(0.010)
N	42663	42663	41594	41594	20500	41594
R^2	0.002	0.357	0.357	0.357		
pseudo R^2					0.693	
Estimation Method	LPM	LPM	LPM	LPM	Logit	Logit
Village FE	Yes	Yes	Yes	Yes	Yes	No
Year FE	No	Yes	Yes	Yes	Yes	Yes
Urban * Year FE	No	No	No	Yes	Yes	Yes

* Notes: Robust standard errors in parentheses. Columns (1) - (4) are at the village levels. The unit of observation is at the village level. The dependent variable in this estimation is dummy variable for civic engagement activities at the village level. The years included in the regressions are 2008, 2011 and 2014. Column (5) is the coefficient for the fixed effects logit regression. Column (6) is the coefficient for the random effects logit regression. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results from the fixed effects logit model in column 5 are negative (though

insignificant). Nevertheless, in column 6, for the random effects logit model, the results indicate a positive relationship between signal strength and civic engagement, and are statistically significant at the 1% level. However, it does not isolate the within-village variations and, thus, might bias the results.

Moreover, the results for civic engagement are quite different than those obtained in Olken (2009), which has found that media (such as television and radio) reduce participation in social organisations in Indonesia. Thus, the results of the present study demonstrate that mobile phones can be an effective media tool to inform people about or ask people to participate in civic engagement activities. People can more easily contact one another when they need help or when they want to organise collective activities via mobile phones. This result is consistent with other studies on the positive association between mobile phone adoption and collective action or political mobilisation (Manacorda and Tesei, 2017; Pierskalla and Hollenbach, 2013).

3.6.2 Instrumental Variable

I performed a two stage least square (2SLS) estimation in this study to address the endogeneity problem with previous estimations. As previously mentioned, the flash rate intensity is used as an instrument for signal strength. Table 3.5 presents the results from this estimation. The first stage results indicate that a one standard deviation increase in flash rate intensity reduces the signal strength by 1.09%. The instrument passes the standard test for validity, as the joint-F statistics for this instrument range from 22.46 to 26.06 (Staiger and Stock, 1997).

Column (1) contains the 2SLS estimation results for the infrastructure program, without including control variables, while column 2 includes the control variables. Village and year fixed effects are included in all of these estimations. The results from the 2SLS estimation exhibit a larger magnitude than the LPM and logit regressions, although they are less significant than the results of the LPM. Villages with higher signal strength have a 0.37 percentage points higher probability of having an infrastructure program than a village with a weak signal, and this is significant at 10%. The effects in IV are larger than those in the LPM and logit regressions, which indicates a downward bias in the latter two. One possible explanation for this could be the measurement error of the signal strength variable, which could bias the results.

Table 3.5: Instrumental Variable Estimations

	(1) Infrastructure Program	(2) Infrastructure Program	(3) Economic Program	(4) Economic Program	(5) Civic Engagement	(6) Civic Engagement
Signal	0.39**	0.37*	0.60**	0.52*	1.43***	1.59***
	(0.19)	(0.21)	(0.27)	(0.29)	(0.34)	(0.40)
Male Leader		-0.0046		0.0076		0.015
		(0.011)		(0.013)		(0.018)
Age		0.00030		0.00029		-0.0022***
		(0.00043)		(0.00052)		(0.00072)
Years of Education		0.0015		0.0019		-0.0087***
		(0.0016)		(0.0021)		(0.0030)
Log Population		-0.069***		-0.063***		-0.051**
		(0.011)		(0.016)		(0.022)
Log Expenditure per Capita		-0.14***		-0.18***		-0.37***
		(0.038)		(0.052)		(0.072)
Main Sources of Income		0.021		0.00020		0.034
		(0.015)		(0.017)		(0.021)
Muslim		-0.0012		0.020		0.15***
		(0.018)		(0.024)		(0.033)
Multi Ethnic		-0.030***		-0.040***		-0.064***
		(0.011)		(0.015)		(0.021)
Mosque		0.0014		0.00099		-0.00024
		(0.00088)		(0.00099)		(0.0014)
Church		-0.0022		-0.0056**		-0.0015
		(0.0022)		(0.0027)		(0.0041)
N	42663	41561	42663	41561	42663	41561
Estimation Method	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
First Stage						
Flash Rate Intensity X	-0.001***	-0.0009***	-0.001***	-0.0009***	-0.001***	-0.0009***
Time Trend	(0.0001)	(0.001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
F	26.06	22.46	26.06	22.46	26.06	22.46

* Notes: The years included in the regressions are 2008, 2011 and 2014. Signal strength is instrumented by mean annual flash rate density per km^2. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The 2SLS estimation results for the economic program are presented in columns (3) and (4). By instrumenting signal strength with flash rate intensity, the probability of having an economic program increases by 0.60 percentage points in a village with greater signal strength. In column (4), after including the control variables, the results exhibit a lower magnitude than those in column 3. Nevertheless, they are still statistically significant at 10% level. Similarly, the magnitude for the economic program in the 2SLS estimation is higher than in the LPM and logit models. Regarding civic engagement, higher signal strength is associated with a higher probability of having civic engagement activities. The results are substantially larger than those that I obtained in Table 3.4, which could be explained by the measurement error from the signal strength that yield a downward bias result.

These three results from the 2SLS estimation method support the evidence obtained from the LPM and logit. Therefore, based on the IV estimations, it can be argued that signal strength has causal effects on infrastructure and economic programs in Indonesia. Furthermore, it is also possible to verify that stronger mobile phone signal has a causal relationship with social participation programs in Indonesia. These results are consistent with those obtained in the study by Manacorda and Tesei (2017), who has found that flash rate intensity affects political mobilisation due to its impact on mobile phone adoption.

3.6.3 Propensity Score Matching

To address the selection issues, I constructed a propensity score matching estimator, following Rosenbaum and Rubin (1983) and Abadie and Imbens (2006, 2011).[19] A matching estimator can be used to estimate treatment effects for non-experimental data. This method measures the differences in the outcome variable between the treatment and control groups with the same probability of being treated. This model examines the probability of the outcome variable being 1 (Pr ($Y_{v,t}$ = 1)) for villages with either a strong signal ($Signal_{v,t}$ = 1) or a weak signal ($Signal_{v,t}$ = 0), but which have an identical probability of having a strong signal based on their observable variables. This method is important because it can minimise the issue with the non-random assignment of signal strength.

This method has two conditions that need to be met to estimates the average treatment

[19]See Abadie et al. (2004) for the practical steps on the implementation of this estimator.

effect:

1. Unconfoundedness: $(Y_{v,t} = 0, Y_{v,t} = 1) \perp Signal_{v,t} \mid P(X'_{v,t}, \theta_{v,t})$

2. (Weak) overlap or common support condition: $P(X'_{v,t}, \theta_{v,t}) < 1$

where $P(X'_{v,t}, \theta_{v,t})$ is the probability of receiving treatment or the propensity score of having a strong signal, conditional on the control variables and the village dummies.[20]

In this estimation, I use the matching method based on the same geographic area, because geographically matched controls significantly reduce the possibility of selection bias (Heckman et al., 1998). The set of geographical controls are village topography (1 = the top of the mountain, 2 = valley or slopes, 3 = lowland), paved road, land, distance to sub district and urban dummies. I also include the same control variables that are used in the LPM and Logistic estimation methods.

The matching results are presented in Table 3.6, where I use the propensity score matching algorithm to compare the differences in outcome variables between villages with higher signal strength (treatment group) and villages with lower signal strength (control group) based on the distance between several covariates. All the results in Table 3.6 are the estimated average treatment effect (ATE) of signal strength. I use nearest neighbour matching estimation method in columns (1), (3) and (5) and kernel method in columns (2), (4) and (6).

Table 3.6: Treatment-effects Estimation: Propensity Score Matching

	(1) Infrastructure Program	(2) Infrastructure Program	(3) Economic Program	(4) Economic Program	(5) Civic Engagement	(6) Civic Engagement
Signal	0.039*	0.012*	0.063***	0.03***	0.036*	0.006
	(0.020)	(0.006)	(0.018)	(0.008)	(0.022)	(0.004)
N	41594	41594	41594	41594	41594	41594
Estimation Method	NNM	Kernel	NNM	Kernel	NNM	Kernel
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The years included in the regressions are 2008, 2011 and 2014. The propensity matching results include a full set of control variables and additional geographical variables (topography, urban, paved road, land and distance to sub-district) and also village dummies. Standard error for the propensity results are Abadie-Imbens robust standard errors (Abadie and Imbens, 2016) for columns(1), (3) and (5) and bootstrap standard errors for columns (2), (4) and (6). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The dependent variable in column 1 is infrastructure program. According to the results, infrastructure programs are more likely to be implemented in villages with higher

[20] See Rosenbaum and Rubin (1983) for a more comprehensive explanation of the assumptions for a matching method.

signal strength than in villages with weak signal; This result is statistically significant at the 10% level. For the economic program, the results indicate that villages with high signal strength are more likely to have an economic program than a village with low signal strength. The coefficient is robust and significant at the 1% level. With regard to civic engagement activity, the results of the nearest neighbour matching estimations indicate that higher signal strength is associated with higher probability of civic engagement activities.

The results from the matching methods confirm and support the previous results from the LPM and Probit method for all independent variables used in this study. This finding is important, because after estimating the differences in the conditional expectation of the dependent variable between villages with higher and lower signal strength that are matched based on their geographical similarities, the results are still similar to and consistent with previous methods. Figure 3.A.1 demonstrates the common support condition, and it appears to satisfy the common support condition.

3.6.4 Extensions

Desa versus Kelurahan In the previous section, I discussed the differences between *Desa* and *Kelurahan* in terms of administrative characteristics. In this section, I further differentiate the sample into two groups: *Desa* village and *Kelurahan* village. Table 3.7 presents the results of this analysis.

Columns 1 and 2 in Table 3.7 are the estimation results for *Desa*. Moreover, columns 3 and 4 are for *Kelurahan*. I include sub-districts fixed effects instead of village fixed effects to discover whether *desa* and *kelurahan*, which are located within the same sub-district, would provide difference results due to the difference in signal strength. For infrastructure program in *Desa*, the results from both the LPM and 2SLS models indicate that villages with higher signals are more likely to have infrastructure programs, and this finding is significant at 10%. However, the results for *Kelurahan* are statistically insignificant for both estimation methods. This result is consistent with the fact that village leaders in *Desa* have more power, in terms of implementing policies, than village leaders in *Kelurahan*. Therefore, they can be more responsive to any reports or requests made by the villagers.

With regard to the economic program, mobile phone signal is positively associated

Table 3.7: Additional Results: Desa versus Kelurahan

	(1)	(2)	(3)	(4)
	Dependent Variable = Infrastructure Program			
Signal	0.011*	0.61*	0.020	0.094
	(0.0063)	(0.34)	(0.031)	(0.47)
N	38026	37923	3568	3561
R^2	0.466		0.437	
First Stage				
Flash Rate Intensity		-0.0017***		-0.002***
X Time Trend		(0.0004)		(0.0006)
F		12.62		14.22
	Dependent Variable = Economic Program			
Signal	0.019**	0.67	0.046	0.84
	(0.0076)	(0.48)	(0.032)	(0.59)
N	38026	37923	3568	3561
R^2	0.298		0.339	
First Stage				
Flash Rate Intensity		-0.0017***		-0.002***
X Time Trend		(0.0004)		(0.0006)
F		12.62		14.22
	Dependent Variable = Civic Engagement			
Signal	0.0041	1.82***	0.050*	0.97*
	(0.0054)	(0.63)	(0.029)	(0.57)
N	38026	37923	3568	3561
R^2	0.404		0.448	
First Stage				
Flash Rate Intensity		-0.0017***		-0.002***
X Time Trend		(0.0004)		(0.0006)
F		12.62		14.22
Estimation Method	LPM	2SLS	LPM	2SLS
Year * Topography FE	Yes	Yes	Yes	Yes
Sub-District FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Sample	Desa	Desa	Kelurahan	Kelurahan

* Notes: Robust standard errors in parentheses and clustered at the sub-district. The unit of observation is at the village level. Signal strength is instrumented by flash rate intensity at the sub-district levels interacted with time trend.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

with the implementation of training or providing grants for those who want to start a new business, but only in the LPM estimation. Moreover, the results for *Kelurahan* are insignificant for both LPM and 2SLS. This is consistent with the previous finding that villages with better mobile phone signal are more likely to have economic empowerment programs.

For collective action, the results are relatively similar: For *desa*, mobile phone signal has a positive correlation to civic engagement activities, although it is not significant for the LPM method. Moreover, the results from *kelurahan* indicate that mobile phone usage has a positive and significant relationship with civic engagement.

In summary, there is a clear difference between *desa* and *kelurahan* in terms of the association between mobile phone signal and the outcome variables. The evidence also reveals that village leaders in *desa* are more responsive with these programs. For *kelurahan*, however, there is not enough evidence on the relationship between these variables, except for civic engagement activity. This could be explained by the fact that in *desa*, due to its rural characteristics and lack of facilities, major improvement in infrastructure and economic programs are essential.

Moreover, the village leader in *desa* has relatively more power and, thus, ability to implement policies than those the leader of *kelurahan*. Another possible explanation for why a village may be impacted to a greater extent, is due to the fact that they do not have many alternative options to call their leader. Once they have access to better mobile phone signal strength, it is easier for them to request assistance from their leaders. Nevertheless, the distinct differences, in terms of the number of observations, might affect the results presented in this table.

Robustness Check I also performed a robustness check by introducing ordered signal strength as an alternative explanatory variable. This variable has a value of 2 if the signal strength is strong, 1 if the signal strength is weak and 0 if there is no signal. Table 3.B.1 presents the results for this new variable. Based on the table, the correspondence of ordered signal strength and outcome variables is still statistically significant for all outcome variables (except the LPM result for economic program in column (3)). The results from the 2SLS estimations in columns (2), (4) and (6) also suggest that flash rate intensity has a negative association with ordered signal. The results are statistically

significant at 10% for infrastructure and economic programs, and significant at 1% for civic engagement.

I also estimate whether the association between signal strength and the dependent variables is driven by signal strength. Table 3.B.2 exhibits the results for this estimation. The LPM model was used to test this query. For the infrastructure program, a strong signal appears to be the most important driver. Indeed, strong signal has a positive and significant effect on the likelihood of having an infrastructure program. Similar results can be found in columns (3) and (4): a strong signal has a positive and statistically significant relation to economic program. The results for civic engagement activity, presented in columns (5) and (6), suggest that weak signal strength reduces the likelihood of having civic engagement activities. This is consistent with my prior where mobile phones help villagers communicate and help the village head announce upcoming social participation activities.

3.7 Mechanisms

As explained in Section 3.4, I propose two mechanisms to explain what drives the extent to which mobile phone affect policies. The first mechanism reveals that better signal strength increases villagers' incentive to report or request their needs to village head. This could be through calling the village head or sending text messages. Therefore, I assume that when villages have better signal strength, it will result in an increase in villagers' consumption of telecommunication services (e.g. due to higher telecommunication bills or top-up mobile phone credits).

The present study uses data from the *Indonesian Family Life Survey* (IFLS) – a longitudinal survey in Indonesia that represents around 83% of the Indonesian population – and from the household survey from IFLS 4 and IFLS 5, which were conducted in 2007 and 2014, respectively, to determine the amount of money all households spent, in total, for their telecommunication needs in the past month. Table 3.8 depicts the results for the effect of signal strength on telecommunication expenditures. In columns (1) and (2), sub-district fixed effects were used, and in columns (3) and (4), household fixed effects were used. Control variables were used in columns (2) and (4). The explanatory variable here is the average signal strength in the sub-districts where the households are located.

Table 3.8: Effects on Household Telecommunication Expenditure

	(1) Log Communication Expenditure	(2) Log Communication Expenditure	(3) Log Communication Expenditure	(4) Log Communication Expenditure
Signal Strength	0.542**	0.483**	1.613***	1.380**
	(0.224)	(0.234)	(0.554)	(0.543)
N	3703	3703	3798	3798
R^2	0.0015	0.0243	0.0072	0.0379
Estimation Method	OLS	OLS	OLS	OLS
Sub District FE	Yes	Yes	No	No
Household FE	No	No	Yes	Yes
Controls	No	Yes	No	Yes

* Notes: The dependent variable is log total household expenditures for telecommunication. The table uses Indonesian Family Life Survey (IFLS) rounds 4 and 5 in 2007 and 2014, respectively. The unit of observations is number of household. Controls variable included household home ownership (1 = self owned, 0 = otherwise), access to electricity (1 = have access, 0 = otherwise) and access to TV (1 = have TV, 0 = otherwise). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results from Table 3.8 indicate that households living in areas with higher signal strength spend more on telecommunication services. The results are positive and statistically significant for all different estimation methods. This result confirms that when villages have stronger coverage, people are incentivised to use mobile phones more than those who live in areas with weak coverage. In terms of the magnitude, a one standard deviation increase in signal strength is associated with an increase in telecommunication expenditure by 8.9% in column (2). Moreover, once household fixed effects are controlled for, the magnitude becomes 25.5%. Therefore, we can also expect that people living in areas with better signal will also be more likely to interact with their village leaders, and thus affect policy.

The second proposed mechanism considers spillover effects. Neighbouring villages with better signal strength will affect other village leaders' policies through the exchange of information between villages. Therefore, when neighbouring villages have good signal strength, other villages will learn about policy that is being implemented by neighbouring village leaders. If a neighbouring village's head performs better, then the people in the village will increase the pressure on their own leader to do the same.

The results in Table 3.9 provides some evidences for this mechanism. I use the average signal strength of the neighbouring villages within the same sub-districts as the explanatory variable. All estimation methods use village and year fixed effects. In columns (1) and (2), a one standard deviation increase in neighbouring signal strength is associated with an increase in the likelihood of having an infrastructure program by 1.8 %, and it is statistically significant at 1%. Neighbouring signal strength is also positively associated

Table 3.9: Neighbouring Effects

	(1) Infrastructure Program	(2) Infrastructure Program	(3) Economic Program	(4) Economic Program	(5) Civic Engagement	(6) Civic Engagement
Neighbour Signal Strength	0.093***	0.093***	0.058***	0.055***	0.081***	0.10***
	(0.017)	(0.017)	(0.020)	(0.021)	(0.016)	(0.017)
Signal Strength	0.0024	0.0024	0.011	0.011	0.0054	0.0091
	(0.0068)	(0.0068)	(0.0079)	(0.0081)	(0.0064)	(0.0065)
N	42663	42663	42663	41594	42663	41594
R^2	0.472	0.472	0.213	0.213	0.358	0.358
Estimation Method	LPM	LPM	LPM	LPM	LPM	LPM
Village Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

* Notes: The years included in the regressions are 2008, 2011 and 2014. Neighbour signal strength is the neighbouring signal strength within the same sub-district. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

with the likelihood of having economic programs, and it is statistically significant at 1%. In columns (3) and (4), it is clear that the point estimates for neighbour signal strength are approximately 5.8% and 5.5%, respectively. In terms of magnitude, a one standard deviation increase in neighbouring signal strength is associated with an increase in the likelihood of economic programs being implemented by 1.10%. Finally, the estimation results in columns (5) and (6) also suggest that neighbour signal strength is associated with civic engagement activity. A one standard deviation increase in signal strength in the neighbouring village increases the likelihood of civic engagement by 1.54% to 1.9%, and it is significant at 1%.

3.8 Conclusions

This study explores the village-level data from three waves of Indonesia's village census to investigate the role of mobile phones in policymaking. This study finds that increased signal strength is associated with higher infrastructure and economic programs. Furthermore, mobile phones are very important to mobilise people to do *gotong royong* or to participate in collective action activities. The results are robust after implementing various estimation strategies.

To acknowledge the potential bias caused by several endogeneity problems, I performed instrumental variable estimations, using lightning strike intensity as the instrument for assessing signal strength. The results from the 2SLS support the results from the LPM and logit estimation methods, even though the 2SLS results yield a higher magni-

tude and lower statistical significance compared to the other methods. Nevertheless, the results from the 2SLS reveal that mobile phone signal strength has a causal relationship with a village leader's policies, as well as social participation activity.

In terms of magnitude, this study finds that villages with a strong signal are more likely to have infrastructure programs by 0.37 percentage points, compared with villages with poor signal coverage. Moreover, signal strength is positively associated with economic programs. A strong signal increases the probability that the village head will implement an economic program by 0.52 percentage points. These results suggest that mobile phones could be an effective media for villagers to report or request their needs, especially with regard to infrastructure and the economic sector. It is also because mobile phones increase villagers' incentive to interact with their leader (Grossman et al., 2016, 2014). Moreover, in accordance with previous studies that have found the mobile phones are influential for mobilising people, this study reveals that signal strength increases civic engagement activity by 1.59 percentage points. Thus, this study confirms that mobile phones could help village heads inform people about collective action activity and upcoming social activity.

I also extended the analysis by splitting the sample into rural villages (*desa*) and urban villages (*kelurahan*). The results indicate that there is a heterogeneous effect between urban and rural villages, especially for programs related to infrastructure and economic empowerment. The results for *kelurahan* are statistically insignificant. This is likely because there is a significant difference in terms of the government characteristics between urban and rural villages. Whereas village leaders in *kelurahan* are appointed by the district government, and most of them are civil servants, village leaders in *desa* are elected through village elections and have greater power than village leaders in *kelurahan*. For civic engagement activity, this study finds no significant difference between rural and urban villages. Indeed, for both, signal strength increases the likelihood of having social participation activities.

These findings could be useful to enhance the role of mobile phones in policymaking throughout the world. Some policy recommendations for Indonesia would be to increase access to ICT infrastructure in the country by expanding ICT availability, especially in the remote areas. This can also be implemented in other countries, as many areas throughout the world still lack investment in ICT infrastructure.

Nevertheless, there are several limitations of this study. First, this study does not consider the political power of the village leader (e.g. vote share for the village leader and political alignment). Using alternative ICT data could probably enhance the robustness of the results; for example, data on ICTs before the expansion of ICT infrastructure in Indonesia. Aggregating data to the district level could also help explain the impact of mobile phones on district governments, since these governments have a greater responsibility to provide service delivery.

3.A Appendices to Chapter 3: Figures

Figure 3.A.1: (Weak) Overlap and Common Support Condition

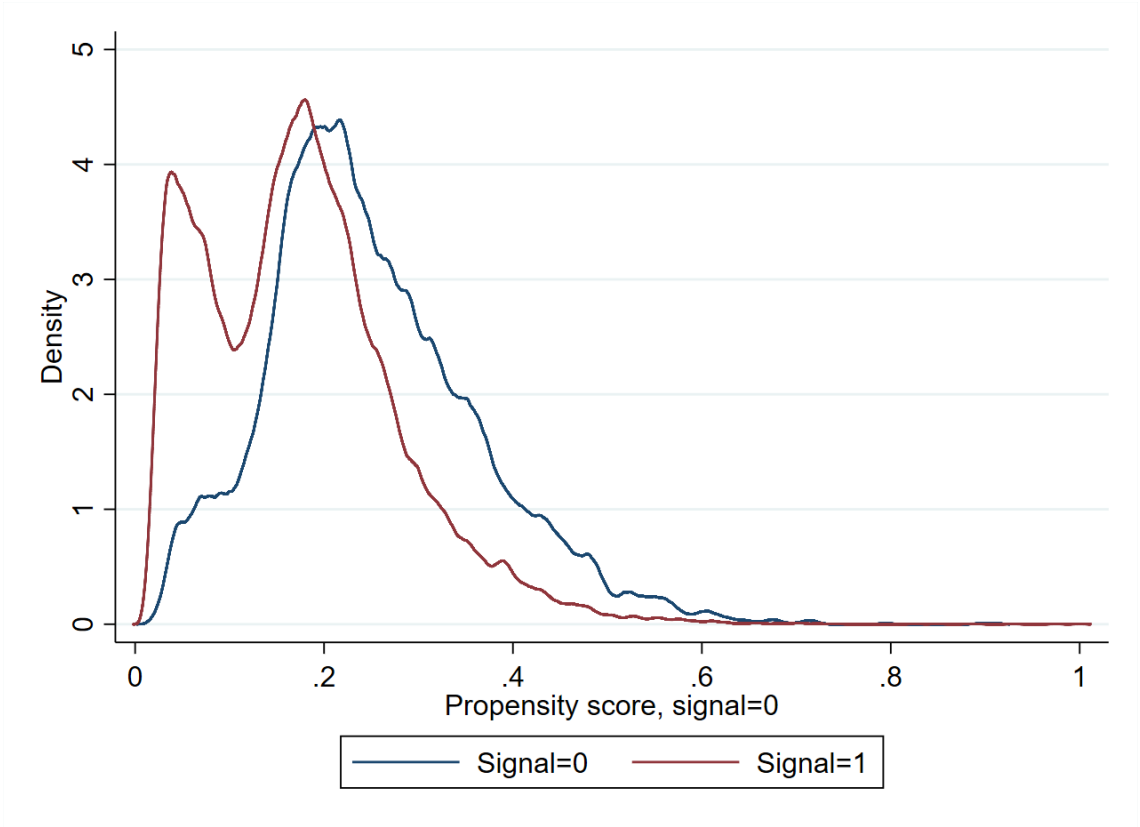
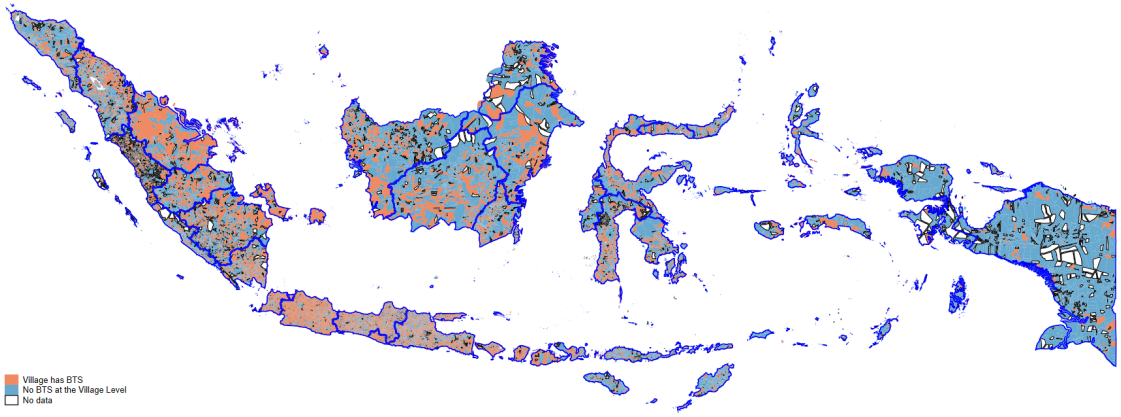
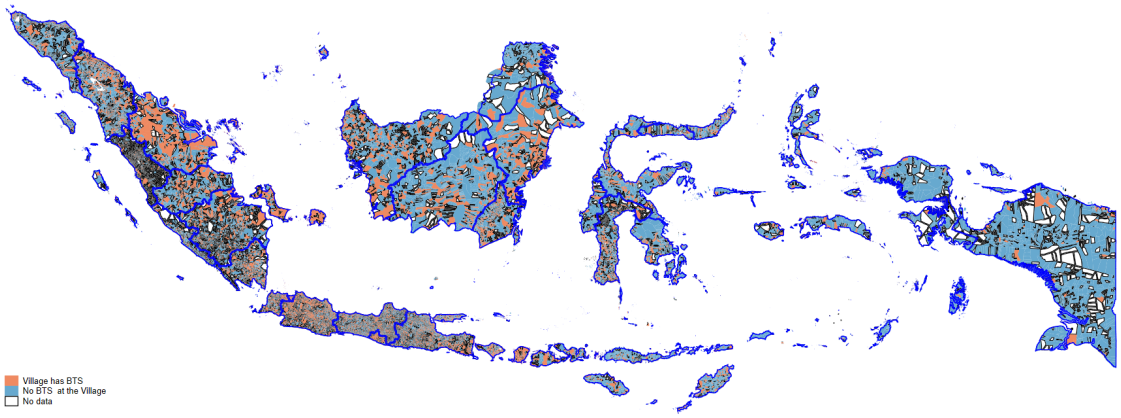


Figure 3.A.2: Base Transceiver Tower at Village Level in 2014



Source: Author's calculation from Podes 2014

Figure 3.A.3: Base Transceiver Tower at Village Level in 2011



Source: Author's calculation from Podes 2011

3.B Appendices to Chapter 3: Tables

Table 3.B.1: Ordered Signal

	(1) Infrastructure Program	(2) Infrastructure Program	(3) Economic Program	(4) Economic Program	(5) Civic Engagement	(6) Civic Engagement
Ordered Signal	0.011*	0.25*	0.011	0.35*	0.019***	1.07***
	(0.0059)	(0.14)	(0.0068)	(0.19)	(0.0057)	(0.22)
Male Leader	-0.0089	-0.0058	0.0015	0.0059	-0.0036	0.010
	(0.010)	(0.011)	(0.012)	(0.012)	(0.0092)	(0.015)
Age	0.00073**	0.00043	0.00090**	0.00047	-0.00035	-0.0017***
	(0.00033)	(0.00038)	(0.00037)	(0.00045)	(0.00030)	(0.00054)
Years of Education	0.0037***	0.0021	0.0049***	0.0026	0.00073	-0.0064***
	(0.0010)	(0.0014)	(0.0012)	(0.0017)	(0.00097)	(0.0021)
Log Population	-0.060***	-0.064***	-0.050***	-0.056***	-0.0099	-0.029
	(0.0092)	(0.0099)	(0.013)	(0.014)	(0.0099)	(0.018)
Log Expenditure per Capita	-0.089***	-0.14***	-0.10***	-0.18***	-0.12***	-0.35***
	(0.018)	(0.035)	(0.022)	(0.048)	(0.020)	(0.058)
Main Sources of Income	0.013	0.019	-0.011	-0.0014	0.00096	0.030*
	(0.013)	(0.014)	(0.015)	(0.016)	(0.011)	(0.017)
Muslim	-0.028***	-0.0092	-0.018**	0.0082	0.030***	0.11***
	(0.0081)	(0.014)	(0.0093)	(0.018)	(0.0086)	(0.022)
Multi Ethnic	-0.014**	-0.027***	-0.017**	-0.034***	0.0084*	-0.047***
	(0.0057)	(0.0092)	(0.0065)	(0.012)	(0.0050)	(0.014)
Mosque	0.0012	0.0012	0.00085	0.00085	-0.00071	-0.00072
	(0.00084)	(0.00086)	(0.00091)	(0.00095)	(0.00079)	(0.0011)
Church	-0.0016	-0.0015	-0.0048*	-0.0047*	0.00095	0.0013
	(0.0021)	(0.0022)	(0.0025)	(0.0027)	(0.0023)	(0.0037)
N	41594	41561	41594	41561	41594	41561
R^2	0.467		0.213		0.357	
Estimation Method	LPM	2SLS	LPM	2SLS	LPM	2SLS
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	Yes	Yes
First Stage						
Flash Rate Intensity		-0.0014***		-0.0014***		-0.0014***
X Time Tredmd		(0.0002)		(0.0002)		(0.0002)
F		37.32		37.32		37.32

* Notes: The years included in the regressions are 2008, 2011 and 2014. Ordered signal equal to 2 if signal is strong, 1 if signal is weak and 0 if no signal. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3.B.2: Strong versus Weak Signal

	(1) Infrastructure Program	(2) Infrastructure Program	(3) Economic Program	(4) Economic Program	(5) Civic Engagement	(6) Civic Engagement
Strong Signal	0.013*	0.013*	0.018**	0.019**	0.016**	0.0082
	(0.0069)	(0.0070)	(0.0080)	(0.0081)	(0.0064)	(0.0064)
Weak Signal	0.00091	0.0023	0.026	0.027	-0.036*	-0.035*
	(0.018)	(0.018)	(0.021)	(0.021)	(0.019)	(0.019)
Male Leader	-0.0089	-0.0088	0.0015	0.0016	-0.0036	-0.0032
	(0.010)	(0.011)	(0.012)	(0.012)	(0.0092)	(0.0092)
Age	0.00073**	0.00075**	0.00090**	0.00090**	-0.00035	-0.00039
	(0.00033)	(0.00033)	(0.00037)	(0.00037)	(0.00030)	(0.00030)
Years of Education	0.0037***	0.0037***	0.0049***	0.0050***	0.00074	0.00023
	(0.0010)	(0.0010)	(0.0012)	(0.0012)	(0.00097)	(0.00097)
Log Population	-0.060***	-0.058***	-0.050***	-0.050***	-0.0097	-0.0097
	(0.0092)	(0.0092)	(0.013)	(0.013)	(0.0099)	(0.0098)
Log Expenditure per Capita	-0.088***	-0.094***	-0.099***	-0.099***	-0.12***	-0.12***
	(0.018)	(0.018)	(0.022)	(0.022)	(0.020)	(0.020)
Main Sources of Income	0.013	0.014	-0.011	-0.010	0.0010	0.0013
	(0.013)	(0.013)	(0.015)	(0.015)	(0.011)	(0.011)
Muslim	-0.028***	-0.028***	-0.018*	-0.017*	0.030***	0.026***
	(0.0081)	(0.0081)	(0.0093)	(0.0093)	(0.0086)	(0.0086)
Multi Ethnic	-0.014**	-0.014**	-0.017***	-0.016**	0.0085*	0.0068
	(0.0057)	(0.0057)	(0.0065)	(0.0065)	(0.0050)	(0.0050)
Mosque	0.0012	0.0012	0.00086	0.00083	-0.00071	-0.00050
	(0.00084)	(0.00084)	(0.00091)	(0.00091)	(0.00079)	(0.00079)
Church	-0.0017	-0.0014	-0.0049*	-0.0049*	0.00099	0.0012
	(0.0021)	(0.0021)	(0.0025)	(0.0025)	(0.0022)	(0.0022)
N	41594	41594	41594	41594	41594	41594
R^2	0.467	0.467	0.213	0.213	0.357	0.361
Estimation Method	LPM	LPM	LPM	LPM	LPM	LPM
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Topography * Year FE	No	Yes	No	Yes	No	Yes

* Notes: The years included in the regressions are 2008, 2011 and 2014. Strong signal is equal to 1 if the village has strong signal and 0 if otherwise. No signal is equal to 1 if the village has no signal and 0 if otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 4

Islamic Parties, Policy Choice and Economic Performance: Evidence from Indonesia

This study investigates the role of Islamic parties on government policy choice and economic outcomes. The analysis was conducted using the results from Indonesian mayoral elections. Using a regression discontinuity (RD) design, I compare districts in which the Islamic coalition barely won or lost in the mayoral elections. This study suggests that districts in which the Islamic party barely won the election tend to have lower government expenditures and government revenues. Moreover, in terms of spending by sectors, the leaders of Islamic parties tend to spend more on education. However, none of the evidence suggests that Islamic mayors affect economic outcomes (e.g. GDP per capita, GDP per capita growth, unemployment rate). I argue that the ability of Islamic parties to collect taxes due to the implementation of laws related to Islamic law and partisan alignment influences these results. Moreover, this paper suggests that the education sector is very important for Islamic parties to spread their ideology.

4.1 Introduction

It is important to determine whether Islamic party rule affects policy choice and economic performance, because many Islam majority countries have become more democratised in recent decades. Numerous countries have implemented direct elections, although many issues and deep scepticism surround its implementation. One of the consequences of democratisation in the Muslim world is the growth of political parties that use Islam for their main platform. Many people are afraid that religious conservatism would lead to policies that are harmful to economic development. Nonetheless, there is limited evidence on the effect of Islamic parties on policies.

There has been a growing interest by economists to determine connections between religion and economic development. Iyer (2016) provides an extensive literature survey on the economics of religion. Moreover, a study by Kuran (2018) has conducted an extensive review of recent research on the effects of Islam on economic performance. Rubin (2017) has argued that the reason why the Middle East country is still very much behind western countries is because it is difficult to achieve economic success when religion plays an important role in politics, since many interest groups have bargaining power in politics. A study by La Porta et al. (1999) has observed that countries with a higher proportion of Catholics or Muslims exhibit worse government performance. Conversely, Noland (2005) has found that a large Muslim population is positively associated with economic growth in either cross-country or within country estimation.[1]

Even though many are sceptical of the role religion plays in politics, especially Islam, several studies have been able to determine why voters might still support Islamic parties in political election. For example, many voters still perceive Islamic parties as cleaner than other parties and less corrupt (Henderson and Kuncoro, 2011). Moreover, Islamic parties use economic conditions to win popular votes in many Muslim countries (Pepinsky et al., 2012). For example, The Prosperous Justice Party (PKS) in Indonesia focuses on issues of social justice and economic conditions when campaigning (Mujani and Liddle, 2009).[2]

This paper investigates the role of Islamic parties on policy choices and economic outcomes in Indonesia. There are four reasons why Indonesia is an ideal case study to

[1] Some country specific studies on the role of Islam on policies and outcomes have been conducted by Meyersson (2014) in Turkey and Bhalotra et al. (2014) and Chaudhary and Rubin (2016) in India.

[2] See Pepinsky et al. (2012) for more comprehensive information about Islamic parties and economic appeals throughout the Muslim world.

answer this question. First, Indonesia has the largest Muslim population of any country in the world. Grim et al. (2011) estimate that Indonesia has a Muslim population of around 204 million and contributes to around 12.65% of the global Muslim population. Indeed, almost 82% of the Indonesian population is Muslim. Second, Indonesia has been transitioning from Suharto's authoritarian regime into a more democratic country. The country just held a direct election for the president, as well as elections for governors and mayors. Third, Indonesia has begun decentralising its government since 2001; Local governments now have greater responsibilities for public goods provisions. Finally, since the majority of Indonesia's citizens are Muslim, the power of Islamic parties has grown exponentially. During Suharto's New Order regime (*Orde Baru*), Islamic parties were repressed by the government. However, since 1999, they are now free to spread their movement and ideology. As a result, in recent years, Islamic parties have become more influential in Indonesian politics. Moreover, although the majority of Indonesians are Muslim, Indonesia is not a Muslim country.

To study the causal impact of Islamic parties on policy choices and economic performance, I implemented a regression discontinuity (RD) design (Lee et al., 2004; Lee, 2008; Lee and Lemieux, 2010). Specifically, I investigated the treatment effect of mayors from Islamic parties who either barely won or lost their respective elections. I used data on the mayoral election results at Indonesian district levels from 2005 to 2013, which was provided by the General Election Commission of Indonesia (*Komisi Pemilihan Umum*) and also shared by Pierskalla and Sacks (2018). For the outcome and socio-economic indicators, I used data provided by the INDO-Dapoer dataset, which is managed by the World Bank and provides information about the district characteristics in Indonesia.

The results indicate that districts in which Islamic parties barely won the election exhibit lower total expenditure per capita and total expenditure relative to regional gross domestic product (RGDP).[3] It corresponds to a decrease by 28.6 percentage points and 21.6 percentage points, respectively. Moreover, Islamic mayors reduce total revenue per capita by 20.9 percentage points and further reduce the share of total revenue per GDP by 20 percentage points. This study also finds that districts with Islamic mayors cannot generate more local taxes compared to districts with secular mayors. Moreover, local tax per capita is reduced by approximately 22 percentage points and 2.9 percentage points

[3]For brevity, I also refer to GDP instead of RGDP.

relative to total GDP.

There are two mechanisms behind these findings: First, districts' revenues are mostly driven by central government transfers; Therefore, local governments rely heavily on the central government. During the study period, the President of Indonesia was from the secular party. Therefore, it is likely that the central government would reduce transfers to districts in which Islamic parties had barely won their elections. Second, districts with Islamic mayors tend to have difficulties generating more local taxes due to the implementation of laws that are motivated by Islamic law (*Shari'a law*). For example, banning alcohol, and restricting nightclubs, pubs and other entertainment industries. Due to these restrictions, there are less economic activities in districts with Islamic mayors, which results in lower tax revenues.

This study also assesses whether Islamic parties are likely to implement progressive policies, especially on the provision of public goods. The results indicate that Islamic mayors tend to spend more on education sectors relative to total expenditures. In this regard, the treatment effects for education expenditure relative to total expenditure is approximately 2.9 percentage points, or it increases the dependent variable by 17 percentage points relative to the mean. Moreover, the effects on infrastructure and health expenditures relative to total expenditures are not as apparent, since the treatment effects are statistically insignificant.

Finally, this study finds that Islamic parties do not affect economic indicators, such as real GDP per capita, real GDP per capita growth and unemployment rate. These results are in accordance with the findings from Ferreira and Gyourko (2009) in the US, where political parties do not have any effect on economic outcomes. One possible explanation is that no significant differences exist in terms of economic policy choices between the mayors from Islamic parties and those from the secular parties. I also implemented several robustness and validity checks (e.g. using different polynomial order and bandwidth) and the results remain statistically and economically significant.

This paper contributes to the literature on the effect of religion on policy choices and outcomes (Iyer, 2016; Kuran, 2018; Meyersson, 2014, 2017; Bhalotra et al., 2014; Blaydes, 2014; Henderson and Kuncoro, 2011). More specifically, this study provides the causal impact of Islamic parties on policy choices and economics performance. This study further illustrates the mechanism that causes Islamic parties to behave differently. This

study also explains the role of political parties (Besley and Case, 2003; Lee et al., 2004; Pettersson-Lidbom, 2008; Ferreira and Gyourko, 2009), especially those with a religious ideology. Previous studies have mainly used political ideology to differentiate political parties, but this study specifically considers only political parties with an Islamic ideology. From our understanding, this is the first study to provide evidence in support of the idea that religious political parties, especially Islamic ones, affect local state capacity.

Third, this study extends the growing research on the role of local government in Indonesia (Sjahrir et al., 2013; Skoufias et al., 2014; Lewis, 2018; Martinez-Bravo, 2016; Martinez-Bravo et al., 2018). Unlike previous studies, which only investigate the role of local government, this study attempts to explain the role of Islamic parties in Indonesian politics at the district level. Finally, this study finds that political alignment is crucial within the context of Indonesia, especially when the political parties of the central and districts governments differ. Nevertheless, the political alignment in Indonesia and its impact on policies remains unclear. Finally, significantly contributes to the extant literature within an Indonesia context, as well as within the broader scope of religious ideology and government preferences.

The rest of the paper proceeds as follows: section 4.2 provides an extensive review of related studies. Section 4.3 presents the conceptual framework for this study. The political and institutional framework is explained in section 4.4. Section 4.5 states the data specifications, and section 4.6 analyses the results. Lastly, section 4.7 concludes this study.

4.2 Literature Review

This paper is related to several other studies, such as those that explore the effect of religion on economic performance. Iyer (2016) provides a comprehensive literature review on the development of research in economics related to religion. Moreover, a study by Kuran (2018) documents many previous papers that have investigated the effects of Islam on economic performance. The study further reveals that the Islamic religion affects every aspect (e.g. economic outcomes, social behaviour, health and development, etc.). However, the effects are quite mixed, and thus the results are inconclusive.

In regard to country-specific research, Meyersson (2014) has investigated the role of

Islamic mayors in Turkey on some social progressive policies, and found that municipalities in which the Islamic party barely won a mayoral election exhibit higher high school completion rates for women; Moreover, the women in these municipalities tend to postpone marriage. This finding may be explained by the fact that Islamic parties tend to increase access to education for the poor by building more schools and rescinding headscarf ban policies.

Another study by Meyersson (2017) has observed that Turkey, which has been led by an Islamic government, did not grow faster compared to other countries. Using a synthetic control method after the Islamic party (Justice and Development Party/AKP) gained control of the government, this study found that the presence of AKP in the government did not improve economic indicators, such as GDP per capita and the labour market. However, improvement in the health and education sectors was observed, likely due to the fact that AKP policies focus heavily on these two sectors.

Moreover, other studies have found that Islamic parties improve development outcomes. Bhalotra et al. (2014), for example, have observed that, in India, Members of Parliaments who are Muslim advocate policies that improve health and education outcomes (e.g. lower child mortality rate and improvement in literacy rate and education attainment). The study also suggests that there is no religious favouritism, as the Muslim population benefits less than the non-Muslim population. Similarly, Blaydes (2014) has found that in Egypt, women living in areas ruled by radical Islamist organisations have better reproductive health outcomes compared to women living in areas led by the non-Islamist organisations. The authors therefore argue that Islamist organisations provide health services to citizens with otherwise limited access. An improvement in health facilities creates a net benefit for women living in this area.

Studies on Islamic parties and economic development in Indonesia, although limited, have become an area of interest for many researchers. Henderson and Kuncoro (2011) investigated the role of Islamic parties on local corruption at the district level in Indonesia. Using data from the general election for parliamentary districts between 1999 and 2004, this study suggests that districts in which secular parties won the election in 1999 experienced more bribery in 2004. This study suggests that voters perceived Islamic parties to be reformist and relatively *cleaner* than the secular parties, which had dominated parliament before 1999. Therefore, Islamic parties were associated with a

higher probability of implementing policies that would reduce corruption.

A study by Bazzi et al. (2018) explores the long-term effects of the Islamic institution (e.g. donating land to *waqf* or charitable organisation) on the support for Islamic movement in Indonesia. The study used the termination of land reform in 1960 (Basic Agrarian Law), for which the government wanted to redistribute land to the rural population. When this policy failed, many landowners—who were primarily conservative—transferred their land into a *waqf* trust. Using the differences-in-discontinuity design by exploiting the population density threshold to determine the intensity of the government's land take-over, this study shows that, in the long-term, this reform created strong support for Islamic parties and the adoption of laws motivated by the Islam religion. Moreover, many Islamic schools were built, which also helped spread support for the Islamic movement.

Second, this study also relates to the effect of political parties on the outcomes. Besley and Case (2003) have found that, in the US, when the Democratic party controls the state legislature, state spending per capita increases, especially spending related to family assistance. The study conducted by Lee et al. (2004) employed a regression discontinuity design to examine close U.S. congressional elections; This study found that the variation in congressional voting preference can be explained by party affiliation. Moreover, Pettersson-Lidbom (2008) used an RD design to examine changes in party control in Swedish local elections; The findings suggest that party control has a causal effect on spending, taxes and unemployment. The left-wing party results in higher government spending and a lower unemployment rate.

Conversely, Ferreira and Gyourko (2009) have suggested that there is no evidence that a near-win or near-loss for the democratic party in mayoral elections in the US affects the outcomes (e.g. size of the governments, government spending or crime rates). Indeed, because cities tend to have homogeneous characteristics, the mayor's ability to implement extreme partisanship policies is limited. However, this study has noted an incumbent effect: meaning that when the Democratic Party barely wins the election, they have a higher chance of being re-elected in the upcoming election.

Third, this study is also related to the role of local government and, specifically, the impact of direct mayoral elections. For example, Skoufias et al. (2014) have found that direct mayoral elections are associated with higher spending on health, although they

have no effect on revenues or budget surplus. Similarly, Lewis (2018) has suggested that direct mayoral elections do not affect the generation of own source taxes. However, this study has found that directly elected mayors spend less on infrastructure, likely due to the fact that direct elections reduce rent-seeking behaviour policies, and therefore these districts perform relatively better than those in which the mayor was appointed by a parliament. Sjahrir et al. (2013) have also noted that directly elected mayors tend to implement political budget cycles, especially when they are running for re-election.[4]

Fourth, this paper concerns the role of political alignment on the local government state capacity. Because district governments in Indonesia rely heavily on central government transfers, partisan alignment between the president and a local mayor might affect the central government transfers to the local government. A study by Larcinese et al. (2006) suggests that, in the US, states receive more funds if they supported the president in the previous presidential election. Moreover, governors belonging to the same party as the president will receive more federal funds, meaning that party affiliation is very important.[5]

In general, studies that explore the role of Islamic parties on policy choices are few. Specifically, within the context of Indonesia, although the number of studies conducted on the role of local government have increased, there is no conclusion regarding whether Islamic mayors reduce rent-seeking behaviour and implement policies that lead to better development outcomes and improved economic performance. Furthermore, previous studies have also suggested that the effects of religion on economic performance are mixed. Thus, this study fills the gap in the literature by providing the causal impacts on the relationship between Islamic parties and policy choices.

4.3 Hypotheses

Based on the previous literature mentioned in section 4.2, political parties have mixed effect on outcomes, as suggested by Besley and Case (2003), Lee et al. (2004), Pettersson-Lidbom (2008) and Ferreira and Gyourko (2009). Moreover, research on the effects

[4]Studies by Martinez-Bravo et al. (2018) and Martinez-Bravo (2016) also explain the important role of mayors in Indonesia. However, these studies investigate the role of mayors that are appointed by district parliaments.

[5]Other studies related to political alignment, such as Grossman (1994), Johansson (2003), Levitt and Snyder Jr (1995), Ansolabehere and Snyder Jr (2006) and others.

of religion, specifically religious parties, on policies and outcomes has not reached a consensus in regard to whether or not Islamic parties will implement policies that are less progressive and more conservative. Indeed, many Islamic parties attempt to impose regulations motivated by Islamic laws.

In regard to Indonesia, the number of Sharia laws passed by the government since 2005 has steadily increased, although these instances are clustered in specific areas, such as West Sumatra, Aceh and West Java. These laws are usually related to banning alcohol and narcotics, as well as restricting clubs and pubs (also, however, requirements to wear Islamic clothes at work/school, requirements to read the Quran, regulations on Zakah, etc.). I predict that the implementation of these laws will affect the local government's ability to generate taxes from certain economic activities (e.g. restaurant/hotel that sell alcohol, pubs, nightclubs, etc.). More specifically, the first hypothesis is as follows:

Hypothesis 1 *Islamic parties are associated with lower local government capacity.*

I expect that local governments run by Islamic mayors will be less able to generate tax revenues. Restrictions imposed by Islamic law will reduce the incentives for industries to conduct certain business activities. Moreover, I also expect that, because local governments rely on central government transfers, districts with Islamic mayors will tend to receive less in government revenue. Therefore, due to the reduction in government transfers, these districts will face a decrease in government spending.

Previous studies have shown that Islamic parties tend to implement more progressive policies related to public goods provisions and development sectors (e.g. education and health). As explained by Meyersson (2014), Bhalotra et al. (2014) and Blaydes (2014), an Islamic government is associated with better development outcomes. In an Indonesian context, I am specifically interested in observing the impacts of an Islamic government on education spending, as Islam is focused on education for training and systematic development (*Tarbiyah*). Indeed, education, religion and Islamic parties are closely interrelated. For example, after the end of Suharto's presidency, hundreds of Islamic schools have opened, all of which are connected with one of the two Islamist groups: 1) the Prosperous Justice Party (PKS) and 2) the *Hidayatullah* movement (Hefner and Zaman, 2007). Hefner and Zaman (2007) have suggested that PKS and *Hidayatullah* provide

examples of how social movements through education increase people's awareness of an ideology. Furthermore, other organisations that also focus on education, such as *Muhammadiyah* and *Nahdatul Ulama* have a close connection with the Islamic parties. Therefore, the second hypothesis for this study is:

Hypothesis 2 *Islamic parties are associated with higher spending on education.*

Districts in which Islamic mayors barely won the election are expected to increase their spending on education relative to total expenditure, especially because education spending is one way for Islamic parties to increase their number of political supporters and to spread their political ideology. Thus, I expect the impact of Islamic mayors to be more significant for education than any other sector. Also, because they will need to reallocate government spending from other sectors due to budget constraints (as explained in hypothesis 1), I expect the impact of Islamic parties on other sectors to be insignificant.

4.4 Political and Institutional Framework

4.4.1 Religion and Politics in Indonesia

After the end of Suharto's regime in 1998, Indonesia began democratising. The number of political parties has risen, including Islamic parties.[6] Even though Indonesia is one of the most populous Muslim countries in the world, Indonesia is not an Islamic country. Before 1998, Islamic parties did not have enough power in the parliament; Indeed, there was only one Islamic party: The Unity and Development Party (PPP), founded in 1973. However, this party has never won an election. During his presidency, President Suharto sought to reduce the presence of Islam and communism and to ensure that all political parties retained their official platforms to "Five Principles" (Pancasila) (Pepinsky et al., 2012).[7]

[6]Carnegie Endowment (2013) classifies Indonesian political parties into two broad groups: Secular parties and Islamic Parties. The major secular parties are the Democratic Party (PD), the Party of the Functional Groups (Golkar), the Indonesian Democratic Party-Struggle (PDI-P), the Great Indonesia Movement Party (Gerindra), the People's Conscience Party (Hanura) and the National Democratic Party (Nasdem).

[7]Pancasila is the foundation philosophy of the Indonesian state; It is composed by five main principles: 1) Belief in one single God; 2) Civilized humanitarianism; 3) A unified Indonesia; 4) Democracy guided by the wisdom of the representative's people and 5) Social justice for all Indonesians.

Since the fall of Suharto, many new Islamic parties have emerged onto the political arena. The Prosperous Justice Party (PKS) is a new party that explicitly claims Islam as their platform.[8] The Moon and Star Party (PBB) and the Reform Star Party (PBR) also have substantial support from devout Muslims. Moreover, there are two other parties that use Pancasila as their main ideology and are more open to multi-faith religions, such as The National Awakening Party (PKB) and the National Mandate Party (PAN). However, these two parties were founded by the two largest Islamic organisations in Indonesia. Indeed, the PKB was founded in 1998 by the leaders of *Nahdatul Ulama* (Ulama's Revival/NU), a traditionalist Muslim organisation with more than 60 million members in 2013 (Sobary, 2013). Furthermore, the PAN was also founded in 1998, although by the former head of *Muhammadiyah*, a more modernist version of NU. Both parties are closely connected with Masyumi, an Islamic party that proposed the implementation of sharia law in Indonesia during the general 1955 election (Higashikata and Kawamura, 2015; Pepinsky et al., 2012; Mujani and Liddle, 2009).

Even though the number of Islamic parties has grown since 1998, they have never won the general election. In the 1999 general election, the big five Islamic parties (PKB, PPP, PAN, PBB and PK) received a total of 35.682 million votes (33.73%). The number was slightly lower than the total votes for the winner of the 1999 general election, which was the Indonesian Democracy Party-Struggle (PDI-P), with 35.689 million votes (33.74%). In 2004, the Islamic parties (PKB, PPP, PKS and PAN) earned around 36.86 million votes (32.49%). In 2009, the Islamic parties (PKS, PAN, PPP and PKB) earned 25.17 million votes (24.18%) which were lower than what they had earned in the previous two elections. On the national level, especially after the country began implementing direct presidential elections, Islamic parties have never been able to nominate their own politician for the election.[9]

Although the evidence indicates that Indonesian politics is more secular (Mujani and Liddle, 2009), Islamic parties and Islam are still important. Many Indonesian citizens still consider Islamic parties to be cleaner than secular parties, as well as less corrupt (Henderson and Kuncoro, 2011). Moreover, Islamic parties in Indonesia still have a

[8]Formerly, it was known as the Prosperous Party (PK), but it failed to meet the minimum parliamentary threshold in the 1999 general election.

[9]See Figure 4.A.1 and Figure 4.A.2 for the development of Islamic parties' vote shares in the 2004 and 2009 general elections. In 2009, the Islamic parties earned higher vote shares in the western part of Indonesia, especially in Sumatra and Java. Nonetheless, many Islamic parties won the mayoral and governor elections since the implementation of direct elections for local governments.

political advantage and are more popular than non-Islamic parties, especially during periods of economic uncertainty (Pepinsky et al., 2012).[10]

4.4.2 Administrative Framework

Indonesia has three tiers of government: central, province and *Kabupaten* or *Kota* (Regencies and Cities, for simplicity, referred to as districts or local government). Local government plays an important role in Indonesia, especially once the country's political system began decentralising in 2001. Local governments are now responsible for infrastructure, health, agriculture, trade and industry, transportation, labour market and environment. District governments are responsible for the first nine years of education (six years of primary school and 3 years of secondary education). In the health sector, local governments are responsible for primary health services provision and the supply of health workers. On average, district government expenditure covers almost 75% of total sub-national expenditures (Lewis, 2016). Between 2001 and 2007, districts expenditures doubled, and further increased between 2008 and 2009 (Sjahrir et al., 2014). In 2016, the ratio between districts' total expenditures and total central government expenditures was around 38% (Ministry of Finance, 2016).

In terms of revenues, local governments can collect revenues from various sources, such as shared taxes, shared non-taxes, specific allocation grants, a general-purpose grant, etc. Own source revenues (PAD) and transfers from the central government are the main sources of local government revenues (World Bank, 2007). Of these two, however, the central government transfers comprise the largest share (almost three-quarters) of the local government's total revenue (Ministry of Finance, 2016). Common in many developing countries, decentralisation gives local governments more responsibilities, but narrows its ability to generate revenue. Although districts can adjust tax rates, it should be within specified range.

Since 2005, based on Law No. 32/2004, Indonesia has implemented direct elections for governors and mayors (*Pilkada Langsung*). Citizens directly elect local leaders that were previously appointed by the local parliament (DPRD). The elections are held every five years and the mayors can run for office twice. The elections occurred gradually

[10] In recent years, Islam fundamentalism has become more popular in the country and, as a result, many Islamic parties have begun advocating policies that impose Islamic laws (Foreign Policy, 1999).

because some mayors had just assumed leadership right before the law was passed by the government. Moreover, due to many newly established districts (the result of decentralisation), some districts need to first establish the status of their administrative area to start holding mayoral elections. At the end of 2005, approximately 40% of local governments were directly elected by the citizens (Lewis, 2016). Between 2005 and 2007, roughly 229 mayoral were elections held across the country. By 2010, all districts had already conducted direct elections (Skoufias et al., 2014).

To become a candidate for a mayoral election, political parties need to have at least 15% seats in the local parliaments or 15% of the vote share in the previous general elections.[11] Therefore, if the party has less than 15% of the seats, they need to form a coalition with other parties. To win the election, the candidates need more than 50% or 25% of the votes. If no candidate earns 25% of the votes, then a second round of elections will be held between the two candidates from the first round who received the most votes. The party coalitions in the local elections vary. It is possible that certain parties will make a coalition in certain areas, while in other areas they will be competing against one another. It is also possible that certain parties that form a coalition for the mayoral elections will be opposition parties at the central level.

4.5 Data and Specification

4.5.1 Data Description

Data on the district mayoral election were collected from the General Election Commission, the Republic of Indonesia (KPU) and from Pierskalla and Sacks (2018). Data on the district mayoral elections were collected from 2005 to 2013, which covers two direct mayoral elections in Indonesia. If an election had two rounds, I used the second-round data. I excluded areas such as Aceh, Papua and Papua Barat, because these have different political environments. DKI Jakarta was also excluded because the mayor was appointed by the Governor. For the outcomes and socio-economic variables, I relied on Indonesian Statistics (BPS) and data from the INDO-DAPOER shared by the World Bank group. Table 4.1 and Table 4.2 present the summary statistics for the data in this study. Table 4.1 reports the summary statistics used in the analysis. The total number of observations

[11] Recently, according to law No.1/2014, it needs at least 20% of the seats in the parliament or 25% of the vote share in the previous general elections.

in this study is 1,522: 731 of the districts elected Islamic mayors and 791 of the districts elected secular party mayors. Columns (1) - (3) consist of the mean and the standard deviation for the full sample, Islamic and secular mayors, respectively. Column 4 in Table 4.1 reports the mean differences in the group between districts with Islamic mayors and secular mayors, as well as the standard error (in parentheses).

Main Explanatory Variable

The main explanatory variable in this study is the vote share margin between Islamic party candidates and secular party candidates. In this study, I used the margin between the mayors from an Islamic coalition and a secular coalition. Due to the possibility of Islamic and secular parties jointly forming a coalition (mixed coalition), I classified a coalition as an Islamic party coalition if the number of Islamic parties was higher than the number of secular parties within the coalition. For the robustness check, I also estimated the RD design by excluding mixed coalitions from the observations and the results remain unchanged (See Section 4.6.4).

Table 4.1 and Table 4.2 indicate that the mean of the Islamic vote margin is around -0.6% and that the standard deviation is around 0.216. The maximum vote margin in the sample is 90% in Ogan Komering Ulu, and the lowest vote margin is -80% in Surakarta. The negative mean value for the vote share is also supported by the fact that the number of districts with Islamic mayors in the sample is lower than the mayors from secular parties. Another important explanatory variable for our empirical model is the dummy variable for mayors from an Islamic party, which will have a value of one if it is from the Islamic party and zero otherwise. Approximately 48% of our sample comprises mayors who are affiliated with Islamic parties: roughly 731 of 1522 districts. Moreover, the standard deviation for this variable is 0.499.

Dependent Variables

There are several dependent variables in this study: 1) log total expenditure per capita and the share of total expenditure relative to GDP; 2) log total revenue per capita and the share of total revenue per GDP and 3) log total tax per capita and the share of total tax per GDP. The mean for log total expenditure per capita is 15.06 or Rp 4.1 million

Table 4.1: Summary Statistics

	Mayor Type			Difference
	All	Islamic	Secular	(2) - (3)
	(1)	(2)	(3)	(4)
	Mean	Mean	Mean	Est.
	(S.D.)	(S.D.)	(S.D.)	(S.E.)
Main Variables				
Log Total Expenditure per Capita	15.06	15.02	15.10	-0.077**
	(0.606)	(0.619)	(0.593)	(0.034)
Total Expenditure per GDP	0.429	0.411	0.443	-0.032
	(0.392)	(0.386)	(0.397)	(0.026)
Log Total Revenue per Capita	14.45	14.42	14.48	-0.058*
	(0.563)	(0.572)	(0.554)	(0.031)
Total Revenue per GDP	0.433	0.437	0.430	0.006
	(0.406)	(0.459)	(0.358)	(0.025)
Log Total Tax per Capita	12.28	12.26	12.31	-0.051
	(0.790)	(0.758)	(0.817)	(0.044)
Total Tax per GDP	0.053	0.056	0.051	0.004
	(0.063)	(0.077)	(0.049)	(0.003)
Log Education Expenditure per capita	13.16	13.15	13.16	-0.0104
	(0.649)	(0.624)	(0.670)	(0.039)
Education Share	0.168	0.171	0.164	0.006*
	(0.055)	(0.059)	(0.052)	(0.003)
Log Infrastructure Expenditure per capita	12.32	12.31	12.33	0.023
	(1.104)	(1.030)	(1.165)	(0.052)
Infrastructure Share	0.084	0.085	0.083	0.002
	(0.042)	(0.041)	(0.042)	(0.002)
Log Health Expenditure per capita	11.902	11.896	11.907	-0.010
	(0.768)	(0.723)	(0.805)	(0.046)
Health Share	0.048	0.049	0.047	0.002***
	(0.014)	(0.015)	(0.013)	(0.0009)
Log GDP per Capita	15.54	15.51	15.56	-0.050
	(0.642)	(0.594)	(0.677)	(0.040)
Log GDP per Capita Growth	0.047	0.048	0.045	-0.002
	(0.092)	(0.100)	(0.084)	(0.005)
Unemployment Rate	0.061	0.062	0.060	0.001
	(0.033)	(0.034)	(0.033)	(0.002)
Explanatory Variables				
Islamic Party Vote Margin	-0.006	0.153	-0.154	0.308***
	(0.216)	(0.153)	(0.150)	(0.007)
Additional Variables				
Islamic Vote Share in General Election (in %)	36.52	44.90	28.78	16.11***
	(13.68)	(13.36)	(8.41)	(0.567)
Population Density	921.04	870.13	968.02	-921.04
	(1914.23)	(1830.60)	(1988.28)	(98.30)
Urban Rate (in %)	68.06	65.51	70.42	-4.903***
	(26.75)	(28.25)	(25.07)	(1.367)
Political Competition	0.851	0.857	0.845	0.011***
	(0.060)	(0.056)	(0.064)	(0.003)
Literacy Rate (in %)	92.95	93.59	92.35	1.241***
	(5.95)	(5.41)	(6.35)	(0.303)
Observation	1,522	731	791	1,522

Notes: Columns (1)-(3) report means and standard deviation in parentheses. Column (4) reports differences of group means between columns (2) and (3) with standard error in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Main Variables					
Total Expenditure per Capita (in million IDR)	1,505	4.1	3.4	0.464	48.3
Total Expenditure per GDP	1,142	0.41	0.40	0.001	2.97
Total Revenue per Capita (in million IDR)	1,506	2.1	1.4	0.1	17.4
Total Revenue per GDP	1,480	0.40	0.39	0.009	3.18
Total Tax per Capita (in million IDR)	1,503	0.326	0.4	0.003	6.3
Total Tax per GDP	1,252	0.052	0.063	0.0003	0.764
Total Education Expenditure per capita (in million IDR)	1,081	0.627	0.389	0.005	3.628
Education Share	1,081	0.170	0.056	0.008	0.5
Total Infrastructure Expenditure per capita (in million IDR)	1,076	0.387	0.507	0.002	5.691
Infrastructure Share	1,076	0.080	0.042	0.0018	0.258
Total Health Expenditure per capita (in million IDR)	1,080	0.195	0.172	0.003	2.102
Health Share	1,080	0.047	0.015	0.004	0.138
Real GDP per Capita (in million IDR)	1,288	7.1	7.3	0.564	77.1
Log Real GDP per Capita Growth	1,029	0.05	0.09	-1.02	1.43
Unemployment Rate	1,234	0.061	0.033	0.001	0.208
Government Transfer per Capita (in million IDR)	1,467	1.5	1.1	0.001	12.9
Government Transfer per GDP	1,251	0.295	0.305	0.0001	2.57
Explanatory Variables					
Islamic Party Vote Margin	1,522	-0.006	0.21	-0.8	0.9
Islamic Vote Share in General Election (in %)	1,522	36.52	13.68	8	95
Mayor from Islamic Party	1,522	0.480	0.499	0	1
Additional Variables					
Log Income per Capita	1,488	15.54	0.637	13.24	18.16
Population Density (number of people per km^2)	1,519	921	1914	1.59	12911
Urban Rate (in %)	1,522	68.06	26.75	0.96	100
Political Competition Fractionalisation	1,522	0.851	0.060	0.5	0.94
Literacy Rate (in %)	1,522	92.95	5.95	60.58	99.84

(US$ 273) and the standard deviation is roughly 0.606.[12] We can also see that the total expenditure in areas where Islamic parties won the election is less by 7.7 percentage points than in areas where secular parties won the election. I also used the share of total expenditure relative to GDP, for which the mean is approximately 0.429 and the standard deviation is 0.392.

For log total revenue per capita, the mean for this variable is 14.45 or Rp 2.1 million (US$ 140) and the standard deviation is around 0.563. The mean difference for log total revenue per capita between Islamic and secular parties is statistically significant at 10%; In regard to total revenues per capita, there is 5.8% disparity between districts with mayors from an Islamic party and districts with mayors from a secular party. The mean for the share between total revenue relative to GDP is around 0.433 and the standard deviation is approximately 0.406.

Lastly, I used log total tax per capita, which is the total amount of own source and tax sharing revenues. The mean for this variable is 12.28 (US$ 21.73) and the standard deviation is 0.790. There is no significant difference between the mean values for Islamic and secular mayors. Moreover, total tax per capita is less because local districts do not have enough power to generate revenue from taxes, and thus rely heavily on central government transfers. The ratio between total tax per GDP also suggests that tax revenues generated by local districts is quite small: the mean for this variable is roughly 0.053 and the standard deviation is around 0.063.

The next set of dependent variables relates to the provision of public goods. I used the log total government expenditure per capita for the education, infrastructure and health sectors. Moreover, I also wanted to discover the share of government expenditure for public goods provisions relative to total expenditure. The mean for log education expenditure per capita is around 13.16 or Rp 627,000 (US$ 41.8). The mean for the share of education expenditure relative to total government expenditure is approximately 0.17 and the standard deviation is around 0.055. Districts with an Islamic party leader have a 6% higher education share compared to districts with a secular party leader, and the mean difference is statistically significant at 10%.

The mean for log infrastructure expenditure per capita is approximately 12.32 or Rp 387,000 (US$ 25.8) with a 1.104 standard deviation. In terms of the share between

[12] US$ 1 $\approx$ Rp 15,000.

infrastructure expenditure and total expenditure, the mean is around 8.4% and the standard deviation is approximately 0.042. Finally, for health expenditures per capita, the mean for this variable is roughly 11.902 or Rp 195,000 (US$ 13) and the mean for the health expenditure relative to total expenditure is around 4.7%.

I also sought to determine whether the policy choices implemented by Islamic mayors affected economic outcomes, such as log real GDP per capita, log real GDP per capita growth and unemployment rate. The mean for log GDP per capita is 15.54 (US$ 473) with a 0.642 standard deviation. Moreover, in terms of log GDP per capita growth, the mean is around 4.7% and a 0.092 standard deviation. The difference in means between districts with Islamic and secular mayors is statistically insignificant. Finally, the unemployment rate for the whole sample is roughly 6.1% and the standard deviation is around 0.033. Whereas the unemployment in districts with Islamic mayors is around 6.2 percentage points, it is 6 percentage points in districts with secular parties.

4.5.2 Econometric Model and Research Design

This paper investigates whether mayors from Islamic parties make significantly different policy choices compared to mayors from secular parties. To answer this question, I first identified a causal effect by implementing a regression discontinuity design with a close victory margin. As suggested by Hahn et al. (2001) and Imbens and Lemieux (2008), a RDD can be used to identify a causal effect by exploiting a discontinuity in the treatment assignment. I compared the policy choices in districts with Islamic mayors to those with secular party mayors. As typical in RD designs, the underlying assumption in this study is that the two types of districts are identical in all aspects, except mayor political party.

Following Imbens and Lemieux (2008), $Y_d(0)$ and $Y_d(1)$ represent the potential outcomes. $Y_d(0)$ is the outcome in which the Islamic party barely lost the election and $Y_d(1)$ is the outcome in which the Islamic party barely won the election d. VM_d is the forcing variable, which is the vote margin between the Islamic party's mayor and the secular party's mayor. The impact of an Islamic mayor on policies is given by $Y_d(1) - Y_d(0)$. However, both outcomes cannot be observed simultaneously, and I therefore need to observe the average effect of Islamic parties across subgroups of the relevant population. For example, suppose $I_d = 0$ if a district was not exposed to an Islamic party mayor and $I_d = 1$ if it was exposed to an Islamic party mayor. The observed outcomes Y_d will be

$Y_d(0)$ if $I_d = 0$ and $Y_d(1)$ if $I_d = 1$. Finally, the average treatment effect at the cut-off, $c = 0$ or $VM_d = c$ will be:

$$\tau RD = E[(Y_d(1) - Y_d(0)|VM_d = c] = E[Y_d(1)|VM_d = c] - E[Y_d(0)|VM_d = c] \quad (4.1)$$

As previously mentioned, the main identifying assumption in this design is that $E[Y_d(1)]$ and $E[Y_d(0)]$ are continuous in the Islamic vote margin, VM_d. Following Imbens and Lemieux (2008), it suggests that all other unobserved variables that would affect the outcomes Y_d are also continuously related to VM_d.

I employed (local) linear and quadratic regressions with optimal bandwidth as the main method in this paper, as suggested by Cattaneo et al. (2018) and Calonico et al. (2014).[13] The use of a low-order polynomial has also been proposed by Gelman and Imbens (2018), because it is less sensitive to overfitting and boundary problems, and also it is more robust.[14] The empirical model in this study is the following:

$$Y_{d,t+1} = \beta_0 + \pi_1 I_{d,t} + P(\beta VM_{d,t}) + \varepsilon_{d,t}, \quad \forall\ VM_{d,t}\ \in\ (c-h, c+h) \quad (4.2)$$

where $Y_{d,t+1}$ represents the policy choices and outcome variables of interest in district d during the following year t+1. $I_{d,t}$ is the dummy variable whose value is one if the mayor from the Islamic party won the mayoral election in election t at district d. P is the order of polynomial in the $VM_{d,t}$, which is the vote margin between the Islamic party and the secular party candidates at time t and in district d. More formally:

$$VM_{d,t} = VSI_{d,t} - VSS_{d,t} \quad (4.3)$$

where $VSI_{d,t}$ is the vote share for the Islamic party candidate at district d and time t, and $VSS_{d,t}$ is the vote share for the secular party candidate at district d and time t.

[13] See Imbens and Kalyanaraman (2012) for another type of optimal bandwidth for RD design.

[14] This paper uses a nonparametric approach because it has three main features: 1) the bandwidth is based on non-parametric approximation and generated in a data-driven procedure, 2) the RD point estimates is the optimal mean square error (MSE) and 3) it incorporates the effects of local parametric specifications. See Hahn et al. (2001), Imbens and Kalyanaraman (2012), Calonico et al. (2014) and Cattaneo et al. (2017) for further discussion.

I used the sharp RD design for this study, where $I_{d,t}$ will be:

$$I_{d,t} = \begin{cases} 1, & \text{if } VM_{d,t} \geq 0 \\ 0, & \text{if } VM_{d,t} < 0 \end{cases} \tag{4.4}$$

The cut-off score in this paper will be $c = 0$. $P(\beta VM_{d,t})$ is the continuous control function. β represents the vote share coefficients. π_1 is the pure Islamic candidates effect (or the treatment) and is estimated by the victory margin in a linear and quadratic form. h is a neighbouring around c or cut-off score and will be refereed as the bandwidth.

I also controlled the estimation using several pre-determined covariates. Heteroscedasticity and standard errors are clustered at the district levels.[15] All estimations used a triangular kernel, as suggested by Cattaneo et al. (2018), because it yields a point estimator with optimal properties in a mean squared error (MSE). Following Calonico et al. (2017) in all tables, I report the conventional estimates of RD design with conventional standard errors; However, the significance levels are based on the robust bias-corrected p-value levels (per definitions in Calonico et al. (2014) and Calonico et al. (2018)).

4.6 Results

4.6.1 Main Results

Local Government Budget Capacity

This section first explores the effects of an Islamic leader on the government budget capacity. I first analysed the standard RD plots. Figure 4.1 depicts the plots for log total expenditure per capita in panel (a); total expenditure per GDP in panel (b); log total revenue per capita in panel (c); total revenue per GDP in panel (d); log total tax per capita in panel (e); and total tax per GDP in panel (f). All figures are plotted on the full bandwidth and for a linear control function. I used a data-driven approach to choose the bins. Specifically, I utilized evenly spaced bins that mimic the variance of the data.[16]

The figures depict a relationship between the Islamic party vote margin (on the x-axis) and the outcome variables the year immediately following the election (on the y-axis).

[15] See Bartalotti and Brummet (2017) for the implementation of RD design with clustered data.

[16] This method was chosen because is it yields an RD plot with more dots that characterise local means, and therefore provide a better variability of the data. See Cattaneo et al. (2018) and Calonico et al. (2017) for further information.

The vertical line indicates the cut-off at zero. Thus, there is a negative association between the Islamic party vote margin with log total expenditure per capita and total expenditure per GDP. Moreover, there is a negative jump at the cut-off when Islamic parties barely won the mayoral elections. The same patterns can be observed for total revenues (panels (c) and (d)) and total taxes (panels (e) and (f)), where the figures suggest that Islamic party vote share has a negative relationship with these outcomes. Moreover, the negative jump at the cut-off supports hypothesis 1, which states that Islamic party rule has a negative association with government capacity.

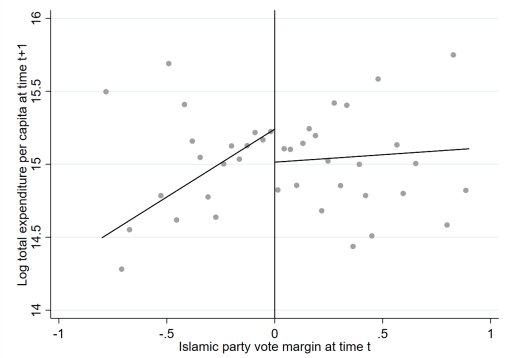
Even though the RD plots for the government budget capacity suggest a negative association between Islamic parties and the outcomes, a formal analysis of the regression results was conducted. Table 4.3 provides the results for the dependent variables during the year after the election. The dependent variable in panel A is log total expenditure per capita (columns (1)-(5)) and total expenditure relative to GDP (columns (6) - (10)). In panel B, the variables are log total revenue per capita and total revenue relative to GDP. Finally, log total tax revenue per capita and total tax per GDP are the variables in panel C.

Columns (1) and (6) report the estimation results with a zero order polynomial and global bandwidth. Columns (2) - (3) and (7) - (8) were estimated using a linear polynomial. Moreover, columns (4) - (5) and (9) - (10) present the RD estimations obtained using a quadratic polynomial form. Covariates are included for all columns. The control variables include population density, urban rate, Islamic party vote share, political competition, log real GDP per capita and literacy rate. I used two different bandwidth types, as proposed by Cattaneo et al. (2018). Moreover, one common Mean Square Error (MSE) optimal bandwidth was used for columns (2), (4), (7) and (9). For columns (3), (5), (8) and (10), I used two different MSE-optimal (MSE/2) bandwidths. All columns were estimated using a triangular kernel, and the robust standard errors are clustered at the district levels.

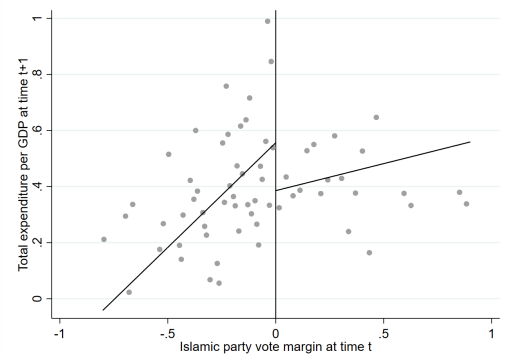
From panel A in Table 4.3, it is evident that districts run by Islamic mayors have lower log total expenditure per capita as well as share of total expenditure per GDP. The results are robust for different RD specifications. In column (1), using a local constant polynomial order with full bandwidth, it can be seen that Islamic party rule exhibits 17.7 percentage points less total expenditure per capita than secular party rule. In column 2, when using a linear polynomial with mean square error bandwidth, the bandwidth size becomes 0.411.

Figure 4.1: Local State Capacity and Vote Margin.

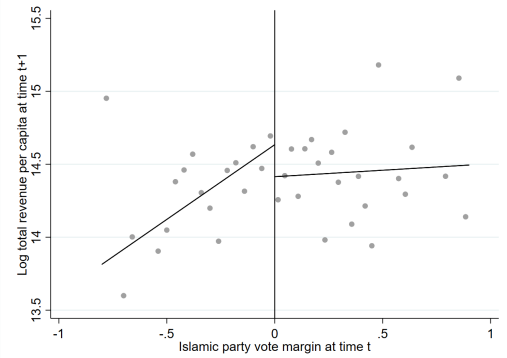
(a) Log Total Expenditure per Capita



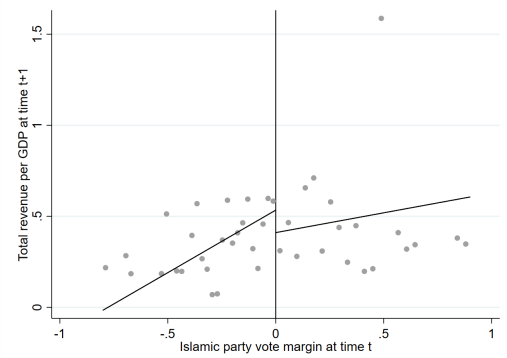
(b) Total Expenditure per GDP



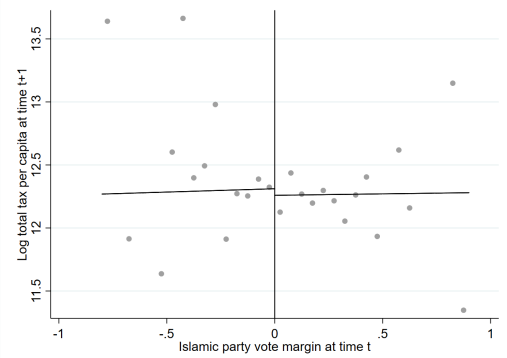
(c) Log Total Revenue per Capita



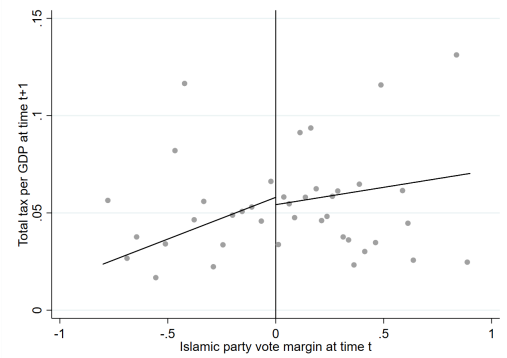
(d) Total Revenue per GDP



(e) Log Total Tax per Capita



(f) Total Tax per GDP



Notes: The figures show the relation between the state capacity by districts and the win margin of the islamic party candidate in the mayoral election based on the full bandwidth and a linear control function. I use a data-driven approach to choose the bins. More specifically, I use even spaced bins that mimic the variance in the data. See Cattaneo et al. (2018) and Calonico et al. (2017) for further information.

In terms of the magnitude, Islamic party rule reduces total expenditure per capita by 28.6 percentage points, and is statistically significant at 1%. The results remain robust when I use different local polynomial orders and bandwidth types. Similarly, the results for the share of total expenditure relative to GDP are statistically and economically significant. Districts in which Islamic parties barely won the election exhibit approximately 21.6% percentage points less total expenditure per GDP, and this is statistically significant at 5%.

I also wanted to determine whether Islamic party rule affects government ability to generate revenue. From panel B, it can be seen that the results suggest that the treatment effects between Islamic parties and the outcome variables are negative and statistically significant. In column 1, we can observe that mayors from Islamic parties are associated with 16.8% less total revenue per capita, a result that is statistically significant at 1%. In regard to the share of total revenue per GDP, the relationship is negative and statistically significant. Mayors from Islamic parties who barely won the election attain 20.9% lower total revenue per GDP. When the RD specifications are varied, similar results are obtained in terms of the coefficient and the significance levels. All results from columns (7) - (10) suggest that Islamic parties will lower the total revenue per GDP from around 20.1% to 21.8%, and these results are economically significant in terms of magnitude.

Finally, I analysed whether the presence of Islamic parties affects total tax revenues. Panel C suggests that districts with Islamic mayors are associated with lower total tax per capita. The treatment effects in columns (2) - (4) range from 22% to 33%. The results are statistically significant at 10%. Similarly, when using the share of total tax relative to GDP, the results remain statistically significant, although only at 10%. Thus, districts with Islamic mayors will have 2.9% to 3.4% lower total tax revenue relative to total GDP.

The results from Table 4.3 suggest that Islamic party rule is associated with lower government capacity to generate revenue and lower government expenditures. These results confirm hypothesis 1, which states that districts with the mayors from Islamic parties tend to have lower local state capacity.

Table 4.3: State Capacity and Islamic Vote Margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	Log Total Expenditure pc.					Total Expenditure/GDP				
Islamic Party, *t*	-0.177***	-0.286***	-0.342**	-0.357**	-0.362**	-0.125***	-0.216**	-0.217***	-0.224**	-0.264**
	(0.059)	(0.092)	(0.118)	(0.124)	(0.150)	(0.056)	(0.084)	(0.081)	(0.086)	(0.104)
Bandwidth Size	1.000	0.411	0.184	0.498	0.303	1.000	0.234	0.183	0.581	0.319
N	1246	1246	1246	1246	1246	914	914	914	914	914
Effective N (Left of Cut-off)	664	620	578	631	606	510	400	457	493	465
Effective N (Right of Cut-off)	582	551	413	564	513	404	317	286	397	365
Panel B	Log Total Revenue pc.					Total Revenue/GDP				
Islamic Party, *t*	-0.168***	-0.356**	-0.325**	-0.415**	-0.429**	-0.053	-0.209**	-0.201***	-0.218**	-0.217**
	(0.059)	(0.123)	(0.121)	(0.163)	(0.158)	(0.047)	(0.090)	(0.074)	(0.091)	(0.098)
Bandwidth Size	1.000	0.208	0.155	0.287	0.265	1.000	0.186	0.135	0.460	0.436
N	1251	1251	1251	1251	1251	1021	1021	1021	1021	1021
Effective N (Left of Cut-off)	666	503	635	570	625	566	387	521	537	510
Effective N (Right of Cut-off)	585	441	385	491	476	455	331	292	440	440
Panel C	Log Total Tax pc.					Total Tax/GDP				
Islamic Party, *t*	-0.141	-0.223*	-0.305*	-0.331*	-0.341	-0.003	-0.029*	-0.029**	-0.034*	-0.034*
	(0.076)	(0.138)	(0.157)	(0.195)	(0.197)	(0.009)	(0.015)	(0.010)	(0.018)	(0.018)
Bandwidth Size	1.000	0.251	0.136	0.244	0.237	1.000	0.164	0.111	0.271	0.251
N	1239	1239	1239	1239	1239	1023	1023	1023	1023	1023
Effective N (Left of Cut-off)	660	557	474	549	524	568	373	510	486	486
Effective N (Right of Cut-off)	579	470	362	459	455	455	314	261	383	375
Polynomial	None	Linear	Linear	Quadratic	Quadratic	None	Linear	Linear	Quadratic	Quadratic
Bandwidth Type	Global	MSE	MSE/2	MSE	MSE/2	Global	MSE	MSE/2	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variables are log total expenditure per capita at time *t+1* and the share of total expenditure per GDP at time *t+1* in panel A. Log total revenue per capita at time *t+1* and the share of total revenue per GDP at time *t+1* in panel B and log total tax per capita at time *t+1* and the share of total tax per GDP at time *t+1* in panel C. Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Government Spending and Provision of Public Goods

I analysed the effect of Islamic parties on public goods provision using the following outcome variables: 1) log education expenditure per capita and the share of total education expenditure relative to total expenditure; 2) log infrastructure expenditure per capita and the share of total infrastructure expenditure relative to total expenditure; and 3) log health expenditure per capita and the share of total health expenditure relative to total expenditure.

Similar to the analysis of local government capacity, I analysed the association between Islamic party rule and the provision of public goods using RD plots. Figure 4.2 depicts the association between the dependent variables and Islamic parties' vote margins. I employed the same approaches used in Figure 4.1. Panel (a) presents the association between log education expenditure per capita and vote margins. Panel (b) illustrates the correspondence between education share and Islamic party vote margin. Panel (a) indicates a negative jump between the Islamic parties' vote margins and per capita government expenditures in the education sector. However, there is a positive jump at the cut-off—when the Islamic party barely won the election—on relative education spending. The associations are less obvious for government expenditure on infrastructure sectors, found in panels (c) and (d). For health expenditure, the discontinuity above the cut-off is obvious in panel (e), but less clear in panel (f), where the y-axis is the share of health expenditure relative to total expenditure.

In regard to the RD estimation, Table 4.4 provides the results for government spending and public goods provision. First, our variable interest related to education sectors. In panel A, log education expenditures per capita are presented in columns (1) - (5), and the share of education expenditure relative to total expenditure can be found in columns (6) - (10). I used the same specification method as in Table 4.3. The results for log education expenditures per capita are negative and statistically insignificant in all columns, except column (1). There is a positive relationship between Islamic mayors and education expenditure relative to total expenditure. Islamic mayors tend to increase education spending relative to total spending by 2.9 percentage points, and this finding is robust at 1%. The results remain robust and statistically significant for different types of RD specifications.

In Panel B, I estimated the treatment effects of Islamic party rule on infrastructure

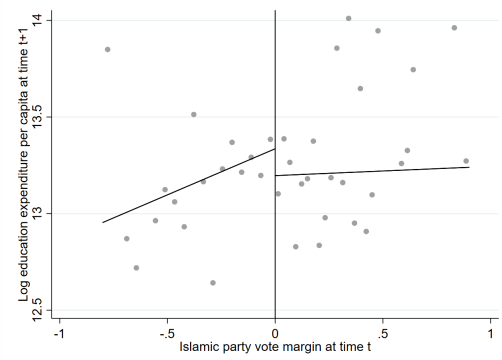
spending. Columns (1) - (5) report the RD estimation results for log infrastructure expenditure per capita, while columns (6) - (10) report on infrastructure share. The results for log infrastructure expenditures per capita are negative and statistically insignificant. Similarly, the results for infrastructure share are also statistically insignificant for all RD specifications. These results suggest that Islamic party rule does not affect government spending on infrastructure.

The last outcome variables are log health expenditure per capita and the share of health expenditure relative to total expenditure. The results provide no statistical evidence for whether Islamic parties affect government expenditure in the health sector.

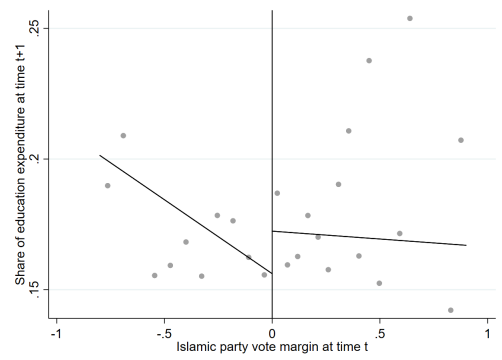
The results for government expenditures confirm hypothesis 2, which states that Islamic party increases education spending. This finding confirms the results of a previous study by Hefner and Zaman (2007), which found a close correlation between Islamic parties in government and increased education spending, because the Islamic movement spreads its ideology through education and schools. The non-significant results found for the infrastructure and health sectors can be interpreted to mean that Islamic parties in Indonesia prefer to spend more on education sectors rather than other public goods, because doing so is more beneficial for the Islamic party in the future.

Figure 4.2: The Provision of Public Goods.

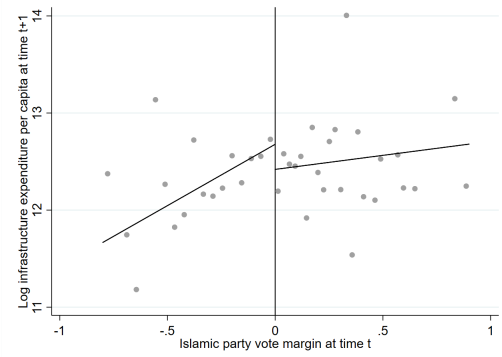
(a) Log Education Expenditures per capita



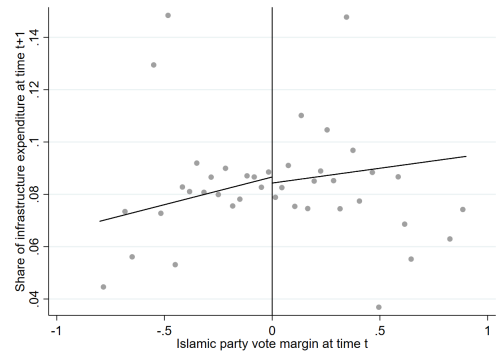
(b) Education Share



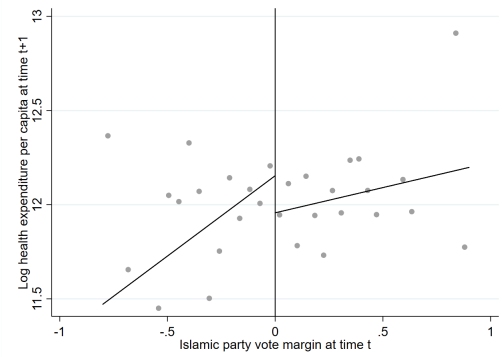
(c) Log Infrastructure Expenditures per capita



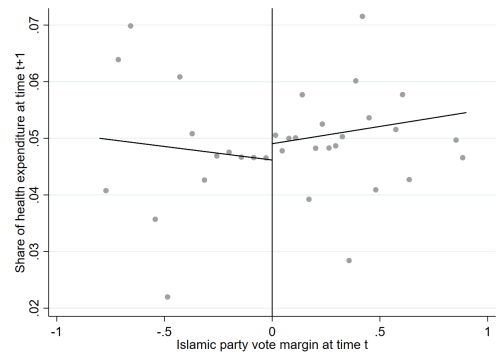
(d) Infrastructure Share



(e) Log Health Expenditures per capita



(f) Health Share



Notes: The figures show the relation between the provision of public goods and the win margin of the islamic party candidate in the mayoral election based on the full bandwidth and a linear control function. I use a data-driven approach to choose the bins. More specifically, I use even spaced bins that mimic the variance in the data. See Cattaneo et al. (2018) and Calonico et al. (2017) for further information.

Table 4.4: Government Expenditures and Islamic Vote Margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	Log Education Expenditures pc					Education Share				
Islamic Party, *t*	-0.172*	-0.098	-0.116	-0.074	-0.092	0.008**	0.029***	0.031**	0.036**	0.032**
	(0.061)	(0.113)	(0.107)	(0.156)	(0.184)	(0.005)	(0.010)	(0.010)	(0.012)	(0.013)
Bandwidth Size	1.000	0.279	0.362	0.352	0.234	1.000	0.251	0.201	0.360	0.383
N	868	868	868	868	868	868	868	868	868	868
Effective N (Left of Cut-off)	475	403	399	432	435	475	399	360	433	372
Effective N (Right of Cut-off)	393	327	360	358	309	393	319	299	360	368
Panel B	Log Infrastructure Expenditures pc					Infrastructure Share				
Islamic Party, *t*	-0.159**	-0.315	-0.291	-0.313	-0.341	0.002	-0.003	-0.004	-0.005	-0.004
	(0.100)	(0.166)	(0.161)	(0.230)	(0.266)	(0.004)	(0.006)	(0.006)	(0.007)	(0.008)
Bandwidth Size	1.000	0.300	0.471	0.374	0.273	1.000	0.400	0.331	0.514	0.609
N	866	866	866	866	866	866	866	866	866	866
Effective N (Left of Cut-off)	474	408	398	434	402	474	442	442	451	431
Effective N (Right of Cut-off)	392	347	379	359	326	392	371	355	380	388
Panel C	Log Health Expenditures pc					Health Share				
Islamic Party, *t*	-0.168*	-0.189	-0.236	-0.321	-0.306	0.002	0.003	0.002	0.004	0.004
	(0.076)	(0.100)	(0.141)	(0.213)	(0.204)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)
Bandwidth Size	1.000	1.943	0.228	0.241	0.204	1.000	0.348	0.824	0.340	0.462
N	867	867	867	867	867	867	867	867	867	867
Effective N (Left of Cut-off)	475	475	432	391	425	475	432	438	425	443
Effective N (Right of Cut-off)	392	392	301	309	298	392	357	389	355	379
Polynomial	None	Linear	Linear	Quadratic	Quadratic	None	Linear	Linear	Quadratic	Quadratic
Bandwidth Type	Global	MSE	MSE/2	MSE	MSE/2	Global	MSE	MSE/2	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variable in panel A is log total education expenditures per capita at time *t+1* and the share of total education expenditure relative to total expenditure at time *t+1*. Panel B is log total infrastructure expenditures per capita at time *t+1* and the share of total infrastructure expenditures relative to total expenditure at time *t+1*. Panel C is log total health expenditures per capita at time *t+1* and the share of total health expenditure relative to total expenditure at time *t+1* Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Economic Outcomes

In this section, I also examine whether Islamic mayors implement policies that affect economic outcomes such as log GDP per capita, log GDP per capita growth and unemployment rate. Figure 4.3 illustrates the association between the economic outcomes and the Islamic party vote margin. Panel (a) depicts the RD plot for log GDP per capita, panel (b) for log GDP per capita growth, and panel (c) for the unemployment rate. All figures suggest that Islamic parties do not affect economic outcomes in the year following their election.

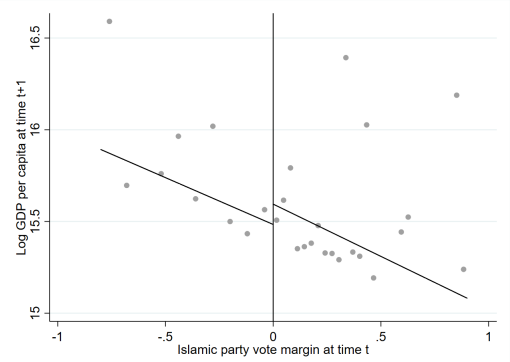
The results from our RD estimations also confirm the results illustrated in Figure 4.3. Table 4.5 provides the results for the economic outcomes. Column (1) uses a zero order polynomial and global bandwidth. Columns (2) - (3) were estimated using a local linear polynomial and columns (4) - (5) were estimated using a quadratic polynomial.

Panel A presents the RD estimation results for log GDP per capita. The results suggest that Islamic parties affect GDP per capita negatively, although this finding is not statistically significant for most RD specifications. The same patterns were found for GDP per capita growth. Thus, mayors from Islamic parties are not associated with any changes in economic growth. Even though the treatment effects are positive and the magnitudes range from 5% to 7%, it is not statistically significant. Finally, the estimation results from the RD design suggest that Islamic party rule does not affect unemployment rate. Similar to the results from panel B, even though the coefficients are positive and range from 4% to 9%, it is not statistically significant.

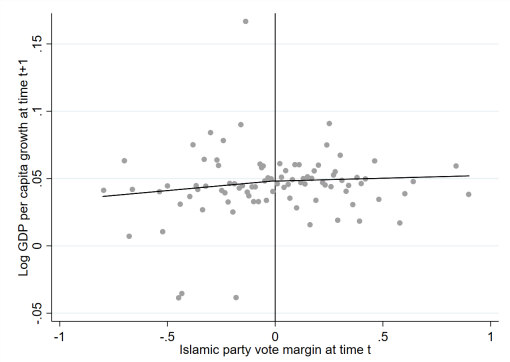
Thus, there is no evidence that Islamic mayors would implement policies that improve economic conditions. Indeed, the results for all three economic outcomes suggest that there is a non-significant effect between Islamic party rule and the outcome variables. This is also in accordance with the results from our RD plots, which identified no discontinuities for these outcomes at the cut-off point. The non-significant effect could likely be interpreted, as there are no policy differences between the Islamic party and the secular party in terms of economic policy choices. These two parties might have different policy choices on the provision of public goods and public finance, but there none in terms of economic policy choices.

Figure 4.3: Economic Indicators

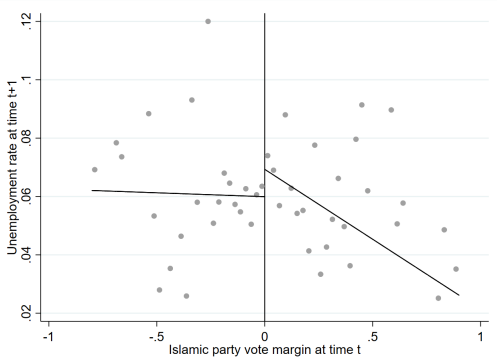
(a) Log GDP per Capita



(b) Log GDP per Capita Growth



(c) Unemployment Rate



Notes: The figures show the relation between log real GDP per capita, log real GDP per capita growth and unemployment rate by districts and the win margin of the islamic party candidate in the mayoral election. Panels (a), (b) and (c) are based on the full bandwidth and a linear control function. I use a data-driven approach to choose the bins. More specifically, I use even spaced bins that mimic the variance in the data. See Cattaneo et al. (2018) and Calonico et al. (2017) for further information.

Table 4.5: Economic Outcomes and Islamic Vote Margin

	(1)	(2)	(3)	(4)	(5)
	Panel A: Log Real GDP per Capita				
Islamic Party, *t*	-0.004*	-0.001	-0.004	-0.003	-0.002
	(0.004)	(0.005)	(0.005)	(0.007)	(0.007)
Bandwidth Size	1.000	0.101	0.101	0.180	0.191
N	1029	1029	1029	1029	1029
Effective N (Left of Cut-off)	572	256	448	390	375
Effective N (Right of Cut-off)	457	246	246	333	344
	Panel B: Log Real GDP per Capita Growth				
Islamic Party, *t*	0.004	0.007	0.005	0.007	0.005
	(0.004)	(0.007)	(0.007)	(0.010)	(0.009)
Bandwidth Size	1.000	0.130	0.169	0.184	0.243
N	1029	1029	1029	1029	1029
Effective N (Left of Cut-off)	556	301	522	384	374
Effective N (Right of Cut-off)	473	282	315	334	371
	Panel C: Unemployment Rate				
Islamic Party, *t*	0.004	0.007	0.004	0.009	0.005
	(0.003)	(0.005)	(0.006)	(0.008)	(0.009)
Bandwidth Size	1.000	0.410	0.320	0.325	0.348
N	1119	1119	1119	1119	1119
Effective N (Left of Cut-off)	586	548	352	521	446
Effective N (Right of Cut-off)	533	503	476	477	483
Polynomial	None	Linear	Linear	Quadratic	Quadratic
Bandwidth Type	Global	MSE	MSE/2	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variables are log real GDP per capita at time *t+1* in panel A, log real GDP per capita growth at time *t+1* in panel B and unemployment rate at time *t+1* in panel C. Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.6.2 Validity of RD Design

To determine whether the forcing variable has been manipulated around the cut-off, following Imbens and Lemieux (2008) I conducted a validity check on the RD design. The standard validity test for this is the McCrary (2008) manipulation test. I examined whether the density of the forcing variable, i.e. the Islamic vote margin, is continuous at the cut-off. I also conducted a covariance balance test to test the continuity of the victory margin between the Islamic and secular parties.

Figure 4.A.3 investigates the continuity of control variables at the cut-off. Each graph provides the local averages of the outcome, plotted against the forcing variable. The covariate balance tests produce a somewhat similar pattern and, overall, they suggest that RDD ought to work well for this study. None of the figures indicates any significant jump.[17] Figure 4.A.3 indicates no discontinuities between the Islamic vote share and Islamic vote margin, which supports the underlying assumption that there is a consistent, continuous Islamic preference over the cut-off.

Finally, I also plotted the histogram for the density of the forcing variable and the formal McCrary (2008) density test in Figure 4.A.4. This test is used to determine whether there is a discontinuity in the density of the observations around the cut-off point. It is also used to discover any manipulations of the assignment variable. These two figures suggest that there is no obvious discontinuity at the cut-off. The McCrary test also indicates that the log difference is small and statistically insignificant.

4.6.3 Mechanisms

I propose two mechanisms to explain the negative correspondence between Islamic mayors and total government revenue, as well as Islamic mayors and total tax. The first relates to political alignment theory, in which central government transfers to districts run by Islamic mayors are fewer. This may be the case since, between 2005 and 2013, the President of Indonesia was from the secular party.[18]

[17] Estimation results for the RD specification also suggest no statistically significant effects between Islamic party and the covariates. Following Canay and Kamat (2017), I conducted a permutation test to evaluate whether the distribution of the covariates continues around the cut-off. The permutation test suggests that the covariate distribution is continuous at the cut-off. Therefore, I reject the null hypothesis which states that the covariates are continuous for urban rate, Islamic party vote share and literacy at 10% significance. See Table 4.B.5.

[18] Susilo Bambang Yudhoyono (SBY) was the President of Indonesia from 2004 to 2014 for two periods. The President's party was the Democratic Party *Partai Demokrat*, which is a secular party. Even though SBY

I used the central government transfers, which consists of the total of General Allocation Fund (DAU) and Special Allocation Fund (DAK). I also used two outcome variables related to this variable: 1) log central government transfer per capita and 2) the share of central government transfer relative to GDP. Table 4.6 depicts the RD results for this estimation. Columns (1) - (5) provide the estimation results for log central government transfer per capita, and columns (6) - (10) provide the results for the share of central government transfer over GDP.

Table 4.6: Central Government Transfer and Islamic Vote Margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Log Central Government Transfer pc					Central Government Transfer/GDP				
Islamic Party, *t*	-0.163***	-0.302**	-0.439**	-0.334**	-0.429**	-0.056**	-0.170***	-0.165**	-0.162***	-0.197**
	(0.069)	(0.103)	(0.181)	(0.118)	(0.170)	(0.032)	(0.059)	(0.057)	(0.051)	(0.070)
Bandwidth Size	1.000	0.372	0.278	0.203	0.338	1.000	0.185	0.727	0.144	0.268
N	1238	1238	1238	1238	1238	1022	1022	1022	1022	1022
Effective N (Left of Cut-off)	659	605	564	639	562	567	404	539	525	505
Effective N (Right of Cut-off)	579	532	482	436	525	455	342	443	299	383
Polynomial	None	Linear	Linear	Quadratic	Quadratic	None	Linear	Linear	Quadratic	Quadratic
Bandwidth Type	Global	MSE	MSE/2	MSE	MSE/2	Global	MSE	MSE/2	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variable is log total central government transfer per capita at time *t+1*. Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

First, the results for log central government transfer per capita indicate that Islamic party rule is associated with fewer transfers from the central government. When I used the zero order polynomial and global bandwidth (see column (1)), the treatment effect between the Islamic party and the outcome is negative; The magnitude is approximately 16.3% and statistically significant at 1%. The results for columns (2) - (3), for which I used a local linear polynomial and data-driven bandwidth, are negative and significant at 5%. Similarly, using the quadratic polynomial order in columns (4) and (5) still provides both economically and statistically significant results.

The results for the share of central government transfer relative to GDP suggest that Islamic governments are negatively associated with outcomes. The treatment effects are roughly -16% to -19.7% and the results are statistically significant at 1% in columns (7) and (9), and at 5% in columns (8) and (10). The mean of the total central government transfer per capita is approximately Rp 1.5 million (US$ 100) and the share of total central government transfer per capita relative to total revenue per capita is around

was supported by many Islamic parties, there were several times during his presidency where he was in conflict with the Islamic parties. For example, PKS voted with the opposition during the fuel subsidy vote `https://www.economist.com/asia/2013/06/22/unpriming-the-pump`.

70%. Therefore, a reduction in central government transfers will significantly affect government revenue. In terms of the absolute number, Islamic parties reduce government transfer per capita by Rp 450,000 (US$ 30), or 21% relative to total revenue per capita.

Table 4.7: Central Government Transfer and Islamic Vote Margin: Governor from the Islamic Party

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Log Central Government Transfer pc					Central Government Transfer/GDP				
Islamic Party, *t*	-0.169**	-0.323	-0.392	-0.278*	-0.227	-0.061	-0.103*	-0.171*	-0.158*	-0.179
	(0.090)	(0.201)	(0.252)	(0.156)	(0.240)	(0.043)	(0.056)	(0.091)	(0.071)	(0.107)
Bandwidth Size	1.000	0.177	0.261	0.402	0.534	1.000	0.348	0.358	0.174	0.246
N	549	549	549	549	549	419	419	419	419	419
Effective N (Left of Cut-off)	253	176	221	176	157	198	190	190	192	156
Effective N (Right of Cut-off)	296	191	229	271	283	221	197	197	145	170
Polynomial	None	Linear	Linear	Quadratic	Quadratic	None	Linear	Linear	Quadratic	Quadratic
Bandwidth Type	Global	MSE	MSE/2	MSE	MSE/2	Global	MSE	MSE/2	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variable is log total central government transfer per capita at time *t+1*. Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. The sample in this table is if the province level government are led the Islamic party. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

I also examined whether province governments affect the amount transferred to district governments from the central government. Intuitively, if governors are from Islamic parties, then it is expected that central government transfers to these provinces will be less, ultimately reducing transfers received by district governments. Table 4.7 presents the RD results when the sample is restricted to provinces run by Islamic parties. The total number of observations in the sample were reduced significantly, meaning that most of the province governments are led by members of the secular party. The RD estimation results indicate that mayors from Islamic parties in provinces with Islamic governors received less in central government transfers per capita. However, the results are not robust for all specifications, possibly due to the sample size.

It is important to determine whether the central government transfers less to district governments in which purely Islamic party coalitions are in power. The results presented in Table 4.8 suggest that partisan alignment plays an important role in determining the allocation of central government transfers. The association between Islamic parties and outcomes are negative, even though this correlation is not robust for log central government transfers per capita. Nevertheless, for the ratio relative to total GDP the results are negative and statistically significant for different type of specifications.

It is also interesting to consider why Islamic parties cannot generate more local taxes.

Table 4.8: Central Government Transfer and Islamic Vote Margin: Pure Islamic Party Coalition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Log Central Government Transfer pc					Central Government Transfer/GDP				
Islamic Party, t	-0.590***	-0.531	-0.216	-0.401	-0.360	-0.143***	-0.166*	-0.121	-0.142**	-0.114
	(0.116)	(0.165)	(0.214)	(0.162)	(0.223)	(0.031)	(0.059)	(0.094)	(0.071)	(0.092)
Bandwidth Size	1.000	0.187	0.176	0.147	0.328	1.000	0.226	0.207	0.192	0.233
N	768	768	768	768	768	670	670	670	670	670
Effective N (Left of Cut-off)	646	454	441	441	549	554	444	426	532	431
Effective N (Right of Cut-off)	122	103	98	89	108	116	99	99	99	104
Polynomial	None	Linear	Linear	Quadratic	Quadratic	None	Linear	Linear	Quadratic	Quadratic
Bandwidth Type	Global	MSE	MSE/2	MSE	MSE/2	Global	MSE	MSE/2	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variable is log total central government transfer per capita at time $t+1$. Islamic party is the the dummy if the mayor is from Islamic party at time t. Results based on Indonesia's mayoral elections from 2005 to 2013. The sample in this table is if the mayor are from the Islamic party without having to form the coalition with the secular party. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

This is likely due to the fact that districts with Islamic mayors tend to introduce laws that are influenced by Islamic law or *Sharia* law, including banning the consumption and sale of alcohol. To address this phenomenon, I used data from the Regional Financial Information System (*Sistem Informasi Keuangan Daerah*) provided by the Directorate General of Fiscal Balance, the Ministry of Finance of the Republic of Indonesia. I used data on local taxes (e.g. hotel tax, restaurant tax and entertainment tax) to capture the effects of some of these laws. The data from these taxes covered the study period, from 2008 to 2013.

Table 4.9 provides the results for the estimations. Panel A shows the effects of Islamic mayors on log hotel tax per capita; Panel B presents the effects for log restaurant tax per capita; and Panel C shows the estimation results for log entertainment tax per capita. Column 1 was estimated using global bandwidth and zero order polynomial, whereas columns (2) - (5) used a linear polynomial. I also used a different type of bandwidth, in accordance with Cattaneo et al. (2018).

The results for log hotel tax per capita are negative; However, all estimation results are statistically insignificant. In regard to log restaurant tax per capita, the results from the RD designs suggest that districts with Islamic mayors that barely won their respective elections exhibit approximately a 70% reduction in restaurant tax per capita; This finding is statistically significant at 5% in columns (4) and (5). The coefficient is quite substantial, and it reduces total tax per capita by roughly 1.5% or 0.22% relative to total revenues per capita.

Lastly, the results for entertainment tax are statistically significant for all columns,

Table 4.9: Local Taxes and Islamic Vote Margin

	(1)	(2)	(3)	(4)	(5)
Panel A	Log Hotel Tax pc				
Islamic Party, *t*	-0.310	-0.327	-0.347	-0.371	-0.394
	(0.210)	(0.298)	(0.309)	(0.311)	(0.333)
Bandwidth Size	1.000	0.750	0.500	0.473	0.415
N	874	874	874	874	874
Effective N (Left of Cut-off)	426	418	406	406	371
Effective N (Right of Cut-off)	448	441	429	426	418
Panel B	Log Restaurant Tax pc				
Islamic Party, *t*	-0.162	-0.193	-0.221	-0.712**	-0.698**
	(0.163)	(0.231)	(0.242)	(0.345)	(0.329)
Bandwidth Size	1.000	0.750	0.500	0.160	0.134
N	895	895	895	895	895
Effective N (Left of Cut-off)	441	433	421	292	402
Effective N (Right of Cut-off)	454	447	435	271	255
Panel C	Log Entertainment Tax pc				
Islamic Party, *t*	-0.265	-0.352**	-0.429***	-0.656**	-0.685**
	(0.159)	(0.215)	(0.222)	(0.286)	(0.274)
Bandwidth Size	1.000	0.750	0.500	0.198	0.229
N	851	851	851	851	851
Effective N (Left of Cut-off)	414	406	394	306	320
Effective N (Right of Cut-off)	437	430	418	297	313
Polynomial	None	Linear	Linear	Linear	Linear
Bandwidth Type	Global	Manual	Manual	MSE	MSE/2
Controls	Yes	Yes	Yes	Yes	Yes

* Notes: The dependent variables are log hotel tax per capita for panel A, log restaurant tax per capita for panel B and log entertainment tax per capita for panel C. Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

except column 1, for which I used a zero order polynomial and global bandwidth. The results from our main RD estimation suggest that Islamic parties are associated with a 35%-69% reduction in tax generated from the entertainment industry. This number is equal to a reduction of 0.13% to 0.26% for total tax per capita or roughly 0.02% to 0.04% relative to total revenues per capita.

These results suggest that some policy choices and laws implemented by Islamic mayors will have a direct impact on the government's ability to generate more local taxes. Indeed, the hotel, restaurant and entertainment industries will be significantly impacted due to the implementation of such laws. Moreover, it is important to note that the entertainment industries will be impacted the most if Islamic laws are introduced, because this sector is closely associated with the banning of alcohol and restrictions placed on pubs, bars and nightclubs. Compared to the results from political alignment and local taxes, lower local state capacity is primarily driven by central government transfers, which account for approximately 21% relative to total revenue per capita. It indicates that the main source of income for local governments is central government transfers.

4.6.4 Robustness

Alternative RD Specification. Following Imbens and Lemieux (2008), Lee and Card (2008) and Meyersson (2014), I conducted further sensitivity analyses of the RD specifications using different bandwidths and varying the control function polynomial. As explained by Cattaneo et al. (2018), the choice of bandwidth improves the accuracy of the approximation for a given polynomial order. A smaller bandwidth can reduce misspecification of the polynomial approximation. However, it can also potentially increase the variance of the estimated coefficient. Conversely, a higher bandwidth yields more smoothing bias, but reduces variance.

Table 4.B.1 presents the treatment effects using alternative specifications for local state capacity and Table 4.B.2 provides the results for the alternative RD specifications for government expenditure.[19] Each outcome variable is estimated using linear, quadratic and cubic polynomial orders, and I employed three different bandwidths for each polynomial order (1, 0.5 and 0.25). All estimations include covariates, and standard errors

[19]See Table 4.B.6 for the economic outcomes.

are clustered at the district levels.

Panel A in Table 4.B.1 depicts the results for log total expenditure per capita in columns (1) - (3) and the share of total expenditure relative to GDP in columns (4) - (6). The results for outcomes related to total government expenditure are statistically significant and consistent with the results of our baseline specification in Table 4.3. Using different types of polynomial orders and bandwidths does not change the treatment effects for these outcomes. In Panel B, log total revenue per capita and total revenue relative to GDP are the outcomes, which suggests that the same association between Islamic party rule and the outcome variables will be achieved for different specifications. Lastly, Panel C presents the results for total tax per capita and its share relative to GDP. Similar to the results from our baseline RD specifications, the association between Islamic mayor and tax revenue is statistically significant at 10%. Nevertheless, the results are the same as in Table 4.3.

The results from Table 4.B.2 for government expenditure are somewhat similar to those in Table 4.4. Thus, Islamic party rule is associated with a higher share of education expenditure relative to total expenditure. Indeed, there is evidence that Islamic governments would affect government expenditure on infrastructure sectors, even though this finding is not robust. Finally, the results for the health sector are statistically insignificant.

Finally, the results obtained using alternative RD specifications suggest that the causal relationship between Islamic parties and the outcome variables is robust. The treatment effects obtained from these exercises are also similar to what was concluded using the baseline specifications.

Excluding Mixed Coalition. I also estimated the RD specification by excluding Islamic parties that made a coalition with secular parties. As a result, 913 mayoral elections ($\approx$ 60% of our sample) were found in which a purely Islamic party won the election. Table 4.B.3 presents the results of this new estimation. I employed a linear polynomial order and one MSE optimal bandwidth for all estimations.

The results obtained using the purely Islamic sample are consistent with the results from the full sample. The results in Panel A, regarding the local state capacity, are robust and statistically significant. The coefficients of the treatment effects are relatively similar

to the main results from Table 4.3. For panel B, the correspondence between Islamic mayors and education spending is still positive. The results for health expenditure relative to total expenditure is somehow negative and statistically significant at 5%. A potential explanation for this may be that when the party coalition is purely Islamic, the government allocates more money to education spending to extend their movement and reallocate spending from the health sector to the education sector.

The results of the economic outcomes presented in Table 4.B.7 are similar to our baseline RD specifications; There is no evidence that the Islamic party's policies affect the economic outcomes. In summary, the results obtained when excluding mayors who are supported by both Islamic and secular parties from our sample do not change the main results.

Effects on Educations. I further explored the effects of an increase in education spending on several education outcomes. First, I assessed whether higher spending on the education sector would affect public goods provision, such as the number of schools. Second, I determined whether there are any effects on net enrolment for different types of schools. Table 4.B.4 presents the results regarding the effects on education. I used two types of education outcomes: first, the number of schools, and second, the net enrolment ratio. I also classified the schools into primary schools (Panel A), secondary schools (Panel B) and high schools (Panel C). All specifications used linear polynomial order, as well as one Mean Square Error (MSE) and two Mean Square Error (MSE/2) following Calonico et al. (2017) and Cattaneo et al. (2018). I also included control variables for columns (3) - (4) and columns (7) - (8).

The effects of Islamic parties on education outcomes are stronger for the number of schools. However, the RD estimation results suggest that the type of political party has no effect on net enrolment ratio. From panel A, it can be seen that the treatment effect of having mayors from Islamic parties on the number of primary schools ranges from 123 to 140. The RD results are statistically significant at 5% for columns (2) and (3), and at 10% for column (1). In terms of the magnitude, Islamic mayors are associated with an increase in the number of primary schools by 38 % - 43 %. Nevertheless, an increase in the number of primary schools is not followed by an increase in the enrolment ratio of primary schools, as the results for all specifications are statistically insignificant.

The effects of Islamic parties on the number of secondary schools are less robust than for primary schools. The treatment effects are positive for columns (1) and (4), but they are only significant at 10%. In terms of the magnitude, Islamic mayors are associated with an increase in the number of secondary schools by 38%. Similar to the results for the primary school enrolment ratio, the treatment effects of Islamic parties on the net enrolment ratio for secondary schools are statistically insignificant.

The effects on high schools are weaker compared to the results for primary and secondary schools. Although the treatment effects are positive, they are statistically insignificant. There is also no evidence that an increase in education spending would affect the net enrolment ratio for high schools, as the treatment effects are statistically insignificant.

The results for the education sector suggest that, although an increase in education expenditures relative to total expenditures should be followed by an increase in the number of schools, especially primary and secondary schools, net enrolment does not increase. This may be explained by the fact that the growth of the total school age population is less than the number of schools built by the government. Second, it is possible that Islamic mayors tend to build more Islamic schools. On the other hand, the majority of citizens still send their children to conventional/secular schools. Even though more information/data is needed to explain this phenomenon, in Indonesia, religious parties and politicians commonly maintain a presence in the education sectors by managing or owning religious schools. Nevertheless, the quality of religious schools is not as good as conventional and private schools. Further information about the different type of schools, especially Islamic schools could possibly provide an alternative explanation for this condition.

4.7 Conclusions

This study uses an RD design to investigate the causal impacts of having democratically elected Islamic mayors on policy choices and outcomes. This study finds that districts in which Islamic parties barely won the mayoral election exhibit 17.7 percentage points less total expenditure per capita and 21.6 percentage points less total expenditure relative to GDP. Second, Islamic mayors are associated with a decrease in 16.8 percentage points for

total revenue per capita and 20 percentage points for total revenue relative to GDP. In terms of local tax per capita, Islamic mayors are less able to generate tax compared to secular mayors. Districts with Islamic mayors exhibit a decrease in 22 percentage points for total tax per capita and 2.9 percentage points for total tax relative to GDP.

These findings can possibly be explained through the following: 1) Local governments in Indonesia rely heavily on central government transfers. During the study period, from 2005-2013, Indonesia's central government was dominated by secular parties. Therefore, partisan alignment could have affected the number of central government transfers to local governments. 2) Mayors from Islamic parties tend to introduce laws and regulations motivated by Islamic laws. This reduces certain business activities, which in turn reduces tax revenues. In terms of the magnitude, mayors from Islamic parties receive 30% less from transfers from the central government, which is equivalent to approximately Rp 450,000 (US$ 30) per capita or a 21-percentage-point decrease relative to total revenue per capita. For local tax revenues, Islamic parties are associated with lower restaurant tax per capita by 1.5% and also lower entertainment tax per capita by 0.26%, both relative to total tax per capita.

This study also indicates that Islamic parties tend to spend more on education. In terms of economic outcomes, policies implemented by Islamic parties do not have any significant effects on economic outcome, as no statistical association was found between Islamic parties and log real GDP per capita, log real GDP per capita growth and unemployment rate.

I also extended the analysis by using alternative RD design specifications and using only pure Islamic parties' coalitions. The robustness check confirms that the results are robust for different specifications. I also extended the analysis based on the impacts of education spending on outcomes, and have found that higher education spending increases the number of schools, especially primary schools.

There are several limitations of this study. First, it is necessary to further explore the impacts of the central government transfers on local governments. The current study only loosely distinguishes between the Islamic and secular parties. Indeed, it is likely that Islamic parties at the district level may initiate a coalition with the incumbent party in the national parliament. Second, since direct mayoral elections in Indonesia were only just implemented in 2005, it was not possible to observe the impacts for a longer period.

Extending the study period will thus make it possible to determine the long-term effects of Islamic mayors on future outcomes.

4.A Appendices to Chapter 4: Figures

Figure 4.A.1: Islamic Parties Vote Share in the 2009 General Election

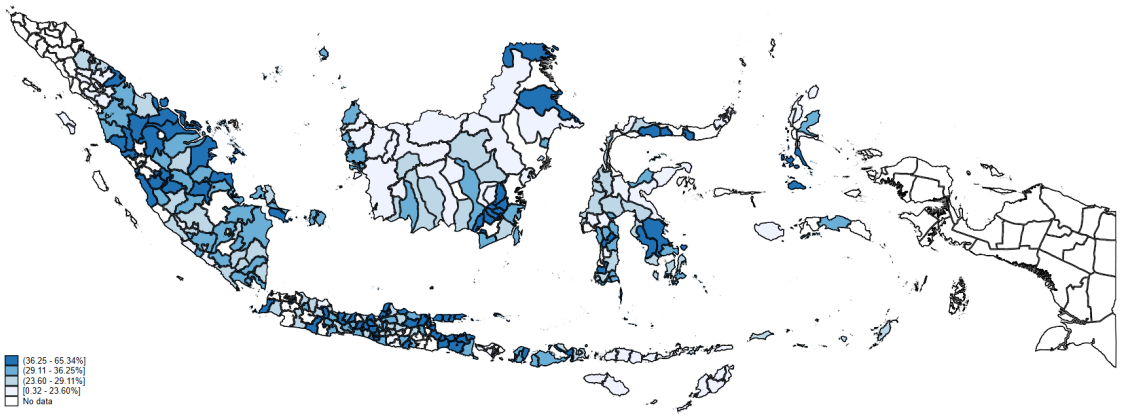


Figure 4.A.2: Islamic Parties Vote Share in the 2004 General Election

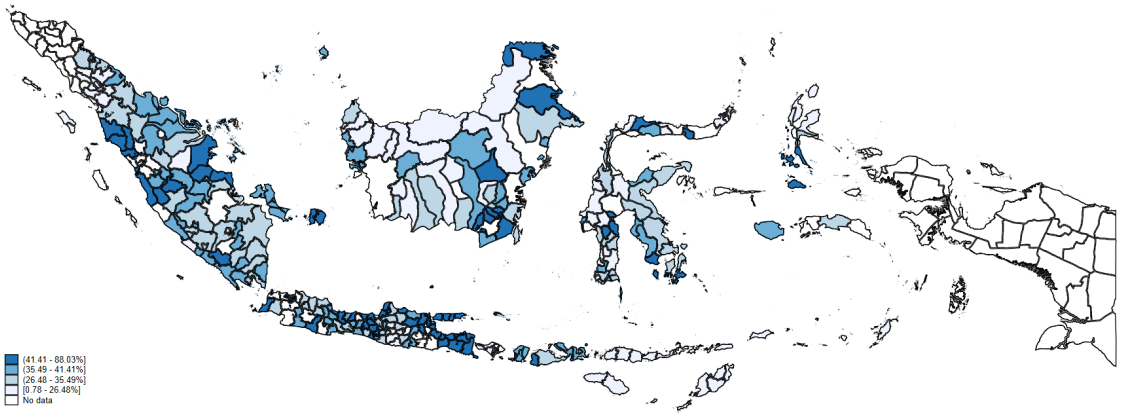
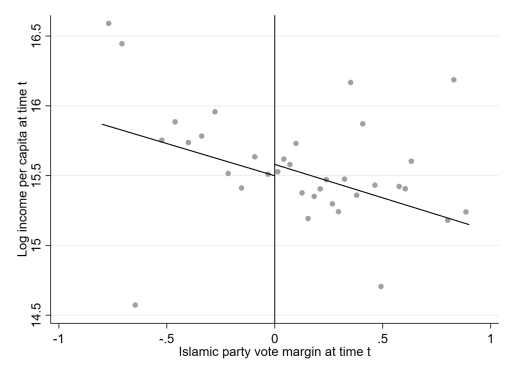
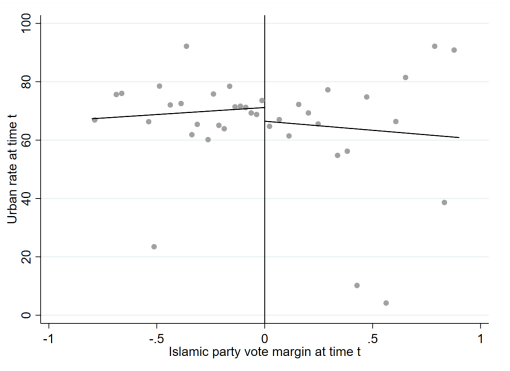


Figure 4.A.3: Covariance Balance

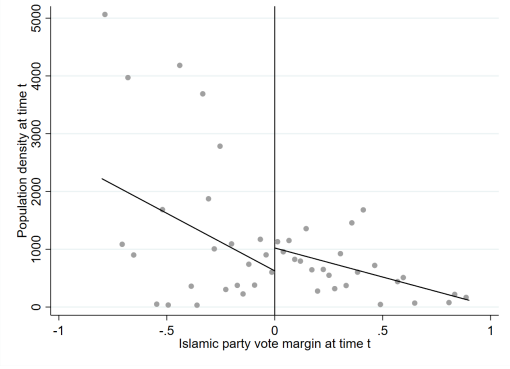
(a) Income per Capita



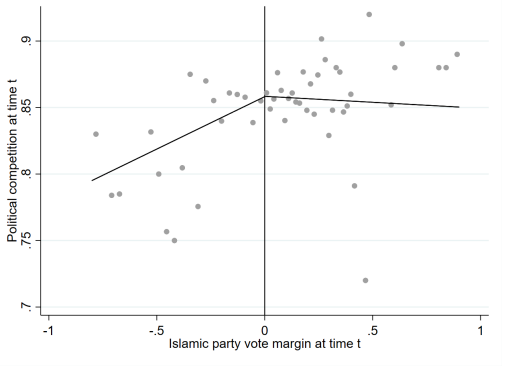
(b) Urban Rate



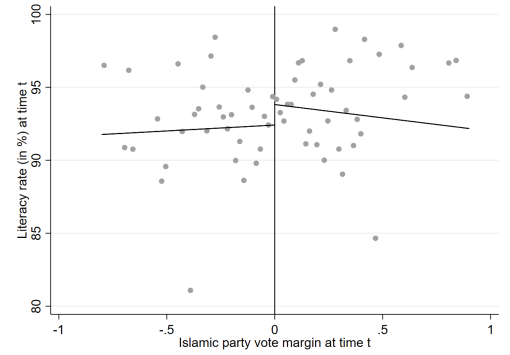
(c) Population Density



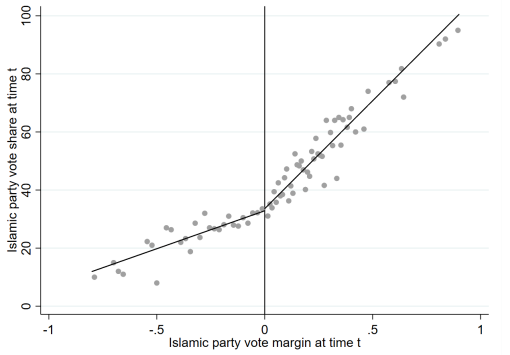
(d) Political Competition



(e) Literacy Rate



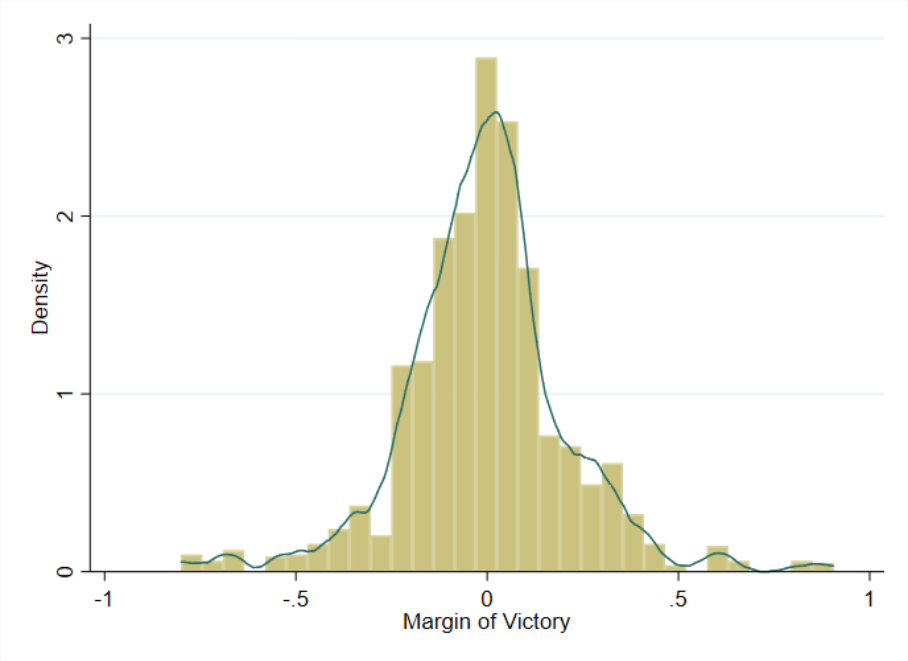
(f) Islamic Party Vote Share



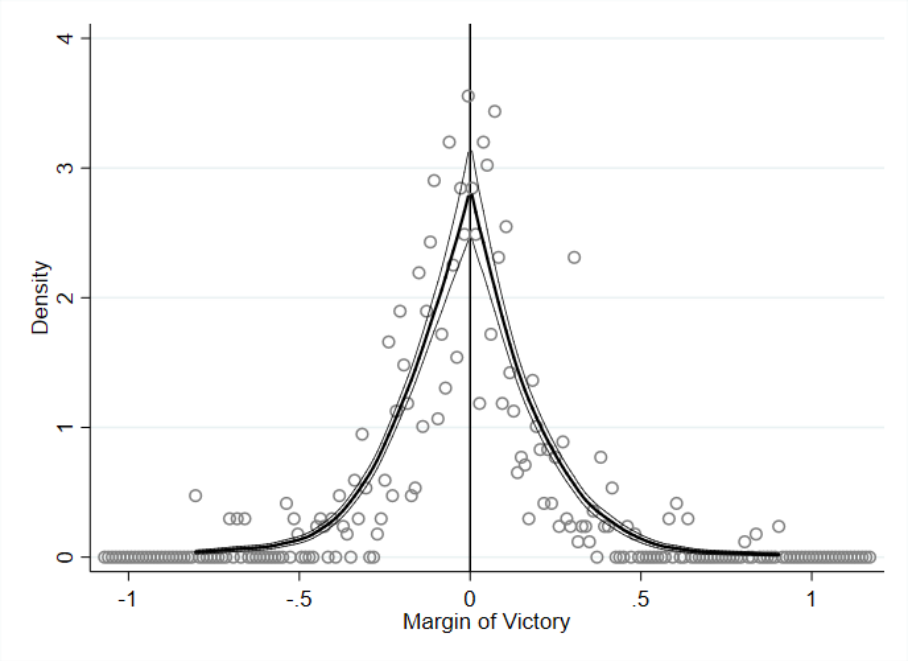
Notes: The figures show the relation between the pre-treatment covariates and the win margin of the islamic party candidate in the mayoral election. I use a data-driven approach to choose the bins. More specifically, I use even spaced bins that mimic the variance in the data. All figures are based on full bandwidth and a quartics control function. See Cattaneo et al. (2018) and Calonico et al. (2017) for further information.

Figure 4.A.4: Continuity of the Victory Margin between Islamic and Secular Party Candidates

(a) Density of the Victory Margin



(b) Testing for Density Discontinuities at Zero (McCrary Test)



Notes: The log difference in height is -1.4327 (P>|T| = 0.1519). See McCrary (2008) and Cattaneo et al. (2016) for further information about density continuity test.

4.B Appendices to Chapter 4: Tables

Table 4.B.1: Alternative RD Specifications: State Capacity

	Bandwidth					
	(1)	(2)	(3)	(4)	(5)	(6)
	1	0.5	0.25	1	0.5	0.25
Panel A	Log Total Expenditure pc			Total Expenditure/GDP		
Linear	-0.224***	-0.266***	-0.315**	-0.125***	-0.158***	-0.210**
	(0.079)	(0.088)	(0.112)	(0.056)	(0.064)	(0.081)
Quadratic	-0.300***	-0.357**	-0.394**	-0.187**	-0.236**	-0.286**
	(0.099)	(0.124)	(0.168)	(0.071)	(0.090)	(0.116)
Cubic	-0.351**	-0.359**	-0.468***	-0.233**	-0.282**	-0.310*
	(0.125)	(0.167)	(0.214)	(0.092)	(0.117)	(0.137)
N	1246	1246	1246	914	914	914
Effective N (Left of Cut-off)	664	631	556	510	485	420
Effective N (Right of Cut-off)	582	564	460	404	392	318
Panel B	Log Total Revenue pc			Total Revenue/GDP		
Linear	-0.218***	-0.256***	-0.322**	-0.078**	-0.112**	-0.182**
	(0.079)	(0.088)	(0.112)	(0.060)	(0.063)	(0.078)
Quadratic	-0.293***	-0.367**	-0.430	-0.145**	-0.211**	-0.251**
	(0.099)	(0.126)	(0.174)	(0.068)	(0.088)	(0.105)
Cubic	-0.346***	-0.390**	-0.379	-0.205**	-0.260**	-0.251*
	(0.127)	(0.172)	(0.233)	(0.088)	(0.113)	(0.128)
N	1251	1251	1251	1021	1021	1021
Effective N (Left of Cut-off)	666	633	555	566	537	472
Effective N (Right of Cut-off)	585	567	463	455	443	366
Panel C	Log Total Tax pc			Total Tax/GDP		
Linear	-0.129	-0.157*	-0.223*	-0.001	-0.006*	-0.022*
	(0.101)	(0.112)	(0.138)	(0.010)	(0.010)	(0.013)
Quadratic	-0.190*	-0.298	-0.322*	-0.012*	-0.029*	-0.034
	(0.126)	(0.156)	(0.194)	(0.010)	(0.015)	(0.018)
Cubic	-0.264*	-0.268	-0.453	-0.028**	-0.037*	-0.029
	(0.159)	(0.200)	(0.246)	(0.015)	(0.020)	(0.020)
N	1239	1239	1239	1023	1023	1023
Effective N (Left of Cut-off)	660	627	549	568	539	472
Effective N (Right of Cut-off)	579	561	459	455	443	366

* Notes: Each panel yields for different outcomes. Each cell represents an RD estiamtion results correspondence for the bandwidth type for each column. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.B.2: Alternative RD Specifications: Government Expenditures

	Bandwidth					
	(1)	(2)	(3)	(4)	(5)	(6)
	1	0.5	0.25	1	0.5	0.25
Panel A	Log Education Exp. pc			Education Share		
Linear	0-.149	-0.135	-0.099	0.017***	0.021***	0.029***
	(0.085)	(0.094)	(0.119)	(0.007)	(0.008)	(0.010)
Quadratic	-0.129	-0.115	-0.125	0.025***	0.034**	0.037**
	(0.107)	(0.134)	(0.190)	(0.009)	(0.011)	(0.014)
Cubic	-0.100	-0.070	-0.250*	0.035***	0.037**	0.039
	(0.135)	(0.186)	(0.244)	(0.011)	(0.014)	(0.018)
N	868	868	868	868	868	868
Effective N (Left of Cut-off)	475	451	391	475	451	391
Effective N (Right of Cut-off)	393	381	310	393	381	310
Panel B	Log Infrastructure Exp. pc			Infrastructure Share		
Linear	-0.271**	-0.312*	-0.299	-0.002	-0.003	-0.004
	(0.132)	(0.144)	(0.181)	(0.005)	(0.005)	(0.006)
Quadratic	-0.339*	-0.350	-0.367*	-0.005	-0.005	-0.007
	(0.159)	(0.201)	(0.276)	(0.006)	(0.007)	(0.010)
Cubic	-0.380	-0.312	-0.565*	-0.007	-0.008	-0.006
	(0.203)	(0.275)	(0.327)	(0.008)	(0.010)	(0.012)
N	866	866	866	866	866	866
Effective N (Left of Cut-off)	474	450	390	474	450	390
Effective N (Right of Cut-off)	392	380	309	392	380	309
Panel C	Log Health Exp. pc			Health Share		
Linear	-0.202*	-0.216	-0.208	0.002	0.002	0.003
	(0.104)	(0.116)	(0.146)	(0.002)	(0.002)	(0.003)
Quadratic	-0.238	-0.243	-0.314*	0.002	0.004	0.003
	(0.130)	(0.163)	(0.210)	(0.002)	(0.003)	(0.005)
Cubic	-0.227	-0.241	-0.448*	0.004	0.004	0.005
	(0.166)	(0.210)	(0.265)	(0.003)	(0.005)	(0.006)
N	867	867	867	867	867	867
Effective N (Left of Cut-off)	475	451	391	475	451	391
Effective N (Right of Cut-off)	392	380	309	392	380	309

* Notes: Each panel yields for different outcomes. Each cell represents an RD estiamtion results correspondence for the bandwidth type for each column. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.B.3: Excluding Mixed Coalition

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	Log Total Expenditure pc	Total Expenditure/GDP	Log Total Revenue pc	Total Revenue/GDP	Log Total Tax pc	Total Tax/GDP
Islamic Parties	-0.286*	-0.204*	-0.402***	-0.204*	-0.451**	-0.035***
	(0.168)	(0.104)	(0.118)	(0.104)	(0.211)	(0.012)
Bandwidth Size	0.123	0.193	0.167	0.193	0.201	0.353
N	773	588	776	588	769	671
Effective N (Left of Cut-off)	358	358	439	358	497	505
Effective N (Right of Cut-off)	82	72	95	72	103	104
Panel B	Log Education Exp. pc	Education Share	Log Infrastructure Exp. pc	Infrastructure Share	Log Health Exp. pc	Health Share
Islamic Parties	-0.189	0.042**	-0.221	0.003	-0.441	-0.006**
	(0.162)	(0.019)	(0.295)	(0.009)	(0.200)	(0.003)
Bandwidth Size	0.096	0.113	0.119	0.309	0.123	0.133
N	558	558	557	557	558	558
Effective N (Left of Cut-off)	198	221	220	397	248	266
Effective N (Right of Cut-off)	52	87	57	82	61	62
Polynomial	Linear	Linear	Linear	Linear	Linear	Linear
Bandwidth Type	MSE	MSE	MSE	MSE	MSE	MSE
Controls	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: The sample in this table is pure Islamic parties coaltion. The outcomes are at the year after the election year. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports bias-corrected RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on bias-corrected standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.B.4: Extension: Effects on Education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A	**Number of Primary Schools *t+1***				**Enrolment Ratio Primary Schools *t+1***			
Islamic Party, *t*	140.36*	133.33**	122.96**	111.43	0.108	-0.043	0.230	0.073
	(67.341)	(64.461)	(55.185)	(53.49)	(0.578)	(0.545)	(0.550)	(0.491)
Bandwidth Size	0.249	0.270	0.325	0.352	0.223	0.180	0.222	0.194
N	290	290	290	290	1260	1260	1260	1260
Effective N (Left of Cut-off)	124	132	132	145	530	639	530	660
Effective N (Right of Cut-off)	108	111	126	128	447	417	447	431
Panel B	**Number of Secondary Schools *t+1***				**Enrolment Ratio Secondary Schools *t+1***			
Islamic Party, *t*	33.787*	32.933	27.833	31.615*	-0.356	-0.59	-0.864	-0.502
	(20.093)	(18.932)	(16.136)	(17.455)	(1.913)	(1.837)	(1.790)	(1.615)
Bandwidth Size	0.289	0.273	0.506	0.290	0.213	0.163	0.210	0.161
N	289	289	289	289	1260	1260	1260	1260
Effective N (Left of Cut-off)	126	149	142	126	514	628	509	671
Effective N (Right of Cut-off)	116	114	137	116	442	395	442	395
Panel C	**Number of High Schools *t+1***				**Enrolment Ratio High Schools *t+1***			
Islamic Party, *t*	24.859	20.656	20.226	15.736	-0.778	-1.082	-1.589	-1.953
	(19.453)	(16.434)	(14.122)	(11.827)	(2.694)	(2.637)	(1.856)	(2.396)
Bandwidth Size	0.184	0.287	0.194	0.146	0.232	0.155	0.516	0.153
N	271	271	271	271	1260	1260	1260	1260
Effective N (Left of Cut-off)	93	88	98	103	536	639	641	561
Effective N (Right of Cut-off)	94	111	97	124	460	386	569	386
Polynomial	Linear	Linear	Linear	Linear	Linear	Linear	Linear	Linear
Bandwidth Type	MSE	MSE/2	MSE	MSE/2	MSE	MSE/2	MSE	MSE/2
Controls	No	No	Yes	Yes	No	No	Yes	Yes

* Notes: The dependent variable in panel A is the number of primary schools and net enrolment ratio of primary schools at time *t+1*. Panel B is the number of secondary schools and net enrolment ratio of secondary schools at time *t+1*. Panel C is the number of high schools and net enrolment ratio of high schools at time *t+1* Islamic party is the the dummy if the mayor is from Islamic party at time *t*. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.B.5: Covariates Approximate Permutation Test

	(1)	(2)	(3)
	RD Estimate	Robust Bias-Corrected *p-value*	Permutation Test *p-value*
Log Income per capita	0.055 (0.122)	0.903	0.331
Urban Rate	-6.250 (6.309)	0.645	0.064
Population Density	283.26 (367.45)	0.703	0.139
Political Competition	0.004 (0.009)	0.598	0.599
Islamic Party Vote Share	-0.772 (1.89)	0.520	0.053
Literacy Rate	-0.481 (1.50)	0.749	0.081
Polynomial	Linear		
Bandwidth Type	MSE		

* Notes: Column 1 denotes conventional RD estimates for the covariates. Column 2 shows the robust bias corrected p-value and column 3 presents the p-value from the permutation test as in Canay and Kamat (2017), with null hypothesis of continuity in the covariates distribution around the cut-off. Heteroscedasticity and cluster robust standard errors are in parentheses. The forcing variable is vote margin between Islamic party and secular party. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.B.6: Alternative RD Specifications: Economic Outcomes

	Bandwidth		
	(1)	(2)	(3)
	1	0.5	0.25
Panel A	Log GDP per Capita		
Linear	-0.008**	-0.010	-0.008
	(0.005)	(0.005)	(0.005)
Quadratic	-0.011	-0.008	0.0003
	(0.005)	(0.006)	(0.007)
Cubic	-0.008	-0.002	-0.0002
	(0.006)	(0.008)	(0.009)
N	1029	1029	1029
Effective N (Left of Cut-off)	572	543	476
Effective N (Right of Cut-off)	457	445	368
Panel B	Log GDP per Capita Growth		
Linear	0.0006	0.001	0.004
	(0.005)	(0.005)	(0.006)
Quadratic	0.001	0.005	0.009
	(0.006)	(0.007)	(0.008)
Cubic	0.005	0.006	0.010
	(0.008)	(0.009)	(0.011)
N	1029	1029	1029
Effective N (Left of Cut-off)	556	529	464
Effective N (Right of Cut-off)	473	460	371
Panel C	Unemployment Rate		
Linear	0.004	0.006	0.009
	(0.004)	(0.004)	(0.006)
Quadratic	0.007*	0.011	0.009
	(0.005)	(0.007)	(0.010)
Cubic	0.012	0.007	0.005
	(0.007)	(0.010)	(0.014)
N	1119	1119	1119
Effective N (Left of Cut-off)	586	558	490
Effective N (Right of Cut-off)	533	515	416

* Notes: Each panel yields for different outcomes. Each cell represents an RD estiamtion results correspondence for the bandwidth type for each column. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports conventional RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.B.7: Excluding Mixed Coalition: Economic Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	Log GDP pc		Log GDP pc Growth		Unemployment Rate	
Islamic Parties	-0.084	-0.004	0.001	0.003	0.001	0.001
	(0.189)	(0.009)	(0.006)	(0.006)	(0.012)	(0.014)
Bandwidth Size	0.148	1.353	0.182	0.567	0.163	0.131
N	677	676	645	645	675	675
Effective N (Left of Cut-off)	340	368	544	526	386	341
Effective N (Right of Cut-off)	86	91	101	95	76	68
Polynomial	Linear	Linear	Linear	Linear	Linear	Linear
Bandwidth Type	MSE	MSE	MSE	MSE	MSE	MSE
Controls	No	Yes	No	Yes	No	Yes

* Notes: The sample in this table is pure Islamic parties coaltion. The outcomes are at the year after the election year. Islamic party is the the dummy if the mayor is from Islamic party at time t. Results based on Indonesia's mayoral elections from 2005 to 2013. All columns are estimated with a triangular kernel as suggested by Imbens and Lemieux (2008). All estimations follow the procedures used by Calonico et al. (2017) and Cattaneo et al. (2018). The table reports bias corrected RD estimates. Heteroscedasticity and cluster-robust standard errors are in parentheses. Significance levels based on robust standard errors. The unit of clustering is the district of the mayor. The set of controls are population density, urban rate, Islamic party vote share, political competition, log income per capita and literacy rate.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 5

Conclusion

This thesis presents empirical evidence on a variety of topics in the political economy of development literature. The topics explored cover political accountability, the role of the media, decentralisation, local state capacity, and the role of religion. The analysis uses a wide variety of methodological tools. Within an Indonesian context, this thesis provides an alternative view of the long-standing problems in the political economy literature. While the extant literature has begun to address Indonesian politics and development, it remains understudied.

Chapter 2 examines the impact of political competition on local government performance. The results suggest that a one standard deviation increase in political competition has a positive impact on the real regional gross domestic product (RGDP) per capita and RGDP per capita growth by 1.9% and 0.81%, respectively. Higher political competition is also associated with pro-growth policy: it lowers own sourced revenues per capita by 10.1%. Finally, it shows that an increase in political competition by one standard deviation is associated with higher infrastructure expenditure per capita by 17%. To address the endogeneity concern due to the non-randomness of the political competition variable, as well as reverse causality, I employed an instrumental variable strategy using the lag of the average political competition in neighbouring districts within the same provinces and political competition from the 1955 general election. The results from the 2SLS estimation support the OLS estimation results.

The results presented in this chapter advocate the improvement of the current political system. The Indonesian government has been trying to improve the political system by introducing parliamentary thresholds and new regulations for new political parties.

Moreover, in 2019, the elections for the President and Members of the Parliament will be held at the same time. These new policies could potentially affect the dynamics of political competition within the country. The results from this study could potentially be employed in other developing countries that have begun to transition into democracies as well. For example, in the Middle East, in which many have started conducting direct elections, the results of this study could be used to advocate a more competitive political environment.

One limitation of this study is it does not investigate the dynamic between local executives, district parliaments and the impacts of district proliferation on political outcomes or political competition. The impacts of political competition on natural resource revenues and the allocation of grants generated from this sector could also improve this paper.

Chapter 3 contributes to our understanding of the role of ICT in political processes and policy-making. The results indicate that villages with better signal strength are more likely to have an infrastructure program. Furthermore, higher signal strength is considered to increase the likelihood that village heads will provide grants and training for villagers. Moreover, mobile phones increase civic engagement. Because mobile phone signal strength might be endogenous, I used lightning strike intensity as an instrumental variable. The results from the 2SLS estimation suggest that mobile phones have a causal impact on village heads' policies.

The results presented in this chapter contribute to our understanding of the role of mobile phone usage in policy-making. Previous studies have shown that mobile phones are influential, as they provide information to voters and policymakers. Due to increases in mobile phone usage, voters are becoming better informed about government policies, which further incentivizes the government to perform well. Thus, ICT infrastructure needs to be improved in Indonesia, especially in remote areas.

Other countries can also learn from this experience and adopt this policy. The media also plays an important role in politics, as it can provide information to the government, politicians and voters about what kinds of policies need to be prioritised. Even though this paper addresses the causal link between mobile phones and policy-making, it is still challenging to obtain information about how voters communicate with their leaders. It would be interesting to determine how different communication channels (e.g. telephone,

text, video call) affect leaders' policymaking.

Future studies could also investigate digital media and social media as alternative forms of ICT. Some governments have started to introduce mobile *apps* to increase citizens' engagement with the government, and vice versa. It is unclear whether the introduction of these platforms increases civic engagement and government performance, however. Extending the present research by introducing broader topics, such as the impact of social media on political polarisation, the causes and effects of fabricated information and the impact of political speech coverage on voters' preference, would be interesting avenues of exploration for future studies.

Chapter 4 presents an extensive investigation of Islamic parties, especially in regard to policy choice and economic performance. Districts in which Islamic parties barely won the election have lower total expenditure per capita and total expenditure relative to GDP by 28.6 % and 21.6%, respectively. Islamic mayors were also found to be associated with lower total revenue per capita and the share of GDP. Moreover, Islamic mayors generate less tax compared to secular mayors. In terms of spending by sector, Islamic mayors are associated with higher relative spending on education.

This chapter explores the two mechanisms underpinning these findings: First, it relates to the partisan dis-alignment between the central and district governments. District revenue is mainly generated through central government transfers. During the study period, secular parties dominated the central government. Thus, districts in which Islamic parties barely won their respective elections received fewer central government transfers. Second, the implementation of Islamic laws reduces district government revenues from certain sectors (e.g. entertainment tax and restaurant tax).

One of the limitations of this study is that the study period was relatively short. Obtaining data for mayoral elections after 2013 will benefit the paper greatly. Moreover, it is important to observe heterogeneous effects within Islamic parties itself. Differentiating Islamic parties by their level of conservatism will improve our understanding of each party's preferences. The study contributes to our understanding of the impact of Islamic government on policies. Previous studies have presented mixed results. This study reveals that Islamic parties also implement some policies that are beneficial for society. Other countries, especially the Middle East country can also learn from this experience on how Islamic parties will affect policy choice and government performance.

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